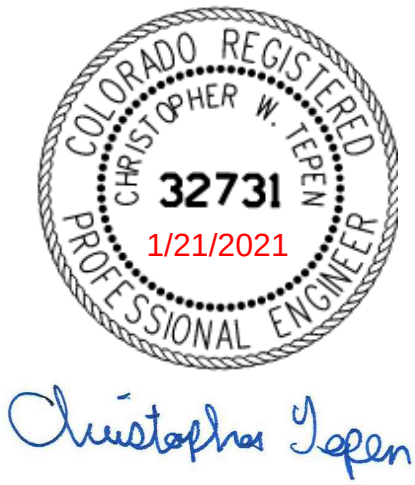
Bridge Department

Mesa Top Drive South Over Little North Beaver Creek Design Check Calculations



Bridge xxxx
Mesa Top Drive South over Little North Beaver Creek – Monument, CO

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Mesa Top Drive South over North Beaver Creek

Monument, Colorado

Design Check Calculations

Final Design
Abutment

Job	**Forest Lakes**	**Project No.**			
Description	**Abutment**	**Designed by:**	**cwt**	**Date**	**19-Jan-21**
		Checked by:		**Date**	

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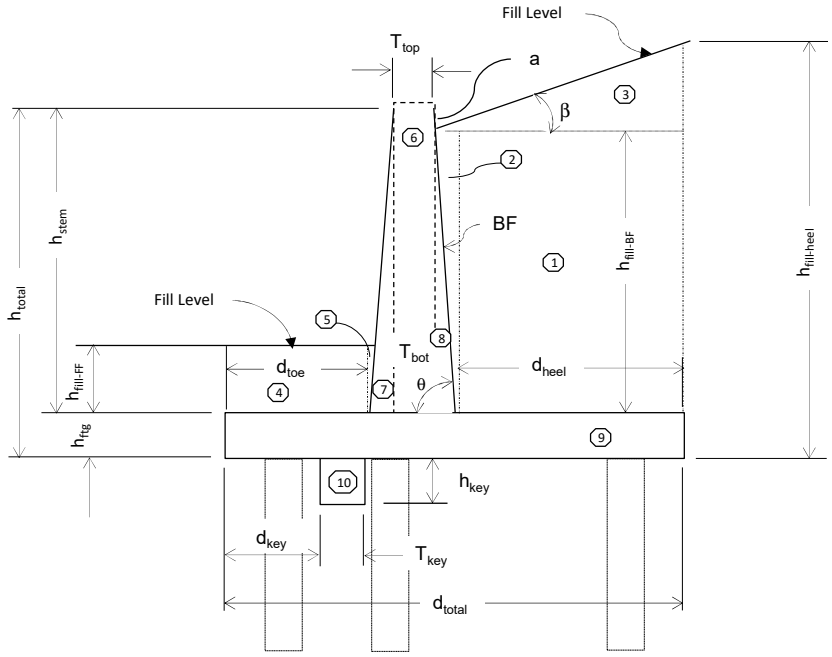
Retaining Wall on Spread Footing

Abutment



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Retaining Wall on Spread Footing

Abutment

Rankine

AASHTO 3.11.5.5

~ not current/recommended method used in AASHTO, but is required by some owners.
Rankine is the basis of equivalent fluid method described in Article 3.11.5.5.

$$\alpha = \tfrac{1}{2}\left(90 + \beta - \phi_a - \varepsilon\right)$$

$$\varepsilon = \sin^{-1}\left(\frac{\sin\beta}{\sin\phi_a}\right)$$

Rankine

See Table 3.11.5.5-1 for EFW Values

$$k_a = \frac{EFW_a}{\gamma_s}$$

$$P_v = P_h \tan(\beta)$$

$$P_h = \tfrac{1}{2} EFW_a H^2$$

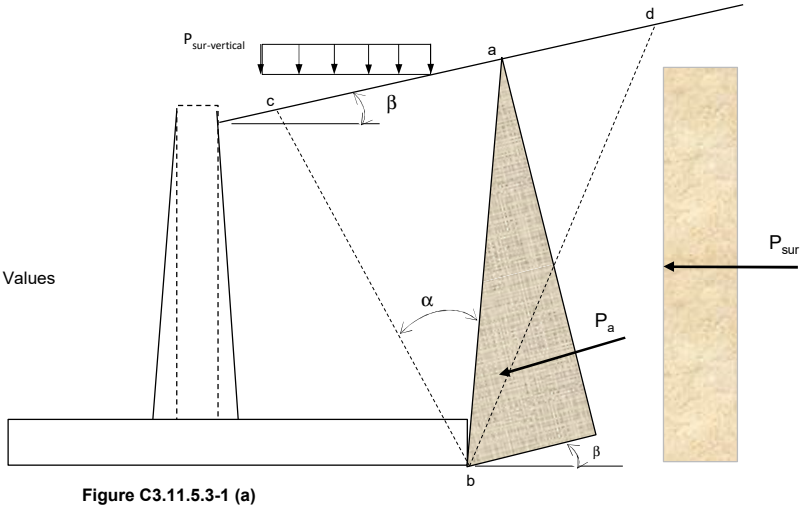

Figure C3.11.5.3-1 (a)

~ Shear zone bcd is uninterupted by stem or back of wall.
~ Pressure on back of vertical wall section, P_a is determined by Rankine Theory.

~ The values of equivanent fluid weight presented in Table 3.11.5.5-1 for D/H=240 represent the horizontal component of active earth pressure based on Rankine earth pressure theory. The horizontal pressure is applied to a vertical plane extending up from the hell of the wall base.

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Coulomb

AASHTO 3.11.5.3

~ Coulomb theory is necessary for design of retaining walls for which the back face of the wall interferes with the development of the full sliding surfaces in the backfill soil assumed in Rankine theory (Figure C3.11.5.3-1 and Article C3.11.5.8).

~ Either Coulomb or Rankine wedge theory may be used for long heeled cantilever walls shown in Figure C3.11.5.3-1a.

~ In general, Coulomb wedge theory applies for gravity, semigravity and prefabricated modular walls with relatively steep back faces, and concrete cantilever walls with short heels.

$$K_a = \frac{\sin^2(\theta+\phi_a)}{\Gamma\left[\sin^2\theta\sin(\theta-\delta)\right]}$$

$$\Gamma = \left[1+\sqrt{\frac{\sin(\phi_a+\delta)\sin(\phi_a-\beta)}{\sin(\theta-\delta)\sin(\theta+\beta)}}\right]^2$$

$$P_{ah} = \frac{1}{2}k_A\gamma\, h^2 Cos(\delta)$$

$$P_{av} = \frac{1}{2}k_A\gamma\, h^2 Sin(\delta)$$

$$\frac{\phi_a}{3} \le \delta \le \frac{2\phi_a}{3}$$

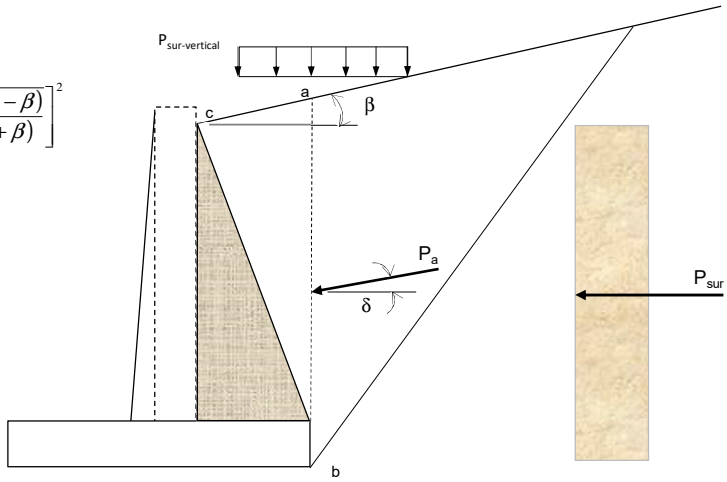

Figure C3.11.5.3-1 (b)

~ earth pressure P_a is applied to a plane extending vertically up from the heel of the wall base, and the weight of soil to the left of the vertical plane is considered as part of the wall weight.

~ wedge of soil abc slides along back of wall. The Triangular wedge of soil on top of footing and up face of backwall does not move.

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Retaining Wall on Spread Footing

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Assumptions:

Soil cohesion along failure plane is neglected.
Lateral pressure is to bottom of ftg for cantilever wall and to bottom of shear key for L shaped walls.

INPUT

Fill

$h_{fill\text{-}BF}$ =	12.50	ft (top ftg to top wall)
actual $h_{fill\text{-}FF}$ =	**2.00**	ft (from top ftg)
effective $h_{fill\text{-}FF}$ =	**1.00**	ft (to calc passive pressure, from top ftg)
Fill slope β @ BF(y/x)=	**0.00**	ft/ft (zero for horizontal fill)
Fill slope angle=	0.00	degrees
Ht of fill at heel $h_{fill\text{-}heel}$ =	12.50	ft (from top ftg)
Top wall to fill (a) =	**12.00**	in
Consider LL surcharge (LS) =	**y**	(y/n)
Consider LLsur-vertical =	**y**	(y/n)
Dist from BF to LS (z) =	**1.00**	ft
Ht of surcharge=	2.00	ft (Table 3.11.6.4- [1 or2])

Concrete

Unit wt of concrete γ_c=	**150**	pcf
f'_c =	**4.50**	ksi

Wall Dimensions

h_{total} =	15.50	ft (top stem to bot ftg)
h_{stem} =	**13.50**	ft (stem height)
T_{top} =	**38.00**	in (stem width at top *)
Stem $taper_{FF}$ =	**0.00**	in (taper of stem on front face *)
Top of stem to beginning of taper FF =	**0.00**	ft
Stem $taper_{BF}$ =	**0.00**	in (taper of stem on back face *)
Top of stem to beginning of taper BF =	**0.00**	ft
T_{bot} =	38.00	in (stem width at bottom *)
T_{FL} =	**0.00**	in (form liner thickness)

* does not include form liner thickness

d_{heel} =	**3.50**	ft (heel width)
d_{toe} =	**2.00**	ft (toe width to Tbot, est. 0.3*ftg width = 2.60')
d_{total} =	8.67	ft (footing width, est. .80*(stem ht) = 10.80')
h_{ftg} =	**24.00**	in (footing height), est. 0.1*ht stem = 16.20")
Strip length=	**7.47**	ft
Fill side Wall batter (y/x)=	**0.00**	
Wall batter θ angle BF =	90.00	degrees

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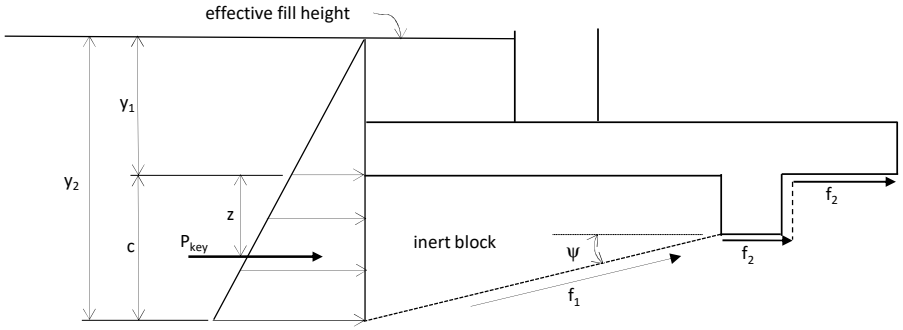
Shear Key Information

~ per CDOT Bridge Manual - Section 5.9



$$P_{key} = \phi_{ep}\frac{\gamma k_p y_1 + \gamma k_p y_2}{2}(y_2 - y_1)$$

$$F = f_1 + f_2$$

$$\psi = \tfrac{2}{3}\phi$$

$$z = \frac{0.5 k_p \gamma_s y_1 C^2 + .333 k_p \gamma_s C^3}{P_{key}}$$

h_{key} =	**0.00**	ft (key height)
d_{key} =	**0.00**	ft (toe to face of key)
T_{key} =	**0.00**	ft (key width)
ψ =	18.7	degrees

~ Failure plane will shift from bottom of footing to bottom of key when using a shear key.

~ Can use distance from heel to Centerline of key, d_{total} / 4 for H<=10', else use d_{total} / 3.

~ if footing is on soil, use reaction, if on rock, use bearing pressure to calculate R.

y_1 =	3.00	ft
C =	0.00	
y_2 =	3.00	ft
z =	0.000	ft
P_{key} =	0.00	k (unfactored)

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PILE PATTERN DATA

Sum moments below bottom of ftg? =	**no**	(for stability)
Ht below ftg to sum moments=	**0.00**	ft (6*Pile width 'B')
Pile batter h/v =	**0.00**	
Pile Width (B) =	**12.00**	in
Allowable Pile Tension ($T_{allowable}$) =	**3.00**	tons
Number of Pile Rows =	**2**	

Row (from toe)	Dist from Toe	# Pile in Row	d from CL ftg	# * d	D from C.G.	# * D^2	Section Modulus $\Sigma(\#*D^2) / D$	Battered (Y/N)
First	**1.25**	**1.00**	3.08	3.08	3.08	9.51	6.17	**n**
Second	**7.42**	**1.00**	-3.08	-3.08	-3.08	9.51	6.17	**n**
	Σ =	2		Σ = 0.00		Σ = 19.01		

Total # pile =	2.00	
C.G. Pile pattern =	0.00	ft (left of C.L. ftg)
C.G. Pile pattern =	4.33	ft (from toe)

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Geotechnical Data

~ C3.11.5.3 Silt and lean clan should not be used for backfill material. If they are, serious consideration should be given for the development of pore water pressure per Article 3.11.3. Appropriate drainage provisions should be provided to prevent hydrostatic and seepage forces from developing behind the wall in accordance with the provisions in Section 11. In no case should highly plastic clay be used for backfill.

~ Backfill Soil data

Unit wt of soil γ =	**125**	pcf
Soil Density =	**Medium**	used for Rankine EFW method
c = soil cohesion =	**0**	ksf
Internal friction, ϕ_a, of soil=	**28**	degrees
δ =	**0.00**	degrees (friction angle between fill and wall Table 3.11.5.3-1) (approx 2/3ϕ) (zero for level fill) (formed concrete)

~ Active Pressure

k_A or k_o =	0.361	**Coulomb**	*At Rest*	$k_o = 1 - \sin(\phi_a)$
Γ =	2.159			
EFW_a =	45.13	pcf		

per CDOT Bridge manual 5.9, if the Geotech Report does not give recommended design values for EFW, it is acceptable to use 30 psf for level fill and 40 psf for 2:1 sloped fill.

~ Passive Pressure

AASHTO 3.11.5.4	EFW_P =	**500**	Fig. 3.11.5.4-1, 3.11.5.4-2 (no resistance factor)
	ϕ_{ep} =	**0.50**	passive earth for key (Table 10.5.5.2.2-1)
	EFW_P =	250	Fig. 3.11.5.4-1, 3.11.5.4-2 (with resistance factor)

~ Pile Bearing Capacity 10.6.3

Resistance factors for extreme events shall be taken as 1.0, per 10.5.5.3.3

Foundation Type =	**H Pile**	soil or rock

Side Friction

Rock embedment L_f =	**15.00**	ft
Perimeter =	N/A	in
Nominal Friction Capacity, f_n =	**11.30**	ksf, (no resistance factor)
ϕ_f =	**0.60**	friction resistance factor
Factored Friction Capacity, f_r =	6.78	ksf, (w/ resistance factor)
Pile Friction Resistance $P_{f\text{-}r}$ =	0.0	kips / pile

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End Bearing

Area =	15.5	in^2
Nominal End Bearing Capacity, σ_n =	**4000.00**	ksf, (no resistance factor)
ϕ_{brg} =	**0.65**	bearing resistance factor
Factored End Bearing Capacity, σ_n =	2600.0	ksf, (resistance factor)
Pile End Bearing Resistance P_{brg-r} =	279.9	kips / pile
$P_{r-total}$ =	279.9	kips / pile (total pile factored resistance)

~ Sliding

Resistance factors for extreme events shall be taken as 1.0, per 10.5.5.3.3

Bearing Material =	**Sand**	
ϕ_f, for sliding=	**20.5**	degrees
CDOT or AASHTO =	**aashto**	(cdot tan(2/3ϕ), aashto tan(ϕ)
coefficient for sliding (sand) =	0.374	(no resistance factor)
coefficient for sliding (Clay) =	**500**	psf
ϕ_{T-cs} =	**0.80**	cip concrete on soil (Table 10.5.5.2.2-1)
coefficient of friction CS_{T-cs} =	0.299	*(sand)(w/ resistance factor)*
ϕ_{T-ss} =	**0.90**	soil on soil for key (Table 10.5.5.2.2-1)
coefficient of friction CS_{T-ss} =	0.336	*(sand)(w/ resistance factor)*

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Service Loadings

$P_{DL\text{-}app}$ =	**0.75**	k/ft (DL vertical)	$P_{DL\text{-}ss}$ =	**4.55**	k/ft (DL vertical)
Dist from BF to P_{app} =	**0.00**	ft	Dist from BF to $P_{DL\text{-}ss}$ =	**1.58**	ft
$P_{DL\text{-}bkwall}$ =	**0.75**	k/ft (DL vertical)	$P_{LL\text{-}ss}$ =	**3.70**	k/ft (LL vertical)
Dist from BF to P_{bkwall} =	**0.63**	ft	Dist from BF to $P_{LL\text{-}ss}$ =	**1.58**	ft
$P_{DL\text{-}fws}$ =	**3.04**	k/ft (DL vertical)	$P_{DL\text{-}misc}$ =	**0.00**	k/ft (DL vertical)
Dist from BF to $P_{DL\text{-}fws}$ =	**1.58**	ft	Dist from BF to $P_{DL\text{-}misc}$ =	**0.75**	ft
			~ due to Bridge Rail Type 8 Special with ped railing		

Collision Loading

*~ **Post & Rail** - Distribute collision load between multiple posts and down from top of wall to bottom of footing at 45 angle (can assume 3 post distribution max), if at end of wall assume edge distance plus 2 posts and then down at 45 from top of wall to bottom of footing.*

*~ **Concrete Barrier** - Distribute collision load at 5' plus down at 45 degrees or per AASHTO LFD 3.24.5.2, conservative to assume collision at end of wall. Distribution is from point of collision to bottom of footing.*

F_{coll} =	**0.00**	kips (Section 13, app A, per 13.6.2 loading is considered factored)
Rail type =	**SBC**	(sbc or post)
SBC Distribution width =	**10.00**	ft (10' max post spacing, assume 5' for sbc, Caltrans Stnds uses 10')
	2.00	ea
	1.50	ft
Locaton of collision =	**middle**	(end or middle of wall)
Type of distribution =	**45**	(AASHTO or 45)
$E_{effective}$ =		ft (reduced if collsion on end of wall)
d (top wall to F_{coll}) =	**2.67**	ft
Moment arm =	18.17	ft

** LRFD does not cover the provision of collision of a barrier on top of a retaining wall. Can use LFD 3.24.5.2 provisions.*

Wind Loading

3.8.1.2	$P_{wind\text{-}bf}$ =	**0.00**	k/ft (horizontal) (40 psf)
	h from top ftg to $P_{wind\text{-}bf}$ =	**14.92**	ft

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Retaining Wall on Spread Footing

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FORCE PER STRIP LENGTH (Unfactored)

~ (moments taken about Centerline of toe pile at a specified depth (6B) below the bottom of footing)

Vertical	Area (ft^2)	Force (k)	Arm (ft)	M_A	Load Type
1 (soil on heel)	43.75	40.85	5.67	231.49	EV
2 (soil on heel - stem taper)	0.00	0.00	0.00	0.00	EV
3 (soil fill slope)	0.00	0.00	6.25	0.00	EV
4_{act} (soil on toe)	4.00	3.74	-0.25	-0.93	EV
4_{eff} (soil on toe)	2.00	1.87	-0.25	-0.47	EV
5_{act} (soil on toe - stem taper)	0.00	0.00	0.75	0.00	EV
5_{eff} (soil on toe - stem taper)	0.00	0.00	0.75	0.00	EV
6 (stem)	42.75	47.90	2.33	111.77	DC
7 (stem taper FF)	0.00	0.00	0.75	0.00	DC
8 (stem taper BF)	0.00	0.00	3.92	0.00	DC
9 (footing)	17.33	19.42	3.08	59.88	DC
10 (key)	0.00	0.00	-1.25	0.00	DC
P_{DL-FL}	0.00	0.00	0.75	0.00	DC
P_{DL-app}		5.60	3.92	21.94	DC
$P_{DL-bkwall}$		5.60	3.29	18.44	DC
P_{DL-ss}		33.99	2.34	79.42	DC
$P_{DL-misc}$		0.00	3.17	0.00	DC
P_{DL-fws}		22.69	2.34	53.02	DW
P_{LL-ss}		27.64	2.34	64.58	LL
$P_{sur-vertical}$		4.67	6.17	28.79	LS
P_{av}	h = 14.50 ft	0.00	7.42	0.00	EH
Horizontal					
F_{coll}		0.00	0.00	0.00	CT
P_{ah}	h = 14.50 ft	35.44	4.83	171.29	EH
P_{sur}		9.78	7.25	70.88	LS
$P_{wind-bf}$		0.00	16.92	0.00	WS
P_{ph}	h = 3.00 ft	0.00	1.00	0.00	EH
P_{key}		0.00	0.00	0.00	EH

$$P_{sur} = h_{sur} k_A \gamma h$$

$$P_{sur-vertical} = \gamma_s h_{sur} (d_{heel} - z)$$

$$M_{coll} = F_{coll} * Arm / E$$

h_a = 14.50 ft

h_p = 3.00 ft

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Summation of Loads per strip length (Unfactored)

Vertical Loads (k-ft)			
Load	V	M	
DC	112.52	291.46	$P_{DL-(6-10)}$, P_{DL-FL}, P_{DL-app}, $P_{DL-bkwall}$, P_{DL-ss}, $P_{DL-misc}$
DW	22.69	53.02	P_{DL-fws}
EH	0.00	0.00	P_{av}
LL	27.64	64.58	P_{LL-ss}
$LS_{vertical}$	4.67	28.79	$P_{sur-vertical}$
EV_{actual}	44.59	230.56	$P_{DL-(1-5)}$
$EV_{effective}$	42.72	231.03	$P_{DL-(1-5)}$
	ΣV =	210.23	
	ΣM =	668.88	

Horizontal Loads (k-ft)			
Load	H	M	
EH_{ah}	35.44	171.29	P_{ah}
EH_{ph}	0.00	0.00	P_{ph}
EH_{ph-key}	0.00	0.00	P_{key}
LS	9.78	70.88	P_{sur}
WS	0.00	0.00	$P_{wind-bf}$
CT	0.00	0.00	F_{coll}
	ΣV =	45.22	
	ΣM =	242.17	

Consider P_{av} =	**y**	(y / n) (makes EH_{vert} = 0)
Consider P_{ph} =	**n**	(y / n) (makes EH_{ph} = 0)

Load Modifiers

AASHTO (1.3.3 - 1.3.5)

η_D =	**1.00**
η_R =	**1.00**
η_I =	**1.00**
η_{total} =	1.00

V_u or $M_u = \eta_{total} \Sigma (\gamma * Load)$

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BEARING CAPACITY

Bearing resistance shall be investigated at the strength limit state using factored loads and resistances.

Load Factors - γ

(Table 3.4.1-2)

	Strength 1	Strength 2	Strength 3	Strength 4	Strength 5	Extreme 2	Service 1	
DC =	**1.25**	**1.25**	**1.25**	**1.50**	**1.25**	**1.25**	**1.00**	(dead load of st
DW =	**1.50**	**1.50**	**1.50**	**1.50**	**1.50**	**1.00**	**1.00**	(dead load wea
EH_a =	**1.50**	**1.50**	**1.50**	**1.50**	**1.50**	**0.00**	**1.00**	(horizontal activ
EH_p =	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	(horizontal pass
EV =	**1.35**	**1.35**	**1.35**	**1.35**	**1.35**	**1.35**	**1.00**	(vertical pressu
LL =	**1.75**	**1.35**	**0.00**	**0.00**	**1.35**	**0.00**	**1.00**	(live load)
LS =	**1.75**	**1.35**	**0.00**	**0.00**	**1.35**	**0.00**	**1.00**	(earth Live Loa
$LS_{vertical}$ =	**1.75**	**1.35**	**0.00**	**0.00**	**0.00**	**1.00**	**1.00**	(earth vertical L
WS =	**0.00**	**0.00**	**1.40**	**0.00**	**0.40**	**0.00**	**0.30**	(wind load on b
CT =	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**1.00**	**0.00**	(collision load)

~ maximize overturning moment and maximize resisting vertical load to get the Resultant location.

~ Per AASHTO Figure C11.5.6-3 Apply LS vertical for bearing calculations

Consider active pressure in Collision Case E2 =	**n**	(y / n) (makes P_a = 0)
Consider LS in Collision Case E2 =	**n**	(y / n) (makes LS = 0)
Consider LL in Collision Case E2 =	**n**	(y / n) (makes LL = 0)
Consider passive resistance =	**n**	(y / n) (makes P_p and P_{key} = 0)(see note below)

~ in the extreme exent case, it can be assumed that the earth pressure is not activated due to the force of the collision deflecting the wall away from the soil mass at the instant of collision.

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Factored Loads per strip Length (Bearing)

k, k-ft	Strength 1		Strength 2		Strength 3	
	F	M	F	M	F	M
Vertical						
1 (soil on heel)	55.1	312.5	55.1	312.5	55.1	312.5
2 (soil on heel - stem taper)	0.0	0.0	0.0	0.0	0.0	0.0
3 (soil fill slope)	0.0	0.0	0.0	0.0	0.0	0.0
4_{act} (soil on toe)	5.0	-1.3	5.0	-1.3	5.0	-1.3
4_{eff} (soil on toe)	0.0	0.0	0.0	0.0	0.0	0.0
5_{act} (soil on toe - stem taper)	0.0	0.0	0.0	0.0	0.0	0.0
5_{eff} (soil on toe - stem taper)	0.0	0.0	0.0	0.0	0.0	0.0
6 (stem)	59.9	139.7	59.9	139.7	59.9	139.7
7 (stem taper FF)	0.0	0.0	0.0	0.0	0.0	0.0
8 (stem taper BF)	0.0	0.0	0.0	0.0	0.0	0.0
9 (footing)	24.3	74.9	24.3	74.9	24.3	74.9
10 (key)	0.0	0.0	0.0	0.0	0.0	0.0
P_{DL-FL}	0.0	0.0	0.0	0.0	0.0	0.0
P_{DL-app}	7.0	27.4	7.0	27.4	7.0	27.4
$P_{DL-bkwall}$	7.0	23.1	7.0	23.1	7.0	23.1
P_{DL-ss}	42.5	99.3	42.5	99.3	42.5	99.3
$P_{DL-misc}$	0.0	0.0	0.0	0.0	0.0	0.0
P_{DL-fws}	34.0	79.5	34.0	79.5	34.0	79.5
P_{LL-ss}	48.4	113.0	37.3	87.2	0.0	0.0
$P_{sur-vertical}$	8.2	50.4	6.3	38.9	0.0	0.0
P_{av}	0.0	0.0	0.0	0.0	0.0	0.0
Horizontal						
F_{coll}	0.0	0.0	0.0	0.0	0.0	0.0
P_{ah}	53.2	256.9	53.2	256.9	53.2	256.9
P_{sur}	17.1	124.0	13.2	95.7	0.0	0.0
$P_{wind-bf}$	0.0	0.0	0.0	0.0	0.0	0.0
P_{ph}	0.0	0.0	0.0	0.0	0.0	0.0
P_{key}	0.0	0.0	0.0	0.0	0.0	0.0

Job	Forest Lakes	Project No.	
Description	Abutment	Designed by: cwt	Date 19-Jan-21
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AASHTO

Retaining Wall on Spread Footing

Abutment

Factored Loads (Bearing)

k, k-ft	Strength 4		Strength 5		Extreme 2	
	F	M	F	M	F	M
Vertical						
1 (soil on heel)	55.1	312.5	55.1	312.5	55.1	312.5
2 (soil on heel - stem taper)	0.0	0.0	0.0	0.0	0.0	0.0
3 (soil fill slope)	0.0	0.0	0.0	0.0	0.0	0.0
4_{act} (soil on toe)	5.0	-1.3	5.0	-1.3	5.0	-1.3
4_{eff} (soil on toe)	0.0	0.0	0.0	0.0	0.0	0.0
5_{act} (soil on toe - stem taper)	0.0	0.0	0.0	0.0	0.0	0.0
5_{eff} (soil on toe - stem taper)	0.0	0.0	0.0	0.0	0.0	0.0
6 (stem)	71.9	167.7	59.9	139.7	59.9	139.7
7 (stem taper FF)	0.0	0.0	0.0	0.0	0.0	0.0
8 (stem taper BF)	0.0	0.0	0.0	0.0	0.0	0.0
9 (footing)	29.1	89.8	24.3	74.9	24.3	74.9
10 (key)	0.0	0.0	0.0	0.0	0.0	0.0
P_{DL-FL}	0.0	0.0	0.0	0.0	0.0	0.0
P_{DL-app}	8.4	32.9	7.0	27.4	7.0	27.4
$P_{DL-bkwall}$	8.4	27.7	7.0	23.1	7.0	23.1
P_{DL-ss}	51.0	119.1	42.5	99.3	42.5	99.3
$P_{DL-misc}$	0.0	0.0	0.0	0.0	0.0	0.0
P_{DL-fws}	34.0	79.5	34.0	79.5	22.7	53.0
P_{LL-ss}	0.0	0.0	37.3	87.2	0.0	0.0
$P_{sur-vertical}$	0.0	0.0	0.0	0.0	4.7	28.8
P_{av}	0.0	0.0	0.0	0.0	0.0	0.0
Horizontal						
F_{coll}	0.0	0.0	0.0	0.0	0.0	0.0
P_{ah}	53.2	256.9	53.2	256.9	0.0	0.0
P_{sur}	0.0	0.0	13.2	95.7	0.0	0.0
$P_{wind-bf}$	0.0	0.0	0.0	0.0	0.0	0.0
P_{ph}	0.0	0.0	0.0	0.0	0.0	0.0
P_{key}	0.0	0.0	0.0	0.0	0.0	0.0

B = 8.67 ft

$$V_{pile} = \frac{\sum V}{N} + \frac{M_{NA}}{S}$$

~ Moment about the toe pile (ΣM)must be translated to get the moment about the neutral axis (M_{NA}) of the pile group.

~ eccentricity ($e_{toe\text{-}pile} = \Sigma M / \Sigma V$) is measured from the centroid of the toe piles, not from the centerline of the footing.

~ if e is to the left of cg, then piles to left have > load (+) and piles to right have < load (-)

~ if e is to the right of cg, then piles to right have > load (+) and piles to left have < load (-)

~ Moment arm is the distance from e to cg of pile group ($e_{toe\text{-}pile}$ - cg pile group)

Job	Forest Lakes	Project No.		
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AASHTO

Retaining Wall on Spread Footing

Abutment

Bearing material is H Pile.

Factored Load Summary per Strip Length (Bearing)

Group	Case S1	Case S2	Case S3	Case S4	Case S5	Case E2	Service 1
Σ V (kips)	291.41	278.49	234.87	263.00	272.19	228.20	207.43
Σ M (k-ft)	537.54	528.54	498.17	571.04	489.67	N/A	397.45
$e_{toe\text{-}pile}$ (ft) (from toe Pile)	1.84	1.90	2.12	2.17	1.80	N/A	1.92
cg pile group (from toe pile)	3.08	3.08	3.08	3.08	3.08	3.08	3.08
Moment Arm (x) ft	-1.24	-1.19	-0.96	-0.91	-1.28	-3.08	-1.17
$M_{NA} = \Sigma V * X$ (k-ft)	-360.98	-330.13	-226.02	-239.89	-349.57	-703.61	-242.13

$P_{r\text{-}total}$ = 279.9 kips / pile (total pile factored resistance)

Case S1

Row (from toe)	Section Modulus ft	Σ V / # Pile k / pile	Σ M / S k / pile	Pile Load k / pile	
First	6.17	145.71	58.54	204.24	**OK**
Second	6.17	145.71	-58.54	87.17	**OK**

Case S2

Row (from toe)	Section Modulus ft	Σ V / # Pile k / pile	Σ M / S k / pile	Pile Load k / pile	
First	6.17	139.24	53.53	192.78	**OK**
Second	6.17	139.24	-53.53	85.71	**OK**

Case S3

Row (from toe)	Section Modulus ft	Σ V / # Pile k / pile	Σ M / S k / pile	Pile Load k / pile	
First	6.17	117.44	36.65	154.09	**OK**
Second	6.17	117.44	-36.65	80.78	**OK**

Job	**Forest Lakes**		**Project No.**		
Description	**Abutment**		**Designed by:** cwt	**Date**	19-Jan-21
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AASHTO

Retaining Wall on Spread Footing

Abutment

Case S4

Row (from toe)	Section Modulus ft	Σ V / # Pile k / pile	Σ M / S k / pile	Pile Load k / pile	
First	6.17	131.50	38.90	170.40	**OK**
Second	6.17	131.50	-38.90	92.60	**OK**

Case S5

Row (from toe)	Section Modulus ft	Σ V / # Pile k / pile	Σ M / S k / pile	Pile Load k / pile	
First	6.17	136.09	56.69	192.78	**OK**
Second	6.17	136.09	-56.69	79.41	**OK**

Case E2

Row (from toe)	Section Modulus ft	Σ V / # Pile k / pile	Σ M / S k / pile	Pile Load k / pile	
First	6.17	114.10	114.10	228.20	**OK**
Second	6.17	114.10	-114.10	0.00	**OK**

Case Service

Row (from toe)	Section Modulus ft	Σ V / # Pile k / pile	Σ M / S k / pile	Pile Load k / pile
First	6.17	103.72	39.26	142.98
Second	6.17	103.72	-39.26	64.45

Job	**Forest Lakes**	**Project No.**			
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AASHTO

Retaining Wall on Spread Footing

Abutment

SLIDING

AASHTO (11.6.3.6, 10.6.3.4)

Load Factors - γ

(Table 3.4.1-2)

	Strength 1	Strength 2	Strength 3	Strength 4	Strength 5	Extreme 2	
DC =	**0.90**	**0.90**	**0.90**	**0.90**	**0.90**	**0.90**	(dead load of structural components
DW =	**0.65**	**0.65**	**0.65**	**0.65**	**0.65**	**0.65**	(dead load wearing surfaces and ut
EH_a =	**1.50**	**1.50**	**1.50**	**1.50**	**1.50**	**0.00**	(horizontal active earth pressure loa
EH_p =	**1.50**	**1.50**	**1.50**	**1.50**	**1.50**	**1.50**	(horizontal passive earth pressure l
EV =	**1.00**	**1.00**	**1.00**	**1.00**	**1.00**	**1.00**	(vertical pressure from dead load of
LL =	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	(live load)
LS =	**1.75**	**1.35**	**0.00**	**0.00**	**1.35**	**0.00**	(earth Live Load surcharge)
$LS_{vertical}$ =	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	(earth vertical Live Load surcharge)
WS =	**0.00**	**0.00**	**1.40**	**0.00**	**0.40**	**0.00**	(wind load on back face)
CT =	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**1.00**	(collision load)

~ maximize overturning moment and minimize resisting vertical load to get the worse case Resultant location.

~ Per AASHTO Figure C11.5.6-3 Do not apply LS vertical for sliding calculations

Consider active pressure in Collision Case E2 =	**n**	(y / n) (makes P_a = 0)
Consider LS in Collision Case E2 =	**n**	(y / n) (makes LS = 0)
Consider LL in Collision Case E2 =	**n**	(y / n) (makes LL = 0)
Consider passive resistance in determining eccentricity =	**y**	(y / n) (makes P_p and P_{key} = 0)

Job	Forest Lakes	Project No.			
Description	Abutment	Designed by: cwt		Date	19-Jan-21
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AASHTO

Retaining Wall on Spread Footing

Abutment

Factored Loads (Sliding)

k, k-ft	Strength 1		Strength 2		Strength 3	
	F	M	F	M	F	M
Vertical						
1 (soil on heel)	40.85	231.49	40.85	231.49	40.85	231.49
2 (soil on heel - stem taper)	0.00	0.00	0.00	0.00	0.00	0.00
3 (soil fill slope)	0.00	0.00	0.00	0.00	0.00	0.00
4_{act} (soil on toe)	0.00	0.00	0.00	0.00	0.00	0.00
4_{eff} (soil on toe)	1.87	-0.47	1.87	-0.47	1.87	-0.47
5_{act} (soil on toe - stem taper)	0.00	0.00	0.00	0.00	0.00	0.00
5_{eff} (soil on toe - stem taper)	0.00	0.00	0.00	0.00	0.00	0.00
6 (stem)	43.11	100.59	43.11	100.59	43.11	100.59
7 (stem taper FF)	0.00	0.00	0.00	0.00	0.00	0.00
8 (stem taper BF)	0.00	0.00	0.00	0.00	0.00	0.00
9 (footing)	17.48	53.90	17.48	53.90	17.48	53.90
10 (key)	0.00	0.00	0.00	0.00	0.00	0.00
P_{DL-FL}	0.00	0.00	0.00	0.00	0.00	0.00
P_{DL-app}	5.04	19.75	5.04	19.75	5.04	19.75
$P_{DL-bkwall}$	5.04	16.60	5.04	16.60	5.04	16.60
P_{DL-ss}	30.59	71.48	30.59	71.48	30.59	71.48
$P_{DL-misc}$	0.00	0.00	0.00	0.00	0.00	0.00
P_{DL-fws}	14.75	34.46	14.75	34.46	14.75	34.46
P_{LL-ss}	0.00	0.00	0.00	0.00	0.00	0.00
$P_{sur-vertical}$	0.00	0.00	0.00	0.00	0.00	0.00
P_{av}	0.00	0.00	0.00	0.00	0.00	0.00
Horizontal						
F_{coll}	0.00	0.00	0.00	0.00	0.00	0.00
P_{ah}	53.16	256.93	53.16	256.93	53.16	256.93
P_{sur}	17.11	124.04	13.20	95.69	0.00	0.00
$P_{wind-bf}$	0.00	0.00	0.00	0.00	0.00	0.00
P_{ph}	0.00	0.00	0.00	0.00	0.00	0.00
P_{key}	0.00	0.00	0.00	0.00	0.00	0.00

Job	Forest Lakes	Project No.			
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AASHTO

Retaining Wall on Spread Footing

Abutment

Factored Loads (Sliding)

k, k-ft	Strength 4		Strength 5		Extreme 2	
	F	M	F	M	F	M
Vertical						
1 (soil on heel)	40.85	231.49	40.85	231.49	40.85	231.49
2 (soil on heel - stem taper)	0.00	0.00	0.00	0.00	0.00	0.00
3 (soil fill slope)	0.00	0.00	0.00	0.00	0.00	0.00
4_{act} (soil on toe)	0.00	0.00	0.00	0.00	0.00	0.00
4_{eff} (soil on toe)	1.87	-0.47	1.87	-0.47	1.87	-0.47
5_{act} (soil on toe - stem taper)	0.00	0.00	0.00	0.00	0.00	0.00
5_{eff} (soil on toe - stem taper)	0.00	0.00	0.00	0.00	0.00	0.00
6 (stem)	43.11	100.59	43.11	100.59	43.11	100.59
7 (stem taper FF)	0.00	0.00	0.00	0.00	0.00	0.00
8 (stem taper BF)	0.00	0.00	0.00	0.00	0.00	0.00
9 (footing)	17.48	53.90	17.48	53.90	17.48	53.90
10 (key)	0.00	0.00	0.00	0.00	0.00	0.00
P_{DL-FL}	0.00	0.00	0.00	0.00	0.00	0.00
P_{DL-app}	5.04	19.75	5.04	19.75	5.04	19.75
$P_{DL-bkwall}$	5.04	16.60	5.04	16.60	5.04	16.60
P_{DL-ss}	30.59	71.48	30.59	71.48	30.59	71.48
$P_{DL-misc}$	0.00	0.00	0.00	0.00	0.00	0.00
P_{DL-fws}	14.75	34.46	14.75	34.46	14.75	34.46
P_{LL-ss}	0.00	0.00	0.00	0.00	0.00	0.00
$P_{sur-vertical}$	0.00	0.00	0.00	0.00	0.00	0.00
P_{av}	0.00	0.00	0.00	0.00	0.00	0.00
Horizontal						
F_{coll}	0.00	0.00	0.00	0.00	0.00	0.00
P_{ah}	53.16	256.93	53.16	256.93	0.00	0.00
P_{sur}	0.00	0.00	13.20	95.69	0.00	0.00
$P_{wind-bf}$	0.00	0.00	0.00	0.00	0.00	0.00
P_{ph}	0.00	0.00	0.00	0.00	0.00	0.00
P_{key}	0.00	0.00	0.00	0.00	0.00	0.00

Job	**Forest Lakes**	**Project No.**			
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AASHTO

Retaining Wall on Spread Footing

Abutment

~ in the extreme exent case, it is assumed that the earth pressure is not activated due to the force of the collision deflecting the wall away from the soil mass at the instant of collision.

~ The resistance factor for the extreme event = 1.0.

Pile resistance can be determined by either allowable values stipulated by the owner or through a L-Pile run. If using a L-Pile run, determine the lateral load from an allowable deflection at top of pile (typically values are between 1/2" and 1').

Pile Resistance =	**36.00**	kips / pile
# pile =	**2.00**	
Total Pile resistance =	72.00	kips / strip

Group	Case S1	Case S2	Case S3	Case S4	Case S5	Case E1
Σ H (kips/strip)	70.27	66.36	53.16	53.16	66.36	0.00
Σ V (kips/strip)	158.73	158.73	158.73	158.73	158.73	N/A
Row 1 Batter Resistance	0.00	0.00	0.00	0.00	0.00	0.00
Row 2 Batter Resistance	0.00	0.00	0.00	0.00	0.00	0.00
Row 3 Batter Resistance	0.00	0.00	0.00	0.00	0.00	0.00
Row 4 Batter Resistance	0.00	0.00	0.00	0.00	0.00	0.00
Row 5 Batter Resistance	0.00	0.00	0.00	0.00	0.00	0.00
Σ Pile Resistance (kips)	72.00	72.00	72.00	72.00	72.00	72.00
	OK	**OK**	**OK**	**OK**	**OK**	**OK**

Job	Forest Lakes	**Project No.**			
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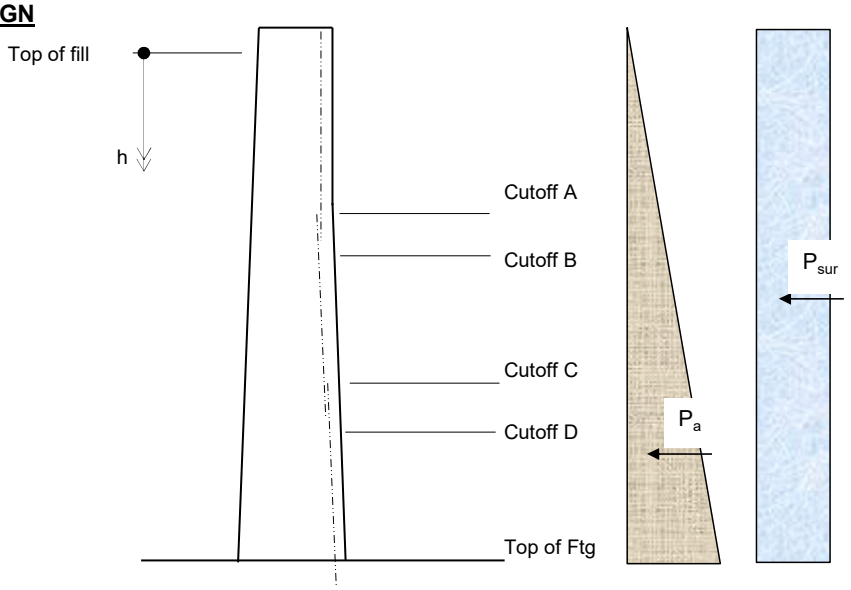
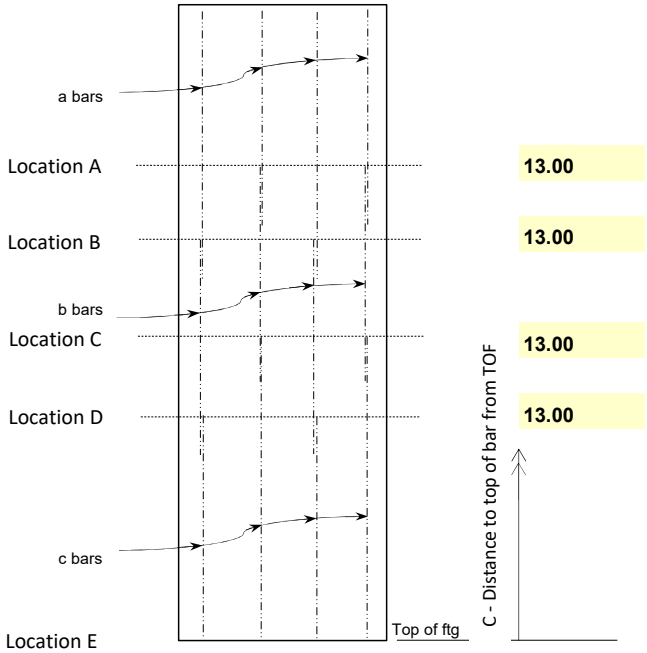
REINFORCEMENT DESIGN

Abutment

STEM DESIGN



Section



Elevation

Job	Forest Lakes	**Project No.**			
Description	Abutment	**Designed by:** cwt	**Date**	19-Jan-21	
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REINFORCEMENT DESIGN

Abutment

a bars

USE # 0 **spa at** 0 **inches** A_s = **0.000** in^2 / ft

a bars req'd = 0.000 in^2 / ft (at location A) **OK**

b bars

USE # 0 **spa at** 0 **inches** A_s = **0.000** in^2 / ft

a + b alternating bars req'd = 0.000 in^2 / ft (at location B) **OK**

b bars req'd = 0.000 in^2 / ft (at location C) **OK**

c bars

USE # 5 **spa at** 9 **inches** A_s = **0.409** in^2 / ft

b + c alternating bars req'd = 0.000 in^2 / ft (at location D) **OK**

c bars req'd = 0.215 in^2 / ft (at location E) **OK**

Stem Shear = **OK**

Load Factors

(Table 3.4.1-2)	Strength 1	Strength 2	Strength 3	Strength 4	Strength 5	Extreme 2	Service 1
EH =	**1.50**	**1.50**	**1.50**	**1.50**	**1.50**	**0.00**	**1.00**
LS =	**1.75**	**1.35**	**0.00**	**0.00**	**1.35**	**0.00**	**1.00**
WS =	**0.00**	**0.00**	**1.40**	**0.00**	**0.40**	**0.00**	**0.30**
CT =	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**1.00**	**0.50**

~ Collision service load factor assumes a factor of safety of 2 to get the 0.5 multiplier.

Location of active pressure = **heel** (stem or heel)

~ Critical sections for bending are at the front and back faces of wall.

f'_c = **4500** psi

F_y = **60000** psi

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REINFORCEMENT DESIGN

Abutment

Location E - Top of Footing

Loads

C = 0.00 ft (from top of ftg to location)

h = 12.50 ft (from top of fill to location)

~ Unfactored Loads

	Force	Arm	Moment
P_{ah}	3.53	4.17	14.69
P_{sur}	1.13	6.25	7.05
$P_{wind-bf}$	0.00	14.92	0.00
F_{coll}	0.00	0.00	0.00

~ Factored Load Summary

Group	ΣH_u	ΣM_u
Case S1	7.26	34.38
Case S2	6.81	31.56
Case S3	5.29	22.04
Case S4	5.29	22.04
Case S5	6.81	31.56
Case E2	0.00	0.00
ΣM_{serv-S}		21.74
ΣM_{serv-E}		0.00

~ with c bars only

A_s = 0.409 in^2 / ft

#5 @ 9"

Reinforcement

h =	38.00	in	f'_c =	4500	psi
b =	12.00	in	F_y =	60000	psi
Shear bar size =	**0**		$n=E_s/E_c$=	8	
Clear =	**2.00**	in			
d =	35.69	in			

M_u = **34.38** k - ft / ft (factored moment)

M_s = **21.74** k - ft / ft (service moment)

Job	Forest Lakes	**Project No.**			
Description	Abutment	**Designed by:** cwt	**Date**	19-Jan-21	
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REINFORCEMENT DESIGN

Abutment

~ Required Reinforcement

M_n = M_u / 0.90
R_n = M_n / (bd^2)
m = F_y / (0.85f'_c)
p = 1 / m [1 - (1 - 2mR_n / F_y)$^{0.5}$]
A_s = pbd

M_n =	38.195	k-ft
R_n =	29.99	psi
m =	15.69	
p =	0.0005	
A_s (req'd) =	0.215	in^2 / ft

~ Determine Section Capacity

(5.7.3.2) $\Phi M_n >= M_u$

d =	35.69	in	f'_c =	4500	psi
h =	38.00	in	F_y =	60000	psi
b =	12.00	in	n =	8	
B_1 =	0.825	(5.7.2.2)	Φ =	**0.9**	(5.5.4.2)
a =	0.648	in			
ΦM_n =	65.10	k-ft			
M_u =	34.38	ft - k			
	OK				

$$a = \frac{A_s f_y}{.85 \beta_1 f'_c b}$$

$$\phi M_n = \phi A_s f_y \left(d - a/2\right)$$

~ Limits of Reinforcment

(5.7.3.3)

~ Minimum

(5.7.3.3.2)

The reinforcement provided shall be adequate to develop a factored flexural resistance, M_r at least equal to the lesser of 1.2M_{cr} or 1.33M_u.

ΦM_n >= 1.2M_{cr}

f_r =	0.424	ksi (modulus of rupture, 5.4.2.6)
y_t =	19.00	in (distance from the neutral axis to the extreme tension fiber)
I_g =	54872	in^4 (gross moment of inertia about centroid)
M_{cr} =	102.11	k-ft (5.7.3.6.2)
1.2*M_{cr} =	122.53	k-ft
1.33*M_u =	45.72	k-ft
$M_{control}$ =	45.72	k-ft (smaller of 1.2M_{cr} or 4/3M_u)
ΦM_n =	65.10	k-ft
	OK	

$$M_{cr} = \frac{f_r I_g}{y_t}$$

$$I_g = \frac{bh^3}{12}$$

$$f_r = 0.20\sqrt{f'_c}$$

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REINFORCEMENT DESIGN

Abutment

~ Crack Control

(5.7.3.4)

~ Control of cracking by distribution of reinforcement. Do not consider E2 case, use Strength.

Exposure Class = **2** *(Class 1 allows cracks, Class 2 don't want cracks)*

γ_e = 0.75

d_c = 2.00 in (depth of concrete measured from extreme tension fiber to center of bar closest thereto; the thickness of clear cover used to compute d_c shall be taken as the actual concrete cover thickness.

β_s = 1.08

$$s \le \frac{700\gamma_e}{\beta_s f_{ss}} - 2d_c$$

$$\beta_s = 1 + \frac{d_c}{0.7(h - d_c)}$$

Actual Stress, f_{ss}

Service Load Moment: M_s = 21.74 ft - k / ft

$$f_{ss} = \frac{M_s}{A_s jd}$$

A_s = 0.409 in^2 / ft

p = 0.0010

n = 8

k = 0.1162

j = 0.961

$$j = 1 - \frac{k}{3}$$

$$k = \sqrt{2np + (pn)^2} - np$$

$$p = \frac{A_s}{bd}$$

$f_{ss\ (actual)}$ = 18.59 ksi

s <= 22.2 in

OK

Job	**Forest Lakes**	**Project No.**			
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REINFORCEMENT DESIGN

Abutment

CHECK STEM SHEAR - at top of footing

AASHTO 5.13.3.6, 5.8.2.9

~ effective depth for shear is taken as the distance between the resultants of the tensile and compressive forces due to flexure.
~ A cantilever wall stem does not develop diagonal cracking under the lateral earth pressure, thus shear reinforcement requirement per equation 5.8.2.4-1 does not need to be met.

Check $2V_u < \phi V_c$ = **n** *per AASHTO 5.8.2.4-1*

$d_{v\text{-stem}}$ =	35.36	in
$d_{v\text{-stem}}$ =	32.12	in
$d_{v\text{-stem}}$ =	27.36	in
$d_{v\text{-stem}}$ =	35.36	in (controlling)
ΣV_u =	7.26	kips
β =	**2.0**	AASHTO 5.8.3.4
ϕ =	**0.9**	AASHTO 5.5.4.2
ϕV_c =	51.20	kips
Vu =	7.26	kips
	O.K.	

$$d_{v-stem} = d_{stem} - a/2$$
$$but-not-less-than-greater-of$$
$$d_{v-stem} = 0.9 * d_{stem}$$
$$d_{v-stem} = 0.72 * h_{stem}$$

$$\phi V_c = \phi 0.0316 * \beta \sqrt{f_c'} b_v * d_v$$

$$2V_u < \phi V_c \quad \text{5.8.2.4-1}$$

LONGITUDINAL STEM REINFORCEMENT

AASHTO 5.10.6
~ Provide longitudinal reinforcement in the stem based on shrinkage and temperature requirements. A_s is total area steel required in each face and in each direction.

b =	38.00	in (least thickness)
h =	162.00	in (least height)
A_s (total) =	0.333	in^2 / ft
A_s (each face) =	0.333	in^2 / ft
	OK	

$$A_s \geq \frac{1.3bh}{2(b+h)f_y} = 0.0018bh$$

$$0.11 \leq A_s \leq 0.60$$

Longitudinal Stem Reinforcement in each face, each direction minimum

USE # **5** **spa at** **9** **inches** **A_s =** **0.409** **in2 / ft**

Job	**Forest Lakes**	**Project No.**			
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REINFORCEMENT DESIGN

Abutment

TOP OF FOOTING REINFORCEMENT (HEEL)

~ The heel of the footing is assumed to carry its selfweight and the soil block above it without using P_{av}.. It is commonly acceptable to neglect the benefit of any upward soil pressure below the footing. Design section is taken at back face of stem. If considering the bearing pressure, include the P_{av}.

Consider Bearing Pressure =	**n**	*(for bending)*
Consider P_{av} =	**n**	*(for bending and shear)*

Unfactored Loads

	Force	Arm	Moment	M_s	M_u
Soil on heel (1)	5.47	1.75	9.57	9.57	12.92
Sloped soil on heel (3)	0.00	2.33	0.00	0.00	0.00
Footing (4)	0.14	1.75	0.25	0.25	0.31
P_{av}	0.00	3.50	0.00	0.00	0.00

Load Factors

(Table 3.4.1-2)	Strength 1	Strength 2	Strength 3	Strength 4	Strength 5	Service 1
DC =	**1.25**	**1.25**	**1.25**	**1.50**	**1.25**	**1.00**
EV =	**1.35**	**1.35**	**1.35**	**1.35**	**1.35**	**1.00**
EH =	**1.50**	**1.50**	**1.50**	**1.50**	**1.50**	**1.00**

Factored Load Summary

Group	ΣV_u	ΣM_u
Case S1	7.56	13.23
Case S2	7.56	13.23
Case S3	7.56	13.23
Case S4	7.59	13.29
Case S5	7.56	13.23
$\Sigma M_{serv\text{-}S}$	5.61	9.82

~ if resultant rorce and moment is negative when considering bearing pressure, i.e. acting up, values default to zero.

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REINFORCEMENT DESIGN

Abutment

Reinforcement

h =	24.00	in	f'_c =	**4500**	psi
b =	12.00	in	F_y =	**60000**	psi
Shear bar size =	**0**		$n=E_s/E_c$=	8	
Clear =	**2.00**	in			
d =	21.69	in			

M_u =	**13.29**	k - ft / ft (factored moment)
M_s =	**9.82**	k - ft / ft (service moment)

~ Required Reinforcement

M_n =	M_u / 0.90
R_n =	$M_n / (bd^2)$
m =	$F_y / (0.85f'_c)$
p =	$1 / m [1 - (1 - 2mR_n / F_y)^{0.5}]$
A_s =	pbd

M_n =	14.765	k-ft
R_n =	31.39	psi
m =	15.69	
p =	0.0005	

A_s (req'd) = 0.137 in^2 / ft

Top of Footing Reinforcement

USE # **5** **spa at** **12** **inches** A_s = **0.307** in^2 / ft **OK**

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REINFORCEMENT DESIGN

Abutment

TOP OF FOOTING REINFORCEMENT (HEEL) cont.

~ Determine Section Capacity

(5.7.3.2) $\Phi M_n >= M_u$

d_{heel} =	21.69	in	f'_c =	4500	psi
h =	24.00	in	F_y =	60000	psi
b =	12.00	in	n =	8	
B_1 =	0.825	(5.7.2.2)	Φ =	**0.9**	(5.5.4.2)

a =	0.486	in
ΦM_n =	29.61	k-ft
M_u =	13.29	ft - k
	OK	

$$a = \frac{A_s f_y}{.85 \beta_1 f_c' b}$$

$$\phi M_n = \phi A_s f_y \left(d - a/2\right)$$

~ Limits of Reinforcment

(5.7.3.3)

~ Minimum

(5.7.3.3.2)

The reinforcement provided shall be adequate to develop a factored flexural resistance, M_r at least equal to the lesser of 1.2M_{cr} or 1.33M_u.

$\Phi M_n >= 1.2 M_{cr}$

f_r =	0.424	ksi (modulus of rupture, 5.4.2.6)
y_t =	12.00	in (distance from the neutral axis to the extreme tension fiber)
I_g =	13824	in^4 (gross moment of inertia about centroid)
M_{cr} =	40.73	k-ft (5.7.3.6.2)
1.2*M_{cr} =	48.88	k-ft
1.33*M_u =	17.67	k-ft
$M_{control}$ =	17.67	k-ft (smaller of 1.2M_{cr} or 4/3M_u)
ΦM_n =	29.61	k-ft
	OK	

$$M_{cr} = \frac{f_r I_g}{y_t}$$

$$I_g = \frac{bh^3}{12}$$

$$f_r = 0.20 \sqrt{f_c'}$$

REINFORCEMENT DESIGN

Abutment

TOP OF FOOTING REINFORCEMENT (HEEL) cont.

~ Crack Control

(5.7.3.4)

~ Control of cracking by distribution of reinforcement. Do not consider E2 case, use Strength.

Exposure Class = **1** *(Class 1 allows cracks, Class 2 don't want cracks)*

γ_e = 1.00

d_c = 2.31 in (depth of concrete measured from extreme tension fiber to center of bar closest thereto; the thickness of clear cover used to compute d_c shall be taken as the actual concrete cover thickness.

β_s = 1.15

$$s \le \frac{700\gamma_e}{\beta_s f_{ss}} - 2d_c$$

$$\beta_s = 1 + \frac{d_c}{0.7(h - d_c)}$$

Actual Stress, f_{ss}

Service Load Moment: M_s = 9.82 ft - k / ft

A_s = 0.307 in^2 / ft

p = 0.0012

n = 8

k = 0.1282

j = 0.957

f_{ss} (actual) = 18.49 ksi

s <= 28.22 in

OK

$$f_{ss} = \frac{M_s}{A_s jd}$$

$$j = 1 - k/3$$

$$k = \sqrt{2np + (pn)^2} - np$$

$$p = \frac{A_s}{bd}$$

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REINFORCEMENT DESIGN

Abutment

CHECK SHEAR IN FOOTING

AASHTO 5.13.3.6, 5.8.3.2, 5.8.2.9

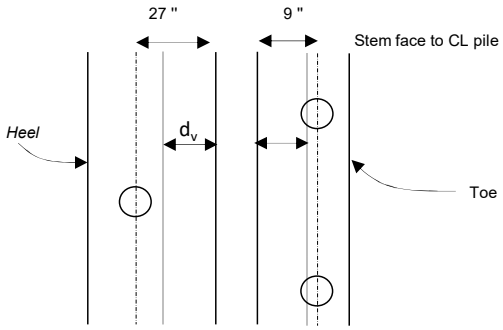
~ The critical shear section for the heel of the footing is located at the back face of the wall, see C5.13.3.6.1-1.

~ Shear in cantilever retaining wall footings is considered one way action and shall meet 5.8.3.2.

~ determine d_v

b =	89.64	in
$d_{v\text{-heel}}$ =	21.44	in (d_{heel} - a/2)
$d_{v\text{-heel}}$ =	19.52	
$d_{v\text{-heel}}$ =	17.28	
$d_{v\text{-heel}}$ =	21.44	in (controlling)

$$d_{v-heel} = d_{heel} - a/2$$
$$but - not - less - than - greater - of$$
$$d_{v-heel} = 0.9 * d_{heel}$$
$$d_{v-heel} = 0.72 * h_{heel}$$



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REINFORCEMENT DESIGN

Abutment

Heel

# of pile behind shear plane =	**1.00**	(in strip length)
Load per pile =	**92.60**	kips (factored)
Total Load (V_u) =	92.60	kips (factored)

v_u =	0.05	ksi	
	≤		**OK**
0.18*f'$_c$ =	0.81	ksi	

$$v_u = \frac{V_u}{\phi b d_v}$$

$$v_u \le 0.18 f_c'$$

Toe

# of pile behind shear plane =	**1.00**	(in strip length)
Load per pile =	**228.20**	kips (factored)
Total Load (V_u) =	228.20	kips (factored)

v_u =	0.13	ksi	
	≤		**OK**
0.18*f'$_c$ =	0.81	ksi	

$V_u \le \phi V_c$ 5.8.2.4-1 (footing exception to 2*)

β =	**2.0**	AASHTO 5.8.3.4
ϕ =	**0.9**	AASHTO 5.5.4.2

ϕV$_c$ =	231.94	kips
	O.K.	

$$\phi V_c = \phi 0.0316 * \beta \sqrt{f_c'} b_v * d_v$$

Job	**Forest Lakes**	**Project No.**			
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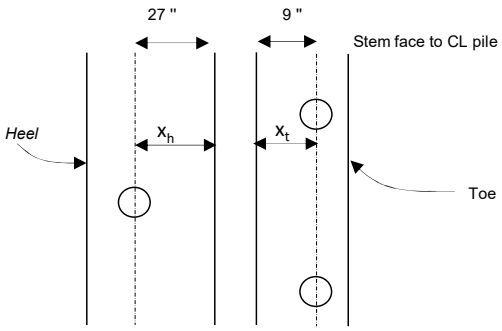
REINFORCEMENT DESIGN

Abutment

BOTTOM OF FOOTING REINFORCEMENT

~ Design for the peak factored pile reaction moment at either the heel piles or toe piles. The design section is assumed to be located at the worse case of front face of stem or back face of stem.



Heel

# of pile fill face of stem =	**1.00**	(in strip length)
Load per pile =	**92.60**	kips (factored)
Load per pile =	**64.45**	kips (service)
Load per pile =	0.00	kips (earthquake)
distance from pile to face =	**2.25**	feet
Total Load (P_u) =	92.60	kips (factored)
M_u =	208.35	k-ft (per strip length)
M_u =	**27.89**	k-ft / ft
M_s =	19.41	k-ft / ft

Toe

# of pile behind front face of stem =	**1.00**	(in strip length)
Load per pile =	**228.20**	kips (factored)
Load per pile =	**142.98**	kips (service)
Load per pile =	0.00	kips (earthquake)
distance from pile to face =	**0.75**	feet
Total Load (P_u) =	228.20	kips (factored)
M_u =	171.15	k-ft (per strip length)
M_u =	**22.91**	k-ft / ft
M_s =	14.36	k-ft / ft

Job	**Forest Lakes**	**Project No.**			
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REINFORCEMENT DESIGN

Abutment

h =	24.00	in	f'_c =	4500	psi
b =	12.00	in	F_y =	60000	psi
Shear bar size =	**0**		$n=E_s/E_c$=	8	
Clear =	**3.00**	in			
d =	20.63	in			

M_u = 27.89 k - ft / ft (factored moment from Bearing Capacity Calculations)

M_s = 19.41 k - ft / ft (service moment)

~ Required Reinforcement

$M_n = M_u / 0.90$

$R_n = M_n / (bd^2)$

$m = F_y / (0.85f'_c)$

$p = 1 / m [1 - (1 - 2mR_n / F_y)^{0.5}]$

$A_s = pbd$

M_n = 30.991 k-ft

R_n = 72.85 psi

m = 15.69

p = 0.0012

$A_{s\ (req'd)}$ = 0.303 in^2 / ft

Bottom of Footing Reinforcement

USE #	**6**	**spa at**	**12**	**inches**	**A_s =**	**0.442**	**in^2 / ft**
alt w/	**0**	**spa at**	**6**	**inches**	**A_s =**	**0.000**	**in^2 / ft**
					A_s =	**0.442**	**in^2 / ft**
						OK	

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REINFORCEMENT DESIGN

Abutment

BOTTOM OF FOOTING REINFORCEMENT (TOE) cont.

~ Determine Section Capacity

(5.7.3.2) $\Phi M_n >= M_u$

d =	20.63	in	f'_c =	4500	psi
h =	24.00	in	Fy =	60000	psi
b =	12.00	in	n =	8	
B_1 =	0.825	(5.7.2.2)	Φ =	**0.9**	(5.5.4.2)

a =	0.700	in
ΦM_n =	40.31	k-ft
M_u =	27.89	ft - k
	OK	

$$a = \frac{A_s f_y}{.85 \beta_1 f_c' b}$$

$$\phi M_n = \phi A_s f_y \left(d - a/2\right)$$

~ Limits of Reinforcment

(5.7.3.3)

~ Minimum

(5.7.3.3.2)

The reinforcement provided shall be adequate to develop a factored flexural resistance, M_r at least equal to the lesser of $1.2M_{cr}$ or $1.33M_u$.

$\Phi M_n >= 1.2M_{cr}$

f_r =	0.424	ksi (modulus of rupture, 5.4.2.6)
y_t =	12.00	in (distance from the neutral axis to the extreme tension fiber)
I_g =	13824	in^4 (gross moment of inertia about centroid)

M_{cr} =	40.73	k-ft (5.7.3.6.2)
$1.2*M_{cr}$ =	48.88	k-ft
$1.33*M_u$ =	37.10	k-ft
$M_{control}$ =	37.10	k-ft (smaller of $1.2M_{cr}$ or $4/3M_u$)
ΦM_n =	40.31	k-ft
	OK	

$$M_{cr} = \frac{f_r I_g}{y_t}$$

$$I_g = \frac{bh^3}{12}$$

$$f_r = 0.20\sqrt{f_c'}$$

REINFORCEMENT DESIGN

Abutment

BOTTOM OF FOOTING REINFORCEMENT (TOE) cont.

~ Crack Control

(5.7.3.4)

~ Control of cracking by distribution of reinforcement. Do not consider E2 case, use Strength.

Exposure Class = **1** *(Class 1 allows cracks, Class 2 don't want cracks)*

γ_e = 1.00

d_c = 3.38 in (depth of concrete measured from extreme tension fiber to center of bar closest thereto; the thickness of clear cover used to compute d_c shall be taken as the actual concrete cover thickness.

β_s = 1.23

$$s \le \frac{700\gamma_e}{\beta_s f_{ss}} - 2d_c$$

$$\beta_s = 1 + \frac{d_c}{0.7(h - d_c)}$$

Actual Stress, f_{ss}

Service Load Moment: M_s = 19.41 ft - k / ft

A_s = 0.442 in^2 / ft

p = 0.0018

n = 8

k = 0.1553

j = 0.948

f_{ss} = $\frac{M_s}{A_s jd}$

$j = 1 - k/3$

$k = \sqrt{2np + (pn)^2} - np$

$p = \frac{A_s}{bd}$

$f_{ss\ (actual)}$ = 26.96 ksi

s <= 14.29 in

OK

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REINFORCEMENT DESIGN

Abutment

LONGITUDINAL FOOTING REINFORCEMENT

AASHTO 5.10.6

~ Provide longitudinal reinforcement in the footing based on shrinkage and temperature requirements. A_s is total area steel to be distributed to each face.

b =	24.00	in	
h =	104.00	in	
A_s (total) =	0.211	in^2 / ft	$A_s \geq \frac{1.3bh}{2(b+h)f_y} = 0.0018\,bh$
A_s (each face) =	0.211	in^2 / ft	$0.11 \leq A_s \leq 0.60$
	OK		

Longitudinal Ftg Reinforcement in top and bottom

USE # 5 **spa at** 12 **inches** **A_s =** **0.307** in^2 / ft

OK

Job	**Forest Lakes**	**Project No.**			
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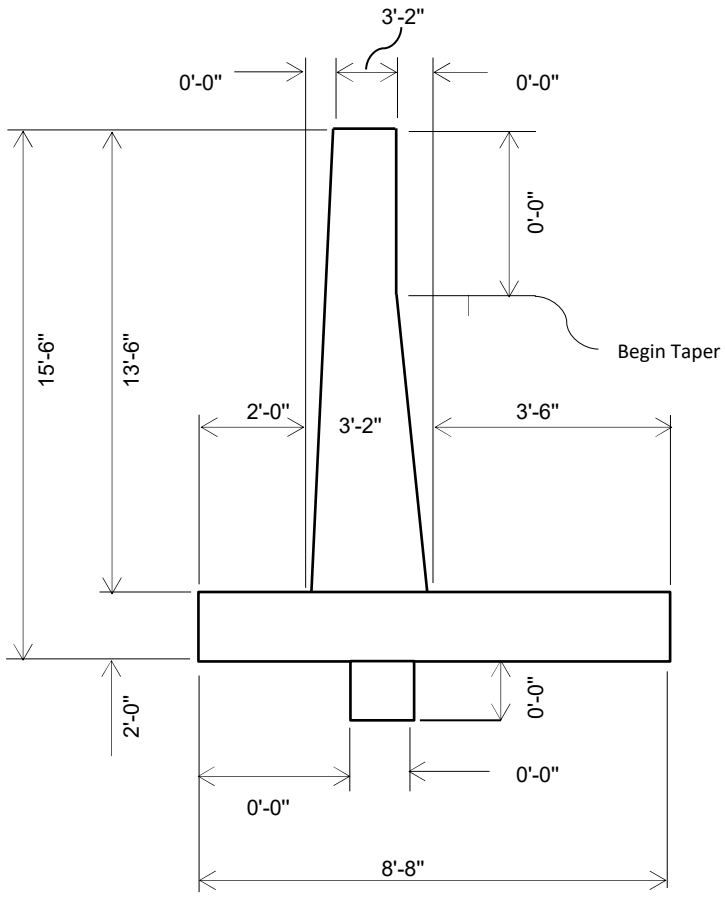
SUMMARY

Abutment



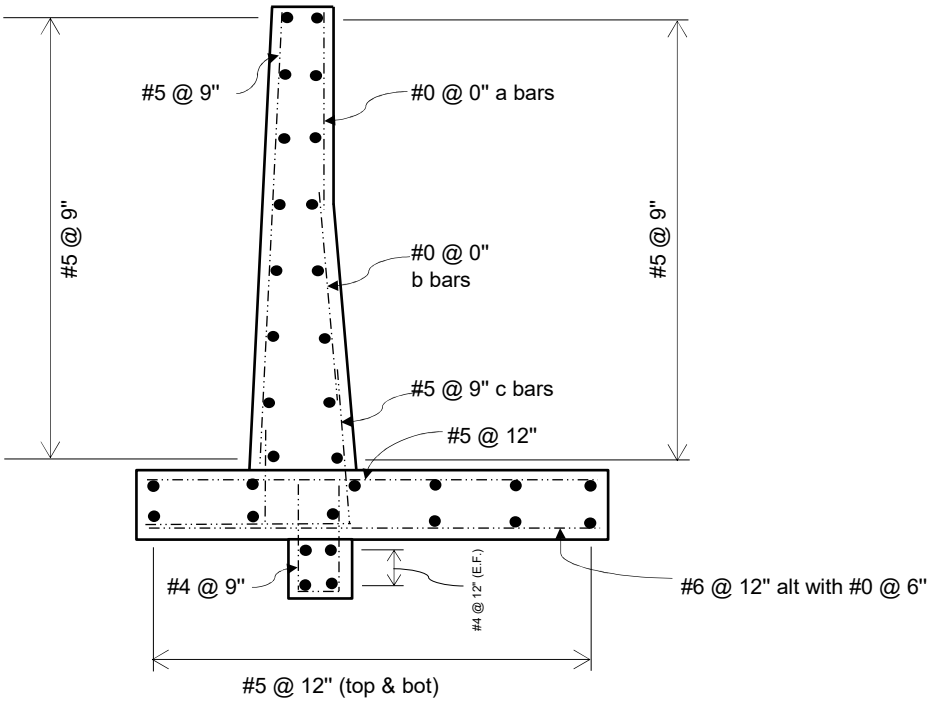
TYPICAL SECTION

Job	**Forest Lakes**	**Project No.**			
Description	**Abutment**	**Designed by:**	**cwt**	**Date**	**19-Jan-21**
		Checked by:		**Date**	

Z:\ctepen\Projects\Steamboat\Forest Lakes\[retaining wall-pile ftg LRFD 6th edition.xlsm]Reinforcement

SUMMARY

Abutment



3" clear in bottom of footing
2" clear in top of footing
2" clear in stem
3" clear in key

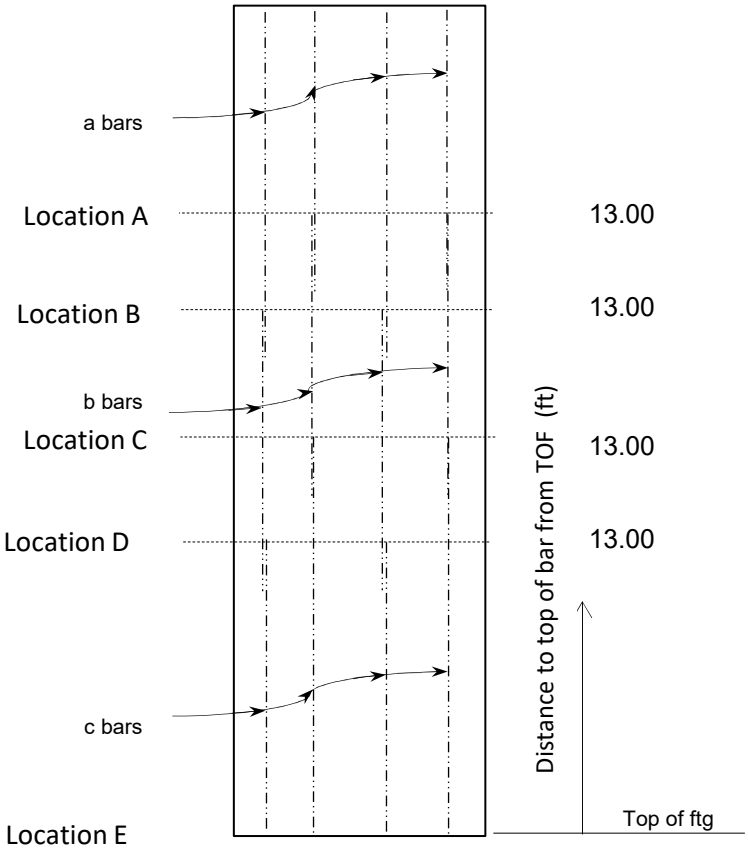
REINFORCEMENT

Job	**Forest Lakes**	**Project No.**			
Description	**Abutment**	**Designed by:**	**cwt**	**Date**	**19-Jan-21**
		Checked by:		**Date**	

Z:\ctepen\Projects\Steamboat\Forest Lakes\[retaining wall-pile ftg LRFD 6th edition.xlsm]Reinforcement

SUMMARY

Abutment



Elevation

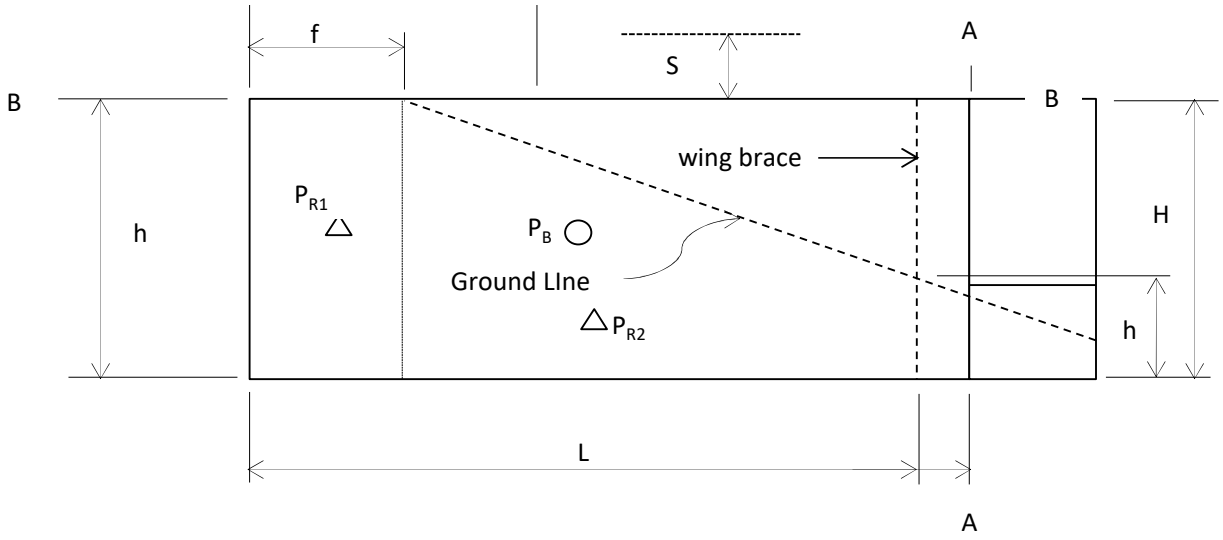
Wingwall Design

benesch

Job	**Forest Lakes**	**Project No.**	**0**		
Description	**Wing Design**	**Designed by:**	**cwt**	**Date**	**19-Jan-21**
		Checked by:		**Date**	

Z:\ctepen\Projects\Steamboat\Forest Lakes\[concrete beam-lrfd.xlsm]per foot

Wingwall Design



g = dist to ground line =	**0**	ft
S = Surcharge height =	**0**	ft
h = End height =	**14.0**	ft
H = Wing height =	**14.0**	ft
L = Wing length =	**23.75**	ft
f = end wing to fill intersection =	**0.00**	ft
h= fill height at BF =	**4.00**	ft
w_a = Equivalent Fluid Earth Pressure =	**36**	# / ft^3 (from CDOT 7.1)
Collision Test Level =	**TL-0**	AASHTO Table A13.2-1
CT =	**0.0**	kips (collison load on barrier)
L_t =	**0.0**	ft

Factored Design Moments

(AASHTO 3.4, Table 3.4.1-1)

$$M_u = h_i [1.5M_{eh} + 1.5M_{es)}]$$

$h_i = h_D h_R h_I >= 0.95$ (AASHTO 1.3.2) = h_i = 1.00

h_D =	**1.00**	(AASHTO 1.3.3) Reinforcement is designed to yield
h_R =	**1.00**	(AASHTO 1.3.4) Cantilever has a single load path and is nonredundant
h_I =	**1.00**	(AASHTO 1.3.5) Structure assumed operationally important
h_i =	1.00	(controlling)

benesch

Job	**Forest Lakes**	**Project No.**	**0**		
Description	**Wing Design**	**Designed by:**	**cwt**	**Date**	**19-Jan-21**
		Checked by:		**Date**	

Z:\ctepen\Projects\Steamboat\Forest Lakes\[concrete beam-lrfd.xlsm]per foot

Wingwall Design

Resisting Moment - horizontal, P_{Rn}

~ determine the resisting moment from soil on outside of wing

~ ignore any resistance for vertical reinforcement

% M_{resist} to consider = **100.00%** (percent of resisting moment to consider due to erosion of soil on front or possible future construction)

p_{R1} =	3.53	k/ft	$p_{R1} = \frac{1}{2} w_a H^2$
P_{R1} =	0.00	kips	$P_{R1} = p_{R1} f$
M_{R1} =	0.0	k-ft	$M_{R1} = P_{R1}\left(L - \frac{f}{2}\right)$
p_{R2} =	0.29	k/ft	$p_{R2} = \frac{1}{2} w_a g^2$
P_{R2} =	45.32	kips	$P_{R2} = \frac{p_{R1} + p_{R2}}{2}(L - f)$
M_{R2} =	717.5	k-ft	$M_{R2} = P_{R2}\frac{2}{3}(L - f)$
$M_{R\text{-total}}$ =	717.5	k-ft (on whole wall height)	$M_{R-total} = M_{R1} + M_{R2}$
$M_{R\text{-total}}$ =	51.3	k-ft per ft of wall height)	

~ effective resisting moment

$M_{R\text{-total-eff}}$ =	717.5	k-ft (on whole wall height)
$M_{R\text{-total-eff}}$ =	51.3	k-ft/ft (per ft of wall height)
$M_{Ru\text{-total-eff}}$ =	1076.3	k-ft (factored - on whole wall height)
$M_{Ru\text{-total-eff}}$ =	76.9	k-ft/ft (factored - per ft of wall height)

benesch

Job	**Forest Lakes**	**Project No.**	**0**		
Description	**Wing Design**	**Designed by:**	**cwt**	**Date**	**19-Jan-21**
		Checked by:		**Date**	

Z:\ctepen\Projects\Steamboat\Forest Lakes\[concrete beam-lrfd.xlsm]per foot

Wingwall Design

Bending Moment, P_B

~ determine the bending moment from soil on inside of wing

Horizontal Reinforcement

$$M_{AA} = \frac{wL^2}{24}\left[3h^2 + (H + 4S)(H + 2h)\right]$$

$$P = \frac{wL}{6}\left[H^2 + (h + H)(h + 3S)\right]$$

$$\bar{x} = \frac{M_{AA}}{P}$$

$M_{B\text{-}AA}$ = 995.01 k-ft

P_B = 83.79 kips

$\bar{x}$ = 11.88 ft

$\frac{M_{B-AA}}{H}$ = 71.07 k-ft / ft

M_u = 106.61 k-ft / ft

Vertical Reinforcement

$$M_{BB} = \frac{wL}{12}\left[(H + h + 2S)(H^2 + h^2) + 2ShH\right]$$

$$\bar{y} = \frac{M_{BB}}{P}$$

M_{BB} = 782.04 k-ft

$\bar{y}$ = 9.33 ft

$\frac{M_{BB}}{L}$ = 32.93 k-ft / ft

M_u = 49.39 k-ft / ft

Bending Moment, CT

~ determine the bending moment from vehicular collision on barrier mounted on wing

~ the crash load CT is applied over length L_t

~ assume the wing disengages from the soil mass at instant of collision, thus no soil pressure applied.

M_{CT} = 0.0 k-ft $\quad M_{CT} = CT(L - L_t/2)$

Extreme Event II Load Case

$M_u = h_i\,[1.0M_{CT}]$

$M_{u\text{-}CT}$ = 0.0 k-ft (horizontal)

Design Moment

~ see spreadsheet output for reinforcement

Horizontal Reinforcement

$M_{s\text{-}horiz}$ = 277.5 k-ft (on whole wall height)

benesch

Job	**Forest Lakes**	**Project No.**	**0**		
Description	**Wing Design**	**Designed by:**	**cwt**	**Date**	**19-Jan-21**
		Checked by:		**Date**	

Z:\ctepen\Projects\Steamboat\Forest Lakes\[concrete beam-lrfd.xlsm]per foot

Wingwall Design

$M_{u\text{-}horiz}$ = 416.2 k-ft (factored - on whole wall height)

$$M_{design} = M_B - M_R$$

$M_{s\text{-}horiz}$ = 19.8 k-ft/ft (per ft of wall height)

$M_{u\text{-}horiz}$ = 29.7 k-ft/ft (factored - per ft of wall height)

Vertical Reinforcement - this is too conservative…use 67% of horiz for distribution

$M_{s\text{-}vert}$ = 782.0 k-ft (on whole wall length)

$M_{u\text{-}vert}$ = 1173.1 k-ft (factored - on whole wall length)

$M_{s\text{-}vert}$ = 32.9 k-ft/ft (per ft of wall length)

$M_{u\text{-}vert}$ = 49.4 k-ft/ft (factored - per ft of wall length) h #6@6

Job	**Forest Lakes**		**Project No.**		
Description	**Wingwall design**		**Designed by:** **cwt**	**Date**	**19-Jan-21**
			Checked by:	**Date**	

Z:\ctepen\Projects\Steamboat\Forest Lakes\[concrete beam-lrfd.xlsm]per foot

BEAM DESIGN - LRFD

Wingwall horizontal

h =	**12.00**	in	f'_c =	**4500**	psi
b =	**12.00**	in	E_c =	4435	ksi (5.4.2.4)
Shear bar size =	**6**		K_1 =	**1.0**	(5.4.2.4)
Clear =	**2.00**	in	wc =	**150**	pcf
d =	8.75	in	F_y =	**60000**	psi
			Es =	**29000**	ksi
			n =	6.5	
M_u =	**30.000**	k - ft (factored moment)			
M_s =	**20.000**	k - ft (service moment)			

~ Required Reinforcement

M_n = M_u / 1.00
R_n = $M_n / (bd^2)$
m = $F_y / (0.85f'_c)$
p = $1 / m [1 - (1 - 2mR_n / F_y)^{0.5}]$
A_s = pbd

M_n =	30.000	k-ft
R_n =	391.84	psi
m =	15.69	
p =	0.0069	
$A_{s\ (req'd)}$ =	0.725	in^2

USE #	**8**	**spa at**	**6.00**	**inches**	**A_s =**	**1.571**	**in^2 / ft**
with							
	0	**spa at**	**12.00**	**inches**	**A_s =**	**0.000**	**in^2 / ft**
					$A_{s\text{-total}}$ =	**1.571**	**in^2 / ft**
						OK	

~ Determine Section Capacity

(5.7.3.2) $M_r = \Phi M_n >= M_u$

d =	8.75	in	f_c' =	4500	psi
h =	12.00	in	F_y =	60000	psi
b =	12.00	in	n =	6.5	
β_1 =	0.825	(5.7.2.2)	Φ =	**1.00**	(5.5.4.2)
α_1 =	0.85				

a =	2.49	in
ΦM_n =	58.95	k-ft
M_u =	30.00	ft - k
	OK	

$$a = \frac{A_s f_y}{\alpha_1 \beta_1 f_c' b}$$

$$\phi M_n = \phi A_s f_y \left(d - a/2\right)$$

Job	**Forest Lakes**	**Project No.**			
Description	**Wingwall design**	**Designed by:**	**cwt**	**Date**	**19-Jan-21**
		Checked by:		**Date**	

Z:\ctepen\Projects\Steamboat\Forest Lakes\[concrete beam-lrfd.xlsm]per foot

BEAM DESIGN - LRFD

Wingwall horizontal

~ Limits of Reinforcment

(5.7.3.3)

~Maximum

(5.7.3.3.1)

~ provision deleted in 2005 edition.

~ Minimum

(5.7.3.3.2)

The reinforcement provided shall be adequate to develop a factored flexural resistance, M_r at least equal to the lesser of $1.0M_{cr}$ or $1.33M_u$.

$\Phi M_n >= 1.2M_{cr}$

f_r =	0.51	ksi (modulus of rupture, 5.4.2.6)
λ =	1.00	normal weight concrete only (5.4.2.8)
y_t =	6.00	in (distance from the neutral axis to the extreme tension fiber)
I_g =	1728	in^4 (gross moment of inertia about centroid)
γ_1 =	**1.60**	(5.7.3.3)
γ_3 =	**0.67**	(0.67 A615 mild reinf, 0.75 for A706 weldable reinf)(5.7.3.3)

M_{cr} =	13.10	k-ft (5.7.3.6.2)
$1.0*M_{cr}$ =	13.10	k-ft
$1.33*M_u$ =	39.90	k-ft
$M_{control}$ =	13.10	k-ft
ΦM_n =	58.95	k-ft
	OK	

$$M_{cr} = \gamma_3 \frac{\gamma_1 f_r I_g}{y_t}$$

$$I_g = \frac{bh^3}{12}$$

$$f_r = 0.24\lambda\sqrt{f_c'}$$

(5.10.8.2)

$A_s \geq 0.11$ =		
$A_s \leq 0.60$ =		
A_s >=	0.065	in^2 / ft
	OK	

$$A_s \geq \frac{1.30\,bh}{2(b+h)f_y}$$

$$0.11 \leq A_s \leq 0.60$$

~ Crack Control

(5.7.3.4)

~ Control of cracking by distribution of reinforcement. The spacing s of mild steel reinforcement in the layer closest to the tension face shall satisfy the following:

Actual Stress, f_s

Service Load Moment: M_s =	20.000	ft - k		
A_s =	1.571	in^2 / ft		
p =	0.0150			
n =	6.5			
k =	0.3544			
j =	0.882			
$f_{ss\ (actual)}$ =	19.80	≤	36.00	ksi
	OK			

$$f_s = \frac{M_s}{A_s\,jd} \leq 0.60\,f_y$$

$$j = 1 - k/3$$

$$k = \sqrt{2np + (pn)^2} - np$$

$$p = \frac{A_s}{bd}$$

Allowable Spacing

$$s \leq \frac{700\gamma_e}{\beta_s f_{ss}} - 2d_c$$

$$\beta_s = 1 + \frac{d_c}{0.7(h - d_c)}$$

d_c =	2.38	in (depth of concrete measured from extreme tension fiber to center of bar closest thereto; for calculation purposes, d_c need not be taken greater than 2" plus the bar radius.)
h =	12.00	
B_s =	1.3525	
γ_e =	**1.00**	(1.0 for Class 1 exposure, 0.75 for Class 2 exposure *)
s <=	21.39	in
	OK	

** Class 1 exposure condition applies when cracks can be tolerated due to reduced concerns of appearance and/or corrosion. Class 2 exposure condition applies to when there is increased concern of appearance and/or corrosion and transverse design of segmental concrete box girders for any loads applied prior to attaining full nominal concrete strength.*

Job	**Forest Lakes**		**Project No.**		
Description	**Wingwall design**		**Designed by:** **cwt**	**Date**	**19-Jan-21**
			Checked by:	**Date**	

Z:\ctepen\Projects\Steamboat\Forest Lakes\[concrete beam-lrfd.xlsm]per foot

BEAM DESIGN - LRFD

Wingwall vertical

h =	**12.00**	in	f'_c =	**4500**	psi
b =	**12.00**	in	E_c =	4435	ksi (5.4.2.4)
Shear bar size =	**6**		K_1 =	**1.0**	(5.4.2.4)
Clear =	**2.00**	in	wc =	**150**	pcf
d =	8.88	in	F_y =	**60000**	psi
			Es =	**29000**	ksi
			n =	6.5	
M_u =	**20.100**	k - ft (factored moment)		67% of horizontal for distribution	
M_s =	**13.400**	k - ft (service moment)			

~ Required Reinforcement

M_n = M_u / 1.00

R_n = $M_n / (bd^2)$

m = $F_y / (0.85f'_c)$

p = $1 / m \left[1 - \left(1 - 2mR_n / F_y \right)^{0.5} \right]$

A_s = pbd

M_n =	20.100	k-ft
R_n =	255.19	psi
m =	15.69	
p =	0.0044	
A_s (req'd) =	0.469	in^2

USE #	**6**	**spa at**	**6.00**	**inches**	**A_s =**	**0.884**	**in^2 / ft**
with							
	0	**spa at**	**12.00**	**inches**	**A_s =**	**0.000**	**in^2 / ft**
					$A_{s\text{-total}}$ =	**0.884**	**in^2 / ft**
						OK	

~ Determine Section Capacity

(5.7.3.2) $M_r = \Phi M_n >= M_u$

d =	8.88	in	f_c' =	4500	psi
h =	12.00	in	F_y =	60000	psi
b =	12.00	in	n =	6.5	
β_1 =	0.825	(5.7.2.2)	Φ =	**1.00**	(5.5.4.2)
α_1 =	0.85				

a =	1.40	in
ΦM_n =	36.12	k-ft
M_u =	20.10	ft - k
	OK	

$$a = \frac{A_s f_y}{\alpha_1 \beta_1 f_c' b}$$

$$\phi M_n = \phi A_s f_y \left(d - a/2 \right)$$

Job	**Forest Lakes**	**Project No.**			
Description	**Wingwall design**	**Designed by:**	**cwt**	**Date**	**19-Jan-21**
		Checked by:		**Date**	

Z:\ctepen\Projects\Steamboat\Forest Lakes\[concrete beam-lrfd.xlsm]per foot

BEAM DESIGN - LRFD

Wingwall vertical

~ Limits of Reinforcment

(5.7.3.3)

~Maximum

(5.7.3.3.1)

~ provision deleted in 2005 edition.

~ Minimum

(5.7.3.3.2)

The reinforcement provided shall be adequate to develop a factored flexural resistance, M_r at least equal to the lesser of $1.0M_{cr}$ or $1.33M_u$.

$\Phi M_n >= 1.2M_{cr}$

f_r =	0.51	ksi (modulus of rupture, 5.4.2.6)
λ =	1.00	normal weight concrete only (5.4.2.8)
y_t =	6.00	in (distance from the neutral axis to the extreme tension fiber)
I_g =	1728	in^4 (gross moment of inertia about centroid)
γ_1 =	**1.60**	(5.7.3.3)
γ_3 =	**0.67**	(0.67 A615 mild reinf, 0.75 for A706 weldable reinf)(5.7.3.3)

M_{cr} =	13.10	k-ft (5.7.3.6.2)
1.0*M_{cr} =	13.10	k-ft
1.33*M_u =	26.73	k-ft
$M_{control}$ =	13.10	k-ft
ΦM_n =	36.12	k-ft
	OK	

$$M_{cr} = \gamma_3 \frac{\gamma_1 f_r I_g}{y_t}$$

$$I_g = \frac{bh^3}{12}$$

$$f_r = 0.24\lambda\sqrt{f_c'}$$

(5.10.8.2)

$A_s \geq 0.11$ =		
$A_s \leq 0.60$ =		
A_s >=	0.065	in^2 / ft
	OK	

$$A_s \geq \frac{1.30\,bh}{2(b+h)f_y}$$

$$0.11 \leq A_s \leq 0.60$$

~ Crack Control

(5.7.3.4)

~ Control of cracking by distribution of reinforcement. The spacing s of mild steel reinforcement in the layer closest to the tension face shall satisfy the following:

Actual Stress, f_s

Service Load Moment: M_s =	13.400	ft - k		
A_s =	0.884	in^2 / ft		
p =	0.0083			
n =	6.5			
k =	0.2789			
j =	0.907			
$f_{ss\ (actual)}$ =	22.61	≤	36.00	ksi
	OK			

$$f_s = \frac{M_s}{A_s jd} \leq 0.60\,f_y$$

$$j = 1 - k/3$$

$$k = \sqrt{2np + (pn)^2} - np$$

$$p = \frac{A_s}{bd}$$

Allowable Spacing

$$s \leq \frac{700\gamma_e}{\beta_s f_{ss}} - 2d_c$$

$$\beta_s = 1 + \frac{d_c}{0.7(h - d_c)}$$

d_c =	2.38	in (depth of concrete measured from extreme tension fiber to center of bar closest thereto; for calculation purposes, d_c need not be taken greater than 2" plus the bar radius.)
h =	12.00	
B_s =	1.3525	
γ_e =	**1.00**	(1.0 for Class 1 exposure, 0.75 for Class 2 exposure *)
s <=	18.14	in
	OK	

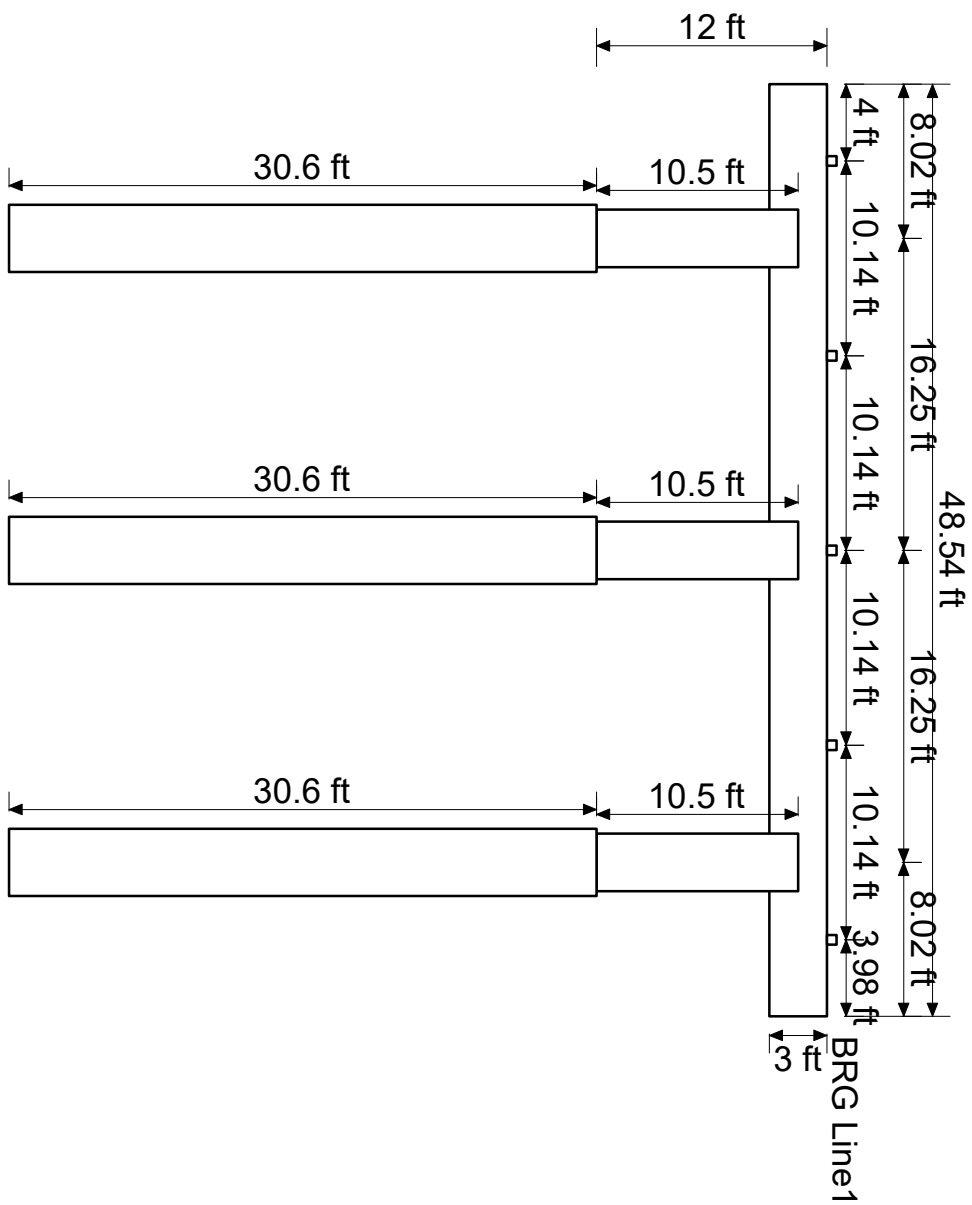
** Class 1 exposure condition applies when cracks can be tolerated due to reduced concerns of appearance and/or corrosion. Class 2 exposure condition applies to when there is increased concern of appearance and/or corrosion and transverse design of segmental concrete box girders for any loads applied prior to attaining full nominal concrete strength.*

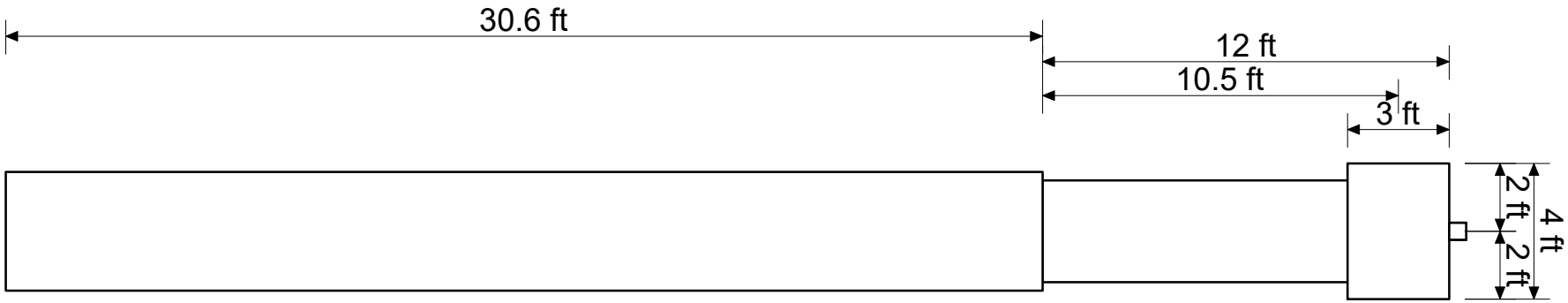
Mesa Top Drive South over North Beaver Creek

Monument, Colorado

Design Check Calculations

Final Design
Pier


12 ft
30.6 ft
10.5 ft
30.6 ft
10.5 ft
30.6 ft
10.5 ft
4 ft
10.14 ft
10.14 ft
10.14 ft
10.14 ft
10.14 ft
3.98 ft
8.02 ft
16.25 ft
16.25 ft
8.02 ft
48.54 ft
3 ft
BRG Line1


30.6 ft
12 ft
10.5 ft
3 ft
2 ft
2 ft
4 ft

CAP DESIGN

Code: AASHTO LRFD 8
Units: US
Pier View: Downstation.

DESIGN PARAMETERS

f'c = 4500.0 psi	
Fy flex = 60000.0 psi	Fy shear = 60000.0 psi
phi tens = 0.90	
phi comp = 0.75	phi shear = 0.90
Tens above = 0.005	Comp below = 0.002
Ec = 4435.3 ksi	Es = 29000.0 ksi
Crack check as per current LRFD	
Crack control Exposure = 1.00	
Concrete Type : Normal Weight.	
Design of cap at face of column.	

CAP GEOMETRY

Straight Cap : Length(X) = 48.54 ft Depth(Z) = 48.00 in

Cap Section Properties

Sec.	Area ft ^2	Iz in ^4	Iy in ^4
1	12.00	186624.00	331776.00

MAIN REINFORCEMENT

	Bar size	Quantity	Bar dist. in	As total in^2	From ft	To ft	Hook
TOP	US#9[M29]	10	3.13	10.000	0.00	48.54	None
BOTTOM	US#9[M29]	10	3.13	10.000	0.00	48.54	None

STIRRUPS

From ft	To ft	Stirrup Size	n legs	Spacing in	Aprv/s in^2 / ft	Bar Type
0.27	6.77	US#5[M16]	4	6.00	2.48	Stirrup
8.02	9.27	US#5[M16]	4	15.00	0.99	Stirrup
9.65	22.65	US#5[M16]	4	6.00	2.48	Stirrup
23.02	25.52	US#5[M16]	4	15.00	0.99	Stirrup
25.90	38.90	US#5[M16]	4	6.00	2.48	Stirrup
39.27	41.77	US#5[M16]	4	15.00	0.99	Stirrup
41.77	48.27	US#5[M16]	4	6.00	2.48	Stirrup

Clear Cover on Sides = 2.00 in

FLEXURE DESIGN

Span 1: From 0.00 ft To 8.02 ft

Loc ft	AbsLoc ft	H in	Mmax Mmin kips-ft	Mr kips-ft	Comb	CL	c	dt in	eps_t	Phi	Asb-req in^2	Asb-prv in^2	Asb-eff in^2	Ast-req in^2	Ast-prv in^2	Ast-eff in^2
4.0	4.0	36	2.4	1405.0	501	T	3.41	32.87	0.026	0.90	0.89	10.00	10.00	0.89	10.00	10.00
			-33.4	-1405.0	207	T	3.41	32.87	0.026	0.90	0.89	10.00	10.00	0.89	10.00	10.00
6.7	6.7	36	0.0	1405.0	0	T	3.41	32.87	0.026	0.90	0.89	10.00	10.00	0.89	10.00	10.00
			-1167.9	-1405.0	1	T	3.41	32.87	0.026	0.90	0.89	10.00	10.00	8.23	10.00	10.00

Span 2: From 8.02 ft To 24.27 ft

Loc ft	AbsLoc ft	H in	Mmax Mmin kips-ft	Mr kips-ft	Comb	CL	c	dt in	eps_t	Phi	Asb-req in^2	Asb-prv in^2	Asb-eff in^2	Ast-req in^2	Ast-prv in^2	Ast-eff in^2
1.3	9.3	36	0.0	1405.0	0	T	3.41	32.87	0.026	0.90	0.89	10.00	10.00	0.89	10.00	10.00
			-1221.0	-1405.0	5	T	3.41	32.87	0.026	0.90	0.89	10.00	10.00	8.62	10.00	10.00
6.1	14.1	36	964.6	1405.0	23	T	3.41	32.87	0.026	0.90	6.75	10.00	10.00	0.89	10.00	10.00
			-13.7	-1405.0	540	T	3.41	32.87	0.026	0.90	0.89	10.00	10.00	0.89	10.00	10.00
14.9	22.9	36	0.0	1405.0	0	T	3.41	32.87	0.026	0.90	0.89	10.00	10.00	0.89	10.00	10.00
			-458.2	-1405.0	22	T	3.41	32.87	0.026	0.90	0.89	10.00	10.00	3.24	10.00	10.00

Span 3: From 24.27 ft To 40.52 ft

Loc ft	AbsLoc ft	H in	Mmax Mmin kips-ft	Mr kips-ft	Comb	CL	c	dt in	eps_t	Phi	Asb-req in^2	Asb-prv in^2	Asb-eff in^2	Ast-req in^2	Ast-prv in^2	Ast-eff in^2
1.3	25.6	36	0.0	1405.0	0	T	3.41	32.87	0.026	0.90	0.89	10.00	10.00	0.89	10.00	10.00
			-457.1	-1405.0	16	T	3.41	32.87	0.026	0.90	0.89	10.00	10.00	3.24	10.00	10.00
10.2	34.4	36	960.1	1405.0	18	T	3.41	32.87	0.026	0.90	6.72	10.00	10.00	0.89	10.00	10.00
			0.0	-1405.0	0	T	3.41	32.87	0.026	0.90	0.89	10.00	10.00	0.89	10.00	10.00
14.9	39.2	36	0.0	1405.0	0	T	3.41	32.87	0.026	0.90	0.89	10.00	10.00	0.89	10.00	10.00
			-1224.5	-1405.0	12	T	3.41	32.87	0.026	0.90	0.89	10.00	10.00	8.65	10.00	10.00

Span 4: From 40.52 ft To 48.54 ft

Loc ft	AbsLoc ft	H in	Mmax Mmin kips-ft	Mr kips-ft	Comb	CL	c	dt in	eps_t	Phi	Asb-req in^2	Asb-prv in^2	Asb-eff in^2	Ast-req in^2	Ast-prv in^2	Ast-eff in^2
1.3	41.8	36	0.0	1405.0	0	T	3.41	32.87	0.026	0.90	0.89	10.00	10.00	0.89	10.00	10.00
			-1199.9	-1405.0	8	T	3.41	32.87	0.026	0.90	0.89	10.00	10.00	8.47	10.00	10.00
4.0	44.6	36	2.6	1405.0	543	T	3.41	32.87	0.026	0.90	0.89	10.00	10.00	0.89	10.00	10.00
			-33.2	-1405.0	165	T	3.41	32.87	0.026	0.90	0.89	10.00	10.00	0.89	10.00	10.00

Flexure Design : Notes

CL: Section classification as per LRFD 2006 interims for provided reinforcement.
C = Compression controlled, I = In-Transition, T = Tension controlled.

SHEAR AND TORSION DESIGN:

Span 1: From 0.00 ft To 8.02 ft

Loc ft	AbsLoc ft	Pos	Vu kips	Comb	Tu kips-ft	Comb	phi*Vn kips	T-lim kips-ft	Avs/s in^2/ft	Ats/s in^2/ft	Av/s in^2/ft	Aprv/s in^2/ft	Alx in^2	Vc kips	Vs kips	Beta	The deg
4.00	4.00	L	10.8	109	0.0	0	1038.7	89.1	0.00	0.00	0.00	2.48	0.00	458.39	695.69	4.52	29.2
		R	424.4	1	15.4	147	565.4	88.1	1.66	0.00	1.66	2.48	0.00	151.58	476.59	1.50	39.3
6.69	6.69	L	430.4	1	15.4	273	557.5	88.1	1.74	0.00	1.74	2.48	3.23	148.33	471.07	1.46	39.6

Span 2: From 8.02 ft To 24.27 ft

Loc ft	AbsLoc ft	Pos	Vu kips	Comb	Tu kips-ft	Comb	phi*Vn kips	T-lim kips-ft	Avs/s in^2/ft	Ats/s in^2/ft	Av/s in^2/ft	Aprv/s in^2/ft	Alx in^2	Vc kips	Vs kips	Beta	Th d
1.33	9.35	R	415.8	5	119.8	11	94.6#	89.7	1.65	0.11	1.88*	0.00**	7.92	148.65	43.52	1.47	39
6.12	14.14	L	405.0	5	119.8	5	540.5	89.7	1.49	0.11	1.71	2.48	1.52	157.54	443.05	1.56	38
		R	142.8	23	106.4	23	650.1	88.0	0.47	0.09	0.64	2.48	0.00	208.31	514.07	2.06	35
14.92	22.94	L	162.6	23	106.4	17	197.2	88.0	0.48	0.08	0.64	0.00**	0.00	257.82	38.66	2.54	33
		R	162.6	23	106.4	23	197.2	88.0	0.48	0.08	0.64	0.00**	0.00	257.82	38.66	2.54	33

Span 3: From 24.27 ft To 40.52 ft

Loc ft	AbsLoc ft	Pos	Vu kips	Comb	Tu kips-ft	Comb	phi*Vn kips	T-lim kips-ft	Avs/s in^2/ft	Ats/s in^2/ft	Av/s in^2/ft	Aprv/s in^2/ft	Alx in^2	Vc kips	Vs kips	Beta	Th d
1.33	25.60	R	161.4	18	106.2	18	200.3	89.5	0.48	0.08	0.64	0.00**	0.00	261.15	38.60	2.58	33
10.15	34.42	L	141.6	18	106.2	24	654.8	89.5	0.47	0.09	0.64	2.48	0.00	210.80	516.77	2.08	35
		R	406.2	12	119.6	6	537.0	87.9	1.51	0.11	1.73	2.48	1.65	156.02	440.67	1.54	38
14.92	39.19	L	416.9	12	119.6	12	93.4#	87.9	1.67	0.11	1.90*	0.00**	8.09	147.28	43.46	1.45	39

Span 4: From 40.52 ft To 48.54 ft

Loc ft	AbsLoc ft	Pos	Vu kips	Comb	Tu kips-ft	Comb	phi*Vn kips	T-lim kips-ft	Avs/s in^2/ft	Ats/s in^2/ft	Av/s in^2/ft	Aprv/s in^2/ft	Alx in^2	Vc kips	Vs kips	Beta	The deg
1.33	41.85	R	436.2	8	15.4	274	555.3	90.1	1.78	0.00	1.78	2.48	3.39	147.44	469.52	1.46	39.7
4.04	44.56	L	430.1	8	15.4	148	565.0	90.1	1.70	0.00	1.70	2.48	0.00	151.44	476.35	1.49	39.3
		R	10.7	109	0.0	0	1038.8	89.1	0.00	0.00	0.00	2.48	0.00	458.53	695.74	4.53	29.2

Red flagged values are at equivalent column face and have dbl stirrups As=2.48 in2. Design ok.

Shear and Torsion Design : Notes

* Shear resistance provided by shear reinforcement (Vs) is greater than maximum allowed.
** Provided stirrup area (Aprv/s) is not adequate.
- Pos is the design position. L suggests the calculation is done at immediate left of "Loc" and R suggests at immediate right of it.
- T-lim is the limiting value of torsion for the concrete section. If actual torsion is higher than this value, torsional steel has to be provided.
- Avs/s is the required area of steel per unit length for shear force.
- Ats/s is the required area of steel per unit length for one leg of torsional reinforcement.
- Av/s is the total required area of steel per unit length due to shear plus torsion.
- Aprvs/s is the total provided area of transverse steel reinforcement.
- Alx is the EFFECTIVE longitudinal steel required in addition to the PROVIDED EFFECTIVE flexural steel.
- Vc is the nominal shear resistence of concrete.
- Vs is the nominal shear resistence of transverse reinforcement.
- Beta is the factor indicating ability of diagonally cracked concrete to transmit tension and shear.
- Theta is the angle of inclination of diagonal compressive stress.
- # Vu is greater tha phi*Vn.

CRACKING/FATIGUE CHECK

Span 1: From 0.00 ft To 8.02 ft

Loc ft	AbsLoc ft	H in	Cracking Comb	Cracking fs-t fs-b ksi	Cracking dc in	Cracking Srqt Srqb in	Cracking Sprt Sprb in	Fatigue stress range fs-t fs-b ksi	Fatigue threshold FTH-t FTH-b ksi
4.00	4.0	36.0	879	1.0	2.6	48.0	4.6	0.00	0.00
			0	0.0	2.6	5.0	4.6	0.00	0.00
6.69	6.7	36.0	953	34.3	2.6	13.3	4.6	0.00	0.00
			0	0.0	2.6	5.0	4.6	0.00	0.00

Span 2: From 8.02 ft To 24.27 ft

Loc ft	AbsLoc ft	H in	Cracking Comb	Cracking fs-t fs-b ksi	Cracking dc in	Cracking Srqt Srqb in	Cracking Sprt Sprb in	Fatigue stress range fs-t fs-b ksi	Fatigue threshold FTH-t FTH-b ksi
1.33	9.3	36.0	957	35.8	2.6	12.5	4.8	0.00	0.00
			0	0.0	2.6	5.0	4.8	0.00	0.00
6.12	14.1	36.0	0	0.0	2.6	5.0	4.6	0.00	0.00
			963	28.3	2.6	17.2	4.6	0.00	0.00
14.92	22.9	36.0	962	13.7	2.6	40.9	4.8	0.00	0.00
			0	0.0	2.6	5.0	4.8	0.00	0.00

Span 3: From 24.27 ft To 40.52 ft

Loc ft	AbsLoc ft	H in	Cracking Comb	Cracking fs-t fs-b ksi	Cracking dc in	Cracking Srqt Srqb in	Cracking Sprt Sprb in	Fatigue stress range fs-t fs-b ksi	Fatigue threshold FTH-t FTH-b ksi
1.33	25.6	36.0	956	13.7	2.6	41.0	4.8	0.00	0.00
			0	0.0	2.6	5.0	4.8	0.00	0.00
10.15	34.4	36.0	0	0.0	2.6	5.0	4.6	0.00	0.00
			958	27.7	2.6	17.6	4.6	0.00	0.00
14.92	39.2	36.0	964	35.9	2.6	12.4	4.8	0.00	0.00
			0	0.0	2.6	5.0	4.8	0.00	0.00

Span 4: From 40.52 ft To 48.54 ft

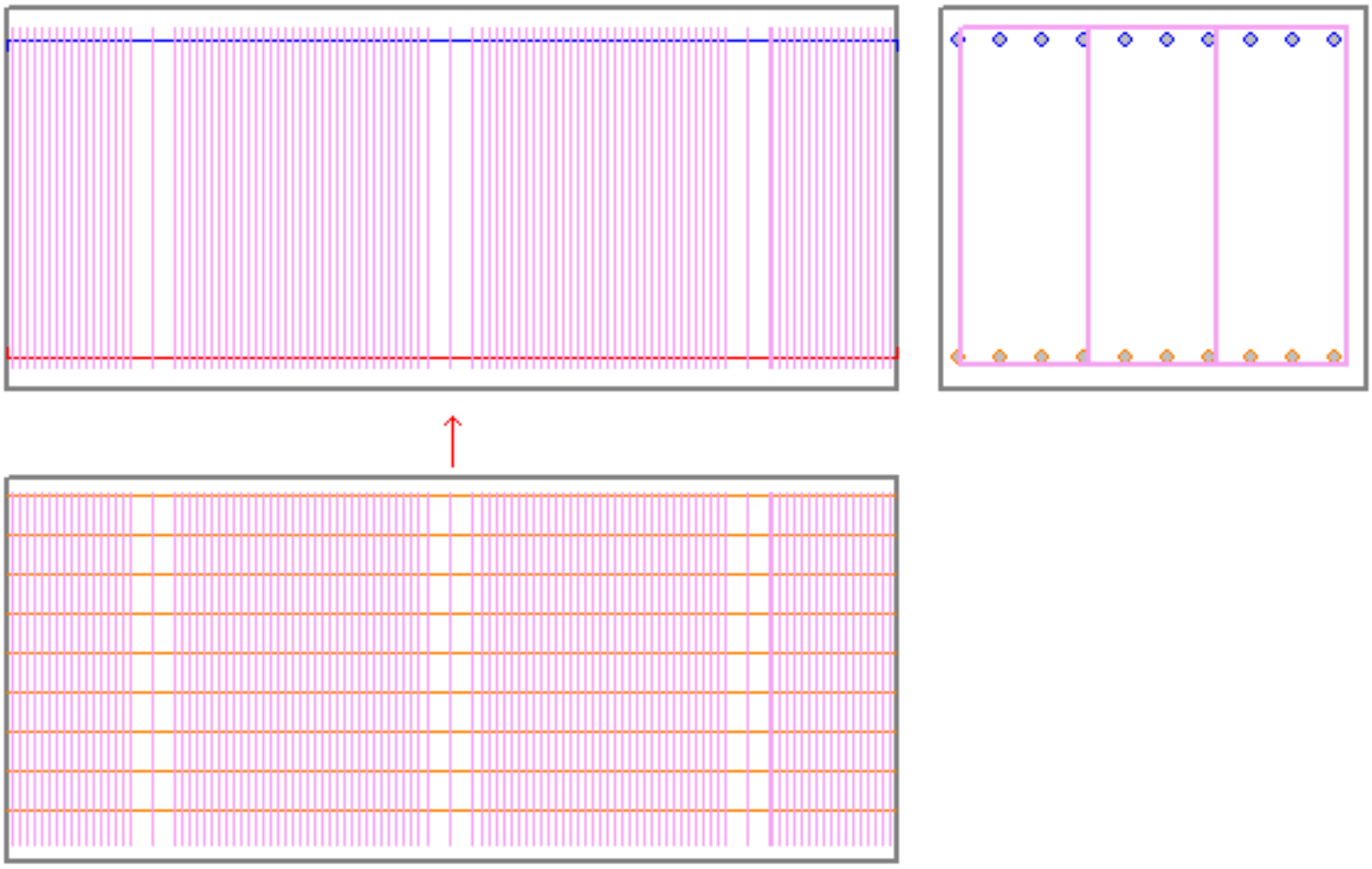
Loc ft	AbsLoc ft	H in	Cracking Comb	Cracking fs-t fs-b ksi	Cracking dc in	Cracking Srqt Srqb in	Cracking Sprt Sprb in	Fatigue stress range fs-t fs-b ksi	Fatigue threshold FTH-t FTH-b ksi
1.33	41.8	36.0	960	35.2	2.6	12.8	4.6	0.00	0.00
			0	0.0	2.6	5.0	4.6	0.00	0.00
4.04	44.6	36.0	785	0.6	2.6	48.0	4.6	0.00	0.00
			0	0.0	2.6	5.0	4.6	0.00	0.00

Cracking and fatigue Check : Notes

* Cracking / fatigue checking failed.
Required bar spacing, Sreq, should not be less than 5 in per Art. 5.7.3.4.

PROJECT:

Reinforcement Sketch for Cap



10 - #9 top and bottom longitudinal

#5 dbl stirrups @ 6" at ends and between columns

COLUMN DESIGN - Column: 1

Code: AASHTO LRFD 8
Units: US
Pier View: Downstation.
Design/Analysis Method: No Slenderness Considered.

Column Type: Round D = 36.00 in

Column Section Properties

Sec.	Area ft^2	Ix in^4	Iz in^4
1	7.07	82447.96	82447.96

DESIGN PARAMETERS

f'c = 4500.0 psi	fy = 60000.0 psi
phi tens = 0.90	phi comp = 0.75
Tens above = 0.005	Comp below = 0.002
phi shear = 0.90	fy shear = 60000.00 psi
Ec = 4435.3 ksi	Es = 29000 ksi
Concrete Type : Normal Weight.	

Reinforcement

Rebar Pattern: Circular
Rebar Orientation: Face Parallel

Main Reinforcement Schedule

Layer	Size	No. bars	Bar Dist. in	From ft	To ft	Hook
1	US#10[M32]	11	3.25	0.00	10.50	None

COLUMN DESIGN - Column: 2

Code: AASHTO LRFD 8
Units: US
Pier View: Downstation.
Design/Analysis Method: No Slenderness Considered.

Column Type: Round D = 36.00 in

Column Section Properties

Sec.	Area ft^2	Ix in^4	Iz in^4
1	7.07	82447.96	82447.96

DESIGN PARAMETERS

f'c = 4500.0 psi	fy = 60000.0 psi
phi tens = 0.90	phi comp = 0.75
Tens above = 0.005	Comp below = 0.002
phi shear = 0.90	fy shear = 60000.00 psi
Ec = 4435.3 ksi	Es = 29000 ksi
Concrete Type : Normal Weight.	

Reinforcement

Rebar Pattern: Circular
Rebar Orientation: Face Parallel

Main Reinforcement Schedule

Layer	Size	No. bars	Bar Dist. in	From ft	To ft	Hook
1	US#10[M32]	11	3.25	0.00	10.50	None

Note:

Bar Dist refers to the distance between center of reinforcement and concrete surface.

Lateral Reinforcement Schedule

Layer	Size	Type	Pitch in	From ft	To ft
1	US#5[M16]	Ties	12.00	0.00	10.50

Design values used - (e-min effect included).

Loc ft	Comb	Fx kips	Fy kips	Fz kips	Mx kips-ft	My kips-ft	Mz kips-ft
88.00	669	-21.5	505.2	5.5	232.6	-0.0	-79.8
98.50	669	20.8	496.6	-5.7	-173.4	-0.0	301.6
88.00	778	-7.8	505.1	16.4	355.5	-0.1	-70.7
98.50	778	8.0	496.5	-15.7	-187.8	-0.1	88.5

COLUMN DESIGN

Bot/Top Elev. ft	Comb	Pu kips	Mux kips-ft	Muz kips-ft	pMn kips-ft	Incl deg	pPn/Pu	pMn/Mu
88.00	778	505.1	355.5	70.7	1230.8	11.25	1.00	3.39614
98.50	669	496.6	173.4	301.6	1230.2	60.10	1.00	3.53562

COLUMN DESIGN

Bot/Top Elev. ft	As_min in^2	As_max in^2	As_prov in^2
88.00	10.31	81.43	13.97
98.50	10.31	81.43	13.97

SHEAR DESIGN:

Loc ft	Pos	Vu kips	Comb	phi*Vn kips	Av/s in^2/ft	Aprv/s in^2/ft	Vc kips	Vs kips	Beta	Theta deg	b in	dv in	Eps_s	Smax in	Sprv in
88.00	L	22.2	165	490.6	0.00	0.62	399.36	145.73	6.71	27.67	36.00	24.65	-0.0004	19.72	12.00
98.50	R	21.6	165	443.5	0.00	0.62	349.94	142.85	5.88	28.14	36.00	24.65	-0.0002	19.72	12.00

Column Design : Notes

Min reinforcement = 1.0125 % of Ag.
Shear Design : Notes
- Pos is the design position. L suggests the calculation is done at immediate left of "Loc" and R suggests at immediate right of it.
- Av/s is the total required area of steel per unit length due to shear plus torsion.
- Aprvs/s is the total provided area of transverse steel reinforcement.
- Vc is the nominal shear resistence of concrete.
- Vs is the nominal shear resistence of transverse reinforcement.
- Beta is the factor indicating ability of diagonally cracked concrete to transmit tension and shear.
- Theta is the angle of inclination of diagonal compressive stress.
- # Vu is greater tha phi*Vn.

Note:

Bar Dist refers to the distance between center of reinforcement and concrete surface.

Lateral Reinforcement Schedule

Layer	Size	Type	Pitch in	From ft	To ft
1	US#5[M16]	Ties	12.00	0.00	10.50

Design values used - (e-min effect included).

Loc ft	Comb	Fx kips	Fy kips	Fz kips	Mx kips-ft	My kips-ft	Mz kips-ft
88.00	498	-19.8	290.6	4.2	102.8	-0.3	-77.8
98.50	498	19.2	282.1	-4.4	-57.2	-0.3	282.0
88.00	778	-8.4	256.1	20.3	319.9	1.0	-35.9
98.50	778	8.5	247.5	-19.6	-110.8	1.0	98.8

COLUMN DESIGN

Bot/Top Elev. ft	Comb	Pu kips	Mux kips-ft	Muz kips-ft	pMn kips-ft	Incl deg	pPn/Pu	pMn/Mu
88.00	778	256.1	319.9	35.9	1055.5	6.40	1.00	3.27904
98.50	498	282.1	57.2	282.0	1076.8	78.54	1.00	3.74201

COLUMN DESIGN

Bot/Top Elev. ft	As_min in^2	As_max in^2	As_prov in^2
88.00	10.31	81.43	13.97
98.50	10.31	81.43	13.97

SHEAR DESIGN:

Loc ft	Pos	Vu kips	Comb	phi*Vn kips	Av/s in^2/ft	Aprv/s in^2/ft	Vc kips	Vs kips	Beta	Theta deg	b in	dv in	Eps_s	Smax in	Sprv in
88.00	L	23.8	12	396.3	0.00	0.62	301.07	139.22	5.06	28.76	36.00	24.65	-0.0001	19.72	12.00
98.50	R	23.8	12	408.5	0.00	0.62	313.68	140.25	5.27	28.58	36.00	24.65	-0.0001	19.72	12.00

Column Design : Notes

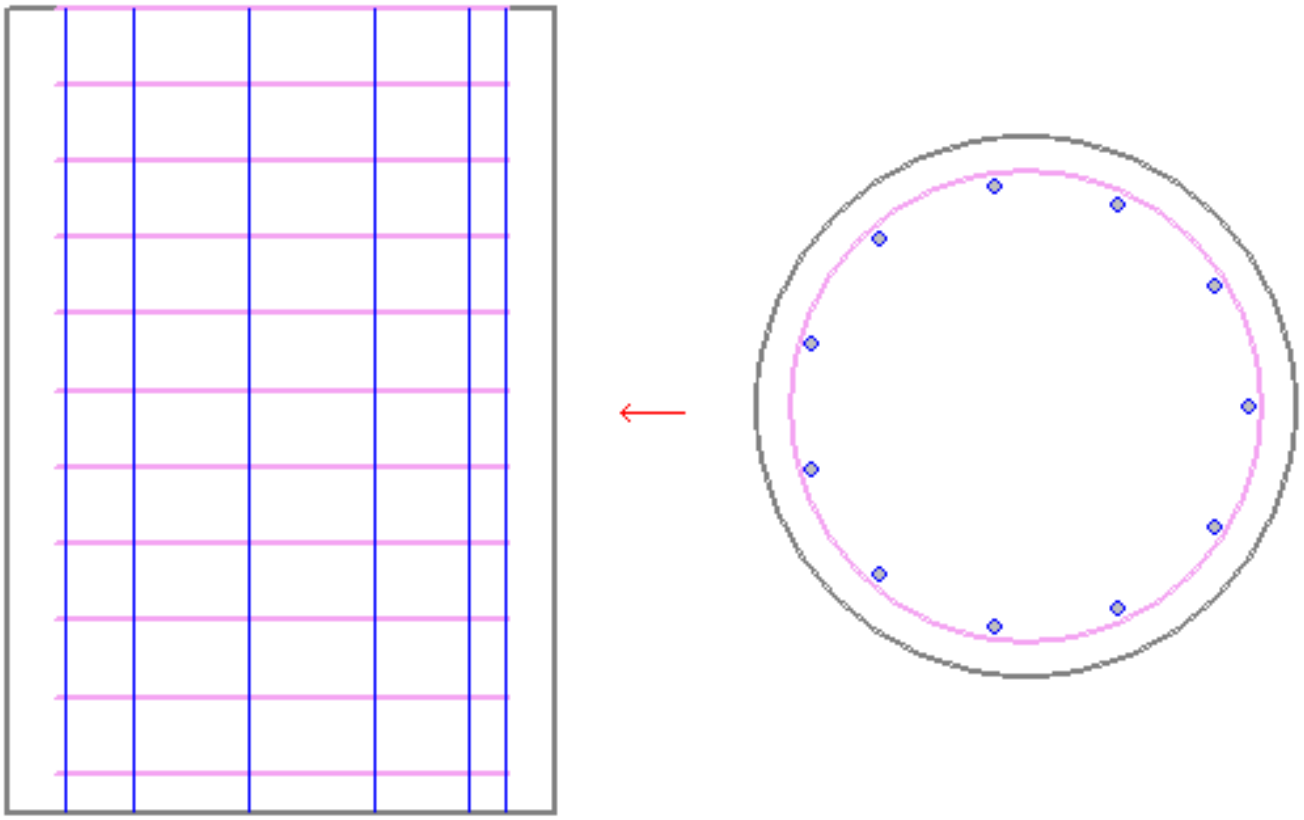
Min reinforcement = 1.0125 % of Ag.

Shear Design : Notes

- Pos is the design position. L suggests the calculation is done at immediate left of "Loc" and R suggests at immediate right of it.
- Av/s is the total required area of steel per unit length due to shear plus torsion.
- Aprvs/s is the total provided area of transverse steel reinforcement.
- Vc is the nominal shear resistence of concrete.
- Vs is the nominal shear resistence of transverse reinforcement.
- Beta is the factor indicating ability of diagonally cracked concrete to transmit tension and shear.
- Theta is the angle of inclination of diagonal compressive stress.
- # Vu is greater tha phi*Vn.

PROJECT:

Reinforcement Sketch for Column No. 4 (Shaft)



11 - #10 longitudinal

#5 stirrups @ 12"

PROJECT:

PROJECT DATA
==========

Project :
User Job No.:
Designer :
Date : Dec/29/2020
Checker :
Checked Date:
State : State Job No. :
Structure type: Pier.
Pier View : Downstation.
State Specification: None
Code : AASHTO LRFD 8th Edition
Comments :

PROJECT:

PIER GEOMETRY
==========

Pier Type: Multi Column

Pier View : Downstation.
Cap Shape: Straight Top Elevations: start = 100.00 ft end = 100.00 ft
Depth(Z) = 48.00 in Skew angle = 45.00 Reduction of I = 1.000
Length(X) = 48.54 ft Height(Y) = 36.00 in

Column Shape : Round
Number of columns: 3

Column number 1:

Location from the left edge of the cap(X): 8.02 ft
Elevations: bottom = 88.00 ft top = 98.50 ft Reduction of I = 1.000
Column Bottom is Fixed
Drilled Shaft at the bottom of the column:
Type: Circular Diameter = 42.00 in
Total height(Y) = 30.60 ft Height below the ground level = 10.00 ft
Column section dimensions:
Diameter = 36.00 in

Column number 2:

Location from the left edge of the cap(X): 24.27 ft
Elevations: bottom = 88.00 ft top = 98.50 ft Reduction of I = 1.000
Column Bottom is Fixed
Drilled Shaft at the bottom of the column:
Type: Circular Diameter = 42.00 in
Total height(Y) = 30.60 ft Height below the ground level = 10.00 ft
Column section dimensions:
Diameter = 36.00 in

Column number 3:

Location from the left edge of the cap(X): 40.52 ft
Elevations: bottom = 88.00 ft top = 98.50 ft Reduction of I = 1.000
Column Bottom is Fixed
Drilled Shaft at the bottom of the column:
Type: Circular Diameter = 42.00 in
Total height(Y) = 30.60 ft Height below the ground level = 10.00 ft
Column section dimensions:
Diameter = 36.00 in

SUPERSTRUCTURE INFO
==========

Total number of spans: 2 Span number rear to current pier: 1
Number of traffic lanes: 2

Beam: height : 36.00 in section area : 100.00 in^2
Beam Inertia (Ixx): 20300.00 in^4 Beam inertia (Iyy): 1300.00 in^4
Beam CG:18.00 in Barrier height : 28.00 in Depth of slab : 8.00 in
Curb to curb distance: 30.000 ft

Span #	Span length	Bridge Width

PROJECT:

1	99.590 ft	30.000 ft
2	99.590 ft	30.000 ft
		30.000 ft

BEARING POINTS

Number of bearing lines: 1

First bearing line Eccentricity = 0.00 ft

Point	Distance ft
1	4.00
2	14.14
3	24.28
4	34.42
5	44.56

MATERIAL PROPERTIES

	Cap	Column	Shaft
Concrete Type	normal	normal	normal
Concrete Strength (psi)	4500.00	4500.00	4000.00
Concrete Density (lb/ft3)	150.00	150.00	150.00
Concrete Modulus Ec (ksi)	4435.31	4435.31	4266.22
Steel Strength Fy (ksi)	60.00	60.00	60.00

DESIGN PARAMETERS

AASHTO LRFD Code

Resistance factors for reinf. concrete:

Flexure and tension	0.90
Shear and torsion (normal)	0.90
(lightweight)	0.90
Axial compression (ties)	0.75
Axial compression (spiral)	0.75
Compression in STM	0.70

Multi presence factors for live load:

1	Lanes	1.20
2	Lanes	1.00
3	Lanes	0.85
4	Lanes	0.65
5	Lanes	0.65
6	Lanes	0.65

Dynamic load allowance IM:

	Truck	Lane	Fatigue
Cap	0.33	0.00	0.15
Column	0.33	0.00	0.15
Footing	0.00	0.00	0.00

	Exposure factors	Clear cover in	Clear side cover in
Cap	1.00	2.00	2.00
Column	1.00	2.00	
Footing	1.00	3.00	3.00

PROJECT:

Degree of fixity in foundations for Moment Magnify Method: Ga = 5.00

SEISMIC DESIGN PARAMETERS

Strength Reduction factors for reinf. Concrete Seismic Design:

Tension controlled	0.90
Shear and torsion (normal)	0.90
(lightweight)	0.70
Compression Controlled (ties)	0.75
Compression Controlled (spiral)	0.75

Seismic Overstrength

Flexure and tension	1.30
Axial compression (ties)	1.30
Axial compression (spiral)	1.30

Response Modification Factor : 1.00

Use core area for plastic hinging calculations.

Design Factors

Cap Design Factor	1.20
Footing Design Factor	1.20

Plastic Hinge Moment

Use actual computed Plastic Hinging Moment for each column in all combinations.

PROJECT:

LOADS
=====

Pier View : Downstation.
Load Cases: 50
Longitudinal Reaction: Simple Span Distribution
Selected Vehicles:

Load: Design Truck
Load: Design Truck + Lane Load
Load: Two Design Trucks + Lane Load
Load: Fatigue Truck

Tranverse Positioning
=====================

Number of loaded lanes = All combinations
Live Load Positions = Constant Spacing
Minimum Distance from Curb = 2.000000
Center to Center Spacing = 10.000000

Generate Braking/Longitudinal Force = Selected
Generate Centrifugal Force = Not Selected

Total number of Considered Truck Positions = 5
Total number of Possible Combination = 3

Loadcase ID: DC1 Name: DL1
Multiplier = 1.000

Bearing loads:

Line #	Bearing #	Dir.	Load, kips
1	1	Y	-80.00
1	2	Y	-108.00
1	3	Y	-108.00
1	4	Y	-108.00
1	5	Y	-80.00

Auto generation details

Generated Dead Load
Slab weight = 150.00 pcf Girder weight = 150.00 pcf
Composite distributed reaction factor on 1st bearing line: 1.00
Composite distributed reaction factor on 2nd bearing line: 0.00
Input dead load reaction: 240.00 kips

Loadcase ID: DW1 Name: FWS
Multiplier = 1.000

Bearing loads:

Line #	Bearing #	Dir.	Load, kips
1	1	Y	-69.00
1	2	Y	-27.00
1	3	Y	-27.00
1	4	Y	-27.00

PROJECT:

1	5	Y	-69.00	

Auto generation details

Generated Dead Load

Slab weight = Not included Girder weight = Not included
Wearing weight = 418.00 plf Barrier load = Not included

Loadcase ID: LL1 Name:
Multiplier = 1.500

Bearing loads:

Line #	Bearing #	Dir.	Load, kips	
1	1	Y	-38.51	
1	2	Y	-55.03	
1	3	Y	-1.08	
1	4	Y	0.00	
1	5	Y	0.00	
1	1	Y	-29.48	L
1	2	Y	-37.11	L
1	3	Y	-2.25	L
1	4	Y	0.00	L
1	5	Y	0.00	L

Auto generation details

Generated Live Load

Loadcase ID: LL2 Name:
Multiplier = 1.500

Bearing loads:

Line #	Bearing #	Dir.	Load, kips	
1	1	Y	0.00	
1	2	Y	0.00	
1	3	Y	-1.17	
1	4	Y	-55.03	
1	5	Y	-38.42	
1	1	Y	0.00	L
1	2	Y	0.00	L
1	3	Y	-2.28	L
1	4	Y	-37.18	L
1	5	Y	-29.38	L

Auto generation details

Generated Live Load

Loadcase ID: LL3 Name:
Multiplier = 1.500

Bearing loads:

Line #	Bearing #	Dir.	Load, kips	
1	1	Y	0.00	
1	2	Y	-19.84	
1	3	Y	-55.03	
1	4	Y	-19.75	

PROJECT:

1	5	Y	0.00	
1	1	Y	0.00	L
1	2	Y	-12.03	L
1	3	Y	-44.84	L
1	4	Y	-11.97	L
1	5	Y	0.00	L

Auto generation details

Generated Live Load

Loadcase ID: LL4 Name:
Multiplier = 1.500

Bearing loads:

Line #	Bearing #	Dir.	Load, kips	
1	1	Y	-32.09	
1	2	Y	-45.86	
1	3	Y	-1.87	
1	4	Y	-45.86	
1	5	Y	-32.02	
1	1	Y	-24.57	L
1	2	Y	-30.92	L
1	3	Y	-3.77	L
1	4	Y	-30.99	L
1	5	Y	-24.48	L

Auto generation details

Generated Live Load

Loadcase ID: LL5 Name:
Multiplier = 1.500

Bearing loads:

Line #	Bearing #	Dir.	Load, kips	
1	1	Y	-32.09	
1	2	Y	-62.39	
1	3	Y	-46.75	
1	4	Y	-16.46	
1	5	Y	0.00	
1	1	Y	-24.57	L
1	2	Y	-40.95	L
1	3	Y	-39.23	L
1	4	Y	-9.97	L
1	5	Y	0.00	L

Auto generation details

Generated Live Load

Loadcase ID: LL6 Name:
Multiplier = 1.500

Bearing loads:

Line #	Bearing #	Dir.	Load, kips
1	1	Y	0.00

PROJECT:

1	2	Y	-16.53	
1	3	Y	-46.83	
1	4	Y	-62.31	
1	5	Y	-32.02	
1	1	Y	0.00	L
1	2	Y	-10.03	L
1	3	Y	-39.26	L
1	4	Y	-40.96	L
1	5	Y	-24.48	L

Auto generation details

Generated Live Load

Loadcase ID: BR1 Name:
Multiplier = 1.000

Loadcase ID: BR1 Name:
Multiplier = 1.000

Cap loads:

Type	Dir	Arm ft	Mag1 kips, klf,k-ft	x1/L	Mag2 kips, klf,k-ft	x2/L
Moment	X	----	147.64	0.50	----	----

Bearing loads:

Line #	Bearing #	Dir.	Load, kips
1	1	X	-3.05
1	1	Z	3.05
1	1	Y	-3.64
1	2	X	-3.05
1	2	Z	3.05
1	3	X	-3.05
1	3	Z	3.05
1	4	X	-3.05
1	4	Z	3.05
1	5	X	-3.05
1	5	Z	3.05
1	5	Y	3.64

Auto generation details

Selected Live Load for BR generation
Load: Design Truck
Load: Design Truck + Lane Load
Load: Two Design Trucks + Lane Load
Load: Fatigue Truck
Number of loaded lanes = 1
Contributing longitudinal length = 99.59 ft

Loadcase ID: BR2 Name:
Multiplier = 1.000

Cap loads:

Type	Dir	Arm ft	Mag1 kips, klf,k-ft	x1/L	Mag2 kips, klf,k-ft	x2/L
Moment	X	----	147.64	0.50	----	----

PROJECT:

Bearing loads:

Line #	Bearing #	Dir.	Load, kips
1	1	X	-3.05
1	1	Z	3.05
1	1	Y	-3.64
1	2	X	-3.05
1	2	Z	3.05
1	3	X	-3.05
1	3	Z	3.05
1	4	X	-3.05
1	4	Z	3.05
1	5	X	-3.05
1	5	Z	3.05
1	5	Y	3.64

Auto generation details

Selected Live Load for BR generation
Load: Design Truck
Load: Design Truck + Lane Load
Load: Two Design Trucks + Lane Load
Load: Fatigue Truck
Number of loaded lanes = 1
Contributing longitudinal length = 99.59 ft

Loadcase ID: BR3 Name:
Multiplier = 1.000

Cap loads:

Type	Dir	Arm ft	Mag1 kips, klf,k-ft	x1/L	Mag2 kips, klf,k-ft	x2/L
Moment	X	----	147.64	0.50	----	----

Bearing loads:

Line #	Bearing #	Dir.	Load, kips
1	1	X	-3.05
1	1	Z	3.05
1	1	Y	-3.64
1	2	X	-3.05
1	2	Z	3.05
1	3	X	-3.05
1	3	Z	3.05
1	4	X	-3.05
1	4	Z	3.05
1	5	X	-3.05
1	5	Z	3.05
1	5	Y	3.64

Auto generation details

Selected Live Load for BR generation
Load: Design Truck
Load: Design Truck + Lane Load
Load: Two Design Trucks + Lane Load
Load: Fatigue Truck
Number of loaded lanes = 1
Contributing longitudinal length = 99.59 ft

PROJECT:

Loadcase ID: BR4 Name:
Multiplier = 1.000

Cap loads:

Type	Dir	Arm ft	Mag1 kips, klf,k-ft	x1/L	Mag2 kips, klf,k-ft	x2/L
Moment	X	----	246.07	0.50	----	----

Bearing loads:

Line #	Bearing #	Dir.	Load, kips
1	1	X	-5.09
1	1	Z	5.09
1	1	Y	-6.07
1	2	X	-5.09
1	2	Z	5.09
1	3	X	-5.09
1	3	Z	5.09
1	4	X	-5.09
1	4	Z	5.09
1	5	X	-5.09
1	5	Z	5.09
1	5	Y	6.07

Auto generation details

Selected Live Load for BR generation
Load: Design Truck
Load: Design Truck + Lane Load
Load: Two Design Trucks + Lane Load
Load: Fatigue Truck
Number of loaded lanes = 2
Contributing longitudinal length = 99.59 ft

Loadcase ID: BR5 Name:
Multiplier = 1.000

Cap loads:

Type	Dir	Arm ft	Mag1 kips, klf,k-ft	x1/L	Mag2 kips, klf,k-ft	x2/L
Moment	X	----	246.07	0.50	----	----

Bearing loads:

Line #	Bearing #	Dir.	Load, kips
1	1	X	-5.09
1	1	Z	5.09
1	1	Y	-6.07
1	2	X	-5.09
1	2	Z	5.09
1	3	X	-5.09
1	3	Z	5.09
1	4	X	-5.09
1	4	Z	5.09
1	5	X	-5.09
1	5	Z	5.09
1	5	Y	6.07

Auto generation details

PROJECT:

Selected Live Load for BR generation
Load: Design Truck
Load: Design Truck + Lane Load
Load: Two Design Trucks + Lane Load
Load: Fatigue Truck
Number of loaded lanes = 2
Contributing longitudinal length = 99.59 ft

Loadcase ID: BR6 Name:
Multiplier = 1.000

Cap loads:

Type	Dir	Arm ft	Mag1 kips, klf,k-ft	x1/L	Mag2 kips, klf,k-ft	x2/L
Moment	X	----	246.07	0.50	----	----

Bearing loads:

Line #	Bearing #	Dir.	Load, kips
1	1	X	-5.09
1	1	Z	5.09
1	1	Y	-6.07
1	2	X	-5.09
1	2	Z	5.09
1	3	X	-5.09
1	3	Z	5.09
1	4	X	-5.09
1	4	Z	5.09
1	5	X	-5.09
1	5	Z	5.09
1	5	Y	6.07

Auto generation details

Selected Live Load for BR generation
Load: Design Truck
Load: Design Truck + Lane Load
Load: Two Design Trucks + Lane Load
Load: Fatigue Truck
Number of loaded lanes = 2
Contributing longitudinal length = 99.59 ft

Loadcase ID: WS1 Name: STR III-Angle: 45
Multiplier = 1.000

Cap loads:

Type	Dir	Arm ft	Mag1 kips, klf,k-ft	x1/L	Mag2 kips, klf,k-ft	x2/L
Force	X	0.00	0.35	0.50	----	----

Column loads:

Col #	Type	Dir	Mag1		y1/L	Mag2	y2/L
1	UDL	X	0.103	klf	0.00	----	0.66
1	UDL	X	0.088	klf	0.66	----	0.95
2	UDL	X	0.103	klf	0.00	----	0.66
2	UDL	X	0.088	klf	0.66	----	0.95
3	UDL	X	0.103	klf	0.00	----	0.66

3	UDL	X	0.088	klf	0.66	----		0.95

Bearing loads:

Line #	Bearing #	Dir.	Load, kips
1	1	X	1.98
1	1	Y	0.73
1	1	Z	0.69
1	2	X	1.98
1	2	Y	-0.00
1	2	Z	0.69
1	3	X	1.98
1	3	Y	-0.00
1	3	Z	0.69
1	4	X	1.98
1	4	Y	-0.00
1	4	Z	0.69
1	5	X	1.98
1	5	Y	-0.73
1	5	Z	0.69

Auto generation details
Generated Wind Load on Structure
Angle of wind = 45.00 deg Elevation above which wind load acts = 67.40 ft
Default wind pressure
For STR III
Wind pressure for superstructure: Wind pressure for substructure:
Pz = 23.960 psf Pz = 29.490 psf
Overturning not considered
For SER IV
Wind pressure for superstructure: Wind pressure for substructure:
Pz = 13.480 psf Pz = 16.590 psf
Overturning not considered
For STR V
Wind pressure for superstructure: Wind pressure for substructure:
Pz = 21.190 psf Pz = 26.080 psf
For SER I
Wind pressure for superstructure: Wind pressure for substructure:
Pz = 16.250 psf Pz = 20.000 psf

Loadcase ID: WS2 Name: STR III-Angle: 30
Multiplier = 1.000

Cap loads:

Type	Dir	Arm ft	Mag1 kips, klf,k-ft	x1/L	Mag2 kips, klf,k-ft	x2/L
Force	X	0.00	1.40	0.50	----	----
UDL	Z	----	0.01	0.00	----	1.00

Column loads:

Col #	Type	Dir	Mag1		y1/L	Mag2	y2/L
1	UDL	X	0.100	klf	0.00	----	0.66
1	UDL	X	0.085	klf	0.66	----	0.95
1	UDL	Z	0.027	klf	0.00	----	0.66
1	UDL	Z	0.023	klf	0.66	----	0.95
2	UDL	X	0.100	klf	0.00	----	0.66
2	UDL	X	0.085	klf	0.66	----	0.95
2	UDL	Z	0.027	klf	0.00	----	0.66
2	UDL	Z	0.023	klf	0.66	----	0.95
3	UDL	X	0.100	klf	0.00	----	0.66

3	UDL	X	0.085	klf	0.66	----	0.95
3	UDL	Z	0.027	klf	0.00	----	0.66
3	UDL	Z	0.023	klf	0.66	----	0.95

Bearing loads:

Line #	Bearing #	Dir.	Load, kips
1	1	X	2.15
1	1	Y	0.79
1	1	Z	1.17
1	2	X	2.15
1	2	Y	-0.00
1	2	Z	1.17
1	3	X	2.15
1	3	Y	-0.00
1	3	Z	1.17
1	4	X	2.15
1	4	Y	-0.00
1	4	Z	1.17
1	5	X	2.15
1	5	Y	-0.79
1	5	Z	1.17

Auto generation details
Generated Wind Load on Structure
Angle of wind = 30.00 deg Elevation above which wind load acts = 67.40 ft
Default wind pressure
For STR III
Wind pressure for superstructure: Wind pressure for substructure:
Pz = 23.960 psf Pz = 29.490 psf
Overturning not considered
For SER IV
Wind pressure for superstructure: Wind pressure for substructure:
Pz = 13.480 psf Pz = 16.590 psf
Overturning not considered
For STR V
Wind pressure for superstructure: Wind pressure for substructure:
Pz = 21.190 psf Pz = 26.080 psf
For SER I
Wind pressure for superstructure: Wind pressure for substructure:
Pz = 16.250 psf Pz = 20.000 psf

Loadcase ID: WS3 Name: STR III-Angle: 15
Multiplier = 1.000

Cap loads:

Type	Dir	Arm ft	Mag1 kips, klf,k-ft	x1/L	Mag2 kips, klf,k-ft	x2/L
Force	X	0.00	2.12	0.50	----	----
UDL	Z	----	0.03	0.00	----	1.00

Column loads:

Col #	Type	Dir	Mag1		y1/L	Mag2	y2/L
1	UDL	X	0.089	klf	0.00	----	0.66
1	UDL	X	0.077	klf	0.66	----	0.95
1	UDL	Z	0.052	klf	0.00	----	0.66
1	UDL	Z	0.044	klf	0.66	----	0.95
2	UDL	X	0.089	klf	0.00	----	0.66
2	UDL	X	0.077	klf	0.66	----	0.95
2	UDL	Z	0.052	klf	0.00	----	0.66

PROJECT:

2	UDL	Z	0.044	klf	0.66	----	0.95
3	UDL	X	0.089	klf	0.00	----	0.66
3	UDL	X	0.077	klf	0.66	----	0.95
3	UDL	Z	0.052	klf	0.00	----	0.66
3	UDL	Z	0.044	klf	0.66	----	0.95

Bearing loads:

Line #	Bearing #	Dir.	Load, kips
1	1	X	2.02
1	1	Y	0.75
1	1	Z	1.54
1	2	X	2.02
1	2	Y	-0.00
1	2	Z	1.54
1	3	X	2.02
1	3	Y	-0.00
1	3	Z	1.54
1	4	X	2.02
1	4	Y	-0.00
1	4	Z	1.54
1	5	X	2.02
1	5	Y	-0.75
1	5	Z	1.54

Auto generation details
Generated Wind Load on Structure
Angle of wind = 15.00 deg Elevation above which wind load acts = 67.40 ft
Default wind pressure
For STR III
Wind pressure for superstructure: Wind pressure for substructure:
Pz = 23.960 psf Pz = 29.490 psf
Overturning not considered
For SER IV
Wind pressure for superstructure: Wind pressure for substructure:
Pz = 13.480 psf Pz = 16.590 psf
Overturning not considered
For STR V
Wind pressure for superstructure: Wind pressure for substructure:
Pz = 21.190 psf Pz = 26.080 psf
For SER I
Wind pressure for superstructure: Wind pressure for substructure:
Pz = 16.250 psf Pz = 20.000 psf

Loadcase ID: WS4 Name: STR III-Angle: 0
Multiplier = 1.000

Cap loads:

Type	Dir	Arm ft	Mag1 kips, klf,k-ft	x1/L	Mag2 kips, klf,k-ft	x2/L
Force	X	0.00	2.32	0.50	----	----
UDL	Z	----	0.05	0.00	----	1.00

Column loads:

Col #	Type	Dir	Mag1	y1/L	Mag2	y2/L
1	UDL	X	0.073 klf	0.00	----	0.66
1	UDL	X	0.063 klf	0.66	----	0.95
1	UDL	Z	0.073 klf	0.00	----	0.66
1	UDL	Z	0.063 klf	0.66	----	0.95
2	UDL	X	0.073 klf	0.00	----	0.66

PROJECT:

2	UDL	X	0.063	klf	0.66	----	0.95
2	UDL	Z	0.073	klf	0.00	----	0.66
2	UDL	Z	0.063	klf	0.66	----	0.95
3	UDL	X	0.073	klf	0.00	----	0.66
3	UDL	X	0.063	klf	0.66	----	0.95
3	UDL	Z	0.073	klf	0.00	----	0.66
3	UDL	Z	0.063	klf	0.66	----	0.95

Bearing loads:

Line #	Bearing #	Dir.	Load, kips
1	1	X	2.02
1	1	Y	0.75
1	1	Z	2.02
1	2	X	2.02
1	2	Y	-0.00
1	2	Z	2.02
1	3	X	2.02
1	3	Y	-0.00
1	3	Z	2.02
1	4	X	2.02
1	4	Y	-0.00
1	4	Z	2.02
1	5	X	2.02
1	5	Y	-0.75
1	5	Z	2.02

Auto generation details
Generated Wind Load on Structure
Angle of wind = 0.00 deg Elevation above which wind load acts = 67.40 ft
Default wind pressure
For STR III
Wind pressure for superstructure: Wind pressure for substructure:
Pz = 23.960 psf Pz = 29.490 psf
Overturning not considered
For SER IV
Wind pressure for superstructure: Wind pressure for substructure:
Pz = 13.480 psf Pz = 16.590 psf
Overturning not considered
For STR V
Wind pressure for superstructure: Wind pressure for substructure:
Pz = 21.190 psf Pz = 26.080 psf
For SER I
Wind pressure for superstructure: Wind pressure for substructure:
Pz = 16.250 psf Pz = 20.000 psf

Loadcase ID: WS5 Name: STR III-Angle: -15
Multiplier = 1.000

Cap loads:

Type	Dir	Arm ft	Mag1 kips, klf,k-ft	x1/L	Mag2 kips, klf,k-ft	x2/L
Force	X	0.00	1.95	0.50	----	----
UDL	Z	----	0.07	0.00	----	1.00

Column loads:

Col #	Type	Dir	Mag1	y1/L	Mag2	y2/L
1	UDL	X	0.052 klf	0.00	----	0.66
1	UDL	X	0.044 klf	0.66	----	0.95
1	UDL	Z	0.089 klf	0.00	----	0.66

PROJECT:

1	UDL	Z	0.077	klf	0.66	----	0.95
2	UDL	X	0.052	klf	0.00	----	0.66
2	UDL	X	0.044	klf	0.66	----	0.95
2	UDL	Z	0.089	klf	0.00	----	0.66
2	UDL	Z	0.077	klf	0.66	----	0.95
3	UDL	X	0.052	klf	0.00	----	0.66
3	UDL	X	0.044	klf	0.66	----	0.95
3	UDL	Z	0.089	klf	0.00	----	0.66
3	UDL	Z	0.077	klf	0.66	----	0.95

Bearing loads:

Line #	Bearing #	Dir.	Load, kips
1	1	X	1.54
1	1	Y	0.57
1	1	Z	2.02
1	2	X	1.54
1	2	Y	-0.00
1	2	Z	2.02
1	3	X	1.54
1	3	Y	-0.00
1	3	Z	2.02
1	4	X	1.54
1	4	Y	-0.00
1	4	Z	2.02
1	5	X	1.54
1	5	Y	-0.57
1	5	Z	2.02

Auto generation details
Generated Wind Load on Structure
Angle of wind = -15.00 deg Elevation above which wind load acts = 67.40 ft
Default wind pressure
For STR III
Wind pressure for superstructure: Wind pressure for substructure:
Pz = 23.960 psf Pz = 29.490 psf
Overturning not considered
For SER IV
Wind pressure for superstructure: Wind pressure for substructure:
Pz = 13.480 psf Pz = 16.590 psf
Overturning not considered
For STR V
Wind pressure for superstructure: Wind pressure for substructure:
Pz = 21.190 psf Pz = 26.080 psf
For SER I
Wind pressure for superstructure: Wind pressure for substructure:
Pz = 16.250 psf Pz = 20.000 psf

Loadcase ID: WS6 Name: STR III-Angle: -30
Multiplier = 1.000

Cap loads:

Type	Dir	Arm ft	Mag1 kips, klf,k-ft	x1/L	Mag2 kips, klf,k-ft	x2/L
Force	X	0.00	1.10	0.50	----	----
UDL	Z	----	0.08	0.00	----	1.00

Column loads:

Col #	Type	Dir	Mag1	y1/L	Mag2	y2/L
1	UDL	X	0.027 klf	0.00	----	0.66

PROJECT:

1	UDL	X	0.023	klf	0.66	----	0.95
1	UDL	Z	0.100	klf	0.00	----	0.66
1	UDL	Z	0.085	klf	0.66	----	0.95
2	UDL	X	0.027	klf	0.00	----	0.66
2	UDL	X	0.023	klf	0.66	----	0.95
2	UDL	Z	0.100	klf	0.00	----	0.66
2	UDL	Z	0.085	klf	0.66	----	0.95
3	UDL	X	0.027	klf	0.00	----	0.66
3	UDL	X	0.023	klf	0.66	----	0.95
3	UDL	Z	0.100	klf	0.00	----	0.66
3	UDL	Z	0.085	klf	0.66	----	0.95

Bearing loads:

Line #	Bearing #	Dir.	Load, kips
1	1	X	1.17
1	1	Y	0.43
1	1	Z	2.15
1	2	X	1.17
1	2	Y	-0.00
1	2	Z	2.15
1	3	X	1.17
1	3	Y	-0.00
1	3	Z	2.15
1	4	X	1.17
1	4	Y	-0.00
1	4	Z	2.15
1	5	X	1.17
1	5	Y	-0.43
1	5	Z	2.15

Auto generation details
Generated Wind Load on Structure
Angle of wind = -30.00 deg Elevation above which wind load acts = 67.40 ft
Default wind pressure
For STR III
Wind pressure for superstructure: Wind pressure for substructure:
Pz = 23.960 psf Pz = 29.490 psf
Overturning not considered
For SER IV
Wind pressure for superstructure: Wind pressure for substructure:
Pz = 13.480 psf Pz = 16.590 psf
Overturning not considered
For STR V
Wind pressure for superstructure: Wind pressure for substructure:
Pz = 21.190 psf Pz = 26.080 psf
For SER I
Wind pressure for superstructure: Wind pressure for substructure:
Pz = 16.250 psf Pz = 20.000 psf

Loadcase ID: WS7 Name: STR III-Angle: -45
Multiplier = 1.000

Cap loads:

Type	Dir	Arm ft	Mag1 kips, klf,k-ft	x1/L	Mag2 kips, klf,k-ft	x2/L
UDL	Z	----	0.09	0.00	----	1.00

Column loads:

Col #	Type	Dir	Mag1	y1/L	Mag2	y2/L

PROJECT:

1	UDL	Z	0.103	klf	0.00	----	0.66
1	UDL	Z	0.088	klf	0.66	----	0.95
2	UDL	Z	0.103	klf	0.00	----	0.66
2	UDL	Z	0.088	klf	0.66	----	0.95
3	UDL	Z	0.103	klf	0.00	----	0.66
3	UDL	Z	0.088	klf	0.66	----	0.95

Bearing loads:

Line #	Bearing #	Dir.	Load, kips
1	1	X	0.69
1	1	Y	0.25
1	1	Z	1.98
1	2	X	0.69
1	2	Y	-0.00
1	2	Z	1.98
1	3	X	0.69
1	3	Y	-0.00
1	3	Z	1.98
1	4	X	0.69
1	4	Y	-0.00
1	4	Z	1.98
1	5	X	0.69
1	5	Y	-0.25
1	5	Z	1.98

Auto generation details
Generated Wind Load on Structure
Angle of wind = -45.00 deg Elevation above which wind load acts = 67.40 ft
Default wind pressure
For STR III
Wind pressure for superstructure: Wind pressure for substructure:
Pz = 23.960 psf Pz = 29.490 psf
Overturning not considered
For SER IV
Wind pressure for superstructure: Wind pressure for substructure:
Pz = 13.480 psf Pz = 16.590 psf
Overturning not considered
For STR V
Wind pressure for superstructure: Wind pressure for substructure:
Pz = 21.190 psf Pz = 26.080 psf
For SER I
Wind pressure for superstructure: Wind pressure for substructure:
Pz = 16.250 psf Pz = 20.000 psf

Loadcase ID: WS8 Name: SER IV-Angle: 45
Multiplier = 1.000

Cap loads:

Type	Dir	Arm ft	Mag1 kips, klf,k-ft	x1/L	Mag2 kips, klf,k-ft	x2/L
Force	X	0.00	0.20	0.50	----	----

Column loads:

Col #	Type	Dir	Mag1		y1/L	Mag2	y2/L
1	UDL	X	0.058	klf	0.00	----	0.66
1	UDL	X	0.050	klf	0.66	----	0.95
2	UDL	X	0.058	klf	0.00	----	0.66
2	UDL	X	0.050	klf	0.66	----	0.95
3	UDL	X	0.058	klf	0.00	----	0.66

PROJECT:

3	UDL	X	0.050	klf	0.66	----		0.95

Bearing loads:

Line #	Bearing #	Dir.	Load, kips
1	1	X	1.12
1	1	Y	0.41
1	1	Z	0.39
1	2	X	1.12
1	2	Y	-0.00
1	2	Z	0.39
1	3	X	1.12
1	3	Y	-0.00
1	3	Z	0.39
1	4	X	1.12
1	4	Y	-0.00
1	4	Z	0.39
1	5	X	1.12
1	5	Y	-0.41
1	5	Z	0.39

Auto generation details
Generated Wind Load on Structure
Angle of wind = 45.00 deg Elevation above which wind load acts = 67.40 ft
Default wind pressure
For STR III
Wind pressure for superstructure: Wind pressure for substructure:
Pz = 23.960 psf Pz = 29.490 psf
Overturning not considered
For SER IV
Wind pressure for superstructure: Wind pressure for substructure:
Pz = 13.480 psf Pz = 16.590 psf
Overturning not considered
For STR V
Wind pressure for superstructure: Wind pressure for substructure:
Pz = 21.190 psf Pz = 26.080 psf
For SER I
Wind pressure for superstructure: Wind pressure for substructure:
Pz = 16.250 psf Pz = 20.000 psf

Loadcase ID: WS9 Name: SER IV-Angle: 30
Multiplier = 1.000

Cap loads:

Type	Dir	Arm ft	Mag1 kips, klf,k-ft	x1/L	Mag2 kips, klf,k-ft	x2/L
Force	X	0.00	0.79	0.50	----	----
UDL	Z	----	0.00	0.00	----	1.00

Column loads:

Col #	Type	Dir	Mag1		y1/L	Mag2	y2/L
1	UDL	X	0.056	klf	0.00	----	0.66
1	UDL	X	0.048	klf	0.66	----	0.95
1	UDL	Z	0.015	klf	0.00	----	0.66
1	UDL	Z	0.013	klf	0.66	----	0.95
2	UDL	X	0.056	klf	0.00	----	0.66
2	UDL	X	0.048	klf	0.66	----	0.95
2	UDL	Z	0.015	klf	0.00	----	0.66
2	UDL	Z	0.013	klf	0.66	----	0.95
3	UDL	X	0.056	klf	0.00	----	0.66

PROJECT:

3	UDL	X	0.048	klf	0.66	----	0.95
3	UDL	Z	0.015	klf	0.00	----	0.66
3	UDL	Z	0.013	klf	0.66	----	0.95

Bearing loads:

Line #	Bearing #	Dir.	Load, kips
1	1	X	1.21
1	1	Y	0.45
1	1	Z	0.66
1	2	X	1.21
1	2	Y	-0.00
1	2	Z	0.66
1	3	X	1.21
1	3	Y	-0.00
1	3	Z	0.66
1	4	X	1.21
1	4	Y	-0.00
1	4	Z	0.66
1	5	X	1.21
1	5	Y	-0.45
1	5	Z	0.66

Auto generation details
Generated Wind Load on Structure
Angle of wind = 30.00 deg Elevation above which wind load acts = 67.40 ft
Default wind pressure
For STR III
Wind pressure for superstructure: Wind pressure for substructure:
Pz = 23.960 psf Pz = 29.490 psf
Overturning not considered
For SER IV
Wind pressure for superstructure: Wind pressure for substructure:
Pz = 13.480 psf Pz = 16.590 psf
Overturning not considered
For STR V
Wind pressure for superstructure: Wind pressure for substructure:
Pz = 21.190 psf Pz = 26.080 psf
For SER I
Wind pressure for superstructure: Wind pressure for substructure:
Pz = 16.250 psf Pz = 20.000 psf

Loadcase ID: WS10 Name: SER IV-Angle: 15
Multiplier = 1.000

Cap loads:

Type	Dir	Arm ft	Mag1 kips, klf,k-ft	x1/L	Mag2 kips, klf,k-ft	x2/L
Force	X	0.00	1.20	0.50	----	----
UDL	Z	----	0.01	0.00	----	1.00

Column loads:

Col #	Type	Dir	Mag1		y1/L	Mag2	y2/L
1	UDL	X	0.050	klf	0.00	----	0.66
1	UDL	X	0.043	klf	0.66	----	0.95
1	UDL	Z	0.029	klf	0.00	----	0.66
1	UDL	Z	0.025	klf	0.66	----	0.95
2	UDL	X	0.050	klf	0.00	----	0.66
2	UDL	X	0.043	klf	0.66	----	0.95
2	UDL	Z	0.029	klf	0.00	----	0.66

PROJECT:

2	UDL	Z	0.025	klf	0.66	----	0.95
3	UDL	X	0.050	klf	0.00	----	0.66
3	UDL	X	0.043	klf	0.66	----	0.95
3	UDL	Z	0.029	klf	0.00	----	0.66
3	UDL	Z	0.025	klf	0.66	----	0.95

Bearing loads:

Line #	Bearing #	Dir.	Load, kips
1	1	X	1.14
1	1	Y	0.42
1	1	Z	0.87
1	2	X	1.14
1	2	Y	-0.00
1	2	Z	0.87
1	3	X	1.14
1	3	Y	-0.00
1	3	Z	0.87
1	4	X	1.14
1	4	Y	-0.00
1	4	Z	0.87
1	5	X	1.14
1	5	Y	-0.42
1	5	Z	0.87

Auto generation details
Generated Wind Load on Structure
Angle of wind = 15.00 deg Elevation above which wind load acts = 67.40 ft
Default wind pressure
For STR III
Wind pressure for superstructure: Wind pressure for substructure:
Pz = 23.960 psf Pz = 29.490 psf
Overturning not considered
For SER IV
Wind pressure for superstructure: Wind pressure for substructure:
Pz = 13.480 psf Pz = 16.590 psf
Overturning not considered
For STR V
Wind pressure for superstructure: Wind pressure for substructure:
Pz = 21.190 psf Pz = 26.080 psf
For SER I
Wind pressure for superstructure: Wind pressure for substructure:
Pz = 16.250 psf Pz = 20.000 psf

Loadcase ID: WS11 Name: SER IV-Angle: 0
Multiplier = 1.000

Cap loads:

Type	Dir	Arm ft	Mag1 kips, klf,k-ft	x1/L	Mag2 kips, klf,k-ft	x2/L
Force	X	0.00	1.31	0.50	----	----
UDL	Z	----	0.03	0.00	----	1.00

Column loads:

Col #	Type	Dir	Mag1	y1/L	Mag2	y2/L
1	UDL	X	0.041 klf	0.00	----	0.66
1	UDL	X	0.035 klf	0.66	----	0.95
1	UDL	Z	0.041 klf	0.00	----	0.66
1	UDL	Z	0.035 klf	0.66	----	0.95
2	UDL	X	0.041 klf	0.00	----	0.66

PROJECT:

2	UDL	X	0.035	klf	0.66	----	0.95
2	UDL	Z	0.041	klf	0.00	----	0.66
2	UDL	Z	0.035	klf	0.66	----	0.95
3	UDL	X	0.041	klf	0.00	----	0.66
3	UDL	X	0.035	klf	0.66	----	0.95
3	UDL	Z	0.041	klf	0.00	----	0.66
3	UDL	Z	0.035	klf	0.66	----	0.95

Bearing loads:

Line #	Bearing #	Dir.	Load, kips
1	1	X	1.14
1	1	Y	0.42
1	1	Z	1.14
1	2	X	1.14
1	2	Y	-0.00
1	2	Z	1.14
1	3	X	1.14
1	3	Y	-0.00
1	3	Z	1.14
1	4	X	1.14
1	4	Y	-0.00
1	4	Z	1.14
1	5	X	1.14
1	5	Y	-0.42
1	5	Z	1.14

Auto generation details
Generated Wind Load on Structure
Angle of wind = 0.00 deg Elevation above which wind load acts = 67.40 ft
Default wind pressure
For STR III
Wind pressure for superstructure: Wind pressure for substructure:
Pz = 23.960 psf Pz = 29.490 psf
Overturning not considered
For SER IV
Wind pressure for superstructure: Wind pressure for substructure:
Pz = 13.480 psf Pz = 16.590 psf
Overturning not considered
For STR V
Wind pressure for superstructure: Wind pressure for substructure:
Pz = 21.190 psf Pz = 26.080 psf
For SER I
Wind pressure for superstructure: Wind pressure for substructure:
Pz = 16.250 psf Pz = 20.000 psf

Loadcase ID: WS12 Name: SER IV-Angle: -15
Multiplier = 1.000

Cap loads:

Type	Dir	Arm ft	Mag1 kips, klf,k-ft	x1/L	Mag2 kips, klf,k-ft	x2/L
Force	X	0.00	1.10	0.50	----	----
UDL	Z	----	0.04	0.00	----	1.00

Column loads:

Col #	Type	Dir	Mag1	y1/L	Mag2	y2/L
1	UDL	X	0.029 klf	0.00	----	0.66
1	UDL	X	0.025 klf	0.66	----	0.95
1	UDL	Z	0.050 klf	0.00	----	0.66

PROJECT:

1	UDL	Z	0.043	klf	0.66	----	0.95
2	UDL	X	0.029	klf	0.00	----	0.66
2	UDL	X	0.025	klf	0.66	----	0.95
2	UDL	Z	0.050	klf	0.00	----	0.66
2	UDL	Z	0.043	klf	0.66	----	0.95
3	UDL	X	0.029	klf	0.00	----	0.66
3	UDL	X	0.025	klf	0.66	----	0.95
3	UDL	Z	0.050	klf	0.00	----	0.66
3	UDL	Z	0.043	klf	0.66	----	0.95

Bearing loads:

Line #	Bearing #	Dir.	Load, kips
1	1	X	0.87
1	1	Y	0.32
1	1	Z	1.14
1	2	X	0.87
1	2	Y	-0.00
1	2	Z	1.14
1	3	X	0.87
1	3	Y	-0.00
1	3	Z	1.14
1	4	X	0.87
1	4	Y	-0.00
1	4	Z	1.14
1	5	X	0.87
1	5	Y	-0.32
1	5	Z	1.14

Auto generation details
Generated Wind Load on Structure
Angle of wind = -15.00 deg Elevation above which wind load acts = 67.40 ft
Default wind pressure
For STR III
Wind pressure for superstructure: Wind pressure for substructure:
Pz = 23.960 psf Pz = 29.490 psf
Overturning not considered
For SER IV
Wind pressure for superstructure: Wind pressure for substructure:
Pz = 13.480 psf Pz = 16.590 psf
Overturning not considered
For STR V
Wind pressure for superstructure: Wind pressure for substructure:
Pz = 21.190 psf Pz = 26.080 psf
For SER I
Wind pressure for superstructure: Wind pressure for substructure:
Pz = 16.250 psf Pz = 20.000 psf

Loadcase ID: WS13 Name: SER IV-Angle: -30
Multiplier = 1.000

Cap loads:

Type	Dir	Arm ft	Mag1 kips, klf,k-ft	x1/L	Mag2 kips, klf,k-ft	x2/L
Force	X	0.00	0.62	0.50	----	----
UDL	Z	----	0.05	0.00	----	1.00

Column loads:

Col #	Type	Dir	Mag1	y1/L	Mag2	y2/L
1	UDL	X	0.015 klf	0.00	----	0.66

PROJECT:

1	UDL	X	0.013	klf	0.66	----	0.95
1	UDL	Z	0.056	klf	0.00	----	0.66
1	UDL	Z	0.048	klf	0.66	----	0.95
2	UDL	X	0.015	klf	0.00	----	0.66
2	UDL	X	0.013	klf	0.66	----	0.95
2	UDL	Z	0.056	klf	0.00	----	0.66
2	UDL	Z	0.048	klf	0.66	----	0.95
3	UDL	X	0.015	klf	0.00	----	0.66
3	UDL	X	0.013	klf	0.66	----	0.95
3	UDL	Z	0.056	klf	0.00	----	0.66
3	UDL	Z	0.048	klf	0.66	----	0.95

Bearing loads:

Line #	Bearing #	Dir.	Load, kips
1	1	X	0.66
1	1	Y	0.24
1	1	Z	1.21
1	2	X	0.66
1	2	Y	-0.00
1	2	Z	1.21
1	3	X	0.66
1	3	Y	-0.00
1	3	Z	1.21
1	4	X	0.66
1	4	Y	-0.00
1	4	Z	1.21
1	5	X	0.66
1	5	Y	-0.24
1	5	Z	1.21

Auto generation details
Generated Wind Load on Structure
Angle of wind = -30.00 deg Elevation above which wind load acts = 67.40 ft
Default wind pressure
For STR III
Wind pressure for superstructure: Wind pressure for substructure:
Pz = 23.960 psf Pz = 29.490 psf
Overturning not considered
For SER IV
Wind pressure for superstructure: Wind pressure for substructure:
Pz = 13.480 psf Pz = 16.590 psf
Overturning not considered
For STR V
Wind pressure for superstructure: Wind pressure for substructure:
Pz = 21.190 psf Pz = 26.080 psf
For SER I
Wind pressure for superstructure: Wind pressure for substructure:
Pz = 16.250 psf Pz = 20.000 psf

Loadcase ID: WS14 Name: SER IV-Angle: -45
Multiplier = 1.000

Cap loads:

Type	Dir	Arm ft	Mag1 kips, klf,k-ft	x1/L	Mag2 kips, klf,k-ft	x2/L
UDL	Z	----	0.05	0.00	----	1.00

Column loads:

Col #	Type	Dir	Mag1	y1/L	Mag2	y2/L

PROJECT:

1	UDL	Z	0.058	klf	0.00	----	0.66
1	UDL	Z	0.050	klf	0.66	----	0.95
2	UDL	Z	0.058	klf	0.00	----	0.66
2	UDL	Z	0.050	klf	0.66	----	0.95
3	UDL	Z	0.058	klf	0.00	----	0.66
3	UDL	Z	0.050	klf	0.66	----	0.95

Bearing loads:

Line #	Bearing #	Dir.	Load, kips
1	1	X	0.39
1	1	Y	0.14
1	1	Z	1.12
1	2	X	0.39
1	2	Y	-0.00
1	2	Z	1.12
1	3	X	0.39
1	3	Y	-0.00
1	3	Z	1.12
1	4	X	0.39
1	4	Y	-0.00
1	4	Z	1.12
1	5	X	0.39
1	5	Y	-0.14
1	5	Z	1.12

Auto generation details
Generated Wind Load on Structure
Angle of wind = -45.00 deg Elevation above which wind load acts = 67.40 ft
Default wind pressure
For STR III
Wind pressure for superstructure: Wind pressure for substructure:
Pz = 23.960 psf Pz = 29.490 psf
Overturning not considered
For SER IV
Wind pressure for superstructure: Wind pressure for substructure:
Pz = 13.480 psf Pz = 16.590 psf
Overturning not considered
For STR V
Wind pressure for superstructure: Wind pressure for substructure:
Pz = 21.190 psf Pz = 26.080 psf
For SER I
Wind pressure for superstructure: Wind pressure for substructure:
Pz = 16.250 psf Pz = 20.000 psf

Loadcase ID: WS15 Name: STR V-Angle: 45
Multiplier = 1.000

Cap loads:

Type	Dir	Arm ft	Mag1 kips, klf,k-ft	x1/L	Mag2 kips, klf,k-ft	x2/L
Force	X	0.00	0.31	0.50	----	----

Column loads:

Col #	Type	Dir	Mag1		y1/L	Mag2	y2/L
1	UDL	X	0.091	klf	0.00	----	0.66
1	UDL	X	0.078	klf	0.66	----	0.95
2	UDL	X	0.091	klf	0.00	----	0.66
2	UDL	X	0.078	klf	0.66	----	0.95
3	UDL	X	0.091	klf	0.00	----	0.66

3	UDL	X	0.078	klf	0.66	----		0.95

Bearing loads:

Line #	Bearing #	Dir.	Load, kips
1	1	X	1.75
1	1	Y	0.65
1	1	Z	0.61
1	2	X	1.75
1	2	Y	-0.00
1	2	Z	0.61
1	3	X	1.75
1	3	Y	-0.00
1	3	Z	0.61
1	4	X	1.75
1	4	Y	-0.00
1	4	Z	0.61
1	5	X	1.75
1	5	Y	-0.65
1	5	Z	0.61

Auto generation details
Generated Wind Load on Structure
Angle of wind = 45.00 deg Elevation above which wind load acts = 67.40 ft
Default wind pressure
For STR III
Wind pressure for superstructure: Wind pressure for substructure:
Pz = 23.960 psf Pz = 29.490 psf
Overturning not considered
For SER IV
Wind pressure for superstructure: Wind pressure for substructure:
Pz = 13.480 psf Pz = 16.590 psf
Overturning not considered
For STR V
Wind pressure for superstructure: Wind pressure for substructure:
Pz = 21.190 psf Pz = 26.080 psf
For SER I
Wind pressure for superstructure: Wind pressure for substructure:
Pz = 16.250 psf Pz = 20.000 psf

Loadcase ID: WS16 Name: STR V-Angle: 30
Multiplier = 1.000

Cap loads:

Type	Dir	Arm ft	Mag1 kips, klf,k-ft	x1/L	Mag2 kips, klf,k-ft	x2/L
Force	X	0.00	1.24	0.50	----	----
UDL	Z	----	0.01	0.00	----	1.00

Column loads:

Col #	Type	Dir	Mag1		y1/L	Mag2	y2/L
1	UDL	X	0.088	klf	0.00	----	0.66
1	UDL	X	0.076	klf	0.66	----	0.95
1	UDL	Z	0.024	klf	0.00	----	0.66
1	UDL	Z	0.020	klf	0.66	----	0.95
2	UDL	X	0.088	klf	0.00	----	0.66
2	UDL	X	0.076	klf	0.66	----	0.95
2	UDL	Z	0.024	klf	0.00	----	0.66
2	UDL	Z	0.020	klf	0.66	----	0.95
3	UDL	X	0.088	klf	0.00	----	0.66

PROJECT:

3	UDL	X	0.076	klf	0.66	----	0.95
3	UDL	Z	0.024	klf	0.00	----	0.66
3	UDL	Z	0.020	klf	0.66	----	0.95

Bearing loads:

Line #	Bearing #	Dir.	Load, kips
1	1	X	1.90
1	1	Y	0.70
1	1	Z	1.04
1	2	X	1.90
1	2	Y	-0.00
1	2	Z	1.04
1	3	X	1.90
1	3	Y	-0.00
1	3	Z	1.04
1	4	X	1.90
1	4	Y	-0.00
1	4	Z	1.04
1	5	X	1.90
1	5	Y	-0.70
1	5	Z	1.04

Auto generation details
Generated Wind Load on Structure
Angle of wind = 30.00 deg Elevation above which wind load acts = 67.40 ft
Default wind pressure
For STR III
Wind pressure for superstructure: Wind pressure for substructure:
Pz = 23.960 psf Pz = 29.490 psf
Overturning not considered
For SER IV
Wind pressure for superstructure: Wind pressure for substructure:
Pz = 13.480 psf Pz = 16.590 psf
Overturning not considered
For STR V
Wind pressure for superstructure: Wind pressure for substructure:
Pz = 21.190 psf Pz = 26.080 psf
For SER I
Wind pressure for superstructure: Wind pressure for substructure:
Pz = 16.250 psf Pz = 20.000 psf

Loadcase ID: WS17 Name: STR V-Angle: 15
Multiplier = 1.000

Cap loads:

Type	Dir	Arm ft	Mag1 kips, klf,k-ft	x1/L	Mag2 kips, klf,k-ft	x2/L
Force	X	0.00	1.88	0.50	----	----
UDL	Z	----	0.02	0.00	----	1.00

Column loads:

Col #	Type	Dir	Mag1		y1/L	Mag2	y2/L
1	UDL	X	0.079	klf	0.00	----	0.66
1	UDL	X	0.068	klf	0.66	----	0.95
1	UDL	Z	0.046	klf	0.00	----	0.66
1	UDL	Z	0.039	klf	0.66	----	0.95
2	UDL	X	0.079	klf	0.00	----	0.66
2	UDL	X	0.068	klf	0.66	----	0.95
2	UDL	Z	0.046	klf	0.00	----	0.66

PROJECT:

2	UDL	Z	0.039	klf	0.66	----	0.95
3	UDL	X	0.079	klf	0.00	----	0.66
3	UDL	X	0.068	klf	0.66	----	0.95
3	UDL	Z	0.046	klf	0.00	----	0.66
3	UDL	Z	0.039	klf	0.66	----	0.95

Bearing loads:

Line #	Bearing #	Dir.	Load, kips
1	1	X	1.79
1	1	Y	0.66
1	1	Z	1.36
1	2	X	1.79
1	2	Y	-0.00
1	2	Z	1.36
1	3	X	1.79
1	3	Y	-0.00
1	3	Z	1.36
1	4	X	1.79
1	4	Y	-0.00
1	4	Z	1.36
1	5	X	1.79
1	5	Y	-0.66
1	5	Z	1.36

Auto generation details
Generated Wind Load on Structure
Angle of wind = 15.00 deg Elevation above which wind load acts = 67.40 ft
Default wind pressure
For STR III
Wind pressure for superstructure: Wind pressure for substructure:
Pz = 23.960 psf Pz = 29.490 psf
Overturning not considered
For SER IV
Wind pressure for superstructure: Wind pressure for substructure:
Pz = 13.480 psf Pz = 16.590 psf
Overturning not considered
For STR V
Wind pressure for superstructure: Wind pressure for substructure:
Pz = 21.190 psf Pz = 26.080 psf
For SER I
Wind pressure for superstructure: Wind pressure for substructure:
Pz = 16.250 psf Pz = 20.000 psf

Loadcase ID: WS18 Name: STR V-Angle: 0
Multiplier = 1.000

Cap loads:

Type	Dir	Arm ft	Mag1 kips, klf,k-ft	x1/L	Mag2 kips, klf,k-ft	x2/L
Force	X	0.00	2.06	0.50	----	----
UDL	Z	----	0.04	0.00	----	1.00

Column loads:

Col #	Type	Dir	Mag1	y1/L	Mag2	y2/L
1	UDL	X	0.065 klf	0.00	----	0.66
1	UDL	X	0.055 klf	0.66	----	0.95
1	UDL	Z	0.065 klf	0.00	----	0.66
1	UDL	Z	0.055 klf	0.66	----	0.95
2	UDL	X	0.065 klf	0.00	----	0.66

PROJECT:

2	UDL	X	0.055	klf	0.66	----	0.95
2	UDL	Z	0.065	klf	0.00	----	0.66
2	UDL	Z	0.055	klf	0.66	----	0.95
3	UDL	X	0.065	klf	0.00	----	0.66
3	UDL	X	0.055	klf	0.66	----	0.95
3	UDL	Z	0.065	klf	0.00	----	0.66
3	UDL	Z	0.055	klf	0.66	----	0.95

Bearing loads:

Line #	Bearing #	Dir.	Load, kips
1	1	X	1.79
1	1	Y	0.66
1	1	Z	1.79
1	2	X	1.79
1	2	Y	-0.00
1	2	Z	1.79
1	3	X	1.79
1	3	Y	-0.00
1	3	Z	1.79
1	4	X	1.79
1	4	Y	-0.00
1	4	Z	1.79
1	5	X	1.79
1	5	Y	-0.66
1	5	Z	1.79

Auto generation details
Generated Wind Load on Structure
Angle of wind = 0.00 deg Elevation above which wind load acts = 67.40 ft
Default wind pressure
For STR III
Wind pressure for superstructure: Wind pressure for substructure:
Pz = 23.960 psf Pz = 29.490 psf
Overturning not considered
For SER IV
Wind pressure for superstructure: Wind pressure for substructure:
Pz = 13.480 psf Pz = 16.590 psf
Overturning not considered
For STR V
Wind pressure for superstructure: Wind pressure for substructure:
Pz = 21.190 psf Pz = 26.080 psf
For SER I
Wind pressure for superstructure: Wind pressure for substructure:
Pz = 16.250 psf Pz = 20.000 psf

Loadcase ID: WS19 Name: STR V-Angle: -15
Multiplier = 1.000

Cap loads:

Type	Dir	Arm ft	Mag1 kips, klf,k-ft	x1/L	Mag2 kips, klf,k-ft	x2/L
Force	X	0.00	1.72	0.50	----	----
UDL	Z	----	0.06	0.00	----	1.00

Column loads:

Col #	Type	Dir	Mag1	y1/L	Mag2	y2/L
1	UDL	X	0.046 klf	0.00	----	0.66
1	UDL	X	0.039 klf	0.66	----	0.95
1	UDL	Z	0.079 klf	0.00	----	0.66

PROJECT:

1	UDL	Z	0.068	klf	0.66	----	0.95
2	UDL	X	0.046	klf	0.00	----	0.66
2	UDL	X	0.039	klf	0.66	----	0.95
2	UDL	Z	0.079	klf	0.00	----	0.66
2	UDL	Z	0.068	klf	0.66	----	0.95
3	UDL	X	0.046	klf	0.00	----	0.66
3	UDL	X	0.039	klf	0.66	----	0.95
3	UDL	Z	0.079	klf	0.00	----	0.66
3	UDL	Z	0.068	klf	0.66	----	0.95

Bearing loads:

Line #	Bearing #	Dir.	Load, kips
1	1	X	1.36
1	1	Y	0.50
1	1	Z	1.79
1	2	X	1.36
1	2	Y	-0.00
1	2	Z	1.79
1	3	X	1.36
1	3	Y	-0.00
1	3	Z	1.79
1	4	X	1.36
1	4	Y	-0.00
1	4	Z	1.79
1	5	X	1.36
1	5	Y	-0.50
1	5	Z	1.79

Auto generation details
Generated Wind Load on Structure
Angle of wind = -15.00 deg Elevation above which wind load acts = 67.40 ft
Default wind pressure
For STR III
Wind pressure for superstructure: Wind pressure for substructure:
Pz = 23.960 psf Pz = 29.490 psf
Overturning not considered
For SER IV
Wind pressure for superstructure: Wind pressure for substructure:
Pz = 13.480 psf Pz = 16.590 psf
Overturning not considered
For STR V
Wind pressure for superstructure: Wind pressure for substructure:
Pz = 21.190 psf Pz = 26.080 psf
For SER I
Wind pressure for superstructure: Wind pressure for substructure:
Pz = 16.250 psf Pz = 20.000 psf

Loadcase ID: WS20 Name: STR V-Angle: -30
Multiplier = 1.000

Cap loads:

Type	Dir	Arm ft	Mag1 kips, klf,k-ft	x1/L	Mag2 kips, klf,k-ft	x2/L
Force	X	0.00	0.97	0.50	----	----
UDL	Z	----	0.07	0.00	----	1.00

Column loads:

Col #	Type	Dir	Mag1	y1/L	Mag2	y2/L
1	UDL	X	0.024 klf	0.00	----	0.66

PROJECT:

1	UDL	X	0.020	klf	0.66	----	0.95
1	UDL	Z	0.088	klf	0.00	----	0.66
1	UDL	Z	0.076	klf	0.66	----	0.95
2	UDL	X	0.024	klf	0.00	----	0.66
2	UDL	X	0.020	klf	0.66	----	0.95
2	UDL	Z	0.088	klf	0.00	----	0.66
2	UDL	Z	0.076	klf	0.66	----	0.95
3	UDL	X	0.024	klf	0.00	----	0.66
3	UDL	X	0.020	klf	0.66	----	0.95
3	UDL	Z	0.088	klf	0.00	----	0.66
3	UDL	Z	0.076	klf	0.66	----	0.95

Bearing loads:

Line #	Bearing #	Dir.	Load, kips
1	1	X	1.04
1	1	Y	0.38
1	1	Z	1.90
1	2	X	1.04
1	2	Y	-0.00
1	2	Z	1.90
1	3	X	1.04
1	3	Y	-0.00
1	3	Z	1.90
1	4	X	1.04
1	4	Y	-0.00
1	4	Z	1.90
1	5	X	1.04
1	5	Y	-0.38
1	5	Z	1.90

Auto generation details
Generated Wind Load on Structure
Angle of wind = -30.00 deg Elevation above which wind load acts = 67.40 ft
Default wind pressure
For STR III
Wind pressure for superstructure: Wind pressure for substructure:
Pz = 23.960 psf Pz = 29.490 psf
Overturning not considered
For SER IV
Wind pressure for superstructure: Wind pressure for substructure:
Pz = 13.480 psf Pz = 16.590 psf
Overturning not considered
For STR V
Wind pressure for superstructure: Wind pressure for substructure:
Pz = 21.190 psf Pz = 26.080 psf
For SER I
Wind pressure for superstructure: Wind pressure for substructure:
Pz = 16.250 psf Pz = 20.000 psf

Loadcase ID: WS21 Name: STR V-Angle: -45
Multiplier = 1.000

Cap loads:

Type	Dir	Arm ft	Mag1 kips, klf,k-ft	x1/L	Mag2 kips, klf,k-ft	x2/L
UDL	Z	----	0.08	0.00	----	1.00

Column loads:

Col #	Type	Dir	Mag1	y1/L	Mag2	y2/L

PROJECT:

1	UDL	Z	0.091	klf	0.00	----	0.66
1	UDL	Z	0.078	klf	0.66	----	0.95
2	UDL	Z	0.091	klf	0.00	----	0.66
2	UDL	Z	0.078	klf	0.66	----	0.95
3	UDL	Z	0.091	klf	0.00	----	0.66
3	UDL	Z	0.078	klf	0.66	----	0.95

Bearing loads:

Line #	Bearing #	Dir.	Load, kips
1	1	X	0.61
1	1	Y	0.23
1	1	Z	1.75
1	2	X	0.61
1	2	Y	-0.00
1	2	Z	1.75
1	3	X	0.61
1	3	Y	-0.00
1	3	Z	1.75
1	4	X	0.61
1	4	Y	-0.00
1	4	Z	1.75
1	5	X	0.61
1	5	Y	-0.23
1	5	Z	1.75

Auto generation details
Generated Wind Load on Structure
Angle of wind = -45.00 deg Elevation above which wind load acts = 67.40 ft
Default wind pressure
For STR III
Wind pressure for superstructure: Wind pressure for substructure:
Pz = 23.960 psf Pz = 29.490 psf
Overturning not considered
For SER IV
Wind pressure for superstructure: Wind pressure for substructure:
Pz = 13.480 psf Pz = 16.590 psf
Overturning not considered
For STR V
Wind pressure for superstructure: Wind pressure for substructure:
Pz = 21.190 psf Pz = 26.080 psf
For SER I
Wind pressure for superstructure: Wind pressure for substructure:
Pz = 16.250 psf Pz = 20.000 psf

Loadcase ID: WS22 Name: SER I-Angle: 45
Multiplier = 1.000

Cap loads:

Type	Dir	Arm ft	Mag1 kips, klf,k-ft	x1/L	Mag2 kips, klf,k-ft	x2/L
Force	X	0.00	0.24	0.50	----	----

Column loads:

Col #	Type	Dir	Mag1		y1/L	Mag2	y2/L
1	UDL	X	0.070	klf	0.00	----	0.66
1	UDL	X	0.060	klf	0.66	----	0.95
2	UDL	X	0.070	klf	0.00	----	0.66
2	UDL	X	0.060	klf	0.66	----	0.95
3	UDL	X	0.070	klf	0.00	----	0.66

3	UDL	X	0.060	klf	0.66	----		0.95

Bearing loads:

Line #	Bearing #	Dir.	Load, kips
1	1	X	1.35
1	1	Y	0.50
1	1	Z	0.47
1	2	X	1.35
1	2	Y	-0.00
1	2	Z	0.47
1	3	X	1.35
1	3	Y	-0.00
1	3	Z	0.47
1	4	X	1.35
1	4	Y	-0.00
1	4	Z	0.47
1	5	X	1.35
1	5	Y	-0.50
1	5	Z	0.47

Auto generation details
Generated Wind Load on Structure
Angle of wind = 45.00 deg Elevation above which wind load acts = 67.40 ft
Default wind pressure
For STR III
Wind pressure for superstructure: Wind pressure for substructure:
Pz = 23.960 psf Pz = 29.490 psf
Overturning not considered
For SER IV
Wind pressure for superstructure: Wind pressure for substructure:
Pz = 13.480 psf Pz = 16.590 psf
Overturning not considered
For STR V
Wind pressure for superstructure: Wind pressure for substructure:
Pz = 21.190 psf Pz = 26.080 psf
For SER I
Wind pressure for superstructure: Wind pressure for substructure:
Pz = 16.250 psf Pz = 20.000 psf

Loadcase ID: WS23 Name: SER I-Angle: 30
Multiplier = 1.000

Cap loads:

Type	Dir	Arm ft	Mag1 kips, klf,k-ft	x1/L	Mag2 kips, klf,k-ft	x2/L
Force	X	0.00	0.95	0.50	----	----
UDL	Z	----	0.01	0.00	----	1.00

Column loads:

Col #	Type	Dir	Mag1		y1/L	Mag2	y2/L
1	UDL	X	0.068	klf	0.00	----	0.66
1	UDL	X	0.058	klf	0.66	----	0.95
1	UDL	Z	0.018	klf	0.00	----	0.66
1	UDL	Z	0.016	klf	0.66	----	0.95
2	UDL	X	0.068	klf	0.00	----	0.66
2	UDL	X	0.058	klf	0.66	----	0.95
2	UDL	Z	0.018	klf	0.00	----	0.66
2	UDL	Z	0.016	klf	0.66	----	0.95
3	UDL	X	0.068	klf	0.00	----	0.66

PROJECT:

3	UDL	X	0.058	klf	0.66	----	0.95
3	UDL	Z	0.018	klf	0.00	----	0.66
3	UDL	Z	0.016	klf	0.66	----	0.95

Bearing loads:

Line #	Bearing #	Dir.	Load, kips
1	1	X	1.46
1	1	Y	0.54
1	1	Z	0.80
1	2	X	1.46
1	2	Y	-0.00
1	2	Z	0.80
1	3	X	1.46
1	3	Y	-0.00
1	3	Z	0.80
1	4	X	1.46
1	4	Y	-0.00
1	4	Z	0.80
1	5	X	1.46
1	5	Y	-0.54
1	5	Z	0.80

Auto generation details
Generated Wind Load on Structure
Angle of wind = 30.00 deg Elevation above which wind load acts = 67.40 ft
Default wind pressure
For STR III
Wind pressure for superstructure: Wind pressure for substructure:
Pz = 23.960 psf Pz = 29.490 psf
Overturning not considered
For SER IV
Wind pressure for superstructure: Wind pressure for substructure:
Pz = 13.480 psf Pz = 16.590 psf
Overturning not considered
For STR V
Wind pressure for superstructure: Wind pressure for substructure:
Pz = 21.190 psf Pz = 26.080 psf
For SER I
Wind pressure for superstructure: Wind pressure for substructure:
Pz = 16.250 psf Pz = 20.000 psf

Loadcase ID: WS24 Name: SER I-Angle: 15
Multiplier = 1.000

Cap loads:

Type	Dir	Arm ft	Mag1 kips, klf,k-ft	x1/L	Mag2 kips, klf,k-ft	x2/L
Force	X	0.00	1.44	0.50	----	----
UDL	Z	----	0.02	0.00	----	1.00

Column loads:

Col #	Type	Dir	Mag1	y1/L	Mag2	y2/L
1	UDL	X	0.061 klf	0.00	----	0.66
1	UDL	X	0.052 klf	0.66	----	0.95
1	UDL	Z	0.035 klf	0.00	----	0.66
1	UDL	Z	0.030 klf	0.66	----	0.95
2	UDL	X	0.061 klf	0.00	----	0.66
2	UDL	X	0.052 klf	0.66	----	0.95
2	UDL	Z	0.035 klf	0.00	----	0.66

PROJECT:

2	UDL	Z	0.030	klf	0.66	----	0.95
3	UDL	X	0.061	klf	0.00	----	0.66
3	UDL	X	0.052	klf	0.66	----	0.95
3	UDL	Z	0.035	klf	0.00	----	0.66
3	UDL	Z	0.030	klf	0.66	----	0.95

Bearing loads:

Line #	Bearing #	Dir.	Load, kips
1	1	X	1.37
1	1	Y	0.51
1	1	Z	1.04
1	2	X	1.37
1	2	Y	-0.00
1	2	Z	1.04
1	3	X	1.37
1	3	Y	-0.00
1	3	Z	1.04
1	4	X	1.37
1	4	Y	-0.00
1	4	Z	1.04
1	5	X	1.37
1	5	Y	-0.51
1	5	Z	1.04

Auto generation details
Generated Wind Load on Structure
Angle of wind = 15.00 deg Elevation above which wind load acts = 67.40 ft
Default wind pressure
For STR III
Wind pressure for superstructure: Wind pressure for substructure:
Pz = 23.960 psf Pz = 29.490 psf
Overturning not considered
For SER IV
Wind pressure for superstructure: Wind pressure for substructure:
Pz = 13.480 psf Pz = 16.590 psf
Overturning not considered
For STR V
Wind pressure for superstructure: Wind pressure for substructure:
Pz = 21.190 psf Pz = 26.080 psf
For SER I
Wind pressure for superstructure: Wind pressure for substructure:
Pz = 16.250 psf Pz = 20.000 psf

Loadcase ID: WS25 Name: SER I-Angle: 0
Multiplier = 1.000

Cap loads:

Type	Dir	Arm ft	Mag1 kips, klf,k-ft	x1/L	Mag2 kips, klf,k-ft	x2/L
Force	X	0.00	1.58	0.50	----	----
UDL	Z	----	0.03	0.00	----	1.00

Column loads:

Col #	Type	Dir	Mag1	y1/L	Mag2	y2/L
1	UDL	X	0.049 klf	0.00	----	0.66
1	UDL	X	0.042 klf	0.66	----	0.95
1	UDL	Z	0.049 klf	0.00	----	0.66
1	UDL	Z	0.042 klf	0.66	----	0.95
2	UDL	X	0.049 klf	0.00	----	0.66

PROJECT:

2	UDL	X	0.042	klf	0.66	----	0.95
2	UDL	Z	0.049	klf	0.00	----	0.66
2	UDL	Z	0.042	klf	0.66	----	0.95
3	UDL	X	0.049	klf	0.00	----	0.66
3	UDL	X	0.042	klf	0.66	----	0.95
3	UDL	Z	0.049	klf	0.00	----	0.66
3	UDL	Z	0.042	klf	0.66	----	0.95

Bearing loads:

Line #	Bearing #	Dir.	Load, kips
1	1	X	1.37
1	1	Y	0.51
1	1	Z	1.37
1	2	X	1.37
1	2	Y	-0.00
1	2	Z	1.37
1	3	X	1.37
1	3	Y	-0.00
1	3	Z	1.37
1	4	X	1.37
1	4	Y	-0.00
1	4	Z	1.37
1	5	X	1.37
1	5	Y	-0.51
1	5	Z	1.37

Auto generation details
Generated Wind Load on Structure
Angle of wind = 0.00 deg Elevation above which wind load acts = 67.40 ft
Default wind pressure
For STR III
Wind pressure for superstructure: Wind pressure for substructure:
Pz = 23.960 psf Pz = 29.490 psf
Overturning not considered
For SER IV
Wind pressure for superstructure: Wind pressure for substructure:
Pz = 13.480 psf Pz = 16.590 psf
Overturning not considered
For STR V
Wind pressure for superstructure: Wind pressure for substructure:
Pz = 21.190 psf Pz = 26.080 psf
For SER I
Wind pressure for superstructure: Wind pressure for substructure:
Pz = 16.250 psf Pz = 20.000 psf

Loadcase ID: WS26 Name: SER I-Angle: -15
Multiplier = 1.000

Cap loads:

Type	Dir	Arm ft	Mag1 kips, klf,k-ft	x1/L	Mag2 kips, klf,k-ft	x2/L
Force	X	0.00	1.32	0.50	----	----
UDL	Z	----	0.05	0.00	----	1.00

Column loads:

Col #	Type	Dir	Mag1	y1/L	Mag2	y2/L
1	UDL	X	0.035 klf	0.00	----	0.66
1	UDL	X	0.030 klf	0.66	----	0.95
1	UDL	Z	0.061 klf	0.00	----	0.66

PROJECT:

1	UDL	Z	0.052	klf	0.66	----	0.95
2	UDL	X	0.035	klf	0.00	----	0.66
2	UDL	X	0.030	klf	0.66	----	0.95
2	UDL	Z	0.061	klf	0.00	----	0.66
2	UDL	Z	0.052	klf	0.66	----	0.95
3	UDL	X	0.035	klf	0.00	----	0.66
3	UDL	X	0.030	klf	0.66	----	0.95
3	UDL	Z	0.061	klf	0.00	----	0.66
3	UDL	Z	0.052	klf	0.66	----	0.95

Bearing loads:

Line #	Bearing #	Dir.	Load, kips
1	1	X	1.04
1	1	Y	0.39
1	1	Z	1.37
1	2	X	1.04
1	2	Y	-0.00
1	2	Z	1.37
1	3	X	1.04
1	3	Y	-0.00
1	3	Z	1.37
1	4	X	1.04
1	4	Y	-0.00
1	4	Z	1.37
1	5	X	1.04
1	5	Y	-0.39
1	5	Z	1.37

Auto generation details
Generated Wind Load on Structure
Angle of wind = -15.00 deg Elevation above which wind load acts = 67.40 ft
Default wind pressure
For STR III
Wind pressure for superstructure: Wind pressure for substructure:
Pz = 23.960 psf Pz = 29.490 psf
Overturning not considered
For SER IV
Wind pressure for superstructure: Wind pressure for substructure:
Pz = 13.480 psf Pz = 16.590 psf
Overturning not considered
For STR V
Wind pressure for superstructure: Wind pressure for substructure:
Pz = 21.190 psf Pz = 26.080 psf
For SER I
Wind pressure for superstructure: Wind pressure for substructure:
Pz = 16.250 psf Pz = 20.000 psf

Loadcase ID: WS27 Name: SER I-Angle: -30
Multiplier = 1.000

Cap loads:

Type	Dir	Arm ft	Mag1 kips, klf,k-ft	x1/L	Mag2 kips, klf,k-ft	x2/L
Force	X	0.00	0.74	0.50	----	----
UDL	Z	----	0.06	0.00	----	1.00

Column loads:

Col #	Type	Dir	Mag1	y1/L	Mag2	y2/L
1	UDL	X	0.018 klf	0.00	----	0.66

PROJECT:

1	UDL	X	0.016	klf	0.66	----	0.95
1	UDL	Z	0.068	klf	0.00	----	0.66
1	UDL	Z	0.058	klf	0.66	----	0.95
2	UDL	X	0.018	klf	0.00	----	0.66
2	UDL	X	0.016	klf	0.66	----	0.95
2	UDL	Z	0.068	klf	0.00	----	0.66
2	UDL	Z	0.058	klf	0.66	----	0.95
3	UDL	X	0.018	klf	0.00	----	0.66
3	UDL	X	0.016	klf	0.66	----	0.95
3	UDL	Z	0.068	klf	0.00	----	0.66
3	UDL	Z	0.058	klf	0.66	----	0.95

Bearing loads:

Line #	Bearing #	Dir.	Load, kips
1	1	X	0.80
1	1	Y	0.29
1	1	Z	1.46
1	2	X	0.80
1	2	Y	-0.00
1	2	Z	1.46
1	3	X	0.80
1	3	Y	-0.00
1	3	Z	1.46
1	4	X	0.80
1	4	Y	-0.00
1	4	Z	1.46
1	5	X	0.80
1	5	Y	-0.29
1	5	Z	1.46

Auto generation details
Generated Wind Load on Structure
Angle of wind = -30.00 deg Elevation above which wind load acts = 67.40 ft
Default wind pressure
For STR III
Wind pressure for superstructure: Wind pressure for substructure:
Pz = 23.960 psf Pz = 29.490 psf
Overturning not considered
For SER IV
Wind pressure for superstructure: Wind pressure for substructure:
Pz = 13.480 psf Pz = 16.590 psf
Overturning not considered
For STR V
Wind pressure for superstructure: Wind pressure for substructure:
Pz = 21.190 psf Pz = 26.080 psf
For SER I
Wind pressure for superstructure: Wind pressure for substructure:
Pz = 16.250 psf Pz = 20.000 psf

Loadcase ID: WS28 Name: SER I-Angle: -45
Multiplier = 1.000

Cap loads:

Type	Dir	Arm ft	Mag1 kips, klf,k-ft	x1/L	Mag2 kips, klf,k-ft	x2/L
UDL	Z	----	0.06	0.00	----	1.00

Column loads:

Col #	Type	Dir	Mag1	y1/L	Mag2	y2/L

PROJECT:

1	UDL	Z	0.070	klf	0.00	----	0.66
1	UDL	Z	0.060	klf	0.66	----	0.95
2	UDL	Z	0.070	klf	0.00	----	0.66
2	UDL	Z	0.060	klf	0.66	----	0.95
3	UDL	Z	0.070	klf	0.00	----	0.66
3	UDL	Z	0.060	klf	0.66	----	0.95

Bearing loads:

Line #	Bearing #	Dir.	Load, kips
1	1	X	0.47
1	1	Y	0.17
1	1	Z	1.35
1	2	X	0.47
1	2	Y	-0.00
1	2	Z	1.35
1	3	X	0.47
1	3	Y	-0.00
1	3	Z	1.35
1	4	X	0.47
1	4	Y	-0.00
1	4	Z	1.35
1	5	X	0.47
1	5	Y	-0.17
1	5	Z	1.35

Auto generation details
Generated Wind Load on Structure
Angle of wind = -45.00 deg Elevation above which wind load acts = 67.40 ft
Default wind pressure
For STR III
Wind pressure for superstructure: Wind pressure for substructure:
Pz = 23.960 psf Pz = 29.490 psf
Overturning not considered
For SER IV
Wind pressure for superstructure: Wind pressure for substructure:
Pz = 13.480 psf Pz = 16.590 psf
Overturning not considered
For STR V
Wind pressure for superstructure: Wind pressure for substructure:
Pz = 21.190 psf Pz = 26.080 psf
For SER I
Wind pressure for superstructure: Wind pressure for substructure:
Pz = 16.250 psf Pz = 20.000 psf

Loadcase ID: WL1 Name: Angle: 45
Multiplier = 1.000

Bearing loads:

Line #	Bearing #	Dir.	Load, kips
1	1	X	1.38
1	1	Y	1.64
1	1	Z	0.48
1	2	X	1.38
1	2	Y	-0.00
1	2	Z	0.48
1	3	X	1.38
1	3	Y	-0.00
1	3	Z	0.48
1	4	X	1.38
1	4	Y	-0.00

PROJECT:

1	4	Z	0.48
1	5	X	1.38
1	5	Y	-1.64
1	5	Z	0.48

Auto generation details
Generated Wind Load on Live Load
Angle of wind = 45.00 deg Live load length = 99.59 ft

Loadcase ID: WL2 Name: Angle: 30
Multiplier = 1.000

Bearing loads:

Line #	Bearing #	Dir.	Load, kips
1	1	X	1.49
1	1	Y	1.78
1	1	Z	0.82
1	2	X	1.49
1	2	Y	-0.00
1	2	Z	0.82
1	3	X	1.49
1	3	Y	-0.00
1	3	Z	0.82
1	4	X	1.49
1	4	Y	-0.00
1	4	Z	0.82
1	5	X	1.49
1	5	Y	-1.78
1	5	Z	0.82

Auto generation details
Generated Wind Load on Live Load
Angle of wind = 30.00 deg Live load length = 99.59 ft

Loadcase ID: WL3 Name: Angle: 15
Multiplier = 1.000

Bearing loads:

Line #	Bearing #	Dir.	Load, kips
1	1	X	1.41
1	1	Y	1.68
1	1	Z	1.07
1	2	X	1.41
1	2	Y	-0.00
1	2	Z	1.07
1	3	X	1.41
1	3	Y	-0.00
1	3	Z	1.07
1	4	X	1.41
1	4	Y	-0.00
1	4	Z	1.07
1	5	X	1.41
1	5	Y	-1.68
1	5	Z	1.07

Auto generation details
Generated Wind Load on Live Load
Angle of wind = 15.00 deg Live load length = 99.59 ft

PROJECT:

Loadcase ID: WL4 Name: Angle: 0
Multiplier = 1.000

Bearing loads:

Line #	Bearing #	Dir.	Load, kips
1	1	X	1.41
1	1	Y	1.68
1	1	Z	1.41
1	2	X	1.41
1	2	Y	-0.00
1	2	Z	1.41
1	3	X	1.41
1	3	Y	-0.00
1	3	Z	1.41
1	4	X	1.41
1	4	Y	-0.00
1	4	Z	1.41
1	5	X	1.41
1	5	Y	-1.68
1	5	Z	1.41

Auto generation details
Generated Wind Load on Live Load
Angle of wind = 0.00 deg Live load length = 99.59 ft

Loadcase ID: WL5 Name: Angle: -15
Multiplier = 1.000

Bearing loads:

Line #	Bearing #	Dir.	Load, kips
1	1	X	1.07
1	1	Y	1.28
1	1	Z	1.41
1	2	X	1.07
1	2	Y	-0.00
1	2	Z	1.41
1	3	X	1.07
1	3	Y	-0.00
1	3	Z	1.41
1	4	X	1.07
1	4	Y	-0.00
1	4	Z	1.41
1	5	X	1.07
1	5	Y	-1.28
1	5	Z	1.41

Auto generation details
Generated Wind Load on Live Load
Angle of wind = -15.00 deg Live load length = 99.59 ft

Loadcase ID: WL6 Name: Angle: -30
Multiplier = 1.000

Bearing loads:

Line #	Bearing #	Dir.	Load, kips
1	1	X	0.82
1	1	Y	0.97

PROJECT:

1	1	Z	1.49
1	2	X	0.82
1	2	Y	-0.00
1	2	Z	1.49
1	3	X	0.82
1	3	Y	-0.00
1	3	Z	1.49
1	4	X	0.82
1	4	Y	-0.00
1	4	Z	1.49
1	5	X	0.82
1	5	Y	-0.97
1	5	Z	1.49

Auto generation details
Generated Wind Load on Live Load
Angle of wind = -30.00 deg Live load length = 99.59 ft

Loadcase ID: WL7 Name: Angle: -45
Multiplier = 1.000

Bearing loads:

Line #	Bearing #	Dir.	Load, kips
1	1	X	0.48
1	1	Y	0.57
1	1	Z	1.38
1	2	X	0.48
1	2	Y	-0.00
1	2	Z	1.38
1	3	X	0.48
1	3	Y	-0.00
1	3	Z	1.38
1	4	X	0.48
1	4	Y	-0.00
1	4	Z	1.38
1	5	X	0.48
1	5	Y	-0.57
1	5	Z	1.38

Auto generation details
Generated Wind Load on Live Load
Angle of wind = -45.00 deg Live load length = 99.59 ft

Selected load groups:

STRENGTH GROUP I
STRENGTH GROUP II
STRENGTH GROUP III
STRENGTH GROUP IV
STRENGTH GROUP V
SERVICE GROUP I
SERVICE GROUP II
SERVICE GROUP III
SERVICE GROUP IV
FATIGUE I

STRUCTURE MODEL
==========

PROJECT:

FRAME Model:

	Member	Node	Hinge	Check Pt	Dist(ft)	Memb length(ft)
Column No. 1						
	1	1	-		0.00	
		2	-		20.60	20.60
Column No. 1						
	2	2	-		0.00	
		3	-		10.50	10.50
Column No. 1						
	3	4	-		0.00	
		5	-		20.60	20.60
Column No. 1						
	4	5	-		0.00	
		6	-		10.50	10.50
Column No. 1						
	5	7	-		0.00	
		8	-		20.60	20.60
Column No. 1						
	6	8	-		0.00	
		9	-		10.50	10.50
Cap						
	7	10	-		0.00	
		11	-		4.00	4.00
	8	11	-		4.00	
		12	-	f	6.69	2.69
	9	12	-	f	6.69	
		3	-		8.02	1.33
	10	3	-		8.02	
		13	-	f	9.35	1.33
	11	13	-	f	9.35	
		14	-		14.14	4.79
	12	14	-		14.14	
		15	-	f	22.94	8.80
	13	15	-	f	22.94	
		6	-		24.27	1.33
	14	6	-		24.27	
		16	-		24.28	0.01
	15	16	-		24.28	
		17	-	f	25.60	1.32
	16	17	-	f	25.60	
		18	-		34.42	8.82
	17	18	-		34.42	
		19	-	f	39.19	4.77
	18	19	-	f	39.19	
		9	-		40.52	1.33
	19	9	-		40.52	
		20	-	f	41.85	1.33
	20	20	-	f	41.85	
		21	-		44.56	2.71
	21	21	-		44.56	
		22	-		48.54	3.98

Node coordinates:

Number	X(ft)	Y(ft)	Node type
1	8.02	67.40	fixed at ground
2	8.02	88.00	column-shaft
3	8.02	98.50	column-cap
4	24.27	67.40	fixed at ground
5	24.27	88.00	column-shaft
6	24.27	98.50	column-cap

PROJECT:

7	40.52	67.40	fixed at ground
8	40.52	88.00	column-shaft
9	40.52	98.50	column-cap
10	0.00	98.50	
11	4.00	98.50	bearing
12	6.69	98.50	face of support
13	9.35	98.50	face of support
14	14.14	98.50	bearing
15	22.94	98.50	face of support
16	24.28	98.50	bearing
17	25.60	98.50	face of support
18	34.42	98.50	bearing
19	39.19	98.50	face of support
20	41.85	98.50	face of support
21	44.56	98.50	bearing
22	48.54	98.50	

PROJECT:

ANALYSIS RESULTS

Global Coordinate System, Units: kip kft

LOAD CASES RESULTS FROM FRAME ANALYSIS:

Loadcase ID: SELF Name: Self Load of Structure

Memb	Node	Fx kip	Fy kip	Fz kip	Mx kft	My kft	Mz kft
1	1	-0.22	69.55	0.00	-0.00	0.00	2.49
1	2	0.22	-39.82	0.00	-0.00	0.00	1.98
2	2	-0.22	39.82	0.00	-0.00	0.00	-1.98
2	3	0.22	-30.27	0.00	-0.00	0.00	4.26
3	4	-0.00	66.10	0.00	-0.00	0.00	0.00
3	5	-0.00	-36.37	0.00	-0.00	0.00	0.00
4	5	-0.00	36.37	0.00	-0.00	0.00	0.00
4	6	-0.00	-26.82	0.00	-0.00	0.00	0.00
5	7	0.22	69.55	0.00	-0.00	0.00	-2.49
5	8	-0.22	-39.82	0.00	-0.00	0.00	-1.98
6	8	0.22	39.82	0.00	-0.00	0.00	1.98
6	9	-0.22	-30.27	0.00	-0.00	0.00	-4.26
7	10	0.00	0.00	0.00	0.00	0.00	0.00
7	11	0.00	7.20	0.00	0.00	0.00	-14.40
8	11	0.00	-7.20	0.00	0.00	0.00	14.40
8	12	0.00	12.04	0.00	0.00	0.00	-40.29
9	12	0.00	-12.04	0.00	0.00	0.00	40.29
9	3	0.00	14.44	0.00	0.00	0.00	-57.89
10	3	-0.22	15.84	0.00	0.00	0.00	53.62
10	13	0.22	-13.45	0.00	0.00	0.00	-34.16
11	13	-0.22	13.45	0.00	0.00	0.00	34.16
11	14	0.22	-4.82	0.00	0.00	0.00	9.60
12	14	-0.22	4.82	0.00	0.00	0.00	-9.60
12	15	0.22	11.02	0.00	0.00	0.00	-17.67
13	15	-0.22	-11.02	0.00	0.00	0.00	17.67
13	6	0.22	13.41	0.00	0.00	0.00	-33.91
14	6	-0.22	13.41	0.00	0.00	0.00	33.91
14	16	0.22	-13.39	0.00	0.00	0.00	-33.78
15	16	-0.22	13.39	0.00	0.00	0.00	33.78
15	17	0.22	-11.02	0.00	0.00	0.00	-17.67
16	17	-0.22	11.02	0.00	0.00	0.00	17.67
16	18	0.22	4.86	0.00	0.00	0.00	9.50
17	18	-0.22	-4.86	0.00	0.00	0.00	-9.50
17	19	0.22	13.45	0.00	0.00	0.00	-34.16
18	19	-0.22	-13.45	0.00	0.00	0.00	34.16
18	9	0.22	15.84	0.00	0.00	0.00	-53.62
19	9	0.00	14.44	0.00	0.00	0.00	57.89
19	20	0.00	-12.04	0.00	0.00	0.00	-40.29
20	20	0.00	12.04	0.00	0.00	0.00	40.29
20	21	0.00	-7.16	0.00	0.00	0.00	-14.26
21	21	0.00	7.16	0.00	0.00	0.00	14.26
21	22	0.00	0.00	0.00	0.00	0.00	0.00

Loadcase ID: DC1 Name: DL1

Memb	Node	Fx kip	Fy kip	Fz kip	Mx kft	My kft	Mz kft

PROJECT:

1	1	-0.62	158.63	0.00	-0.00	0.00	7.11
1	2	0.62	-158.63	0.00	-0.00	0.00	5.59
2	2	-0.62	158.63	0.00	-0.00	0.00	-5.59
2	3	0.62	-158.63	0.00	-0.00	0.00	12.06
3	4	-0.01	166.45	0.00	-0.00	0.00	0.11
3	5	0.01	-166.45	0.00	-0.00	0.00	0.02
4	5	-0.01	166.45	0.00	-0.00	0.00	-0.02
4	6	0.01	-166.45	0.00	-0.00	0.00	0.09
5	7	0.62	158.92	0.00	-0.00	0.00	-7.11
5	8	-0.62	-158.92	0.00	-0.00	0.00	-5.73
6	8	0.62	158.92	0.00	-0.00	0.00	5.73
6	9	-0.62	-158.92	0.00	-0.00	0.00	-12.27
7	10	0.00	0.00	0.00	0.00	0.00	0.00
7	11	0.00	0.00	0.00	0.00	0.00	0.00
8	11	0.00	-80.00	0.00	0.00	0.00	0.00
8	12	0.00	80.00	0.00	0.00	0.00	-215.25
9	12	0.00	-80.00	0.00	0.00	0.00	215.25
9	3	0.00	80.00	0.00	0.00	0.00	-321.60
10	3	-0.62	78.63	0.00	0.00	0.00	309.54
10	13	0.62	-78.63	0.00	0.00	0.00	-205.01
11	13	-0.62	78.63	0.00	0.00	0.00	205.01
11	14	0.62	-78.63	0.00	0.00	0.00	171.68
12	14	-0.62	-29.37	0.00	0.00	0.00	-171.68
12	15	0.62	29.37	0.00	0.00	0.00	-86.81
13	15	-0.62	-29.37	0.00	0.00	0.00	86.81
13	6	0.62	29.37	0.00	0.00	0.00	-125.85
14	6	-0.62	137.08	0.00	0.00	0.00	125.76
14	16	0.62	-137.08	0.00	0.00	0.00	-124.39
15	16	-0.62	29.08	0.00	0.00	0.00	124.39
15	17	0.62	-29.08	0.00	0.00	0.00	-86.02
16	17	-0.62	29.08	0.00	0.00	0.00	86.02
16	18	0.62	-29.08	0.00	0.00	0.00	170.48
17	18	-0.62	-78.92	0.00	0.00	0.00	-170.48
17	19	0.62	78.92	0.00	0.00	0.00	-206.02
18	19	-0.62	-78.92	0.00	0.00	0.00	206.02
18	9	0.62	78.92	0.00	0.00	0.00	-310.93
19	9	0.00	80.00	0.00	0.00	0.00	323.20
19	20	0.00	-80.00	0.00	0.00	0.00	-216.85
20	20	0.00	80.00	0.00	0.00	0.00	216.85
20	21	0.00	-80.00	0.00	0.00	0.00	0.00
21	21	0.00	0.00	0.00	0.00	0.00	0.00
21	22	0.00	0.00	0.00	0.00	0.00	0.00

Loadcase ID: DW1 Name: FWS

Memb	Node	Fx kip	Fy kip	Fz kip	Mx kft	My kft	Mz kft
1	1	-2.86	100.01	0.00	-0.00	0.00	32.84
1	2	2.86	-100.01	0.00	-0.00	0.00	26.07
2	2	-2.86	100.01	0.00	-0.00	0.00	-26.07
2	3	2.86	-100.01	0.00	-0.00	0.00	56.10
3	4	-0.01	18.86	0.00	-0.00	0.00	0.12
3	5	0.01	-18.86	0.00	-0.00	0.00	0.04
4	5	-0.01	18.86	0.00	-0.00	0.00	-0.04
4	6	0.01	-18.86	0.00	-0.00	0.00	0.12
5	7	2.87	100.14	0.00	-0.00	0.00	-32.87
5	8	-2.87	-100.14	0.00	-0.00	0.00	-26.21
6	8	2.87	100.14	0.00	-0.00	0.00	26.21
6	9	-2.87	-100.14	0.00	-0.00	0.00	-56.32
7	10	0.00	0.00	0.00	0.00	0.00	0.00

PROJECT:

7	11	0.00	0.00	0.00	0.00	0.00	0.00
8	11	0.00	-69.00	0.00	0.00	0.00	0.00
8	12	0.00	69.00	0.00	0.00	0.00	-185.66
9	12	0.00	-69.00	0.00	0.00	0.00	185.66
9	3	0.00	69.00	0.00	0.00	0.00	-277.38
10	3	-2.86	31.01	0.00	0.00	0.00	221.28
10	13	2.86	-31.01	0.00	0.00	0.00	-180.06
11	13	-2.86	31.01	0.00	0.00	0.00	180.06
11	14	2.86	-31.01	0.00	0.00	0.00	-31.51
12	14	-2.86	4.01	0.00	0.00	0.00	31.51
12	15	2.86	-4.01	0.00	0.00	0.00	3.76
13	15	-2.86	4.01	0.00	0.00	0.00	-3.76
13	6	2.86	-4.01	0.00	0.00	0.00	9.09
14	6	-2.87	22.86	0.00	0.00	0.00	-9.21
14	16	2.87	-22.86	0.00	0.00	0.00	9.44
15	16	-2.87	-4.14	0.00	0.00	0.00	-9.44
15	17	2.87	4.14	0.00	0.00	0.00	3.98
16	17	-2.87	-4.14	0.00	0.00	0.00	-3.98
16	18	2.87	4.14	0.00	0.00	0.00	-32.51
17	18	-2.87	-31.14	0.00	0.00	0.00	32.51
17	19	2.87	31.14	0.00	0.00	0.00	-181.05
18	19	-2.87	-31.14	0.00	0.00	0.00	181.05
18	9	2.87	31.14	0.00	0.00	0.00	-222.44
19	9	0.00	69.00	0.00	0.00	0.00	278.76
19	20	0.00	-69.00	0.00	0.00	0.00	-187.04
20	20	0.00	69.00	0.00	0.00	0.00	187.04
20	21	0.00	-69.00	0.00	0.00	0.00	0.00
21	21	0.00	0.00	0.00	0.00	0.00	0.00
21	22	0.00	0.00	0.00	0.00	0.00	0.00

Loadcase ID: LL1 Name:
No impact factor is included in the individual live load.

Memb	Node	Fx kip	Fy kip	Fz kip	Mx kft	My kft	Mz kft
1	1	-0.29	136.79	0.00	-0.00	0.00	-1.13
1	2	0.29	-136.79	0.00	-0.00	0.00	7.06
2	2	-0.29	136.79	0.00	-0.00	0.00	-7.06
2	3	0.29	-136.79	0.00	-0.00	0.00	10.08
3	4	-0.54	31.32	0.00	-0.00	0.00	1.74
3	5	0.54	-31.32	0.00	-0.00	0.00	9.32
4	5	-0.54	31.32	0.00	-0.00	0.00	-9.32
4	6	0.54	-31.32	0.00	-0.00	0.00	14.95
5	7	0.82	-4.65	0.00	-0.00	0.00	-13.89
5	8	-0.82	4.65	0.00	-0.00	0.00	-3.09
6	8	0.82	-4.65	0.00	-0.00	0.00	3.09
6	9	-0.82	4.65	0.00	-0.00	0.00	-11.75
7	10	0.00	0.00	0.00	0.00	0.00	0.00
7	11	0.00	0.00	0.00	0.00	0.00	0.00
8	11	0.00	-68.00	0.00	0.00	0.00	0.00
8	12	0.00	68.00	0.00	0.00	0.00	-182.95
9	12	0.00	-68.00	0.00	0.00	0.00	182.95
9	3	0.00	68.00	0.00	0.00	0.00	-273.34
10	3	-0.29	68.79	0.00	0.00	0.00	263.27
10	13	0.29	-68.79	0.00	0.00	0.00	-171.82
11	13	-0.29	68.79	0.00	0.00	0.00	171.82
11	14	0.29	-68.79	0.00	0.00	0.00	157.73
12	14	-0.29	-23.35	0.00	0.00	0.00	-157.73
12	15	0.29	23.35	0.00	0.00	0.00	-47.74
13	15	-0.29	-23.35	0.00	0.00	0.00	47.74
13	6	0.29	23.35	0.00	0.00	0.00	-78.78
14	6	-0.82	7.97	0.00	0.00	0.00	63.82

14	16	0.82	-7.97	0.00	0.00	0.00	-63.74
15	16	-0.82	4.65	0.00	0.00	0.00	63.74
15	17	0.82	-4.65	0.00	0.00	0.00	-57.61
16	17	-0.82	4.65	0.00	0.00	0.00	57.61
16	18	0.82	-4.65	0.00	0.00	0.00	-16.61
17	18	-0.82	4.65	0.00	0.00	0.00	16.61
17	19	0.82	-4.65	0.00	0.00	0.00	5.57
18	19	-0.82	4.65	0.00	0.00	0.00	-5.57
18	9	0.82	-4.65	0.00	0.00	0.00	11.75
19	9	0.00	0.00	0.00	0.00	0.00	0.00
19	20	0.00	0.00	0.00	0.00	0.00	0.00
20	20	0.00	0.00	0.00	0.00	0.00	0.00
20	21	0.00	0.00	0.00	0.00	0.00	0.00
21	21	0.00	0.00	0.00	0.00	0.00	0.00
21	22	0.00	0.00	0.00	0.00	0.00	0.00

Loadcase ID: LL2 Name:
No impact factor is included in the individual live load.

Memb	Node	Fx kip	Fy kip	Fz kip	Mx kft	My kft	Mz kft
1	1	-0.82	-4.64	0.00	-0.00	0.00	13.88
1	2	0.82	4.64	0.00	-0.00	0.00	3.08
2	2	-0.82	-4.64	0.00	-0.00	0.00	-3.08
2	3	0.82	4.64	0.00	-0.00	0.00	11.73
3	4	0.53	31.29	0.00	-0.00	0.00	-1.68
3	5	-0.53	-31.29	0.00	-0.00	0.00	-9.28
4	5	0.53	31.29	0.00	-0.00	0.00	9.28
4	6	-0.53	-31.29	0.00	-0.00	0.00	-14.87
5	7	0.29	136.80	0.00	-0.00	0.00	1.09
5	8	-0.29	-136.80	0.00	-0.00	0.00	-7.09
6	8	0.29	136.80	0.00	-0.00	0.00	7.09
6	9	-0.29	-136.80	0.00	-0.00	0.00	-10.15
7	10	0.00	0.00	0.00	0.00	0.00	0.00
7	11	0.00	0.00	0.00	0.00	0.00	0.00
8	11	0.00	0.00	0.00	0.00	0.00	0.00
8	12	0.00	0.00	0.00	0.00	0.00	0.00
9	12	0.00	0.00	0.00	0.00	0.00	0.00
9	3	0.00	0.00	0.00	0.00	0.00	0.00
10	3	-0.82	-4.64	0.00	0.00	0.00	-11.73
10	13	0.82	4.64	0.00	0.00	0.00	5.57
11	13	-0.82	-4.64	0.00	0.00	0.00	-5.57
11	14	0.82	4.64	0.00	0.00	0.00	-16.63
12	14	-0.82	-4.64	0.00	0.00	0.00	16.63
12	15	0.82	4.64	0.00	0.00	0.00	-57.43
13	15	-0.82	-4.64	0.00	0.00	0.00	57.43
13	6	0.82	4.64	0.00	0.00	0.00	-63.59
14	6	-0.29	26.66	0.00	0.00	0.00	78.46
14	16	0.29	-26.66	0.00	0.00	0.00	-78.20
15	16	-0.29	23.21	0.00	0.00	0.00	78.20
15	17	0.29	-23.21	0.00	0.00	0.00	-47.57
16	17	-0.29	23.21	0.00	0.00	0.00	47.57
16	18	0.29	-23.21	0.00	0.00	0.00	157.17
17	18	-0.29	-69.00	0.00	0.00	0.00	-157.17
17	19	0.29	69.00	0.00	0.00	0.00	-172.02
18	19	-0.29	-69.00	0.00	0.00	0.00	172.02
18	9	0.29	69.00	0.00	0.00	0.00	-263.75
19	9	0.00	67.80	0.00	0.00	0.00	273.90
19	20	0.00	-67.80	0.00	0.00	0.00	-183.77
20	20	0.00	67.80	0.00	0.00	0.00	183.77
20	21	0.00	-67.80	0.00	0.00	0.00	0.00
21	21	0.00	0.00	0.00	0.00	0.00	0.00

21	22	0.00	0.00	0.00	0.00	0.00	0.00

Loadcase ID: LL3 Name:
No impact factor is included in the individual live load.

Memb	Node	Fx kip	Fy kip	Fz kip	Mx kft	My kft	Mz kft
1	1	1.60	20.03	0.00	-0.00	0.00	-18.36
1	2	-1.60	-20.03	0.00	-0.00	0.00	-14.63
2	2	1.60	20.03	0.00	-0.00	0.00	14.63
2	3	-1.60	-20.03	0.00	-0.00	0.00	-31.44
3	4	0.00	123.40	0.00	-0.00	0.00	-0.01
3	5	-0.00	-123.40	0.00	-0.00	0.00	-0.02
4	5	0.00	123.40	0.00	-0.00	0.00	0.02
4	6	-0.00	-123.40	0.00	-0.00	0.00	-0.04
5	7	-1.60	20.02	0.00	-0.00	0.00	18.40
5	8	1.60	-20.02	0.00	-0.00	0.00	14.62
6	8	-1.60	20.02	0.00	-0.00	0.00	-14.62
6	9	1.60	-20.02	0.00	-0.00	0.00	31.45
7	10	0.00	0.00	0.00	0.00	0.00	0.00
7	11	0.00	0.00	0.00	0.00	0.00	0.00
8	11	0.00	0.00	0.00	0.00	0.00	0.00
8	12	0.00	0.00	0.00	0.00	0.00	0.00
9	12	0.00	0.00	0.00	0.00	0.00	0.00
9	3	0.00	0.00	0.00	0.00	0.00	0.00
10	3	1.60	20.03	0.00	0.00	0.00	31.44
10	13	-1.60	-20.03	0.00	0.00	0.00	-4.82
11	13	1.60	20.03	0.00	0.00	0.00	4.82
11	14	-1.60	-20.03	0.00	0.00	0.00	91.12
12	14	1.60	-11.85	0.00	0.00	0.00	-91.12
12	15	-1.60	11.85	0.00	0.00	0.00	-13.17
13	15	1.60	-11.85	0.00	0.00	0.00	13.17
13	6	-1.60	11.85	0.00	0.00	0.00	-28.93
14	6	1.60	111.55	0.00	0.00	0.00	28.97
14	16	-1.60	-111.55	0.00	0.00	0.00	-27.85
15	16	1.60	11.69	0.00	0.00	0.00	27.85
15	17	-1.60	-11.69	0.00	0.00	0.00	-12.43
16	17	1.60	11.69	0.00	0.00	0.00	12.43
16	18	-1.60	-11.69	0.00	0.00	0.00	90.69
17	18	1.60	-20.02	0.00	0.00	0.00	-90.69
17	19	-1.60	20.02	0.00	0.00	0.00	-4.83
18	19	1.60	-20.02	0.00	0.00	0.00	4.83
18	9	-1.60	20.02	0.00	0.00	0.00	-31.45
19	9	0.00	0.00	0.00	0.00	0.00	0.00
19	20	0.00	0.00	0.00	0.00	0.00	0.00
20	20	0.00	0.00	0.00	0.00	0.00	0.00
20	21	0.00	0.00	0.00	0.00	0.00	0.00
21	21	0.00	0.00	0.00	0.00	0.00	0.00
21	22	0.00	0.00	0.00	0.00	0.00	0.00

Loadcase ID: LL4 Name:
No impact factor is included in the individual live load.

Memb	Node	Fx kip	Fy kip	Fz kip	Mx kft	My kft	Mz kft
1	1	-0.93	110.13	0.00	-0.00	0.00	10.63
1	2	0.93	-110.13	0.00	-0.00	0.00	8.45
2	2	-0.93	110.13	0.00	-0.00	0.00	-8.45
2	3	0.93	-110.13	0.00	-0.00	0.00	18.18
3	4	-0.00	52.17	0.00	-0.00	0.00	0.04
3	5	0.00	-52.17	0.00	-0.00	0.00	0.03

PROJECT:

4	5	-0.00	52.17	0.00	-0.00	0.00	-0.03
4	6	0.00	-52.17	0.00	-0.00	0.00	0.07
5	7	0.93	110.12	0.00	-0.00	0.00	-10.66
5	8	-0.93	-110.12	0.00	-0.00	0.00	-8.49
6	8	0.93	110.12	0.00	-0.00	0.00	8.49
6	9	-0.93	-110.12	0.00	-0.00	0.00	-18.25
7	10	0.00	0.00	0.00	0.00	0.00	0.00
7	11	0.00	0.00	0.00	0.00	0.00	0.00
8	11	0.00	-56.66	0.00	0.00	0.00	0.00
8	12	0.00	56.66	0.00	0.00	0.00	-152.46
9	12	0.00	-56.66	0.00	0.00	0.00	152.46
9	3	0.00	56.66	0.00	0.00	0.00	-227.79
10	3	-0.93	53.46	0.00	0.00	0.00	209.61
10	13	0.93	-53.46	0.00	0.00	0.00	-138.54
11	13	-0.93	53.46	0.00	0.00	0.00	138.54
11	14	0.93	-53.46	0.00	0.00	0.00	117.58
12	14	-0.93	-23.32	0.00	0.00	0.00	-117.58
12	15	0.93	23.32	0.00	0.00	0.00	-87.64
13	15	-0.93	-23.32	0.00	0.00	0.00	87.64
13	6	0.93	23.32	0.00	0.00	0.00	-118.64
14	6	-0.93	28.85	0.00	0.00	0.00	118.57
14	16	0.93	-28.85	0.00	0.00	0.00	-118.28
15	16	-0.93	23.22	0.00	0.00	0.00	118.28
15	17	0.93	-23.22	0.00	0.00	0.00	-87.65
16	17	-0.93	23.22	0.00	0.00	0.00	87.65
16	18	0.93	-23.22	0.00	0.00	0.00	117.13
17	18	-0.93	-53.63	0.00	0.00	0.00	-117.13
17	19	0.93	53.63	0.00	0.00	0.00	-138.71
18	19	-0.93	-53.63	0.00	0.00	0.00	138.71
18	9	0.93	53.63	0.00	0.00	0.00	-210.00
19	9	0.00	56.50	0.00	0.00	0.00	228.25
19	20	0.00	-56.50	0.00	0.00	0.00	-153.14
20	20	0.00	56.50	0.00	0.00	0.00	153.14
20	21	0.00	-56.50	0.00	0.00	0.00	0.00
21	21	0.00	0.00	0.00	0.00	0.00	0.00
21	22	0.00	0.00	0.00	0.00	0.00	0.00

Loadcase ID: LL5 Name:
No impact factor is included in the individual live load.

Memb	Node	Fx kip	Fy kip	Fz kip	Mx kft	My kft	Mz kft
1	1	1.09	130.68	0.00	-0.00	0.00	-16.24
1	2	-1.09	-130.68	0.00	-0.00	0.00	-6.31
2	2	1.09	130.68	0.00	-0.00	0.00	6.31
2	3	-1.09	-130.68	0.00	-0.00	0.00	-17.80
3	4	-0.45	128.93	0.00	-0.00	0.00	1.44
3	5	0.45	-128.93	0.00	-0.00	0.00	7.75
4	5	-0.45	128.93	0.00	-0.00	0.00	-7.75
4	6	0.45	-128.93	0.00	-0.00	0.00	12.43
5	7	-0.65	12.81	0.00	-0.00	0.00	3.76
5	8	0.65	-12.81	0.00	-0.00	0.00	9.61
6	8	-0.65	12.81	0.00	-0.00	0.00	-9.61
6	9	0.65	-12.81	0.00	-0.00	0.00	16.42
7	10	0.00	0.00	0.00	0.00	0.00	0.00
7	11	0.00	0.00	0.00	0.00	0.00	0.00
8	11	0.00	-56.66	0.00	0.00	0.00	0.00
8	12	0.00	56.66	0.00	0.00	0.00	-152.46
9	12	0.00	-56.66	0.00	0.00	0.00	152.46
9	3	0.00	56.66	0.00	0.00	0.00	-227.79
10	3	1.09	74.01	0.00	0.00	0.00	245.59
10	13	-1.09	-74.01	0.00	0.00	0.00	-147.20

PROJECT:

11	13	1.09	74.01	0.00	0.00	0.00	147.20
11	14	-1.09	-74.01	0.00	0.00	0.00	207.37
12	14	1.09	-29.33	0.00	0.00	0.00	-207.37
12	15	-1.09	29.33	0.00	0.00	0.00	-50.76
13	15	1.09	-29.33	0.00	0.00	0.00	50.76
13	6	-1.09	29.33	0.00	0.00	0.00	-89.75
14	6	0.65	99.60	0.00	0.00	0.00	77.32
14	16	-0.65	-99.60	0.00	0.00	0.00	-76.33
15	16	0.65	13.62	0.00	0.00	0.00	76.33
15	17	-0.65	-13.62	0.00	0.00	0.00	-58.36
16	17	0.65	13.62	0.00	0.00	0.00	58.36
16	18	-0.65	-13.62	0.00	0.00	0.00	61.74
17	18	0.65	-12.81	0.00	0.00	0.00	-61.74
17	19	-0.65	12.81	0.00	0.00	0.00	0.61
18	19	0.65	-12.81	0.00	0.00	0.00	-0.61
18	9	-0.65	12.81	0.00	0.00	0.00	-16.42
19	9	0.00	0.00	0.00	0.00	0.00	0.00
19	20	0.00	0.00	0.00	0.00	0.00	0.00
20	20	0.00	0.00	0.00	0.00	0.00	0.00
20	21	0.00	0.00	0.00	0.00	0.00	0.00
21	21	0.00	0.00	0.00	0.00	0.00	0.00
21	22	0.00	0.00	0.00	0.00	0.00	0.00

Loadcase ID: LL6 Name:
No impact factor is included in the individual live load.

Memb	Node	Fx kip	Fy kip	Fz kip	Mx kft	My kft	Mz kft
1	1	0.65	12.83	0.00	-0.00	0.00	-3.73
1	2	-0.65	-12.83	0.00	-0.00	0.00	-9.62
2	2	0.65	12.83	0.00	-0.00	0.00	9.62
2	3	-0.65	-12.83	0.00	-0.00	0.00	-16.42
3	4	0.44	128.91	0.00	-0.00	0.00	-1.41
3	5	-0.44	-128.91	0.00	-0.00	0.00	-7.76
4	5	0.44	128.91	0.00	-0.00	0.00	7.76
4	6	-0.44	-128.91	0.00	-0.00	0.00	-12.43
5	7	-1.09	130.69	0.00	-0.00	0.00	16.24
5	8	1.09	-130.69	0.00	-0.00	0.00	6.27
6	8	-1.09	130.69	0.00	-0.00	0.00	-6.27
6	9	1.09	-130.69	0.00	-0.00	0.00	17.75
7	10	0.00	0.00	0.00	0.00	0.00	0.00
7	11	0.00	0.00	0.00	0.00	0.00	0.00
8	11	0.00	0.00	0.00	0.00	0.00	0.00
8	12	0.00	0.00	0.00	0.00	0.00	0.00
9	12	0.00	0.00	0.00	0.00	0.00	0.00
9	3	0.00	0.00	0.00	0.00	0.00	0.00
10	3	0.65	12.83	0.00	0.00	0.00	16.42
10	13	-0.65	-12.83	0.00	0.00	0.00	0.63
11	13	0.65	12.83	0.00	0.00	0.00	-0.63
11	14	-0.65	-12.83	0.00	0.00	0.00	62.07
12	14	0.65	-13.74	0.00	0.00	0.00	-62.07
12	15	-0.65	13.74	0.00	0.00	0.00	-58.83
13	15	0.65	-13.74	0.00	0.00	0.00	58.83
13	6	-0.65	13.74	0.00	0.00	0.00	-77.10
14	6	1.09	115.18	0.00	0.00	0.00	89.52
14	16	-1.09	-115.18	0.00	0.00	0.00	-88.37
15	16	1.09	29.09	0.00	0.00	0.00	88.37
15	17	-1.09	-29.09	0.00	0.00	0.00	-50.00
16	17	1.09	29.09	0.00	0.00	0.00	50.00
16	18	-1.09	-29.09	0.00	0.00	0.00	206.55
17	18	1.09	-74.19	0.00	0.00	0.00	-206.55
17	19	-1.09	74.19	0.00	0.00	0.00	-147.38

PROJECT:

18	19	1.09	-74.19	0.00	0.00	0.00	147.38
18	9	-1.09	74.19	0.00	0.00	0.00	-246.00
19	9	0.00	56.50	0.00	0.00	0.00	228.25
19	20	0.00	-56.50	0.00	0.00	0.00	-153.14
20	20	0.00	56.50	0.00	0.00	0.00	153.14
20	21	0.00	-56.50	0.00	0.00	0.00	0.00
21	21	0.00	0.00	0.00	0.00	0.00	0.00
21	22	0.00	0.00	0.00	0.00	0.00	0.00

Loadcase ID: BR1 Name:

Memb	Node	Fx kip	Fy kip	Fz kip	Mx kft	My kft	Mz kft
1	1	-0.00	0.00	0.00	-0.00	0.00	0.00
1	2	-0.00	0.00	0.00	-0.00	0.00	0.00
2	2	-0.00	0.00	0.00	-0.00	0.00	0.00
2	3	-0.00	0.00	0.00	-0.00	0.00	0.00
3	4	-0.00	0.00	0.00	-0.00	0.00	0.00
3	5	-0.00	0.00	0.00	-0.00	0.00	0.00
4	5	-0.00	0.00	0.00	-0.00	0.00	0.00
4	6	-0.00	0.00	0.00	-0.00	0.00	0.00
5	7	-0.00	0.00	0.00	-0.00	0.00	0.00
5	8	-0.00	0.00	0.00	-0.00	0.00	0.00
6	8	-0.00	0.00	0.00	-0.00	0.00	0.00
6	9	-0.00	0.00	0.00	-0.00	0.00	0.00
7	10	0.00	0.00	0.00	0.00	0.00	0.00
7	11	0.00	0.00	0.00	0.00	0.00	0.00
8	11	0.00	0.00	0.00	0.00	0.00	0.00
8	12	0.00	0.00	0.00	0.00	0.00	0.00
9	12	0.00	0.00	0.00	0.00	0.00	0.00
9	3	0.00	0.00	0.00	0.00	0.00	0.00
10	3	0.00	0.00	0.00	0.00	0.00	0.00
10	13	0.00	0.00	0.00	0.00	0.00	0.00
11	13	0.00	0.00	0.00	0.00	0.00	0.00
11	14	0.00	0.00	0.00	0.00	0.00	0.00
12	14	0.00	0.00	0.00	0.00	0.00	0.00
12	15	0.00	0.00	0.00	0.00	0.00	0.00
13	15	0.00	0.00	0.00	0.00	0.00	0.00
13	6	0.00	0.00	0.00	0.00	0.00	0.00
14	6	0.00	0.00	0.00	0.00	0.00	0.00
14	16	0.00	0.00	0.00	0.00	0.00	0.00
15	16	0.00	0.00	0.00	0.00	0.00	0.00
15	17	0.00	0.00	0.00	0.00	0.00	0.00
16	17	0.00	0.00	0.00	0.00	0.00	0.00
16	18	0.00	0.00	0.00	0.00	0.00	0.00
17	18	0.00	0.00	0.00	0.00	0.00	0.00
17	19	0.00	0.00	0.00	0.00	0.00	0.00
18	19	0.00	0.00	0.00	0.00	0.00	0.00
18	9	0.00	0.00	0.00	0.00	0.00	0.00
19	9	0.00	0.00	0.00	0.00	0.00	0.00
19	20	0.00	0.00	0.00	0.00	0.00	0.00
20	20	0.00	0.00	0.00	0.00	0.00	0.00
20	21	0.00	0.00	0.00	0.00	0.00	0.00
21	21	0.00	0.00	0.00	0.00	0.00	0.00
21	22	0.00	0.00	0.00	0.00	0.00	0.00

Loadcase ID: BR1 Name:

Memb	Node	Fx kip	Fy kip	Fz kip	Mx kft	My kft	Mz kft

PROJECT:

1	1	4.77	11.12	-5.66	-221.67	-0.08	-90.99
1	2	-4.77	-11.12	5.66	105.07	0.08	-7.22
2	2	4.77	11.12	-5.66	-105.07	-0.08	7.22
2	3	-4.77	-11.12	5.66	45.64	0.08	-57.27
3	4	5.74	0.01	-3.95	-202.11	0.02	-102.16
3	5	-5.74	-0.01	3.95	120.78	-0.02	-16.08
4	5	5.74	0.01	-3.95	-120.78	0.02	16.08
4	6	-5.74	-0.01	3.95	79.32	-0.02	-76.36
5	7	4.77	-11.12	-5.67	-221.79	0.12	-90.98
5	8	-4.77	11.12	5.67	105.08	-0.12	-7.21
6	8	4.77	-11.12	-5.67	-105.08	0.12	7.21
6	9	-4.77	11.12	5.67	45.59	-0.12	-57.25
7	10	0.00	0.00	0.00	0.00	0.00	0.00
7	11	0.00	0.00	0.00	0.00	0.00	0.00
8	11	-3.05	-3.64	3.05	4.58	0.00	4.58
8	12	3.05	3.64	-3.05	-4.58	-8.22	-14.38
9	12	-3.05	-3.64	3.05	4.58	8.22	14.38
9	3	3.05	3.64	-3.05	-4.58	-12.28	-19.22
10	3	1.71	7.48	-2.61	-41.06	12.20	76.49
10	13	-1.71	-7.48	2.61	41.06	-8.73	-66.55
11	13	1.71	7.48	-2.61	-41.06	8.73	66.55
11	14	-1.71	-7.48	2.61	41.06	3.75	-30.72
12	14	-1.34	7.48	0.45	-36.48	-3.75	35.30
12	15	1.34	-7.48	-0.45	36.48	-0.21	30.51
13	15	-1.34	7.48	0.45	-36.48	0.21	-30.51
13	6	1.34	-7.48	-0.45	36.48	-0.80	40.45
14	6	4.40	7.48	-3.50	31.84	0.82	35.91
14	16	-4.40	-7.48	3.50	-31.84	-0.79	-35.83
15	16	1.34	7.48	-0.44	36.42	0.79	40.41
15	17	-1.34	-7.48	0.44	-36.42	-0.20	-30.54
16	17	1.34	7.48	-0.44	36.42	0.20	30.54
16	18	-1.34	-7.48	0.44	-36.42	3.71	35.47
17	18	-1.71	7.48	2.61	41.00	-3.71	-30.89
17	19	1.71	-7.48	-2.61	-41.00	-8.75	66.59
18	19	-1.71	7.48	2.61	41.00	8.75	-66.59
18	9	1.71	-7.48	-2.61	-41.00	-12.22	76.54
19	9	3.05	-3.64	-3.05	-4.58	12.34	-19.29
19	20	-3.05	3.64	3.05	4.58	-8.28	14.45
20	20	3.05	-3.64	-3.05	-4.58	8.28	-14.45
20	21	-3.05	3.64	3.05	4.58	0.00	4.58
21	21	0.00	0.00	0.00	0.00	0.00	0.00
21	22	0.00	0.00	0.00	0.00	0.00	0.00

Loadcase ID: BR2 Name:

Memb	Node	Fx kip	Fy kip	Fz kip	Mx kft	My kft	Mz kft
1	1	4.77	11.12	-5.66	-221.67	-0.08	-90.99
1	2	-4.77	-11.12	5.66	105.07	0.08	-7.22
2	2	4.77	11.12	-5.66	-105.07	-0.08	7.22
2	3	-4.77	-11.12	5.66	45.64	0.08	-57.27
3	4	5.74	0.01	-3.95	-202.11	0.02	-102.16
3	5	-5.74	-0.01	3.95	120.78	-0.02	-16.08
4	5	5.74	0.01	-3.95	-120.78	0.02	16.08
4	6	-5.74	-0.01	3.95	79.32	-0.02	-76.36
5	7	4.77	-11.12	-5.67	-221.79	0.12	-90.98
5	8	-4.77	11.12	5.67	105.08	-0.12	-7.21
6	8	4.77	-11.12	-5.67	-105.08	0.12	7.21
6	9	-4.77	11.12	5.67	45.59	-0.12	-57.25
7	10	0.00	0.00	0.00	0.00	0.00	0.00

PROJECT:

7	11	0.00	0.00	0.00	0.00	0.00	0.00
8	11	-3.05	-3.64	3.05	4.58	0.00	4.58
8	12	3.05	3.64	-3.05	-4.58	-8.22	-14.38
9	12	-3.05	-3.64	3.05	4.58	8.22	14.38
9	3	3.05	3.64	-3.05	-4.58	-12.28	-19.22
10	3	1.71	7.48	-2.61	-41.06	12.20	76.49
10	13	-1.71	-7.48	2.61	41.06	-8.73	-66.55
11	13	1.71	7.48	-2.61	-41.06	8.73	66.55
11	14	-1.71	-7.48	2.61	41.06	3.75	-30.72
12	14	-1.34	7.48	0.45	-36.48	-3.75	35.30
12	15	1.34	-7.48	-0.45	36.48	-0.21	30.51
13	15	-1.34	7.48	0.45	-36.48	0.21	-30.51
13	6	1.34	-7.48	-0.45	36.48	-0.80	40.45
14	6	4.40	7.48	-3.50	31.84	0.82	35.91
14	16	-4.40	-7.48	3.50	-31.84	-0.79	-35.83
15	16	1.34	7.48	-0.44	36.42	0.79	40.41
15	17	-1.34	-7.48	0.44	-36.42	-0.20	-30.54
16	17	1.34	7.48	-0.44	36.42	0.20	30.54
16	18	-1.34	-7.48	0.44	-36.42	3.71	35.47
17	18	-1.71	7.48	2.61	41.00	-3.71	-30.89
17	19	1.71	-7.48	-2.61	-41.00	-8.75	66.59
18	19	-1.71	7.48	2.61	41.00	8.75	-66.59
18	9	1.71	-7.48	-2.61	-41.00	-12.22	76.54
19	9	3.05	-3.64	-3.05	-4.58	12.34	-19.29
19	20	-3.05	3.64	3.05	4.58	-8.28	14.45
20	20	3.05	-3.64	-3.05	-4.58	8.28	-14.45
20	21	-3.05	3.64	3.05	4.58	0.00	4.58
21	21	0.00	0.00	0.00	0.00	0.00	0.00
21	22	0.00	0.00	0.00	0.00	0.00	0.00

Loadcase ID: BR3 Name:

Memb	Node	Fx kip	Fy kip	Fz kip	Mx kft	My kft	Mz kft
1	1	4.77	11.12	-5.66	-221.67	-0.08	-90.99
1	2	-4.77	-11.12	5.66	105.07	0.08	-7.22
2	2	4.77	11.12	-5.66	-105.07	-0.08	7.22
2	3	-4.77	-11.12	5.66	45.64	0.08	-57.27
3	4	5.74	0.01	-3.95	-202.11	0.02	-102.16
3	5	-5.74	-0.01	3.95	120.78	-0.02	-16.08
4	5	5.74	0.01	-3.95	-120.78	0.02	16.08
4	6	-5.74	-0.01	3.95	79.32	-0.02	-76.36
5	7	4.77	-11.12	-5.67	-221.79	0.12	-90.98
5	8	-4.77	11.12	5.67	105.08	-0.12	-7.21
6	8	4.77	-11.12	-5.67	-105.08	0.12	7.21
6	9	-4.77	11.12	5.67	45.59	-0.12	-57.25
7	10	0.00	0.00	0.00	0.00	0.00	0.00
7	11	0.00	0.00	0.00	0.00	0.00	0.00
8	11	-3.05	-3.64	3.05	4.58	0.00	4.58
8	12	3.05	3.64	-3.05	-4.58	-8.22	-14.38
9	12	-3.05	-3.64	3.05	4.58	8.22	14.38
9	3	3.05	3.64	-3.05	-4.58	-12.28	-19.22
10	3	1.71	7.48	-2.61	-41.06	12.20	76.49
10	13	-1.71	-7.48	2.61	41.06	-8.73	-66.55
11	13	1.71	7.48	-2.61	-41.06	8.73	66.55
11	14	-1.71	-7.48	2.61	41.06	3.75	-30.72
12	14	-1.34	7.48	0.45	-36.48	-3.75	35.30
12	15	1.34	-7.48	-0.45	36.48	-0.21	30.51
13	15	-1.34	7.48	0.45	-36.48	0.21	-30.51
13	6	1.34	-7.48	-0.45	36.48	-0.80	40.45
14	6	4.40	7.48	-3.50	31.84	0.82	35.91

14	16	-4.40	-7.48	3.50	-31.84	-0.79	-35.83
15	16	1.34	7.48	-0.44	36.42	0.79	40.41
15	17	-1.34	-7.48	0.44	-36.42	-0.20	-30.54
16	17	1.34	7.48	-0.44	36.42	0.20	30.54
16	18	-1.34	-7.48	0.44	-36.42	3.71	35.47
17	18	-1.71	7.48	2.61	41.00	-3.71	-30.89
17	19	1.71	-7.48	-2.61	-41.00	-8.75	66.59
18	19	-1.71	7.48	2.61	41.00	8.75	-66.59
18	9	1.71	-7.48	-2.61	-41.00	-12.22	76.54
19	9	3.05	-3.64	-3.05	-4.58	12.34	-19.29
19	20	-3.05	3.64	3.05	4.58	-8.28	14.45
20	20	3.05	-3.64	-3.05	-4.58	8.28	-14.45
20	21	-3.05	3.64	3.05	4.58	0.00	4.58
21	21	0.00	0.00	0.00	0.00	0.00	0.00
21	22	0.00	0.00	0.00	0.00	0.00	0.00

Loadcase ID: BR4 Name:

Memb	Node	Fx kip	Fy kip	Fz kip	Mx kft	My kft	Mz kft
1	1	7.95	18.53	-9.43	-369.45	-0.14	-151.64
1	2	-7.95	-18.53	9.43	175.12	0.14	-12.03
2	2	7.95	18.53	-9.43	-175.12	-0.14	12.03
2	3	-7.95	-18.53	9.43	76.07	0.14	-95.45
3	4	9.57	0.01	-6.58	-336.84	0.03	-170.27
3	5	-9.57	-0.01	6.58	201.30	-0.03	-26.81
4	5	9.57	0.01	-6.58	-201.30	0.03	26.81
4	6	-9.57	-0.01	6.58	132.21	-0.03	-127.26
5	7	7.94	-18.54	-9.44	-369.65	0.21	-151.63
5	8	-7.94	18.54	9.44	175.13	-0.21	-12.01
6	8	7.94	-18.54	-9.44	-175.13	0.21	12.01
6	9	-7.94	18.54	9.44	75.98	-0.21	-95.42
7	10	0.00	0.00	0.00	0.00	0.00	0.00
7	11	0.00	0.00	0.00	0.00	0.00	0.00
8	11	-5.09	-6.07	5.09	7.64	0.00	7.64
8	12	5.09	6.07	-5.09	-7.64	-13.70	-23.96
9	12	-5.09	-6.07	5.09	7.64	13.70	23.96
9	3	5.09	6.07	-5.09	-7.64	-20.47	-32.03
10	3	2.85	12.46	-4.34	-68.44	20.33	127.48
10	13	-2.85	-12.46	4.34	68.44	-14.55	-110.91
11	13	2.85	12.46	-4.34	-68.44	14.55	110.91
11	14	-2.85	-12.46	4.34	68.44	6.25	-51.20
12	14	-2.24	12.46	0.75	-60.80	-6.25	58.84
12	15	2.24	-12.46	-0.75	60.80	-0.35	50.85
13	15	-2.24	12.46	0.75	-60.80	0.35	-50.85
13	6	2.24	-12.46	-0.75	60.80	-1.34	67.42
14	6	7.33	12.47	-5.83	53.06	1.37	59.84
14	16	-7.33	-12.47	5.83	-53.06	-1.31	-59.72
15	16	2.24	12.47	-0.74	60.70	1.31	67.35
15	17	-2.24	-12.47	0.74	-60.70	-0.34	-50.90
16	17	2.24	12.47	-0.74	60.70	0.34	50.90
16	18	-2.24	-12.47	0.74	-60.70	6.18	59.12
17	18	-2.85	12.47	4.35	68.34	-6.18	-51.48
17	19	2.85	-12.47	-4.35	-68.34	-14.58	110.99
18	19	-2.85	12.47	4.35	68.34	14.58	-110.99
18	9	2.85	-12.47	-4.35	-68.34	-20.36	127.57
19	9	5.09	-6.07	-5.09	-7.64	20.57	-32.15
19	20	-5.09	6.07	5.09	7.64	-13.80	24.08
20	20	5.09	-6.07	-5.09	-7.64	13.80	-24.08
20	21	-5.09	6.07	5.09	7.64	0.00	7.64
21	21	0.00	0.00	0.00	0.00	0.00	0.00

21	22	0.00	0.00	0.00	0.00	0.00	0.00

Loadcase ID: BR5 Name:

Memb	Node	Fx kip	Fy kip	Fz kip	Mx kft	My kft	Mz kft
1	1	7.95	18.53	-9.43	-369.45	-0.14	-151.64
1	2	-7.95	-18.53	9.43	175.12	0.14	-12.03
2	2	7.95	18.53	-9.43	-175.12	-0.14	12.03
2	3	-7.95	-18.53	9.43	76.07	0.14	-95.45
3	4	9.57	0.01	-6.58	-336.84	0.03	-170.27
3	5	-9.57	-0.01	6.58	201.30	-0.03	-26.81
4	5	9.57	0.01	-6.58	-201.30	0.03	26.81
4	6	-9.57	-0.01	6.58	132.21	-0.03	-127.26
5	7	7.94	-18.54	-9.44	-369.65	0.21	-151.63
5	8	-7.94	18.54	9.44	175.13	-0.21	-12.01
6	8	7.94	-18.54	-9.44	-175.13	0.21	12.01
6	9	-7.94	18.54	9.44	75.98	-0.21	-95.42
7	10	0.00	0.00	0.00	0.00	0.00	0.00
7	11	0.00	0.00	0.00	0.00	0.00	0.00
8	11	-5.09	-6.07	5.09	7.64	0.00	7.64
8	12	5.09	6.07	-5.09	-7.64	-13.70	-23.96
9	12	-5.09	-6.07	5.09	7.64	13.70	23.96
9	3	5.09	6.07	-5.09	-7.64	-20.47	-32.03
10	3	2.85	12.46	-4.34	-68.44	20.33	127.48
10	13	-2.85	-12.46	4.34	68.44	-14.55	-110.91
11	13	2.85	12.46	-4.34	-68.44	14.55	110.91
11	14	-2.85	-12.46	4.34	68.44	6.25	-51.20
12	14	-2.24	12.46	0.75	-60.80	-6.25	58.84
12	15	2.24	-12.46	-0.75	60.80	-0.35	50.85
13	15	-2.24	12.46	0.75	-60.80	0.35	-50.85
13	6	2.24	-12.46	-0.75	60.80	-1.34	67.42
14	6	7.33	12.47	-5.83	53.06	1.37	59.84
14	16	-7.33	-12.47	5.83	-53.06	-1.31	-59.72
15	16	2.24	12.47	-0.74	60.70	1.31	67.35
15	17	-2.24	-12.47	0.74	-60.70	-0.34	-50.90
16	17	2.24	12.47	-0.74	60.70	0.34	50.90
16	18	-2.24	-12.47	0.74	-60.70	6.18	59.12
17	18	-2.85	12.47	4.35	68.34	-6.18	-51.48
17	19	2.85	-12.47	-4.35	-68.34	-14.58	110.99
18	19	-2.85	12.47	4.35	68.34	14.58	-110.99
18	9	2.85	-12.47	-4.35	-68.34	-20.36	127.57
19	9	5.09	-6.07	-5.09	-7.64	20.57	-32.15
19	20	-5.09	6.07	5.09	7.64	-13.80	24.08
20	20	5.09	-6.07	-5.09	-7.64	13.80	-24.08
20	21	-5.09	6.07	5.09	7.64	0.00	7.64
21	21	0.00	0.00	0.00	0.00	0.00	0.00
21	22	0.00	0.00	0.00	0.00	0.00	0.00

Loadcase ID: BR6 Name:

Memb	Node	Fx kip	Fy kip	Fz kip	Mx kft	My kft	Mz kft
1	1	7.95	18.53	-9.43	-369.45	-0.14	-151.64
1	2	-7.95	-18.53	9.43	175.12	0.14	-12.03
2	2	7.95	18.53	-9.43	-175.12	-0.14	12.03
2	3	-7.95	-18.53	9.43	76.07	0.14	-95.45
3	4	9.57	0.01	-6.58	-336.84	0.03	-170.27
3	5	-9.57	-0.01	6.58	201.30	-0.03	-26.81

PROJECT:

4	5	9.57	0.01	-6.58	-201.30	0.03	26.81
4	6	-9.57	-0.01	6.58	132.21	-0.03	-127.26
5	7	7.94	-18.54	-9.44	-369.65	0.21	-151.63
5	8	-7.94	18.54	9.44	175.13	-0.21	-12.01
6	8	7.94	-18.54	-9.44	-175.13	0.21	12.01
6	9	-7.94	18.54	9.44	75.98	-0.21	-95.42
7	10	0.00	0.00	0.00	0.00	0.00	0.00
7	11	0.00	0.00	0.00	0.00	0.00	0.00
8	11	-5.09	-6.07	5.09	7.64	0.00	7.64
8	12	5.09	6.07	-5.09	-7.64	-13.70	-23.96
9	12	-5.09	-6.07	5.09	7.64	13.70	23.96
9	3	5.09	6.07	-5.09	-7.64	-20.47	-32.03
10	3	2.85	12.46	-4.34	-68.44	20.33	127.48
10	13	-2.85	-12.46	4.34	68.44	-14.55	-110.91
11	13	2.85	12.46	-4.34	-68.44	14.55	110.91
11	14	-2.85	-12.46	4.34	68.44	6.25	-51.20
12	14	-2.24	12.46	0.75	-60.80	-6.25	58.84
12	15	2.24	-12.46	-0.75	60.80	-0.35	50.85
13	15	-2.24	12.46	0.75	-60.80	0.35	-50.85
13	6	2.24	-12.46	-0.75	60.80	-1.34	67.42
14	6	7.33	12.47	-5.83	53.06	1.37	59.84
14	16	-7.33	-12.47	5.83	-53.06	-1.31	-59.72
15	16	2.24	12.47	-0.74	60.70	1.31	67.35
15	17	-2.24	-12.47	0.74	-60.70	-0.34	-50.90
16	17	2.24	12.47	-0.74	60.70	0.34	50.90
16	18	-2.24	-12.47	0.74	-60.70	6.18	59.12
17	18	-2.85	12.47	4.35	68.34	-6.18	-51.48
17	19	2.85	-12.47	-4.35	-68.34	-14.58	110.99
18	19	-2.85	12.47	4.35	68.34	14.58	-110.99
18	9	2.85	-12.47	-4.35	-68.34	-20.36	127.57
19	9	5.09	-6.07	-5.09	-7.64	20.57	-32.15
19	20	-5.09	6.07	5.09	7.64	-13.80	24.08
20	20	5.09	-6.07	-5.09	-7.64	13.80	-24.08
20	21	-5.09	6.07	5.09	7.64	0.00	7.64
21	21	0.00	0.00	0.00	0.00	0.00	0.00
21	22	0.00	0.00	0.00	0.00	0.00	0.00

Loadcase ID: WS1 Name: STR III-Angle: 45

Memb	Node	Fx kip	Fy kip	Fz kip	Mx kft	My kft	Mz kft
1	1	-6.14	-6.28	-1.15	-37.49	-0.15	92.88
1	2	4.01	6.28	1.15	13.75	0.15	11.72
2	2	-4.01	-6.28	-1.15	-13.75	-0.15	-11.72
2	3	3.22	6.28	1.15	1.65	0.15	49.10
3	4	-6.76	-0.00	-1.14	-37.20	0.00	100.00
3	5	4.63	0.00	1.14	13.80	-0.00	17.37
4	5	-4.63	-0.00	-1.14	-13.80	0.00	-17.37
4	6	3.84	0.00	1.14	1.87	-0.00	61.25
5	7	-6.14	6.28	-1.15	-37.52	0.16	92.88
5	8	4.01	-6.28	1.15	13.75	-0.16	11.72
6	8	-4.01	6.28	-1.15	-13.75	0.16	-11.72
6	9	3.22	-6.28	1.15	1.64	-0.16	49.10
7	10	0.00	0.00	0.00	0.00	0.00	0.00
7	11	0.00	0.00	0.00	0.00	0.00	0.00
8	11	1.98	0.73	0.69	1.03	0.00	-2.98
8	12	-1.98	-0.73	-0.69	-1.03	-1.85	4.95
9	12	1.98	0.73	0.69	1.03	1.85	-4.95
9	3	-1.98	-0.73	-0.69	-1.03	-2.77	5.93
10	3	-1.23	-5.55	-0.46	-0.62	2.62	-55.03
10	13	1.23	5.55	0.46	0.62	-2.00	47.65

11	13	-1.23	-5.55	-0.46	-0.62	2.00	-47.65
11	14	1.23	5.55	0.46	0.62	0.22	21.09
12	14	0.75	-5.55	0.22	0.41	-0.22	-24.07
12	15	-0.75	5.55	-0.22	-0.41	-1.75	-24.74
13	15	0.75	-5.55	0.22	0.41	1.75	24.74
13	6	-0.75	5.55	-0.22	-0.41	-2.05	-32.11
14	6	-2.73	-5.55	-0.91	-1.46	2.05	-29.14
14	16	2.73	5.55	0.91	1.46	-2.04	29.09
15	16	-0.75	-5.55	-0.22	-0.42	2.04	-32.06
15	17	0.75	5.55	0.22	0.42	-1.75	24.75
16	17	-0.75	-5.55	-0.22	-0.42	1.75	-24.75
16	18	0.75	5.55	0.22	0.42	0.22	-24.18
17	18	1.23	-5.55	0.47	0.61	-0.22	21.20
17	19	-1.23	5.55	-0.47	-0.61	-2.00	-47.66
18	19	1.23	-5.55	0.47	0.61	2.00	47.66
18	9	-1.23	5.55	-0.47	-0.61	-2.62	-55.04
19	9	-1.98	0.73	-0.69	-1.03	2.78	5.94
19	20	1.98	-0.73	0.69	1.03	-1.87	-4.97
20	20	-1.98	0.73	-0.69	-1.03	1.87	4.97
20	21	1.98	-0.73	0.69	1.03	0.00	-2.98
21	21	0.00	0.00	0.00	0.00	0.00	0.00
21	22	0.00	0.00	0.00	0.00	0.00	0.00

Loadcase ID: WS2 Name: STR III-Angle: 30

Memb	Node	Fx kip	Fy kip	Fz kip	Mx kft	My kft	Mz kft
1	1	-6.63	-7.08	-2.85	-78.71	-0.27	102.91
1	2	4.58	7.08	2.30	25.71	0.27	12.60
2	2	-4.58	-7.08	-2.30	-25.71	-0.27	-12.60
2	3	3.81	7.08	2.09	2.82	0.27	56.08
3	4	-7.34	-0.00	-2.82	-78.18	0.01	110.98
3	5	5.28	0.00	2.27	25.78	-0.01	18.99
4	5	-5.28	-0.00	-2.27	-25.78	0.01	-18.99
4	6	4.51	0.00	2.06	3.20	-0.01	69.84
5	7	-6.63	7.09	-2.85	-78.75	0.28	102.90
5	8	4.58	-7.09	2.30	25.71	-0.28	12.60
6	8	-4.58	7.09	-2.30	-25.71	0.28	-12.60
6	9	3.81	-7.09	2.09	2.79	-0.28	56.07
7	10	0.00	0.00	0.00	0.00	0.00	0.00
7	11	0.00	0.00	-0.03	0.00	-0.06	0.00
8	11	2.15	0.79	1.21	1.76	0.06	-3.22
8	12	-2.15	-0.79	-1.23	-1.76	-3.33	5.35
9	12	2.15	0.79	1.23	1.76	3.33	-5.35
9	3	-2.15	-0.79	-1.24	-1.76	-4.97	6.41
10	3	-1.66	-6.29	-0.86	-1.06	4.70	-62.49
10	13	1.66	6.29	0.84	1.06	-3.57	54.12
11	13	-1.66	-6.29	-0.84	-1.06	3.57	-54.12
11	14	1.66	6.29	0.81	1.06	0.39	23.99
12	14	0.48	-6.29	0.37	0.71	-0.39	-27.21
12	15	-0.48	6.29	-0.43	-0.71	-3.14	-28.16
13	15	0.48	-6.29	0.43	0.71	3.14	28.16
13	6	-0.48	6.29	-0.45	-0.71	-3.73	-36.52
14	6	-2.63	-6.29	-1.62	-2.49	3.73	-33.32
14	16	2.63	6.29	1.62	2.49	-3.72	33.25
15	16	-0.48	-6.29	-0.44	-0.73	3.72	-36.47
15	17	0.48	6.29	0.43	0.73	-3.14	28.17
16	17	-0.48	-6.29	-0.43	-0.73	3.14	-28.17
16	18	0.48	6.29	0.36	0.73	0.37	-27.33
17	18	1.66	-6.29	0.81	1.03	-0.37	24.11
17	19	-1.66	6.29	-0.85	-1.03	-3.58	-54.13

18	19	1.66	-6.29	0.85	1.03	3.58	54.13
18	9	-1.66	6.29	-0.86	-1.03	-4.71	-62.50
19	9	-2.15	0.79	-1.24	-1.76	4.99	6.43
19	20	2.15	-0.79	1.23	1.76	-3.36	-5.37
20	20	-2.15	0.79	-1.23	-1.76	3.36	5.37
20	21	2.15	-0.79	1.21	1.76	-0.06	-3.22
21	21	0.00	0.00	-0.03	0.00	0.06	0.00
21	22	0.00	0.00	0.00	0.00	0.00	0.00

Loadcase ID: WS3 Name: STR III-Angle: 15

Memb	Node	Fx kip	Fy kip	Fz kip	Mx kft	My kft	Mz kft
1	1	-6.38	-6.95	-4.45	-117.49	-0.37	100.43
1	2	4.54	6.95	3.38	36.83	0.37	12.10
2	2	-4.54	-6.95	-3.38	-36.83	-0.37	-12.10
2	3	3.85	6.95	2.99	3.68	0.37	55.65
3	4	-7.07	-0.00	-4.41	-116.77	0.01	108.39
3	5	5.23	0.00	3.34	36.93	-0.01	18.39
4	5	-5.23	-0.00	-3.34	-36.93	0.01	-18.39
4	6	4.54	0.00	2.95	4.20	-0.01	69.20
5	7	-6.38	6.96	-4.45	-117.55	0.39	100.43
5	8	4.54	-6.96	3.39	36.83	-0.39	12.10
6	8	-4.54	6.96	-3.39	-36.83	0.39	-12.10
6	9	3.85	-6.96	2.99	3.65	-0.39	55.65
7	10	0.00	0.00	0.00	0.00	0.00	0.00
7	11	0.00	0.00	-0.10	0.00	-0.20	0.00
8	11	2.02	0.75	1.64	2.31	0.20	-3.04
8	12	-2.02	-0.75	-1.71	-2.31	-4.71	5.05
9	12	2.02	0.75	1.71	2.31	4.71	-5.05
9	3	-2.02	-0.75	-1.74	-2.31	-7.00	6.05
10	3	-1.83	-6.21	-1.24	-1.38	6.63	-61.70
10	13	1.83	6.21	1.21	1.38	-5.00	53.45
11	13	-1.83	-6.21	-1.21	-1.38	5.00	-53.45
11	14	1.83	6.21	1.09	1.38	0.51	23.72
12	14	0.20	-6.21	0.45	0.93	-0.51	-26.75
12	15	-0.20	6.21	-0.67	-0.93	-4.42	-27.86
13	15	0.20	-6.21	0.67	0.93	4.42	27.86
13	6	-0.20	6.21	-0.71	-0.93	-5.33	-36.11
14	6	-2.22	-6.21	-2.24	-3.27	5.34	-33.09
14	16	2.22	6.21	2.24	3.27	-5.32	33.03
15	16	-0.20	-6.21	-0.70	-0.96	5.32	-36.07
15	17	0.20	6.21	0.67	0.96	-4.41	27.88
16	17	-0.20	-6.21	-0.67	-0.96	4.41	-27.88
16	18	0.20	6.21	0.45	0.96	0.50	-26.88
17	18	1.83	-6.21	1.09	1.35	-0.50	23.84
17	19	-1.83	6.21	-1.21	-1.35	-5.00	-53.46
18	19	1.83	-6.21	1.21	1.35	5.00	53.46
18	9	-1.83	6.21	-1.25	-1.35	-6.64	-61.71
19	9	-2.02	0.75	-1.74	-2.31	7.03	6.06
19	20	2.02	-0.75	1.71	2.31	-4.74	-5.07
20	20	-2.02	0.75	-1.71	-2.31	4.74	5.07
20	21	2.02	-0.75	1.64	2.31	-0.20	-3.04
21	21	0.00	0.00	-0.10	0.00	0.20	0.00
21	22	0.00	0.00	0.00	0.00	0.00	0.00

Loadcase ID: WS4 Name: STR III-Angle: 0

Memb	Node	Fx kip	Fy kip	Fz kip	Mx kft	My kft	Mz kft

PROJECT:

1	1	-5.99	-6.89	-6.23	-164.02	-0.51	96.60
1	2	4.48	6.89	4.73	51.12	0.51	11.26
2	2	-4.48	-6.89	-4.73	-51.12	-0.51	-11.26
2	3	3.92	6.89	4.17	4.84	0.51	54.96
3	4	-6.67	-0.00	-6.18	-163.04	0.01	104.48
3	5	5.17	0.00	4.67	51.25	-0.01	17.48
4	5	-5.17	-0.00	-4.67	-51.25	0.01	-17.48
4	6	4.61	0.00	4.11	5.54	-0.01	68.37
5	7	-5.99	6.89	-6.24	-164.11	0.53	96.60
5	8	4.48	-6.89	4.73	51.12	-0.53	11.25
6	8	-4.48	6.89	-4.73	-51.12	0.53	-11.25
6	9	3.92	-6.89	4.17	4.80	-0.53	54.96
7	10	0.00	0.00	0.00	0.00	0.00	0.00
7	11	0.00	0.00	-0.19	0.00	-0.38	0.00
8	11	2.02	0.75	2.22	3.04	0.38	-3.04
8	12	-2.02	-0.75	-2.35	-3.04	-6.52	5.05
9	12	2.02	0.75	2.35	3.04	6.52	-5.05
9	3	-2.02	-0.75	-2.41	-3.04	-9.68	6.05
10	3	-1.90	-6.14	-1.76	-1.80	9.17	-61.01
10	13	1.90	6.14	1.69	1.80	-6.88	52.85
11	13	-1.90	-6.14	-1.69	-1.80	6.88	-52.85
11	14	1.90	6.14	1.46	1.80	0.68	23.44
12	14	0.13	-6.14	0.56	1.23	-0.68	-26.48
12	15	-0.13	6.14	-0.98	-1.23	-6.10	-27.54
13	15	0.13	-6.14	0.98	1.23	6.10	27.54
13	6	-0.13	6.14	-1.05	-1.23	-7.45	-35.70
14	6	-2.15	-6.14	-3.07	-4.31	7.46	-32.68
14	16	2.15	6.14	3.07	4.31	-7.43	32.61
15	16	-0.13	-6.14	-1.04	-1.27	7.43	-35.65
15	17	0.13	6.14	0.98	1.27	-6.10	27.55
16	17	-0.13	-6.14	-0.98	-1.27	6.10	-27.55
16	18	0.13	6.14	0.56	1.27	0.66	-26.60
17	18	1.90	-6.14	1.47	1.76	-0.66	23.57
17	19	-1.90	6.14	-1.70	-1.76	-6.89	-52.86
18	19	1.90	-6.14	1.70	1.76	6.89	52.86
18	9	-1.90	6.14	-1.76	-1.76	-9.19	-61.02
19	9	-2.02	0.75	-2.41	-3.04	9.72	6.06
19	20	2.02	-0.75	2.35	3.04	-6.56	-5.07
20	20	-2.02	0.75	-2.35	-3.04	6.56	5.07
20	21	2.02	-0.75	2.22	3.04	-0.38	-3.04
21	21	0.00	0.00	-0.19	0.00	0.38	0.00
21	22	0.00	0.00	0.00	0.00	0.00	0.00

Loadcase ID: WS5 Name: STR III-Angle: -15

Memb	Node	Fx kip	Fy kip	Fz kip	Mx kft	My kft	Mz kft
1	1	-4.50	-5.27	-7.05	-181.58	-0.53	73.32
1	2	3.44	5.27	5.21	55.36	0.53	8.44
2	2	-3.44	-5.27	-5.21	-55.36	-0.53	-8.44
2	3	3.04	5.27	4.52	4.83	0.53	42.14
3	4	-5.02	-0.00	-6.99	-180.55	0.01	79.36
3	5	3.96	0.00	5.15	55.50	-0.01	13.20
4	5	-3.96	-0.00	-5.15	-55.50	0.01	-13.20
4	6	3.56	0.00	4.46	5.56	-0.01	52.41
5	7	-4.50	5.27	-7.05	-181.66	0.56	73.32
5	8	3.44	-5.27	5.21	55.36	-0.56	8.44
6	8	-3.44	5.27	-5.21	-55.36	0.56	-8.44
6	9	3.04	-5.27	4.52	4.79	-0.56	42.14
7	10	0.00	0.00	0.00	0.00	0.00	0.00

7	11	0.00	0.00	-0.28	0.00	-0.56	0.00
8	11	1.54	0.57	2.30	3.04	0.56	-2.31
8	12	-1.54	-0.57	-2.49	-3.04	-7.00	3.84
9	12	1.54	0.57	2.49	3.04	7.00	-3.84
9	3	-1.54	-0.57	-2.58	-3.04	-10.37	4.60
10	3	-1.50	-4.70	-1.93	-1.79	9.84	-46.74
10	13	1.50	4.70	1.84	1.79	-7.33	40.49
11	13	-1.50	-4.70	-1.84	-1.79	7.33	-40.49
11	14	1.50	4.70	1.51	1.79	0.70	17.96
12	14	0.04	-4.70	0.52	1.24	-0.70	-20.27
12	15	-0.04	4.70	-1.13	-1.24	-6.53	-21.11
13	15	0.04	-4.70	1.13	1.24	6.53	21.11
13	6	-0.04	4.70	-1.22	-1.24	-8.09	-27.36
14	6	-1.58	-4.70	-3.24	-4.32	8.10	-25.06
14	16	1.58	4.70	3.24	4.32	-8.07	25.01
15	16	-0.04	-4.70	-1.21	-1.28	8.07	-27.32
15	17	0.04	4.70	1.12	1.28	-6.53	21.11
16	17	-0.04	-4.70	-1.12	-1.28	6.53	-21.11
16	18	0.04	4.70	0.51	1.28	0.68	-20.37
17	18	1.50	-4.70	1.51	1.75	-0.68	18.06
17	19	-1.50	4.70	-1.85	-1.75	-7.34	-40.49
18	19	1.50	-4.70	1.85	1.75	7.34	40.49
18	9	-1.50	4.70	-1.94	-1.75	-9.86	-46.75
19	9	-1.54	0.57	-2.58	-3.04	10.42	4.61
19	20	1.54	-0.57	2.49	3.04	-7.04	-3.85
20	20	-1.54	0.57	-2.49	-3.04	7.04	3.85
20	21	1.54	-0.57	2.30	3.04	-0.55	-2.31
21	21	0.00	0.00	-0.28	0.00	0.55	0.00
21	22	0.00	0.00	0.00	0.00	0.00	0.00

Loadcase ID: WS6 Name: STR III-Angle: -30

Memb	Node	Fx kip	Fy kip	Fz kip	Mx kft	My kft	Mz kft
1	1	-2.96	-3.76	-7.78	-199.87	-0.58	49.76
1	2	2.41	3.76	5.73	60.67	0.58	5.46
2	2	-2.41	-3.76	-5.73	-60.67	-0.58	-5.46
2	3	2.20	3.76	4.96	5.11	0.58	29.48
3	4	-3.33	-0.00	-7.72	-198.75	0.01	54.04
3	5	2.78	0.00	5.67	60.82	-0.01	8.84
4	5	-2.78	-0.00	-5.67	-60.82	0.01	-8.84
4	6	2.57	0.00	4.90	5.91	-0.01	36.76
5	7	-2.96	3.76	-7.79	-199.96	0.61	49.76
5	8	2.41	-3.76	5.73	60.67	-0.61	5.46
6	8	-2.41	3.76	-5.73	-60.67	0.61	-5.46
6	9	2.20	-3.76	4.97	5.07	-0.61	29.47
7	10	0.00	0.00	0.00	0.00	0.00	0.00
7	11	0.00	0.00	-0.34	0.00	-0.67	0.00
8	11	1.17	0.43	2.48	3.22	0.67	-1.76
8	12	-1.17	-0.43	-2.71	-3.22	-7.66	2.93
9	12	1.17	0.43	2.71	3.22	7.66	-2.93
9	3	-1.17	-0.43	-2.82	-3.22	-11.34	3.51
10	3	-1.02	-3.32	-2.14	-1.90	10.76	-32.98
10	13	1.02	3.32	2.03	1.90	-7.99	28.57
11	13	-1.02	-3.32	-2.03	-1.90	7.99	-28.57
11	14	1.02	3.32	1.62	1.90	0.74	12.64
12	14	0.15	-3.32	0.52	1.32	-0.74	-14.41
12	15	-0.15	3.32	-1.27	-1.32	-7.13	-14.84
13	15	0.15	-3.32	1.27	1.32	7.13	14.84
13	6	-0.15	3.32	-1.38	-1.32	-8.89	-19.26
14	6	-1.32	-3.32	-3.52	-4.59	8.91	-17.50

14	16	1.32	3.32	3.52	4.59	-8.87	17.47
15	16	-0.15	-3.32	-1.37	-1.37	8.87	-19.23
15	17	0.15	3.32	1.26	1.37	-7.13	14.85
16	17	-0.15	-3.32	-1.26	-1.37	7.13	-14.85
16	18	0.15	3.32	0.52	1.37	0.72	-14.47
17	18	1.02	-3.32	1.63	1.85	-0.72	12.71
17	19	-1.02	3.32	-2.03	-1.85	-8.00	-28.57
18	19	1.02	-3.32	2.03	1.85	8.00	28.57
18	9	-1.02	3.32	-2.14	-1.85	-10.78	-32.99
19	9	-1.17	0.43	-2.82	-3.22	11.38	3.52
19	20	1.17	-0.43	2.71	3.22	-7.71	-2.94
20	20	-1.17	0.43	-2.71	-3.22	7.71	2.94
20	21	1.17	-0.43	2.48	3.22	-0.67	-1.76
21	21	0.00	0.00	-0.34	0.00	0.67	0.00
21	22	0.00	0.00	0.00	0.00	0.00	0.00

Loadcase ID: WS7 Name: STR III-Angle: -45

Memb	Node	Fx kip	Fy kip	Fz kip	Mx kft	My kft	Mz kft
1	1	-1.09	-1.81	-7.68	-194.54	-0.55	20.54
1	2	1.09	1.81	5.55	58.25	0.55	1.89
2	2	-1.09	-1.81	-5.55	-58.25	-0.55	-1.89
2	3	1.09	1.81	4.76	4.72	0.55	13.32
3	4	-1.26	-0.00	-7.62	-193.48	0.01	22.56
3	5	1.26	0.00	5.49	58.39	-0.01	3.49
4	5	-1.26	-0.00	-5.49	-58.39	0.01	-3.49
4	6	1.26	0.00	4.70	5.47	-0.01	16.77
5	7	-1.09	1.81	-7.68	-194.62	0.57	20.54
5	8	1.09	-1.81	5.56	58.25	-0.57	1.89
6	8	-1.09	1.81	-5.56	-58.25	0.57	-1.89
6	9	1.09	-1.81	4.76	4.68	-0.57	13.32
7	10	0.00	0.00	0.00	0.00	0.00	0.00
7	11	0.00	0.00	-0.35	0.00	-0.71	0.00
8	11	0.69	0.25	2.34	2.98	0.71	-1.03
8	12	-0.69	-0.25	-2.58	-2.98	-7.32	1.72
9	12	0.69	0.25	2.58	2.98	7.32	-1.72
9	3	-0.69	-0.25	-2.69	-2.98	-10.82	2.06
10	3	-0.40	-1.56	-2.06	-1.75	10.27	-15.37
10	13	0.40	1.56	1.95	1.75	-7.61	13.30
11	13	-0.40	-1.56	-1.95	-1.75	7.61	-13.30
11	14	0.40	1.56	1.52	1.75	0.69	5.84
12	14	0.29	-1.56	0.46	1.23	-0.69	-6.88
12	15	-0.29	1.56	-1.24	-1.23	-6.80	-6.83
13	15	0.29	-1.56	1.24	1.23	6.80	6.83
13	6	-0.29	1.56	-1.36	-1.23	-8.53	-8.90
14	6	-0.98	-1.56	-3.34	-4.24	8.54	-7.87
14	16	0.98	1.56	3.34	4.24	-8.51	7.86
15	16	-0.29	-1.56	-1.35	-1.27	8.51	-8.89
15	17	0.29	1.56	1.24	1.27	-6.80	6.83
16	17	-0.29	-1.56	-1.24	-1.27	6.80	-6.83
16	18	0.29	1.56	0.46	1.27	0.67	-6.91
17	18	0.40	-1.56	1.53	1.71	-0.67	5.87
17	19	-0.40	1.56	-1.95	-1.71	-7.62	-13.31
18	19	0.40	-1.56	1.95	1.71	7.62	13.31
18	9	-0.40	1.56	-2.07	-1.71	-10.29	-15.38
19	9	-0.69	0.25	-2.69	-2.98	10.86	2.06
19	20	0.69	-0.25	2.58	2.98	-7.36	-1.72
20	20	-0.69	0.25	-2.58	-2.98	7.36	1.72
20	21	0.69	-0.25	2.34	2.98	-0.70	-1.03
21	21	0.00	0.00	-0.35	0.00	0.70	0.00

21	22	0.00	0.00	0.00	0.00	0.00	0.00

Loadcase ID: WS8 Name: SER IV-Angle: 45

Memb	Node	Fx kip	Fy kip	Fz kip	Mx kft	My kft	Mz kft
1	1	-3.45	-3.53	-0.65	-21.09	-0.09	52.25
1	2	2.26	3.53	0.65	7.74	0.09	6.59
2	2	-2.26	-3.53	-0.65	-7.74	-0.09	-6.59
2	3	1.81	3.53	0.65	0.93	0.09	27.62
3	4	-3.80	-0.00	-0.64	-20.93	0.00	56.26
3	5	2.61	0.00	0.64	7.76	-0.00	9.77
4	5	-2.61	-0.00	-0.64	-7.76	0.00	-9.77
4	6	2.16	0.00	0.64	1.05	-0.00	34.46
5	7	-3.45	3.53	-0.65	-21.11	0.09	52.25
5	8	2.26	-3.53	0.65	7.74	-0.09	6.59
6	8	-2.26	3.53	-0.65	-7.74	0.09	-6.59
6	9	1.81	-3.53	0.65	0.92	-0.09	27.62
7	10	0.00	0.00	0.00	0.00	0.00	0.00
7	11	0.00	0.00	0.00	0.00	0.00	0.00
8	11	1.12	0.41	0.39	0.58	0.00	-1.67
8	12	-1.12	-0.41	-0.39	-0.58	-1.04	2.79
9	12	1.12	0.41	0.39	0.58	1.04	-2.79
9	3	-1.12	-0.41	-0.39	-0.58	-1.56	3.33
10	3	-0.69	-3.12	-0.26	-0.35	1.47	-30.96
10	13	0.69	3.12	0.26	0.35	-1.12	26.81
11	13	-0.69	-3.12	-0.26	-0.35	1.12	-26.81
11	14	0.69	3.12	0.26	0.35	0.13	11.86
12	14	0.42	-3.12	0.13	0.23	-0.13	-13.54
12	15	-0.42	3.12	-0.13	-0.23	-0.99	-13.92
13	15	0.42	-3.12	0.13	0.23	0.99	13.92
13	6	-0.42	3.12	-0.13	-0.23	-1.15	-18.06
14	6	-1.54	-3.12	-0.51	-0.82	1.16	-16.40
14	16	1.54	3.12	0.51	0.82	-1.15	16.36
15	16	-0.42	-3.12	-0.13	-0.24	1.15	-18.04
15	17	0.42	3.12	0.13	0.24	-0.98	13.92
16	17	-0.42	-3.12	-0.13	-0.24	0.98	-13.92
16	18	0.42	3.12	0.13	0.24	0.12	-13.60
17	18	0.69	-3.12	0.26	0.34	-0.12	11.93
17	19	-0.69	3.12	-0.26	-0.34	-1.13	-26.81
18	19	0.69	-3.12	0.26	0.34	1.13	26.81
18	9	-0.69	3.12	-0.26	-0.34	-1.47	-30.96
19	9	-1.12	0.41	-0.39	-0.58	1.56	3.34
19	20	1.12	-0.41	0.39	0.58	-1.05	-2.79
20	20	-1.12	0.41	-0.39	-0.58	1.05	2.79
20	21	1.12	-0.41	0.39	0.58	0.00	-1.67
21	21	0.00	0.00	0.00	0.00	0.00	0.00
21	22	0.00	0.00	0.00	0.00	0.00	0.00

Loadcase ID: WS9 Name: SER IV-Angle: 30

Memb	Node	Fx kip	Fy kip	Fz kip	Mx kft	My kft	Mz kft
1	1	-3.73	-3.99	-1.60	-44.28	-0.15	57.89
1	2	2.58	3.99	1.29	14.46	0.15	7.09
2	2	-2.58	-3.99	-1.29	-14.46	-0.15	-7.09
2	3	2.14	3.99	1.18	1.59	0.15	31.55
3	4	-4.13	-0.00	-1.59	-43.98	0.00	62.44
3	5	2.97	0.00	1.28	14.50	-0.00	10.68

PROJECT:

4	5	-2.97	-0.00	-1.28	-14.50	0.00	-10.68
4	6	2.54	0.00	1.16	1.80	-0.00	39.29
5	7	-3.73	3.99	-1.60	-44.31	0.16	57.89
5	8	2.58	-3.99	1.29	14.46	-0.16	7.09
6	8	-2.58	3.99	-1.29	-14.46	0.16	-7.09
6	9	2.14	-3.99	1.18	1.57	-0.16	31.54
7	10	0.00	0.00	0.00	0.00	0.00	0.00
7	11	0.00	0.00	-0.02	0.00	-0.03	0.00
8	11	1.21	0.45	0.68	0.99	0.03	-1.81
8	12	-1.21	-0.45	-0.69	-0.99	-1.88	3.01
9	12	1.21	0.45	0.69	0.99	1.88	-3.01
9	3	-1.21	-0.45	-0.70	-0.99	-2.80	3.61
10	3	-0.94	-3.54	-0.48	-0.59	2.65	-35.15
10	13	0.94	3.54	0.48	0.59	-2.01	30.45
11	13	-0.94	-3.54	-0.48	-0.59	2.01	-30.45
11	14	0.94	3.54	0.45	0.59	0.22	13.49
12	14	0.27	-3.54	0.21	0.40	-0.22	-15.31
12	15	-0.27	3.54	-0.24	-0.40	-1.77	-15.84
13	15	0.27	-3.54	0.24	0.40	1.77	15.84
13	6	-0.27	3.54	-0.25	-0.40	-2.10	-20.55
14	6	-1.48	-3.54	-0.91	-1.40	2.10	-18.74
14	16	1.48	3.54	0.91	1.40	-2.09	18.71
15	16	-0.27	-3.54	-0.25	-0.41	2.09	-20.52
15	17	0.27	3.54	0.24	0.41	-1.77	15.85
16	17	-0.27	-3.54	-0.24	-0.41	1.77	-15.85
16	18	0.27	3.54	0.20	0.41	0.21	-15.38
17	18	0.94	-3.54	0.46	0.58	-0.21	13.57
17	19	-0.94	3.54	-0.48	-0.58	-2.01	-30.45
18	19	0.94	-3.54	0.48	0.58	2.01	30.45
18	9	-0.94	3.54	-0.48	-0.58	-2.65	-35.16
19	9	-1.21	0.45	-0.70	-0.99	2.81	3.62
19	20	1.21	-0.45	0.69	0.99	-1.89	-3.02
20	20	-1.21	0.45	-0.69	-0.99	1.89	3.02
20	21	1.21	-0.45	0.68	0.99	-0.03	-1.81
21	21	0.00	0.00	-0.02	0.00	0.03	0.00
21	22	0.00	0.00	0.00	0.00	0.00	0.00

Loadcase ID: WS10 Name: SER IV-Angle: 15

Memb	Node	Fx kip	Fy kip	Fz kip	Mx kft	My kft	Mz kft
1	1	-3.59	-3.91	-2.50	-66.10	-0.21	56.50
1	2	2.56	3.91	1.90	20.72	0.21	6.81
2	2	-2.56	-3.91	-1.90	-20.72	-0.21	-6.81
2	3	2.17	3.91	1.68	2.07	0.21	31.31
3	4	-3.98	-0.00	-2.48	-65.69	0.01	60.98
3	5	2.94	0.00	1.88	20.77	-0.01	10.35
4	5	-2.94	-0.00	-1.88	-20.77	0.01	-10.35
4	6	2.56	0.00	1.66	2.36	-0.01	38.93
5	7	-3.59	3.91	-2.50	-66.13	0.22	56.50
5	8	2.56	-3.91	1.91	20.72	-0.22	6.81
6	8	-2.56	3.91	-1.91	-20.72	0.22	-6.81
6	9	2.17	-3.91	1.68	2.06	-0.22	31.31
7	10	0.00	0.00	0.00	0.00	0.00	0.00
7	11	0.00	0.00	-0.06	0.00	-0.11	0.00
8	11	1.14	0.42	0.92	1.30	0.11	-1.71
8	12	-1.14	-0.42	-0.96	-1.30	-2.65	2.84
9	12	1.14	0.42	0.96	1.30	2.65	-2.84
9	3	-1.14	-0.42	-0.98	-1.30	-3.94	3.40
10	3	-1.03	-3.49	-0.70	-0.77	3.73	-34.71
10	13	1.03	3.49	0.68	0.77	-2.81	30.07

11	13	-1.03	-3.49	-0.68	-0.77	2.81	-30.07
11	14	1.03	3.49	0.61	0.77	0.29	13.34
12	14	0.11	-3.49	0.25	0.52	-0.29	-15.05
12	15	-0.11	3.49	-0.38	-0.52	-2.48	-15.68
13	15	0.11	-3.49	0.38	0.52	2.48	15.68
13	6	-0.11	3.49	-0.40	-0.52	-3.00	-20.32
14	6	-1.25	-3.49	-1.26	-1.84	3.00	-18.62
14	16	1.25	3.49	1.26	1.84	-2.99	18.58
15	16	-0.11	-3.49	-0.39	-0.54	2.99	-20.29
15	17	0.11	3.49	0.38	0.54	-2.48	15.68
16	17	-0.11	-3.49	-0.38	-0.54	2.48	-15.68
16	18	0.11	3.49	0.25	0.54	0.28	-15.12
17	18	1.03	-3.49	0.62	0.76	-0.28	13.41
17	19	-1.03	3.49	-0.68	-0.76	-2.82	-30.08
18	19	1.03	-3.49	0.68	0.76	2.82	30.08
18	9	-1.03	3.49	-0.70	-0.76	-3.74	-34.72
19	9	-1.14	0.42	-0.98	-1.30	3.95	3.41
19	20	1.14	-0.42	0.96	1.30	-2.66	-2.85
20	20	-1.14	0.42	-0.96	-1.30	2.66	2.85
20	21	1.14	-0.42	0.92	1.30	-0.11	-1.71
21	21	0.00	0.00	-0.06	0.00	0.11	0.00
21	22	0.00	0.00	0.00	0.00	0.00	0.00

Loadcase ID: WS11 Name: SER IV-Angle: 0

Memb	Node	Fx kip	Fy kip	Fz kip	Mx kft	My kft	Mz kft
1	1	-3.37	-3.87	-3.51	-92.28	-0.28	54.35
1	2	2.52	3.87	2.66	28.76	0.28	6.33
2	2	-2.52	-3.87	-2.66	-28.76	-0.28	-6.33
2	3	2.21	3.87	2.34	2.72	0.28	30.92
3	4	-3.75	-0.00	-3.48	-91.72	0.01	58.78
3	5	2.91	0.00	2.63	28.83	-0.01	9.83
4	5	-2.91	-0.00	-2.63	-28.83	0.01	-9.83
4	6	2.59	0.00	2.31	3.12	-0.01	38.47
5	7	-3.37	3.88	-3.51	-92.32	0.30	54.35
5	8	2.52	-3.88	2.66	28.76	-0.30	6.33
6	8	-2.52	3.88	-2.66	-28.76	0.30	-6.33
6	9	2.21	-3.88	2.35	2.70	-0.30	30.92
7	10	0.00	0.00	0.00	0.00	0.00	0.00
7	11	0.00	0.00	-0.11	0.00	-0.22	0.00
8	11	1.14	0.42	1.25	1.71	0.22	-1.71
8	12	-1.14	-0.42	-1.32	-1.71	-3.67	2.84
9	12	1.14	0.42	1.32	1.71	3.67	-2.84
9	3	-1.14	-0.42	-1.36	-1.71	-5.45	3.40
10	3	-1.07	-3.45	-0.99	-1.01	5.16	-34.32
10	13	1.07	3.45	0.95	1.01	-3.87	29.73
11	13	-1.07	-3.45	-0.95	-1.01	3.87	-29.73
11	14	1.07	3.45	0.82	1.01	0.39	13.19
12	14	0.07	-3.45	0.32	0.69	-0.39	-14.90
12	15	-0.07	3.45	-0.55	-0.69	-3.43	-15.49
13	15	0.07	-3.45	0.55	0.69	3.43	15.49
13	6	-0.07	3.45	-0.59	-0.69	-4.19	-20.08
14	6	-1.21	-3.45	-1.73	-2.42	4.20	-18.38
14	16	1.21	3.45	1.73	2.42	-4.18	18.35
15	16	-0.07	-3.45	-0.59	-0.72	4.18	-20.06
15	17	0.07	3.45	0.55	0.72	-3.43	15.50
16	17	-0.07	-3.45	-0.55	-0.72	3.43	-15.50
16	18	0.07	3.45	0.31	0.72	0.37	-14.97
17	18	1.07	-3.45	0.83	0.99	-0.37	13.26
17	19	-1.07	3.45	-0.96	-0.99	-3.88	-29.74

18	19	1.07	-3.45	0.96	0.99	3.88	29.74
18	9	-1.07	3.45	-0.99	-0.99	-5.17	-34.33
19	9	-1.14	0.42	-1.36	-1.71	5.47	3.41
19	20	1.14	-0.42	1.32	1.71	-3.69	-2.85
20	20	-1.14	0.42	-1.32	-1.71	3.69	2.85
20	21	1.14	-0.42	1.25	1.71	-0.21	-1.71
21	21	0.00	0.00	-0.11	0.00	0.21	0.00
21	22	0.00	0.00	0.00	0.00	0.00	0.00

Loadcase ID: WS12 Name: SER IV-Angle: -15

Memb	Node	Fx kip	Fy kip	Fz kip	Mx kft	My kft	Mz kft
1	1	-2.53	-2.97	-3.97	-102.16	-0.30	41.25
1	2	1.93	2.97	2.93	31.15	0.30	4.75
2	2	-1.93	-2.97	-2.93	-31.15	-0.30	-4.75
2	3	1.71	2.97	2.54	2.72	0.30	23.71
3	4	-2.83	-0.00	-3.93	-101.57	0.01	44.65
3	5	2.23	0.00	2.90	31.22	-0.01	7.43
4	5	-2.23	-0.00	-2.90	-31.22	0.01	-7.43
4	6	2.00	0.00	2.51	3.13	-0.01	29.49
5	7	-2.53	2.97	-3.97	-102.20	0.31	41.25
5	8	1.93	-2.97	2.93	31.15	-0.31	4.75
6	8	-1.93	2.97	-2.93	-31.15	0.31	-4.75
6	9	1.71	-2.97	2.54	2.70	-0.31	23.71
7	10	0.00	0.00	0.00	0.00	0.00	0.00
7	11	0.00	0.00	-0.16	0.00	-0.31	0.00
8	11	0.87	0.32	1.30	1.71	0.31	-1.30
8	12	-0.87	-0.32	-1.40	-1.71	-3.94	2.16
9	12	0.87	0.32	1.40	1.71	3.94	-2.16
9	3	-0.87	-0.32	-1.45	-1.71	-5.84	2.59
10	3	-0.84	-2.65	-1.09	-1.01	5.54	-26.29
10	13	0.84	2.65	1.04	1.01	-4.12	22.78
11	13	-0.84	-2.65	-1.04	-1.01	4.12	-22.78
11	14	0.84	2.65	0.85	1.01	0.39	10.11
12	14	0.02	-2.65	0.29	0.70	-0.39	-11.40
12	15	-0.02	2.65	-0.63	-0.70	-3.67	-11.87
13	15	0.02	-2.65	0.63	0.70	3.67	11.87
13	6	-0.02	2.65	-0.69	-0.70	-4.55	-15.39
14	6	-0.89	-2.65	-1.82	-2.43	4.56	-14.10
14	16	0.89	2.65	1.82	2.43	-4.54	14.07
15	16	-0.02	-2.65	-0.68	-0.72	4.54	-15.37
15	17	0.02	2.65	0.63	0.72	-3.67	11.88
16	17	-0.02	-2.65	-0.63	-0.72	3.67	-11.88
16	18	0.02	2.65	0.29	0.72	0.38	-11.46
17	18	0.84	-2.65	0.85	0.99	-0.38	10.16
17	19	-0.84	2.65	-1.04	-0.99	-4.13	-22.78
18	19	0.84	-2.65	1.04	0.99	4.13	22.78
18	9	-0.84	2.65	-1.09	-0.99	-5.55	-26.30
19	9	-0.87	0.32	-1.45	-1.71	5.86	2.59
19	20	0.87	-0.32	1.40	1.71	-3.96	-2.17
20	20	-0.87	0.32	-1.40	-1.71	3.96	2.17
20	21	0.87	-0.32	1.29	1.71	-0.31	-1.30
21	21	0.00	0.00	-0.16	0.00	0.31	0.00
21	22	0.00	0.00	0.00	0.00	0.00	0.00

Loadcase ID: WS13 Name: SER IV-Angle: -30

Memb	Node	Fx kip	Fy kip	Fz kip	Mx kft	My kft	Mz kft

PROJECT:

1	1	-1.66	-2.11	-4.38	-112.44	-0.33	27.99
1	2	1.35	2.11	3.22	34.13	0.33	3.07
2	2	-1.35	-2.11	-3.22	-34.13	-0.33	-3.07
2	3	1.24	2.11	2.79	2.88	0.33	16.58
3	4	-1.87	-0.00	-4.34	-111.81	0.01	30.40
3	5	1.56	0.00	3.19	34.21	-0.01	4.97
4	5	-1.56	-0.00	-3.19	-34.21	0.01	-4.97
4	6	1.45	0.00	2.76	3.32	-0.01	20.68
5	7	-1.66	2.11	-4.38	-112.49	0.34	27.99
5	8	1.35	-2.11	3.23	34.13	-0.34	3.07
6	8	-1.35	2.11	-3.23	-34.13	0.34	-3.07
6	9	1.24	-2.11	2.79	2.85	-0.34	16.58
7	10	0.00	0.00	0.00	0.00	0.00	0.00
7	11	0.00	0.00	-0.19	0.00	-0.38	0.00
8	11	0.66	0.24	1.40	1.81	0.38	-0.99
8	12	-0.66	-0.24	-1.53	-1.81	-4.31	1.65
9	12	0.66	0.24	1.53	1.81	4.31	-1.65
9	3	-0.66	-0.24	-1.59	-1.81	-6.38	1.97
10	3	-0.58	-1.87	-1.20	-1.07	6.06	-18.56
10	13	0.58	1.87	1.14	1.07	-4.50	16.07
11	13	-0.58	-1.87	-1.14	-1.07	4.50	-16.07
11	14	0.58	1.87	0.91	1.07	0.42	7.11
12	14	0.08	-1.87	0.29	0.74	-0.42	-8.11
12	15	-0.08	1.87	-0.71	-0.74	-4.01	-8.35
13	15	0.08	-1.87	0.71	0.74	4.01	8.35
13	6	-0.08	1.87	-0.78	-0.74	-5.00	-10.83
14	6	-0.74	-1.87	-1.98	-2.58	5.01	-9.85
14	16	0.74	1.87	1.98	2.58	-4.99	9.83
15	16	-0.08	-1.87	-0.77	-0.77	4.99	-10.82
15	17	0.08	1.87	0.71	0.77	-4.01	8.35
16	17	-0.08	-1.87	-0.71	-0.77	4.01	-8.35
16	18	0.08	1.87	0.29	0.77	0.41	-8.14
17	18	0.58	-1.87	0.92	1.04	-0.41	7.15
17	19	-0.58	1.87	-1.14	-1.04	-4.50	-16.07
18	19	0.58	-1.87	1.14	1.04	4.50	16.07
18	9	-0.58	1.87	-1.21	-1.04	-6.06	-18.56
19	9	-0.66	0.24	-1.59	-1.81	6.40	1.98
19	20	0.66	-0.24	1.53	1.81	-4.34	-1.65
20	20	-0.66	0.24	-1.53	-1.81	4.34	1.65
20	21	0.66	-0.24	1.40	1.81	-0.38	-0.99
21	21	0.00	0.00	-0.19	0.00	0.38	0.00
21	22	0.00	0.00	0.00	0.00	0.00	0.00

Loadcase ID: WS14 Name: SER IV-Angle: -45

Memb	Node	Fx kip	Fy kip	Fz kip	Mx kft	My kft	Mz kft
1	1	-0.61	-1.02	-4.32	-109.45	-0.31	11.56
1	2	0.61	1.02	3.12	32.77	0.31	1.06
2	2	-0.61	-1.02	-3.12	-32.77	-0.31	-1.06
2	3	0.61	1.02	2.68	2.66	0.31	7.49
3	4	-0.71	-0.00	-4.29	-108.85	0.01	12.69
3	5	0.71	0.00	3.09	32.85	-0.01	1.96
4	5	-0.71	-0.00	-3.09	-32.85	0.01	-1.96
4	6	0.71	0.00	2.64	3.08	-0.01	9.44
5	7	-0.61	1.02	-4.32	-109.49	0.32	11.56
5	8	0.61	-1.02	3.13	32.77	-0.32	1.06
6	8	-0.61	1.02	-3.13	-32.77	0.32	-1.06
6	9	0.61	-1.02	2.68	2.64	-0.32	7.49
7	10	0.00	0.00	0.00	0.00	0.00	0.00

7	11	0.00	0.00	-0.20	0.00	-0.40	0.00
8	11	0.39	0.14	1.32	1.67	0.40	-0.58
8	12	-0.39	-0.14	-1.45	-1.67	-4.12	0.97
9	12	0.39	0.14	1.45	1.67	4.12	-0.97
9	3	-0.39	-0.14	-1.52	-1.67	-6.09	1.16
10	3	-0.23	-0.88	-1.16	-0.98	5.78	-8.65
10	13	0.23	0.88	1.09	0.98	-4.28	7.48
11	13	-0.23	-0.88	-1.09	-0.98	4.28	-7.48
11	14	0.23	0.88	0.86	0.98	0.39	3.29
12	14	0.16	-0.88	0.26	0.69	-0.39	-3.87
12	15	-0.16	0.88	-0.70	-0.69	-3.83	-3.84
13	15	0.16	-0.88	0.70	0.69	3.83	3.84
13	6	-0.16	0.88	-0.76	-0.69	-4.80	-5.01
14	6	-0.55	-0.88	-1.88	-2.39	4.81	-4.43
14	16	0.55	0.88	1.88	2.39	-4.79	4.42
15	16	-0.16	-0.88	-0.76	-0.71	4.79	-5.00
15	17	0.16	0.88	0.70	0.71	-3.83	3.84
16	17	-0.16	-0.88	-0.70	-0.71	3.83	-3.84
16	18	0.16	0.88	0.26	0.71	0.38	-3.89
17	18	0.23	-0.88	0.86	0.96	-0.38	3.30
17	19	-0.23	0.88	-1.10	-0.96	-4.29	-7.49
18	19	0.23	-0.88	1.10	0.96	4.29	7.49
18	9	-0.23	0.88	-1.16	-0.96	-5.79	-8.65
19	9	-0.39	0.14	-1.52	-1.67	6.11	1.16
19	20	0.39	-0.14	1.45	1.67	-4.14	-0.97
20	20	-0.39	0.14	-1.45	-1.67	4.14	0.97
20	21	0.39	-0.14	1.31	1.67	-0.39	-0.58
21	21	0.00	0.00	-0.20	0.00	0.39	0.00
21	22	0.00	0.00	0.00	0.00	0.00	0.00

Loadcase ID: WS15 Name: STR V-Angle: 45

Memb	Node	Fx kip	Fy kip	Fz kip	Mx kft	My kft	Mz kft
1	1	-5.43	-5.55	-1.02	-33.16	-0.13	82.14
1	2	3.55	5.55	1.02	12.16	0.13	10.37
2	2	-3.55	-5.55	-1.02	-12.16	-0.13	-10.37
2	3	2.85	5.55	1.02	1.46	0.13	43.42
3	4	-5.98	-0.00	-1.00	-32.90	0.00	88.44
3	5	4.10	0.00	1.00	12.20	-0.00	15.36
4	5	-4.10	-0.00	-1.00	-12.20	0.00	-15.36
4	6	3.39	0.00	1.00	1.65	-0.00	54.17
5	7	-5.43	5.55	-1.02	-33.18	0.14	82.14
5	8	3.55	-5.55	1.02	12.16	-0.14	10.36
6	8	-3.55	5.55	-1.02	-12.16	0.14	-10.36
6	9	2.85	-5.55	1.02	1.45	-0.14	43.42
7	10	0.00	0.00	0.00	0.00	0.00	0.00
7	11	0.00	0.00	0.00	0.00	0.00	0.00
8	11	1.75	0.65	0.61	0.91	0.00	-2.63
8	12	-1.75	-0.65	-0.61	-0.91	-1.64	4.38
9	12	1.75	0.65	0.61	0.91	1.64	-4.38
9	3	-1.75	-0.65	-0.61	-0.91	-2.45	5.24
10	3	-1.09	-4.90	-0.41	-0.55	2.31	-48.66
10	13	1.09	4.90	0.41	0.55	-1.77	42.14
11	13	-1.09	-4.90	-0.41	-0.55	1.77	-42.14
11	14	1.09	4.90	0.41	0.55	0.20	18.65
12	14	0.66	-4.90	0.20	0.36	-0.20	-21.28
12	15	-0.66	4.90	-0.20	-0.36	-1.55	-21.88
13	15	0.66	-4.90	0.20	0.36	1.55	21.88
13	6	-0.66	4.90	-0.20	-0.36	-1.81	-28.39
14	6	-2.42	-4.91	-0.81	-1.29	1.82	-25.77

14	16	2.42	4.91	0.81	1.29	-1.81	25.73
15	16	-0.66	-4.91	-0.20	-0.38	1.81	-28.36
15	17	0.66	4.91	0.20	0.38	-1.55	21.89
16	17	-0.66	-4.91	-0.20	-0.38	1.55	-21.89
16	18	0.66	4.91	0.20	0.38	0.19	-21.38
17	18	1.09	-4.91	0.41	0.54	-0.19	18.75
17	19	-1.09	4.91	-0.41	-0.54	-1.77	-42.15
18	19	1.09	-4.91	0.41	0.54	1.77	42.15
18	9	-1.09	4.91	-0.41	-0.54	-2.32	-48.67
19	9	-1.75	0.65	-0.61	-0.91	2.46	5.25
19	20	1.75	-0.65	0.61	0.91	-1.65	-4.39
20	20	-1.75	0.65	-0.61	-0.91	1.65	4.39
20	21	1.75	-0.65	0.61	0.91	0.00	-2.63
21	21	0.00	0.00	0.00	0.00	0.00	0.00
21	22	0.00	0.00	0.00	0.00	0.00	0.00

Loadcase ID: WS16 Name: STR V-Angle: 30

Memb	Node	Fx kip	Fy kip	Fz kip	Mx kft	My kft	Mz kft
1	1	-5.87	-6.27	-2.52	-69.61	-0.24	91.01
1	2	4.05	6.27	2.03	22.73	0.24	11.14
2	2	-4.05	-6.27	-2.03	-22.73	-0.24	-11.14
2	3	3.37	6.27	1.85	2.49	0.24	49.59
3	4	-6.49	-0.00	-2.49	-69.14	0.01	98.15
3	5	4.67	0.00	2.01	22.80	-0.01	16.79
4	5	-4.67	-0.00	-2.01	-22.80	0.01	-16.79
4	6	3.99	0.00	1.82	2.83	-0.01	61.76
5	7	-5.87	6.27	-2.52	-69.65	0.25	91.01
5	8	4.05	-6.27	2.03	22.74	-0.25	11.14
6	8	-4.05	6.27	-2.03	-22.74	0.25	-11.14
6	9	3.37	-6.27	1.85	2.47	-0.25	49.59
7	10	0.00	0.00	0.00	0.00	0.00	0.00
7	11	0.00	0.00	-0.03	0.00	-0.05	0.00
8	11	1.90	0.70	1.07	1.56	0.05	-2.85
8	12	-1.90	-0.70	-1.08	-1.56	-2.95	4.74
9	12	1.90	0.70	1.08	1.56	2.95	-4.74
9	3	-1.90	-0.70	-1.09	-1.56	-4.40	5.67
10	3	-1.47	-5.56	-0.76	-0.93	4.16	-55.26
10	13	1.47	5.56	0.75	0.93	-3.16	47.87
11	13	-1.47	-5.56	-0.75	-0.93	3.16	-47.87
11	14	1.47	5.56	0.71	0.93	0.34	21.21
12	14	0.43	-5.56	0.32	0.62	-0.34	-24.06
12	15	-0.43	5.56	-0.38	-0.62	-2.78	-24.90
13	15	0.43	-5.56	0.38	0.62	2.78	24.90
13	6	-0.43	5.56	-0.39	-0.62	-3.30	-32.30
14	6	-2.32	-5.56	-1.43	-2.20	3.30	-29.46
14	16	2.32	5.56	1.43	2.20	-3.29	29.41
15	16	-0.43	-5.56	-0.39	-0.64	3.29	-32.25
15	17	0.43	5.56	0.38	0.64	-2.78	24.91
16	17	-0.43	-5.56	-0.38	-0.64	2.78	-24.91
16	18	0.43	5.56	0.32	0.64	0.33	-24.17
17	18	1.47	-5.56	0.72	0.91	-0.33	21.33
17	19	-1.47	5.56	-0.75	-0.91	-3.16	-47.87
18	19	1.47	-5.56	0.75	0.91	3.16	47.87
18	9	-1.47	5.56	-0.76	-0.91	-4.17	-55.27
19	9	-1.90	0.70	-1.09	-1.56	4.42	5.68
19	20	1.90	-0.70	1.08	1.56	-2.97	-4.75
20	20	-1.90	0.70	-1.08	-1.56	2.97	4.75
20	21	1.90	-0.70	1.07	1.56	-0.05	-2.85
21	21	0.00	0.00	-0.03	0.00	0.05	0.00

21	22	0.00	0.00	0.00	0.00	0.00	0.00

Loadcase ID: WS17 Name: STR V-Angle: 15

Memb	Node	Fx kip	Fy kip	Fz kip	Mx kft	My kft	Mz kft
1	1	-5.65	-6.15	-3.93	-103.91	-0.33	88.82
1	2	4.02	6.15	2.99	32.57	0.33	10.70
2	2	-4.02	-6.15	-2.99	-32.57	-0.33	-10.70
2	3	3.41	6.15	2.64	3.26	0.33	49.22
3	4	-6.26	-0.00	-3.90	-103.27	0.01	95.86
3	5	4.63	0.00	2.96	32.66	-0.01	16.26
4	5	-4.63	-0.00	-2.96	-32.66	0.01	-16.26
4	6	4.02	0.00	2.61	3.72	-0.01	61.20
5	7	-5.65	6.15	-3.94	-103.96	0.34	88.82
5	8	4.02	-6.15	3.00	32.57	-0.34	10.70
6	8	-4.02	6.15	-3.00	-32.57	0.34	-10.70
6	9	3.41	-6.15	2.64	3.23	-0.34	49.21
7	10	0.00	0.00	0.00	0.00	0.00	0.00
7	11	0.00	0.00	-0.09	0.00	-0.18	0.00
8	11	1.79	0.66	1.45	2.04	0.18	-2.69
8	12	-1.79	-0.66	-1.51	-2.04	-4.16	4.47
9	12	1.79	0.66	1.51	2.04	4.16	-4.47
9	3	-1.79	-0.66	-1.54	-2.04	-6.19	5.35
10	3	-1.62	-5.49	-1.10	-1.22	5.86	-54.57
10	13	1.62	5.49	1.07	1.22	-4.42	47.27
11	13	-1.62	-5.49	-1.07	-1.22	4.42	-47.27
11	14	1.62	5.49	0.96	1.22	0.45	20.98
12	14	0.17	-5.49	0.40	0.82	-0.45	-23.66
12	15	-0.17	5.49	-0.59	-0.82	-3.91	-24.64
13	15	0.17	-5.49	0.59	0.82	3.91	24.64
13	6	-0.17	5.49	-0.62	-0.82	-4.71	-31.94
14	6	-1.97	-5.49	-1.98	-2.89	4.72	-29.26
14	16	1.97	5.49	1.98	2.89	-4.70	29.21
15	16	-0.17	-5.49	-0.62	-0.85	4.70	-31.90
15	17	0.17	5.49	0.59	0.85	-3.90	24.65
16	17	-0.17	-5.49	-0.59	-0.85	3.90	-24.65
16	18	0.17	5.49	0.39	0.85	0.44	-23.77
17	18	1.62	-5.49	0.97	1.19	-0.44	21.09
17	19	-1.62	5.49	-1.07	-1.19	-4.43	-47.28
18	19	1.62	-5.49	1.07	1.19	4.43	47.28
18	9	-1.62	5.49	-1.10	-1.19	-5.87	-54.58
19	9	-1.79	0.66	-1.54	-2.04	6.22	5.36
19	20	1.79	-0.66	1.51	2.04	-4.19	-4.48
20	20	-1.79	0.66	-1.51	-2.04	4.19	4.48
20	21	1.79	-0.66	1.45	2.04	-0.18	-2.69
21	21	0.00	0.00	-0.09	0.00	0.18	0.00
21	22	0.00	0.00	0.00	0.00	0.00	0.00

Loadcase ID: WS18 Name: STR V-Angle: 0

Memb	Node	Fx kip	Fy kip	Fz kip	Mx kft	My kft	Mz kft
1	1	-5.30	-6.09	-5.51	-145.06	-0.45	85.43
1	2	3.97	6.09	4.18	45.21	0.45	9.95
2	2	-3.97	-6.09	-4.18	-45.21	-0.45	-9.95
2	3	3.47	6.09	3.68	4.28	0.45	48.61
3	4	-5.90	-0.00	-5.46	-144.19	0.01	92.40
3	5	4.57	0.00	4.13	45.33	-0.01	15.46

PROJECT:

4	5	-4.57	-0.00	-4.13	-45.33	0.01	-15.46
4	6	4.07	0.00	3.64	4.90	-0.01	60.47
5	7	-5.30	6.09	-5.52	-145.13	0.47	85.43
5	8	3.97	-6.09	4.19	45.21	-0.47	9.95
6	8	-3.97	6.09	-4.19	-45.21	0.47	-9.95
6	9	3.47	-6.09	3.69	4.25	-0.47	48.60
7	10	0.00	0.00	0.00	0.00	0.00	0.00
7	11	0.00	0.00	-0.17	0.00	-0.34	0.00
8	11	1.79	0.66	1.96	2.69	0.34	-2.69
8	12	-1.79	-0.66	-2.07	-2.69	-5.77	4.47
9	12	1.79	0.66	2.07	2.69	5.77	-4.47
9	3	-1.79	-0.66	-2.13	-2.69	-8.56	5.35
10	3	-1.68	-5.43	-1.55	-1.60	8.11	-53.96
10	13	1.68	5.43	1.50	1.60	-6.08	46.74
11	13	-1.68	-5.43	-1.50	-1.60	6.08	-46.74
11	14	1.68	5.43	1.30	1.60	0.61	20.73
12	14	0.11	-5.43	0.50	1.09	-0.61	-23.42
12	15	-0.11	5.43	-0.87	-1.09	-5.40	-24.36
13	15	0.11	-5.43	0.87	1.09	5.40	24.36
13	6	-0.11	5.43	-0.92	-1.09	-6.59	-31.57
14	6	-1.90	-5.43	-2.71	-3.81	6.60	-28.90
14	16	1.90	5.43	2.71	3.81	-6.57	28.84
15	16	-0.11	-5.43	-0.92	-1.13	6.57	-31.53
15	17	0.11	5.43	0.86	1.13	-5.39	24.37
16	17	-0.11	-5.43	-0.86	-1.13	5.39	-24.37
16	18	0.11	5.43	0.49	1.13	0.59	-23.53
17	18	1.68	-5.43	1.30	1.56	-0.59	20.84
17	19	-1.68	5.43	-1.50	-1.56	-6.09	-46.75
18	19	1.68	-5.43	1.50	1.56	6.09	46.75
18	9	-1.68	5.43	-1.56	-1.56	-8.13	-53.96
19	9	-1.79	0.66	-2.13	-2.69	8.60	5.36
19	20	1.79	-0.66	2.07	2.69	-5.80	-4.48
20	20	-1.79	0.66	-2.07	-2.69	5.80	4.48
20	21	1.79	-0.66	1.96	2.69	-0.34	-2.69
21	21	0.00	0.00	-0.17	0.00	0.34	0.00
21	22	0.00	0.00	0.00	0.00	0.00	0.00

Loadcase ID: WS19 Name: STR V-Angle: -15

Memb	Node	Fx kip	Fy kip	Fz kip	Mx kft	My kft	Mz kft
1	1	-3.98	-4.66	-6.23	-160.59	-0.47	64.84
1	2	3.04	4.66	4.60	48.96	0.47	7.46
2	2	-3.04	-4.66	-4.60	-48.96	-0.47	-7.46
2	3	2.69	4.66	3.99	4.27	0.47	37.27
3	4	-4.44	-0.00	-6.18	-159.67	0.01	70.18
3	5	3.50	0.00	4.55	49.08	-0.01	11.68
4	5	-3.50	-0.00	-4.55	-49.08	0.01	-11.68
4	6	3.15	0.00	3.94	4.92	-0.01	46.35
5	7	-3.98	4.66	-6.24	-160.66	0.49	64.84
5	8	3.04	-4.66	4.61	48.96	-0.49	7.46
6	8	-3.04	4.66	-4.61	-48.96	0.49	-7.46
6	9	2.69	-4.66	4.00	4.24	-0.49	37.27
7	10	0.00	0.00	0.00	0.00	0.00	0.00
7	11	0.00	0.00	-0.25	0.00	-0.49	0.00
8	11	1.36	0.50	2.04	2.69	0.49	-2.04
8	12	-1.36	-0.50	-2.20	-2.69	-6.19	3.40
9	12	1.36	0.50	2.20	2.69	6.19	-3.40
9	3	-1.36	-0.50	-2.28	-2.69	-9.18	4.06
10	3	-1.33	-4.16	-1.71	-1.59	8.70	-41.33
10	13	1.33	4.16	1.63	1.59	-6.48	35.81

11	13	-1.33	-4.16	-1.63	-1.59	6.48	-35.81
11	14	1.33	4.16	1.33	1.59	0.62	15.89
12	14	0.03	-4.16	0.46	1.10	-0.62	-17.93
12	15	-0.03	4.16	-1.00	-1.10	-5.78	-18.67
13	15	0.03	-4.16	1.00	1.10	5.78	18.67
13	6	-0.03	4.16	-1.08	-1.10	-7.15	-24.19
14	6	-1.39	-4.16	-2.87	-3.82	7.17	-22.16
14	16	1.39	4.16	2.87	3.82	-7.14	22.12
15	16	-0.03	-4.16	-1.07	-1.14	7.14	-24.16
15	17	0.03	4.16	0.99	1.14	-5.77	18.67
16	17	-0.03	-4.16	-0.99	-1.14	5.77	-18.67
16	18	0.03	4.16	0.45	1.14	0.60	-18.01
17	18	1.33	-4.16	1.34	1.55	-0.60	15.97
17	19	-1.33	4.16	-1.63	-1.55	-6.49	-35.81
18	19	1.33	-4.16	1.63	1.55	6.49	35.81
18	9	-1.33	4.16	-1.71	-1.55	-8.72	-41.34
19	9	-1.36	0.50	-2.28	-2.69	9.21	4.07
19	20	1.36	-0.50	2.20	2.69	-6.23	-3.41
20	20	-1.36	0.50	-2.20	-2.69	6.23	3.41
20	21	1.36	-0.50	2.04	2.69	-0.49	-2.04
21	21	0.00	0.00	-0.24	0.00	0.49	0.00
21	22	0.00	0.00	0.00	0.00	0.00	0.00

Loadcase ID: WS20 Name: STR V-Angle: -30

Memb	Node	Fx kip	Fy kip	Fz kip	Mx kft	My kft	Mz kft
1	1	-2.61	-3.32	-6.88	-176.76	-0.51	44.00
1	2	2.13	3.32	5.07	53.65	0.51	4.83
2	2	-2.13	-3.32	-5.07	-53.65	-0.51	-4.83
2	3	1.94	3.32	4.39	4.52	0.51	26.07
3	4	-2.94	-0.00	-6.83	-175.77	0.01	47.79
3	5	2.46	0.00	5.01	53.79	-0.01	7.82
4	5	-2.46	-0.00	-5.01	-53.79	0.01	-7.82
4	6	2.27	0.00	4.33	5.23	-0.01	32.51
5	7	-2.61	3.32	-6.89	-176.84	0.54	44.00
5	8	2.13	-3.32	5.07	53.66	-0.54	4.83
6	8	-2.13	3.32	-5.07	-53.66	0.54	-4.83
6	9	1.94	-3.32	4.39	4.49	-0.54	26.07
7	10	0.00	0.00	0.00	0.00	0.00	0.00
7	11	0.00	0.00	-0.30	0.00	-0.60	0.00
8	11	1.04	0.38	2.20	2.85	0.60	-1.56
8	12	-1.04	-0.38	-2.40	-2.85	-6.78	2.59
9	12	1.04	0.38	2.40	2.85	6.78	-2.59
9	3	-1.04	-0.38	-2.50	-2.85	-10.03	3.10
10	3	-0.91	-2.94	-1.89	-1.68	9.52	-29.17
10	13	0.91	2.94	1.79	1.68	-7.07	25.26
11	13	-0.91	-2.94	-1.79	-1.68	7.07	-25.26
11	14	0.91	2.94	1.43	1.68	0.66	11.18
12	14	0.13	-2.94	0.46	1.17	-0.66	-12.74
12	15	-0.13	2.94	-1.12	-1.17	-6.31	-13.12
13	15	0.13	-2.94	1.12	1.17	6.31	13.12
13	6	-0.13	2.94	-1.22	-1.17	-7.86	-17.03
14	6	-1.17	-2.94	-3.11	-4.05	7.88	-15.48
14	16	1.17	2.94	3.11	4.05	-7.85	15.45
15	16	-0.13	-2.94	-1.21	-1.21	7.85	-17.01
15	17	0.13	2.94	1.12	1.21	-6.31	13.13
16	17	-0.13	-2.94	-1.12	-1.21	6.31	-13.13
16	18	0.13	2.94	0.46	1.21	0.64	-12.80
17	18	0.91	-2.94	1.44	1.64	-0.64	11.24
17	19	-0.91	2.94	-1.80	-1.64	-7.08	-25.27

18	19	0.91	-2.94	1.80	1.64	7.08	25.27
18	9	-0.91	2.94	-1.89	-1.64	-9.53	-29.18
19	9	-1.04	0.38	-2.50	-2.85	10.07	3.11
19	20	1.04	-0.38	2.40	2.85	-6.82	-2.60
20	20	-1.04	0.38	-2.40	-2.85	6.82	2.60
20	21	1.04	-0.38	2.20	2.85	-0.59	-1.56
21	21	0.00	0.00	-0.30	0.00	0.59	0.00
21	22	0.00	0.00	0.00	0.00	0.00	0.00

Loadcase ID: WS21 Name: STR V-Angle: -45

Memb	Node	Fx kip	Fy kip	Fz kip	Mx kft	My kft	Mz kft
1	1	-0.96	-1.60	-6.79	-172.05	-0.48	18.16
1	2	0.96	1.60	4.91	51.52	0.48	1.67
2	2	-0.96	-1.60	-4.91	-51.52	-0.48	-1.67
2	3	0.96	1.60	4.21	4.18	0.48	11.78
3	4	-1.12	-0.00	-6.74	-171.11	0.01	19.95
3	5	1.12	0.00	4.86	51.64	-0.01	3.09
4	5	-1.12	-0.00	-4.86	-51.64	0.01	-3.09
4	6	1.12	0.00	4.16	4.84	-0.01	14.83
5	7	-0.96	1.60	-6.79	-172.12	0.51	18.16
5	8	0.96	-1.60	4.91	51.52	-0.51	1.67
6	8	-0.96	1.60	-4.91	-51.52	0.51	-1.67
6	9	0.96	-1.60	4.21	4.14	-0.51	11.78
7	10	0.00	0.00	0.00	0.00	0.00	0.00
7	11	0.00	0.00	-0.31	0.00	-0.63	0.00
8	11	0.61	0.23	2.07	2.63	0.63	-0.91
8	12	-0.61	-0.23	-2.28	-2.63	-6.47	1.52
9	12	0.61	0.23	2.28	2.63	6.47	-1.52
9	3	-0.61	-0.23	-2.38	-2.63	-9.57	1.82
10	3	-0.35	-1.38	-1.82	-1.55	9.09	-13.60
10	13	0.35	1.38	1.72	1.55	-6.73	11.77
11	13	-0.35	-1.38	-1.72	-1.55	6.73	-11.77
11	14	0.35	1.38	1.35	1.55	0.61	5.17
12	14	0.25	-1.38	0.41	1.09	-0.61	-6.08
12	15	-0.25	1.38	-1.10	-1.09	-6.02	-6.04
13	15	0.25	-1.38	1.10	1.09	6.02	6.04
13	6	-0.25	1.38	-1.20	-1.09	-7.55	-7.87
14	6	-0.86	-1.38	-2.95	-3.75	7.56	-6.96
14	16	0.86	1.38	2.95	3.75	-7.53	6.95
15	16	-0.25	-1.38	-1.20	-1.12	7.53	-7.86
15	17	0.25	1.38	1.09	1.12	-6.01	6.04
16	17	-0.25	-1.38	-1.09	-1.12	6.01	-6.04
16	18	0.25	1.38	0.40	1.12	0.60	-6.11
17	18	0.35	-1.38	1.35	1.51	-0.60	5.20
17	19	-0.35	1.38	-1.72	-1.51	-6.74	-11.77
18	19	0.35	-1.38	1.72	1.51	6.74	11.77
18	9	-0.35	1.38	-1.83	-1.51	-9.10	-13.60
19	9	-0.61	0.23	-2.38	-2.63	9.61	1.82
19	20	0.61	-0.23	2.28	2.63	-6.51	-1.52
20	20	-0.61	0.23	-2.28	-2.63	6.51	1.52
20	21	0.61	-0.23	2.07	2.63	-0.62	-0.91
21	21	0.00	0.00	-0.31	0.00	0.62	0.00
21	22	0.00	0.00	0.00	0.00	0.00	0.00

Loadcase ID: WS22 Name: SER I-Angle: 45

Memb	Node	Fx kip	Fy kip	Fz kip	Mx kft	My kft	Mz kft

PROJECT:

1	1	-4.16	-4.26	-0.78	-25.43	-0.10	62.99
1	2	2.72	4.26	0.78	9.33	0.10	7.95
2	2	-2.72	-4.26	-0.78	-9.33	-0.10	-7.95
2	3	2.18	4.26	0.78	1.12	0.10	33.30
3	4	-4.59	-0.00	-0.77	-25.23	0.00	67.82
3	5	3.14	0.00	0.77	9.36	-0.00	11.78
4	5	-3.14	-0.00	-0.77	-9.36	0.00	-11.78
4	6	2.60	0.00	0.77	1.27	-0.00	41.54
5	7	-4.16	4.26	-0.78	-25.45	0.11	62.99
5	8	2.72	-4.26	0.78	9.33	-0.11	7.95
6	8	-2.72	4.26	-0.78	-9.33	0.11	-7.95
6	9	2.18	-4.26	0.78	1.11	-0.11	33.30
7	10	0.00	0.00	0.00	0.00	0.00	0.00
7	11	0.00	0.00	0.00	0.00	0.00	0.00
8	11	1.35	0.50	0.47	0.70	0.00	-2.02
8	12	-1.35	-0.50	-0.47	-0.70	-1.26	3.36
9	12	1.35	0.50	0.47	0.70	1.26	-3.36
9	3	-1.35	-0.50	-0.47	-0.70	-1.88	4.02
10	3	-0.84	-3.76	-0.31	-0.42	1.77	-37.32
10	13	0.84	3.76	0.31	0.42	-1.36	32.32
11	13	-0.84	-3.76	-0.31	-0.42	1.36	-32.32
11	14	0.84	3.76	0.31	0.42	0.15	14.30
12	14	0.51	-3.76	0.15	0.28	-0.15	-16.32
12	15	-0.51	3.76	-0.15	-0.28	-1.19	-16.78
13	15	0.51	-3.76	0.15	0.28	1.19	16.78
13	6	-0.51	3.76	-0.15	-0.28	-1.39	-21.78
14	6	-1.85	-3.76	-0.62	-0.99	1.39	-19.77
14	16	1.85	3.76	0.62	0.99	-1.39	19.73
15	16	-0.51	-3.76	-0.15	-0.29	1.39	-21.75
15	17	0.51	3.76	0.15	0.29	-1.19	16.78
16	17	-0.51	-3.76	-0.15	-0.29	1.19	-16.78
16	18	0.51	3.76	0.15	0.29	0.15	-16.40
17	18	0.84	-3.76	0.32	0.41	-0.15	14.38
17	19	-0.84	3.76	-0.32	-0.41	-1.36	-32.33
18	19	0.84	-3.76	0.32	0.41	1.36	32.33
18	9	-0.84	3.76	-0.32	-0.41	-1.78	-37.33
19	9	-1.35	0.50	-0.47	-0.70	1.89	4.03
19	20	1.35	-0.50	0.47	0.70	-1.27	-3.37
20	20	-1.35	0.50	-0.47	-0.70	1.27	3.37
20	21	1.35	-0.50	0.47	0.70	0.00	-2.02
21	21	0.00	0.00	0.00	0.00	0.00	0.00
21	22	0.00	0.00	0.00	0.00	0.00	0.00

Loadcase ID: WS23 Name: SER I-Angle: 30

Memb	Node	Fx kip	Fy kip	Fz kip	Mx kft	My kft	Mz kft
1	1	-4.50	-4.80	-1.93	-53.38	-0.18	69.79
1	2	3.11	4.80	1.56	17.43	0.18	8.54
2	2	-3.11	-4.80	-1.56	-17.43	-0.18	-8.54
2	3	2.58	4.80	1.42	1.91	0.18	38.03
3	4	-4.98	-0.00	-1.91	-53.02	0.00	75.27
3	5	3.58	0.00	1.54	17.48	-0.00	12.88
4	5	-3.58	-0.00	-1.54	-17.48	0.00	-12.88
4	6	3.06	0.00	1.40	2.17	-0.00	47.36
5	7	-4.50	4.81	-1.93	-53.41	0.19	69.79
5	8	3.11	-4.81	1.56	17.44	-0.19	8.54
6	8	-3.11	4.81	-1.56	-17.44	0.19	-8.54
6	9	2.58	-4.81	1.42	1.90	-0.19	38.03
7	10	0.00	0.00	0.00	0.00	0.00	0.00

PROJECT:

7	11	0.00	0.00	-0.02	0.00	-0.04	0.00
8	11	1.46	0.54	0.82	1.19	0.04	-2.18
8	12	-1.46	-0.54	-0.83	-1.19	-2.26	3.63
9	12	1.46	0.54	0.83	1.19	2.26	-3.63
9	3	-1.46	-0.54	-0.84	-1.19	-3.37	4.35
10	3	-1.13	-4.27	-0.58	-0.72	3.19	-42.38
10	13	1.13	4.27	0.57	0.72	-2.42	36.71
11	13	-1.13	-4.27	-0.57	-0.72	2.42	-36.71
11	14	1.13	4.27	0.55	0.72	0.26	16.27
12	14	0.33	-4.27	0.25	0.48	-0.26	-18.45
12	15	-0.33	4.27	-0.29	-0.48	-2.13	-19.10
13	15	0.33	-4.27	0.29	0.48	2.13	19.10
13	6	-0.33	4.27	-0.30	-0.48	-2.53	-24.77
14	6	-1.78	-4.27	-1.10	-1.69	2.53	-22.59
14	16	1.78	4.27	1.10	1.69	-2.52	22.55
15	16	-0.33	-4.27	-0.30	-0.49	2.52	-24.74
15	17	0.33	4.27	0.29	0.49	-2.13	19.11
16	17	-0.33	-4.27	-0.29	-0.49	2.13	-19.11
16	18	0.33	4.27	0.25	0.49	0.25	-18.54
17	18	1.13	-4.27	0.55	0.70	-0.25	16.35
17	19	-1.13	4.27	-0.57	-0.70	-2.43	-36.71
18	19	1.13	-4.27	0.57	0.70	2.43	36.71
18	9	-1.13	4.27	-0.58	-0.70	-3.19	-42.39
19	9	-1.46	0.54	-0.84	-1.19	3.39	4.36
19	20	1.46	-0.54	0.83	1.19	-2.28	-3.64
20	20	-1.46	0.54	-0.83	-1.19	2.28	3.64
20	21	1.46	-0.54	0.82	1.19	-0.04	-2.18
21	21	0.00	0.00	-0.02	0.00	0.04	0.00
21	22	0.00	0.00	0.00	0.00	0.00	0.00

Loadcase ID: WS24 Name: SER I-Angle: 15

Memb	Node	Fx kip	Fy kip	Fz kip	Mx kft	My kft	Mz kft
1	1	-4.33	-4.72	-3.02	-79.68	-0.25	68.11
1	2	3.08	4.72	2.30	24.98	0.25	8.21
2	2	-3.08	-4.72	-2.30	-24.98	-0.25	-8.21
2	3	2.61	4.72	2.03	2.50	0.25	37.74
3	4	-4.80	-0.00	-2.99	-79.19	0.01	73.51
3	5	3.55	0.00	2.27	25.04	-0.01	12.47
4	5	-3.55	-0.00	-2.27	-25.04	0.01	-12.47
4	6	3.08	0.00	2.00	2.85	-0.01	46.93
5	7	-4.33	4.72	-3.02	-79.72	0.26	68.11
5	8	3.08	-4.72	2.30	24.98	-0.26	8.20
6	8	-3.08	4.72	-2.30	-24.98	0.26	-8.20
6	9	2.61	-4.72	2.03	2.48	-0.26	37.74
7	10	0.00	0.00	0.00	0.00	0.00	0.00
7	11	0.00	0.00	-0.07	0.00	-0.14	0.00
8	11	1.37	0.51	1.11	1.57	0.14	-2.06
8	12	-1.37	-0.51	-1.16	-1.57	-3.19	3.43
9	12	1.37	0.51	1.16	1.57	3.19	-3.43
9	3	-1.37	-0.51	-1.18	-1.57	-4.75	4.10
10	3	-1.24	-4.21	-0.84	-0.93	4.50	-41.84
10	13	1.24	4.21	0.82	0.93	-3.39	36.25
11	13	-1.24	-4.21	-0.82	-0.93	3.39	-36.25
11	14	1.24	4.21	0.74	0.93	0.35	16.09
12	14	0.13	-4.21	0.30	0.63	-0.35	-18.15
12	15	-0.13	4.21	-0.46	-0.63	-3.00	-18.90
13	15	0.13	-4.21	0.46	0.63	3.00	18.90
13	6	-0.13	4.21	-0.48	-0.63	-3.62	-24.49
14	6	-1.51	-4.21	-1.52	-2.22	3.62	-22.44

14	16	1.51	4.21	1.52	2.22	-3.61	22.40
15	16	-0.13	-4.21	-0.48	-0.65	3.61	-24.46
15	17	0.13	4.21	0.45	0.65	-2.99	18.91
16	17	-0.13	-4.21	-0.45	-0.65	2.99	-18.91
16	18	0.13	4.21	0.30	0.65	0.34	-18.23
17	18	1.24	-4.21	0.74	0.91	-0.34	16.17
17	19	-1.24	4.21	-0.82	-0.91	-3.39	-36.26
18	19	1.24	-4.21	0.82	0.91	3.39	36.26
18	9	-1.24	4.21	-0.85	-0.91	-4.50	-41.85
19	9	-1.37	0.51	-1.18	-1.57	4.77	4.11
19	20	1.37	-0.51	1.16	1.57	-3.21	-3.44
20	20	-1.37	0.51	-1.16	-1.57	3.21	3.44
20	21	1.37	-0.51	1.11	1.57	-0.14	-2.06
21	21	0.00	0.00	-0.07	0.00	0.14	0.00
21	22	0.00	0.00	0.00	0.00	0.00	0.00

Loadcase ID: WS25 Name: SER I-Angle: 0

Memb	Node	Fx kip	Fy kip	Fz kip	Mx kft	My kft	Mz kft
1	1	-4.06	-4.67	-4.23	-111.24	-0.34	65.52
1	2	3.04	4.67	3.21	34.67	0.34	7.63
2	2	-3.04	-4.67	-3.21	-34.67	-0.34	-7.63
2	3	2.66	4.67	2.83	3.28	0.34	37.28
3	4	-4.53	-0.00	-4.19	-110.57	0.01	70.86
3	5	3.51	0.00	3.17	34.76	-0.01	11.86
4	5	-3.51	-0.00	-3.17	-34.76	0.01	-11.86
4	6	3.12	0.00	2.79	3.76	-0.01	46.37
5	7	-4.06	4.67	-4.23	-111.30	0.36	65.52
5	8	3.04	-4.67	3.21	34.67	-0.36	7.63
6	8	-3.04	4.67	-3.21	-34.67	0.36	-7.63
6	9	2.66	-4.67	2.83	3.26	-0.36	37.27
7	10	0.00	0.00	0.00	0.00	0.00	0.00
7	11	0.00	0.00	-0.13	0.00	-0.26	0.00
8	11	1.37	0.51	1.50	2.06	0.26	-2.06
8	12	-1.37	-0.51	-1.59	-2.06	-4.42	3.43
9	12	1.37	0.51	1.59	2.06	4.42	-3.43
9	3	-1.37	-0.51	-1.63	-2.06	-6.56	4.10
10	3	-1.29	-4.16	-1.19	-1.22	6.22	-41.38
10	13	1.29	4.16	1.15	1.22	-4.67	35.84
11	13	-1.29	-4.16	-1.15	-1.22	4.67	-35.84
11	14	1.29	4.16	0.99	1.22	0.46	15.90
12	14	0.09	-4.16	0.38	0.84	-0.46	-17.96
12	15	-0.09	4.16	-0.67	-0.84	-4.14	-18.68
13	15	0.09	-4.16	0.67	0.84	4.14	18.68
13	6	-0.09	4.16	-0.71	-0.84	-5.05	-24.21
14	6	-1.46	-4.16	-2.08	-2.92	5.06	-22.16
14	16	1.46	4.16	2.08	2.92	-5.04	22.12
15	16	-0.09	-4.16	-0.71	-0.86	5.04	-24.18
15	17	0.09	4.16	0.66	0.86	-4.14	18.69
16	17	-0.09	-4.16	-0.66	-0.86	4.14	-18.69
16	18	0.09	4.16	0.38	0.86	0.45	-18.04
17	18	1.29	-4.16	1.00	1.20	-0.45	15.98
17	19	-1.29	4.16	-1.15	-1.20	-4.67	-35.85
18	19	1.29	-4.16	1.15	1.20	4.67	35.85
18	9	-1.29	4.16	-1.19	-1.20	-6.23	-41.38
19	9	-1.37	0.51	-1.63	-2.06	6.59	4.11
19	20	1.37	-0.51	1.59	2.06	-4.45	-3.44
20	20	-1.37	0.51	-1.59	-2.06	4.45	3.44
20	21	1.37	-0.51	1.50	2.06	-0.26	-2.06
21	21	0.00	0.00	-0.13	0.00	0.26	0.00

21	22	0.00	0.00	0.00	0.00	0.00	0.00

Loadcase ID: WS26 Name: SER I-Angle: -15

Memb	Node	Fx kip	Fy kip	Fz kip	Mx kft	My kft	Mz kft
1	1	-3.05	-3.57	-4.78	-123.15	-0.36	49.73
1	2	2.33	3.57	3.53	37.55	0.36	5.72
2	2	-2.33	-3.57	-3.53	-37.55	-0.36	-5.72
2	3	2.06	3.57	3.06	3.28	0.36	28.58
3	4	-3.41	-0.00	-4.74	-122.45	0.01	53.82
3	5	2.69	0.00	3.49	37.64	-0.01	8.96
4	5	-2.69	-0.00	-3.49	-37.64	0.01	-8.96
4	6	2.42	0.00	3.02	3.77	-0.01	35.55
5	7	-3.05	3.58	-4.78	-123.20	0.38	49.73
5	8	2.33	-3.58	3.53	37.55	-0.38	5.72
6	8	-2.33	3.58	-3.53	-37.55	0.38	-5.72
6	9	2.06	-3.58	3.07	3.25	-0.38	28.58
7	10	0.00	0.00	0.00	0.00	0.00	0.00
7	11	0.00	0.00	-0.19	0.00	-0.38	0.00
8	11	1.04	0.39	1.56	2.06	0.38	-1.57
8	12	-1.04	-0.39	-1.69	-2.06	-4.75	2.60
9	12	1.04	0.39	1.69	2.06	4.75	-2.60
9	3	-1.04	-0.39	-1.75	-2.06	-7.04	3.12
10	3	-1.02	-3.19	-1.31	-1.22	6.67	-31.70
10	13	1.02	3.19	1.25	1.22	-4.97	27.46
11	13	-1.02	-3.19	-1.25	-1.22	4.97	-27.46
11	14	1.02	3.19	1.02	1.22	0.47	12.18
12	14	0.03	-3.19	0.35	0.84	-0.47	-13.75
12	15	-0.03	3.19	-0.76	-0.84	-4.43	-14.31
13	15	0.03	-3.19	0.76	0.84	4.43	14.31
13	6	-0.03	3.19	-0.83	-0.84	-5.49	-18.55
14	6	-1.07	-3.19	-2.20	-2.93	5.50	-16.99
14	16	1.07	3.19	2.20	2.93	-5.47	16.96
15	16	-0.03	-3.19	-0.82	-0.87	5.47	-18.53
15	17	0.03	3.19	0.76	0.87	-4.43	14.32
16	17	-0.03	-3.19	-0.76	-0.87	4.43	-14.32
16	18	0.03	3.19	0.35	0.87	0.46	-13.81
17	18	1.02	-3.19	1.03	1.19	-0.46	12.25
17	19	-1.02	3.19	-1.25	-1.19	-4.98	-27.46
18	19	1.02	-3.19	1.25	1.19	4.98	27.46
18	9	-1.02	3.19	-1.31	-1.19	-6.68	-31.70
19	9	-1.04	0.39	-1.75	-2.06	7.06	3.12
19	20	1.04	-0.39	1.69	2.06	-4.78	-2.61
20	20	-1.04	0.39	-1.69	-2.06	4.78	2.61
20	21	1.04	-0.39	1.56	2.06	-0.37	-1.57
21	21	0.00	0.00	-0.19	0.00	0.37	0.00
21	22	0.00	0.00	0.00	0.00	0.00	0.00

Loadcase ID: WS27 Name: SER I-Angle: -30

Memb	Node	Fx kip	Fy kip	Fz kip	Mx kft	My kft	Mz kft
1	1	-2.00	-2.55	-5.28	-135.55	-0.39	33.75
1	2	1.63	2.55	3.89	41.15	0.39	3.70
2	2	-1.63	-2.55	-3.89	-41.15	-0.39	-3.70
2	3	1.49	2.55	3.36	3.47	0.39	19.99
3	4	-2.26	-0.00	-5.24	-134.79	0.01	36.65
3	5	1.88	0.00	3.84	41.25	-0.01	5.99

PROJECT:

4	5	-1.88	-0.00	-3.84	-41.25	0.01	-5.99
4	6	1.74	0.00	3.32	4.01	-0.01	24.93
5	7	-2.00	2.55	-5.28	-135.61	0.41	33.74
5	8	1.63	-2.55	3.89	41.15	-0.41	3.70
6	8	-1.63	2.55	-3.89	-41.15	0.41	-3.70
6	9	1.49	-2.55	3.37	3.44	-0.41	19.99
7	10	0.00	0.00	0.00	0.00	0.00	0.00
7	11	0.00	0.00	-0.23	0.00	-0.46	0.00
8	11	0.80	0.29	1.68	2.18	0.46	-1.19
8	12	-0.80	-0.29	-1.84	-2.18	-5.20	1.99
9	12	0.80	0.29	1.84	2.18	5.20	-1.99
9	3	-0.80	-0.29	-1.91	-2.18	-7.69	2.38
10	3	-0.69	-2.25	-1.45	-1.29	7.30	-22.37
10	13	0.69	2.25	1.37	1.29	-5.42	19.37
11	13	-0.69	-2.25	-1.37	-1.29	5.42	-19.37
11	14	0.69	2.25	1.10	1.29	0.51	8.58
12	14	0.10	-2.25	0.36	0.90	-0.51	-9.77
12	15	-0.10	2.25	-0.86	-0.90	-4.84	-10.06
13	15	0.10	-2.25	0.86	0.90	4.84	10.06
13	6	-0.10	2.25	-0.94	-0.90	-6.03	-13.06
14	6	-0.90	-2.25	-2.39	-3.11	6.04	-11.87
14	16	0.90	2.25	2.39	3.11	-6.02	11.85
15	16	-0.10	-2.25	-0.93	-0.93	6.02	-13.04
15	17	0.10	2.25	0.86	0.93	-4.84	10.07
16	17	-0.10	-2.25	-0.86	-0.93	4.84	-10.07
16	18	0.10	2.25	0.35	0.93	0.49	-9.82
17	18	0.69	-2.25	1.10	1.26	-0.49	8.62
17	19	-0.69	2.25	-1.38	-1.26	-5.43	-19.38
18	19	0.69	-2.25	1.38	1.26	5.43	19.38
18	9	-0.69	2.25	-1.45	-1.26	-7.31	-22.37
19	9	-0.80	0.29	-1.91	-2.18	7.72	2.38
19	20	0.80	-0.29	1.84	2.18	-5.23	-1.99
20	20	-0.80	0.29	-1.84	-2.18	5.23	1.99
20	21	0.80	-0.29	1.68	2.18	-0.45	-1.19
21	21	0.00	0.00	-0.23	0.00	0.45	0.00
21	22	0.00	0.00	0.00	0.00	0.00	0.00

Loadcase ID: WS28 Name: SER I-Angle: -45

Memb	Node	Fx kip	Fy kip	Fz kip	Mx kft	My kft	Mz kft
1	1	-0.74	-1.23	-5.21	-131.94	-0.37	13.93
1	2	0.74	1.23	3.77	39.51	0.37	1.28
2	2	-0.74	-1.23	-3.77	-39.51	-0.37	-1.28
2	3	0.74	1.23	3.23	3.20	0.37	9.03
3	4	-0.86	-0.00	-5.17	-131.22	0.01	15.30
3	5	0.86	0.00	3.73	39.60	-0.01	2.37
4	5	-0.86	-0.00	-3.73	-39.60	0.01	-2.37
4	6	0.86	0.00	3.19	3.71	-0.01	11.38
5	7	-0.74	1.23	-5.21	-131.99	0.39	13.93
5	8	0.74	-1.23	3.77	39.51	-0.39	1.28
6	8	-0.74	1.23	-3.77	-39.51	0.39	-1.28
6	9	0.74	-1.23	3.23	3.18	-0.39	9.03
7	10	0.00	0.00	0.00	0.00	0.00	0.00
7	11	0.00	0.00	-0.24	0.00	-0.48	0.00
8	11	0.47	0.17	1.59	2.02	0.48	-0.70
8	12	-0.47	-0.17	-1.75	-2.02	-4.96	1.16
9	12	0.47	0.17	1.75	2.02	4.96	-1.16
9	3	-0.47	-0.17	-1.83	-2.02	-7.34	1.39
10	3	-0.27	-1.06	-1.40	-1.18	6.97	-10.43
10	13	0.27	1.06	1.32	1.18	-5.16	9.02

PROJECT:

11	13	-0.27	-1.06	-1.32	-1.18	5.16	-9.02
11	14	0.27	1.06	1.03	1.18	0.47	3.96
12	14	0.20	-1.06	0.31	0.83	-0.47	-4.66
12	15	-0.20	1.06	-0.84	-0.83	-4.61	-4.63
13	15	0.20	-1.06	0.84	0.83	4.61	4.63
13	6	-0.20	1.06	-0.92	-0.83	-5.79	-6.04
14	6	-0.66	-1.06	-2.26	-2.88	5.79	-5.34
14	16	0.66	1.06	2.26	2.88	-5.77	5.33
15	16	-0.20	-1.06	-0.92	-0.86	5.77	-6.03
15	17	0.20	1.06	0.84	0.86	-4.61	4.64
16	17	-0.20	-1.06	-0.84	-0.86	4.61	-4.64
16	18	0.20	1.06	0.31	0.86	0.46	-4.68
17	18	0.27	-1.06	1.04	1.16	-0.46	3.98
17	19	-0.27	1.06	-1.32	-1.16	-5.17	-9.02
18	19	0.27	-1.06	1.32	1.16	5.17	9.02
18	9	-0.27	1.06	-1.40	-1.16	-6.98	-10.43
19	9	-0.47	0.17	-1.83	-2.02	7.37	1.40
19	20	0.47	-0.17	1.75	2.02	-4.99	-1.17
20	20	-0.47	0.17	-1.75	-2.02	4.99	1.17
20	21	0.47	-0.17	1.58	2.02	-0.48	-0.70
21	21	0.00	0.00	-0.24	0.00	0.48	0.00
21	22	0.00	0.00	0.00	0.00	0.00	0.00

Loadcase ID: WL1 Name: Angle: 45

Memb	Node	Fx kip	Fy kip	Fz kip	Mx kft	My kft	Mz kft
1	1	-2.15	-5.02	-0.80	-26.08	-0.11	41.11
1	2	2.15	5.02	0.80	9.57	0.11	3.26
2	2	-2.15	-5.02	-0.80	-9.57	-0.11	-3.26
2	3	2.15	5.02	0.80	1.15	0.11	25.88
3	4	-2.59	-0.00	-0.79	-25.87	0.00	46.16
3	5	2.59	0.00	0.79	9.60	-0.00	7.27
4	5	-2.59	-0.00	-0.79	-9.60	0.00	-7.27
4	6	2.59	0.00	0.79	1.30	-0.00	34.50
5	7	-2.15	5.03	-0.80	-26.10	0.11	41.11
5	8	2.15	-5.03	0.80	9.57	-0.11	3.26
6	8	-2.15	5.03	-0.80	-9.57	0.11	-3.26
6	9	2.15	-5.03	0.80	1.14	-0.11	25.87
7	10	0.00	0.00	0.00	0.00	0.00	0.00
7	11	0.00	0.00	0.00	0.00	0.00	0.00
8	11	1.38	1.64	0.48	0.72	0.00	-2.07
8	12	-1.38	-1.64	-0.48	-0.72	-1.29	6.50
9	12	1.38	1.64	0.48	0.72	1.29	-6.50
9	3	-1.38	-1.64	-0.48	-0.72	-1.93	8.68
10	3	-0.77	-3.38	-0.32	-0.43	1.82	-34.56
10	13	0.77	3.38	0.32	0.43	-1.39	30.07
11	13	-0.77	-3.38	-0.32	-0.43	1.39	-30.07
11	14	0.77	3.38	0.32	0.43	0.16	13.88
12	14	0.61	-3.38	0.16	0.29	-0.16	-15.95
12	15	-0.61	3.38	-0.16	-0.29	-1.22	-13.79
13	15	0.61	-3.38	0.16	0.29	1.22	13.79
13	6	-0.61	3.38	-0.16	-0.29	-1.43	-18.28
14	6	-1.99	-3.38	-0.63	-1.01	1.43	-16.22
14	16	1.99	3.38	0.63	1.01	-1.42	16.19
15	16	-0.61	-3.38	-0.16	-0.30	1.42	-18.26
15	17	0.61	3.38	0.16	0.30	-1.22	13.80
16	17	-0.61	-3.38	-0.16	-0.30	1.22	-13.80
16	18	0.61	3.38	0.16	0.30	0.15	-16.03
17	18	0.77	-3.38	0.32	0.42	-0.15	13.96
17	19	-0.77	3.38	-0.32	-0.42	-1.39	-30.09

18	19	0.77	-3.38	0.32	0.42	1.39	30.09
18	9	-0.77	3.38	-0.32	-0.42	-1.82	-34.58
19	9	-1.38	1.64	-0.48	-0.72	1.93	8.72
19	20	1.38	-1.64	0.48	0.72	-1.30	-6.53
20	20	-1.38	1.64	-0.48	-0.72	1.30	6.53
20	21	1.38	-1.64	0.48	0.72	0.00	-2.07
21	21	0.00	0.00	0.00	0.00	0.00	0.00
21	22	0.00	0.00	0.00	0.00	0.00	0.00

Loadcase ID: WL2 Name: Angle: 30

Memb	Node	Fx kip	Fy kip	Fz kip	Mx kft	My kft	Mz kft
1	1	-2.33	-5.43	-1.37	-44.49	-0.18	44.47
1	2	2.33	5.43	1.37	16.32	0.18	3.53
2	2	-2.33	-5.43	-1.37	-16.32	-0.18	-3.53
2	3	2.33	5.43	1.37	1.96	0.18	27.99
3	4	-2.81	-0.00	-1.35	-44.14	0.00	49.93
3	5	2.81	0.00	1.35	16.37	-0.00	7.86
4	5	-2.81	-0.00	-1.35	-16.37	0.00	-7.86
4	6	2.81	0.00	1.35	2.22	-0.00	37.32
5	7	-2.33	5.44	-1.37	-44.52	0.19	44.46
5	8	2.33	-5.44	1.37	16.32	-0.19	3.52
6	8	-2.33	5.44	-1.37	-16.32	0.19	-3.52
6	9	2.33	-5.44	1.37	1.95	-0.19	27.98
7	10	0.00	0.00	0.00	0.00	0.00	0.00
7	11	0.00	0.00	0.00	0.00	0.00	0.00
8	11	1.49	1.78	0.82	1.23	0.00	-2.24
8	12	-1.49	-1.78	-0.82	-1.23	-2.20	7.03
9	12	1.49	1.78	0.82	1.23	2.20	-7.03
9	3	-1.49	-1.78	-0.82	-1.23	-3.28	9.39
10	3	-0.84	-3.65	-0.55	-0.74	3.10	-37.38
10	13	0.84	3.65	0.55	0.74	-2.37	32.52
11	13	-0.84	-3.65	-0.55	-0.74	2.37	-32.52
11	14	0.84	3.65	0.55	0.74	0.27	15.01
12	14	0.66	-3.65	0.27	0.49	-0.27	-17.25
12	15	-0.66	3.65	-0.27	-0.49	-2.08	-14.91
13	15	0.66	-3.65	0.27	0.49	2.08	14.91
13	6	-0.66	3.65	-0.27	-0.49	-2.43	-19.77
14	6	-2.15	-3.66	-1.08	-1.73	2.44	-17.55
14	16	2.15	3.66	1.08	1.73	-2.43	17.51
15	16	-0.66	-3.66	-0.26	-0.50	2.43	-19.75
15	17	0.66	3.66	0.26	0.50	-2.08	14.93
16	17	-0.66	-3.66	-0.26	-0.50	2.08	-14.93
16	18	0.66	3.66	0.26	0.50	0.26	-17.34
17	18	0.84	-3.66	0.55	0.72	-0.26	15.10
17	19	-0.84	3.66	-0.55	-0.72	-2.38	-32.55
18	19	0.84	-3.66	0.55	0.72	2.38	32.55
18	9	-0.84	3.66	-0.55	-0.72	-3.11	-37.41
19	9	-1.49	1.78	-0.82	-1.23	3.30	9.43
19	20	1.49	-1.78	0.82	1.23	-2.21	-7.06
20	20	-1.49	1.78	-0.82	-1.23	2.21	7.06
20	21	1.49	-1.78	0.82	1.23	0.00	-2.24
21	21	0.00	0.00	0.00	0.00	0.00	0.00
21	22	0.00	0.00	0.00	0.00	0.00	0.00

Loadcase ID: WL3 Name: Angle: 15

Memb	Node	Fx kip	Fy kip	Fz kip	Mx kft	My kft	Mz kft

1	1	-2.20	-5.13	-1.79	-58.30	-0.24	41.95
1	2	2.20	5.13	1.79	21.39	0.24	3.33
2	2	-2.20	-5.13	-1.79	-21.39	-0.24	-3.33
2	3	2.20	5.13	1.79	2.57	0.24	26.41
3	4	-2.65	-0.00	-1.77	-57.84	0.01	47.10
3	5	2.65	0.00	1.77	21.45	-0.01	7.42
4	5	-2.65	-0.00	-1.77	-21.45	0.01	-7.42
4	6	2.65	0.00	1.77	2.91	-0.01	35.21
5	7	-2.20	5.13	-1.79	-58.34	0.25	41.95
5	8	2.20	-5.13	1.79	21.39	-0.25	3.32
6	8	-2.20	5.13	-1.79	-21.39	0.25	-3.32
6	9	2.20	-5.13	1.79	2.55	-0.25	26.40
7	10	0.00	0.00	0.00	0.00	0.00	0.00
7	11	0.00	0.00	0.00	0.00	0.00	0.00
8	11	1.41	1.68	1.07	1.61	0.00	-2.11
8	12	-1.41	-1.68	-1.07	-1.61	-2.88	6.63
9	12	1.41	1.68	1.07	1.61	2.88	-6.63
9	3	-1.41	-1.68	-1.07	-1.61	-4.30	8.86
10	3	-0.79	-3.45	-0.72	-0.97	4.07	-35.27
10	13	0.79	3.45	0.72	0.97	-3.11	30.68
11	13	-0.79	-3.45	-0.72	-0.97	3.11	-30.68
11	14	0.79	3.45	0.72	0.97	0.35	14.16
12	14	0.62	-3.45	0.35	0.64	-0.35	-16.28
12	15	-0.62	3.45	-0.35	-0.64	-2.72	-14.07
13	15	0.62	-3.45	0.35	0.64	2.72	14.07
13	6	-0.62	3.45	-0.35	-0.64	-3.19	-18.65
14	6	-2.03	-3.45	-1.42	-2.27	3.19	-16.55
14	16	2.03	3.45	1.42	2.27	-3.18	16.52
15	16	-0.62	-3.45	-0.35	-0.66	3.18	-18.63
15	17	0.62	3.45	0.35	0.66	-2.72	14.08
16	17	-0.62	-3.45	-0.35	-0.66	2.72	-14.08
16	18	0.62	3.45	0.35	0.66	0.34	-16.36
17	18	0.79	-3.45	0.72	0.95	-0.34	14.24
17	19	-0.79	3.45	-0.72	-0.95	-3.11	-30.70
18	19	0.79	-3.45	0.72	0.95	3.11	30.70
18	9	-0.79	3.45	-0.72	-0.95	-4.08	-35.29
19	9	-1.41	1.68	-1.07	-1.61	4.32	8.89
19	20	1.41	-1.68	1.07	1.61	-2.90	-6.66
20	20	-1.41	1.68	-1.07	-1.61	2.90	6.66
20	21	1.41	-1.68	1.07	1.61	0.00	-2.11
21	21	0.00	0.00	0.00	0.00	0.00	0.00
21	22	0.00	0.00	0.00	0.00	0.00	0.00

Loadcase ID: WL4 Name: Angle: 0

Memb	Node	Fx kip	Fy kip	Fz kip	Mx kft	My kft	Mz kft
1	1	-2.20	-5.13	-2.36	-76.71	-0.31	41.95
1	2	2.20	5.13	2.36	28.14	0.31	3.33
2	2	-2.20	-5.13	-2.36	-28.14	-0.31	-3.33
2	3	2.20	5.13	2.36	3.38	0.31	26.41
3	4	-2.65	-0.00	-2.32	-76.10	0.01	47.10
3	5	2.65	0.00	2.32	28.22	-0.01	7.42
4	5	-2.65	-0.00	-2.32	-28.22	0.01	-7.42
4	6	2.65	0.00	2.32	3.82	-0.01	35.21
5	7	-2.20	5.13	-2.36	-76.77	0.33	41.95
5	8	2.20	-5.13	2.36	28.14	-0.33	3.32
6	8	-2.20	5.13	-2.36	-28.14	0.33	-3.32
6	9	2.20	-5.13	2.36	3.36	-0.33	26.40
7	10	0.00	0.00	0.00	0.00	0.00	0.00

7	11	0.00	0.00	0.00	0.00	0.00	0.00
8	11	1.41	1.68	1.41	2.11	0.00	-2.11
8	12	-1.41	-1.68	-1.41	-2.11	-3.79	6.63
9	12	1.41	1.68	1.41	2.11	3.79	-6.63
9	3	-1.41	-1.68	-1.41	-2.11	-5.66	8.86
10	3	-0.79	-3.45	-0.95	-1.27	5.35	-35.27
10	13	0.79	3.45	0.95	1.27	-4.09	30.68
11	13	-0.79	-3.45	-0.95	-1.27	4.09	-30.68
11	14	0.79	3.45	0.95	1.27	0.46	14.16
12	14	0.62	-3.45	0.46	0.84	-0.46	-16.28
12	15	-0.62	3.45	-0.46	-0.84	-3.58	-14.07
13	15	0.62	-3.45	0.46	0.84	3.58	14.07
13	6	-0.62	3.45	-0.46	-0.84	-4.19	-18.65
14	6	-2.03	-3.45	-1.87	-2.98	4.20	-16.55
14	16	2.03	3.45	1.87	2.98	-4.18	16.52
15	16	-0.62	-3.45	-0.46	-0.87	4.18	-18.63
15	17	0.62	3.45	0.46	0.87	-3.58	14.08
16	17	-0.62	-3.45	-0.46	-0.87	3.58	-14.08
16	18	0.62	3.45	0.46	0.87	0.44	-16.36
17	18	0.79	-3.45	0.95	1.24	-0.44	14.24
17	19	-0.79	3.45	-0.95	-1.24	-4.10	-30.70
18	19	0.79	-3.45	0.95	1.24	4.10	30.70
18	9	-0.79	3.45	-0.95	-1.24	-5.36	-35.29
19	9	-1.41	1.68	-1.41	-2.11	5.69	8.89
19	20	1.41	-1.68	1.41	2.11	-3.82	-6.66
20	20	-1.41	1.68	-1.41	-2.11	3.82	6.66
20	21	1.41	-1.68	1.41	2.11	0.00	-2.11
21	21	0.00	0.00	0.00	0.00	0.00	0.00
21	22	0.00	0.00	0.00	0.00	0.00	0.00

Loadcase ID: WL5 Name: Angle: -15

Memb	Node	Fx kip	Fy kip	Fz kip	Mx kft	My kft	Mz kft
1	1	-1.67	-3.90	-2.36	-76.71	-0.31	31.88
1	2	1.67	3.90	2.36	28.14	0.31	2.53
2	2	-1.67	-3.90	-2.36	-28.14	-0.31	-2.53
2	3	1.67	3.90	2.36	3.38	0.31	20.07
3	4	-2.01	-0.00	-2.32	-76.10	0.01	35.80
3	5	2.01	0.00	2.32	28.22	-0.01	5.64
4	5	-2.01	-0.00	-2.32	-28.22	0.01	-5.64
4	6	2.01	0.00	2.32	3.82	-0.01	26.76
5	7	-1.67	3.90	-2.36	-76.77	0.33	31.88
5	8	1.67	-3.90	2.36	28.14	-0.33	2.53
6	8	-1.67	3.90	-2.36	-28.14	0.33	-2.53
6	9	1.67	-3.90	2.36	3.36	-0.33	20.06
7	10	0.00	0.00	0.00	0.00	0.00	0.00
7	11	0.00	0.00	0.00	0.00	0.00	0.00
8	11	1.07	1.28	1.41	2.11	0.00	-1.61
8	12	-1.07	-1.28	-1.41	-2.11	-3.79	5.04
9	12	1.07	1.28	1.41	2.11	3.79	-5.04
9	3	-1.07	-1.28	-1.41	-2.11	-5.66	6.73
10	3	-0.60	-2.62	-0.95	-1.27	5.35	-26.80
10	13	0.60	2.62	0.95	1.27	-4.09	23.32
11	13	-0.60	-2.62	-0.95	-1.27	4.09	-23.32
11	14	0.60	2.62	0.95	1.27	0.46	10.76
12	14	0.47	-2.62	0.46	0.84	-0.46	-12.37
12	15	-0.47	2.62	-0.46	-0.84	-3.58	-10.69
13	15	0.47	-2.62	0.46	0.84	3.58	10.69
13	6	-0.47	2.62	-0.46	-0.84	-4.19	-14.17
14	6	-1.54	-2.62	-1.86	-2.98	4.20	-12.58

14	16	1.54	2.62	1.86	2.98	-4.18	12.56
15	16	-0.47	-2.62	-0.46	-0.87	4.18	-14.16
15	17	0.47	2.62	0.46	0.87	-3.58	10.70
16	17	-0.47	-2.62	-0.46	-0.87	3.58	-10.70
16	18	0.47	2.62	0.46	0.87	0.44	-12.43
17	18	0.60	-2.62	0.95	1.24	-0.44	10.82
17	19	-0.60	2.62	-0.95	-1.24	-4.10	-23.33
18	19	0.60	-2.62	0.95	1.24	4.10	23.33
18	9	-0.60	2.62	-0.95	-1.24	-5.36	-26.82
19	9	-1.07	1.28	-1.41	-2.11	5.69	6.76
19	20	1.07	-1.28	1.41	2.11	-3.82	-5.06
20	20	-1.07	1.28	-1.41	-2.11	3.82	5.06
20	21	1.07	-1.28	1.41	2.11	0.00	-1.61
21	21	0.00	0.00	0.00	0.00	0.00	0.00
21	22	0.00	0.00	0.00	0.00	0.00	0.00

Loadcase ID: WL6 Name: Angle: -30

Memb	Node	Fx kip	Fy kip	Fz kip	Mx kft	My kft	Mz kft
1	1	-1.27	-2.97	-2.50	-81.31	-0.33	24.33
1	2	1.27	2.97	2.50	29.83	0.33	1.93
2	2	-1.27	-2.97	-2.50	-29.83	-0.33	-1.93
2	3	1.27	2.97	2.50	3.59	0.33	15.32
3	4	-1.54	-0.00	-2.46	-80.67	0.01	27.32
3	5	1.54	0.00	2.46	29.92	-0.01	4.30
4	5	-1.54	-0.00	-2.46	-29.92	0.01	-4.30
4	6	1.54	0.00	2.46	4.05	-0.01	20.42
5	7	-1.27	2.97	-2.50	-81.37	0.35	24.33
5	8	1.27	-2.97	2.50	29.83	-0.35	1.93
6	8	-1.27	2.97	-2.50	-29.83	0.35	-1.93
6	9	1.27	-2.97	2.50	3.56	-0.35	15.31
7	10	0.00	0.00	0.00	0.00	0.00	0.00
7	11	0.00	0.00	0.00	0.00	0.00	0.00
8	11	0.82	0.97	1.49	2.24	0.00	-1.23
8	12	-0.82	-0.97	-1.49	-2.24	-4.02	3.84
9	12	0.82	0.97	1.49	2.24	4.02	-3.84
9	3	-0.82	-0.97	-1.49	-2.24	-6.00	5.14
10	3	-0.46	-2.00	-1.01	-1.35	5.67	-20.45
10	13	0.46	2.00	1.01	1.35	-4.34	17.80
11	13	-0.46	-2.00	-1.01	-1.35	4.34	-17.80
11	14	0.46	2.00	1.01	1.35	0.48	8.22
12	14	0.36	-2.00	0.49	0.89	-0.48	-9.44
12	15	-0.36	2.00	-0.49	-0.89	-3.80	-8.16
13	15	0.36	-2.00	0.49	0.89	3.80	8.16
13	6	-0.36	2.00	-0.49	-0.89	-4.44	-10.82
14	6	-1.18	-2.00	-1.98	-3.16	4.45	-9.60
14	16	1.18	2.00	1.98	3.16	-4.43	9.58
15	16	-0.36	-2.00	-0.48	-0.92	4.43	-10.81
15	17	0.36	2.00	0.48	0.92	-3.80	8.17
16	17	-0.36	-2.00	-0.48	-0.92	3.80	-8.17
16	18	0.36	2.00	0.48	0.92	0.47	-9.49
17	18	0.46	-2.00	1.01	1.32	-0.47	8.26
17	19	-0.46	2.00	-1.01	-1.32	-4.34	-17.81
18	19	0.46	-2.00	1.01	1.32	4.34	17.81
18	9	-0.46	2.00	-1.01	-1.32	-5.68	-20.47
19	9	-0.82	0.97	-1.49	-2.24	6.03	5.16
19	20	0.82	-0.97	1.49	2.24	-4.05	-3.86
20	20	-0.82	0.97	-1.49	-2.24	4.05	3.86
20	21	0.82	-0.97	1.49	2.24	0.00	-1.23
21	21	0.00	0.00	0.00	0.00	0.00	0.00

PROJECT:

21	22	0.00	0.00	0.00	0.00	0.00	0.00

Loadcase ID: WL7 Name: Angle: -45

Memb	Node	Fx kip	Fy kip	Fz kip	Mx kft	My kft	Mz kft
1	1	-0.75	-1.74	-2.31	-75.17	-0.30	14.26
1	2	0.75	1.74	2.31	27.58	0.30	1.13
2	2	-0.75	-1.74	-2.31	-27.58	-0.30	-1.13
2	3	0.75	1.74	2.31	3.32	0.30	8.98
3	4	-0.90	-0.00	-2.28	-74.58	0.01	16.02
3	5	0.90	0.00	2.28	27.66	-0.01	2.52
4	5	-0.90	-0.00	-2.28	-27.66	0.01	-2.52
4	6	0.90	0.00	2.28	3.75	-0.01	11.97
5	7	-0.75	1.74	-2.31	-75.23	0.32	14.26
5	8	0.75	-1.74	2.31	27.58	-0.32	1.13
6	8	-0.75	1.74	-2.31	-27.58	0.32	-1.13
6	9	0.75	-1.74	2.31	3.29	-0.32	8.98
7	10	0.00	0.00	0.00	0.00	0.00	0.00
7	11	0.00	0.00	0.00	0.00	0.00	0.00
8	11	0.48	0.57	1.38	2.07	0.00	-0.72
8	12	-0.48	-0.57	-1.38	-2.07	-3.71	2.25
9	12	0.48	0.57	1.38	2.07	3.71	-2.25
9	3	-0.48	-0.57	-1.38	-2.07	-5.55	3.01
10	3	-0.27	-1.17	-0.93	-1.25	5.25	-11.99
10	13	0.27	1.17	0.93	1.25	-4.01	10.43
11	13	-0.27	-1.17	-0.93	-1.25	4.01	-10.43
11	14	0.27	1.17	0.93	1.25	0.45	4.82
12	14	0.21	-1.17	0.45	0.82	-0.45	-5.53
12	15	-0.21	1.17	-0.45	-0.82	-3.51	-4.78
13	15	0.21	-1.17	0.45	0.82	3.51	4.78
13	6	-0.21	1.17	-0.45	-0.82	-4.11	-6.34
14	6	-0.69	-1.17	-1.83	-2.92	4.12	-5.63
14	16	0.69	1.17	1.83	2.92	-4.10	5.62
15	16	-0.21	-1.17	-0.45	-0.85	4.10	-6.34
15	17	0.21	1.17	0.45	0.85	-3.51	4.79
16	17	-0.21	-1.17	-0.45	-0.85	3.51	-4.79
16	18	0.21	1.17	0.45	0.85	0.44	-5.56
17	18	0.27	-1.17	0.93	1.22	-0.44	4.84
17	19	-0.27	1.17	-0.93	-1.22	-4.01	-10.44
18	19	0.27	-1.17	0.93	1.22	4.01	10.44
18	9	-0.27	1.17	-0.93	-1.22	-5.26	-12.00
19	9	-0.48	0.57	-1.38	-2.07	5.58	3.02
19	20	0.48	-0.57	1.38	2.07	-3.74	-2.27
20	20	-0.48	0.57	-1.38	-2.07	3.74	2.27
20	21	0.48	-0.57	1.38	2.07	0.00	-0.72
21	21	0.00	0.00	0.00	0.00	0.00	0.00
21	22	0.00	0.00	0.00	0.00	0.00	0.00

COMBINATION OF LOADS FROM FRAME ANALYSIS (only controlling ones):

Combination No. 1
Group Id: STR GP 1 Name: STRENGTH GROUP I

Memb	Node	Fx kip	Fy kip	Fz kip	Mx kft	My kft	Mz kft
1	1	-6.17	862.80	0.00	-0.00	0.00	57.15
1	2	6.17	-825.64	0.00	-0.00	0.00	69.92
2	2	-6.17	825.64	0.00	-0.00	0.00	-69.92
2	3	6.17	-813.71	0.00	-0.00	0.00	134.69

3	4	-1.75	417.06	0.00	-0.00	0.00	6.52
3	5	1.75	-379.90	0.00	-0.00	0.00	29.58
4	5	-1.75	379.90	0.00	-0.00	0.00	-29.58
4	6	1.75	-367.97	0.00	-0.00	0.00	47.98
5	7	7.92	421.15	0.00	-0.00	0.00	-104.49
5	8	-7.92	-383.99	0.00	-0.00	0.00	-58.69
6	8	7.92	383.99	0.00	-0.00	0.00	58.69
6	9	-7.92	-372.06	0.00	-0.00	0.00	-141.86
7	10	0.00	0.00	0.00	0.00	0.00	0.00
7	11	0.00	9.00	0.00	0.00	0.00	-18.00
8	11	0.00	-424.35	0.00	0.00	0.00	18.00
8	12	0.00	430.41	0.00	0.00	0.00	-1167.93
9	12	0.00	-430.41	0.00	0.00	0.00	1167.93
9	3	0.00	433.40	0.00	0.00	0.00	-1742.07
10	3	-6.17	380.32	0.00	0.00	0.00	1607.38
10	13	6.17	-377.33	0.00	0.00	0.00	-1103.80
11	13	-6.17	377.33	0.00	0.00	0.00	1103.80
11	14	6.17	-366.55	0.00	0.00	0.00	678.03
12	14	-6.17	-98.48	0.00	0.00	0.00	-678.03
12	15	6.17	118.28	0.00	0.00	0.00	-275.80
13	15	-6.17	-118.28	0.00	0.00	0.00	275.80
13	6	6.17	121.27	0.00	0.00	0.00	-435.03
14	6	-7.92	246.70	0.00	0.00	0.00	387.05
14	16	7.92	-246.68	0.00	0.00	0.00	-384.58
15	16	-7.92	61.53	0.00	0.00	0.00	384.58
15	17	7.92	-58.56	0.00	0.00	0.00	-305.36
16	17	-7.92	58.56	0.00	0.00	0.00	305.36
16	18	7.92	-38.71	0.00	0.00	0.00	123.63
17	18	-7.92	-136.79	0.00	0.00	0.00	-123.63
17	19	7.92	147.52	0.00	0.00	0.00	-554.55
18	19	-7.92	-147.52	0.00	0.00	0.00	554.55
18	9	7.92	150.51	0.00	0.00	0.00	-752.64
19	9	0.00	221.55	0.00	0.00	0.00	894.50
19	20	0.00	-218.55	0.00	0.00	0.00	-601.98
20	20	0.00	218.55	0.00	0.00	0.00	601.98
20	21	0.00	-212.46	0.00	0.00	0.00	-17.82
21	21	0.00	8.95	0.00	0.00	0.00	17.82
21	22	0.00	0.00	0.00	0.00	0.00	0.00

Combination No. 5
Group Id: STR GP 1 Name: STRENGTH GROUP I

Memb	Node	Fx kip	Fy kip	Fz kip	Mx kft	My kft	Mz kft
1	1	12.06	876.60	-16.51	-646.53	-0.25	-255.54
1	2	-12.06	-839.44	16.51	306.46	0.25	7.08
2	2	12.06	839.44	-16.51	-306.46	-0.25	-7.08
2	3	-12.06	-827.51	16.51	133.13	0.25	-119.56
3	4	15.28	721.33	-11.51	-589.48	0.05	-292.51
3	5	-15.28	-684.17	11.51	352.27	-0.05	-22.31
4	5	15.28	684.17	-11.51	-352.27	0.05	22.31
4	6	-15.28	-672.24	11.51	231.36	-0.05	-182.77
5	7	17.20	443.77	-16.53	-646.89	0.36	-314.55
5	8	-17.20	-406.61	16.53	306.47	-0.36	-39.87
6	8	17.20	406.61	-16.53	-306.47	0.36	39.87
6	9	-17.20	-394.68	16.53	132.96	-0.36	-220.52
7	10	0.00	0.00	0.00	0.00	0.00	0.00
7	11	0.00	9.00	0.00	0.00	0.00	-18.00
8	11	-8.91	-399.66	8.91	13.36	0.00	31.36
8	12	8.91	405.71	-8.91	-13.36	-23.97	-1114.86
9	12	-8.91	-405.71	8.91	13.36	23.97	1114.86
9	3	8.91	408.70	-8.91	-13.36	-35.82	-1656.18
10	3	3.15	418.81	-7.60	-119.77	35.57	1775.73

PROJECT:

10	13	-3.15	-415.81	7.60	119.77	-25.47	-1220.99
11	13	3.15	415.81	-7.60	-119.77	25.47	1220.99
11	14	-3.15	-405.04	7.60	119.77	10.93	745.22
12	14	-5.76	-95.79	1.31	-106.40	-10.93	-731.86
12	15	5.76	115.59	-1.31	106.40	-0.60	-198.28
13	15	-5.76	-115.59	1.31	-106.40	0.60	198.28
13	6	5.76	118.58	-1.31	106.40	-2.35	-353.92
14	6	9.52	553.66	-10.21	92.86	2.40	536.69
14	16	-9.52	-553.64	10.21	-92.86	-2.30	-531.16
15	16	0.61	111.92	-1.29	106.23	2.30	544.52
15	17	-0.61	-108.95	1.29	-106.23	-0.59	-398.82
16	17	0.61	108.95	-1.29	106.23	0.59	398.82
16	18	-0.61	-89.10	1.29	-106.23	10.82	474.66
17	18	-8.29	-170.03	7.62	119.59	-10.82	-461.30
17	19	8.29	180.76	-7.62	-119.59	-25.51	-375.45
18	19	-8.29	-180.76	7.62	119.59	25.51	375.45
18	9	8.29	183.75	-7.62	-119.59	-35.64	-617.73
19	9	8.91	210.93	-8.91	-13.36	35.99	838.24
19	20	-8.91	-207.94	8.91	13.36	-24.15	-559.84
20	20	8.91	207.94	-8.91	-13.36	24.15	559.84
20	21	-8.91	-201.84	8.91	13.36	0.00	-4.46
21	21	0.00	8.95	0.00	0.00	0.00	17.82
21	22	0.00	0.00	0.00	0.00	0.00	0.00

Combination No. 6
Group Id: STR GP 1 Name: STRENGTH GROUP I

Memb	Node	Fx kip	Fy kip	Fz kip	Mx kft	My kft	Mz kft
1	1	10.62	508.13	-16.51	-646.53	-0.25	-216.12
1	2	-10.62	-470.97	16.51	306.46	0.25	-2.62
2	2	10.62	470.97	-16.51	-306.46	-0.25	2.62
2	3	-10.62	-459.04	16.51	133.13	0.25	-114.12
3	4	18.16	721.26	-11.51	-589.48	0.05	-302.68
3	5	-18.16	-684.10	11.51	352.27	-0.05	-71.37
4	5	18.16	684.10	-11.51	-352.27	0.05	71.37
4	6	-18.16	-672.17	11.51	231.36	-0.05	-262.02
5	7	15.77	812.31	-16.53	-646.89	0.36	-275.24
5	8	-15.77	-775.15	16.53	306.47	-0.36	-49.65
6	8	15.77	775.15	-16.53	-306.47	0.36	49.65
6	9	-15.77	-763.23	16.53	132.96	-0.36	-215.25
7	10	0.00	0.00	0.00	0.00	0.00	0.00
7	11	0.00	9.00	0.00	0.00	0.00	-18.00
8	11	-8.91	-223.12	8.91	13.36	0.00	31.36
8	12	8.91	229.17	-8.91	-13.36	-23.97	-639.84
9	12	-8.91	-229.17	8.91	13.36	23.97	639.84
9	3	8.91	232.16	-8.91	-13.36	-35.82	-946.48
10	3	1.71	226.88	-7.60	-119.77	35.57	1060.59
10	13	-1.71	-223.89	7.60	119.77	-25.47	-760.99
11	13	1.71	223.89	-7.60	-119.77	25.47	760.99
11	14	-1.71	-213.11	7.60	119.77	10.93	285.75
12	14	-7.20	-46.44	1.31	-106.40	-10.93	-272.39
12	15	7.20	66.25	-1.31	106.40	-0.60	-223.49
13	15	-7.20	-66.25	1.31	-106.40	0.60	223.49
13	6	7.20	69.24	-1.31	106.40	-2.35	-313.54
14	6	10.96	602.93	-10.21	92.86	2.40	575.56
14	16	-10.96	-602.91	10.21	-92.86	-2.30	-569.53
15	16	2.05	160.85	-1.29	106.23	2.30	582.89
15	17	-2.05	-157.89	1.29	-106.23	-0.59	-372.63
16	17	2.05	157.89	-1.29	106.23	0.59	372.63
16	18	-2.05	-138.04	1.29	-106.23	10.82	932.49
17	18	-6.86	-362.53	7.62	119.59	-10.82	-919.13
17	19	6.86	373.27	-7.62	-119.59	-25.51	-836.00

PROJECT:

18	19	-6.86	-373.27	7.62	119.59	25.51	836.00
18	9	6.86	376.26	-7.62	-119.59	-35.64	-1334.19
19	9	8.91	386.97	-8.91	-13.36	35.99	1549.44
19	20	-8.91	-383.98	8.91	13.36	-24.15	-1037.02
20	20	8.91	383.98	-8.91	-13.36	24.15	1037.02
20	21	-8.91	-377.88	8.91	13.36	0.00	-4.46
21	21	0.00	8.95	0.00	0.00	0.00	17.82
21	22	0.00	0.00	0.00	0.00	0.00	0.00

Combination No. 8
Group Id: STR GP 1 Name: STRENGTH GROUP I

Memb	Node	Fx kip	Fy kip	Fz kip	Mx kft	My kft	Mz kft
1	1	-16.24	401.18	9.90	387.92	0.15	263.68
1	2	16.24	-364.02	-9.90	-183.88	-0.15	70.91
2	2	-16.24	364.02	9.90	183.88	0.15	-70.91
2	3	16.24	-352.09	-9.90	-79.88	-0.15	241.44
3	4	-8.35	416.97	6.91	353.69	-0.03	173.10
3	5	8.35	-379.80	-6.91	-211.36	0.03	-1.14
4	5	-8.35	379.80	6.91	211.36	-0.03	1.14
4	6	8.35	-367.88	-6.91	-138.82	0.03	86.51
5	7	-2.14	882.87	9.92	388.13	-0.22	101.89
5	8	2.14	-845.71	-9.92	-183.88	0.22	-57.82
6	8	-2.14	845.71	9.92	183.88	-0.22	57.82
6	9	2.14	-833.78	-9.92	-79.77	0.22	-35.35
7	10	0.00	0.00	0.00	0.00	0.00	0.00
7	11	0.00	9.00	0.00	0.00	0.00	-18.00
8	11	5.35	-206.13	-5.35	-8.02	0.00	9.98
8	12	-5.35	212.18	5.35	8.02	14.38	-572.75
9	12	5.35	-212.18	-5.35	-8.02	-14.38	572.75
9	3	-5.35	215.17	5.35	8.02	21.49	-856.80
10	3	-10.90	136.92	4.56	71.86	-21.34	615.36
10	13	10.90	-133.92	-4.56	-71.86	15.28	-435.34
11	13	-10.90	133.92	4.56	71.86	-15.28	435.34
11	14	10.90	-123.15	-4.56	-71.86	-6.56	180.42
12	14	-5.55	-52.35	-0.79	63.84	6.56	-188.44
12	15	5.55	72.16	0.79	-63.84	0.36	-359.45
13	15	-5.55	-72.16	-0.79	63.84	-0.36	359.45
13	6	5.55	75.15	0.79	-63.84	1.41	-457.36
14	6	-13.90	292.73	6.12	-55.72	-1.44	370.85
14	16	13.90	-292.71	-6.12	55.72	1.38	-367.92
15	16	-8.55	107.15	0.78	-63.74	-1.38	359.90
15	17	8.55	-104.18	-0.78	63.74	0.36	-220.49
16	17	-8.55	104.18	0.78	-63.74	-0.36	220.49
16	18	8.55	-84.34	-0.78	63.74	-6.49	610.95
17	18	-3.21	-380.89	-4.57	-71.76	6.49	-618.97
17	19	3.21	391.63	4.57	71.76	15.31	-1223.74
18	19	-3.21	-391.63	-4.57	-71.76	-15.31	1223.74
18	9	3.21	394.62	4.57	71.76	21.38	-1746.34
19	9	-5.35	439.16	5.35	8.02	-21.60	1781.69
19	20	5.35	-436.17	-5.35	-8.02	14.49	-1199.88
20	20	-5.35	436.17	5.35	8.02	-14.49	1199.88
20	21	5.35	-430.07	-5.35	-8.02	0.00	-25.84
21	21	0.00	8.95	0.00	0.00	0.00	17.82
21	22	0.00	0.00	0.00	0.00	0.00	0.00

Combination No. 11
Group Id: STR GP 1 Name: STRENGTH GROUP I

Memb	Node	Fx kip	Fy kip	Fz kip	Mx kft	My kft	Mz kft
1	1	-15.75	811.74	16.51	646.53	0.25	275.22

PROJECT:

1	2	15.75	-774.58	-16.51	-306.46	-0.25	49.18
2	2	-15.75	774.58	16.51	306.46	0.25	-49.18
2	3	15.75	-762.65	-16.51	-133.13	-0.25	214.52
3	4	-18.20	721.30	11.51	589.48	-0.05	303.45
3	5	18.20	-684.14	-11.51	-352.27	0.05	71.52
4	5	-18.20	684.14	11.51	352.27	-0.05	-71.52
4	6	18.20	-672.21	-11.51	-231.36	0.05	262.64
5	7	-10.60	508.66	16.53	646.89	-0.36	216.14
5	8	10.60	-471.50	-16.53	-306.47	0.36	2.18
6	8	-10.60	471.50	16.53	306.47	-0.36	-2.18
6	9	10.60	-459.57	-16.53	-132.96	0.36	113.46
7	10	0.00	0.00	0.00	0.00	0.00	0.00
7	11	0.00	9.00	0.00	0.00	0.00	-18.00
8	11	8.91	-378.43	-8.91	-13.36	0.00	4.64
8	12	-8.91	384.48	8.91	13.36	23.97	-1030.99
9	12	8.91	-384.48	-8.91	-13.36	-23.97	1030.99
9	3	-8.91	387.47	8.91	13.36	35.82	-1544.09
10	3	-6.84	375.18	7.60	119.77	-35.57	1329.56
10	13	6.84	-372.19	-7.60	-119.77	25.47	-832.81
11	13	-6.84	372.19	7.60	119.77	-25.47	832.81
11	14	6.84	-361.41	-7.60	-119.77	-10.93	924.42
12	14	2.07	-139.41	-1.31	106.40	10.93	-937.79
12	15	-2.07	159.21	1.31	-106.40	0.60	-376.25
13	15	2.07	-159.21	-1.31	106.40	-0.60	376.25
13	6	-2.07	162.20	1.31	-106.40	2.35	-589.89
14	6	-16.13	510.00	10.21	-92.86	-2.40	327.25
14	16	16.13	-509.98	-10.21	92.86	2.30	-322.15
15	16	-7.22	68.26	1.29	-106.23	-2.30	308.78
15	17	7.22	-65.30	-1.29	106.23	0.59	-220.68
16	17	-7.22	65.30	1.29	-106.23	-0.59	220.68
16	18	7.22	-45.45	-1.29	106.23	-10.82	267.74
17	18	1.69	-213.68	-7.62	-119.59	10.82	-281.10
17	19	-1.69	224.42	7.62	119.59	25.51	-763.90
18	19	1.69	-224.42	-7.62	-119.59	-25.51	763.90
18	9	-1.69	227.41	7.62	119.59	35.64	-1064.22
19	9	-8.91	232.16	8.91	13.36	-35.99	950.76
19	20	8.91	-229.17	-8.91	-13.36	24.15	-644.12
20	20	-8.91	229.17	8.91	13.36	-24.15	644.12
20	21	8.91	-223.07	-8.91	-13.36	0.00	-31.18
21	21	0.00	8.95	0.00	0.00	0.00	17.82
21	22	0.00	0.00	0.00	0.00	0.00	0.00

Combination No. 12
Group Id: STR GP 1 Name: STRENGTH GROUP I

Memb	Node	Fx kip	Fy kip	Fz kip	Mx kft	My kft	Mz kft
1	1	-17.19	443.27	16.51	646.53	0.25	314.63
1	2	17.19	-406.11	-16.51	-306.46	-0.25	39.47
2	2	-17.19	406.11	16.51	306.46	0.25	-39.47
2	3	17.19	-394.18	-16.51	-133.13	-0.25	219.96
3	4	-15.33	721.22	11.51	589.48	-0.05	293.28
3	5	15.33	-684.06	-11.51	-352.27	0.05	22.46
4	5	-15.33	684.06	11.51	352.27	-0.05	-22.46
4	6	15.33	-672.13	-11.51	-231.36	0.05	183.39
5	7	-12.03	877.20	16.53	646.89	-0.36	255.45
5	8	12.03	-840.04	-16.53	-306.47	0.36	-7.61
6	8	-12.03	840.04	16.53	306.47	-0.36	7.61
6	9	12.03	-828.11	-16.53	-132.96	0.36	118.72
7	10	0.00	0.00	0.00	0.00	0.00	0.00
7	11	0.00	9.00	0.00	0.00	0.00	-18.00
8	11	8.91	-201.88	-8.91	-13.36	0.00	4.64
8	12	-8.91	207.94	8.91	13.36	23.97	-555.98

9	12	8.91	-207.94	-8.91	-13.36	-23.97	555.98
9	3	-8.91	210.93	8.91	13.36	35.82	-834.39
10	3	-8.28	183.25	7.60	119.77	-35.57	614.42
10	13	8.28	-180.26	-7.60	-119.77	25.47	-372.80
11	13	-8.28	180.26	7.60	119.77	-25.47	372.80
11	14	8.28	-169.48	-7.60	-119.77	-10.93	464.95
12	14	0.63	-90.07	-1.31	106.40	10.93	-478.32
12	15	-0.63	109.87	1.31	-106.40	0.60	-401.46
13	15	0.63	-109.87	-1.31	106.40	-0.60	401.46
13	6	-0.63	112.86	1.31	-106.40	2.35	-549.50
14	6	-14.70	559.28	10.21	-92.86	-2.40	366.11
14	16	14.70	-559.25	-10.21	92.86	2.30	-360.52
15	16	-5.79	117.20	1.29	-106.23	-2.30	347.15
15	17	5.79	-114.23	-1.29	106.23	0.59	-194.49
16	17	-5.79	114.23	1.29	-106.23	-0.59	194.49
16	18	5.79	-94.38	-1.29	106.23	-10.82	725.57
17	18	3.12	-406.19	-7.62	-119.59	10.82	-738.93
17	19	-3.12	416.92	7.62	119.59	25.51	-1224.46
18	19	3.12	-416.92	-7.62	-119.59	-25.51	1224.46
18	9	-3.12	419.91	7.62	119.59	35.64	-1780.68
19	9	-8.91	408.20	8.91	13.36	-35.99	1661.95
19	20	8.91	-405.21	-8.91	-13.36	24.15	-1121.30
20	20	-8.91	405.21	8.91	13.36	-24.15	1121.30
20	21	8.91	-399.11	-8.91	-13.36	0.00	-31.18
21	21	0.00	8.95	0.00	0.00	0.00	17.82
21	22	0.00	0.00	0.00	0.00	0.00	0.00

Combination No. 16
Group Id: STR GP 1 Name: STRENGTH GROUP I

Memb	Node	Fx kip	Fy kip	Fz kip	Mx kft	My kft	Mz kft
1	1	2.60	713.83	-9.90	-387.92	-0.15	-93.32
1	2	-2.60	-676.67	9.90	183.88	0.15	39.66
2	2	2.60	676.67	-9.90	-183.88	-0.15	-39.66
2	3	-2.60	-664.74	9.90	79.88	0.15	12.31
3	4	10.02	466.37	-6.91	-353.69	0.03	-178.41
3	5	-10.02	-429.21	6.91	211.36	-0.03	-28.00
4	5	10.02	429.21	-6.91	-211.36	0.03	28.00
4	6	-10.02	-417.28	6.91	138.82	-0.03	-133.21
5	7	14.10	675.35	-9.92	-388.13	0.22	-225.24
5	8	-14.10	-638.19	9.92	183.88	-0.22	-65.30
6	8	14.10	638.19	-9.92	-183.88	0.22	65.30
6	9	-14.10	-626.26	9.92	79.77	-0.22	-213.39
7	10	0.00	0.00	0.00	0.00	0.00	0.00
7	11	0.00	9.00	0.00	0.00	0.00	-18.00
8	11	-5.35	-336.76	5.35	8.02	0.00	26.02
8	12	5.35	342.82	-5.35	-8.02	-14.38	-940.28
9	12	-5.35	-342.82	5.35	8.02	14.38	940.28
9	3	5.35	345.81	-5.35	-8.02	-21.49	-1397.99
10	3	-2.74	318.93	-4.56	-71.86	21.34	1385.68
10	13	2.74	-315.94	4.56	71.86	-15.28	-963.70
11	13	-2.74	315.94	-4.56	-71.86	15.28	963.70
11	14	2.74	-305.16	4.56	71.86	6.56	524.05
12	14	-8.09	-88.66	0.79	-63.84	-6.56	-516.03
12	15	8.09	108.46	-0.79	63.84	-0.36	-351.38
13	15	-8.09	-108.46	0.79	-63.84	0.36	351.38
13	6	8.09	111.45	-0.79	63.84	-1.41	-497.56
14	6	1.93	305.83	-6.12	55.72	1.44	630.76
14	16	-1.93	-305.80	6.12	-55.72	-1.38	-627.70
15	16	-3.41	136.83	-0.78	63.74	1.38	635.72
15	17	3.41	-133.87	0.78	-63.74	-0.36	-457.15
16	17	-3.41	133.87	-0.78	63.74	0.36	457.15

16	18	3.41	-114.02	0.78	-63.74	6.49	636.11
17	18	-8.76	-279.97	4.57	71.76	-6.49	-628.09
17	19	8.76	290.71	-4.57	-71.76	-15.31	-733.17
18	19	-8.76	-290.71	4.57	71.76	15.31	733.17
18	9	8.76	293.70	-4.57	-71.76	-21.38	-1121.61
19	9	5.35	332.56	-5.35	-8.02	21.60	1335.00
19	20	-5.35	-329.57	5.35	8.02	-14.49	-894.89
20	20	5.35	329.57	-5.35	-8.02	14.49	894.89
20	21	-5.35	-323.47	5.35	8.02	0.00	-9.80
21	21	0.00	8.95	0.00	0.00	0.00	17.82
21	22	0.00	0.00	0.00	0.00	0.00	0.00

Combination No. 17
Group Id: STR GP 1 Name: STRENGTH GROUP I

Memb	Node	Fx kip	Fy kip	Fz kip	Mx kft	My kft	Mz kft
1	1	14.49	791.59	-16.51	-646.53	-0.25	-283.45
1	2	-14.49	-754.43	16.51	306.46	0.25	-15.08
2	2	14.49	754.43	-16.51	-306.46	-0.25	15.08
2	3	-14.49	-742.50	16.51	133.13	0.25	-167.24
3	4	15.29	705.30	-11.51	-589.48	0.05	-292.61
3	5	-15.29	-668.14	11.51	352.27	-0.05	-22.34
4	5	15.29	668.14	-11.51	-352.27	0.05	22.34
4	6	-15.29	-656.21	11.51	231.36	-0.05	-182.88
5	7	14.77	358.65	-16.53	-646.89	0.36	-286.61
5	8	-14.77	-321.49	16.53	306.47	-0.36	-17.59
6	8	14.77	321.49	-16.53	-306.47	0.36	17.59
6	9	-14.77	-309.56	16.53	132.96	-0.36	-172.64
7	10	0.00	0.00	0.00	0.00	0.00	0.00
7	11	0.00	9.00	0.00	0.00	0.00	-18.00
8	11	-8.91	-341.01	8.91	13.36	0.00	31.36
8	12	8.91	347.06	-8.91	-13.36	-23.97	-957.05
9	12	-8.91	-347.06	8.91	13.36	23.97	957.05
9	3	8.91	350.05	-8.91	-13.36	-35.82	-1420.40
10	3	5.58	392.45	-7.60	-119.77	35.57	1587.65
10	13	-5.58	-389.46	7.60	119.77	-25.47	-1067.94
11	13	5.58	389.46	-7.60	-119.77	25.47	1067.94
11	14	-5.58	-378.68	7.60	119.77	10.93	772.01
12	14	-3.33	-99.20	1.31	-106.40	-10.93	-758.64
12	15	3.33	119.00	-1.31	106.40	-0.60	-201.47
13	15	-3.33	-119.00	1.31	-106.40	0.60	201.47
13	6	3.33	121.99	-1.31	106.40	-2.35	-361.65
14	6	11.96	534.23	-10.21	92.86	2.40	544.52
14	16	-11.96	-534.20	10.21	-92.86	-2.30	-539.18
15	16	3.05	115.43	-1.29	106.23	2.30	552.55
15	17	-3.05	-112.47	1.29	-106.23	-0.59	-402.21
16	17	3.05	112.47	-1.29	106.23	0.59	402.21
16	18	-3.05	-92.62	1.29	-106.23	10.82	502.29
17	18	-5.86	-143.56	7.62	119.59	-10.82	-488.93
17	19	5.86	154.29	-7.62	-119.59	-25.51	-221.56
18	19	-5.86	-154.29	7.62	119.59	25.51	221.56
18	9	5.86	157.29	-7.62	-119.59	-35.64	-428.66
19	9	8.91	152.28	-8.91	-13.36	35.99	601.30
19	20	-8.91	-149.29	8.91	13.36	-24.15	-400.86
20	20	8.91	149.29	-8.91	-13.36	24.15	400.86
20	21	-8.91	-143.19	8.91	13.36	0.00	-4.46
21	21	0.00	8.95	0.00	0.00	0.00	17.82
21	22	0.00	0.00	0.00	0.00	0.00	0.00

Combination No. 18
Group Id: STR GP 1 Name: STRENGTH GROUP I

Memb	Node	Fx	Fy	Fz	Mx	My	Mz

PROJECT:

		kip	kip	kip	kft	kft	kft
1	1	13.05	423.12	-16.51	-646.53	-0.25	-244.04
1	2	-13.05	-385.96	16.51	306.46	0.25	-24.78
2	2	13.05	385.96	-16.51	-306.46	-0.25	24.78
2	3	-13.05	-374.03	16.51	133.13	0.25	-161.80
3	4	18.16	705.23	-11.51	-589.48	0.05	-302.79
3	5	-18.16	-668.07	11.51	352.27	-0.05	-71.40
4	5	18.16	668.07	-11.51	-352.27	0.05	71.40
4	6	-18.16	-656.14	11.51	231.36	-0.05	-262.13
5	7	13.33	727.20	-16.53	-646.89	0.36	-247.30
5	8	-13.33	-690.04	16.53	306.47	-0.36	-27.38
6	8	13.33	690.04	-16.53	-306.47	0.36	27.38
6	9	-13.33	-678.11	16.53	132.96	-0.36	-167.38
7	10	0.00	0.00	0.00	0.00	0.00	0.00
7	11	0.00	9.00	0.00	0.00	0.00	-18.00
8	11	-8.91	-164.47	8.91	13.36	0.00	31.36
8	12	8.91	170.52	-8.91	-13.36	-23.97	-482.03
9	12	-8.91	-170.52	8.91	13.36	23.97	482.03
9	3	8.91	173.51	-8.91	-13.36	-35.82	-710.70
10	3	4.14	200.52	-7.60	-119.77	35.57	872.51
10	13	-4.14	-197.53	7.60	119.77	-25.47	-607.94
11	13	4.14	197.53	-7.60	-119.77	25.47	607.94
11	14	-4.14	-186.75	7.60	119.77	10.93	312.54
12	14	-4.77	-49.85	1.31	-106.40	-10.93	-299.17
12	15	4.77	69.65	-1.31	106.40	-0.60	-226.68
13	15	-4.77	-69.65	1.31	-106.40	0.60	226.68
13	6	4.77	72.64	-1.31	106.40	-2.35	-321.26
14	6	13.39	583.50	-10.21	92.86	2.40	583.39
14	16	-13.39	-583.47	10.21	-92.86	-2.30	-577.55
15	16	4.49	164.37	-1.29	106.23	2.30	590.92
15	17	-4.49	-161.40	1.29	-106.23	-0.59	-376.02
16	17	4.49	161.40	-1.29	106.23	0.59	376.02
16	18	-4.49	-141.55	1.29	-106.23	10.82	960.12
17	18	-4.42	-336.07	7.62	119.59	-10.82	-946.76
17	19	4.42	346.80	-7.62	-119.59	-25.51	-682.11
18	19	-4.42	-346.80	7.62	119.59	25.51	682.11
18	9	4.42	349.79	-7.62	-119.59	-35.64	-1145.11
19	9	8.91	328.32	-8.91	-13.36	35.99	1312.49
19	20	-8.91	-325.33	8.91	13.36	-24.15	-878.04
20	20	8.91	325.33	-8.91	-13.36	24.15	878.04
20	21	-8.91	-319.23	8.91	13.36	0.00	-4.46
21	21	0.00	8.95	0.00	0.00	0.00	17.82
21	22	0.00	0.00	0.00	0.00	0.00	0.00

Combination No. 22
Group Id: STR GP 1 Name: STRENGTH GROUP I

Memb	Node	Fx	Fy	Fz	Mx	My	Mz
		kip	kip	kip	kft	kft	kft
1	1	-14.08	674.92	9.90	387.92	0.15	225.13
1	2	14.08	-637.75	-9.90	-183.88	-0.15	64.92
2	2	-14.08	637.75	9.90	183.88	0.15	-64.92
2	3	14.08	-625.83	-9.90	-79.88	-0.15	212.76
3	4	-10.07	466.35	6.91	353.69	-0.03	179.16
3	5	10.07	-429.19	-6.91	-211.36	0.03	28.30
4	5	-10.07	429.19	6.91	211.36	-0.03	-28.30
4	6	10.07	-417.26	-6.91	-138.82	0.03	134.04
5	7	-2.58	714.28	9.92	388.13	-0.22	93.17
5	8	2.58	-677.12	-9.92	-183.88	0.22	-40.07
6	8	-2.58	677.12	9.92	183.88	-0.22	40.07
6	9	2.58	-665.19	-9.92	-79.77	0.22	-13.01
7	10	0.00	0.00	0.00	0.00	0.00	0.00

7	11	0.00	9.00	0.00	0.00	0.00	-18.00
8	11	5.35	-324.02	-5.35	-8.02	0.00	9.98
8	12	-5.35	330.08	5.35	8.02	14.38	-889.96
9	12	5.35	-330.08	-5.35	-8.02	-14.38	889.96
9	3	-5.35	333.07	5.35	8.02	21.49	-1330.73
10	3	-8.73	292.76	4.56	71.86	-21.34	1117.98
10	13	8.73	-289.77	-4.56	-71.86	15.28	-730.79
11	13	-8.73	289.77	4.56	71.86	-15.28	730.79
11	14	8.73	-278.99	-4.56	-71.86	-6.56	631.57
12	14	-3.39	-114.84	-0.79	63.84	6.56	-639.59
12	15	3.39	134.64	0.79	-63.84	0.36	-458.17
13	15	-3.39	-134.64	-0.79	63.84	-0.36	458.17
13	6	3.39	137.63	0.79	-63.84	1.41	-639.14
14	6	-13.46	279.63	6.12	-55.72	-1.44	505.09
14	16	13.46	-279.61	-6.12	55.72	1.38	-502.30
15	16	-8.11	110.64	0.78	-63.74	-1.38	494.28
15	17	8.11	-107.67	-0.78	63.74	0.36	-350.26
16	17	-8.11	107.67	0.78	-63.74	-0.36	350.26
16	18	8.11	-87.83	-0.78	63.74	-6.49	511.95
17	18	-2.77	-306.17	-4.57	-71.76	6.49	-519.97
17	19	2.77	316.90	4.57	71.76	15.31	-966.24
18	19	-2.77	-316.90	-4.57	-71.76	-15.31	966.24
18	9	2.77	319.89	4.57	71.76	21.38	-1389.50
19	9	-5.35	345.30	5.35	8.02	-21.60	1402.51
19	20	5.35	-342.31	-5.35	-8.02	14.49	-945.47
20	20	-5.35	342.31	5.35	8.02	-14.49	945.47
20	21	5.35	-336.21	-5.35	-8.02	0.00	-25.84
21	21	0.00	8.95	0.00	0.00	0.00	17.82
21	22	0.00	0.00	0.00	0.00	0.00	0.00

Combination No. 23
Group Id: STR GP 1 Name: STRENGTH GROUP I

Memb	Node	Fx kip	Fy kip	Fz kip	Mx kft	My kft	Mz kft
1	1	-13.32	726.74	16.51	646.53	0.25	247.30
1	2	13.32	-689.58	-16.51	-306.46	-0.25	27.02
2	2	-13.32	689.58	16.51	306.46	0.25	-27.02
2	3	13.32	-677.65	-16.51	-133.13	-0.25	166.84
3	4	-18.20	705.27	11.51	589.48	-0.05	303.35
3	5	18.20	-668.11	-11.51	-352.27	0.05	71.49
4	5	-18.20	668.11	11.51	352.27	-0.05	-71.49
4	6	18.20	-656.18	-11.51	-231.36	0.05	262.54
5	7	-13.04	423.54	16.53	646.89	-0.36	244.08
5	8	13.04	-386.38	-16.53	-306.47	0.36	24.46
6	8	-13.04	386.38	16.53	306.47	-0.36	-24.46
6	9	13.04	-374.45	-16.53	-132.96	0.36	161.33
7	10	0.00	0.00	0.00	0.00	0.00	0.00
7	11	0.00	9.00	0.00	0.00	0.00	-18.00
8	11	8.91	-319.78	-8.91	-13.36	0.00	4.64
8	12	-8.91	325.83	8.91	13.36	23.97	-873.19
9	12	8.91	-325.83	-8.91	-13.36	-23.97	873.19
9	3	-8.91	328.82	8.91	13.36	35.82	-1308.31
10	3	-4.41	348.83	7.60	119.77	-35.57	1141.48
10	13	4.41	-345.84	-7.60	-119.77	25.47	-679.76
11	13	-4.41	345.84	7.60	119.77	-25.47	679.76
11	14	4.41	-335.06	-7.60	-119.77	-10.93	951.21
12	14	4.50	-142.82	-1.31	106.40	10.93	-964.57
12	15	-4.50	162.62	1.31	-106.40	0.60	-379.45
13	15	4.50	-162.62	-1.31	106.40	-0.60	379.45
13	6	-4.50	165.61	1.31	-106.40	2.35	-597.62
14	6	-13.69	490.57	10.21	-92.86	-2.40	335.08
14	16	13.69	-490.55	-10.21	92.86	2.30	-330.17

PROJECT:

15	16	-4.78	71.78	1.29	-106.23	-2.30	316.81
15	17	4.78	-68.81	-1.29	106.23	0.59	-224.06
16	17	-4.78	68.81	1.29	-106.23	-0.59	224.06
16	18	4.78	-48.96	-1.29	106.23	-10.82	295.37
17	18	4.13	-187.22	-7.62	-119.59	10.82	-308.73
17	19	-4.13	197.95	7.62	119.59	25.51	-610.01
18	19	4.13	-197.95	-7.62	-119.59	-25.51	610.01
18	9	-4.13	200.94	7.62	119.59	35.64	-875.14
19	9	-8.91	173.51	8.91	13.36	-35.99	713.81
19	20	8.91	-170.52	-8.91	-13.36	24.15	-485.14
20	20	-8.91	170.52	8.91	13.36	-24.15	485.14
20	21	8.91	-164.42	-8.91	-13.36	0.00	-31.18
21	21	0.00	8.95	0.00	0.00	0.00	17.82
21	22	0.00	0.00	0.00	0.00	0.00	0.00

Combination No. 24
Group Id: STR GP 1 Name: STRENGTH GROUP I

Memb	Node	Fx kip	Fy kip	Fz kip	Mx kft	My kft	Mz kft
1	1	-14.76	358.26	16.51	646.53	0.25	286.71
1	2	14.76	-321.10	-16.51	-306.46	-0.25	17.31
2	2	-14.76	321.10	16.51	306.46	0.25	-17.31
2	3	14.76	-309.17	-16.51	-133.13	-0.25	172.28
3	4	-15.32	705.20	11.51	589.48	-0.05	293.17
3	5	15.32	-668.04	-11.51	-352.27	0.05	22.43
4	5	-15.32	668.04	11.51	352.27	-0.05	-22.43
4	6	15.32	-656.11	-11.51	-231.36	0.05	183.29
5	7	-14.47	792.09	16.53	646.89	-0.36	283.39
5	8	14.47	-754.93	-16.53	-306.47	0.36	14.67
6	8	-14.47	754.93	16.53	306.47	-0.36	-14.67
6	9	14.47	-743.00	-16.53	-132.96	0.36	166.59
7	10	0.00	0.00	0.00	0.00	0.00	0.00
7	11	0.00	9.00	0.00	0.00	0.00	-18.00
8	11	8.91	-143.23	-8.91	-13.36	0.00	4.64
8	12	-8.91	149.29	8.91	13.36	23.97	-398.17
9	12	8.91	-149.29	-8.91	-13.36	-23.97	398.17
9	3	-8.91	152.28	8.91	13.36	35.82	-598.61
10	3	-5.85	156.90	7.60	119.77	-35.57	426.34
10	13	5.85	-153.91	-7.60	-119.77	25.47	-219.75
11	13	-5.85	153.91	7.60	119.77	-25.47	219.75
11	14	5.85	-143.13	-7.60	-119.77	-10.93	491.74
12	14	3.06	-93.47	-1.31	106.40	10.93	-505.10
12	15	-3.06	113.28	1.31	-106.40	0.60	-404.66
13	15	3.06	-113.28	-1.31	106.40	-0.60	404.66
13	6	-3.06	116.27	1.31	-106.40	2.35	-557.23
14	6	-12.26	539.84	10.21	-92.86	-2.40	373.94
14	16	12.26	-539.82	-10.21	92.86	2.30	-368.54
15	16	-3.35	120.71	1.29	-106.23	-2.30	355.18
15	17	3.35	-117.75	-1.29	106.23	0.59	-197.87
16	17	-3.35	117.75	1.29	-106.23	-0.59	197.87
16	18	3.35	-97.90	-1.29	106.23	-10.82	753.20
17	18	5.56	-379.72	-7.62	-119.59	10.82	-766.56
17	19	-5.56	390.46	7.62	119.59	25.51	-1070.56
18	19	5.56	-390.46	-7.62	-119.59	-25.51	1070.56
18	9	-5.56	393.45	7.62	119.59	35.64	-1591.60
19	9	-8.91	349.55	8.91	13.36	-35.99	1425.01
19	20	8.91	-346.56	-8.91	-13.36	24.15	-962.32
20	20	-8.91	346.56	8.91	13.36	-24.15	962.32
20	21	8.91	-340.46	-8.91	-13.36	0.00	-31.18
21	21	0.00	8.95	0.00	0.00	0.00	17.82
21	22	0.00	0.00	0.00	0.00	0.00	0.00

PROJECT:

Combination No. 109
Group Id: STR GP 4 Name: STRENGTH GROUP IV

Memb	Node	Fx kip	Fy kip	Fz kip	Mx kft	My kft	Mz kft
1	1	-5.54	492.27	0.00	-0.00	0.00	63.67
1	2	5.54	-447.68	0.00	-0.00	0.00	50.47
2	2	-5.54	447.68	0.00	-0.00	0.00	-50.47
2	3	5.54	-433.37	0.00	-0.00	0.00	108.64
3	4	-0.02	377.10	0.00	-0.00	0.00	0.36
3	5	0.02	-332.51	0.00	-0.00	0.00	0.09
4	5	-0.02	332.51	0.00	-0.00	0.00	-0.09
4	6	0.02	-318.19	0.00	-0.00	0.00	0.32
5	7	5.56	492.90	0.00	-0.00	0.00	-63.71
5	8	-5.56	-448.31	0.00	-0.00	0.00	-50.88
6	8	5.56	448.31	0.00	-0.00	0.00	50.88
6	9	-5.56	-434.00	0.00	-0.00	0.00	-109.29
7	10	0.00	0.00	0.00	0.00	0.00	0.00
7	11	0.00	10.80	0.00	0.00	0.00	-21.60
8	11	0.00	-234.30	0.00	0.00	0.00	21.60
8	12	0.00	241.56	0.00	0.00	0.00	-661.80
9	12	0.00	-241.56	0.00	0.00	0.00	661.80
9	3	0.00	245.15	0.00	0.00	0.00	-985.30
10	3	-5.54	188.21	0.00	0.00	0.00	876.66
10	13	5.54	-184.62	0.00	0.00	0.00	-628.85
11	13	-5.54	184.62	0.00	0.00	0.00	628.85
11	14	5.54	-171.69	0.00	0.00	0.00	224.64
12	14	-5.54	-30.81	0.00	0.00	0.00	-224.64
12	15	5.54	54.57	0.00	0.00	0.00	-151.08
13	15	-5.54	-54.57	0.00	0.00	0.00	151.08
13	6	5.54	58.16	0.00	0.00	0.00	-226.01
14	6	-5.56	260.03	0.00	0.00	0.00	225.69
14	16	5.56	-260.01	0.00	0.00	0.00	-223.09
15	16	-5.56	57.51	0.00	0.00	0.00	223.09
15	17	5.56	-53.94	0.00	0.00	0.00	-149.57
16	17	-5.56	53.94	0.00	0.00	0.00	149.57
16	18	5.56	-30.13	0.00	0.00	0.00	221.22
17	18	-5.56	-172.37	0.00	0.00	0.00	-221.22
17	19	5.56	185.25	0.00	0.00	0.00	-631.84
18	19	-5.56	-185.25	0.00	0.00	0.00	631.84
18	9	5.56	188.84	0.00	0.00	0.00	-880.49
19	9	0.00	245.15	0.00	0.00	0.00	989.77
19	20	0.00	-241.56	0.00	0.00	0.00	-666.27
20	20	0.00	241.56	0.00	0.00	0.00	666.27
20	21	0.00	-234.25	0.00	0.00	0.00	-21.38
21	21	0.00	10.75	0.00	0.00	0.00	21.38
21	22	0.00	0.00	0.00	0.00	0.00	0.00

Combination No. 147
Group Id: STR GP 5 Name: STRENGTH GROUP V

Memb	Node	Fx kip	Fy kip	Fz kip	Mx kft	My kft	Mz kft
1	1	4.20	769.42	-22.12	-756.83	-1.03	-114.79
1	2	-4.68	-732.26	20.30	319.90	1.03	23.32
2	2	4.68	732.26	-20.30	-319.90	-1.03	-23.32
2	3	-4.87	-720.33	19.62	110.81	1.03	-26.95
3	4	7.31	629.36	-18.18	-711.17	0.06	-150.47
3	5	-7.79	-592.20	16.36	355.45	-0.06	-5.07
4	5	7.79	592.20	-16.36	-355.45	0.06	5.07
4	6	-7.98	-580.27	15.68	187.76	-0.06	-88.00
5	7	10.61	448.24	-22.14	-757.24	1.16	-188.33
5	8	-11.09	-411.08	20.32	319.91	-1.16	-35.19

PROJECT:

6	8	11.09	411.08	-20.32	-319.91	1.16	35.19
6	9	-11.28	-399.15	19.64	110.61	-1.16	-152.77
7	10	0.00	0.00	0.00	0.00	0.00	0.00
7	11	0.00	9.00	-0.30	0.00	-0.60	-18.00
8	11	-5.02	-355.52	10.56	15.40	0.60	25.53
8	12	5.02	361.58	-10.76	-15.40	-29.29	-990.26
9	12	-5.02	-361.58	10.76	15.40	29.29	990.26
9	3	5.02	364.57	-10.86	-15.40	-43.66	-1472.91
10	3	-0.15	355.76	-8.76	-95.41	42.63	1499.86
10	13	0.15	-352.77	8.66	95.41	-31.05	-1028.92
11	13	-0.15	352.77	-8.66	-95.41	31.05	1028.92
11	14	0.15	-341.99	8.30	95.41	9.58	635.27
12	14	-5.17	-84.47	1.96	-80.02	-9.58	-627.75
12	15	5.17	104.27	-2.62	80.02	-10.57	-202.80
13	15	-5.17	-104.27	2.62	-80.02	10.57	202.80
13	6	5.17	107.26	-2.72	80.02	-14.12	-343.40
14	6	3.78	473.00	-12.96	64.42	14.18	431.40
14	16	-3.78	-472.98	12.96	-64.42	-14.05	-426.67
15	16	-1.24	92.11	-2.70	79.82	14.05	434.20
15	17	1.24	-89.14	2.60	-79.82	-10.56	-314.63
16	17	-1.24	89.14	-2.60	79.82	10.56	314.63
16	18	1.24	-69.30	1.94	-79.82	9.46	384.16
17	18	-6.26	-170.72	8.32	95.21	-9.46	-376.63
17	19	6.26	181.45	-8.68	-95.21	-31.10	-463.40
18	19	-6.26	-181.45	8.68	95.21	31.10	463.40
18	9	6.26	184.44	-8.78	-95.21	-42.71	-706.60
19	9	5.02	214.71	-10.86	-15.40	43.87	859.37
19	20	-5.02	-211.72	10.76	15.40	-29.49	-575.93
20	20	5.02	211.72	-10.76	-15.40	29.49	575.93
20	21	-5.02	-205.62	10.56	15.40	-0.59	-10.29
21	21	0.00	8.95	-0.30	0.00	0.59	17.82
21	22	0.00	0.00	0.00	0.00	0.00	0.00

Combination No. 148
Group Id: STR GP 5 Name: STRENGTH GROUP V

Memb	Node	Fx kip	Fy kip	Fz kip	Mx kft	My kft	Mz kft
1	1	3.08	485.17	-22.12	-756.83	-1.03	-84.38
1	2	-3.57	-448.01	20.30	319.90	1.03	15.84
2	2	3.57	448.01	-20.30	-319.90	-1.03	-15.84
2	3	-3.75	-436.08	19.62	110.81	1.03	-22.75
3	4	9.53	629.30	-18.18	-711.17	0.06	-158.31
3	5	-10.01	-592.14	16.36	355.45	-0.06	-42.92
4	5	10.01	592.14	-16.36	-355.45	0.06	42.92
4	6	-10.19	-580.21	15.68	187.76	-0.06	-149.13
5	7	9.50	732.55	-22.14	-757.24	1.16	-158.01
5	8	-9.99	-695.39	20.32	319.91	-1.16	-42.74
6	8	9.99	695.39	-20.32	-319.91	1.16	42.74
6	9	-10.17	-683.46	19.64	110.61	-1.16	-148.71
7	10	0.00	0.00	0.00	0.00	0.00	0.00
7	11	0.00	9.00	-0.30	0.00	-0.60	-18.00
8	11	-5.02	-219.33	10.56	15.40	0.60	25.53
8	12	5.02	225.39	-10.76	-15.40	-29.29	-623.82
9	12	-5.02	-225.39	10.76	15.40	29.29	623.82
9	3	5.02	228.38	-10.86	-15.40	-43.66	-925.42
10	3	-1.26	207.70	-8.76	-95.41	42.63	948.18
10	13	1.26	-204.71	8.66	95.41	-31.05	-674.06
11	13	-1.26	204.71	-8.66	-95.41	31.05	674.06
11	14	1.26	-193.93	8.30	95.41	9.58	280.82
12	14	-6.28	-46.41	1.96	-80.02	-9.58	-273.30
12	15	6.28	66.21	-2.62	80.02	-10.57	-222.25
13	15	-6.28	-66.21	2.62	-80.02	10.57	222.25

PROJECT:

13	6	6.28	69.20	-2.72	80.02	-14.12	-312.25
14	6	4.88	511.01	-12.96	64.42	14.18	461.38
14	16	-4.88	-510.99	12.96	-64.42	-14.05	-456.27
15	16	-0.14	129.86	-2.70	79.82	14.05	463.80
15	17	0.14	-126.89	2.60	-79.82	-10.56	-294.42
16	17	-0.14	126.89	-2.60	79.82	10.56	294.42
16	18	0.14	-107.05	1.94	-79.82	9.46	737.34
17	18	-5.15	-319.22	8.32	95.21	-9.46	-729.82
17	19	5.15	329.96	-8.68	-95.21	-31.10	-818.68
18	19	-5.15	-329.96	8.68	95.21	31.10	818.68
18	9	5.15	332.95	-8.78	-95.21	-42.71	-1259.30
19	9	5.02	350.51	-10.86	-15.40	43.87	1408.01
19	20	-5.02	-347.52	10.76	15.40	-29.49	-944.04
20	20	5.02	347.52	-10.76	-15.40	29.49	944.04
20	21	-5.02	-341.42	10.56	15.40	-0.59	-10.29
21	21	0.00	8.95	-0.30	0.00	0.59	17.82
21	22	0.00	0.00	0.00	0.00	0.00	0.00

Combination No. 165
Group Id: STR GP 5 Name: STRENGTH GROUP V

Memb	Node	Fx	Fy	Fz	Mx	My	Mz
		kip	kip	kip	kft	kft	kft
1	1	-21.56	713.98	8.85	384.66	-0.23	361.79
1	2	19.75	-676.82	-9.34	-197.36	0.23	63.71
2	2	-19.75	676.82	9.34	197.36	-0.23	-63.71
2	3	19.07	-664.89	-9.52	-98.25	0.23	266.97
3	4	-23.34	629.33	5.04	341.46	-0.03	382.24
3	5	21.52	-592.17	-5.53	-232.58	0.03	79.84
4	5	-21.52	592.17	5.53	232.58	-0.03	-79.84
4	6	20.84	-580.24	-5.71	-173.44	0.03	301.76
5	7	-15.15	503.71	8.86	384.86	0.16	288.20
5	8	13.33	-466.54	-9.34	-197.36	-0.16	5.15
6	8	-13.33	466.54	9.34	197.36	0.16	-5.15
6	9	12.65	-454.62	-9.53	-98.15	-0.16	141.06
7	10	0.00	0.00	0.00	0.00	0.00	0.00
7	11	0.00	9.00	-0.03	0.00	-0.05	-18.00
8	11	10.26	-338.02	-4.99	-7.53	0.05	2.60
8	12	-10.26	344.07	4.97	7.53	13.35	-920.24
9	12	10.26	-344.07	-4.97	-7.53	-13.35	920.24
9	3	-10.26	347.06	4.96	7.53	19.95	-1379.62
10	3	-8.80	317.83	4.55	90.72	-20.18	1112.65
10	13	8.80	-314.84	-4.56	-90.72	14.12	-692.13
11	13	-8.80	314.84	4.56	90.72	-14.12	692.13
11	14	8.80	-304.06	-4.60	-90.72	-7.83	790.34
12	14	1.46	-122.40	-0.42	83.19	7.83	-805.74
12	15	-1.46	142.21	0.36	-83.19	-4.39	-358.63
13	15	1.46	-142.21	-0.36	83.19	4.39	358.63
13	6	-1.46	145.20	0.35	-83.19	-3.92	-549.66
14	6	-18.14	435.05	5.36	-75.57	3.89	247.90
14	16	18.14	-435.02	-5.36	75.57	-3.94	-243.55
15	16	-7.88	54.16	0.34	-83.09	3.94	228.15
15	17	7.88	-51.19	-0.35	83.09	-4.40	-158.66
16	17	-7.88	51.19	0.35	-83.09	4.40	158.66
16	18	7.88	-31.34	-0.41	83.09	-7.76	205.31
17	18	2.39	-208.67	-4.61	-90.62	7.76	-220.71
17	19	-2.39	219.41	4.57	90.62	14.14	-800.41
18	19	2.39	-219.41	-4.57	-90.62	-14.14	800.41
18	9	-2.39	222.40	4.56	90.62	20.21	-1094.07
19	9	-10.26	232.22	4.96	7.53	-20.05	953.01
19	20	10.26	-229.23	-4.97	-7.53	13.45	-646.30
20	20	-10.26	229.23	4.97	7.53	-13.45	646.30
20	21	10.26	-223.13	-4.99	-7.53	-0.05	-33.22

21	21	0.00	8.95	-0.03	0.00	0.05	17.82
21	22	0.00	0.00	0.00	0.00	0.00	0.00

Combination No. 207
Group Id: STR GP 5 Name: STRENGTH GROUP V

Memb	Node	Fx kip	Fy kip	Fz kip	Mx kft	My kft	Mz kft
1	1	16.28	787.42	-8.85	-384.66	0.23	-318.60
1	2	-14.47	-750.25	9.34	197.36	-0.23	1.90
2	2	14.47	750.25	-9.34	-197.36	0.23	-1.90
2	3	-13.79	-738.33	9.52	98.25	-0.23	-145.91
3	4	21.08	629.37	-5.04	-341.46	0.03	-373.65
3	5	-19.26	-592.20	5.53	232.58	-0.03	-41.84
4	5	19.26	592.20	-5.53	-232.58	0.03	41.84
4	6	-18.58	-580.28	5.71	173.44	-0.03	-240.01
5	7	22.69	430.24	-8.86	-384.86	-0.16	-392.13
5	8	-20.88	-393.08	9.34	197.36	0.16	-56.61
6	8	20.88	393.08	-9.34	-197.36	-0.16	56.61
6	9	-20.20	-381.15	9.53	98.15	0.16	-271.72
7	10	0.00	0.00	0.00	0.00	0.00	0.00
7	11	0.00	9.00	0.03	0.00	0.05	-18.00
8	11	-10.26	-359.36	4.99	7.53	-0.05	33.40
8	12	10.26	365.42	-4.97	-7.53	-13.35	-1008.46
9	12	-10.26	-365.42	4.97	7.53	13.35	1008.46
9	3	10.26	368.41	-4.96	-7.53	-19.95	-1496.21
10	3	3.52	369.92	-4.55	-90.72	20.18	1642.12
10	13	-3.52	-366.93	4.56	90.72	-14.12	-1152.36
11	13	3.52	366.93	-4.56	-90.72	14.12	1152.36
11	14	-3.52	-356.15	4.60	90.72	7.83	579.65
12	14	-6.74	-70.32	0.42	-83.19	-7.83	-564.25
12	15	6.74	90.12	-0.36	83.19	4.39	-141.70
13	15	-6.74	-90.12	0.36	-83.19	-4.39	141.70
13	6	6.74	93.11	-0.35	83.19	3.92	-263.49
14	6	10.60	487.17	-5.36	75.57	-3.89	503.50
14	16	-10.60	-487.15	5.36	-75.57	3.94	-498.62
15	16	0.33	106.28	-0.34	83.09	-3.94	514.02
15	17	-0.33	-103.31	0.35	-83.09	4.40	-375.76
16	17	0.33	103.31	-0.35	83.09	-4.40	375.76
16	18	-0.33	-83.46	0.41	-83.09	7.76	447.95
17	18	-9.93	-156.55	4.61	90.62	-7.76	-432.56
17	19	9.93	167.29	-4.57	-90.62	-14.14	-339.91
18	19	-9.93	-167.29	4.57	90.62	14.14	339.91
18	9	9.93	170.28	-4.56	-90.62	-20.21	-564.28
19	9	10.26	210.87	-4.96	-7.53	20.05	835.99
19	20	-10.26	-207.88	4.97	7.53	-13.45	-557.66
20	20	10.26	207.88	-4.97	-7.53	13.45	557.66
20	21	-10.26	-201.78	4.99	7.53	0.05	-2.42
21	21	0.00	8.95	0.03	0.00	-0.05	17.82
21	22	0.00	0.00	0.00	0.00	0.00	0.00

Combination No. 273
Group Id: STR GP 5 Name: STRENGTH GROUP V

Memb	Node	Fx kip	Fy kip	Fz kip	Mx kft	My kft	Mz kft
1	1	-9.48	731.98	22.12	756.83	1.03	157.98
1	2	9.96	-694.82	-20.30	-319.90	-1.03	42.28
2	2	-9.96	694.82	20.30	319.90	1.03	-42.28
2	3	10.15	-682.89	-19.62	-110.81	-1.03	148.01
3	4	-9.57	629.34	18.18	711.17	-0.06	159.06
3	5	10.06	-592.18	-16.36	-355.45	0.06	43.07
4	5	-10.06	592.18	16.36	355.45	-0.06	-43.07

PROJECT:

4	6	10.24	-580.25	-15.68	-187.76	0.06	149.75
5	7	-3.06	485.70	22.14	757.24	-1.16	84.40
5	8	3.55	-448.54	-20.32	-319.91	1.16	-16.26
6	8	-3.55	448.54	20.32	319.91	-1.16	16.26
6	9	3.73	-436.61	-19.64	-110.61	1.16	22.11
7	10	0.00	0.00	0.00	0.00	0.00	0.00
7	11	0.00	9.00	0.30	0.00	0.60	-18.00
8	11	5.02	-341.86	-10.56	-15.40	-0.60	10.47
8	12	-5.02	347.91	10.76	15.40	29.29	-938.44
9	12	5.02	-347.91	-10.76	-15.40	-29.29	938.44
9	3	-5.02	350.90	10.86	15.40	43.66	-1402.92
10	3	-5.13	331.99	8.76	95.41	-42.63	1254.91
10	13	5.13	-329.00	-8.66	-95.41	31.05	-815.58
11	13	-5.13	329.00	8.66	95.41	-31.05	815.58
11	14	5.13	-318.22	-8.30	-95.41	-9.58	734.72
12	14	-0.11	-108.25	-1.96	80.02	9.58	-742.24
12	15	0.11	128.05	2.62	-80.02	10.57	-297.53
13	15	-0.11	-128.05	-2.62	80.02	-10.57	297.53
13	6	0.11	131.04	2.72	-80.02	14.12	-469.74
14	6	-11.32	449.21	12.96	-64.42	-14.18	319.99
14	16	11.32	-449.19	-12.96	64.42	14.05	-315.50
15	16	-6.30	68.32	2.70	-79.82	-14.05	307.97
15	17	6.30	-65.35	-2.60	79.82	10.56	-219.80
16	17	-6.30	65.35	2.60	-79.82	-10.56	219.80
16	18	6.30	-45.50	-1.94	79.82	-9.46	269.11
17	18	-1.28	-194.51	-8.32	-95.21	9.46	-276.63
17	19	1.28	205.25	8.68	95.21	31.10	-676.92
18	19	-1.28	-205.25	-8.68	-95.21	-31.10	676.92
18	9	1.28	208.24	8.78	95.21	42.71	-951.75
19	9	-5.02	228.38	10.86	15.40	-43.87	929.63
19	20	5.02	-225.39	-10.76	-15.40	29.49	-628.03
20	20	-5.02	225.39	10.76	15.40	-29.49	628.03
20	21	5.02	-219.29	-10.56	-15.40	0.59	-25.35
21	21	0.00	8.95	0.30	0.00	-0.59	17.82
21	22	0.00	0.00	0.00	0.00	0.00	0.00

Combination No. 274
Group Id: STR GP 5 Name: STRENGTH GROUP V

Memb	Node	Fx kip	Fy kip	Fz kip	Mx kft	My kft	Mz kft
1	1	-10.59	447.73	22.12	756.83	1.03	188.38
1	2	11.08	-410.57	-20.30	-319.90	-1.03	34.80
2	2	-11.08	410.57	20.30	319.90	1.03	-34.80
2	3	11.26	-398.64	-19.62	-110.81	-1.03	152.20
3	4	-7.35	629.28	18.18	711.17	-0.06	151.21
3	5	7.84	-592.12	-16.36	-355.45	0.06	5.23
4	5	-7.84	592.12	16.36	355.45	-0.06	-5.23
4	6	8.02	-580.19	-15.68	-187.76	0.06	88.61
5	7	-4.17	770.01	22.14	757.24	-1.16	114.72
5	8	4.66	-732.85	-20.32	-319.91	1.16	-23.81
6	8	-4.66	732.85	20.32	319.91	-1.16	23.81
6	9	4.84	-720.92	-19.64	-110.61	1.16	26.17
7	10	0.00	0.00	0.00	0.00	0.00	0.00
7	11	0.00	9.00	0.30	0.00	0.60	-18.00
8	11	5.02	-205.67	-10.56	-15.40	-0.60	10.47
8	12	-5.02	211.72	10.76	15.40	29.29	-572.00
9	12	5.02	-211.72	-10.76	-15.40	-29.29	572.00
9	3	-5.02	214.71	10.86	15.40	43.66	-855.44
10	3	-6.24	183.93	8.76	95.41	-42.63	703.23
10	13	6.24	-180.94	-8.66	-95.41	31.05	-460.72
11	13	-6.24	180.94	8.66	95.41	-31.05	460.72
11	14	6.24	-170.16	-8.30	-95.41	-9.58	380.27

12	14	-1.22	-70.18	-1.96	80.02	9.58	-387.79
12	15	1.22	89.98	2.62	-80.02	10.57	-316.98
13	15	-1.22	-89.98	-2.62	80.02	-10.57	316.98
13	6	1.22	92.97	2.72	-80.02	14.12	-438.58
14	6	-10.21	487.22	12.96	-64.42	-14.18	349.97
14	16	10.21	-487.20	-12.96	64.42	14.05	-345.10
15	16	-5.20	106.07	2.70	-79.82	-14.05	337.57
15	17	5.20	-103.10	-2.60	79.82	10.56	-199.59
16	17	-5.20	103.10	2.60	-79.82	-10.56	199.59
16	18	5.20	-83.25	-1.94	79.82	-9.46	622.29
17	18	-0.18	-343.02	-8.32	-95.21	9.46	-629.82
17	19	0.18	353.75	8.68	95.21	31.10	-1032.20
18	19	-0.18	-353.75	-8.68	-95.21	-31.10	1032.20
18	9	0.18	356.74	8.78	95.21	42.71	-1504.44
19	9	-5.02	364.18	10.86	15.40	-43.87	1478.27
19	20	5.02	-361.19	-10.76	-15.40	29.49	-996.14
20	20	-5.02	361.19	10.76	15.40	-29.49	996.14
20	21	5.02	-355.09	-10.56	-15.40	0.59	-25.35
21	21	0.00	8.95	0.30	0.00	-0.59	17.82
21	22	0.00	0.00	0.00	0.00	0.00	0.00

Combination No. 498
Group Id: STR GP 5 Name: STRENGTH GROUP V

Memb	Node	Fx kip	Fy kip	Fz kip	Mx kft	My kft	Mz kft
1	1	-21.65	317.40	3.75	185.15	-0.30	349.53
1	2	19.84	-290.65	-4.24	-102.79	0.30	77.82
2	2	-19.84	290.65	4.24	102.79	-0.30	-77.82
2	3	19.16	-282.06	-4.42	-57.17	0.30	282.02
3	4	-15.74	313.17	1.49	159.56	-0.01	281.65
3	5	13.92	-286.41	-1.98	-123.88	0.01	23.78
4	5	-13.92	286.41	1.98	123.88	-0.01	-23.78
4	6	13.24	-277.83	-2.16	-102.05	0.01	165.85
5	7	-8.92	712.42	3.76	185.25	0.27	203.41
5	8	7.10	-685.66	-4.25	-102.80	-0.27	-38.43
6	8	-7.10	685.66	4.25	102.80	0.27	38.43
6	9	6.42	-677.07	-4.43	-57.12	-0.27	32.05
7	10	0.00	0.00	0.00	0.00	0.00	0.00
7	11	0.00	6.48	-0.03	0.00	-0.05	-12.96
8	11	7.51	-174.58	-2.24	-3.40	0.05	1.69
8	12	-7.51	178.94	2.22	3.40	5.95	-477.30
9	12	7.51	-178.94	-2.22	-3.40	-5.95	477.30
9	3	-7.51	181.10	2.21	3.40	8.90	-716.61
10	3	-11.64	100.96	2.21	53.76	-9.20	434.59
10	13	11.64	-98.81	-2.22	-53.76	6.26	-301.81
11	13	-11.64	98.81	2.22	53.76	-6.26	301.81
11	14	11.64	-91.05	-2.25	-53.76	-4.45	152.95
12	14	-4.13	-46.65	-0.02	50.36	4.45	-164.23
12	15	4.13	60.91	-0.04	-50.36	-4.58	-309.10
13	15	-4.13	-60.91	0.04	50.36	4.58	309.10
13	6	4.13	63.06	-0.05	-50.36	-4.64	-391.50
14	6	-16.12	214.76	2.21	-46.91	4.63	225.65
14	16	16.12	-214.74	-2.21	46.91	-4.65	-223.50
15	16	-8.61	69.29	-0.06	-50.32	4.65	212.23
15	17	8.61	-67.15	0.05	50.32	-4.58	-122.22
16	17	-8.61	67.15	-0.05	-50.32	4.58	122.22
16	18	8.61	-52.86	-0.01	50.32	-4.42	407.08
17	18	-1.09	-308.34	-2.26	-53.72	4.42	-418.35
17	19	1.09	316.07	2.22	53.72	6.27	-1071.08
18	19	-1.09	-316.07	-2.22	-53.72	-6.27	1071.08
18	9	1.09	318.23	2.21	53.72	9.22	-1492.68
19	9	-7.51	358.85	2.21	3.40	-8.94	1460.63

19	20	7.51	-356.70	-2.22	-3.40	6.00	-985.03
20	20	-7.51	356.70	2.22	3.40	-6.00	985.03
20	21	7.51	-352.30	-2.24	-3.40	-0.05	-24.10
21	21	0.00	6.45	-0.03	0.00	0.05	12.83
21	22	0.00	0.00	0.00	0.00	0.00	0.00

Combination No. 501
Group Id: STR GP 5 Name: STRENGTH GROUP V

Memb	Node	Fx kip	Fy kip	Fz kip	Mx kft	My kft	Mz kft
1	1	-21.27	634.12	8.85	384.66	-0.23	358.43
1	2	19.46	-607.37	-9.34	-197.36	0.23	61.06
2	2	-19.46	607.37	9.34	197.36	-0.23	-61.06
2	3	18.78	-598.78	-9.52	-98.25	0.23	261.26
3	4	-23.34	547.94	5.04	341.46	-0.03	382.20
3	5	21.52	-521.18	-5.53	-232.58	0.03	79.84
4	5	-21.52	521.18	5.53	232.58	-0.03	-79.84
4	6	20.84	-512.60	-5.71	-173.44	0.03	301.73
5	7	-15.44	423.74	8.86	384.86	0.16	291.56
5	8	13.63	-396.99	-9.34	-197.36	-0.16	7.85
6	8	-13.63	396.99	9.34	197.36	0.16	-7.85
6	9	12.95	-388.40	-9.53	-98.15	-0.16	146.85
7	10	0.00	0.00	0.00	0.00	0.00	0.00
7	11	0.00	6.48	-0.03	0.00	-0.05	-12.96
8	11	10.26	-307.50	-4.99	-7.53	0.05	-2.44
8	12	-10.26	311.86	4.97	7.53	13.35	-830.80
9	12	10.26	-311.86	-4.97	-7.53	-13.35	830.80
9	3	-10.26	314.01	4.96	7.53	19.95	-1246.80
10	3	-8.51	284.77	4.55	90.72	-20.18	985.54
10	13	8.51	-282.61	-4.56	-90.72	14.12	-608.42
11	13	-8.51	282.61	4.56	90.72	-14.12	608.42
11	14	8.51	-274.85	-4.60	-90.72	-7.83	726.90
12	14	1.75	-113.81	-0.42	83.19	7.83	-742.29
12	15	-1.75	128.07	0.36	-83.19	-4.39	-322.06
13	15	1.75	-128.07	-0.36	83.19	4.39	322.06
13	6	-1.75	130.22	0.35	-83.19	-3.92	-493.74
14	6	-17.85	382.37	5.36	-75.57	3.89	192.01
14	16	17.85	-382.36	-5.36	75.57	-3.94	-188.19
15	16	-7.58	39.29	0.34	-83.09	3.94	172.79
15	17	7.58	-37.15	-0.35	83.09	-4.40	-122.37
16	17	-7.58	37.15	0.35	-83.09	4.40	122.37
16	18	7.58	-22.86	-0.41	83.09	-7.76	142.32
17	18	2.68	-179.35	-4.61	-90.62	7.76	-157.71
17	19	-2.68	187.08	4.57	90.62	14.14	-716.35
18	19	2.68	-187.08	-4.57	-90.62	-14.14	716.35
18	9	-2.68	189.23	4.56	90.62	20.21	-966.48
19	9	-10.26	199.16	4.96	7.53	-20.05	819.63
19	20	10.26	-197.01	-4.97	-7.53	13.45	-556.30
20	20	-10.26	197.01	4.97	7.53	-13.45	556.30
20	21	10.26	-192.62	-4.99	-7.53	-0.05	-28.23
21	21	0.00	6.45	-0.03	0.00	0.05	12.83
21	22	0.00	0.00	0.00	0.00	0.00	0.00

Combination No. 540
Group Id: STR GP 5 Name: STRENGTH GROUP V

Memb	Node	Fx kip	Fy kip	Fz kip	Mx kft	My kft	Mz kft
1	1	7.61	370.82	-3.75	-185.15	0.30	-167.09
1	2	-5.80	-344.06	4.24	102.79	-0.30	29.00
2	2	5.80	344.06	-4.24	-102.79	0.30	-29.00
2	3	-5.12	-335.48	4.42	57.17	-0.30	-27.77

PROJECT:

3	4	18.35	313.19	-1.49	-159.56	0.01	-290.35
3	5	-16.53	-286.44	1.98	123.88	-0.01	-68.95
4	5	16.53	286.44	-1.98	-123.88	0.01	68.95
4	6	-15.85	-277.85	2.16	102.05	-0.01	-238.47
5	7	20.34	658.98	-3.76	-185.25	-0.27	-313.16
5	8	-18.53	-632.22	4.25	102.80	0.27	-87.22
6	8	18.53	632.22	-4.25	-102.80	-0.27	87.22
6	9	-17.85	-623.63	4.43	57.12	0.27	-277.67
7	10	0.00	0.00	0.00	0.00	0.00	0.00
7	11	0.00	6.48	0.03	0.00	0.05	-12.96
8	11	-7.51	-189.38	2.24	3.40	-0.05	24.23
8	12	7.51	193.73	-2.22	-3.40	-5.95	-539.64
9	12	-7.51	-193.73	2.22	3.40	5.95	539.64
9	3	7.51	195.89	-2.21	-3.40	-8.90	-798.61
10	3	-2.40	139.59	-2.21	-53.76	9.20	826.38
10	13	2.40	-137.43	2.22	53.76	-6.26	-642.25
11	13	-2.40	137.43	-2.22	-53.76	6.26	642.25
11	14	2.40	-129.67	2.25	53.76	4.45	-2.44
12	14	-9.91	-8.03	0.02	-50.36	-4.45	13.72
12	15	9.91	22.28	0.04	50.36	4.58	-147.09
13	15	-9.91	-22.28	-0.04	-50.36	-4.58	147.09
13	6	9.91	24.44	0.05	50.36	4.64	-178.14
14	6	4.70	253.41	-2.21	46.91	-4.63	416.62
14	16	-4.70	-253.40	2.21	-46.91	4.65	-414.08
15	16	-2.82	107.94	0.06	50.32	-4.65	425.36
15	17	2.82	-105.80	-0.05	-50.32	4.58	-284.36
16	17	-2.82	105.80	0.05	50.32	-4.58	284.36
16	18	2.82	-91.51	0.01	-50.32	4.42	585.87
17	18	-10.33	-269.69	2.26	53.72	-4.42	-574.60
17	19	10.33	277.42	-2.22	-53.72	-6.27	-730.45
18	19	-10.33	-277.42	2.22	53.72	6.27	730.45
18	9	10.33	279.57	-2.21	-53.72	-9.22	-1100.66
19	9	7.51	344.06	-2.21	-3.40	8.94	1378.34
19	20	-7.51	-341.91	2.22	3.40	-6.00	-922.40
20	20	7.51	341.91	-2.22	-3.40	6.00	922.40
20	21	-7.51	-337.51	2.24	3.40	0.05	-1.56
21	21	0.00	6.45	0.03	0.00	-0.05	12.83
21	22	0.00	0.00	0.00	0.00	0.00	0.00

Combination No. 543
Group Id: STR GP 5 Name: STRENGTH GROUP V

Memb	Node	Fx kip	Fy kip	Fz kip	Mx kft	My kft	Mz kft
1	1	16.57	707.55	-8.85	-384.66	0.23	-321.96
1	2	-14.76	-680.80	9.34	197.36	-0.23	-0.75
2	2	14.76	680.80	-9.34	-197.36	0.23	0.75
2	3	-14.08	-672.21	9.52	98.25	-0.23	-151.63
3	4	21.08	547.97	-5.04	-341.46	0.03	-373.69
3	5	-19.26	-521.22	5.53	232.58	-0.03	-41.85
4	5	19.26	521.22	-5.53	-232.58	0.03	41.85
4	6	-18.58	-512.63	5.71	173.44	-0.03	-240.04
5	7	22.40	350.28	-8.86	-384.86	-0.16	-388.77
5	8	-20.58	-323.52	9.34	197.36	0.16	-53.91
6	8	20.58	323.52	-9.34	-197.36	-0.16	53.91
6	9	-19.90	-314.93	9.53	98.15	0.16	-265.93
7	10	0.00	0.00	0.00	0.00	0.00	0.00
7	11	0.00	6.48	0.03	0.00	0.05	-12.96
8	11	-10.26	-328.84	4.99	7.53	-0.05	28.36
8	12	10.26	333.20	-4.97	-7.53	-13.35	-919.02
9	12	-10.26	-333.20	4.97	7.53	13.35	919.02
9	3	10.26	335.35	-4.96	-7.53	-19.95	-1363.39
10	3	3.81	336.86	-4.55	-90.72	20.18	1515.02

10	13	-3.81	-334.70	4.56	90.72	-14.12	-1068.65
11	13	3.81	334.70	-4.56	-90.72	14.12	1068.65
11	14	-3.81	-326.94	4.60	90.72	7.83	516.20
12	14	-6.45	-61.72	0.42	-83.19	-7.83	-500.81
12	15	6.45	75.98	-0.36	83.19	4.39	-105.14
13	15	-6.45	-75.98	0.36	-83.19	-4.39	105.14
13	6	6.45	78.13	-0.35	83.19	3.92	-207.57
14	6	10.89	434.50	-5.36	75.57	-3.89	447.61
14	16	-10.89	-434.48	5.36	-75.57	3.94	-443.26
15	16	0.63	91.41	-0.34	83.09	-3.94	458.66
15	17	-0.63	-89.27	0.35	-83.09	4.40	-339.47
16	17	0.63	89.27	-0.35	83.09	-4.40	339.47
16	18	-0.63	-74.98	0.41	-83.09	7.76	384.96
17	18	-9.64	-127.23	4.61	90.62	-7.76	-369.56
17	19	9.64	134.96	-4.57	-90.62	-14.14	-255.85
18	19	-9.64	-134.96	4.57	90.62	14.14	255.85
18	9	9.64	137.11	-4.56	-90.62	-20.21	-436.68
19	9	10.26	177.82	-4.96	-7.53	20.05	702.61
19	20	-10.26	-175.67	4.97	7.53	-13.45	-467.66
20	20	10.26	175.67	-4.97	-7.53	13.45	467.66
20	21	-10.26	-171.28	4.99	7.53	0.05	2.57
21	21	0.00	6.45	0.03	0.00	-0.05	12.83
21	22	0.00	0.00	0.00	0.00	0.00	0.00

Combination No. 651
Group Id: STR GP 5 Name: STRENGTH GROUP V

Memb	Node	Fx kip	Fy kip	Fz kip	Mx kft	My kft	Mz kft
1	1	6.92	604.55	-22.12	-756.83	-1.03	-146.07
1	2	-7.41	-577.80	20.30	319.90	1.03	-1.49
2	2	7.41	577.80	-20.30	-319.90	-1.03	1.49
2	3	-7.59	-569.21	19.62	110.81	1.03	-80.35
3	4	7.32	531.94	-18.18	-711.17	0.06	-150.61
3	5	-7.80	-505.18	16.36	355.45	-0.06	-5.11
4	5	7.80	505.18	-16.36	-355.45	0.06	5.11
4	6	-7.98	-496.60	15.68	187.76	-0.06	-88.13
5	7	7.88	283.16	-22.14	-757.24	1.16	-157.03
5	8	-8.36	-256.41	20.32	319.91	-1.16	-10.21
6	8	8.36	256.41	-20.32	-319.91	1.16	10.21
6	9	-8.54	-247.82	19.64	110.61	-1.16	-99.11
7	10	0.00	0.00	0.00	0.00	0.00	0.00
7	11	0.00	6.48	-0.30	0.00	-0.60	-12.96
8	11	-5.02	-266.35	10.56	15.40	0.60	20.49
8	12	5.02	270.71	-10.76	-15.40	-29.29	-743.02
9	12	-5.02	-270.71	10.76	15.40	29.29	743.02
9	3	5.02	272.87	-10.86	-15.40	-43.66	-1104.31
10	3	2.57	296.34	-8.76	-95.41	42.63	1184.66
10	13	-2.57	-294.19	8.66	95.41	-31.05	-792.16
11	13	2.57	294.19	-8.66	-95.41	31.05	792.16
11	14	-2.57	-286.43	8.30	95.41	9.58	598.61
12	14	-2.45	-79.29	1.96	-80.02	-9.58	-591.08
12	15	2.45	93.54	-2.62	80.02	-10.57	-169.43
13	15	-2.45	-93.54	2.62	-80.02	10.57	169.43
13	6	2.45	95.70	-2.72	80.02	-14.12	-295.21
14	6	6.51	400.90	-12.96	64.42	14.18	383.35
14	16	-6.51	-400.88	12.96	-64.42	-14.05	-379.34
15	16	1.49	80.76	-2.70	79.82	14.05	386.86
15	17	-1.49	-78.63	2.60	-79.82	-10.56	-281.72
16	17	1.49	78.63	-2.60	79.82	10.56	281.72
16	18	-1.49	-64.34	1.94	-79.82	9.46	348.80
17	18	-3.53	-114.93	8.32	95.21	-9.46	-341.27
17	19	3.53	122.66	-8.68	-95.21	-31.10	-225.45

18	19	-3.53	-122.66	8.68	95.21	31.10	225.45
18	9	3.53	124.81	-8.78	-95.21	-42.71	-389.93
19	9	5.02	123.01	-10.86	-15.40	43.87	489.04
19	20	-5.02	-120.86	10.76	15.40	-29.49	-326.95
20	20	5.02	120.86	-10.76	-15.40	29.49	326.95
20	21	-5.02	-116.46	10.56	15.40	-0.59	-5.30
21	21	0.00	6.45	-0.30	0.00	0.59	12.83
21	22	0.00	0.00	0.00	0.00	0.00	0.00

Combination No. 669
Group Id: STR GP 5 Name: STRENGTH GROUP V

Memb	Node	Fx kip	Fy kip	Fz kip	Mx kft	My kft	Mz kft
1	1	-18.84	549.12	8.85	384.66	-0.23	330.51
1	2	17.02	-522.36	-9.34	-197.36	0.23	38.90
2	2	-17.02	522.36	9.34	197.36	-0.23	-38.90
2	3	16.34	-513.77	-9.52	-98.25	0.23	213.57
3	4	-23.33	531.91	5.04	341.46	-0.03	382.10
3	5	21.51	-505.16	-5.53	-232.58	0.03	79.80
4	5	-21.51	505.16	5.53	232.58	-0.03	-79.80
4	6	20.83	-496.57	-5.71	-173.44	0.03	301.62
5	7	-17.88	338.63	8.86	384.86	0.16	319.49
5	8	16.06	-311.87	-9.34	-197.36	-0.16	30.13
6	8	-16.06	311.87	9.34	197.36	0.16	-30.13
6	9	15.38	-303.28	-9.53	-98.15	-0.16	194.72
7	10	0.00	0.00	0.00	0.00	0.00	0.00
7	11	0.00	6.48	-0.03	0.00	-0.05	-12.96
8	11	10.26	-248.85	-4.99	-7.53	0.05	-2.44
8	12	-10.26	253.21	4.97	7.53	13.35	-673.00
9	12	10.26	-253.21	-4.97	-7.53	-13.35	673.00
9	3	-10.26	255.36	4.96	7.53	19.95	-1011.03
10	3	-6.08	258.41	4.55	90.72	-20.18	797.46
10	13	6.08	-256.26	-4.56	-90.72	14.12	-455.37
11	13	-6.08	256.26	4.56	90.72	-14.12	455.37
11	14	6.08	-248.50	-4.60	-90.72	-7.83	753.68
12	14	4.18	-117.22	-0.42	83.19	7.83	-769.08
12	15	-4.18	131.48	0.36	-83.19	-4.39	-325.26
13	15	4.18	-131.48	-0.36	83.19	4.39	325.26
13	6	-4.18	133.63	0.35	-83.19	-3.92	-501.47
14	6	-15.41	362.94	5.36	-75.57	3.89	199.84
14	16	15.41	-362.92	-5.36	75.57	-3.94	-196.21
15	16	-5.14	42.81	0.34	-83.09	3.94	180.82
15	17	5.14	-40.67	-0.35	83.09	-4.40	-125.75
16	17	-5.14	40.67	0.35	-83.09	4.40	125.75
16	18	5.14	-26.38	-0.41	83.09	-7.76	169.95
17	18	5.12	-152.89	-4.61	-90.62	7.76	-185.34
17	19	-5.12	160.61	4.57	90.62	14.14	-562.46
18	19	5.12	-160.61	-4.57	-90.62	-14.14	562.46
18	9	-5.12	162.77	4.56	90.62	20.21	-777.40
19	9	-10.26	140.51	4.96	7.53	-20.05	582.68
19	20	10.26	-138.36	-4.97	-7.53	13.45	-397.32
20	20	-10.26	138.36	4.97	7.53	-13.45	397.32
20	21	10.26	-133.97	-4.99	-7.53	-0.05	-28.23
21	21	0.00	6.45	-0.03	0.00	0.05	12.83
21	22	0.00	0.00	0.00	0.00	0.00	0.00

Combination No. 777
Group Id: STR GP 5 Name: STRENGTH GROUP V

Memb	Node	Fx kip	Fy kip	Fz kip	Mx kft	My kft	Mz kft
1	1	-6.76	567.11	22.12	756.83	1.03	126.70

PROJECT:

1	2	7.24	-540.36	-20.30	-319.90	-1.03	17.47
2	2	-7.24	540.36	20.30	319.90	1.03	-17.47
2	3	7.42	-531.77	-19.62	-110.81	-1.03	94.60
3	4	-9.56	531.92	18.18	711.17	-0.06	158.91
3	5	10.05	-505.16	-16.36	-355.45	0.06	43.03
4	5	-10.05	505.16	16.36	355.45	-0.06	-43.03
4	6	10.23	-496.58	-15.68	-187.76	0.06	149.61
5	7	-5.80	320.62	22.14	757.24	-1.16	115.69
5	8	6.28	-293.87	-20.32	-319.91	1.16	8.71
6	8	-6.28	293.87	20.32	319.91	-1.16	-8.71
6	9	6.46	-285.28	-19.64	-110.61	1.16	75.78
7	10	0.00	0.00	0.00	0.00	0.00	0.00
7	11	0.00	6.48	0.30	0.00	0.60	-12.96
8	11	5.02	-252.69	-10.56	-15.40	-0.60	5.43
8	12	-5.02	257.05	10.76	15.40	29.29	-691.19
9	12	5.02	-257.05	-10.76	-15.40	-29.29	691.19
9	3	-5.02	259.20	10.86	15.40	43.66	-1034.33
10	3	-2.41	272.57	8.76	95.41	-42.63	939.72
10	13	2.41	-270.41	-8.66	-95.41	31.05	-578.82
11	13	-2.41	270.41	8.66	95.41	-31.05	578.82
11	14	2.41	-262.65	-8.30	-95.41	-9.58	698.05
12	14	2.61	-103.06	-1.96	80.02	9.58	-705.58
12	15	-2.61	117.32	2.62	-80.02	10.57	-264.16
13	15	2.61	-117.32	-2.62	80.02	-10.57	264.16
13	6	-2.61	119.47	2.72	-80.02	14.12	-421.55
14	6	-8.59	377.10	12.96	-64.42	-14.18	271.94
14	16	8.59	-377.09	-12.96	64.42	14.05	-268.16
15	16	-3.57	56.97	2.70	-79.82	-14.05	260.64
15	17	3.57	-54.83	-2.60	79.82	10.56	-186.89
16	17	-3.57	54.83	2.60	-79.82	-10.56	186.89
16	18	3.57	-40.54	-1.94	79.82	-9.46	233.74
17	18	1.45	-138.72	-8.32	-95.21	9.46	-241.27
17	19	-1.45	146.45	8.68	95.21	31.10	-438.97
18	19	1.45	-146.45	-8.68	-95.21	-31.10	438.97
18	9	-1.45	148.60	8.78	95.21	42.71	-635.08
19	9	-5.02	136.68	10.86	15.40	-43.87	559.30
19	20	5.02	-134.52	-10.76	-15.40	29.49	-379.05
20	20	-5.02	134.52	10.76	15.40	-29.49	379.05
20	21	5.02	-130.13	-10.56	-15.40	0.59	-20.36
21	21	0.00	6.45	0.30	0.00	-0.59	12.83
21	22	0.00	0.00	0.00	0.00	0.00	0.00

Combination No. 778
Group Id: STR GP 5 Name: STRENGTH GROUP V

Memb	Node	Fx kip	Fy kip	Fz kip	Mx kft	My kft	Mz kft
1	1	-7.87	282.86	22.12	756.83	1.03	157.10
1	2	8.35	-256.11	-20.30	-319.90	-1.03	9.99
2	2	-8.35	256.11	20.30	319.90	1.03	-9.99
2	3	8.54	-247.52	-19.62	-110.81	-1.03	98.80
3	4	-7.34	531.86	18.18	711.17	-0.06	151.06
3	5	7.83	-505.11	-16.36	-355.45	0.06	5.19
4	5	-7.83	505.11	16.36	355.45	-0.06	-5.19
4	6	8.01	-496.52	-15.68	-187.76	0.06	88.48
5	7	-6.90	604.93	22.14	757.24	-1.16	146.02
5	8	7.39	-578.17	-20.32	-319.91	1.16	1.17
6	8	-7.39	578.17	20.32	319.91	-1.16	-1.17
6	9	7.57	-569.59	-19.64	-110.61	1.16	79.83
7	10	0.00	0.00	0.00	0.00	0.00	0.00
7	11	0.00	6.48	0.30	0.00	0.60	-12.96
8	11	5.02	-116.50	-10.56	-15.40	-0.60	5.43
8	12	-5.02	120.86	10.76	15.40	29.29	-324.75

PROJECT:

9	12	5.02	-120.86	-10.76	-15.40	-29.29	324.75
9	3	-5.02	123.01	10.86	15.40	43.66	-486.84
10	3	-3.52	124.51	8.76	95.41	-42.63	388.04
10	13	3.52	-122.35	-8.66	-95.41	31.05	-223.96
11	13	-3.52	122.35	8.66	95.41	-31.05	223.96
11	14	3.52	-114.59	-8.30	-95.41	-9.58	343.61
12	14	1.50	-65.00	-1.96	80.02	9.58	-351.13
12	15	-1.50	79.25	2.62	-80.02	10.57	-283.61
13	15	1.50	-79.25	-2.62	80.02	-10.57	283.61
13	6	-1.50	81.41	2.72	-80.02	14.12	-390.39
14	6	-7.48	415.11	12.96	-64.42	-14.18	301.92
14	16	7.48	-415.10	-12.96	64.42	14.05	-297.77
15	16	-2.46	94.72	2.70	-79.82	-14.05	290.24
15	17	2.46	-92.58	-2.60	79.82	10.56	-166.68
16	17	-2.46	92.58	2.60	-79.82	-10.56	166.68
16	18	2.46	-78.29	-1.94	79.82	-9.46	586.93
17	18	2.55	-287.23	-8.32	-95.21	9.46	-594.45
17	19	-2.55	294.96	8.68	95.21	31.10	-794.25
18	19	2.55	-294.96	-8.68	-95.21	-31.10	794.25
18	9	-2.55	297.11	8.78	95.21	42.71	-1187.78
19	9	-5.02	272.48	10.86	15.40	-43.87	1107.94
19	20	5.02	-270.32	-10.76	-15.40	29.49	-747.16
20	20	-5.02	270.32	10.76	15.40	-29.49	747.16
20	21	5.02	-265.93	-10.56	-15.40	0.59	-20.36
21	21	0.00	6.45	0.30	0.00	-0.59	12.83
21	22	0.00	0.00	0.00	0.00	0.00	0.00

Combination No. 785
Group Id: SER GP 1 Name: SERVICE GROUP I

Memb	Node	Fx kip	Fy kip	Fz kip	Mx kft	My kft	Mz kft
1	1	-10.49	563.23	-1.58	-51.51	-0.21	144.20
1	2	9.05	-533.50	1.58	18.90	0.21	57.05
2	2	-9.05	533.50	-1.58	-18.90	-0.21	-57.05
2	3	8.51	-523.96	1.58	2.27	0.21	148.82
3	4	-8.18	307.45	-1.56	-51.10	0.01	117.76
3	5	6.74	-277.72	1.56	18.95	-0.01	35.96
4	5	-6.74	277.72	-1.56	-18.95	0.01	-35.96
4	6	6.20	-268.18	1.56	2.57	-0.01	103.50
5	7	-1.14	329.52	-1.59	-51.55	0.22	36.95
5	8	-0.30	-299.79	1.59	18.90	-0.22	-28.28
6	8	0.30	299.79	-1.59	-18.90	0.22	28.28
6	9	-0.84	-290.25	1.59	2.25	-0.22	-34.67
7	10	0.00	0.00	0.00	0.00	0.00	0.00
7	11	0.00	7.20	0.00	0.00	0.00	-14.40
8	11	2.73	-275.12	0.95	1.42	0.00	10.31
8	12	-2.73	279.96	-0.95	-1.42	-2.54	-757.07
9	12	2.73	-279.96	0.95	1.42	2.54	757.07
9	3	-2.73	282.35	-0.95	-1.42	-3.80	-1130.82
10	3	-5.78	241.60	-0.64	-0.85	3.59	982.00
10	13	5.78	-239.21	0.64	0.85	-2.75	-662.41
11	13	-5.78	239.21	-0.64	-0.85	2.75	662.41
11	14	5.78	-230.59	0.64	0.85	0.31	462.92
12	14	-3.06	-69.86	0.31	0.56	-0.31	-467.01
12	15	3.06	85.70	-0.31	-0.56	-2.41	-217.48
13	15	-3.06	-85.70	0.31	0.56	2.41	217.48
13	6	3.06	88.09	-0.31	-0.56	-2.82	-332.99
14	6	-9.02	180.09	-1.25	-2.00	2.82	229.49
14	16	9.02	-180.07	1.25	2.00	-2.81	-227.68
15	16	-6.29	39.56	-0.31	-0.58	2.81	223.60
15	17	6.29	-37.18	0.31	0.58	-2.40	-172.97
16	17	-6.29	37.18	-0.31	-0.58	2.40	172.97

16	18	6.29	-21.31	0.31	0.58	0.30	85.00
17	18	-3.57	-113.69	0.64	0.84	-0.30	-89.09
17	19	3.57	122.28	-0.64	-0.84	-2.75	-473.78
18	19	-3.57	-122.28	0.64	0.84	2.75	473.78
18	9	3.57	124.67	-0.64	-0.84	-3.60	-637.93
19	9	-2.73	165.58	-0.95	-1.42	3.82	672.59
19	20	2.73	-163.19	0.95	1.42	-2.56	-454.07
20	20	-2.73	163.19	-0.95	-1.42	2.56	454.07
20	21	2.73	-158.31	0.95	1.42	0.00	-18.35
21	21	0.00	7.16	0.00	0.00	0.00	14.26
21	22	0.00	0.00	0.00	0.00	0.00	0.00

Combination No. 879
Group Id: SER GP 1 Name: SERVICE GROUP I

Memb	Node	Fx kip	Fy kip	Fz kip	Mx kft	My kft	Mz kft
1	1	13.07	590.63	-6.13	-271.58	0.22	-252.84
1	2	-11.68	-560.90	6.51	141.37	-0.22	-2.14
2	2	11.68	560.90	-6.51	-141.37	0.22	2.14
2	3	-11.16	-551.36	6.65	72.20	-0.22	-121.66
3	4	16.51	481.33	-3.32	-239.68	0.02	-292.29
3	5	-15.12	-451.60	3.69	167.44	-0.02	-33.47
4	5	15.12	451.60	-3.69	-167.44	0.02	33.47
4	6	-14.60	-442.06	3.83	127.82	-0.02	-189.08
5	7	17.31	322.92	-6.14	-271.72	-0.18	-301.43
5	8	-15.92	-293.19	6.51	141.37	0.18	-40.79
6	8	15.92	293.19	-6.51	-141.37	-0.18	40.79
6	9	-15.39	-283.65	6.65	72.13	0.18	-204.79
7	10	0.00	0.00	0.00	0.00	0.00	0.00
7	11	0.00	7.20	0.02	0.00	0.04	-14.40
8	11	-8.04	-265.47	3.46	5.22	-0.04	26.46
8	12	8.04	270.31	-3.44	-5.22	-9.24	-747.25
9	12	-8.04	-270.31	3.44	5.22	9.24	747.25
9	3	8.04	272.70	-3.44	-5.22	-13.81	-1108.18
10	3	3.12	278.66	-3.21	-66.98	14.03	1229.84
10	13	-3.12	-276.27	3.22	66.98	-9.76	-860.99
11	13	3.12	276.27	-3.22	-66.98	9.76	860.99
11	14	-3.12	-267.64	3.24	66.98	5.72	441.85
12	14	-4.92	-53.26	0.23	-61.77	-5.72	-429.79
12	15	4.92	69.10	-0.19	61.77	3.86	-108.61
13	15	-4.92	-69.10	0.19	-61.77	-3.86	108.61
13	6	4.92	71.49	-0.18	61.77	3.62	-202.05
14	6	8.72	370.57	-3.65	56.48	-3.60	391.13
14	16	-8.72	-370.55	3.65	-56.48	3.63	-387.42
15	16	0.68	83.42	-0.17	61.70	-3.63	399.48
15	17	-0.68	-81.05	0.18	-61.70	3.87	-290.99
16	17	0.68	81.05	-0.18	61.70	-3.87	290.99
16	18	-0.68	-65.17	0.23	-61.70	5.67	353.89
17	18	-7.36	-117.62	3.25	66.92	-5.67	-341.83
17	19	7.36	126.21	-3.23	-66.92	-9.78	-239.77
18	19	-7.36	-126.21	3.23	66.92	9.78	239.77
18	9	7.36	128.60	-3.22	-66.92	-14.06	-409.13
19	9	8.04	155.05	-3.44	-5.22	13.88	613.92
19	20	-8.04	-152.66	3.44	5.22	-9.31	-409.39
20	20	8.04	152.66	-3.44	-5.22	9.31	409.39
20	21	-8.04	-147.78	3.46	5.22	0.04	-2.20
21	21	0.00	7.16	0.02	0.00	-0.04	14.26
21	22	0.00	0.00	0.00	0.00	0.00	0.00

Combination No. 953
Group Id: SER GP 2 Name: SERVICE GROUP II

Memb	Node	Fx	Fy	Fz	Mx	My	Mz

PROJECT:

		kip	kip	kip	kft	kft	kft
1	1	-4.32	645.81	0.00	-0.00	0.00	39.39
1	2	4.32	-616.08	0.00	-0.00	0.00	49.50
2	2	-4.32	616.08	0.00	-0.00	0.00	-49.50
2	3	4.32	-606.54	0.00	-0.00	0.00	94.81
3	4	-1.30	324.27	0.00	-0.00	0.00	4.84
3	5	1.30	-294.54	0.00	-0.00	0.00	21.97
4	5	-1.30	294.54	0.00	-0.00	0.00	-21.97
4	6	1.30	-285.00	0.00	-0.00	0.00	35.64
5	7	5.62	317.73	0.00	-0.00	0.00	-74.55
5	8	-5.62	-288.00	0.00	-0.00	0.00	-41.15
6	8	5.62	288.00	0.00	-0.00	0.00	41.15
6	9	-5.62	-278.46	0.00	-0.00	0.00	-100.13
7	10	0.00	0.00	0.00	0.00	0.00	0.00
7	11	0.00	7.20	0.00	0.00	0.00	-14.40
8	11	0.00	-313.58	0.00	0.00	0.00	14.40
8	12	0.00	318.42	0.00	0.00	0.00	-864.64
9	12	0.00	-318.42	0.00	0.00	0.00	864.64
9	3	0.00	320.81	0.00	0.00	0.00	-1289.52
10	3	-4.32	285.73	0.00	0.00	0.00	1194.70
10	13	4.32	-283.33	0.00	0.00	0.00	-816.47
11	13	-4.32	283.33	0.00	0.00	0.00	816.47
11	14	4.32	-274.71	0.00	0.00	0.00	520.23
12	14	-4.32	-75.37	0.00	0.00	0.00	-520.23
12	15	4.32	91.21	0.00	0.00	0.00	-212.78
13	15	-4.32	-91.21	0.00	0.00	0.00	212.78
13	6	4.32	93.60	0.00	0.00	0.00	-335.62
14	6	-5.62	191.40	0.00	0.00	0.00	299.98
14	16	5.62	-191.38	0.00	0.00	0.00	-298.06
15	16	-5.62	49.21	0.00	0.00	0.00	298.06
15	17	5.62	-46.84	0.00	0.00	0.00	-234.70
16	17	-5.62	46.84	0.00	0.00	0.00	234.70
16	18	5.62	-30.96	0.00	0.00	0.00	108.41
17	18	-5.62	-104.04	0.00	0.00	0.00	-108.41
17	19	5.62	112.63	0.00	0.00	0.00	-408.41
18	19	-5.62	-112.63	0.00	0.00	0.00	408.41
18	9	5.62	115.02	0.00	0.00	0.00	-559.72
19	9	0.00	163.44	0.00	0.00	0.00	659.85
19	20	0.00	-161.04	0.00	0.00	0.00	-444.18
20	20	0.00	161.04	0.00	0.00	0.00	444.18
20	21	0.00	-156.16	0.00	0.00	0.00	-14.26
21	21	0.00	7.16	0.00	0.00	0.00	14.26
21	22	0.00	0.00	0.00	0.00	0.00	0.00

Combination No. 956
Group Id: SER GP 2 Name: SERVICE GROUP II

Memb	Node	Fx	Fy	Fz	Mx	My	Mz
		kip	kip	kip	kft	kft	kft
1	1	0.40	598.29	-7.36	-288.17	-0.11	-51.65
1	2	-0.40	-568.56	7.36	136.60	0.11	43.48
2	2	0.40	568.56	-7.36	-136.60	-0.11	-43.48
2	3	-0.40	-559.02	7.36	59.34	0.11	39.32
3	4	7.44	372.81	-5.13	-262.74	0.02	-132.46
3	5	-7.44	-343.08	5.13	157.01	-0.02	-20.78
4	5	7.44	343.08	-5.13	-157.01	0.02	20.78
4	6	-7.44	-333.54	5.13	103.12	-0.02	-98.88
5	7	12.02	569.79	-7.37	-288.33	0.16	-185.01
5	8	-12.02	-540.06	7.37	136.60	-0.16	-62.61
6	8	12.02	540.06	-7.37	-136.60	0.16	62.61
6	9	-12.02	-530.52	7.37	59.26	-0.16	-188.83
7	10	0.00	0.00	0.00	0.00	0.00	0.00

PROJECT:

7	11	0.00	7.20	0.00	0.00	0.00	-14.40
8	11	-3.97	-292.08	3.97	5.96	0.00	20.36
8	12	3.97	296.92	-3.97	-5.96	-10.68	-812.76
9	12	-3.97	-296.92	3.97	5.96	10.68	812.76
9	3	3.97	299.31	-3.97	-5.96	-15.96	-1209.06
10	3	-3.57	259.70	-3.39	-53.38	15.85	1169.73
10	13	3.57	-257.31	3.39	53.38	-11.35	-826.09
11	13	-3.57	257.31	-3.39	-53.38	11.35	826.09
11	14	3.57	-248.69	3.39	53.38	4.87	385.95
12	14	-7.55	-65.54	0.58	-47.42	-4.87	-379.99
12	15	7.55	81.39	-0.58	47.42	-0.27	-266.54
13	15	-7.55	-81.39	0.58	-47.42	0.27	266.54
13	6	7.55	83.78	-0.58	47.42	-1.05	-376.32
14	6	-0.11	249.76	-4.55	41.39	1.07	475.21
14	16	0.11	-249.74	4.55	-41.39	-1.02	-472.71
15	16	-4.08	102.54	-0.58	47.35	1.02	478.67
15	17	4.08	-100.17	0.58	-47.35	-0.26	-344.94
16	17	-4.08	100.17	-0.58	47.35	0.26	344.94
16	18	4.08	-84.29	0.58	-47.35	4.82	468.58
17	18	-8.05	-230.07	3.39	53.30	-4.82	-462.63
17	19	8.05	238.65	-3.39	-53.30	-11.37	-655.42
18	19	-8.05	-238.65	3.39	53.30	11.37	655.42
18	9	8.05	241.05	-3.39	-53.30	-15.88	-974.27
19	9	3.97	289.48	-3.97	-5.96	16.04	1163.09
19	20	-3.97	-287.08	3.97	5.96	-10.76	-779.87
20	20	3.97	287.08	-3.97	-5.96	10.76	779.87
20	21	-3.97	-282.20	3.97	5.96	0.00	-8.30
21	21	0.00	7.16	0.00	0.00	0.00	14.26
21	22	0.00	0.00	0.00	0.00	0.00	0.00

Combination No. 957
Group Id: SER GP 2 Name: SERVICE GROUP II

Memb	Node	Fx kip	Fy kip	Fz kip	Mx kft	My kft	Mz kft
1	1	9.23	656.06	-12.26	-480.28	-0.18	-192.89
1	2	-9.23	-626.33	12.26	227.66	0.18	2.82
2	2	9.23	626.33	-12.26	-227.66	-0.18	-2.82
2	3	-9.23	-616.79	12.26	98.90	0.18	-94.06
3	4	11.35	550.30	-8.55	-437.90	0.04	-217.30
3	5	-11.35	-520.57	8.55	261.69	-0.04	-16.57
4	5	11.35	520.57	-8.55	-261.69	0.04	16.57
4	6	-11.35	-511.03	8.55	171.87	-0.04	-135.78
5	7	12.51	334.53	-12.28	-480.55	0.27	-230.59
5	8	-12.51	-304.80	12.28	227.66	-0.27	-27.17
6	8	12.51	304.80	-12.28	-227.66	0.27	27.17
6	9	-12.51	-295.26	12.28	98.77	-0.27	-158.56
7	10	0.00	0.00	0.00	0.00	0.00	0.00
7	11	0.00	7.20	0.00	0.00	0.00	-14.40
8	11	-6.62	-295.23	6.62	9.93	0.00	24.33
8	12	6.62	300.08	-6.62	-9.93	-17.81	-825.21
9	12	-6.62	-300.08	6.62	9.93	17.81	825.21
9	3	6.62	302.47	-6.62	-9.93	-26.61	-1225.71
10	3	2.61	314.32	-5.64	-88.97	26.42	1319.77
10	13	-2.61	-311.92	5.64	88.97	-18.92	-903.52
11	13	2.61	311.92	-5.64	-88.97	18.92	903.52
11	14	-2.61	-303.30	5.64	88.97	8.12	570.14
12	14	-4.01	-73.37	0.97	-79.04	-8.12	-560.21
12	15	4.01	89.21	-0.97	79.04	-0.45	-155.18
13	15	-4.01	-89.21	0.97	-79.04	0.45	155.18
13	6	4.01	91.60	-0.97	79.04	-1.74	-275.36
14	6	7.34	419.43	-7.58	68.98	1.78	411.15
14	16	-7.34	-419.41	7.58	-68.98	-1.71	-406.95

15	16	0.72	86.65	-0.96	78.91	1.71	416.88
15	17	-0.72	-84.27	0.96	-78.91	-0.44	-304.13
16	17	0.72	84.27	-0.96	78.91	0.44	304.13
16	18	-0.72	-68.39	0.96	-78.91	8.04	369.18
17	18	-5.89	-128.73	5.66	88.84	-8.04	-359.25
17	19	5.89	137.32	-5.66	-88.84	-18.95	-275.37
18	19	-5.89	-137.32	5.66	88.84	18.95	275.37
18	9	5.89	139.71	-5.66	-88.84	-26.47	-459.50
19	9	6.62	155.55	-6.62	-9.93	26.74	618.06
19	20	-6.62	-153.16	6.62	9.93	-17.94	-412.87
20	20	6.62	153.16	-6.62	-9.93	17.94	412.87
20	21	-6.62	-148.28	6.62	9.93	0.00	-4.33
21	21	0.00	7.16	0.00	0.00	0.00	14.26
21	22	0.00	0.00	0.00	0.00	0.00	0.00

Combination No. 958
Group Id: SER GP 2 Name: SERVICE GROUP II

Memb	Node	Fx kip	Fy kip	Fz kip	Mx kft	My kft	Mz kft
1	1	8.16	382.34	-12.26	-480.28	-0.18	-163.62
1	2	-8.16	-352.61	12.26	227.66	0.18	-4.39
2	2	8.16	352.61	-12.26	-227.66	-0.18	4.39
2	3	-8.16	-343.06	12.26	98.90	0.18	-90.02
3	4	13.49	550.25	-8.55	-437.90	0.04	-224.85
3	5	-13.49	-520.52	8.55	261.69	-0.04	-53.02
4	5	13.49	520.52	-8.55	-261.69	0.04	53.02
4	6	-13.49	-510.97	8.55	171.87	-0.04	-194.65
5	7	11.45	608.31	-12.28	-480.55	0.27	-201.39
5	8	-11.45	-578.58	12.28	227.66	-0.27	-34.44
6	8	11.45	578.58	-12.28	-227.66	0.27	34.44
6	9	-11.45	-569.04	12.28	98.77	-0.27	-154.65
7	10	0.00	0.00	0.00	0.00	0.00	0.00
7	11	0.00	7.20	0.00	0.00	0.00	-14.40
8	11	-6.62	-164.09	6.62	9.93	0.00	24.33
8	12	6.62	168.93	-6.62	-9.93	-17.81	-472.35
9	12	-6.62	-168.93	6.62	9.93	17.81	472.35
9	3	6.62	171.32	-6.62	-9.93	-26.61	-698.50
10	3	1.54	171.74	-5.64	-88.97	26.42	788.52
10	13	-1.54	-169.35	5.64	88.97	-18.92	-561.81
11	13	1.54	169.35	-5.64	-88.97	18.92	561.81
11	14	-1.54	-160.72	5.64	88.97	8.12	228.82
12	14	-5.08	-36.71	0.97	-79.04	-8.12	-218.90
12	15	5.08	52.55	-0.97	79.04	-0.45	-173.91
13	15	-5.08	-52.55	0.97	-79.04	0.45	173.91
13	6	5.08	54.95	-0.97	79.04	-1.74	-245.36
14	6	8.41	456.03	-7.58	68.98	1.78	440.02
14	16	-8.41	-456.01	7.58	-68.98	-1.71	-435.45
15	16	1.79	123.00	-0.96	78.91	1.71	445.38
15	17	-1.79	-120.62	0.96	-78.91	-0.44	-284.67
16	17	1.79	120.62	-0.96	78.91	0.44	284.67
16	18	-1.79	-104.75	0.96	-78.91	8.04	709.28
17	18	-4.83	-271.74	5.66	88.84	-8.04	-699.35
17	19	4.83	280.32	-5.66	-88.84	-18.95	-617.49
18	19	-4.83	-280.32	5.66	88.84	18.95	617.49
18	9	4.83	282.72	-5.66	-88.84	-26.47	-991.73
19	9	6.62	286.32	-6.62	-9.93	26.74	1146.37
19	20	-6.62	-283.93	6.62	9.93	-17.94	-767.35
20	20	6.62	283.93	-6.62	-9.93	17.94	767.35
20	21	-6.62	-279.05	6.62	9.93	0.00	-4.33
21	21	0.00	7.16	0.00	0.00	0.00	14.26
21	22	0.00	0.00	0.00	0.00	0.00	0.00

PROJECT:

Combination No. 960
Group Id: SER GP 2 Name: SERVICE GROUP II

Memb	Node	Fx kip	Fy kip	Fz kip	Mx kft	My kft	Mz kft
1	1	-11.80	302.89	7.36	288.17	0.11	192.81
1	2	11.80	-273.16	-7.36	-136.60	-0.11	50.23
2	2	-11.80	273.16	7.36	136.60	0.11	-50.23
2	3	11.80	-263.62	-7.36	-59.34	-0.11	174.11
3	4	-6.20	324.20	5.13	262.74	-0.02	128.59
3	5	6.20	-294.47	-5.13	-157.01	0.02	-0.85
4	5	-6.20	294.47	5.13	157.01	-0.02	0.85
4	6	6.20	-284.93	-5.13	-103.12	0.02	64.25
5	7	-1.86	660.72	7.37	288.33	-0.16	78.76
5	8	1.86	-630.99	-7.37	-136.60	0.16	-40.51
6	8	-1.86	630.99	7.37	136.60	-0.16	40.51
6	9	1.86	-621.45	-7.37	-59.26	0.16	-21.01
7	10	0.00	0.00	0.00	0.00	0.00	0.00
7	11	0.00	7.20	0.00	0.00	0.00	-14.40
8	11	3.97	-151.47	-3.97	-5.96	0.00	8.44
8	12	-3.97	156.31	3.97	5.96	10.68	-422.51
9	12	3.97	-156.31	-3.97	-5.96	-10.68	422.51
9	3	-3.97	158.70	3.97	5.96	15.96	-631.89
10	3	-7.83	104.91	3.39	53.38	-15.85	457.78
10	13	7.83	-102.52	-3.39	-53.38	11.35	-319.90
11	13	-7.83	102.52	3.39	53.38	-11.35	319.90
11	14	7.83	-93.90	-3.39	-53.38	-4.87	150.58
12	14	-3.86	-41.10	-0.58	47.42	4.87	-156.54
12	15	3.86	56.94	0.58	-47.42	0.27	-274.91
13	15	-3.86	-56.94	-0.58	47.42	-0.27	274.91
13	6	3.86	59.34	0.58	-47.42	1.05	-352.20
14	6	-10.06	225.59	4.55	-41.39	-1.07	287.95
14	16	10.06	-225.57	-4.55	41.39	1.02	-285.69
15	16	-6.09	83.11	0.58	-47.35	-1.02	279.73
15	17	6.09	-80.73	-0.58	47.35	0.26	-171.66
16	17	-6.09	80.73	0.58	-47.35	-0.26	171.66
16	18	6.09	-64.85	-0.58	47.35	-4.82	470.42
17	18	-2.11	-285.37	-3.39	-53.30	4.82	-476.38
17	19	2.11	293.96	3.39	53.30	11.37	-905.53
18	19	-2.11	-293.96	-3.39	-53.30	-11.37	905.53
18	9	2.11	296.35	3.39	53.30	15.88	-1297.90
19	9	-3.97	325.09	3.97	5.96	-16.04	1318.90
19	20	3.97	-322.70	-3.97	-5.96	10.76	-888.33
20	20	-3.97	322.70	3.97	5.96	-10.76	888.33
20	21	3.97	-317.82	-3.97	-5.96	0.00	-20.21
21	21	0.00	7.16	0.00	0.00	0.00	14.26
21	22	0.00	0.00	0.00	0.00	0.00	0.00

Combination No. 962
Group Id: SER GP 2 Name: SERVICE GROUP II

Memb	Node	Fx kip	Fy kip	Fz kip	Mx kft	My kft	Mz kft
1	1	-12.00	569.38	7.36	288.17	0.11	184.91
1	2	12.00	-539.65	-7.36	-136.60	-0.11	62.25
2	2	-12.00	539.65	7.36	136.60	0.11	-62.25
2	3	12.00	-530.11	-7.36	-59.34	-0.11	188.23
3	4	-7.49	372.79	5.13	262.74	-0.02	133.16
3	5	7.49	-343.06	-5.13	-157.01	0.02	21.04
4	5	-7.49	343.06	5.13	157.01	-0.02	-21.04
4	6	7.49	-333.52	-5.13	-103.12	0.02	99.64
5	7	-0.37	598.72	7.37	288.33	-0.16	51.53
5	8	0.37	-568.99	-7.37	-136.60	0.16	-43.87

PROJECT:

6	8	-0.37	568.99	7.37	136.60	-0.16	43.87
6	9	0.37	-559.44	-7.37	-59.26	0.16	-39.97
7	10	0.00	0.00	0.00	0.00	0.00	0.00
7	11	0.00	7.20	0.00	0.00	0.00	-14.40
8	11	3.97	-282.61	-3.97	-5.96	0.00	8.44
8	12	-3.97	287.46	3.97	5.96	10.68	-775.38
9	12	3.97	-287.46	-3.97	-5.96	-10.68	775.38
9	3	-3.97	289.85	3.97	5.96	15.96	-1159.09
10	3	-8.03	240.26	3.39	53.38	-15.85	970.87
10	13	8.03	-237.87	-3.39	-53.38	11.35	-653.07
11	13	-8.03	237.87	3.39	53.38	-11.35	653.07
11	14	8.03	-229.24	-3.39	-53.38	-4.87	465.82
12	14	-4.06	-84.99	-0.58	47.42	4.87	-471.78
12	15	4.06	100.83	0.58	-47.42	0.27	-345.87
13	15	-4.06	-100.83	-0.58	47.42	-0.27	345.87
13	6	4.06	103.22	0.58	-47.42	1.05	-481.50
14	6	-11.54	230.30	4.55	-41.39	-1.07	381.85
14	16	11.54	-230.28	-4.55	41.39	1.02	-379.55
15	16	-7.57	83.09	0.58	-47.35	-1.02	373.59
15	17	7.57	-80.71	-0.58	47.35	0.26	-265.54
16	17	-7.57	80.71	0.58	-47.35	-0.26	265.54
16	18	7.57	-64.83	-0.58	47.35	-4.82	376.35
17	18	-3.60	-249.52	-3.39	-53.30	4.82	-382.31
17	19	3.60	258.11	3.39	53.30	11.37	-828.56
18	19	-3.60	-258.11	-3.39	-53.30	-11.37	828.56
18	9	3.60	260.50	3.39	53.30	15.88	-1173.27
19	9	-3.97	298.94	3.97	5.96	-16.04	1213.24
19	20	3.97	-296.55	-3.97	-5.96	10.76	-817.44
20	20	-3.97	296.55	3.97	5.96	-10.76	817.44
20	21	3.97	-291.67	-3.97	-5.96	0.00	-20.21
21	21	0.00	7.16	0.00	0.00	0.00	14.26
21	22	0.00	0.00	0.00	0.00	0.00	0.00

Combination No. 963
Group Id: SER GP 2 Name: SERVICE GROUP II

Memb	Node	Fx kip	Fy kip	Fz kip	Mx kft	My kft	Mz kft
1	1	-11.43	607.88	12.26	480.28	0.18	201.38
1	2	11.43	-578.15	-12.26	-227.66	-0.18	34.09
2	2	-11.43	578.15	12.26	227.66	0.18	-34.09
2	3	11.43	-568.61	-12.26	-98.90	-0.18	154.11
3	4	-13.52	550.28	8.55	437.90	-0.04	225.41
3	5	13.52	-520.55	-8.55	-261.69	0.04	53.12
4	5	-13.52	520.55	8.55	261.69	-0.04	-53.12
4	6	13.52	-511.00	-8.55	-171.87	0.04	195.10
5	7	-8.14	382.74	12.28	480.55	-0.27	163.63
5	8	8.14	-353.01	-12.28	-227.66	0.27	4.06
6	8	-8.14	353.01	12.28	227.66	-0.27	-4.06
6	9	8.14	-343.46	-12.28	-98.77	0.27	89.54
7	10	0.00	0.00	0.00	0.00	0.00	0.00
7	11	0.00	7.20	0.00	0.00	0.00	-14.40
8	11	6.62	-279.46	-6.62	-9.93	0.00	4.47
8	12	-6.62	284.30	6.62	9.93	17.81	-762.92
9	12	6.62	-284.30	-6.62	-9.93	-17.81	762.92
9	3	-6.62	286.69	6.62	9.93	26.61	-1142.44
10	3	-4.81	281.91	5.64	88.97	-26.42	988.33
10	13	4.81	-279.52	-5.64	-88.97	18.92	-615.16
11	13	-4.81	279.52	5.64	88.97	-18.92	615.16
11	14	4.81	-270.90	-5.64	-88.97	-8.12	703.26
12	14	1.81	-105.77	-0.97	79.04	8.12	-713.19
12	15	-1.81	121.62	0.97	-79.04	0.45	-287.40
13	15	1.81	-121.62	-0.97	79.04	-0.45	287.40

PROJECT:

13	6	-1.81	124.01	0.97	-79.04	1.74	-450.65
14	6	-11.71	387.00	7.58	-68.98	-1.78	255.56
14	16	11.71	-386.98	-7.58	68.98	1.71	-251.68
15	16	-5.10	54.22	0.96	-78.91	-1.71	241.76
15	17	5.10	-51.84	-0.96	78.91	0.44	-171.79
16	17	-5.10	51.84	0.96	-78.91	-0.44	171.79
16	18	5.10	-35.96	-0.96	78.91	-8.04	215.46
17	18	1.52	-161.16	-5.66	-88.84	8.04	-225.39
17	19	-1.52	169.75	5.66	88.84	18.95	-563.94
18	19	1.52	-169.75	-5.66	-88.84	-18.95	563.94
18	9	-1.52	172.14	5.66	88.84	26.47	-791.18
19	9	-6.62	171.32	6.62	9.93	-26.74	701.64
19	20	6.62	-168.93	-6.62	-9.93	17.94	-475.48
20	20	-6.62	168.93	6.62	9.93	-17.94	475.48
20	21	6.62	-164.05	-6.62	-9.93	0.00	-24.18
21	21	0.00	7.16	0.00	0.00	0.00	14.26
21	22	0.00	0.00	0.00	0.00	0.00	0.00

Combination No. 964
Group Id: SER GP 2 Name: SERVICE GROUP II

Memb	Node	Fx	Fy	Fz	Mx	My	Mz
		kip	kip	kip	kft	kft	kft
1	1	-12.50	334.16	12.26	480.28	0.18	230.66
1	2	12.50	-304.43	-12.26	-227.66	-0.18	26.88
2	2	-12.50	304.43	12.26	227.66	0.18	-26.88
2	3	12.50	-294.88	-12.26	-98.90	-0.18	158.16
3	4	-11.39	550.22	8.55	437.90	-0.04	217.86
3	5	11.39	-520.49	-8.55	-261.69	0.04	16.68
4	5	-11.39	520.49	8.55	261.69	-0.04	-16.68
4	6	11.39	-510.95	-8.55	-171.87	0.04	136.23
5	7	-9.21	656.51	12.28	480.55	-0.27	192.84
5	8	9.21	-626.78	-12.28	-227.66	0.27	-3.21
6	8	-9.21	626.78	12.28	227.66	-0.27	3.21
6	9	9.21	-617.24	-12.28	-98.77	0.27	93.45
7	10	0.00	0.00	0.00	0.00	0.00	0.00
7	11	0.00	7.20	0.00	0.00	0.00	-14.40
8	11	6.62	-148.31	-6.62	-9.93	0.00	4.47
8	12	-6.62	153.16	6.62	9.93	17.81	-410.05
9	12	6.62	-153.16	-6.62	-9.93	-17.81	410.05
9	3	-6.62	155.55	6.62	9.93	26.61	-615.24
10	3	-5.88	139.34	5.64	88.97	-26.42	457.08
10	13	5.88	-136.94	-5.64	-88.97	18.92	-273.45
11	13	-5.88	136.94	5.64	88.97	-18.92	273.45
11	14	5.88	-128.32	-5.64	-88.97	-8.12	361.94
12	14	0.74	-69.12	-0.97	79.04	8.12	-371.87
12	15	-0.74	84.96	0.97	-79.04	0.45	-306.12
13	15	0.74	-84.96	-0.97	79.04	-0.45	306.12
13	6	-0.74	87.35	0.97	-79.04	1.74	-420.65
14	6	-10.65	423.60	7.58	-68.98	-1.78	284.43
14	16	10.65	-423.58	-7.58	68.98	1.71	-280.19
15	16	-4.03	90.57	0.96	-78.91	-1.71	270.26
15	17	4.03	-88.19	-0.96	78.91	0.44	-152.34
16	17	-4.03	88.19	0.96	-78.91	-0.44	152.34
16	18	4.03	-72.32	-0.96	78.91	-8.04	555.57
17	18	2.59	-304.17	-5.66	-88.84	8.04	-565.49
17	19	-2.59	312.75	5.66	88.84	18.95	-906.06
18	19	2.59	-312.75	-5.66	-88.84	-18.95	906.06
18	9	-2.59	315.15	5.66	88.84	26.47	-1323.41
19	9	-6.62	302.09	6.62	9.93	-26.74	1229.96
19	20	6.62	-299.70	-6.62	-9.93	17.94	-829.96
20	20	-6.62	299.70	6.62	9.93	-17.94	829.96
20	21	6.62	-294.82	-6.62	-9.93	0.00	-24.18

PROJECT:

21	21	0.00	7.16	0.00	0.00	0.00	14.26
21	22	0.00	0.00	0.00	0.00	0.00	0.00

PROJECT:

CAP DESIGN
==========

Code: AASHTO LRFD 8
Units: US
Pier View : Downstation.

DESIGN PARAMETERS:
==================
f'c = 4500.0 psi
Fy flex = 60000.0 psi Fy shear = 60000.0 psi
phi tens = 0.90 phi comp = 0.75 phi shear = 0.90
Tens above = 0.005 Comp below = 0.002
Ec = 4435.3 ksi Es = 29000.0 ksi
Crack check as per current LRFD
Crack control Exposure = 1.00
Concrete Type : Normal Weight.
Design : face of column.

CAP GEOMETRY:
=============
Straight Cap : Length(X) = 48.54 ft Depth(Z) = 48.00 in

Cap Section Properties:
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Sec.	Area ft ^2	Iz in ^4	Iy in ^4
1	12.00	186624.00	331776.00

MAIN REINFORCEMENT:
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	Bar size	Quantity	Bar dist. in	As total in^2	From ft	To ft	Hook
TOP							
	US#9[M29]	10	3.13	10.000	0.00	48.54	None
BOTTOM							
	US#9[M29]	10	3.13	10.000	0.00	48.54	None

STIRRUPS:
==========

From ft	To ft	Stirrup Size	n legs	Spacing in	Aprv/s in^2 / ft	Bar Type
0.27	6.77	US#5[M16]	4	6.00	2.48	Stirrup
8.02	9.27	US#5[M16]	4	15.00	0.99	Stirrup
9.65	22.65	US#5[M16]	4	6.00	2.48	Stirrup
23.02	25.52	US#5[M16]	4	15.00	0.99	Stirrup
25.90	38.90	US#5[M16]	4	6.00	2.48	Stirrup
39.27	41.77	US#5[M16]	4	15.00	0.99	Stirrup
41.77	48.27	US#5[M16]	4	6.00	2.48	Stirrup

Clear Cover on Sides = 2.00 in

FLEXURE DESIGN:
===============

Span 1: From 0.00 ft To 8.02 ft

PROJECT:

Loc	AbsLoc	H	Mmax / Mmin	Mr	Comb	CL	c	dt	eps_t	Phi	Asb-req	Asb-prv	Asb-eff	As
ft	ft	in	kips-ft	kips-ft				in			in^2	in^2	in^2	in
4.0	4.0	36	2.4	1405.0	501	T	3.41	32.87	0.026	0.90	0.89	10.00	10.00	0
			-33.4	-1405.0	207	T	3.41	32.87	0.026	0.90	0.89	10.00	10.00	0.
6.7	6.7	36	0.0	1405.0	0	T	3.41	32.87	0.026	0.90	0.89	10.00	10.00	0
			-1167.9	-1405.0	1	T	3.41	32.87	0.026	0.90	0.89	10.00	10.00	8

Span 2: From 8.02 ft To 24.27 ft

Loc	AbsLoc	H	Mmax / Mmin	Mr	Comb	CL	c	dt	eps_t	Phi	Asb-req	Asb-prv	Asb-eff	As
ft	ft	in	kips-ft	kips-ft				in			in^2	in^2	in^2	in
1.3	9.3	36	0.0	1405.0	0	T	3.41	32.87	0.026	0.90	0.89	10.00	10.00	0
			-1221.0	-1405.0	5	T	3.41	32.87	0.026	0.90	0.89	10.00	10.00	8
6.1	14.1	36	964.6	1405.0	23	T	3.41	32.87	0.026	0.90	6.75	10.00	10.00	0
			-13.7	-1405.0	540	T	3.41	32.87	0.026	0.90	0.89	10.00	10.00	0.
14.9	22.9	36	0.0	1405.0	0	T	3.41	32.87	0.026	0.90	0.89	10.00	10.00	0
			-458.2	-1405.0	22	T	3.41	32.87	0.026	0.90	0.89	10.00	10.00	3

Span 3: From 24.27 ft To 40.52 ft

Loc	AbsLoc	H	Mmax / Mmin	Mr	Comb	CL	c	dt	eps_t	Phi	Asb-req	Asb-prv	Asb-eff	As
ft	ft	in	kips-ft	kips-ft				in			in^2	in^2	in^2	in
1.3	25.6	36	0.0	1405.0	0	T	3.41	32.87	0.026	0.90	0.89	10.00	10.00	0
			-457.1	-1405.0	16	T	3.41	32.87	0.026	0.90	0.89	10.00	10.00	3
10.2	34.4	36	960.1	1405.0	18	T	3.41	32.87	0.026	0.90	6.72	10.00	10.00	0
			0.0	-1405.0	0	T	3.41	32.87	0.026	0.90	0.89	10.00	10.00	0
14.9	39.2	36	0.0	1405.0	0	T	3.41	32.87	0.026	0.90	0.89	10.00	10.00	0
			-1224.5	-1405.0	12	T	3.41	32.87	0.026	0.90	0.89	10.00	10.00	8

Span 4: From 40.52 ft To 48.54 ft

Loc	AbsLoc	H	Mmax / Mmin	Mr	Comb	CL	c	dt	eps_t	Phi	Asb-req	Asb-prv	Asb-eff	As
ft	ft	in	kips-ft	kips-ft				in			in^2	in^2	in^2	in
1.3	41.8	36	0.0	1405.0	0	T	3.41	32.87	0.026	0.90	0.89	10.00	10.00	0
			-1199.9	-1405.0	8	T	3.41	32.87	0.026	0.90	0.89	10.00	10.00	8
4.0	44.6	36	2.6	1405.0	543	T	3.41	32.87	0.026	0.90	0.89	10.00	10.00	0
			-33.2	-1405.0	165	T	3.41	32.87	0.026	0.90	0.89	10.00	10.00	0

Note:
CL: Section classification as per LRFD 2006 interims for provided reinforcement.
C = Compression controlled, I = In-Transition, T = Tension controlled.
SHEAR AND TORSION DESIGN:
==========
Beta-Theta Method used for design.

Span 1: From 0.00 ft To 8.02 ft

Loc	AbsLoc	Pos	Vu	Comb	Tu	Comb	phi*Vn	T-lim	Avs/s	Ats/s	Av/s	Aprv/s	Alx
ft	ft		kips		kips-ft		kips	kips-ft	<--------- in^2/ft -------->				in^2

PROJECT:

4.00	4.00	L	10.8	109	0.0	0	1038.7	89.1	0.00	0.00	0.00	2.48	0.00
		R	424.4	1	15.4	147	565.4	88.1	1.66	0.00	1.66	2.48	0.00
6.69	6.69	L	430.4	1	15.4	273	557.5	88.1	1.74	0.00	1.74	2.48	3.23

Loc ft	AbsLoc ft	Pos	Vc kips	Vs kips	Beta	Theta deg	b in	dv in	Esp_s
4.00	4.00	L	458.39	695.69	4.52	29.28	48.00	31.46	0.0001
		R	151.58	476.59	1.50	39.30	48.00	31.46	0.0029
6.69	6.69	L	148.33	471.07	1.46	39.63	48.00	31.46	0.0030

Span 2: From 8.02 ft To 24.27 ft

Loc ft	AbsLoc ft	Pos	Vu kips	Comb	Tu kips-ft	Comb	phi*Vn kips	T-lim kips-ft	Avs/s <--------- in^2/ft	Ats/s	Av/s -------->	Aprv/s	Alx in^2
1.33	9.35	R	415.8	5	119.8	11	94.6#	89.7	1.65	0.11	1.88*	0.00**	7.92
6.12	14.14	L	405.0	5	119.8	5	540.5	89.7	1.49	0.11	1.71	2.48	1.52
		R	142.8	23	106.4	23	650.1	88.0	0.47	0.09	0.64	2.48	0.00
14.92	22.94	L	162.6	23	106.4	17	197.2	88.0	0.48	0.08	0.64	0.00**	0.00
		R	162.6	23	106.4	23	197.2	88.0	0.48	0.08	0.64	0.00**	0.00

Loc ft	AbsLoc ft	Pos	Vc kips	Vs kips	Beta	Theta deg	b in	dv in	Esp_s
1.33	9.35	R	148.65	43.52	1.47	39.60	48.00	31.46	0.0030
6.12	14.14	L	157.54	443.05	1.56	38.74	48.00	31.46	0.0028
		R	208.31	514.07	2.06	35.23	48.00	31.46	0.0018
14.92	22.94	L	257.82	38.66	2.54	33.14	48.00	31.46	0.0012
		R	257.82	38.66	2.54	33.14	48.00	31.46	0.0012

Span 3: From 24.27 ft To 40.52 ft

Loc ft	AbsLoc ft	Pos	Vu kips	Comb	Tu kips-ft	Comb	phi*Vn kips	T-lim kips-ft	Avs/s <--------- in^2/ft	Ats/s	Av/s -------->	Aprv/s	Alx in^2
1.33	25.60	R	161.4	18	106.2	18	200.3	89.5	0.48	0.08	0.64	0.00**	0.00
10.15	34.42	L	141.6	18	106.2	24	654.8	89.5	0.47	0.09	0.64	2.48	0.00
		R	406.2	12	119.6	6	537.0	87.9	1.51	0.11	1.73	2.48	1.65
14.92	39.19	L	416.9	12	119.6	12	93.4#	87.9	1.67	0.11	1.90*	0.00**	8.09

Loc ft	AbsLoc ft	Pos	Vc kips	Vs kips	Beta	Theta deg	b in	dv in	Esp_s
1.33	25.60	R	261.15	38.60	2.58	33.02	48.00	31.46	0.0011
10.15	34.42	L	210.80	516.77	2.08	35.10	48.00	31.46	0.0017
		R	156.02	440.67	1.54	38.88	48.00	31.46	0.0028
14.92	39.19	L	147.28	43.46	1.45	39.74	48.00	31.46	0.0031

Span 4: From 40.52 ft To 48.54 ft

Loc ft	AbsLoc ft	Pos	Vu kips	Comb	Tu kips-ft	Comb	phi*Vn kips	T-lim kips-ft	Avs/s <--------- in^2/ft	Ats/s	Av/s -------->	Aprv/s	Alx in^2
1.33	41.85	R	436.2	8	15.4	274	555.3	90.1	1.78	0.00	1.78	2.48	3.39
4.04	44.56	L	430.1	8	15.4	148	565.0	90.1	1.70	0.00	1.70	2.48	0.00
		R	10.7	109	0.0	0	1038.8	89.1	0.00	0.00	0.00	2.48	0.00

Loc ft	AbsLoc ft	Pos	Vc kips	Vs kips	Beta	Theta deg	b in	dv in	Esp_s
1.33	41.85	R	147.44	469.52	1.46	39.73	48.00	31.46	0.0031
4.04	44.56	L	151.44	476.35	1.49	39.32	48.00	31.46	0.0029

PROJECT:

R 458.53 695.74 4.53 29.28 48.00 31.46 0.0001

Note:
* Shear resistance provided by shear reinforcement (Vs) is greater than maximum allowed.
** Provided stirrup area (Aprv/s) is not adequate.

- Pos is the design position. L suggests the calculation is done at immediate left of "Loc" and R suggests at immediate right of it.
- T-lim is the limiting value of torsion for the concrete section. If actual torsion is higher than this value, torsional steel has to be provided.
- Avs/s is the required area of steel per unit length for shear force.
- Ats/s is the required area of steel per unit length for one leg of torsional reinforcement.
- Av/s is the total required area of steel per unit length due to shear plus torsion.
- Aprvs/s is the total provided area of transverse steel reinforcement.
- Alx is the EFFECTIVE longitudinal steel required in addition to the PROVIDED EFFECTIVE flexural steel.
- Vc is the nominal shear resistence of concrete.
- Vs is the nominal shear resistence of transverse reinforcement.
- Beta is the factor indicating ability of diagonally cracked concrete to transmit tension and shear.
- Theta is the angle of inclination of diagonal compressive stress.
- # Vu is greater tha phi*Vn.

CRACKING/FATIGUE CHECK:
==========

Span 1: From 0.00 ft To 8.02 ft

				<------ Cracking ------>				<---- Fatigue ---->	
Loc	AbsLoc	H	Comb	fs-t	dc	Srqt	Sprt	fs-t	FTH-t
Loc	AbsLoc	H	Comb	fs-b	dc	Srqb	Sprb	fs-b	FTH-b
ft	ft	in		ksi	in	in	in	ksi	ksi
4.00	4.0	36.0	879	1.0	2.6	48.0	4.6	0.00	0.00
			0	0.0	2.6	5.0	4.6	0.00	0.00
6.69	6.7	36.0	953	34.3	2.6	13.3	4.6	0.00	0.00
			0	0.0	2.6	5.0	4.6	0.00	0.00

Span 2: From 8.02 ft To 24.27 ft

				<------ Cracking ------>				<---- Fatigue ---->	
Loc	AbsLoc	H	Comb	fs-t	dc	Srqt	Sprt	fs-t	FTH-t
Loc	AbsLoc	H	Comb	fs-b	dc	Srqb	Sprb	fs-b	FTH-b
ft	ft	in		ksi	in	in	in	ksi	ksi
1.33	9.3	36.0	957	35.8	2.6	12.5	4.8	0.00	0.00
			0	0.0	2.6	5.0	4.8	0.00	0.00
6.12	14.1	36.0	0	0.0	2.6	5.0	4.6	0.00	0.00
			963	28.3	2.6	17.2	4.6	0.00	0.00
14.92	22.9	36.0	962	13.7	2.6	40.9	4.8	0.00	0.00
			0	0.0	2.6	5.0	4.8	0.00	0.00

Span 3: From 24.27 ft To 40.52 ft

				<------ Cracking ------>				<---- Fatigue ---->	
Loc	AbsLoc	H	Comb	fs-t	dc	Srqt	Sprt	fs-t	FTH-t
Loc	AbsLoc	H	Comb	fs-b	dc	Srqb	Sprb	fs-b	FTH-b

PROJECT:

ft	ft	in		ksi	in	in	in	ksi	ksi
1.33	25.6	36.0	956	13.7	2.6	41.0	4.8	0.00	0.00
			0	0.0	2.6	5.0	4.8	0.00	0.00
10.15	34.4	36.0	0	0.0	2.6	5.0	4.6	0.00	0.00
			958	27.7	2.6	17.6	4.6	0.00	0.00
14.92	39.2	36.0	964	35.9	2.6	12.4	4.8	0.00	0.00
			0	0.0	2.6	5.0	4.8	0.00	0.00

Span 4: From 40.52 ft To 48.54 ft

			<------ Cracking ------>					<---- Fatigue ---->	
Loc	AbsLoc	H	Comb	fs-t	dc	Srqt	Sprt	fs-t	FTH-t
Loc	AbsLoc	H	Comb	fs-b	dc	Srqb	Sprb	fs-b	FTH-b
ft	ft	in		ksi	in	in	in	ksi	ksi
1.33	41.8	36.0	960	35.2	2.6	12.8	4.6	0.00	0.00
			0	0.0	2.6	5.0	4.6	0.00	0.00
4.04	44.6	36.0	785	0.6	2.6	48.0	4.6	0.00	0.00
			0	0.0	2.6	5.0	4.6	0.00	0.00

Note:
* Cracking / fatigue checking failed.
Required bar spacing, Sreq, should not be less than 5 in per Art. 5.7.3.4.

PROJECT:

PROJECT:

COLUMN DESIGN
==========

COLUMN DESIGN - Column: 1 - Shaft

Shaft Type: Round D = 42.00 in

Code: AASHTO LRFD 8
Units: US
Pier View : Downstation.
Design/Analysis Method: No Slenderness Considered.

Shaft Section Properties:
==========

Sec.	Area ft^2	Ix in^4	Iz in^4
0	9.62	152745.02	152745.02

DESIGN PARAMETERS:
==========
f'c = 4000.0 psi fy = 60000.0 psi
phi as per LRFD 2007 with 2006 interims.
phi tens = 0.90 phi comp = 0.75
Tens above = 0.005 Comp below = 0.002
phi shear = 0.90 fy shear = 60000.00 psi
Ec = 4266.2 ksi Es = 29000 ksi
Concrete Type : Normal Weight.

Reinforcement:
==========
Rebar Pattern: Circular
Rebar Orientation: Face Parallel

Layer	Size	No. bars	Bar Dist. in	From ft	To ft	Hook
1	US#8[M25]	16	2.88	0.00	20.60	None

Note:
Bar Dist refers to the distance between center of reinforcement and concrete surface.

Layer	Size	Type	Pitch in	From ft	To ft
1	US#3[M10]	Ties	12.00	0.00	20.60

Design values used - (e-min effect included).
==========
(global coordinates)

Loc ft	Comb	Fx kips	Fy kips	Fz kips	Mx kips-ft	My kips-ft	Mz kips-ft
67.40	778	-7.9	282.9	22.1	756.8	1.0	157.1
88.00	778	8.4	256.1	-20.3	-319.9	1.0	39.7

Shaft Design (above fixity point)
==========

PROJECT:

Bot/Top Elev. ft	Comb	Pu kips	Mux kips-ft	Muz kips-ft	pMn kips-ft	Incl deg	pPn/Pu	pMn/Mu
67.40	778	282.9	756.8	157.1	1258.9	11.73	1.00	1.63
88.00	778	256.1	319.9	39.7	1227.6	7.07	1.00	3.81

Shaft Design (above fixity point)
==========

Bot/Top Elev. ft	As_min in^2	As_max in^2	As_prov in^2
67.40	14.03	110.84	12.64**
88.00	14.03	110.84	12.64**

SHEAR DESIGN:
==========

Loc ft	Pos	Vu kips	Comb	phi*Vn kips	Av/s in^2/ft	Aprv/s in^2/ft	Vc kips	Vs kips	Beta	Theta deg	b in
67.40	L	25.3	280	318.8	0.00	0.22	298.75	55.42	3.84	30.17	42.00
88.00	R	23.8	12	428.6	0.00	0.22	416.91	59.30	5.36	28.51	42.00

SHEAR DESIGN:
==========

Shaft Design (below fixity point)
==========

Diameter in	Height ft	Pu kips	Combo	pPn kips	pPn/Pu
42.00	10.00	894.64	5	3038.52	3.40 **

Note:
Min reinforcement = 0.9000 % of Ag.
** Minimum/Maximum requirement for reinforcement ratio violated.
** Bar spacing violated.
*** Auto-design only considered one layer of reinforcement. Please try providing additional layers of bars to satisfy the design requirements.

- Pos is the design position. L suggests the calculation is done at immediate left of "Loc" and R suggests at immediate right of it.
- Av/s is the total required area of steel per unit length due to shear plus torsion.
- Aprvs/s is the total provided area of transverse steel reinforcement.
- Vc is the nominal shear resistence of concrete.
- Vs is the nominal shear resistence of transverse reinforcement.
- Beta is the factor indicating ability of diagonally cracked concrete to transmit tension and shear.
- Theta is the angle of inclination of diagonal compressive stress.
- # Vu is greater tha phi*Vn.

PROJECT:

COLUMN DESIGN
==========

COLUMN DESIGN - Column: 1

Column Type: Round D = 36.00 in

Code: AASHTO LRFD 8
Units: US
Pier View : Downstation.
Design/Analysis Method: No Slenderness Considered.

Column Section Properties:
==========

Sec.	Area ft^2	Ix in^4	Iz in^4
0	7.07	82447.96	82447.96

DESIGN PARAMETERS:
==========
f'c = 4500.0 psi fy = 60000.0 psi
phi as per LRFD 2007 with 2006 interims.
phi tens = 0.90 phi comp = 0.75
Tens above = 0.005 Comp below = 0.002
phi shear = 0.90 fy shear = 60000.00 psi
Ec = 4435.3 ksi Es = 29000 ksi
Concrete Type : Normal Weight.

Reinforcement:
==========
Rebar Pattern: Circular
Rebar Orientation: Face Parallel

Layer	Size	No. bars	Bar Dist. in	From ft	To ft	Hook
1	US#10[M32]	11	3.25	0.00	10.50	None

Note:
Bar Dist refers to the distance between center of reinforcement and concrete surface.

Layer	Size	Type	Pitch in	From ft	To ft
1	US#5[M16]	Ties	12.00	0.00	10.50

Design values used - (e-min effect included).
==========
(global coordinates)

Loc ft	Comb	Fx kips	Fy kips	Fz kips	Mx kips-ft	My kips-ft	Mz kips-ft
88.00	498	-19.8	290.6	4.2	102.8	-0.3	-77.8
98.50	498	19.2	282.1	-4.4	-57.2	-0.3	282.0
88.00	778	-8.4	256.1	20.3	319.9	1.0	-35.9
98.50	778	8.5	247.5	-19.6	-110.8	1.0	98.8

PROJECT:

Column Design
==========

Bot/Top Elev. ft	Comb	Pu kips	Mux kips-ft	Muz kips-ft	pMn kips-ft	Incl deg	pPn/Pu	pMn/Mu
88.00	778	256.1	319.9	35.9	1055.5	6.40	1.00	3.28
98.50	498	282.1	57.2	282.0	1076.8	78.54	1.00	3.74

Column Design
==========

Bot/Top Elev. ft	As_min in^2	As_max in^2	As_prov in^2
88.00	10.31	81.43	13.97
98.50	10.31	81.43	13.97

SHEAR DESIGN:
==========

Loc ft	Pos	Vu kips	Comb	phi*Vn kips	Av/s in^2/ft	Aprv/s in^2/ft	Vc kips	Vs kips	Beta	Theta deg	b in
88.00	L	23.8	12	396.3	0.00	0.62	301.07	139.22	5.06	28.76	36.00
98.50	R	23.8	12	408.5	0.00	0.62	313.68	140.25	5.27	28.58	36.00

SHEAR DESIGN:
==========

Note:
Min reinforcement = 1.0125 % of Ag.

- Pos is the design position. L suggests the calculation is done at immediate left of "Loc" and R suggests at immediate right of it.
- Av/s is the total required area of steel per unit length due to shear plus torsion.
- Aprvs/s is the total provided area of transverse steel reinforcement.
- Vc is the nominal shear resistence of concrete.
- Vs is the nominal shear resistence of transverse reinforcement.
- Beta is the factor indicating ability of diagonally cracked concrete to transmit tension and shear.
- Theta is the angle of inclination of diagonal compressive stress.
- # Vu is greater tha phi*Vn.

PROJECT:

COLUMN DESIGN
==========

COLUMN DESIGN - Column: 2 - Shaft

Shaft Type: Round D = 42.00 in

Code: AASHTO LRFD 8
Units: US
Pier View : Downstation.
Design/Analysis Method: No Slenderness Considered.

Shaft Section Properties:
==========

Sec.	Area ft^2	Ix in^4	Iz in^4
1	9.62	152745.02	152745.02

DESIGN PARAMETERS:
==========
f'c = 4000.0 psi fy = 60000.0 psi
phi as per LRFD 2007 with 2006 interims.
phi tens = 0.90 phi comp = 0.75
Tens above = 0.005 Comp below = 0.002
phi shear = 0.90 fy shear = 60000.00 psi
Ec = 4266.2 ksi Es = 29000 ksi
Concrete Type : Normal Weight.

Reinforcement:
==========
Rebar Pattern: Circular
Rebar Orientation: Face Parallel

Layer	Size	No. bars	Bar Dist. in	From ft	To ft	Hook
1	US#8[M25]	16	2.88	0.00	20.60	None

Note:
Bar Dist refers to the distance between center of reinforcement and concrete surface.

Layer	Size	Type	Pitch in	From ft	To ft
1	US#3[M10]	Ties	12.00	0.00	20.60

Design values used - (e-min effect included).
==========
(global coordinates)

Loc ft	Comb	Fx kips	Fy kips	Fz kips	Mx kips-ft	My kips-ft	Mz kips-ft
67.40	777	-9.6	531.9	18.2	711.2	-0.1	158.9
88.00	777	10.0	505.2	-16.4	-355.5	-0.1	78.3
67.40	778	-7.3	531.9	18.2	711.2	-0.1	151.1
88.00	778	7.8	505.1	-16.4	-355.5	-0.1	78.3

PROJECT:

Shaft Design (above fixity point)
==========

Bot/Top Elev. ft	Comb	Pu kips	Mux kips-ft	Muz kips-ft	pMn kips-ft	Incl deg	pPn/Pu	pMn/Mu
67.40	777	531.9	711.2	158.9	1490.6	12.60	1.00	2.05
88.00	778	505.1	355.5	78.3	1466.9	12.42	1.00	4.03

Shaft Design (above fixity point)
==========

Bot/Top Elev. ft	As_min in^2	As_max in^2	As_prov in^2
67.40	14.03	110.84	12.64**
88.00	14.03	110.84	12.64**

SHEAR DESIGN:
==========

Loc ft	Pos	Vu kips	Comb	phi*Vn kips	Av/s in^2/ft	Aprv/s in^2/ft	Vc kips	Vs kips	Beta	Theta deg	b in
67.40	L	23.9	165	456.6	0.00	0.22	447.31	60.01	5.75	28.23	42.00
88.00	R	22.2	165	535.5	0.00	0.22	533.42	61.62	6.86	27.60	42.00

SHEAR DESIGN:
==========

Shaft Design (below fixity point)
==========

Diameter in	Height ft	Pu kips	Combo	pPn kips	pPn/Pu
42.00	10.00	739.37	5	3038.52	4.11 **

Note:
Min reinforcement = 0.9000 % of Ag.
** Minimum/Maximum requirement for reinforcement ratio violated.
** Bar spacing violated.
*** Auto-design only considered one layer of reinforcement. Please try providing additional layers of bars to satisfy the design requirements.

- Pos is the design position. L suggests the calculation is done at immediate left of "Loc" and R suggests at immediate right of it.
- Av/s is the total required area of steel per unit length due to shear plus torsion.
- Aprvs/s is the total provided area of transverse steel reinforcement.
- Vc is the nominal shear resistence of concrete.
- Vs is the nominal shear resistence of transverse reinforcement.
- Beta is the factor indicating ability of diagonally cracked concrete to transmit tension and shear.
- Theta is the angle of inclination of diagonal compressive stress.
- # Vu is greater tha phi*Vn.

PROJECT:

COLUMN DESIGN
==========

COLUMN DESIGN - Column: 2

Column Type: Round D = 36.00 in

Code: AASHTO LRFD 8
Units: US
Pier View : Downstation.
Design/Analysis Method: No Slenderness Considered.

Column Section Properties:
==========

Sec.	Area ft^2	Ix in^4	Iz in^4
1	7.07	82447.96	82447.96

DESIGN PARAMETERS:
==========
f'c = 4500.0 psi fy = 60000.0 psi
phi as per LRFD 2007 with 2006 interims.
phi tens = 0.90 phi comp = 0.75
Tens above = 0.005 Comp below = 0.002
phi shear = 0.90 fy shear = 60000.00 psi
Ec = 4435.3 ksi Es = 29000 ksi
Concrete Type : Normal Weight.

Reinforcement:
==========
Rebar Pattern: Circular
Rebar Orientation: Face Parallel

Layer	Size	No. bars	Bar Dist. in	From ft	To ft	Hook
1	US#10[M32]	11	3.25	0.00	10.50	None

Note:
Bar Dist refers to the distance between center of reinforcement and concrete surface.

Layer	Size	Type	Pitch in	From ft	To ft
1	US#5[M16]	Ties	12.00	0.00	10.50

Design values used - (e-min effect included).
==========
(global coordinates)

Loc ft	Comb	Fx kips	Fy kips	Fz kips	Mx kips-ft	My kips-ft	Mz kips-ft
88.00	669	-21.5	505.2	5.5	232.6	-0.0	-79.8
98.50	669	20.8	496.6	-5.7	-173.4	-0.0	301.6
88.00	778	-7.8	505.1	16.4	355.5	-0.1	-70.7
98.50	778	8.0	496.5	-15.7	-187.8	-0.1	88.5

PROJECT:

Column Design
==========

Bot/Top Elev. ft	Comb	Pu kips	Mux kips-ft	Muz kips-ft	pMn kips-ft	Incl deg	pPn/Pu	pMn/Mu
88.00	778	505.1	355.5	70.7	1230.8	11.25	1.00	3.40
98.50	669	496.6	173.4	301.6	1230.2	60.10	1.00	3.54

Column Design
==========

Bot/Top Elev. ft	As_min in^2	As_max in^2	As_prov in^2
88.00	10.31	81.43	13.97
98.50	10.31	81.43	13.97

SHEAR DESIGN:
==========

Loc ft	Pos	Vu kips	Comb	phi*Vn kips	Av/s in^2/ft	Aprv/s in^2/ft	Vc kips	Vs kips	Beta	Theta deg	b in
88.00	L	22.2	165	490.6	0.00	0.62	399.36	145.73	6.71	27.67	36.00
98.50	R	21.6	165	443.5	0.00	0.62	349.94	142.85	5.88	28.14	36.00

SHEAR DESIGN:
==========

Note:
Min reinforcement = 1.0125 % of Ag.

- Pos is the design position. L suggests the calculation is done at immediate left of "Loc" and R suggests at immediate right of it.
- Av/s is the total required area of steel per unit length due to shear plus torsion.
- Aprvs/s is the total provided area of transverse steel reinforcement.
- Vc is the nominal shear resistence of concrete.
- Vs is the nominal shear resistence of transverse reinforcement.
- Beta is the factor indicating ability of diagonally cracked concrete to transmit tension and shear.
- Theta is the angle of inclination of diagonal compressive stress.
- # Vu is greater tha phi*Vn.

PROJECT:

COLUMN DESIGN
==========

COLUMN DESIGN - Column: 3 - Shaft

Shaft Type: Round D = 42.00 in

Code: AASHTO LRFD 8
Units: US
Pier View : Downstation.
Design/Analysis Method: No Slenderness Considered.

Shaft Section Properties:
==========

Sec.	Area ft^2	Ix in^4	Iz in^4
2	9.62	152745.02	152745.02

DESIGN PARAMETERS:
==========
f'c = 4000.0 psi fy = 60000.0 psi
phi as per LRFD 2007 with 2006 interims.
phi tens = 0.90 phi comp = 0.75
Tens above = 0.005 Comp below = 0.002
phi shear = 0.90 fy shear = 60000.00 psi
Ec = 4266.2 ksi Es = 29000 ksi
Concrete Type : Normal Weight.

Reinforcement:
==========
Rebar Pattern: Circular
Rebar Orientation: Face Parallel

Layer	Size	No. bars	Bar Dist. in	From ft	To ft	Hook
1	US#8[M25]	16	2.88	0.00	20.60	None

Note:
Bar Dist refers to the distance between center of reinforcement and concrete surface.

Layer	Size	Type	Pitch in	From ft	To ft
1	US#3[M10]	Ties	12.00	0.00	20.60

Design values used - (e-min effect included).
==========
(global coordinates)

Loc ft	Comb	Fx kips	Fy kips	Fz kips	Mx kips-ft	My kips-ft	Mz kips-ft
67.40	651	7.9	283.2	-22.1	-757.2	1.2	-157.0
88.00	651	-8.4	256.4	20.3	319.9	1.2	-39.7

Shaft Design (above fixity point)
==========

PROJECT:

Bot/Top Elev. ft	Comb	Pu kips	Mux kips-ft	Muz kips-ft	pMn kips-ft	Incl deg	pPn/Pu	pMn/Mu
67.40	651	283.2	757.2	157.0	1259.1	11.72	1.00	1.63
88.00	651	256.4	319.9	39.7	1227.9	7.08	1.00	3.81

Shaft Design (above fixity point)
==========

Bot/Top Elev. ft	As_min in^2	As_max in^2	As_prov in^2
67.40	14.03	110.84	12.64**
88.00	14.03	110.84	12.64**

SHEAR DESIGN:
==========

Loc ft	Pos	Vu kips	Comb	phi*Vn kips	Av/s in^2/ft	Aprv/s in^2/ft	Vc kips	Vs kips	Beta	Theta deg	b in
67.40	L	25.3	153	318.8	0.00	0.22	298.79	55.43	3.84	30.17	42.00
88.00	R	23.9	5	428.8	0.00	0.22	417.12	59.30	5.36	28.51	42.00

SHEAR DESIGN:
==========

Shaft Design (below fixity point)
==========

Diameter in	Height ft	Pu kips	Combo	pPn kips	pPn/Pu
42.00	10.00	900.91	8	3038.52	3.37 **

Note:
Min reinforcement = 0.9000 % of Ag.
** Minimum/Maximum requirement for reinforcement ratio violated.
** Bar spacing violated.
*** Auto-design only considered one layer of reinforcement. Please try providing additional layers of bars to satisfy the design requirements.

- Pos is the design position. L suggests the calculation is done at immediate left of "Loc" and R suggests at immediate right of it.
- Av/s is the total required area of steel per unit length due to shear plus torsion.
- Aprvs/s is the total provided area of transverse steel reinforcement.
- Vc is the nominal shear resistence of concrete.
- Vs is the nominal shear resistence of transverse reinforcement.
- Beta is the factor indicating ability of diagonally cracked concrete to transmit tension and shear.
- Theta is the angle of inclination of diagonal compressive stress.
- # Vu is greater tha phi*Vn.

PROJECT:

COLUMN DESIGN
==========

COLUMN DESIGN - Column: 3

Column Type: Round D = 36.00 in

Code: AASHTO LRFD 8
Units: US
Pier View : Downstation.
Design/Analysis Method: No Slenderness Considered.

Column Section Properties:
==========

Sec.	Area ft^2	Ix in^4	Iz in^4
2	7.07	82447.96	82447.96

DESIGN PARAMETERS:
==========
f'c = 4500.0 psi fy = 60000.0 psi
phi as per LRFD 2007 with 2006 interims.
phi tens = 0.90 phi comp = 0.75
Tens above = 0.005 Comp below = 0.002
phi shear = 0.90 fy shear = 60000.00 psi
Ec = 4435.3 ksi Es = 29000 ksi
Concrete Type : Normal Weight.

Reinforcement:
==========
Rebar Pattern: Circular
Rebar Orientation: Face Parallel

Layer	Size	No. bars	Bar Dist. in	From ft	To ft	Hook
1	US#10[M32]	11	3.25	0.00	10.50	None

Note:
Bar Dist refers to the distance between center of reinforcement and concrete surface.

Layer	Size	Type	Pitch in	From ft	To ft
1	US#5[M16]	Ties	12.00	0.00	10.50

Design values used - (e-min effect included).
==========
(global coordinates)

Loc ft	Comb	Fx kips	Fy kips	Fz kips	Mx kips-ft	My kips-ft	Mz kips-ft
88.00	543	20.6	323.5	-9.3	-197.4	-0.2	53.9
98.50	543	-19.9	314.9	9.5	98.1	-0.2	-265.9
88.00	651	8.4	256.4	-20.3	-319.9	1.2	35.9
98.50	651	-8.5	247.8	19.6	110.6	1.2	-99.1

PROJECT:

Column Design
==========

Bot/Top Elev. ft	Comb	Pu kips	Mux kips-ft	Muz kips-ft	pMn kips-ft	Incl deg	pPn/Pu	pMn/Mu
88.00	651	256.4	319.9	35.9	1055.8	6.40	1.00	3.28
98.50	543	314.9	98.1	265.9	1100.5	69.74	1.00	3.88

Column Design
==========

Bot/Top Elev. ft	As_min in^2	As_max in^2	As_prov in^2
88.00	10.31	81.43	13.97
98.50	10.31	81.43	13.97

SHEAR DESIGN:
==========

Loc ft	Pos	Vu kips	Comb	phi*Vn kips	Av/s in^2/ft	Aprv/s in^2/ft	Vc kips	Vs kips	Beta	Theta deg	b in
88.00	L	23.9	5	396.4	0.00	0.62	301.20	139.23	5.06	28.76	36.00
98.50	R	23.9	5	408.6	0.00	0.62	313.71	140.25	5.27	28.58	36.00

SHEAR DESIGN:
==========

Note:
Min reinforcement = 1.0125 % of Ag.

- Pos is the design position. L suggests the calculation is done at immediate left of "Loc" and R suggests at immediate right of it.
- Av/s is the total required area of steel per unit length due to shear plus torsion.
- Aprvs/s is the total provided area of transverse steel reinforcement.
- Vc is the nominal shear resistence of concrete.
- Vs is the nominal shear resistence of transverse reinforcement.
- Beta is the factor indicating ability of diagonally cracked concrete to transmit tension and shear.
- Theta is the angle of inclination of diagonal compressive stress.
- # Vu is greater tha phi*Vn.

Job	Forest Lakes	**Project No.**			
Description	Forest Lakes	**Designed by:**	cwt	**Date**	19-Jan-21
		Checked by:		**Date**	

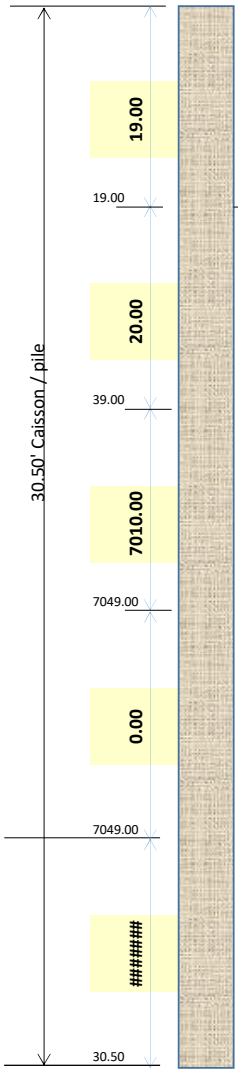
C:\Tepen\Forest Lakes\Lpile Pier\[LPile Inputs - Pier.xlsx]Abut 1

L-Pile Input
Pier #2

Section Type = **Caisson**
Section Shape = **Circle**

Section Diameter / Width =	**42.00**	in
Concrete Strength f'_c =	**4000**	psi
Max Concrete Aggregate Size =	**0.75**	in
Reinforcement Yield F_y =	**60000**	psi
Reinf Elastic Modulus E_s =	**29000**	ksi
Bar Size =	**10**	
No. of bars =	**11**	ea
Conrete Cover =	**5.00**	in
Offset Reinf from CL of Section =	**0.00**	in

Boring No. = **TB-5**
Ground Water Elev = **7032**



Top Caisson / Pile

Layer 1 — EL. = **7049.00**
Class 1 Backfill (Sand)
Sand (Reese)

Unit Weight γ_{soil} =	**120**	pcf	*Ground Water*
Angle of Internal Friction ϕ =	**32**	degrees	
Cohesion C =	-	psf	
Subgrade Reaction Coef K =	**90**	pci	
Strain Factor ε_{50} =	-	%	

19.00

Layer 2 — EL. = **7030.00**
Sandstone
Sand (Reese)

Unit Weight γ_{soil} =	**125**	pcf	*Ground Water*
Angle of Internal Friction ϕ =	**38**	degrees	
Cohesion C =	**4000**	psf	
Subgrade Reaction Coef K =	**225**	pci	
Strain Factor ε_{50} =	**0.005**	%	

39.00

Layer 3 — EL. = **7010.00**
Sandstone
Sand (Reese)

Unit Weight γ_{soil} =	**125**	pcf	*Ground Water*
Angle of Internal Friction ϕ =	**38**	degrees	
Cohesion C =	-	psf	
Subgrade Reaction Coef K =	**225**	pci	
Strain Factor ε_{50} =	-	%	

7049.00

Layer 4 — EL. =
Sandstone
Sand (Reese)

Unit Weight γ_{soil} =	**125**	pcf	*Ground Water*
Angle of Internal Friction ϕ =	**38**	degrees	
Cohesion C =	-	psf	
Subgrade Reaction Coef K =	**225**	pci	
Strain Factor ε_{50} =	-	%	

7049.00

Layer 5 — EL. =
Sandstone
Sand (Reese)

Unit Weight γ_{soil} =	**125**	pcf	*Ground Water*
Angle of Internal Friction ϕ =	**38**	degrees	
Cohesion C =	-	psf	
Subgrade Reaction Coef K =	**225**	pci	
Strain Factor ε_{50} =	-	%	

30.50

Bot Caisson / Pile
EL. = **7018.50**

Job	**Forest Lakes**	**Project No.**	
Description	**Forest Lakes**	**Designed by:** cwt	**Date** 19-Jan-21
		Checked by:	**Date**

C:\Tepen\Forest Lakes\Lpile Pier\[LPile Inputs - Pier.xlsx]Abut 1

L-Pile Input
Pier #2

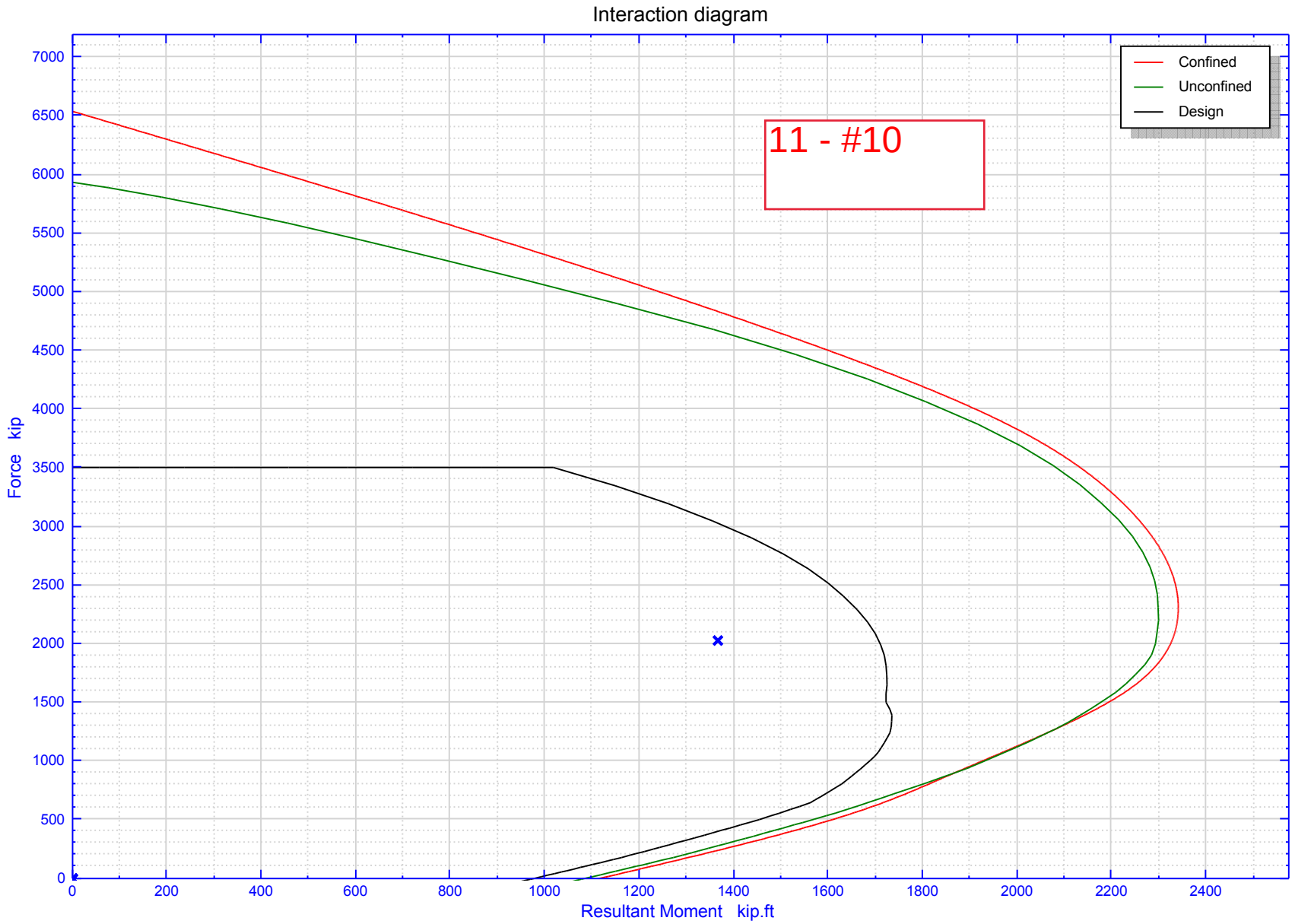
Service Loads (Top of Caisson)

Member 2, Node 2	Global Coordinates						(lbs)	(lb-in)
	F_x	F_y	F_z	M_x	M_y	M_z	F_R	M_R
Fx (max/min)	-16	**295**	7	141	0	-39	**17464**	**1755531**
	12	**589**	-7	-141	0	3	**13892**	**1692383**
Fy (max/min)	10	**662**	-12	-228	0	-2	**15620**	**2736105**
	-16	**268**	3	71	0	-59	**16279**	**1107776**
Fz (max/min)	-7	**547**	6	246	1	-27	**9220**	**2969727**
	4	**573**	-16	-246	1	-15	**16492**	**2957483**
Mx (max/min)	4	**573**	-16	-246	-1	-15	**16492**	**2957483**
	-7	**547**	16	246	1	-27	**17464**	**2969727**
Mz (max/min)	10	**360**	-3	-71	0	15	**10440**	**870807**
	-16	**497**	3	71	0	-70	**16279**	**1196455**
Member 4, Node 5	Global Coordinates						(lbs)	(lb-in)
	F_x	F_y	F_z	M_x	M_y	M_z	F_R	M_R
Fx (max/min)	-17	**480**	4	168	0	-63	**17464**	**2153089**
	17	**480**	-4	-168	0	63	**17464**	**2153089**
Fy (max/min)	11	**557**	-9	-262	0	15	**14213**	**3149148**
	-3	**222**	-1	-15	0	-11	**3162**	**223213**
Fz (max/min)	-7	**480**	13	273	0	-32	**14765**	**3298429**
	7	**480**	13	-273	0	32	**14765**	**3298429**
Mx (max/min)	7	**480**	-13	-273	0	32	**14765**	**3298429**
	-7	**480**	13	273	0	-32	**14765**	**3298429**
Mz (max/min)	17	**480**	-4	-167	0	63	**17464**	**2141857**
	-17	**480**	4	167	0	-63	**17464**	**2141857**

Factored Loads (Top of Caisson)

Member 2, Node 2	Global Coordinates						(lbs)	(lb-in)
	F_x	F_y	F_z	M_x	M_y	M_z	F_R	M_R
Fx (max/min)	-21	**396**	9	197	0	-54	**22847**	**2451204**
	18	**633**	-9	-197	0	24	**20125**	**2381479**
Fy (max/min)	12	**888**	-17	-307	0	-5	**20809**	**3684489**
	-18	**205**	4	103	0	-57	**18439**	**1412640**
Fz (max/min)	-11	**732**	20	320	1	-41	**22825**	**3871390**
	8	**770**	-20	-320	1	-22	**21541**	**3849064**
Mx (max/min)	8	**770**	-20	-320	-1	-22	**21541**	**3849064**
	-11	**732**	20	320	1	-41	**22825**	**3871390**
Mz (max/min)	15	**324**	-4	-103	0	40	**15524**	**1325932**
	-21	**668**	4	103	0	-96	**21378**	**1689615**
Member 4, Node 6	Global Coordinates						(lbs)	(lb-in)
	F_x	F_y	F_z	M_x	M_y	M_z	F_R	M_R
Fx (max/min)	-22	**630**	6	233	0	-82	**22804**	**2964097**
	22	**543**	-6	-233	0	82	**22804**	**2964097**
Fy (max/min)	15	**733**	-12	-352	0	20	**19209**	**4230813**
	-5	**195**	-2	-26	0	-20	**5385**	**393629**
Fz (max/min)	-10	**630**	16	356	0	-45	**18868**	**4305994**
	10	**630**	-16	-356	0	45	**18868**	**4305994**
Mx (max/min)	10	**630**	-16	-356	0	45	**18868**	**4305994**
	-10	**630**	16	356	0	-45	**18868**	**4305994**
Mz (max/min)	22	**543**	-6	-233	0	82	**22804**	**2964097**
	-22	**630**	6	233	0	-82	**22804**	**2964097**

Caisson Design – Pier 2


Interaction diagram
Confined
Unconfined
Design
11 - #10
Force kip
Resultant Moment kip.ft
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
6000
6500
7000
0
200
400
600
800
1000
1200
1400
1600
1800
2000
2200
2400

Job	**Forest Lakes**	**Project No.**			
Description	**Caisson Shear rienforcement**	**Designed by:**	**cwt**	**Date**	**19-Jan-21**
		Checked by:		**Date**	

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Column Ties

LRFD

Forest Lakes

AASHTO 5.7.4.6

~ Category A seismic only

Minimum required Spacing and Size

(AASHTO 5.10.6.3)

Longitudinal Bar size =	**10**		
Bars bundled =	**n**	(y / n)	
Column diameter =	**42.00**	in	
Tie type =	**tie**	(spiral or tie)	
Minimum tie size =	# 3 bars		**OK**
Minimum tie spacing =	12.00	in	**OK**

Minimum required Area of Spiral Steel

(AASHTO 5.7.4.6)

~ The ratio of spiral reinforcement to total volume of concrete core, measured out-to-out of spirals, shall satisfy:

$$\rho_s \geq 0.45\left(\frac{A_g}{A_c} - 1\right)\frac{f_c'}{f_y}$$

A_g =	1385.4	in^2 (gross area of concrete section)
Clear =	**5.00**	in (to tie bars)
A_c =	804.2	in^2 (area of core measured to outside diameter of the spiral)
f'_c =	**4.00**	ksi (strength of concrete at 28 days)
f_y =	**60.00**	ksi (yield strength of spiral reinforcement)

p_s >= 0.02168

Job	**Forest Lakes**	**Project No.**			
Description	**Caisson Shear rienforcement**	**Designed by:**	**cwt**	**Date**	**19-Jan-21**
		Checked by:		**Date**	

Z:\ctepen\Projects\Steamboat\Forest Lakes\Caissons\[Column Ties.xlsx]Sheet1

Column Ties

LRFD

Forest Lakes

Shear Stress, v

(AASHTO 5.8.2.9)

(AASHTO 5.8.2.9-1)

$$V = \frac{V_u - \Phi V_p}{\Phi b_v d_v}$$ *(Shear stress on the concrete)*

b_v = 42.00 in (diameter of column)

(AASHTO C5.8.2.9-2)

$$d_v = 0.9\left(\frac{D}{2} + \frac{D_r}{\pi}\right)$$

D = 42.00 in (diameter of column)

D_r = 29.48 in (diameter of the circle passing through the centers of the longitudinal reinf.)

d_v = 27.35 in

Φ = **0.90** Resistance Factor (AASHTO 5.5.4.2)

V_p = **0.00** kips (component of prestressing force in direction of the shear force)

V_u = **64.00** kips (factored shear force)

v = 0.06 ksi

Job	**Forest Lakes**	**Project No.**			
Description	**Caisson Shear rienforcement**	**Designed by:**	**cwt**	**Date**	**19-Jan-21**
		Checked by:		**Date**	

Z:\ctepen\Projects\Steamboat\Forest Lakes\Caissons\[Column Ties.xlsx]Sheet1

Column Ties

LRFD

Forest Lakes

Nominal Shear Resistance, V_n

(AASHTO 5.8.3.3)

$$V_{n1} = V_c + V_s + V_p$$
$$V_{n2} = 0.25 * f_c' b_v d_v + V_p$$

(lesser of V_n's)

$$V_c = 0.0316 * \beta \sqrt{f_c'} b_v d_v$$

β = **2.00** (AASHTO 5.8.3.4.1)

V_c = 145.17 kips

$$V_s = \frac{A_v f_y d_v (\cot(\Theta) + \cot(\alpha)) \sin(\alpha)}{s}$$

Θ = **45.00** degrees (AASHTO 5.8.3.4.1)

α = **90.00** degrees (angle of inclination of transverse reinf to longitudinal axis)

A_v = 0.307 in^2 / ft (area of shear reinf within a distance s)

V_s = 41.95 kips

V_{n1} = 187.12 kips

V_{n2} = 1148.507 kips

$V_{n\text{-control}}$ = 187.12 kips

Job	Forest Lakes	**Project No.**			
Description	Caisson Shear rienforcement	**Designed by:**	cwt	**Date**	19-Jan-21
		Checked by:		**Date**	

Z:\ctepen\Projects\Steamboat\Forest Lakes\Caissons\[Column Ties.xlsx]Sheet1

Column Ties

LRFD

Forest Lakes

Factored Shear Resistance, V_r

(AASHTO 5.8.2)

$V_r = \Phi V_n$

Φ = 0.90 Resistance Factor (AASHTO 5.5.4.2)

V_r = 168.41 kips **OK**

Minimum Transverse Reinforcement

(AASHTO 5.8.2.5)

$$A_v \geq 0.0316 \sqrt{f_c'} \frac{b_v s}{f_y}$$

A_v >= 0.531 **OK**

Maximum Spacing

(AASHTO 5.8.2.7)

$0.125 * f'_c$ = 0.5 ksi

v = 0.06 ksi

s_{max} = 0.8dv <=24"

s_{max} = 21.88 in **OK**

Use #	**5**	ties spa @	**12.00**	in
	A_s = 0.614		in^2 / ft	

~ Ties lap splices must be rotated

LPile – Service run

Files Used for Analysis

Path to file locations:
\ctepen\Projects\Steamboat\Forest Lakes\

Name of input data file:
Forest Lakes - P2 Service.lp11

Name of output report file:
Forest Lakes - P2 Service.lp11

Name of plot output file:
Forest Lakes - P2 Service.lp11

Name of runtime message file:
Forest Lakes - P2 Service.lp11

Date and Time of Analysis

Date: January 19, 2021 Time: 11:04:25

Problem Title

Project Name:Forest Lakes

Job Number:

Client:

Engineer: CT

Description:

Program Options and Settings

Computational Options:
- Use Load and Resistance Factors (LRFD) in computations

Engineering Units Used for Data Input and Computations:
- US Customary System Units (pounds, feet, inches)

Analysis Control Options:

- Maximum number of iterations allowed	=	500
- Deflection tolerance for convergence	=	1.0000E-05 in
- Maximum allowable deflection	=	100.0000 in
- Number of pile increments	=	100

Loading Type and Number of Cycles of Loading:
- Static loading specified

- Use of p-y modification factors for p-y curves not selected

```
 - Analysis uses layering correction (Method of Georgiadis)
 - No distributed lateral loads are entered
 - Loading by lateral soil movements acting on pile not selected
 - Input of shear resistance at the pile tip not selected
 - Input of moment resistance at the pile tip not selected
 - Computation of pile-head foundation stiffness matrix not selected
 - Push-over analysis of pile not selected
 - Buckling analysis of pile not selected

Output Options:
 - Output files use decimal points to denote decimal symbols.
 - Values of pile-head deflection, bending moment, shear force, and
   soil reaction are printed for full length of pile.
 - Printing Increment (nodal spacing of output points) = 1
 - No p-y curves to be computed and reported for user-specified depths
 - Print using wide report formats



--------------------------------------------------------------------------------
                     Pile Structural Properties and Geometry
--------------------------------------------------------------------------------

Number of pile sections defined                        =            1
Total length of pile                                   =       30.000 ft
Depth of ground surface below top of pile              =       2.0000 ft

Pile diameters used for p-y curve computations are defined using 2 points.

p-y curves are computed using pile diameter values interpolated with depth over
the length of the pile. A summary of values of pile diameter vs. depth follows.

            Depth Below           Pile
Point        Pile Head          Diameter
 No.            feet             inches
-----      -------------     -------------
  1             0.000           42.0000
  2            30.000           42.0000


Input Structural Properties for Pile Sections:
----------------------------------------------

Pile Section No. 1:

   Section 1 is a round drilled shaft, bored pile, or CIDH pile
   Length of section                                   =    30.000000 ft
   Shaft Diameter                                      =    42.000000 in
   Shear capacity of section                           =   232.000000 lbs
```

Ground Slope and Pile Batter Angles

Ground Slope Angle	=	0.000 degrees
	=	0.000 radians
Pile Batter Angle	=	0.000 degrees
	=	0.000 radians

Soil and Rock Layering Information

The soil profile is modelled using 2 layers

Layer 1 is sand, p-y criteria by Reese et al., 1974

Distance from top of pile to top of layer	=	2.000000 ft
Distance from top of pile to bottom of layer	=	19.000000 ft
Effective unit weight at top of layer	=	120.000000 pcf
Effective unit weight at bottom of layer	=	120.000000 pcf
Friction angle at top of layer	=	32.000000 deg.
Friction angle at bottom of layer	=	32.000000 deg.
Subgrade k at top of layer	=	90.000000 pci
Subgrade k at bottom of layer	=	90.000000 pci

Layer 2 is stiff clay with water-induced erosion

Distance from top of pile to top of layer	=	19.000000 ft
Distance from top of pile to bottom of layer	=	40.000000 ft
Effective unit weight at top of layer	=	125.000000 pcf
Effective unit weight at bottom of layer	=	125.000000 pcf
Undrained cohesion at top of layer	=	4000. psf
Undrained cohesion at bottom of layer	=	4000. psf
Epsilon-50 at top of layer	=	0.005000
Epsilon-50 at bottom of layer	=	0.005000
Subgrade k at top of layer	=	225.000000 pci
Subgrade k at bottom of layer	=	225.000000 pci

(Depth of the lowest soil layer extends 10.000 ft below the pile tip)

Summary of Input Soil Properties

Layer Num.	Soil Type Name (p-y Curve Type)	Layer Depth ft	Effective Unit Wt. pcf	Undrained Cohesion psf	Angle of Friction deg.	E50 or kpy krm pci
1	Sand (Reese, et al.)	2.0000 19.0000	120.0000 120.0000	-- --	32.0000 32.0000	-- 90.0000 -- 90.0000
2	Stiff Clay with Free Water	19.0000 40.0000	125.0000 125.0000	4000. 4000.	--	0.00500 225.0000 0.00500 225.0000

Static Loading Type

Static loading criteria were used when computing p-y curves for all analyses.

Loading Groups for LRFD Analysis

Number of Loading Groups = 4

Load Group	Load Type	Horiz. Force lbs	Moment in-lbs	Axial Force lbs	Number of Dist. Lds.
1	Special (Sp)	15620.00	2736105.00	662000.00	0
2	Special (Sp)	17464.00	2969727.00	547000.00	0
3	Special (Sp)	14765.00	3298429.00	480000.00	0
4	Special (Sp)	14213.00	3149148.00	557000.00	0

Totals of Loads by Load Type for LRFD Analyses:

Number of Defined Load Cases = 4

This table presents the sum of pile-head loads for each load type.

Load Type	Horiz. Force lbs	Moment in-lbs	Axial Force lbs	Number of Loads
Dead Loads (DL)	0.00	0.00	0.00	0
Live Loads (LL)	0.00	0.00	0.00	0
Earthquake (EQ)	0.00	0.00	0.00	0
Impact Load (IM)	0.00	0.00	0.00	0
Wind Loads (W)	0.00	0.00	0.00	0
Water Loads (HW)	0.00	0.00	0.00	0
Ice Loads (Ice)	0.00	0.00	0.00	0
Horiz. Soil (Hs)	0.00	0.00	0.00	0
Live Roof (Lr)	0.00	0.00	0.00	0
Rain Loads (Rn)	0.00	0.00	0.00	0
Snow Loads (Sn)	0.00	0.00	0.00	0
Temperature (Tm)	0.00	0.00	0.00	0
Special (Sp)	62062.00	12153409.00	2246000.00	4

Load and Resistance Factors by Load Combinations for LRFD Analyses

---

Number of Factored Load Combinations = 2

Summary of Load and Resistance Factors:

No.	DL	LL	EQ	IM	Wind	Watr	Ice	Soil	Roof	Rain	Snow	Temp	Spec	M Rf	V Rf	Name
1	1.00	1.00	--	--	1.00	--	--	1.00	--	--	--	1.00	1.00	1.00	1.00	Service 1
2	1.25	1.75	--	--	--	--	--	1.50	--	--	--	0.50	1.00	1.00	1.00	Strength 1

Computed Factored Loads for LRFD Analyses

Factored Load Combination No. 1

Load Combination Name = Service 1

Structural Resistance Factor for Flexure = 1.000
Structural Resistance Factor for Shear = 1.000

Factored Load = 1.00*DL + 1.00*LL + 1.00*W + 1.00*Hs + 1.00*Tm + 1.00*Sp

Factored Horizontal Force = 62062.00 lbs
Factored Vertical Force = 2246000.00 lbs
Factored Moment = 12153409.00 in-lbs

Factored Load Combination No. 2

Load Combination Name = Strength 1

Structural Resistance Factor for Flexure = 1.000
Structural Resistance Factor for Shear = 1.000

Factored Load = 1.25*DL + 1.75*LL + 1.50*Hs + 0.50*Tm + 1.00*Sp

Factored Horizontal Force = 62062.00 lbs
Factored Vertical Force = 2246000.00 lbs
Factored Moment = 12153409.00 in-lbs

Totals of Factored Loads by Load Combination:

Load Combination Number	Factored Horiz. Force lbs	Factored Moment in-lbs	Factored Vert. Force lbs	Load Combination Name
1	62062.00	12153409.00	2246000.00	Service 1

```
        2                   62062.00        12153409.00         2246000.00   Strength
1



Sorted Values of Axial Thrust Forces Sorted for LRFD Computations:
-----------------------------------------------------------------

Number of Unique Axial Thrust Values = 1

Number   Factored Axial Thrust
------   ---------------------
   1     2246000.000

-------------------------------------------------------------------------------
     Computations of Nominal Moment Capacity and Nonlinear Bending Stiffness
-------------------------------------------------------------------------------

Axial thrust force values were determined from LRFD load combinations

Number of Pile Sections Analyzed = 1

Pile Section No. 1:
-------------------

Dimensions and Properties of Drilled Shaft (Bored Pile):
--------------------------------------------------------

Length of Section                                    =    30.000000 ft
Shaft Diameter                                       =    42.000000 in
Concrete Cover Thickness (to edge of long. rebar)    =     5.625000 in
Number of Reinforcing Bars                           =           11 bars
Yield Stress of Reinforcing Bars                     =       60000. psi
Modulus of Elasticity of Reinforcing Bars            =    29000000. psi
Gross Area of Shaft                                  =        1385. sq. in.
Total Area of Reinforcing Steel                      =    13.970000 sq. in.
Area Ratio of Steel Reinforcement                    =         1.01 percent
Edge-to-Edge Bar Spacing                             =     7.035476 in
Maximum Concrete Aggregate Size                      =     0.750000 in
Ratio of Bar Spacing to Aggregate Size               =         9.38
Offset of Center of Rebar Cage from Center of Pile   =       0.0000 in
Confined Section
Type: Hoop
Number of Transverse Bars (per spacing)              =           30
Spacing of Transverse Bars                           =    12.000000 in
Yield Stress of Transverse Bars                      =       60000. psi
Total Area of Confinement Steel                      =     9.300000 sq. in.
rho_s                                                =     0.098805
```

ke = 1.127951
f'cc = 13212. psi
f'l = 3343. psi
Epsilon cc = 0.025031
Epsilon cu = 0.060535
r = 1.171535

Axial Structural Capacities:

Nom. Axial Structural Capacity = 0.85 Fc Ac + Fy As = 5501.206 kips
Tensile Load for Cracking of Concrete = -617.148 kips
Nominal Axial Tensile Capacity = -838.200 kips

Reinforcing Bar Dimensions and Positions Used in Computations:

Bar Number	Bar Diam. inches	Bar Area sq. in.	X inches	Y inches
1	1.270000	1.270000	14.740000	0.00000
2	1.270000	1.270000	12.400077	7.969046
3	1.270000	1.270000	6.123217	13.407976
4	1.270000	1.270000	-2.097721	14.589968
5	1.270000	1.270000	-9.652647	11.139749
6	1.270000	1.270000	-14.142926	4.152738
7	1.270000	1.270000	-14.142926	-4.152738
8	1.270000	1.270000	-9.652647	-11.139749
9	1.270000	1.270000	-2.097721	-14.589968
10	1.270000	1.270000	6.123217	-13.407976
11	1.270000	1.270000	12.400077	-7.969046

NOTE: The positions of the above rebars were computed by LPile

Minimum spacing between any two bars not equal to zero = 7.035 inches
between bars 10 and 11.

Ratio of bar spacing to maximum aggregate size = 9.38

Concrete Properties:

Compressive Strength of Concrete = 4000. psi
Modulus of Elasticity of Concrete = 3604997. psi
Modulus of Rupture of Concrete = -474.341649 psi
Compression Strain at Peak Stress = 0.001886
Tensile Strain at Fracture of Concrete = -0.0001154
Maximum Coarse Aggregate Size = 0.750000 in

Number of Axial Thrust Force Values Determined from LRFD Pile-head Loadings = 1

Number	Axial Thrust Force kips
1	2246.000

Definitions of Run Messages and Notes:

C = concrete in section has cracked in tension.
Y = stress in reinforcing steel has reached yield stress.
T = ACI 318 criteria for tension-controlled section met, tensile strain in reinforcement exceeds 0.005 while simultaneously compressive strain in concrete more than 0.003. See ACI 318, Section 10.3.4.
Z = depth of tensile zone in concrete section is less than 10 percent of section depth.

Bending Stiffness (EI) = Computed Bending Moment / Curvature.
Position of neutral axis is measured from edge of compression side of pile.
Compressive stresses and strains are positive in sign.
Tensile stresses and strains are negative in sign.

Axial Thrust Force = 2246.000 kips

Bending Max Conf Curvature Stress rad/in. ksi	Bending Max Conc Moment Stress in-kip ksi	Bending Max Steel Stiffness Stress kip-in2 ksi	Run Msg	Depth to N Axis in	Max Comp Strain in/in	Max Tens Strain in/in
6.25000E-07	339.4212294	543073967.		688.4118463	0.0004303	0.0004040
1.4769185	1.6162486	12.3746960				
0.00000125	680.9915485	544793239.		354.7330671	0.0004434	0.0003909
1.5190834	1.6587112	12.6535362				
0.00000188	1023.	545354370.		243.5188248	0.0004566	0.0003778
1.5611655	1.7008646	12.9330299				
0.00000250	1364.	545621139.		187.9207172	0.0004698	0.0003648
1.6031639	1.7427069	13.2131770				
0.00000313	1706.	545766301.		154.5690639	0.0004830	0.0003518
1.6450780	1.7842361	13.4939777				
0.00000375	2047.	545847440.		132.3406384	0.0004963	0.0003388
1.6869070	1.8254502	13.7754319				
0.00000438	2388.	545889235.		116.4683437	0.0005095	0.0003258

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1.7286503    1.8663472    14.0575399
0.00000500        2730.    545904026.   104.5686312    0.0005228    0.0003128
1.7703071    1.9069251    14.3403015
0.00000563        3071.    545898665.    95.3173076    0.0005362    0.0002999
1.8118769    1.9471819    14.6237170
0.00000625        3412.    545877266.    87.9198569    0.0005495    0.0002870
1.8533589    1.9871157    14.9077865
0.00000688        3753.    545842443.    81.8706780    0.0005629    0.0002741
1.8947526    2.0267245    15.1925102
0.00000750        4093.    545795941.    76.8327036    0.0005762    0.0002612
1.9360575    2.0660062    15.4778880
0.00000813        4434.    545738966.    72.5725796    0.0005897    0.0002484
1.9772729    2.1049588    15.7639203
0.00000875        4775.    545672379.    68.9236245    0.0006031    0.0002356
2.0183982    2.1435804    16.0506072
0.00001000        5455.    545512734.    63.0008467    0.0006300    0.0002100
2.1003769    2.2198223    16.6259456
0.00001125        6135.    545320413.    58.4022750    0.0006570    0.0001845
2.1819893    2.2947160    17.2039048
0.00001250        6814.    545097453.    54.7306530    0.0006841    0.0001591
2.2632319    2.3682452    17.7844868
0.00001375        7492.    544845138.    51.7331816    0.0007113    0.0001338
2.3441009    2.4403937    18.3676937
0.00001500        8168.    544564313.    49.2413287    0.0007386    0.0001086
2.4245933    2.5111454    18.9535280
0.00001625        8844.    544255552.    47.1384186    0.0007660   0.00008350
2.5047058    2.5804839    19.5419923
0.00001750        9519.    543919252.    45.3411120    0.0007935   0.00005847
2.5844357    2.6483929    20.1330894
0.00001875       10192.    543555694.    43.7882939    0.0008210   0.00003353
2.6637803    2.7148560    20.7268223
0.00002000       10863.    543165073.    42.4341283    0.0008487   0.00000868
2.7427372    2.7798567    21.3231945
0.00002125       11533.    542746812.    41.2435571    0.0008764  -0.00001607
2.8213036    2.8433781    21.9222046
0.00002250       12201.    542287792.    40.1891778    0.0009043  -0.00004074
2.8994684    2.9053966    22.5237636
0.00002375       12867.    541764187.    39.2491992    0.0009322  -0.00006533
2.9772104    2.9658810    23.1276735
0.00002500       13529.    541156621.    38.4061646    0.0009602  -0.00008985
3.0545077    3.0248008    23.7337194
0.00002625       13911.    529938499.    37.5240000    0.0009850   -0.0001175
3.1225221    3.0756122    24.2488576 C
0.00002750       14428.    524647941.    36.7790911    0.0010114   -0.0001436
3.1943204    3.1281740    24.8095002 C
0.00003000       15379.    512623067.    35.4459654    0.0010634   -0.0001966
3.3338272    3.2270312    25.9050900 C
0.00003250       16236.    499578502.    34.2856942    0.0011143   -0.0002507
3.4683840    3.3181076    26.9702918 C
0.00003500       17016.    486163377.    33.2644572    0.0011643   -0.0003057
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3.5984427     3.4019444    28.0083742 C
0.00003750        17730.     472789047.    32.3574772     0.0012134    -0.0003616
3.7244341     3.4790272    29.0226316 C
0.00004000        18388.     459688892.    31.5456112     0.0012618    -0.0004182
3.8467106     3.5497554    30.0157092 C
0.00004250        18998.     447008410.    30.8142270     0.0013096    -0.0004754
3.9656077     3.6144852    30.9902599 C
0.00004500        19565.     434773390.    30.1504288     0.0013568    -0.0005332
4.0812770     3.6734487    31.9469597 C
0.00004750        20096.     423075465.    29.5460802     0.0014034    -0.0005916
4.1940995     3.7269729    32.8893007 C
0.00005000        20594.     411872422.    28.9921460     0.0014496    -0.0006504
4.3041351     3.7752060    33.8171119 C
0.00005250        21063.     401208268.    28.4836130     0.0014954    -0.0007096
4.4117275     3.8184061    34.7337253 C
0.00005750        21929.     381368731.    27.5807969     0.0015859    -0.0008291
4.6200484     3.8902478    36.5362540 C
0.00006250        22709.     363343118.    26.8032250     0.0016752    -0.0009498
4.8200473     3.9434932    38.3039704 C
0.00006750        23420.     346964393.    26.1278971     0.0017636    -0.0010714
5.0128087     3.9789571    40.0463338 C
0.00007250        24072.     332025498.    25.5364032     0.0018514    -0.0011936
5.1990559     3.9971774    41.7691120 C
0.00007750        24673.     318362424.    25.0160744     0.0019387    -0.0013163
5.3796148     3.9990610    43.4803023 C
0.00008250        25225.     305757605.    24.5555241     0.0020258    -0.0014392
5.5549451     3.9996989    45.1836166 C
0.00008750        25735.     294113846.    24.1464723     0.0021128    -0.0015622
5.7255600     3.9998291    46.8840487 C
0.00009250        26209.     283337540.    23.7804974     0.0021997    -0.0016853
5.8915913     3.9996827    48.5814094 C
0.00009750        26653.     273367151.    23.4516918     0.0022865    -0.0018085
6.0533108     3.9990079    50.2777339 C
 0.0001025        27075.     264144606.    23.1555495     0.0023734    -0.0019316
6.2110192     3.9999298    51.9757962 C
 0.0001075        27478.     255613095.    22.8886032     0.0024605    -0.0020545
6.3650342     3.9986014    53.6789959 C
 0.0001125        27862.     247660973.    22.6423730     0.0025473    -0.0021777
6.5145589     3.9993455    55.3723672 C
 0.0001175        28235.     240301967.    22.4192754     0.0026343    -0.0023007
6.6607495     3.9996777    57.0731561 C
 0.0001225        28596.     233438310.    22.2122468     0.0027210    -0.0024240
6.8028339     3.9997735    58.7663321 C
 0.0001275        28950.     227061149.    22.0234026     0.0028080    -0.0025470
6.9417664     3.9997330    60.0000000 CY
 0.0001325        29290.     221058104.    21.8471251     0.0028947    -0.0026703
7.0768859     3.9995018    60.0000000 CY
 0.0001375        29618.     215401128.    21.6888495     0.0029822    -0.0027928
7.2097393     3.9989761    60.0000000 CY
 0.0001425        29929.     210030985.    21.5429149     0.0030699    -0.0029151
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 7.3395486     3.9978892    60.0000000 CY
  0.0001475        30210.     204813674.    21.4039595     0.0031571    -0.0030379
 7.4655157     3.9997373    60.0000000 CY
  0.0001525        30447.     199652849.    21.2709746     0.0032438    -0.0031612
 7.5877114     3.9995715    60.0000000 CY
  0.0001575        30649.     194599996.    21.1417751     0.0033298    -0.0032852
 7.7059238     3.9977420    60.0000000 CY
  0.0001625        30818.     189648692.    21.0138194     0.0034147    -0.0034103
 7.8198327     3.9999425    60.0000000 CY
  0.0001675        30975.     184925117.    20.8934600     0.0034997    -0.0035353
 7.9310410     3.9982155    60.0000000 CY
  0.0001725        31130.     180464081.    20.7806688     0.0035847    -0.0036603
 8.0397640     3.9999804    60.0000000 CY
  0.0001775        31272.     176179840.    20.6690369     0.0036688    -0.0037862
 8.1447854     3.9978243    60.0000000 CY
  0.0001825        31396.     172032272.    20.5601781     0.0037522    -0.0039128
 8.2466366     3.9998391    60.0000000 CY
  0.0001875        31396.     167444745.    20.4854616     0.0038410    -0.0040340
 8.3525006     3.9967976    60.0000000 CY
  0.0001925        31396.     163095531.    20.4409914     0.0039349    -0.0041501
 8.4617053     3.9998084    60.0000000 CY
  0.0001975        31396.     158966530.    20.4163609     0.0040322    -0.0042628
 8.5720646     3.9969350    60.0000000 CY
  0.0002025        31396.     155041431.    20.4083215     0.0041327    -0.0043723
 8.6829575     3.9999383    60.0000000 CY
  0.0002075        31396.     151305493.    20.4135406     0.0042358    -0.0044792
 8.7937245     3.9975075    60.0000000 CY
  0.0002125        31396.     147745363.    20.4294752     0.0043413    -0.0045837
 8.9038710     3.9998064    60.0000000 CY
  0.0002175        31396.     144348918.    20.4541466     0.0044488    -0.0046862
 9.0130213     3.9981130    60.0000000 CY
  0.0002225        31396.     141105122.    20.4861823     0.0045582    -0.0047868
 9.1209302     3.9973101    60.0000000 CY
  0.0002275        31396.     138003911.    20.5248825     0.0046694    -0.0048856
 9.2274968     3.9985764    60.0000000 CY
  0.0002325        31396.     135036085.    20.5689163     0.0047823    -0.0049827
 9.3324812     3.9951946    60.0000000 CY
  0.0002375        31396.     132193220.    20.6182440     0.0048968    -0.0050782
 9.4359216     3.9988622    60.0000000 CY
  0.0002425        31396.     129467586.    20.6723164     0.0050130    -0.0051720
 9.5377433     3.9936227    60.0000000 CY
  0.0002475        31396.     126852080.    20.7295352     0.0051306    -0.0052644
 9.6376520     3.9989790    60.0000000 CY
  0.0002525        31396.     124340157.    20.7801400     0.0052470    -0.0053580
 9.7336738     3.9936858    60.0000000 CY
  0.0002725        31396.     115214274.    20.6743871     0.0056338    -0.0058112
10.0323865     3.9915736    60.0000000 CY
  0.0002925        31396.     107336375.    20.5652192     0.0060153    -0.0062697
10.2998800     3.9957421    60.0000000 CY
  0.0003125        31396.     100466847.    20.4642219     0.0063951    -0.0067299
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10.5422046     3.9995801    60.0000000 CY
  0.0003325        31396.     94423728.    20.3028663     0.0067507    -0.0072143
10.7496049     3.9902467    60.0000000 CY
  0.0003525        31396.     89066354.    20.1555884     0.0071048    -0.0077002
10.9393456     3.9984442    60.0000000 CY
  0.0003725        31396.     84284268.    20.0849486     0.0074816    -0.0081634
11.1247316     3.9870209    60.0000000 CY
  0.0003925        31396.     79989528.    19.9021788     0.0078116    -0.0086734
11.2740484     3.9905484    60.0000000 CY
  0.0004125        31396.     76111248.    19.7815746     0.0081599    -0.0091651
11.4199983     3.9971899    60.0000000 CY
  0.0004325        31396.     72591653.    19.6700053     0.0085073    -0.0096577
11.5545496     3.9999045    60.0000000 CY
  0.0004525        31396.     69383182.    19.5687069     0.0088548    -0.0101502
11.6791139     3.9900475    60.0000000 CY
  0.0004725        31396.     66446327.    19.4177962     0.0091749    -0.0106701
11.7855484     3.9858247    60.0000000 CY
  0.0004925        31396.     63747999.    19.3306187     0.0095203    -0.0111647
11.8924519     3.9830425    60.0000000 CY
  0.0005125        31396.     61260273.    19.2015248     0.0098408    -0.0116842
11.9846240     3.9845145    60.0000000 CY
  0.0005325        31396.     58959417.    19.1321576     0.0101879    -0.0121771
12.0776369     3.9918254    60.0000000 CY
  0.0005525        31396.     56825140.    19.0141115     0.0105053    -0.0126997
12.1567769     3.9922832    60.0000000 CY
  0.0005725        31396.     54839982.    18.9039428     0.0108225    -0.0132225
12.2307162     3.9926897    60.0000000 CY
  0.0005925        31396.     52988843.    18.8498627     0.0111685    -0.0137165
12.3060107     3.9972340    60.0000000 CY
  0.0006125        31396.     51258595.    18.7549964     0.0114874    -0.0142376
12.3706516     3.9976510    60.0000000 CY
  0.0006325        31396.     49637770.    18.6650035     0.0118056    -0.0147594
12.4309943     3.9979664    60.0000000 CY
  0.0006525        31396.     48116306.    18.5750146     0.0121202    -0.0152848
12.4868440     3.9979263    60.0000000 CY
  0.0006725        31396.     46685338.    18.5372122     0.0124663    -0.0157787
12.5442842     3.9998416    60.0000000 CY
  0.0006925        31396.     45337025.    18.4570504     0.0127815    -0.0163035
12.5930782     3.9998477    60.0000000 CY
  0.0007125        31396.     44064407.    18.3825178     0.0130975    -0.0168275
12.6389054     3.9998736    60.0000000 CY
  0.0007325        31396.     42861283.    18.3112950     0.0134130    -0.0173520
12.6817580     3.9998848    60.0000000 CY
  0.0007525        31396.     41722113.    18.2852042     0.0137596    -0.0178454
12.7257718     3.9932685    60.0000000 CY
  0.0007725        31396.     40641928.    18.2134731     0.0140699    -0.0183751
12.7625261     3.9947449    60.0000000 CY
  0.0007925        31396.     39616265.    18.1433428     0.0143786    -0.0189064
12.7968113     3.9967226    60.0000000 CY
  0.0008125        31396.     38641095.    18.0747293     0.0146857    -0.0194393
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12.8287991     3.9991937    60.0000000 CY
  0.0008325        31396.     37712780.    18.0103218     0.0149936    -0.0199714
12.8588680     3.9999767    60.0000000 CY
  0.0008525        31396.     36828023.    17.9497911     0.0153022    -0.0205028
12.8871165     3.9998652    60.0000000 CY
  0.0008725        31396.     35983828.    17.8919332     0.0156107    -0.0210343
12.9135712     3.9996583    60.0000000 CY
  0.0008925        31396.     35177467.    17.8353840     0.0159181    -0.0215669
12.9382513     3.9992936    60.0000000 CY
  0.0009125        31396.     34406454.    17.7757582     0.0162204    -0.0221046
12.9609797     3.9983965    60.0000000 CY
  0.0009325        31396.     33668514.    17.7645971     0.0165655    -0.0225995
12.9852082     3.9999341    60.0000000 CY
  0.0009525        31396.     32961564.    17.7101208     0.0168689    -0.0231361
13.0050097     3.9995832    60.0000000 CY
  0.0009725        31396.     32283691.    17.6585454     0.0171729    -0.0236721
13.0235585     3.9989740    60.0000000 CY
  0.0009925        31396.     31633138.    17.6096791     0.0174776    -0.0242074
13.0409145     3.9981524    60.0000000 CY
  0.0010125        31396.     31008286.    17.5633457     0.0177829    -0.0247421
13.0571346     3.9971603    60.0000000 CY
  0.0010325        31396.     30407641.    17.5193825     0.0180888    -0.0252762
13.0722724     3.9960355    60.0000000 CY
  0.0010525        31396.     29829824.    17.4776392     0.0183952    -0.0258098
13.0863790     3.9948122    60.0000000 CY
  0.0011725        31396.     26776878.    17.2357932     0.0202090    -0.0290360
13.1508962     3.9766303    60.0000000 CY
  0.0012925        31396.     24290824.    17.0830296     0.0220798    -0.0322052
13.1901261     3.9700095    60.0000000 CY
  0.0014125        31396.     22227179.    16.9153249     0.0238929    -0.0354321
13.2084509     3.9351100    60.0000000 CY
  0.0015325        31396.     20486714.    16.7699755     0.0257000    -0.0386650
13.2123025     3.8995182    60.0000000 CY
  0.0016525        31396.     18999026.    16.6537004     0.0275202    -0.0418848
13.2124577     3.9055841    60.0000000 CY
  0.0017725        31396.     17712773.    16.5512623     0.0293371    -0.0451079
13.2123841     3.9127097    60.0000000 CY
  0.0018925        31396.     16589638.    16.4524607     0.0311363    -0.0483487
13.2124270     3.9253857    60.0000000 CY
  0.0020125        31396.     15600442.    16.4069889     0.0330191    -0.0515059
13.2124609     3.9118467    60.0000000 CY
  0.0021325        31396.     14722574.    16.3331739     0.0348305    -0.0547345
13.2121875     3.9206792    60.0000000 CY
  0.0022525        31396.     13938242.    16.2709385     0.0366503    -0.0579547
13.2123862     3.9268883    60.0000000 CY
  0.0023725        31396.     13233252.    16.2183104     0.0384779    -0.0611671
13.2124641     3.9306342    60.0000000 CY
  0.0024925        31396.     12596144.    16.1731890     0.0403117    -0.0643733
13.2124457     3.9324744    60.0000000 CY
  0.0026125        31396.     12017565.    16.1118699     0.0420923    -0.0676327
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  13.2124589     3.9509760    60.0000000 CY
    0.0027325         31412.     11495630.    16.0573320     0.0438767    -0.0708883
  13.2124492     3.9682827    60.0000000 CY
    0.0028525         31445.     11023521.    16.0097532     0.0456678    -0.0741372
  13.2122648     3.9834694    60.0000000 CY
    0.0029725         31475.     10588594.    15.9681266     0.0474653    -0.0773797
  13.2118607     3.9966897    60.0000000 CY
    0.0030925         31502.     10186582.    15.9317103     0.0492688    -0.0806162
  13.2123860     3.9992699    60.0000000 CY
    0.0032125         31524.      9812796.    15.8951414     0.0510631    -0.0838619
  13.2123220     3.9943717    60.0000000 CY
    0.0033325         31542.      9465109.    15.8619268     0.0528599    -0.0871051
  13.2119593     3.9854857    60.0000000 CY
    0.0034525         31559.      9141052.    15.8325464     0.0546619    -0.0903431
  13.2124476     3.9742877    60.0000000 CY
    0.0035725         31575.      8838275.    15.8064984     0.0564687    -0.0935763
  13.2116599     3.9619464    60.0000000 CY
    0.0036925         31588.      8554729.    15.7833570     0.0582800    -0.0968050
  13.2124479     3.9493538    60.0000000 CY
    0.0038125         31600.      8288623.    15.7627581     0.0600955    -0.1000295
  13.2117524     3.9371834    60.0000000 CY
    0.0039325         31609.      8037998.    15.7397050     0.0618964    -0.1032686
  13.2123023     3.9149154    60.0000000 CY


-------------------------------------------------------------------------------
   Summary of Results for Nominal Moment Capacity for Section 1
-------------------------------------------------------------------------------

Moment values interpolated at maximum compressive strain = 0.003
or maximum developed moment if pile fails at smaller strains.

 Load           Axial Thrust        Nominal Mom. Cap.      Max. Comp.
  No.              kips                 in-kip               Strain
 ----         ----------------     ------------------     ------------
   1              2246.000             29680.909           0.00300000

Note that the values of moment capacity in the table above are not
factored by a strength reduction factor (phi-factor).

In ACI 318, the value of the strength reduction factor depends on whether
the transverse reinforcing steel bars are tied hoops (0.65) or spirals (0.70).

The above values should be multiplied by the appropriate strength reduction
factor to compute ultimate moment capacity according to ACI 318, Section
9.3.2.2 or the value required by the design standard being followed.

The following table presents factored moment capacities and corresponding
bending stiffnesses computed for common resistance factor values used for
reinforced concrete sections.
```

Axial Load No.	Resist. Factor for Moment	Nominal Moment Cap in-kips	Ult. (Fac) Ax. Thrust kips	Ult. (Fac) Moment Cap in-kips	Bend. Stiff. at Ult Mom kip-in^2
1	0.65	29681.	1460.	19293.	440647887.
1	0.75	29681.	1572.	22261.	373699151.
1	0.90	29681.	1684.	26713.	272064899.

Layering Correction Equivalent Depths of Soil & Rock Layers

Layer No.	Top of Layer Below Pile Head ft	Equivalent Top Depth Below Grnd Surf ft	Same Layer Type As Layer Above	Layer is Rock or is Below Rock Layer	F0 Integral for Layer lbs	F1 Integral for Layer lbs
1	2.0000	0.00	N.A.	No	0.00	657229.
2	19.0000	188.9419	No	No	657229.	N.A.

Notes: The F0 integral of Layer n+1 equals the sum of the F0 and F1 integrals for Layer n. Layering correction equivalent depths are computed only for soil types with both shallow-depth and deep-depth expressions for peak lateral load transfer. These soil types are soft and stiff clays, non-liquefied sands, and cemented c-phi soil.

Computed Values of Pile Loading and Deflection
for Lateral Loading for LRFD Load Case Number 1

Load Case No. 1: Service 1

Depth X	Deflect. y	Bending Moment	Shear Force	Slope S	Total Stress	Bending Stiffness	Soil Res.	Soil Spr. p	Distrib.

Es*h feet	Lat. Load inches	in-lbs	lbs	radians	psi*	in-lb^2 lb/inch	lb/inch	lb/inch
0.00	0.9533	1.22E+07	62062.	-0.00784	0.00	5.42E+11	0.00	0.00	0.00
0.3000	0.9252	1.24E+07	62062.	-0.00775	0.00	5.42E+11	0.00	0.00	0.00
0.6000	0.8974	1.27E+07	62062.	-0.00767	0.00	5.42E+11	0.00	0.00	0.00
0.9000	0.8700	1.30E+07	62062.	-0.00759	0.00	5.42E+11	0.00	0.00	0.00
1.2000	0.8428	1.33E+07	62062.	-0.00750	0.00	5.41E+11	0.00	0.00	0.00
1.5000	0.8160	1.36E+07	62062.	-0.00741	0.00	5.40E+11	0.00	0.00	0.00
1.8000	0.7895	1.39E+07	62062.	-0.00732	0.00	5.31E+11	0.00	0.00	0.00
2.1000	0.7633	1.41E+07	62021.	-0.00722	0.00	5.27E+11	-22.9016	108.0127	0.00
2.4000	0.7375	1.44E+07	61810.	-0.00712	0.00	5.25E+11	-94.2411	460.0404	0.00
2.7000	0.7120	1.47E+07	61336.	-0.00702	0.00	5.21E+11	-168.8828	853.8925	0.00
3.0000	0.6869	1.50E+07	60590.	-0.00692	0.00	5.17E+11	-245.9963	1289.	0.00
3.3000	0.6622	1.53E+07	59562.	-0.00681	0.00	5.14E+11	-324.7030	1765.	0.00
3.6000	0.6378	1.55E+07	58250.	-0.00671	0.00	5.10E+11	-404.1373	2281.	0.00
3.9000	0.6139	1.58E+07	56652.	-0.00660	0.00	5.06E+11	-484.0203	2838.	0.00
4.2000	0.5904	1.60E+07	54765.	-0.00648	0.00	5.02E+11	-563.9723	3439.	0.00
4.5000	0.5672	1.63E+07	52593.	-0.00637	0.00	4.99E+11	-642.8448	4080.	0.00
4.8000	0.5445	1.65E+07	50140.	-0.00625	0.00	4.95E+11	-719.9479	4760.	0.00
5.1000	0.5222	1.67E+07	47414.	-0.00613	0.00	4.91E+11	-794.6132	5478.	0.00
5.4000	0.5004	1.70E+07	44424.	-0.00600	0.00	4.87E+11	-866.1946	6231.	0.00
5.7000	0.4790	1.72E+07	41181.	-0.00588	0.00	4.83E+11	-935.6460	7032.	0.00
6.0000	0.4581	1.73E+07	37693.	-0.00575	0.00	4.80E+11	-1002.	7874.	0.00
6.3000	0.4377	1.75E+07	33974.	-0.00561	0.00	4.76E+11	-1064.	8753.	0.00
6.6000	0.4177	1.77E+07	30040.	-0.00548	0.00	4.74E+11			

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-1121.      9666.       0.00
    6.9000     0.3982   1.78E+07     25909.   -0.00535       0.00   4.71E+11
-1174.     10610.       0.00
    7.2000     0.3792   1.80E+07     21601.   -0.00521       0.00   4.68E+11
-1220.     11581.       0.00
    7.5000     0.3607   1.81E+07     17124.   -0.00507       0.00   4.66E+11
-1267.     12649.       0.00
    7.8000     0.3427   1.82E+07     12483.   -0.00493       0.00   4.64E+11
-1311.     13769.       0.00
    8.1000     0.3252   1.82E+07      7697.   -0.00479       0.00   4.63E+11
-1348.     14927.       0.00
    8.4000     0.3082   1.83E+07      2786.   -0.00465       0.00   4.61E+11
-1380.     16119.       0.00
    8.7000     0.2917   1.83E+07     -2228.   -0.00450       0.00   4.61E+11
-1405.     17340.       0.00
    9.0000     0.2758   1.84E+07     -7320.   -0.00436       0.00   4.60E+11
-1424.     18586.       0.00
    9.3000     0.2604   1.83E+07    -12485.   -0.00422       0.00   4.60E+11
-1445.     19984.       0.00
    9.6000     0.2454   1.83E+07    -17715.   -0.00407       0.00   4.61E+11
-1461.     21426.       0.00
    9.9000     0.2310   1.83E+07    -22991.   -0.00393       0.00   4.62E+11
-1470.     22907.       0.00
   10.2000     0.2171   1.82E+07    -28289.   -0.00379       0.00   4.63E+11
-1473.     24424.       0.00
   10.5000     0.2038   1.81E+07    -33586.   -0.00365       0.00   4.64E+11
-1470.     25971.       0.00
   10.8000     0.1909   1.80E+07    -38862.   -0.00351       0.00   4.66E+11
-1461.     27554.       0.00
   11.1000     0.1785   1.79E+07    -44101.   -0.00337       0.00   4.69E+11
-1449.     29230.       0.00
   11.4000     0.1666   1.78E+07    -49286.   -0.00323       0.00   4.72E+11
-1431.     30914.       0.00
   11.7000     0.1553   1.76E+07    -54392.   -0.00310       0.00   4.75E+11
-1406.     32592.       0.00
   12.0000     0.1443   1.74E+07    -59393.   -0.00296       0.00   4.78E+11
-1373.     34248.       0.00
   12.3000     0.1339   1.72E+07    -64266.   -0.00283       0.00   4.82E+11
-1334.     35863.       0.00
   12.6000     0.1239   1.70E+07    -68997.   -0.00271       0.00   4.86E+11
-1294.     37594.       0.00
   12.9000     0.1144   1.68E+07    -73597.   -0.00258       0.00   4.90E+11
-1261.     39672.       0.00
   13.2000     0.1054   1.65E+07    -78066.   -0.00246       0.00   4.94E+11
-1222.     41750.       0.00
   13.5000    0.09671   1.63E+07    -82383.   -0.00234       0.00   4.99E+11
-1177.     43811.       0.00
   13.8000    0.08850   1.60E+07    -86530.   -0.00223       0.00   5.03E+11
-1127.     45835.       0.00
   14.1000    0.08069   1.57E+07    -90456.   -0.00211       0.00   5.08E+11
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-1054.     47045.       0.00
   14.4000    0.07329   1.54E+07    -94121.   -0.00200       0.00   5.13E+11
-981.4534     48211.       0.00
   14.7000    0.06627   1.50E+07    -97524.   -0.00190       0.00   5.17E+11
-908.9595     49378.       0.00
   15.0000    0.05963   1.47E+07   -100667.   -0.00179       0.00   5.21E+11
-837.2123     50544.       0.00
   15.3000    0.05336   1.43E+07   -103553.   -0.00169       0.00   5.26E+11
-766.4106     51710.       0.00
   15.6000    0.04744   1.40E+07   -106187.   -0.00160       0.00   5.29E+11
-696.7362     52877.       0.00
   15.9000    0.04186   1.36E+07   -108572.   -0.00150       0.00   5.39E+11
-628.3614     54043.       0.00
   16.2000    0.03661   1.32E+07   -110714.   -0.00141       0.00   5.41E+11
-561.3856     55210.       0.00
   16.5000    0.03167   1.28E+07   -112617.   -0.00133       0.00   5.42E+11
-495.9603     56376.       0.00
   16.8000    0.02704   1.24E+07   -114288.   -0.00124       0.00   5.42E+11
-432.2403     57542.       0.00
   17.1000    0.02271   1.20E+07   -115732.   -0.00116       0.00   5.42E+11
-370.3654     58709.       0.00
   17.4000    0.01867   1.16E+07   -116958.   -0.00108       0.00   5.43E+11
-310.4610     59875.       0.00
   17.7000    0.01490   1.12E+07   -117971.   -0.00101       0.00   5.43E+11
-252.6377     61042.       0.00
   18.0000    0.01140   1.08E+07   -118781.  -9.36E-04       0.00   5.43E+11
-196.9918     62208.       0.00
   18.3000    0.00816   1.04E+07   -119394.  -8.66E-04       0.00   5.43E+11
-143.6049     63374.       0.00
   18.6000    0.00516   9932597.   -119819.  -7.99E-04       0.00   5.44E+11
-92.5447     64541.       0.00
   18.9000    0.00240   9506846.   -120064.  -7.35E-04       0.00   5.44E+11
-43.8649     65707.       0.00
   19.2000  -1.29E-04   9080017.   -120133.  -6.73E-04       0.00   5.44E+11
5.9871    167184.       0.00
   19.5000   -0.00244   8652780.   -119914.  -6.15E-04       0.00   5.44E+11
115.5199    170100.       0.00
   19.8000   -0.00455   8226578.   -119312.  -5.59E-04       0.00   5.45E+11
218.9037    173016.       0.00
   20.1000   -0.00647   7802772.   -118349.  -5.06E-04       0.00   5.45E+11
316.1372    175932.       0.00
   20.4000   -0.00820   7382647.   -117047.  -4.56E-04       0.00   5.45E+11
407.2486    178848.       0.00
   20.7000   -0.00975   6967406.   -115428.  -4.08E-04       0.00   5.45E+11
492.2943    181764.       0.00
   21.0000   -0.01114   6558172.   -113513.  -3.64E-04       0.00   5.45E+11
571.3567    184680.       0.00
   21.3000   -0.01237   6155993.   -111324.  -3.22E-04       0.00   5.45E+11
644.5424    187596.       0.00
   21.6000   -0.01345   5761839.   -108883.  -2.82E-04       0.00   5.45E+11
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711.9804    190512.       0.00
   21.9000   -0.01440   5376605.   -106208.  -2.46E-04       0.00   5.46E+11
773.8200    193428.       0.00
   22.2000   -0.01522   5001112.   -103321.  -2.11E-04       0.00   5.46E+11
830.2291    196344.       0.00
   22.5000   -0.01592   4636113.   -100240.  -1.80E-04       0.00   5.46E+11
881.3920    199260.       0.00
   22.8000   -0.01652   4282289.    -96984.  -1.50E-04       0.00   5.46E+11
927.5081    202176.       0.00
   23.1000   -0.01701   3940257.    -93571.  -1.23E-04       0.00   5.46E+11
968.7890    205092.       0.00
   23.4000   -0.01740   3610570.    -90017.  -9.82E-05       0.00   5.46E+11
1005.    208008.       0.00
   23.7000   -0.01771   3293722.    -86339.  -7.54E-05       0.00   5.46E+11
1038.    210924.       0.00
   24.0000   -0.01794   2990147.    -82553.  -5.47E-05       0.00   5.46E+11
1066.    213840.       0.00
   24.3000   -0.01811   2700227.    -78672.  -3.59E-05       0.00   5.46E+11
1090.    216756.       0.00
   24.6000   -0.01820   2424291.    -74710.  -1.90E-05       0.00   5.46E+11
1111.    219672.       0.00
   24.9000   -0.01824   2162620.    -70681.  -3.89E-06       0.00   5.46E+11
1128.    222588.       0.00
   25.2000   -0.01823   1915453.    -66595.   9.56E-06       0.00   5.46E+11
1142.    225504.       0.00
   25.5000   -0.01817   1682983.    -62464.   2.14E-05       0.00   5.46E+11
1153.    228420.       0.00
   25.8000   -0.01808   1465369.    -58297.   3.18E-05       0.00   5.46E+11
1162.    231336.       0.00
   26.1000   -0.01794   1262730.    -54104.   4.08E-05       0.00   5.46E+11
1168.    234252.       0.00
   26.4000   -0.01778   1075156.    -49894.   4.85E-05       0.00   5.45E+11
1172.    237168.       0.00
   26.7000   -0.01760    902709.    -45673.   5.51E-05       0.00   5.45E+11
1173.    240084.       0.00
   27.0000   -0.01739    745420.    -41448.   6.05E-05       0.00   5.45E+11
1174.    243000.       0.00
   27.3000   -0.01716    603302.    -37226.   6.50E-05       0.00   5.45E+11
1172.    245916.       0.00
   27.6000   -0.01692    476342.    -33011.   6.85E-05       0.00   5.44E+11
1169.    248832.       0.00
   27.9000   -0.01667    364513.    -28808.   7.13E-05       0.00   5.43E+11
1165.    251748.       0.00
   28.2000   -0.01641    267768.    -24622.   7.34E-05       0.00   5.43E+11
1161.    254664.       0.00
   28.5000   -0.01614    186050.    -20454.   7.49E-05       0.00   5.43E+11
1155.    257580.       0.00
   28.8000   -0.01587    119285.    -16310.   7.59E-05       0.00   5.43E+11
1148.    260496.       0.00
   29.1000   -0.01559     67393.    -12190.   7.65E-05       0.00   5.43E+11
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1141.    263412.       0.00
   29.4000   -0.01531     30283.     -8097.   7.69E-05       0.00   5.43E+11
1133.    266328.       0.00
   29.7000   -0.01504      7854.     -4033.   7.70E-05       0.00   5.43E+11
1125.    269244.       0.00
   30.0000   -0.01476      0.00       0.00   7.70E-05       0.00   5.43E+11
1116.    136080.       0.00

* This analysis computed pile response using nonlinear moment-curvature rela-
  tionships. Values of total stress due to combined axial and bending stresses
  are computed only for elastic sections only and do not equal the actual
  stresses in concrete and steel. Stresses in concrete and steel may be inter-
  polated from the output for nonlinear bending properties relative to the
  magnitude of bending moment developed in the pile.


Output Summary for Load Case No. 1:

Pile-head deflection             =     0.95326212 inches
Computed slope at pile head      =    -0.00783640 radians
Maximum bending moment           =      18350832. inch-lbs
Maximum shear force              =       -120133. lbs
Depth of maximum bending moment  =     9.00000000 feet below pile head
Depth of maximum shear force     =    19.20000000 feet below pile head
Number of iterations             =             16
Number of zero deflection points =              1



--------------------------------------------------------------------------------
                Computed Values of Pile Loading and Deflection
                for Lateral Loading for LRFD Load Case Number 2
--------------------------------------------------------------------------------


Load Case No. 2:  Strength 1




   Depth    Deflect.    Bending     Shear      Slope      Total     Bending   Soil
Res.  Soil Spr.  Distrib.
     X          y       Moment      Force        S       Stress    Stiffness      p
      Es*h     Lat. Load
   feet      inches     in-lbs       lbs      radians     psi*      in-lb^2
lb/inch    lb/inch    lb/inch
---------- ---------- ---------- ---------- ---------- ---------- ----------
---------- ---------- ----------
      0.00     0.9533   1.22E+07     62062.   -0.00784       0.00   5.42E+11
```

```
0.00       0.00       0.00
    0.3000     0.9252   1.24E+07     62062.   -0.00775       0.00   5.42E+11
0.00       0.00       0.00
    0.6000     0.8974   1.27E+07     62062.   -0.00767       0.00   5.42E+11
0.00       0.00       0.00
    0.9000     0.8700   1.30E+07     62062.   -0.00759       0.00   5.42E+11
0.00       0.00       0.00
    1.2000     0.8428   1.33E+07     62062.   -0.00750       0.00   5.41E+11
0.00       0.00       0.00
    1.5000     0.8160   1.36E+07     62062.   -0.00741       0.00   5.40E+11
0.00       0.00       0.00
    1.8000     0.7895   1.39E+07     62062.   -0.00732       0.00   5.31E+11
0.00       0.00       0.00
    2.1000     0.7633   1.41E+07     62021.   -0.00722       0.00   5.27E+11
-22.9016   108.0127       0.00
    2.4000     0.7375   1.44E+07     61810.   -0.00712       0.00   5.25E+11
-94.2411   460.0404       0.00
    2.7000     0.7120   1.47E+07     61336.   -0.00702       0.00   5.21E+11
-168.8828   853.8925       0.00
    3.0000     0.6869   1.50E+07     60590.   -0.00692       0.00   5.17E+11
-245.9963      1289.       0.00
    3.3000     0.6622   1.53E+07     59562.   -0.00681       0.00   5.14E+11
-324.7030      1765.       0.00
    3.6000     0.6378   1.55E+07     58250.   -0.00671       0.00   5.10E+11
-404.1373      2281.       0.00
    3.9000     0.6139   1.58E+07     56652.   -0.00660       0.00   5.06E+11
-484.0203      2838.       0.00
    4.2000     0.5904   1.60E+07     54765.   -0.00648       0.00   5.02E+11
-563.9723      3439.       0.00
    4.5000     0.5672   1.63E+07     52593.   -0.00637       0.00   4.99E+11
-642.8448      4080.       0.00
    4.8000     0.5445   1.65E+07     50140.   -0.00625       0.00   4.95E+11
-719.9479      4760.       0.00
    5.1000     0.5222   1.67E+07     47414.   -0.00613       0.00   4.91E+11
-794.6132      5478.       0.00
    5.4000     0.5004   1.70E+07     44424.   -0.00600       0.00   4.87E+11
-866.1946      6231.       0.00
    5.7000     0.4790   1.72E+07     41181.   -0.00588       0.00   4.83E+11
-935.6460      7032.       0.00
    6.0000     0.4581   1.73E+07     37693.   -0.00575       0.00   4.80E+11
-1002.      7874.       0.00
    6.3000     0.4377   1.75E+07     33974.   -0.00561       0.00   4.76E+11
-1064.      8753.       0.00
    6.6000     0.4177   1.77E+07     30040.   -0.00548       0.00   4.74E+11
-1121.      9666.       0.00
    6.9000     0.3982   1.78E+07     25909.   -0.00535       0.00   4.71E+11
-1174.     10610.       0.00
    7.2000     0.3792   1.80E+07     21601.   -0.00521       0.00   4.68E+11
-1220.     11581.       0.00
    7.5000     0.3607   1.81E+07     17124.   -0.00507       0.00   4.66E+11
```

```
-1267.     12649.       0.00
    7.8000     0.3427   1.82E+07     12483.   -0.00493       0.00   4.64E+11
-1311.     13769.       0.00
    8.1000     0.3252   1.82E+07      7697.   -0.00479       0.00   4.63E+11
-1348.     14927.       0.00
    8.4000     0.3082   1.83E+07      2786.   -0.00465       0.00   4.61E+11
-1380.     16119.       0.00
    8.7000     0.2917   1.83E+07     -2228.   -0.00450       0.00   4.61E+11
-1405.     17340.       0.00
    9.0000     0.2758   1.84E+07     -7320.   -0.00436       0.00   4.60E+11
-1424.     18586.       0.00
    9.3000     0.2604   1.83E+07    -12485.   -0.00422       0.00   4.60E+11
-1445.     19984.       0.00
    9.6000     0.2454   1.83E+07    -17715.   -0.00407       0.00   4.61E+11
-1461.     21426.       0.00
    9.9000     0.2310   1.83E+07    -22991.   -0.00393       0.00   4.62E+11
-1470.     22907.       0.00
   10.2000     0.2171   1.82E+07    -28289.   -0.00379       0.00   4.63E+11
-1473.     24424.       0.00
   10.5000     0.2038   1.81E+07    -33586.   -0.00365       0.00   4.64E+11
-1470.     25971.       0.00
   10.8000     0.1909   1.80E+07    -38862.   -0.00351       0.00   4.66E+11
-1461.     27554.       0.00
   11.1000     0.1785   1.79E+07    -44101.   -0.00337       0.00   4.69E+11
-1449.     29230.       0.00
   11.4000     0.1666   1.78E+07    -49286.   -0.00323       0.00   4.72E+11
-1431.     30914.       0.00
   11.7000     0.1553   1.76E+07    -54392.   -0.00310       0.00   4.75E+11
-1406.     32592.       0.00
   12.0000     0.1443   1.74E+07    -59393.   -0.00296       0.00   4.78E+11
-1373.     34248.       0.00
   12.3000     0.1339   1.72E+07    -64266.   -0.00283       0.00   4.82E+11
-1334.     35863.       0.00
   12.6000     0.1239   1.70E+07    -68997.   -0.00271       0.00   4.86E+11
-1294.     37594.       0.00
   12.9000     0.1144   1.68E+07    -73597.   -0.00258       0.00   4.90E+11
-1261.     39672.       0.00
   13.2000     0.1054   1.65E+07    -78066.   -0.00246       0.00   4.94E+11
-1222.     41750.       0.00
   13.5000    0.09671   1.63E+07    -82383.   -0.00234       0.00   4.99E+11
-1177.     43811.       0.00
   13.8000    0.08850   1.60E+07    -86530.   -0.00223       0.00   5.03E+11
-1127.     45835.       0.00
   14.1000    0.08069   1.57E+07    -90456.   -0.00211       0.00   5.08E+11
-1054.     47045.       0.00
   14.4000    0.07329   1.54E+07    -94121.   -0.00200       0.00   5.13E+11
-981.4534     48211.       0.00
   14.7000    0.06627   1.50E+07    -97524.   -0.00190       0.00   5.17E+11
-908.9595     49378.       0.00
   15.0000    0.05963   1.47E+07   -100667.   -0.00179       0.00   5.21E+11
```

```
-837.2123     50544.       0.00
   15.3000    0.05336   1.43E+07   -103553.   -0.00169       0.00   5.26E+11
-766.4106     51710.       0.00
   15.6000    0.04744   1.40E+07   -106187.   -0.00160       0.00   5.29E+11
-696.7362     52877.       0.00
   15.9000    0.04186   1.36E+07   -108572.   -0.00150       0.00   5.39E+11
-628.3614     54043.       0.00
   16.2000    0.03661   1.32E+07   -110714.   -0.00141       0.00   5.41E+11
-561.3856     55210.       0.00
   16.5000    0.03167   1.28E+07   -112617.   -0.00133       0.00   5.42E+11
-495.9603     56376.       0.00
   16.8000    0.02704   1.24E+07   -114288.   -0.00124       0.00   5.42E+11
-432.2403     57542.       0.00
   17.1000    0.02271   1.20E+07   -115732.   -0.00116       0.00   5.42E+11
-370.3654     58709.       0.00
   17.4000    0.01867   1.16E+07   -116958.   -0.00108       0.00   5.43E+11
-310.4610     59875.       0.00
   17.7000    0.01490   1.12E+07   -117971.   -0.00101       0.00   5.43E+11
-252.6377     61042.       0.00
   18.0000    0.01140   1.08E+07   -118781.  -9.36E-04       0.00   5.43E+11
-196.9918     62208.       0.00
   18.3000    0.00816   1.04E+07   -119394.  -8.66E-04       0.00   5.43E+11
-143.6049     63374.       0.00
   18.6000    0.00516   9932597.   -119819.  -7.99E-04       0.00   5.44E+11
-92.5447     64541.       0.00
   18.9000    0.00240   9506846.   -120064.  -7.35E-04       0.00   5.44E+11
-43.8649     65707.       0.00
   19.2000  -1.29E-04   9080017.   -120133.  -6.73E-04       0.00   5.44E+11
5.9871    167184.       0.00
   19.5000   -0.00244   8652780.   -119914.  -6.15E-04       0.00   5.44E+11
115.5199    170100.       0.00
   19.8000   -0.00455   8226578.   -119312.  -5.59E-04       0.00   5.45E+11
218.9037    173016.       0.00
   20.1000   -0.00647   7802772.   -118349.  -5.06E-04       0.00   5.45E+11
316.1372    175932.       0.00
   20.4000   -0.00820   7382647.   -117047.  -4.56E-04       0.00   5.45E+11
407.2486    178848.       0.00
   20.7000   -0.00975   6967406.   -115428.  -4.08E-04       0.00   5.45E+11
492.2943    181764.       0.00
   21.0000   -0.01114   6558172.   -113513.  -3.64E-04       0.00   5.45E+11
571.3567    184680.       0.00
   21.3000   -0.01237   6155993.   -111324.  -3.22E-04       0.00   5.45E+11
644.5424    187596.       0.00
   21.6000   -0.01345   5761839.   -108883.  -2.82E-04       0.00   5.45E+11
711.9804    190512.       0.00
   21.9000   -0.01440   5376605.   -106208.  -2.46E-04       0.00   5.46E+11
773.8200    193428.       0.00
   22.2000   -0.01522   5001112.   -103321.  -2.11E-04       0.00   5.46E+11
830.2291    196344.       0.00
   22.5000   -0.01592   4636113.   -100240.  -1.80E-04       0.00   5.46E+11
```

```
881.3920    199260.       0.00
   22.8000   -0.01652   4282289.    -96984.  -1.50E-04       0.00   5.46E+11
927.5081    202176.       0.00
   23.1000   -0.01701   3940257.    -93571.  -1.23E-04       0.00   5.46E+11
968.7890    205092.       0.00
   23.4000   -0.01740   3610570.    -90017.  -9.82E-05       0.00   5.46E+11
1005.    208008.       0.00
   23.7000   -0.01771   3293722.    -86339.  -7.54E-05       0.00   5.46E+11
1038.    210924.       0.00
   24.0000   -0.01794   2990147.    -82553.  -5.47E-05       0.00   5.46E+11
1066.    213840.       0.00
   24.3000   -0.01811   2700227.    -78672.  -3.59E-05       0.00   5.46E+11
1090.    216756.       0.00
   24.6000   -0.01820   2424291.    -74710.  -1.90E-05       0.00   5.46E+11
1111.    219672.       0.00
   24.9000   -0.01824   2162620.    -70681.  -3.89E-06       0.00   5.46E+11
1128.    222588.       0.00
   25.2000   -0.01823   1915453.    -66595.   9.56E-06       0.00   5.46E+11
1142.    225504.       0.00
   25.5000   -0.01817   1682983.    -62464.   2.14E-05       0.00   5.46E+11
1153.    228420.       0.00
   25.8000   -0.01808   1465369.    -58297.   3.18E-05       0.00   5.46E+11
1162.    231336.       0.00
   26.1000   -0.01794   1262730.    -54104.   4.08E-05       0.00   5.46E+11
1168.    234252.       0.00
   26.4000   -0.01778   1075156.    -49894.   4.85E-05       0.00   5.45E+11
1172.    237168.       0.00
   26.7000   -0.01760    902709.    -45673.   5.51E-05       0.00   5.45E+11
1173.    240084.       0.00
   27.0000   -0.01739    745420.    -41448.   6.05E-05       0.00   5.45E+11
1174.    243000.       0.00
   27.3000   -0.01716    603302.    -37226.   6.50E-05       0.00   5.45E+11
1172.    245916.       0.00
   27.6000   -0.01692    476342.    -33011.   6.85E-05       0.00   5.44E+11
1169.    248832.       0.00
   27.9000   -0.01667    364513.    -28808.   7.13E-05       0.00   5.43E+11
1165.    251748.       0.00
   28.2000   -0.01641    267768.    -24622.   7.34E-05       0.00   5.43E+11
1161.    254664.       0.00
   28.5000   -0.01614    186050.    -20454.   7.49E-05       0.00   5.43E+11
1155.    257580.       0.00
   28.8000   -0.01587    119285.    -16310.   7.59E-05       0.00   5.43E+11
1148.    260496.       0.00
   29.1000   -0.01559     67393.    -12190.   7.65E-05       0.00   5.43E+11
1141.    263412.       0.00
   29.4000   -0.01531     30283.     -8097.   7.69E-05       0.00   5.43E+11
1133.    266328.       0.00
   29.7000   -0.01504      7854.     -4033.   7.70E-05       0.00   5.43E+11
1125.    269244.       0.00
   30.0000   -0.01476      0.00       0.00   7.70E-05       0.00   5.43E+11
```

1116.   136080.   0.00

* This analysis computed pile response using nonlinear moment-curvature relationships. Values of total stress due to combined axial and bending stresses are computed only for elastic sections only and do not equal the actual stresses in concrete and steel. Stresses in concrete and steel may be interpolated from the output for nonlinear bending properties relative to the magnitude of bending moment developed in the pile.

Output Summary for Load Case No. 2:

Pile-head deflection   =   0.95326212 inches
Computed slope at pile head   =   -0.00783640 radians
Maximum bending moment   =   18350832. inch-lbs
Maximum shear force   =   -120133. lbs
Depth of maximum bending moment =   9.00000000 feet below pile head
Depth of maximum shear force   =   19.20000000 feet below pile head
Number of iterations   =   16
Number of zero deflection points =   1

Summary of Pile Responses for LRFD Analyses

Load Case No.	Maximum Shear in Pile lbs	Pile-head Shear lbs	Pile-head Moment in-lbs	Axial Loading lbs	Pile-head Deflection inches	Maximum Moment in Pile in-lbs	Pile-Head Rotation radians
1	62062.	12153409.	2246000.	0.95326212	18350832.	-120133.	-0.00783640
2	62062.	12153409.	2246000.	0.95326212	18350832.	-120133.	-0.00783640

Maximum pile-head deflection = 0.9532621214 inches
Maximum pile-head rotation   = -0.0078364042 radians = -0.448993 deg.

LRFD Performance by Load Case Combination

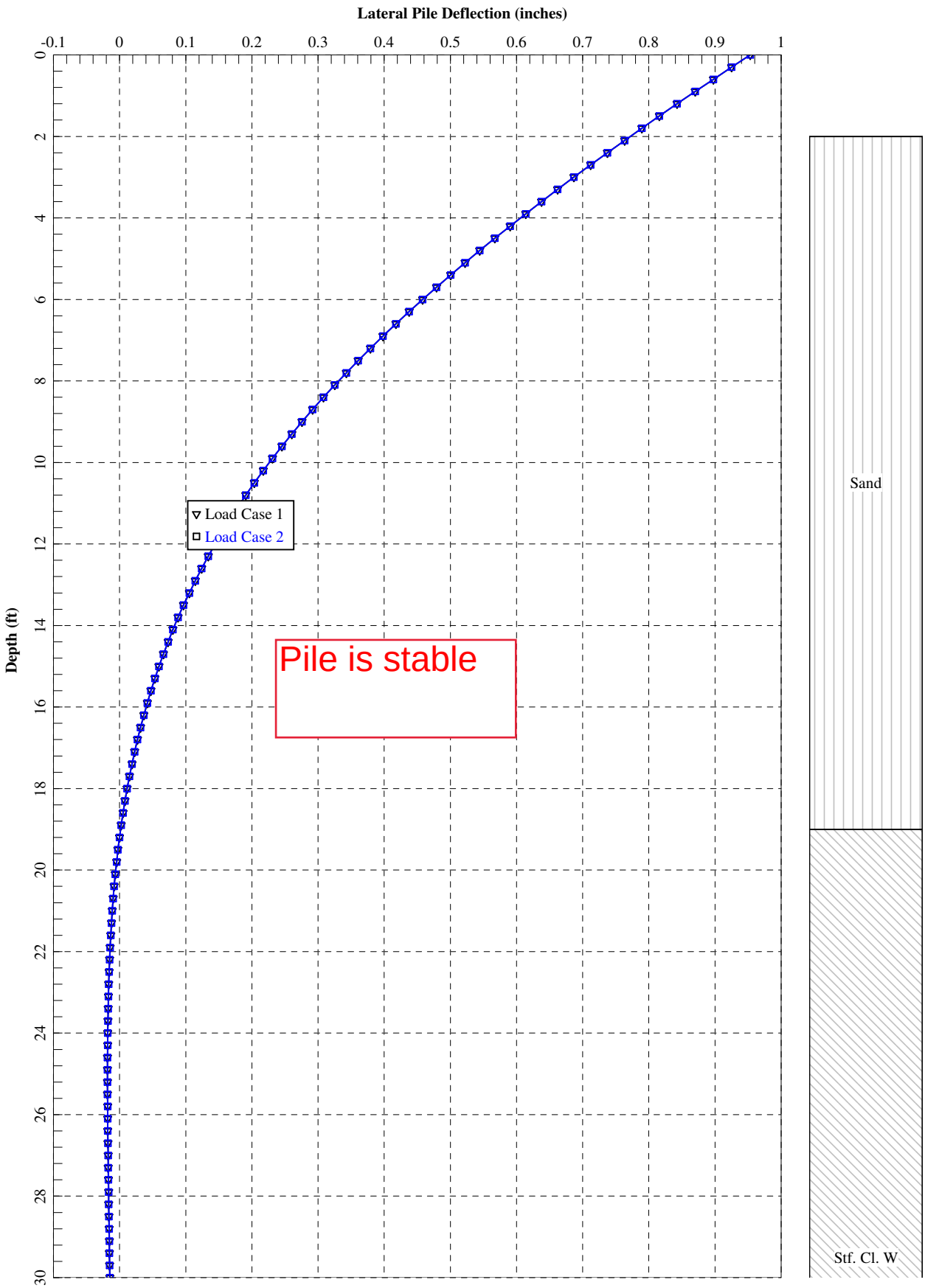
	Factored	Maximum	Fact. Mom.	Pass/Fail

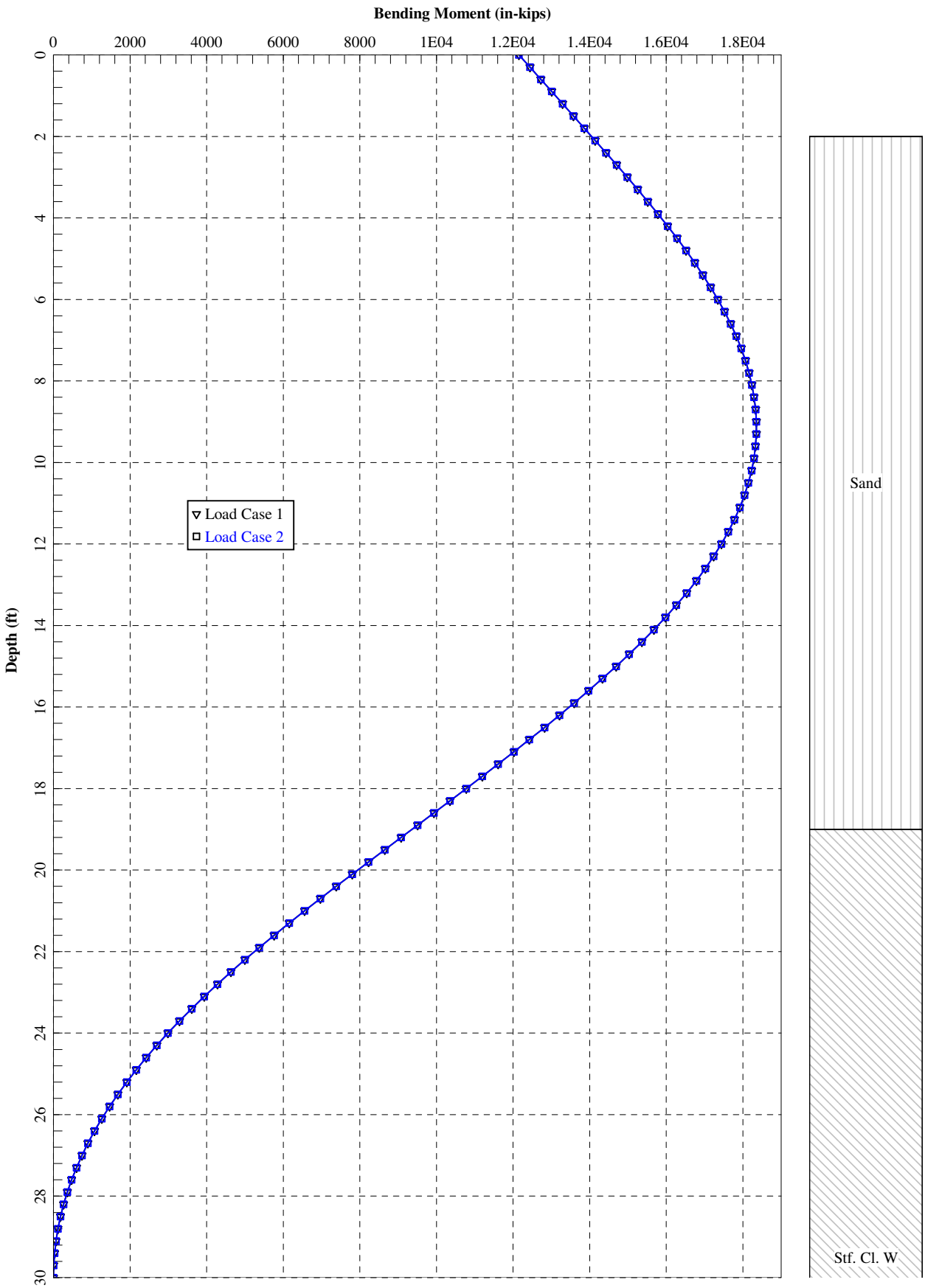
```
        Factored      Maximum    Fac. Shear    Pass/Fail

Load          Resistance     Moment       Moment      Fraction     for LRFD
Resistance      Shear        Shear      Fraction     for LRFD     Pile-top
Pile-top
Case Section    Factor      Capacity     Developed    Developed     Moment
Factor      Capacity     Developed    Developed      Shear     Deflection
Rotation
 No.   No.    for Moment   of Section   in Section   in Section   of Section    for
Shear   of Section   in Section   in Section   in Section    Developed    Developed
        Name of Load Case Combination
                           in-lbs       in-lbs
           lbs          lbs                                  inches       Radians

---- ------- ------------ ------------ ------------ ------------ ------------
------------ ------------ ------------ ------------ ------------ ------------
------------ ----------------------------------------------
  1     1        1.00        29680909.    18350832.     0.618271     Pass
1.00       232.000000     -120133.   517.812860     FAIL         0.953262
-0.007836 Service 1
  2     1        1.00        29680909.    18350832.     0.618271     Pass
1.00       232.000000     -120133.   517.812860     FAIL         0.953262
-0.007836 Strength 1

2 LRFD load combinations have failed.


The load case and pile section with the greatest level of developed moment
capacity:

LRFD Load Case No.                    = 1
Pile Section No.                      = 1


The load case and pile section with the greatest level of developed shear
capacity:

LRFD Load Case No.                    = 1
Pile Section No.                      = 1
Node Number of Maximum Shear Force    = 1
Depth of Maximum Developed Shear      = 0.00 ft
Maximum Developed Shear Force         = -120132.58 lbs
Factored Shear Capacity at Node       = 232.00 lbs
Fraction of Allowable Shear Capacity  = 517.8129

--------------------------------------------------------------------------------
                           Summary of Warning Messages
--------------------------------------------------------------------------------

The following warning was reported 2 times
```

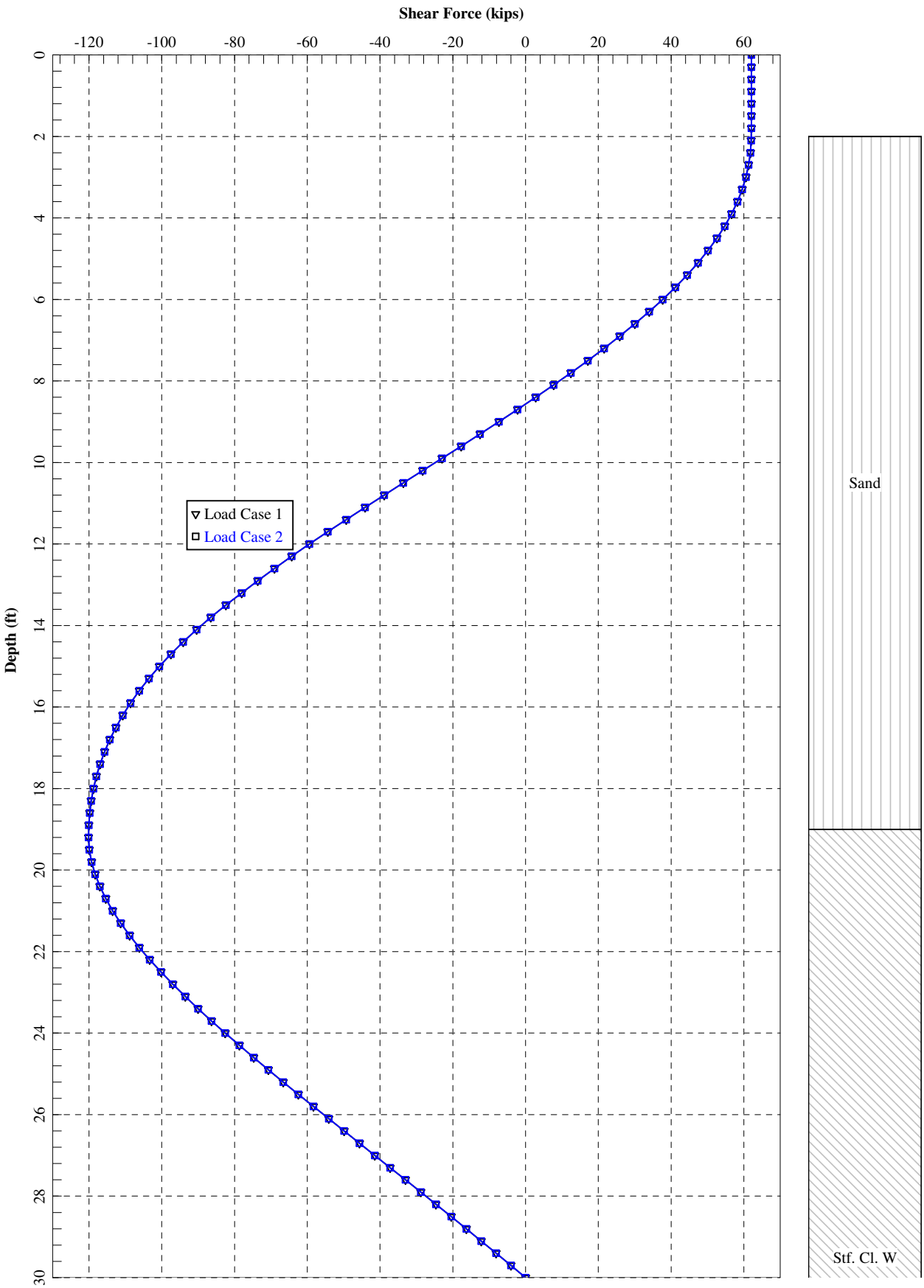
**** Warning - Failure for One or More LRFD Load Cases ****

This warning message is provided to alert the user that one or more of
LRFD load cases has overloaded the moment capacity of the pile.

The analysis ended normally.


Lateral Pile Deflection (inches)
-0.1
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
Depth (ft)
0
2
4
6
8
10
12
14
16
18
20
22
24
26
28
30
Load Case 1
Load Case 2
Pile is stable
Sand
Stf. Cl. W


Bending Moment (in-kips)
0
2000
4000
6000
8000
1E04
1.2E04
1.4E04
1.6E04
1.8E04
Depth (ft)
0
2
4
6
8
10
12
14
16
18
20
22
24
26
28
30
Load Case 1
Load Case 2
Sand
Stf. Cl. W


Shear Force (kips)
-120
-100
-80
-60
-40
-20
0
20
40
60
Depth (ft)
0
2
4
6
8
10
12
14
16
18
20
22
24
26
28
30
Load Case 1
Load Case 2
Sand
Stf. Cl. W

LPile – Factored run

LPile for Windows, Version 2019-11.002

Analysis of Individual Piles and Drilled Shafts
Subjected to Lateral Loading Using the p-y Method

This copy of LPile is being used by:

Serial Number of Security Device: 363000114

This copy of LPile is licensed for exclusive use by:

ALFRED BENESCH & COMPANY, LINCOL

Use of this program by any entity other than ALFRED BENESCH & COMPANY, LINCOL
is a violation of the software license agreement.

Files Used for Analysis

Path to file locations:
\ctepen\Projects\Steamboat\Forest Lakes\

Name of input data file:
Forest Lakes - P2 Factored.lp11

Name of output report file:
Forest Lakes - P2 Factored.lp11

Name of plot output file:
Forest Lakes - P2 Factored.lp11

Name of runtime message file:
Forest Lakes - P2 Factored.lp11

Date and Time of Analysis

Date: January 19, 2021 Time: 11:53:25

Problem Title

Project Name:Forest Lakes

Job Number:

Client:

Engineer: CT

Description:

Program Options and Settings

Computational Options:
 - Use Load and Resistance Factors (LRFD) in computations
Engineering Units Used for Data Input and Computations:
 - US Customary System Units (pounds, feet, inches)

Analysis Control Options:

- Maximum number of iterations allowed	=	500
- Deflection tolerance for convergence	=	1.0000E-05 in
- Maximum allowable deflection	=	100.0000 in
- Number of pile increments	=	100

Loading Type and Number of Cycles of Loading:
 - Static loading specified

 - Use of p-y modification factors for p-y curves not selected
 - Analysis uses layering correction (Method of Georgiadis)
 - No distributed lateral loads are entered
 - Loading by lateral soil movements acting on pile not selected
 - Input of shear resistance at the pile tip not selected
 - Input of moment resistance at the pile tip not selected
 - Computation of pile-head foundation stiffness matrix not selected
 - Push-over analysis of pile not selected
 - Buckling analysis of pile not selected

Output Options:
 - Output files use decimal points to denote decimal symbols.
 - Values of pile-head deflection, bending moment, shear force, and
   soil reaction are printed for full length of pile.
 - Printing Increment (nodal spacing of output points) = 1
 - No p-y curves to be computed and reported for user-specified depths
 - Print using wide report formats

Pile Structural Properties and Geometry

Number of pile sections defined	=	1
Total length of pile	=	30.000 ft

Depth of ground surface below top of pile = 2.0000 ft

Pile diameters used for p-y curve computations are defined using 2 points.

p-y curves are computed using pile diameter values interpolated with depth over the length of the pile. A summary of values of pile diameter vs. depth follows.

Point No.	Depth Below Pile Head feet	Pile Diameter inches
1	0.000	42.0000
2	30.000	42.0000

Input Structural Properties for Pile Sections:

Pile Section No. 1:

Section 1 is a round drilled shaft, bored pile, or CIDH pile
Length of section = 30.000000 ft
Shaft Diameter = 42.000000 in
Shear capacity of section = 232.000000 lbs

Ground Slope and Pile Batter Angles

Ground Slope Angle = 0.000 degrees
= 0.000 radians

Pile Batter Angle = 0.000 degrees
= 0.000 radians

Soil and Rock Layering Information

The soil profile is modelled using 2 layers

Layer 1 is sand, p-y criteria by Reese et al., 1974

Distance from top of pile to top of layer = 2.000000 ft
Distance from top of pile to bottom of layer = 19.000000 ft
Effective unit weight at top of layer = 120.000000 pcf
Effective unit weight at bottom of layer = 120.000000 pcf
Friction angle at top of layer = 32.000000 deg.
Friction angle at bottom of layer = 32.000000 deg.
Subgrade k at top of layer = 90.000000 pci
Subgrade k at bottom of layer = 90.000000 pci

Layer 2 is stiff clay with water-induced erosion

Distance from top of pile to top of layer = 19.000000 ft
Distance from top of pile to bottom of layer = 40.000000 ft
Effective unit weight at top of layer = 125.000000 pcf
Effective unit weight at bottom of layer = 125.000000 pcf

Undrained cohesion at top of layer	=	4000. psf
Undrained cohesion at bottom of layer	=	4000. psf
Epsilon-50 at top of layer	=	0.005000
Epsilon-50 at bottom of layer	=	0.005000
Subgrade k at top of layer	=	225.000000 pci
Subgrade k at bottom of layer	=	225.000000 pci

(Depth of the lowest soil layer extends 10.000 ft below the pile tip)

Summary of Input Soil Properties

Layer Num.	Soil Type Name (p-y Curve Type)	Layer Depth ft	Effective Unit Wt. pcf	Undrained Cohesion psf	Angle of Friction deg.	E50 or kpy krm pci
1	Sand (Reese, et al.)	2.0000 19.0000	120.0000 120.0000	-- --	32.0000 32.0000	-- --
						90.0000 90.0000
2	Stiff Clay with Free Water	19.0000 40.0000	125.0000 125.0000	4000. 4000.	-- --	0.00500 0.00500
						225.0000 225.0000

Static Loading Type

Static loading criteria were used when computing p-y curves for all analyses.

Loading Groups for LRFD Analysis

Number of Loading Groups = 3

Load Group	Load Type	Horiz. Force lbs	Moment in-lbs	Axial Force lbs	Number of Dist. Lds.
1	Special (Sp)	20809.00	3684489.00	888000.00	0
2	Special (Sp)	19209.00	4230813.00	733000.00	0
3	Special (Sp)	22847.00	2451204.00	396000.00	0

Totals of Loads by Load Type for LRFD Analyses:

Number of Defined Load Cases = 3

This table presents the sum of pile-head loads for each load type.

Load Type		Horiz. Force lbs	Moment in-lbs	Axial Force lbs	Number of Loads
Dead Loads	(DL)	0.00	0.00	0.00	0
Live Loads	(LL)	0.00	0.00	0.00	0
Earthquake	(EQ)	0.00	0.00	0.00	0
Impact Load	(IM)	0.00	0.00	0.00	0
Wind Loads	(W)	0.00	0.00	0.00	0
Water Loads	(HW)	0.00	0.00	0.00	0
Ice Loads	(Ice)	0.00	0.00	0.00	0
Horiz. Soil	(Hs)	0.00	0.00	0.00	0
Live Roof	(Lr)	0.00	0.00	0.00	0
Rain Loads	(Rn)	0.00	0.00	0.00	0
Snow Loads	(Sn)	0.00	0.00	0.00	0
Temperature	(Tm)	0.00	0.00	0.00	0
Special	(Sp)	62865.00	10366506.00	2017000.00	3

Load and Resistance Factors by Load Combinations for LRFD Analyses

Number of Factored Load Combinations = 2

Summary of Load and Resistance Factors:

No.	DL	LL	EQ	IM	Wind	Watr	Ice	Soil	Roof	Rain	Snow	Temp	Spec	M Rf	V Rf	Name
1	1.00	1.00	--	--	1.00	--	--	1.00	--	--	--	1.00	1.00	1.00	1.00	Service 1
2	1.25	1.75	--	--	--	--	--	1.50	--	--	--	0.50	1.00	1.00	1.00	Strength 1

Computed Factored Loads for LRFD Analyses

Factored Load Combination No. 1

Load Combination Name = Service 1

Structural Resistance Factor for Flexure = 1.000
Structural Resistance Factor for Shear = 1.000

Factored Load = 1.00*DL + 1.00*LL + 1.00*W + 1.00*Hs + 1.00*Tm + 1.00*Sp

Factored Horizontal Force = 62865.00 lbs

Factored Vertical Force = 2017000.00 lbs
Factored Moment = 10366506.00 in-lbs

Factored Load Combination No. 2

Load Combination Name = Strength 1

Structural Resistance Factor for Flexure = 1.000
Structural Resistance Factor for Shear = 1.000

Factored Load = 1.25*DL + 1.75*LL + 1.50*Hs + 0.50*Tm + 1.00*Sp

Factored Horizontal Force = 62865.00 lbs
Factored Vertical Force = 2017000.00 lbs
Factored Moment = 10366506.00 in-lbs

Totals of Factored Loads by Load Combination:

Load Combination Number	Factored Horiz. Force lbs	Factored Moment in-lbs	Factored Vert. Force lbs	Load Combination Name
1	62865.00	10366506.00	2017000.00	Service 1
2	62865.00	10366506.00	2017000.00	Strength 1

Sorted Values of Axial Thrust Forces Sorted for LRFD Computations:

Number of Unique Axial Thrust Values = 1

Number	Factored Axial Thrust
1	2017000.000

Computations of Nominal Moment Capacity and Nonlinear Bending Stiffness
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Axial thrust force values were determined from LRFD load combinations

Number of Pile Sections Analyzed = 1

Pile Section No. 1:

Dimensions and Properties of Drilled Shaft (Bored Pile):

Length of Section	=	30.000000	ft
Shaft Diameter	=	42.000000	in
Concrete Cover Thickness (to edge of long. rebar)	=	5.625000	in
Number of Reinforcing Bars	=	11	bars
Yield Stress of Reinforcing Bars	=	60000.	psi
Modulus of Elasticity of Reinforcing Bars	=	29000000.	psi
Gross Area of Shaft	=	1385.	sq. in.
Total Area of Reinforcing Steel	=	13.970000	sq. in.
Area Ratio of Steel Reinforcement	=	1.01	percent
Edge-to-Edge Bar Spacing	=	7.035476	in
Maximum Concrete Aggregate Size	=	0.750000	in
Ratio of Bar Spacing to Aggregate Size	=	9.38	
Offset of Center of Rebar Cage from Center of Pile	=	0.0000	in
Confined Section			
Type: Hoop			
Number of Transverse Bars (per spacing)	=	30	
Spacing of Transverse Bars	=	12.000000	in
Yield Stress of Transverse Bars	=	60000.	psi
Total Area of Confinement Steel	=	9.300000	sq. in.
rho_s	=	0.098805	
ke	=	1.127951	
f'cc	=	13212.	psi
f'l	=	3343.	psi
Epsilon cc	=	0.025031	
Epsilon cu	=	0.060535	
r	=	1.171535	

Axial Structural Capacities:

Nom. Axial Structural Capacity = 0.85 Fc Ac + Fy As	=	5501.206	kips
Tensile Load for Cracking of Concrete	=	-617.148	kips
Nominal Axial Tensile Capacity	=	-838.200	kips

Reinforcing Bar Dimensions and Positions Used in Computations:

Bar Number	Bar Diam. inches	Bar Area sq. in.	X inches	Y inches
1	1.270000	1.270000	14.740000	0.00000
2	1.270000	1.270000	12.400077	7.969046
3	1.270000	1.270000	6.123217	13.407976
4	1.270000	1.270000	-2.097721	14.589968
5	1.270000	1.270000	-9.652647	11.139749
6	1.270000	1.270000	-14.142926	4.152738
7	1.270000	1.270000	-14.142926	-4.152738
8	1.270000	1.270000	-9.652647	-11.139749
9	1.270000	1.270000	-2.097721	-14.589968
10	1.270000	1.270000	6.123217	-13.407976
11	1.270000	1.270000	12.400077	-7.969046

NOTE: The positions of the above rebars were computed by LPile

Minimum spacing between any two bars not equal to zero = 7.035 inches
between bars 10 and 11.

Ratio of bar spacing to maximum aggregate size = 9.38

Concrete Properties:

Compressive Strength of Concrete = 4000. psi
Modulus of Elasticity of Concrete = 3604997. psi
Modulus of Rupture of Concrete = -474.341649 psi
Compression Strain at Peak Stress = 0.001886
Tensile Strain at Fracture of Concrete = -0.0001154
Maximum Coarse Aggregate Size = 0.750000 in

Number of Axial Thrust Force Values Determined from LRFD Pile-head Loadings = 1

Number	Axial Thrust Force kips
1	2017.000

Definitions of Run Messages and Notes:

C = concrete in section has cracked in tension.
Y = stress in reinforcing steel has reached yield stress.
T = ACI 318 criteria for tension-controlled section met, tensile strain in reinforcement exceeds 0.005 while simultaneously compressive strain in concrete more than 0.003. See ACI 318, Section 10.3.4.
Z = depth of tensile zone in concrete section is less than 10 percent of section depth.

Bending Stiffness (EI) = Computed Bending Moment / Curvature.
Position of neutral axis is measured from edge of compression side of pile.
Compressive stresses and strains are positive in sign.
Tensile stresses and strains are negative in sign.

Axial Thrust Force = 2017.000 kips

Bending Max Conf Curvature Stress rad/in. ksi	Bending Max Conc Moment Stress in-kip ksi	Bending Max Steel Stiffness Stress kip-in2 ksi	Depth to N Axis in	Max Comp Strain in/in	Max Tens Strain in/in	Run Msg
6.25000E-07	347.6637963	556262074.	615.0460579	0.0003844	0.0003582	
1.3272744	1.4637575	11.0449411				
0.00000125	697.4085430	557926834.	318.0497295	0.0003976	0.0003451	
1.3699844	1.5075613	11.3237652				
0.00000188	1047.	558469952.	219.0627354	0.0004107	0.0003320	
1.4126110	1.5510570	11.6032300				
0.00000250	1397.	558727901.	169.5780753	0.0004239	0.0003189	
1.4551536	1.5942424	11.8833355				
0.00000313	1746.	558867977.	139.8943492	0.0004372	0.0003059	
1.4976112	1.6371156	12.1640817				
0.00000375	2096.	558945943.	120.1110906	0.0004504	0.0002929	
1.5399832	1.6796748	12.4454686				
0.00000438	2446.	558985698.	105.9852425	0.0004637	0.0002799	
1.5822686	1.7219179	12.7274964				
0.00000500	2795.	558999191.	95.3952766	0.0004770	0.0002670	
1.6244669	1.7638430	13.0101651				
0.00000563	3144.	558993060.	87.1625661	0.0004903	0.0002540	
1.6665772	1.8054482	13.2934748				

0.00000625	3494.	558971286.	80.5799349	0.0005036	0.0002411
1.7085989	1.8467315	13.5774257			
0.00000688	3843.	558936402.	75.1973619	0.0005170	0.0002282
1.7505314	1.8876909	13.8620178			
0.00000750	4192.	558890097.	70.7148333	0.0005304	0.0002154
1.7923740	1.9283246	14.1472513			
0.00000813	4541.	558833539.	66.9246471	0.0005438	0.0002025
1.8341260	1.9686304	14.4331262			
0.00000875	4889.	558767561.	63.6784449	0.0005572	0.0001897
1.8757869	2.0086066	14.7196429			
0.00001000	5586.	558609636.	58.4100067	0.0005841	0.0001641
1.9588331	2.0875617	15.2946020			
0.00001125	6282.	558419621.	54.3202066	0.0006111	0.0001386
2.0415082	2.1651743	15.8721299			
0.00001250	6977.	558199484.	51.0554580	0.0006382	0.0001132
2.1238080	2.2414286	16.4522285			
0.00001375	7672.	557950466.	48.3907516	0.0006654	0.00008787
2.2057288	2.3163085	17.0348997			
0.00001500	8365.	557673384.	46.1760817	0.0006926	0.00006264
2.2872670	2.3897984	17.6201456			
0.00001625	9057.	557368788.	44.3075987	0.0007200	0.00003750
2.3684193	2.4618821	18.2079684			
0.00001750	9748.	557037059.	42.7111245	0.0007474	0.00001244
2.4491825	2.5325436	18.7983707			
0.00001875	10438.	556678047.	41.3322581	0.0007750	-0.00001252
2.5295537	2.6017668	19.3913529			
0.00002000	11126.	556277804.	40.1300555	0.0008026	-0.00003740
2.6095216	2.6695282	19.9868323			
0.00002125	11811.	555805567.	39.0729815	0.0008303	-0.00006220
2.6890616	2.7357937	20.5845874			
0.00002250	12493.	555236575.	38.1364724	0.0008581	-0.00008693
2.7681478	2.8005293	21.1843733			
0.00002375	13171.	554555994.	37.3011645	0.0008859	-0.0001116
2.8467569	2.8637043	21.7859647			
0.00002500	13386.	535441372.	36.3387423	0.0009085	-0.0001415
2.9098730	2.9135615	22.2348382 C			
0.00002625	13873.	528511929.	35.5858807	0.0009341	-0.0001684
2.9812300	2.9689751	22.7734643 C			
0.00002750	14334.	521229261.	34.8902845	0.0009595	-0.0001955
3.0511856	3.0222940	23.3031769 C			
0.00003000	15184.	506117199.	33.6447488	0.0010093	-0.0002507
3.1871888	3.1230033	24.3380316 C			
0.00003250	15953.	490860048.	32.5598063	0.0010582	-0.0003068
3.3184453	3.2163483	25.3436426 C			
0.00003500	16653.	475792624.	31.6028453	0.0011061	-0.0003639
3.4452681	3.3027693	26.3218380 C			
0.00003750	17296.	461236872.	30.7524319	0.0011532	-0.0004218
3.5681997	3.3828285	27.2771448 C			
0.00004000	17892.	447309965.	29.9909511	0.0011996	-0.0004804
3.6875956	3.4569216	28.2123034 C			
0.00004250	18446.	434012792.	29.3034077	0.0012454	-0.0005396
3.8036296	3.5253072	29.1281751 C			
0.00004500	18964.	421414326.	28.6802270	0.0012906	-0.0005994
3.9167045	3.5883563	30.0283464 C			
0.00004750	19450.	409467291.	28.1117091	0.0013353	-0.0006597
4.0269514	3.6462599	30.9134539 C			
0.00005000	19909.	398185301.	27.5917779	0.0013796	-0.0007204
4.1347025	3.6992964	31.7865780 C			
0.00005250	20345.	387515140.	27.1139437	0.0014235	-0.0007815
4.2400751	3.7476128	32.6484043 C			
0.00005750	21151.	367838839.	26.2646170	0.0015102	-0.0009048
4.4441817	3.8306414	34.3415234 C			
0.00006250	21885.	350152940.	25.5325685	0.0015958	-0.0010292

4.6403250	3.8963701	36.0009050 C			
0.00006750	22561.	334237320.	24.8971614	0.0016806	-0.0011544
4.8296693	3.9456433	37.6371686 C			
0.00007250	23187.	319816400.	24.3400101	0.0017647	-0.0012803
5.0127383	3.9789472	39.2536964 C			
0.00007750	23770.	306710541.	23.8494263	0.0018483	-0.0014067
5.1903413	3.9966956	40.8582609 C			
0.00008250	24315.	294725329.	23.4146962	0.0019317	-0.0015333
5.3629048	3.9999520	42.4541859 C			
0.00008750	24823.	283689219.	23.0283145	0.0020150	-0.0016600
5.5309600	3.9999744	44.0467232 C			
0.00009250	25298.	273493271.	22.6840051	0.0020983	-0.0017867
5.6949254	3.9999968	45.6400691 C			
0.00009750	25746.	264064924.	22.3765164	0.0021817	-0.0019133
5.8551389	3.9998465	47.2376754 C			
0.0001025	26171.	255327223.	22.1000466	0.0022653	-0.0020397
6.0116110	3.9989888	48.8383138 C			
0.0001075	26575.	247204804.	21.8489646	0.0023488	-0.0021662
6.1641802	3.9998492	50.4379224 C			
0.0001125	26964.	239684235.	21.6237580	0.0024327	-0.0022923
6.3137343	3.9990510	52.0491347 C			
0.0001175	27337.	232653164.	21.4155709	0.0025163	-0.0024187
6.4591900	3.9985295	53.6530326 C			
0.0001225	27701.	226130394.	21.2282612	0.0026005	-0.0025445
6.6019168	3.9988607	55.2707232 C			
0.0001275	28053.	220022059.	21.0533710	0.0026843	-0.0026707
6.7406875	3.9988494	56.8800148 C			
0.0001325	28399.	214329577.	20.8938198	0.0027684	-0.0027966
6.8765604	3.9985378	-59.3135221 C			
0.0001375	28732.	208961493.	20.7453326	0.0028525	-0.0029225
7.0090323	3.9977825	60.0000000 CY			
0.0001425	29022.	203663025.	20.5982514	0.0029353	-0.0030497
7.1363409	3.9994968	60.0000000 CY			
0.0001475	29267.	198417541.	20.4580138	0.0030176	-0.0031774
7.2599527	3.9997541	60.0000000 CY			
0.0001525	29469.	193240561.	20.3218448	0.0030991	-0.0033059
7.3795280	3.9985297	60.0000000 CY			
0.0001575	29646.	188228289.	20.1898277	0.0031799	-0.0034351
7.4953315	3.9988394	60.0000000 CY			
0.0001625	29817.	183488398.	20.0682462	0.0032611	-0.0035639
7.6090268	3.9993358	60.0000000 CY			
0.0001675	29973.	178945930.	19.9556004	0.0033426	-0.0036924
7.7205181	3.9964451	60.0000000 CY			
0.0001725	30102.	174505961.	19.8417413	0.0034227	-0.0038223
7.8276833	3.9994926	60.0000000 CY			
0.0001775	30210.	170195016.	19.7323606	0.0035025	-0.0039525
7.9320098	3.9957994	60.0000000 CY			
0.0001825	30311.	166089793.	19.6293997	0.0035824	-0.0040826
8.0341303	3.9990849	60.0000000 CY			
0.0001875	30411.	162193860.	19.5331321	0.0036625	-0.0042125
8.1342834	3.9986467	60.0000000 CY			
0.0001925	30506.	158472513.	19.4381815	0.0037418	-0.0043432
8.2313637	3.9977842	60.0000000 CY			
0.0001975	30600.	154934786.	19.3485358	0.0038213	-0.0044737
8.3264538	3.9997714	60.0000000 CY			
0.0002025	30600.	151109236.	19.2951209	0.0039073	-0.0045977
8.4270337	3.9955756	60.0000000 CY			
0.0002075	30600.	147468049.	19.2697153	0.0039985	-0.0047165
8.5313021	3.9994063	60.0000000 CY			
0.0002125	30600.	143998213.	19.2607719	0.0040929	-0.0048321
8.6366165	3.9946116	60.0000000 CY			
0.0002175	30600.	140687909.	19.3632847	0.0042115	-0.0049235
8.7653774	3.9999803	60.0000000 CY			

0.0002225	30600.	137526383.	19.3910913	0.0043145	-0.0050305
8.8737509	3.9973905	60.0000000 CY			
0.0002275	30600.	134503825.	19.3114304	0.0043934	-0.0051616
8.9544338	3.9992976	60.0000000 CY			
0.0002325	30600.	131611270.	19.3491309	0.0044987	-0.0052663
9.0599639	3.9940135	60.0000000 CY			
0.0002375	30600.	128840506.	19.3948787	0.0046063	-0.0053687
9.1647918	3.9993995	60.0000000 CY			
0.0002425	30600.	126184001.	19.4473999	0.0047160	-0.0054690
9.2686495	3.9940088	60.0000000 CY			
0.0002475	30600.	123634829.	19.5059421	0.0048277	-0.0055673
9.3713901	3.9994983	60.0000000 CY			
0.0002525	30600.	121186615.	19.5676482	0.0049408	-0.0056642
9.4723940	3.9938579	60.0000000 CY			
0.0002725	30600.	112292184.	19.6946804	0.0053668	-0.0060782
9.8270585	3.9998831	60.0000000 CY			
0.0002925	30600.	104614086.	19.6395213	0.0057446	-0.0065404
10.1105412	3.9998517	60.0000000 CY			
0.0003125	30600.	97918785.	19.5755222	0.0061174	-0.0070076
10.3651902	3.9986584	60.0000000 CY			
0.0003325	30600.	92028933.	19.4368073	0.0064627	-0.0075023
10.5809882	3.9883477	60.0000000 CY			
0.0003525	30600.	86807433.	19.3102452	0.0068069	-0.0079981
10.7787953	3.9982826	60.0000000 CY			
0.0003725	30600.	82146631.	19.2583798	0.0071737	-0.0084713
10.9727218	3.9863847	60.0000000 CY			
0.0003925	30600.	77960816.	19.1444049	0.0075142	-0.0089708
11.1381752	3.9960311	60.0000000 CY			
0.0004125	30600.	74180898.	18.9709958	0.0078255	-0.0094995
11.2783370	3.9983886	60.0000000 CY			
0.0004325	30600.	70750567.	18.8744354	0.0081632	-0.0100018
11.4196289	3.9968656	60.0000000 CY			
0.0004525	30600.	67623470.	18.7877487	0.0085015	-0.0105035
11.5507675	3.9816712	60.0000000 CY			
0.0004725	30600.	64761101.	18.6515999	0.0088129	-0.0110321
11.6629222	3.9842493	60.0000000 CY			
0.0004925	30600.	62131209.	18.5771314	0.0091492	-0.0115358
11.7758001	3.9927674	60.0000000 CY			
0.0005125	30600.	59706576.	18.4551032	0.0094582	-0.0120668
11.8723083	3.9945845	60.0000000 CY			
0.0005325	30600.	57464076.	18.3962271	0.0097960	-0.0125690
11.9707594	3.9989980	60.0000000 CY			
0.0005525	30600.	55383928.	18.2925937	0.0101067	-0.0130983
12.0551101	3.9996601	60.0000000 CY			
0.0005725	30600.	53449118.	18.2435477	0.0104444	-0.0136006
12.1407739	3.9930444	60.0000000 CY			
0.0005925	30600.	51644929.	18.1449932	0.0107509	-0.0141341
12.2132633	3.9904492	60.0000000 CY			
0.0006125	30600.	49958564.	18.0528957	0.0110574	-0.0146676
12.2812148	3.9878501	60.0000000 CY			
0.0006325	30600.	48378846.	18.0163520	0.0113953	-0.0151697
12.3513280	3.9753894	60.0000000 CY			
0.0006525	30600.	46895970.	17.9335163	0.0117016	-0.0157034
12.4106510	3.9728571	60.0000000 CY			
0.0006725	30600.	45501294.	17.8550328	0.0120075	-0.0162375
12.4662389	3.9704460	60.0000000 CY			
0.0006925	30600.	44187177.	17.7728097	0.0123077	-0.0167773
12.5174451	3.9698312	60.0000000 CY			
0.0007125	30600.	42946835.	17.7425038	0.0126415	-0.0172835
12.5708561	3.9685105	60.0000000 CY			
0.0007325	30600.	41774226.	17.6654109	0.0129399	-0.0178251
12.6154971	3.9653412	60.0000000 CY			
0.0007525	30600.	40663947.	17.5931893	0.0132389	-0.0183661

12.6575482	3.9622600	60.0000000 CY			
0.0007725	30600.	39611159.	17.5247307	0.0135379	-0.0189071
12.6970812	3.9590554	60.0000000 CY			
0.0007925	30600.	38611508.	17.4606302	0.0138375	-0.0194475
12.7343300	3.9576418	60.0000000 CY			
0.0008125	30600.	37661071.	17.3961246	0.0141344	-0.0199906
12.7690030	3.9580801	60.0000000 CY			
0.0008325	30600.	36756301.	17.3806488	0.0144694	-0.0204956
12.8057157	3.9639363	60.0000000 CY			
0.0008525	30600.	35893983.	17.3181361	0.0147637	-0.0210413
12.8358625	3.9588219	60.0000000 CY			
0.0008725	30600.	35071198.	17.2592437	0.0150587	-0.0215863
12.8642697	3.9536694	60.0000000 CY			
0.0008925	30600.	34285289.	17.2037100	0.0153543	-0.0221307
12.8910240	3.9495649	60.0000000 CY			
0.0009125	30600.	33533830.	17.1512963	0.0156506	-0.0226744
12.9162072	3.9501773	60.0000000 CY			
0.0009325	30600.	32814606.	17.1017848	0.0159474	-0.0232176
12.9398963	3.9505985	60.0000000 CY			
0.0009525	30600.	32125586.	17.0549754	0.0162449	-0.0237601
12.9621643	3.9508337	60.0000000 CY			
0.0009725	30600.	31464905.	17.0106831	0.0165429	-0.0243021
12.9830801	3.9508885	60.0000000 CY			
0.0009925	30600.	30830852.	16.9615218	0.0168343	-0.0248507
13.0022464	3.9530139	60.0000000 CY			
0.0010125	30600.	30221847.	16.9147459	0.0171262	-0.0253988
13.0202407	3.9549985	60.0000000 CY			
0.0010325	30600.	29636436.	16.9162713	0.0174661	-0.0258989
13.0397987	3.9419341	60.0000000 CY			
0.0010525	30600.	29073273.	16.8729820	0.0177588	-0.0264462
13.0554396	3.9436385	60.0000000 CY			
0.0011725	30600.	26097757.	16.6534077	0.0195261	-0.0297189
13.1297909	3.9505025	60.0000000 CY			
0.0012925	30600.	23674755.	16.4656535	0.0212819	-0.0330031
13.1760608	3.9609940	60.0000000 CY			
0.0014125	30600.	21663448.	16.3494861	0.0230936	-0.0362314
13.2023050	3.9539109	60.0000000 CY			
0.0015325	30600.	19967126.	16.2231103	0.0248619	-0.0395031
13.2120169	3.9604738	60.0000000 CY			
0.0016525	30600.	18517168.	16.1081611	0.0266187	-0.0427863
13.2124245	3.9706258	60.0000000 CY			
0.0017725	30600.	17263538.	16.0003721	0.0283607	-0.0460843
13.2124634	3.9854485	60.0000000 CY			
0.0018925	30600.	16168888.	15.9115233	0.0301126	-0.0493724
13.2124510	3.9971431	60.0000000 CY			
0.0020125	30600.	15204780.	15.8296335	0.0318571	-0.0526679
13.2122272	3.9985825	60.0000000 CY			
0.0021325	30600.	14349177.	15.7613720	0.0336111	-0.0559539
13.2124550	3.9943774	60.0000000 CY			
0.0022525	30600.	13584737.	15.6862334	0.0353332	-0.0592718
13.2122230	3.9786507	60.0000000 CY			
0.0023725	30600.	12897627.	15.6097792	0.0370342	-0.0626108
13.2120850	3.9425567	60.0000000 CY			
0.0024925	30600.	12276678.	15.5431439	0.0387413	-0.0659437
13.2121345	3.8932406	60.0000000 CY			
0.0026125	30600.	11712773.	15.5274993	0.0405656	-0.0691594
13.2122039	3.9161799	60.0000000 CY			
0.0027325	30600.	11198397.	15.4755102	0.0422868	-0.0724782
13.2119363	3.8692637	60.0000000 CY			
0.0028525	30600.	10727299.	15.4300620	0.0440143	-0.0757907
13.2121616	3.8176033	60.0000000 CY			
0.0029725	30600.	10294237.	15.3894161	0.0457450	-0.0791000
13.2124406	3.7608655	60.0000000 CY			

0.0030925	30600.	9894784.	15.3538421	0.0474818	-0.0824032
13.2123210	3.7538331	60.0000000 CY			
0.0032125	30600.	9525174.	15.3176905	0.0492081	-0.0857169
13.2119029	3.7577446	60.0000000 CY			
0.0033325	30600.	9182182.	15.2716138	0.0508927	-0.0890723
13.2124623	3.7747464	60.0000000 CY			
0.0034525	30600.	8863033.	15.2304913	0.0525833	-0.0924217
13.2115447	3.7898525	60.0000000 CY			
0.0035725	30600.	8565324.	15.1936968	0.0542795	-0.0957655
13.2124639	3.8032057	60.0000000 CY			
0.0036925	30600.	8286966.	15.1606977	0.0559809	-0.0991041
13.2115890	3.8149329	60.0000000 CY			
0.0038125	30600.	8026130.	15.1310393	0.0576871	-0.1024379
13.2124116	3.8251502	60.0000000 CY			
0.0039325	30600.	7781213.	15.1043315	0.0593978	-0.1057672
13.2120096	3.8339624	60.0000000 CY			
0.0040525	30600.	7550801.	15.0802379	0.0611127	-0.1090923
13.2119763	3.8414610	60.0000000 CY			

Summary of Results for Nominal Moment Capacity for Section 1

Moment values interpolated at maximum compressive strain = 0.003
or maximum developed moment if pile fails at smaller strains.

Load No.	Axial Thrust kips	Nominal Mom. Cap. in-kip	Max. Comp. Strain
1	2017.000	29214.409	0.00300000

Note that the values of moment capacity in the table above are not
factored by a strength reduction factor (phi-factor).

In ACI 318, the value of the strength reduction factor depends on whether
the transverse reinforcing steel bars are tied hoops (0.65) or spirals (0.70).

The above values should be multiplied by the appropriate strength reduction
factor to compute ultimate moment capacity according to ACI 318, Section
9.3.2.2 or the value required by the design standard being followed.

The following table presents factored moment capacities and corresponding
bending stiffnesses computed for common resistance factor values used for
reinforced concrete sections.

Axial Load No.	Resist. Factor for Moment	Nominal Moment Cap in-kips	Ult. (Fac) Ax. Thrust kips	Ult. (Fac) Moment Cap in-kips	Bend. Stiff. at Ult Mom kip-in^2
1	0.65	29214.	1311.	18989.	420782098.
1	0.75	29214.	1412.	21911.	349535375.
1	0.90	29214.	1513.	26293.	252872676.

Layering Correction Equivalent Depths of Soil & Rock Layers

	Top of	Equivalent

Layer No.	Layer Below Pile Head ft	Top Depth Below Grnd Surf ft	Same Layer Type As Layer Above	Layer is Rock or is Below Rock Layer	F0 Integral for Layer lbs	F1 Integral for Layer lbs
1	2.0000	0.00	N.A.	No	0.00	657229.
2	19.0000	188.9419	No	No	657229.	N.A.

Notes: The F0 integral of Layer n+1 equals the sum of the F0 and F1 integrals for Layer n. Layering correction equivalent depths are computed only for soil types with both shallow-depth and deep-depth expressions for peak lateral load transfer. These soil types are soft and stiff clays, non-liquefied sands, and cemented c-phi soil.

Computed Values of Pile Loading and Deflection
for Lateral Loading for LRFD Load Case Number 1

Load Case No. 1: Service 1

Depth X feet	Deflect. y inches	Bending Moment in-lbs	Shear Force lbs	Slope S radians	Total Stress psi*	Bending Stiffness in-lb^2	Soil Res. Es*h lb/inch	Soil Spr. Lat. Load lb/inch	Distrib. p lb/inch
0.00	0.8184	1.04E+07	62865.	-0.00668	0.00	5.57E+11	0.00	0.00	0.00
0.3000	0.7945	1.06E+07	62865.	-0.00661	0.00	5.57E+11	0.00	0.00	0.00
0.6000	0.7708	1.09E+07	62865.	-0.00654	0.00	5.56E+11	0.00	0.00	0.00
0.9000	0.7473	1.12E+07	62865.	-0.00647	0.00	5.56E+11	0.00	0.00	0.00
1.2000	0.7242	1.15E+07	62865.	-0.00640	0.00	5.56E+11	0.00	0.00	0.00
1.5000	0.7013	1.17E+07	62865.	-0.00632	0.00	5.56E+11	0.00	0.00	0.00
1.8000	0.6786	1.20E+07	62865.	-0.00625	0.00	5.56E+11	0.00	0.00	0.00
2.1000	0.6563	1.23E+07	62825.	-0.00617	0.00	5.55E+11	-22.0062	120.7113	0.00
2.4000	0.6342	1.25E+07	62623.	-0.00609	0.00	5.55E+11	-90.5491	513.9687	0.00
2.7000	0.6125	1.28E+07	62168.	-0.00601	0.00	5.55E+11	-162.2112	953.4589	0.00
3.0000	0.5910	1.31E+07	61451.	-0.00592	0.00	5.55E+11	-236.1402	1438.	0.00
3.3000	0.5698	1.33E+07	60465.	-0.00583	0.00	5.39E+11	-311.4899	1968.	0.00
3.6000	0.5490	1.36E+07	59207.	-0.00574	0.00	5.32E+11	-387.4233	2541.	0.00

3.9000	0.5285	1.39E+07	57675.	-0.00565	0.00	5.29E+11
-463.7863	3159.	0.00				
4.2000	0.5083	1.41E+07	55868.	-0.00556	0.00	5.25E+11
-540.2774	3826.	0.00				
4.5000	0.4885	1.43E+07	53787.	-0.00546	0.00	5.21E+11
-615.6915	4538.	0.00				
4.8000	0.4690	1.46E+07	51438.	-0.00536	0.00	5.17E+11
-689.3642	5291.	0.00				
5.1000	0.4499	1.48E+07	48828.	-0.00525	0.00	5.13E+11
-760.6522	6086.	0.00				
5.4000	0.4312	1.50E+07	45966.	-0.00515	0.00	5.09E+11
-828.9336	6921.	0.00				
5.7000	0.4128	1.52E+07	42863.	-0.00504	0.00	5.06E+11
-895.1779	7806.	0.00				
6.0000	0.3949	1.54E+07	39526.	-0.00493	0.00	5.02E+11
-958.4888	8738.	0.00				
6.3000	0.3773	1.55E+07	35969.	-0.00482	0.00	4.99E+11
-1018.	9710.	0.00				
6.6000	0.3602	1.57E+07	32208.	-0.00471	0.00	4.96E+11
-1072.	10717.	0.00				
6.9000	0.3434	1.58E+07	28259.	-0.00459	0.00	4.93E+11
-1122.	11758.	0.00				
7.2000	0.3271	1.60E+07	24142.	-0.00448	0.00	4.90E+11
-1166.	12828.	0.00				
7.5000	0.3112	1.61E+07	19865.	-0.00436	0.00	4.88E+11
-1210.	14003.	0.00				
7.8000	0.2957	1.62E+07	15434.	-0.00424	0.00	4.86E+11
-1251.	15236.	0.00				
8.1000	0.2806	1.63E+07	10865.	-0.00412	0.00	4.84E+11
-1287.	16507.	0.00				
8.4000	0.2660	1.63E+07	6179.	-0.00400	0.00	4.83E+11
-1316.	17815.	0.00				
8.7000	0.2519	1.64E+07	1397.	-0.00388	0.00	4.82E+11
-1340.	19153.	0.00				
9.0000	0.2381	1.64E+07	-3457.	-0.00375	0.00	4.81E+11
-1357.	20515.	0.00				
9.3000	0.2248	1.64E+07	-8378.	-0.00363	0.00	4.81E+11
-1377.	22048.	0.00				
9.6000	0.2120	1.64E+07	-13361.	-0.00351	0.00	4.81E+11
-1391.	23627.	0.00				
9.9000	0.1996	1.63E+07	-18385.	-0.00339	0.00	4.82E+11
-1400.	25248.	0.00				
10.2000	0.1876	1.63E+07	-23428.	-0.00326	0.00	4.83E+11
-1402.	26906.	0.00				
10.5000	0.1761	1.62E+07	-28469.	-0.00314	0.00	4.85E+11
-1398.	28593.	0.00				
10.8000	0.1650	1.61E+07	-33487.	-0.00302	0.00	4.87E+11
-1389.	30316.	0.00				
11.1000	0.1543	1.60E+07	-38465.	-0.00291	0.00	4.89E+11
-1377.	32123.	0.00				
11.4000	0.1441	1.59E+07	-43388.	-0.00279	0.00	4.92E+11
-1358.	33932.	0.00				
11.7000	0.1342	1.58E+07	-48229.	-0.00267	0.00	4.95E+11
-1332.	35727.	0.00				
12.0000	0.1248	1.56E+07	-52967.	-0.00256	0.00	4.98E+11
-1300.	37490.	0.00				
12.3000	0.1158	1.54E+07	-57576.	-0.00245	0.00	5.01E+11
-1261.	39200.	0.00				
12.6000	0.1072	1.52E+07	-62045.	-0.00234	0.00	5.05E+11
-1222.	41028.	0.00				
12.9000	0.09897	1.50E+07	-66341.	-0.00223	0.00	5.09E+11
-1165.	42379.	0.00				
13.2000	0.09114	1.48E+07	-70422.	-0.00213	0.00	5.13E+11

-1102.	43546.	0.00				
13.5000	0.08367	1.45E+07	-74277.	-0.00202	0.00	5.18E+11
-1039.	44712.	0.00				
13.8000	0.07657	1.43E+07	-77904.	-0.00192	0.00	5.22E+11
-975.8378	45878.	0.00				
14.1000	0.06983	1.40E+07	-81303.	-0.00183	0.00	5.27E+11
-912.4800	47045.	0.00				
14.4000	0.06342	1.37E+07	-84475.	-0.00173	0.00	5.31E+11
-849.3613	48211.	0.00				
14.7000	0.05736	1.34E+07	-87420.	-0.00164	0.00	5.35E+11
-786.6829	49378.	0.00				
15.0000	0.05161	1.31E+07	-90140.	-0.00155	0.00	5.55E+11
-724.6315	50544.	0.00				
15.3000	0.04617	1.28E+07	-92638.	-0.00147	0.00	5.55E+11
-663.2550	51710.	0.00				
15.6000	0.04104	1.25E+07	-94917.	-0.00139	0.00	5.55E+11
-602.7394	52877.	0.00				
15.9000	0.03619	1.21E+07	-96980.	-0.00131	0.00	5.56E+11
-543.2575	54043.	0.00				
16.2000	0.03162	1.18E+07	-98831.	-0.00123	0.00	5.56E+11
-484.9693	55210.	0.00				
16.5000	0.02733	1.14E+07	-100474.	-0.00115	0.00	5.56E+11
-428.0220	56376.	0.00				
16.8000	0.02331	1.11E+07	-101915.	-0.00108	0.00	5.56E+11
-372.5500	57542.	0.00				
17.1000	0.01954	1.07E+07	-103159.	-0.00101	0.00	5.57E+11
-318.6750	58709.	0.00				
17.4000	0.01602	1.03E+07	-104212.	-9.44E-04	0.00	5.57E+11
-266.5056	59875.	0.00				
17.7000	0.01275	9969159.	-105081.	-8.78E-04	0.00	5.57E+11
-216.1382	61042.	0.00				
18.0000	0.00970	9595607.	-105772.	-8.15E-04	0.00	5.57E+11
-167.6564	62208.	0.00				
18.3000	0.00688	9219432.	-106292.	-7.54E-04	0.00	5.57E+11
-121.1312	63374.	0.00				
18.6000	0.00427	8841254.	-106648.	-6.96E-04	0.00	5.57E+11
-76.6216	64541.	0.00				
18.9000	0.00187	8461670.	-106847.	-6.40E-04	0.00	5.58E+11
-34.1742	65707.	0.00				
19.2000	-3.32E-04	8081245.	-106881.	-5.86E-04	0.00	5.58E+11
15.4406	167184.	0.00				
19.5000	-0.00235	7700642.	-106653.	-5.35E-04	0.00	5.58E+11
111.0165	170100.	0.00				
19.8000	-0.00419	7321117.	-106091.	-4.87E-04	0.00	5.58E+11
201.2634	173016.	0.00				
20.1000	-0.00586	6943857.	-105214.	-4.41E-04	0.00	5.58E+11
286.1794	175932.	0.00				
20.4000	-0.00736	6569981.	-104040.	-3.97E-04	0.00	5.58E+11
365.7887	178848.	0.00				
20.7000	-0.00872	6200538.	-102590.	-3.56E-04	0.00	5.58E+11
440.1392	181764.	0.00				
21.0000	-0.00993	5836509.	-100881.	-3.17E-04	0.00	5.59E+11
509.3020	184680.	0.00				
21.3000	-0.01100	5478808.	-98932.	-2.81E-04	0.00	5.59E+11
573.3687	187596.	0.00				
21.6000	-0.01195	5128281.	-96761.	-2.47E-04	0.00	5.59E+11
632.4507	190512.	0.00				
21.9000	-0.01278	4785710.	-94387.	-2.15E-04	0.00	5.59E+11
686.6769	193428.	0.00				
22.2000	-0.01350	4451815.	-91826.	-1.85E-04	0.00	5.59E+11
736.1925	196344.	0.00				
22.5000	-0.01411	4127253.	-89095.	-1.57E-04	0.00	5.59E+11
781.1570	199260.	0.00				

22.8000	-0.01463	3812622.	-86209.	-1.32E-04	0.00	5.59E+11
821.7428	202176.	0.00				
23.1000	-0.01506	3508462.	-83186.	-1.08E-04	0.00	5.59E+11
858.1333	205092.	0.00				
23.4000	-0.01541	3215259.	-80038.	-8.67E-05	0.00	5.59E+11
890.5214	208008.	0.00				
23.7000	-0.01569	2933447.	-76781.	-6.69E-05	0.00	5.59E+11
919.1080	210924.	0.00				
24.0000	-0.01589	2663410.	-73427.	-4.89E-05	0.00	5.59E+11
944.0999	213840.	0.00				
24.3000	-0.01604	2405484.	-69989.	-3.26E-05	0.00	5.59E+11
965.7090	216756.	0.00				
24.6000	-0.01613	2159960.	-66479.	-1.79E-05	0.00	5.59E+11
984.1499	219672.	0.00				
24.9000	-0.01617	1927091.	-62909.	-4.69E-06	0.00	5.59E+11
999.6390	222588.	0.00				
25.2000	-0.01616	1707086.	-59287.	7.02E-06	0.00	5.59E+11
1012.	225504.	0.00				
25.5000	-0.01612	1500122.	-55624.	1.73E-05	0.00	5.59E+11
1023.	228420.	0.00				
25.8000	-0.01604	1306342.	-51928.	2.64E-05	0.00	5.59E+11
1031.	231336.	0.00				
26.1000	-0.01593	1125856.	-48208.	3.42E-05	0.00	5.59E+11
1036.	234252.	0.00				
26.4000	-0.01579	958749.	-44470.	4.09E-05	0.00	5.58E+11
1040.	237168.	0.00				
26.7000	-0.01563	805079.	-40721.	4.66E-05	0.00	5.58E+11
1043.	240084.	0.00				
27.0000	-0.01546	664882.	-36966.	5.14E-05	0.00	5.58E+11
1043.	243000.	0.00				
27.3000	-0.01526	538174.	-33212.	5.53E-05	0.00	5.57E+11
1043.	245916.	0.00				
27.6000	-0.01506	424953.	-29462.	5.84E-05	0.00	5.57E+11
1041.	248832.	0.00				
27.9000	-0.01484	325200.	-25720.	6.08E-05	0.00	5.56E+11
1038.	251748.	0.00				
28.2000	-0.01462	238883.	-21991.	6.26E-05	0.00	5.56E+11
1034.	254664.	0.00				
28.5000	-0.01439	165958.	-18276.	6.39E-05	0.00	5.56E+11
1030.	257580.	0.00				
28.8000	-0.01416	106370.	-14578.	6.48E-05	0.00	5.56E+11
1025.	260496.	0.00				
29.1000	-0.01392	60055.	-10900.	6.53E-05	0.00	5.56E+11
1019.	263412.	0.00				
29.4000	-0.01369	26942.	-7243.	6.56E-05	0.00	5.56E+11
1013.	266328.	0.00				
29.7000	-0.01345	6952.	-3609.	6.57E-05	0.00	5.56E+11
1006.	269244.	0.00				
30.0000	-0.01322	0.00	0.00	6.58E-05	0.00	5.56E+11
999.0808	136080.	0.00				

* This analysis computed pile response using nonlinear moment-curvature relationships. Values of total stress due to combined axial and bending stresses are computed only for elastic sections only and do not equal the actual stresses in concrete and steel. Stresses in concrete and steel may be interpolated from the output for nonlinear bending properties relative to the magnitude of bending moment developed in the pile.

Output Summary for Load Case No. 1:

Pile-head deflection = 0.81839151 inches
Computed slope at pile head = -0.00668130 radians

Maximum bending moment = 16392113. inch-lbs
Maximum shear force = -106881. lbs
Depth of maximum bending moment = 9.30000000 feet below pile head
Depth of maximum shear force = 19.20000000 feet below pile head
Number of iterations = 15
Number of zero deflection points = 1

Computed Values of Pile Loading and Deflection
for Lateral Loading for LRFD Load Case Number 2

Load Case No. 2: Strength 1

Depth X	Deflect. y	Bending Moment	Shear Force	Slope S	Total Stress	Bending Stiffness	Soil Res. Spr. Distrib. p
Es*h	Lat. Load						
feet	inches	in-lbs	lbs	radians	psi*	in-lb^2	
lb/inch	lb/inch	lb/inch					
0.00	0.8184	1.04E+07	62865.	-0.00668	0.00	5.57E+11	
0.00	0.00	0.00					
0.3000	0.7945	1.06E+07	62865.	-0.00661	0.00	5.57E+11	
0.00	0.00	0.00					
0.6000	0.7708	1.09E+07	62865.	-0.00654	0.00	5.56E+11	
0.00	0.00	0.00					
0.9000	0.7473	1.12E+07	62865.	-0.00647	0.00	5.56E+11	
0.00	0.00	0.00					
1.2000	0.7242	1.15E+07	62865.	-0.00640	0.00	5.56E+11	
0.00	0.00	0.00					
1.5000	0.7013	1.17E+07	62865.	-0.00632	0.00	5.56E+11	
0.00	0.00	0.00					
1.8000	0.6786	1.20E+07	62865.	-0.00625	0.00	5.56E+11	
0.00	0.00	0.00					
2.1000	0.6563	1.23E+07	62825.	-0.00617	0.00	5.55E+11	
-22.0062	120.7113	0.00					
2.4000	0.6342	1.25E+07	62623.	-0.00609	0.00	5.55E+11	
-90.5491	513.9687	0.00					
2.7000	0.6125	1.28E+07	62168.	-0.00601	0.00	5.55E+11	
-162.2112	953.4589	0.00					
3.0000	0.5910	1.31E+07	61451.	-0.00592	0.00	5.55E+11	
-236.1402	1438.	0.00					
3.3000	0.5698	1.33E+07	60465.	-0.00583	0.00	5.39E+11	
-311.4899	1968.	0.00					
3.6000	0.5490	1.36E+07	59207.	-0.00574	0.00	5.32E+11	
-387.4233	2541.	0.00					
3.9000	0.5285	1.39E+07	57675.	-0.00565	0.00	5.29E+11	
-463.7863	3159.	0.00					
4.2000	0.5083	1.41E+07	55868.	-0.00556	0.00	5.25E+11	
-540.2774	3826.	0.00					
4.5000	0.4885	1.43E+07	53787.	-0.00546	0.00	5.21E+11	
-615.6915	4538.	0.00					
4.8000	0.4690	1.46E+07	51438.	-0.00536	0.00	5.17E+11	
-689.3642	5291.	0.00					

5.1000	0.4499	1.48E+07	48828.	-0.00525	0.00	5.13E+11
-760.6522	6086.	0.00				
5.4000	0.4312	1.50E+07	45966.	-0.00515	0.00	5.09E+11
-828.9336	6921.	0.00				
5.7000	0.4128	1.52E+07	42863.	-0.00504	0.00	5.06E+11
-895.1779	7806.	0.00				
6.0000	0.3949	1.54E+07	39526.	-0.00493	0.00	5.02E+11
-958.4888	8738.	0.00				
6.3000	0.3773	1.55E+07	35969.	-0.00482	0.00	4.99E+11
-1018.	9710.	0.00				
6.6000	0.3602	1.57E+07	32208.	-0.00471	0.00	4.96E+11
-1072.	10717.	0.00				
6.9000	0.3434	1.58E+07	28259.	-0.00459	0.00	4.93E+11
-1122.	11758.	0.00				
7.2000	0.3271	1.60E+07	24142.	-0.00448	0.00	4.90E+11
-1166.	12828.	0.00				
7.5000	0.3112	1.61E+07	19865.	-0.00436	0.00	4.88E+11
-1210.	14003.	0.00				
7.8000	0.2957	1.62E+07	15434.	-0.00424	0.00	4.86E+11
-1251.	15236.	0.00				
8.1000	0.2806	1.63E+07	10865.	-0.00412	0.00	4.84E+11
-1287.	16507.	0.00				
8.4000	0.2660	1.63E+07	6179.	-0.00400	0.00	4.83E+11
-1316.	17815.	0.00				
8.7000	0.2519	1.64E+07	1397.	-0.00388	0.00	4.82E+11
-1340.	19153.	0.00				
9.0000	0.2381	1.64E+07	-3457.	-0.00375	0.00	4.81E+11
-1357.	20515.	0.00				
9.3000	0.2248	1.64E+07	-8378.	-0.00363	0.00	4.81E+11
-1377.	22048.	0.00				
9.6000	0.2120	1.64E+07	-13361.	-0.00351	0.00	4.81E+11
-1391.	23627.	0.00				
9.9000	0.1996	1.63E+07	-18385.	-0.00339	0.00	4.82E+11
-1400.	25248.	0.00				
10.2000	0.1876	1.63E+07	-23428.	-0.00326	0.00	4.83E+11
-1402.	26906.	0.00				
10.5000	0.1761	1.62E+07	-28469.	-0.00314	0.00	4.85E+11
-1398.	28593.	0.00				
10.8000	0.1650	1.61E+07	-33487.	-0.00302	0.00	4.87E+11
-1389.	30316.	0.00				
11.1000	0.1543	1.60E+07	-38465.	-0.00291	0.00	4.89E+11
-1377.	32123.	0.00				
11.4000	0.1441	1.59E+07	-43388.	-0.00279	0.00	4.92E+11
-1358.	33932.	0.00				
11.7000	0.1342	1.58E+07	-48229.	-0.00267	0.00	4.95E+11
-1332.	35727.	0.00				
12.0000	0.1248	1.56E+07	-52967.	-0.00256	0.00	4.98E+11
-1300.	37490.	0.00				
12.3000	0.1158	1.54E+07	-57576.	-0.00245	0.00	5.01E+11
-1261.	39200.	0.00				
12.6000	0.1072	1.52E+07	-62045.	-0.00234	0.00	5.05E+11
-1222.	41028.	0.00				
12.9000	0.09897	1.50E+07	-66341.	-0.00223	0.00	5.09E+11
-1165.	42379.	0.00				
13.2000	0.09114	1.48E+07	-70422.	-0.00213	0.00	5.13E+11
-1102.	43546.	0.00				
13.5000	0.08367	1.45E+07	-74277.	-0.00202	0.00	5.18E+11
-1039.	44712.	0.00				
13.8000	0.07657	1.43E+07	-77904.	-0.00192	0.00	5.22E+11
-975.8378	45878.	0.00				
14.1000	0.06983	1.40E+07	-81303.	-0.00183	0.00	5.27E+11
-912.4800	47045.	0.00				
14.4000	0.06342	1.37E+07	-84475.	-0.00173	0.00	5.31E+11

-849.3613	48211.	0.00				
14.7000	0.05736	1.34E+07	-87420.	-0.00164	0.00	5.35E+11
-786.6829	49378.	0.00				
15.0000	0.05161	1.31E+07	-90140.	-0.00155	0.00	5.55E+11
-724.6315	50544.	0.00				
15.3000	0.04617	1.28E+07	-92638.	-0.00147	0.00	5.55E+11
-663.2550	51710.	0.00				
15.6000	0.04104	1.25E+07	-94917.	-0.00139	0.00	5.55E+11
-602.7394	52877.	0.00				
15.9000	0.03619	1.21E+07	-96980.	-0.00131	0.00	5.56E+11
-543.2575	54043.	0.00				
16.2000	0.03162	1.18E+07	-98831.	-0.00123	0.00	5.56E+11
-484.9693	55210.	0.00				
16.5000	0.02733	1.14E+07	-100474.	-0.00115	0.00	5.56E+11
-428.0220	56376.	0.00				
16.8000	0.02331	1.11E+07	-101915.	-0.00108	0.00	5.56E+11
-372.5500	57542.	0.00				
17.1000	0.01954	1.07E+07	-103159.	-0.00101	0.00	5.57E+11
-318.6750	58709.	0.00				
17.4000	0.01602	1.03E+07	-104212.	-9.44E-04	0.00	5.57E+11
-266.5056	59875.	0.00				
17.7000	0.01275	9969159.	-105081.	-8.78E-04	0.00	5.57E+11
-216.1382	61042.	0.00				
18.0000	0.00970	9595607.	-105772.	-8.15E-04	0.00	5.57E+11
-167.6564	62208.	0.00				
18.3000	0.00688	9219432.	-106292.	-7.54E-04	0.00	5.57E+11
-121.1312	63374.	0.00				
18.6000	0.00427	8841254.	-106648.	-6.96E-04	0.00	5.57E+11
-76.6216	64541.	0.00				
18.9000	0.00187	8461670.	-106847.	-6.40E-04	0.00	5.58E+11
-34.1742	65707.	0.00				
19.2000	-3.32E-04	8081245.	-106881.	-5.86E-04	0.00	5.58E+11
15.4406	167184.	0.00				
19.5000	-0.00235	7700642.	-106653.	-5.35E-04	0.00	5.58E+11
111.0165	170100.	0.00				
19.8000	-0.00419	7321117.	-106091.	-4.87E-04	0.00	5.58E+11
201.2634	173016.	0.00				
20.1000	-0.00586	6943857.	-105214.	-4.41E-04	0.00	5.58E+11
286.1794	175932.	0.00				
20.4000	-0.00736	6569981.	-104040.	-3.97E-04	0.00	5.58E+11
365.7887	178848.	0.00				
20.7000	-0.00872	6200538.	-102590.	-3.56E-04	0.00	5.58E+11
440.1392	181764.	0.00				
21.0000	-0.00993	5836509.	-100881.	-3.17E-04	0.00	5.59E+11
509.3020	184680.	0.00				
21.3000	-0.01100	5478808.	-98932.	-2.81E-04	0.00	5.59E+11
573.3687	187596.	0.00				
21.6000	-0.01195	5128281.	-96761.	-2.47E-04	0.00	5.59E+11
632.4507	190512.	0.00				
21.9000	-0.01278	4785710.	-94387.	-2.15E-04	0.00	5.59E+11
686.6769	193428.	0.00				
22.2000	-0.01350	4451815.	-91826.	-1.85E-04	0.00	5.59E+11
736.1925	196344.	0.00				
22.5000	-0.01411	4127253.	-89095.	-1.57E-04	0.00	5.59E+11
781.1570	199260.	0.00				
22.8000	-0.01463	3812622.	-86209.	-1.32E-04	0.00	5.59E+11
821.7428	202176.	0.00				
23.1000	-0.01506	3508462.	-83186.	-1.08E-04	0.00	5.59E+11
858.1333	205092.	0.00				
23.4000	-0.01541	3215259.	-80038.	-8.67E-05	0.00	5.59E+11
890.5214	208008.	0.00				
23.7000	-0.01569	2933447.	-76781.	-6.69E-05	0.00	5.59E+11
919.1080	210924.	0.00				

24.0000	-0.01589	2663410.	-73427.	-4.89E-05	0.00	5.59E+11
944.0999	213840.	0.00				
24.3000	-0.01604	2405484.	-69989.	-3.26E-05	0.00	5.59E+11
965.7090	216756.	0.00				
24.6000	-0.01613	2159960.	-66479.	-1.79E-05	0.00	5.59E+11
984.1499	219672.	0.00				
24.9000	-0.01617	1927091.	-62909.	-4.69E-06	0.00	5.59E+11
999.6390	222588.	0.00				
25.2000	-0.01616	1707086.	-59287.	7.02E-06	0.00	5.59E+11
1012.	225504.	0.00				
25.5000	-0.01612	1500122.	-55624.	1.73E-05	0.00	5.59E+11
1023.	228420.	0.00				
25.8000	-0.01604	1306342.	-51928.	2.64E-05	0.00	5.59E+11
1031.	231336.	0.00				
26.1000	-0.01593	1125856.	-48208.	3.42E-05	0.00	5.59E+11
1036.	234252.	0.00				
26.4000	-0.01579	958749.	-44470.	4.09E-05	0.00	5.58E+11
1040.	237168.	0.00				
26.7000	-0.01563	805079.	-40721.	4.66E-05	0.00	5.58E+11
1043.	240084.	0.00				
27.0000	-0.01546	664882.	-36966.	5.14E-05	0.00	5.58E+11
1043.	243000.	0.00				
27.3000	-0.01526	538174.	-33212.	5.53E-05	0.00	5.57E+11
1043.	245916.	0.00				
27.6000	-0.01506	424953.	-29462.	5.84E-05	0.00	5.57E+11
1041.	248832.	0.00				
27.9000	-0.01484	325200.	-25720.	6.08E-05	0.00	5.56E+11
1038.	251748.	0.00				
28.2000	-0.01462	238883.	-21991.	6.26E-05	0.00	5.56E+11
1034.	254664.	0.00				
28.5000	-0.01439	165958.	-18276.	6.39E-05	0.00	5.56E+11
1030.	257580.	0.00				
28.8000	-0.01416	106370.	-14578.	6.48E-05	0.00	5.56E+11
1025.	260496.	0.00				
29.1000	-0.01392	60055.	-10900.	6.53E-05	0.00	5.56E+11
1019.	263412.	0.00				
29.4000	-0.01369	26942.	-7243.	6.56E-05	0.00	5.56E+11
1013.	266328.	0.00				
29.7000	-0.01345	6952.	-3609.	6.57E-05	0.00	5.56E+11
1006.	269244.	0.00				
30.0000	-0.01322	0.00	0.00	6.58E-05	0.00	5.56E+11
999.0808	136080.	0.00				

* This analysis computed pile response using nonlinear moment-curvature relationships. Values of total stress due to combined axial and bending stresses are computed only for elastic sections only and do not equal the actual stresses in concrete and steel. Stresses in concrete and steel may be interpolated from the output for nonlinear bending properties relative to the magnitude of bending moment developed in the pile.

Output Summary for Load Case No. 2:

Pile-head deflection	=	0.81839151 inches
Computed slope at pile head	=	-0.00668130 radians
Maximum bending moment	=	16392113. inch-lbs
Maximum shear force	=	-106881. lbs
Depth of maximum bending moment	=	9.30000000 feet below pile head
Depth of maximum shear force	=	19.20000000 feet below pile head
Number of iterations	=	15
Number of zero deflection points	=	1

Summary of Pile Responses for LRFD Analyses

Load Case No.	Pile-head Shear lbs	Pile-head Moment in-lbs	Axial Loading lbs	Pile-head Deflection inches	Maximum Moment in Pile in-lbs	Maximum Pile-Head Rotation radians
1	62865.	10366506.	2017000.	0.81839151	16392113.	-106881.	-0.00668130
2	62865.	10366506.	2017000.	0.81839151	16392113.	-106881.	-0.00668130

Maximum pile-head deflection = 0.8183915082 inches
Maximum pile-head rotation = -0.0066812970 radians = -0.382810 deg.

LRFD Performance by Load Case Combination

Load Case No.	Section No.	Resistance Factor	Factored Moment Capacity	Maximum Moment Developed	Fact. Mom. Fraction Developed	Pass/Fail for LRFD Moment	Factored Shear Resistance	Maximum Shear Developed	Fac. Shear Fraction Developed	Pass/Fail for LRFD Shear	Pile-top Deflection	Pile-top Rotation	Name of Load Case Combination
		for Moment	of Section	in Section	in Section	of Section	for Shear	of Section	in Section	in Section			
			in-lbs	in-lbs			lbs	lbs			inches	Radians	
1	1	1.00	29214409.	16392113.	0.561097	Pass	1.00	232.000000	-106881.	460.693939	FAIL	0.818392	-0.006681	Service 1
2	1	1.00	29214409.	16392113.	0.561097	Pass	1.00	232.000000	-106881.	460.693939	FAIL	0.818392	-0.006681	Strength 1

2 LRFD load combinations have failed.

The load case and pile section with the greatest level of developed moment capacity:

LRFD Load Case No. = 1
Pile Section No. = 1

The load case and pile section with the greatest level of developed shear

capacity:

LRFD Load Case No. = 1
Pile Section No. = 1
Node Number of Maximum Shear Force = 1
Depth of Maximum Developed Shear = 0.00 ft
Maximum Developed Shear Force = -106880.99 lbs
Factored Shear Capacity at Node = 232.00 lbs
Fraction of Allowable Shear Capacity = 460.6939

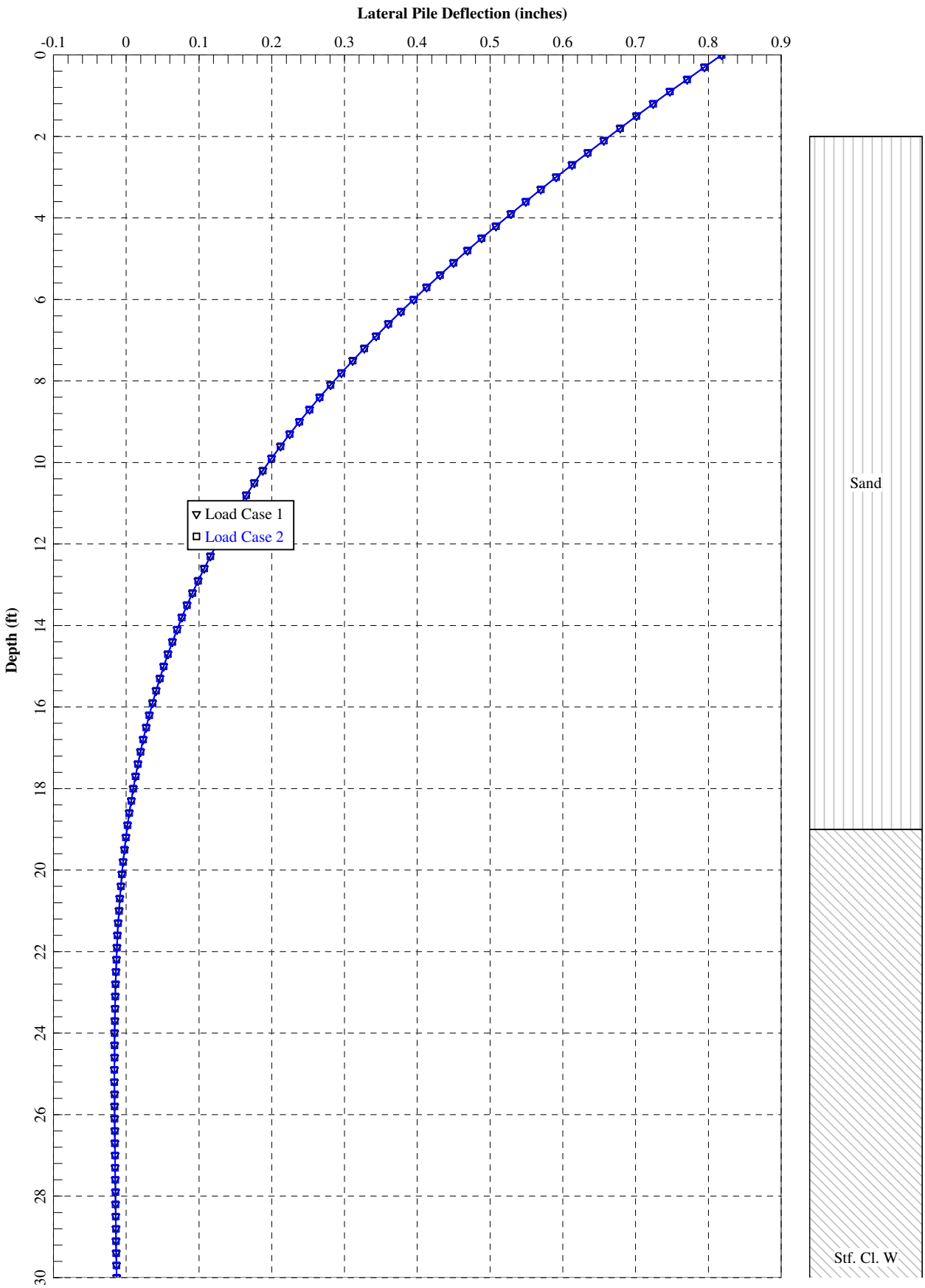
Summary of Warning Messages

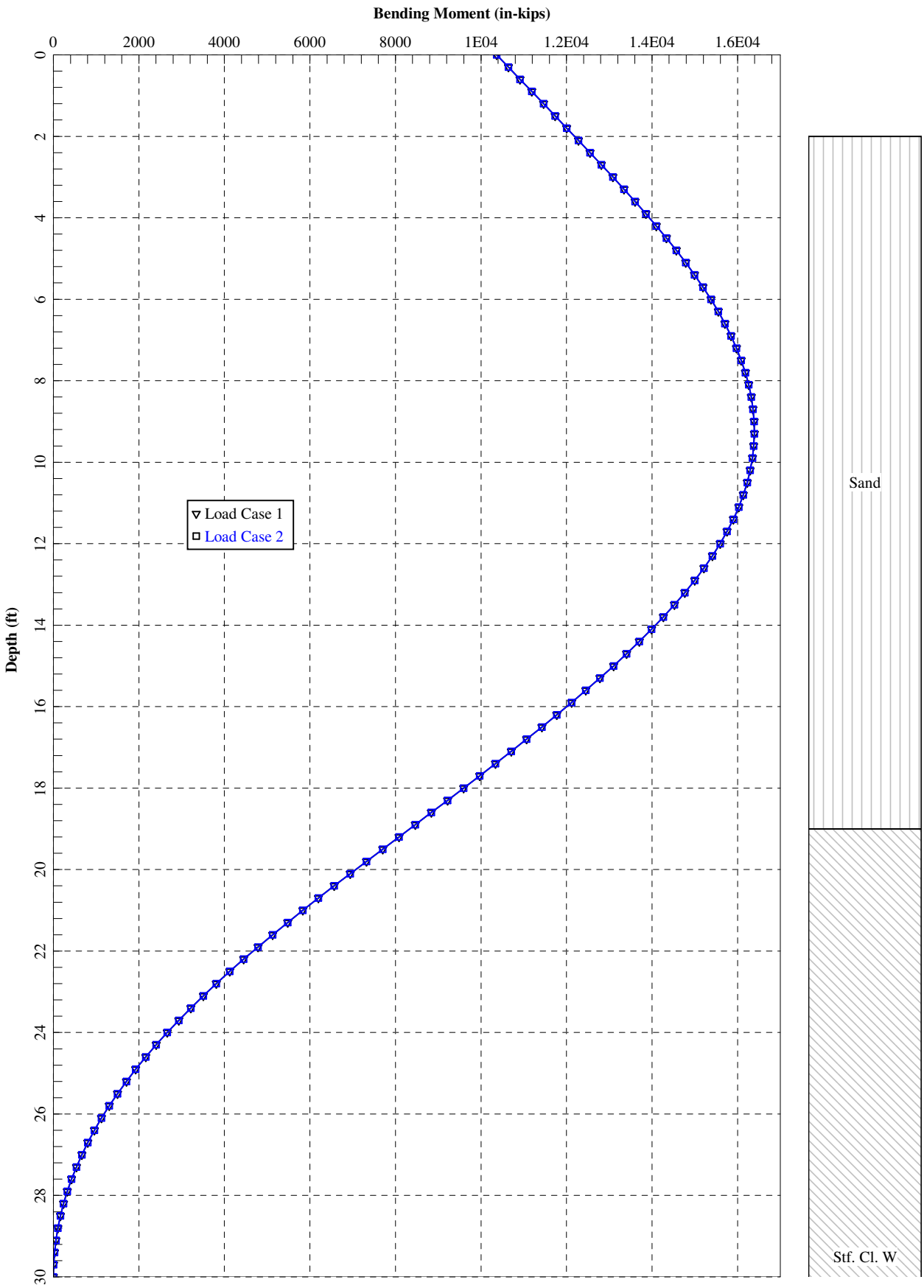
The following warning was reported 2 times

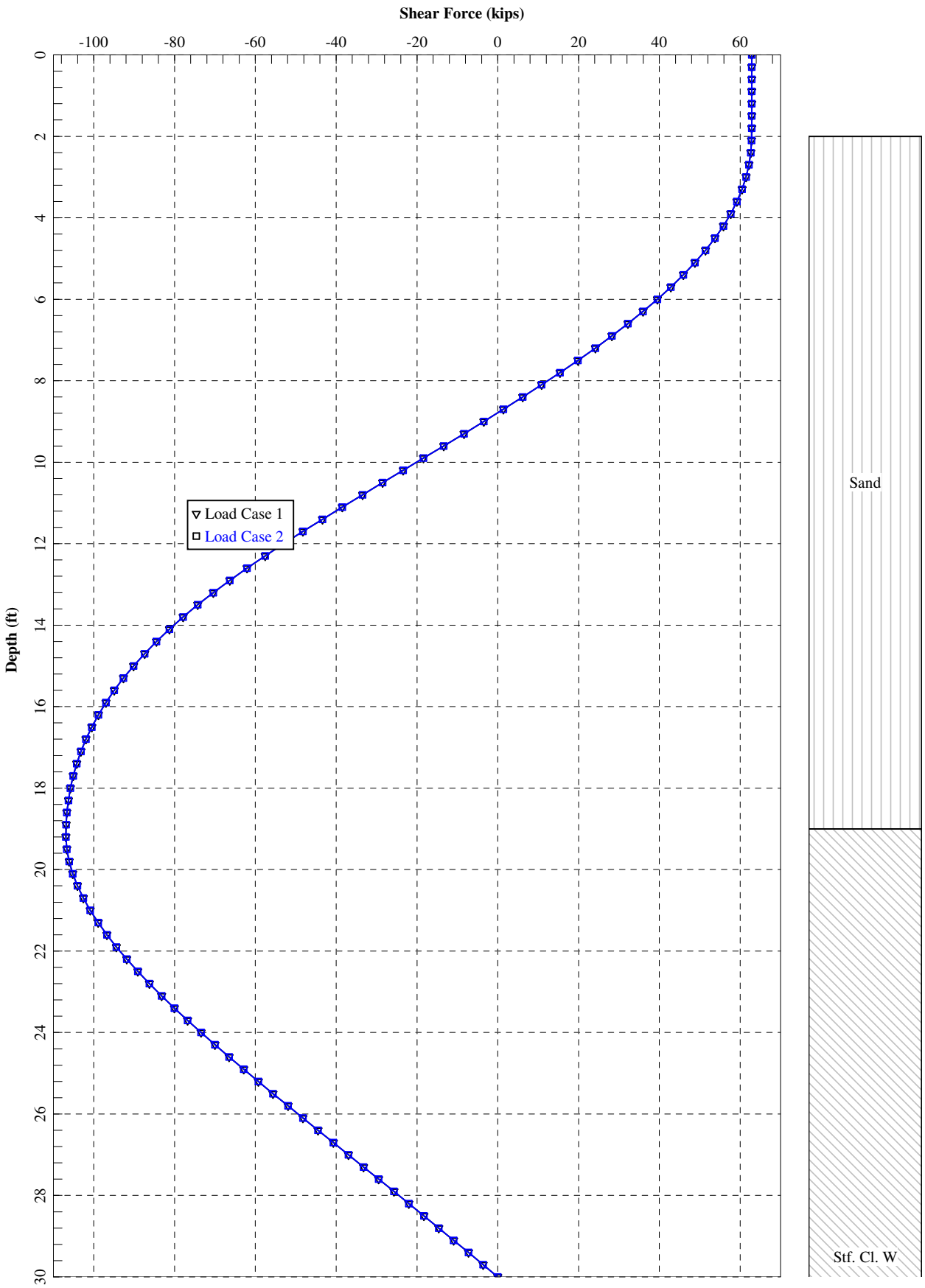
**** Warning - Failure for One or More LRFD Load Cases ****

This warning message is provided to alert the user that one or more of
LRFD load cases has overloaded the moment capacity of the pile.

The analysis ended normally.


Lateral Pile Deflection (inches)
-0.1
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
Depth (ft)
0
2
4
6
8
10
12
14
16
18
20
22
24
26
28
30
Load Case 1
Load Case 2
Sand
Stf. Cl. W


Bending Moment (in-kips)
0
2000
4000
6000
8000
1E04
1.2E04
1.4E04
1.6E04
Depth (ft)
0
2
4
6
8
10
12
14
16
18
20
22
24
26
28
30
Load Case 1
Load Case 2
Sand
Stf. Cl. W

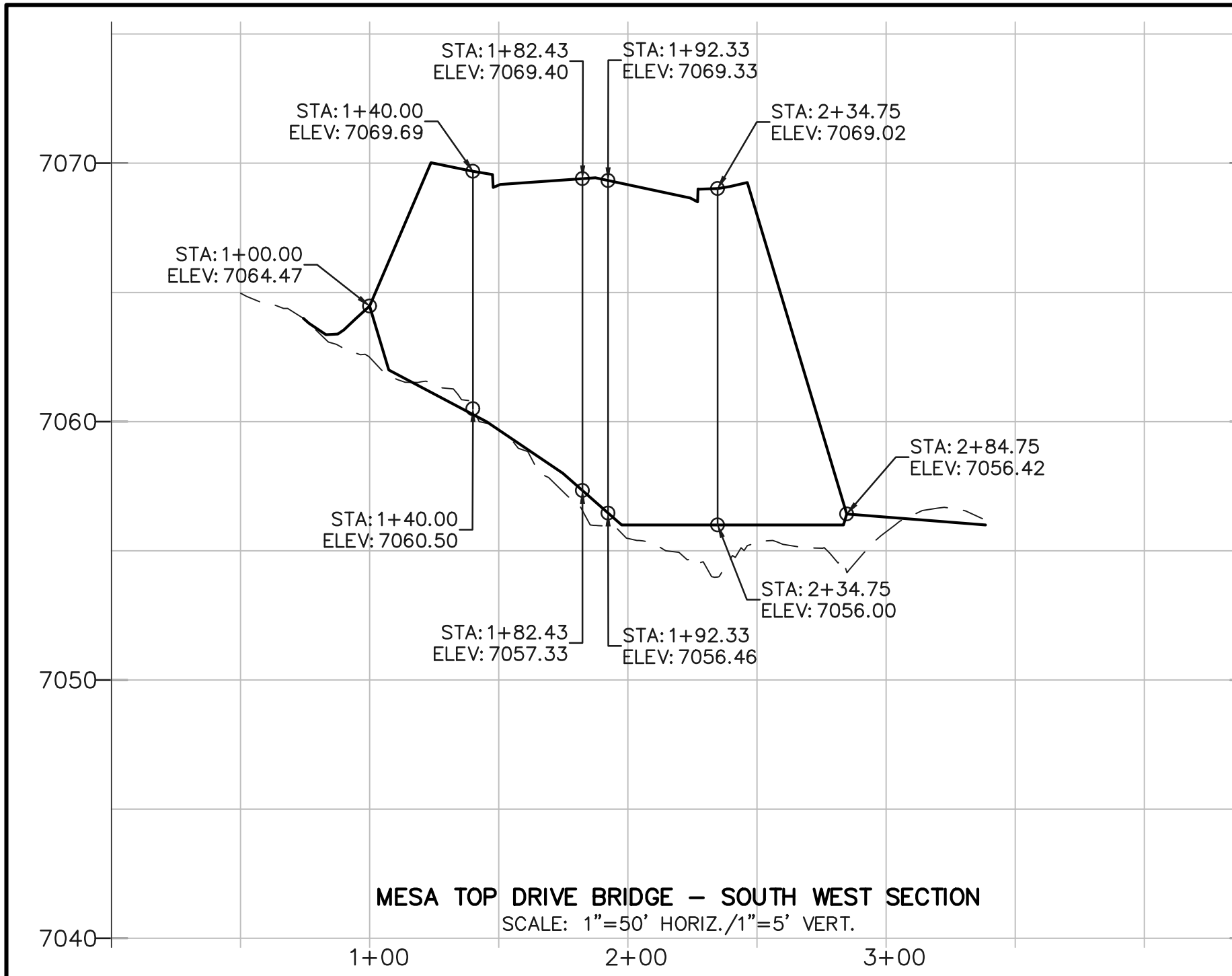

Shear Force (kips)
-100
-80
-60
-40
-20
0
20
40
60
Depth (ft)
0
2
4
6
8
10
12
14
16
18
20
22
24
26
28
30
Load Case 1
Load Case 2
Sand
Stf. Cl. W

Mesa Top Drive South over North Beaver Creek

Monument, Colorado

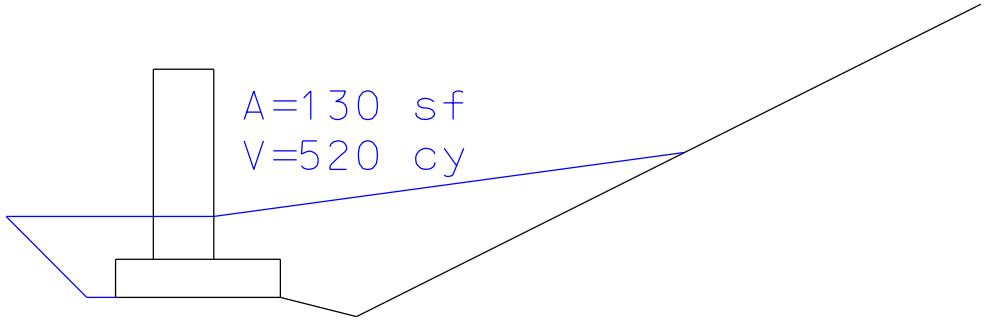
Design Check Calculations

Quantities

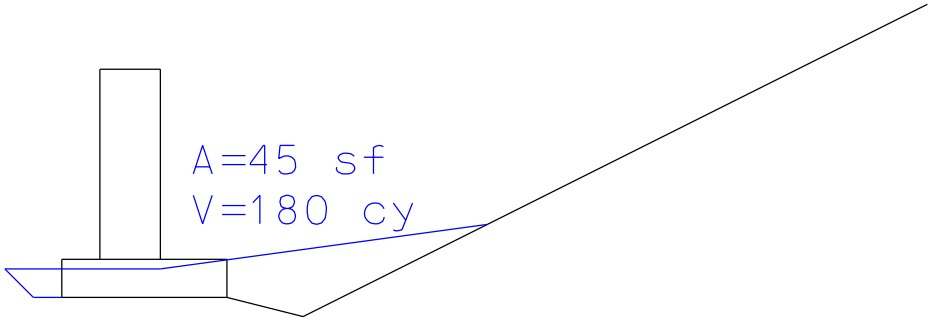


MESA TOP DRIVE BRIDGE – SOUTH WEST SECTION

SCALE: 1"=50' HORIZ./1"=5' VERT.

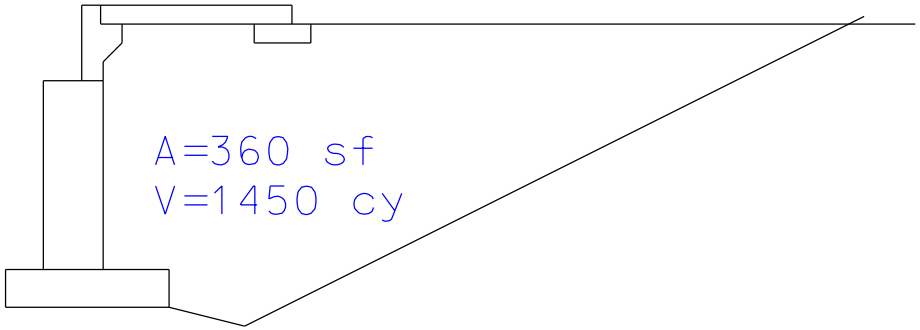


Abutment 1

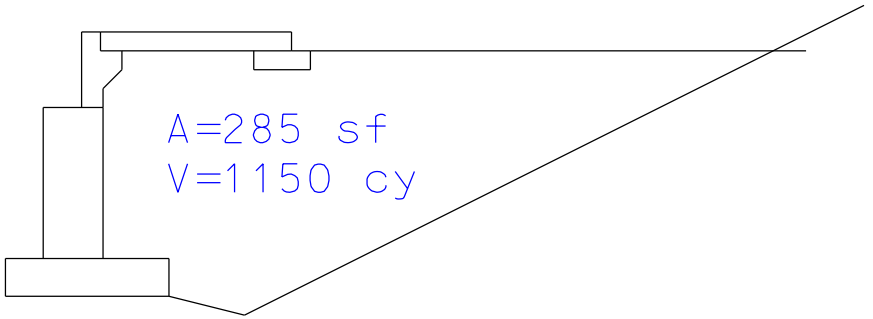


Abutment 3

Excavation



Abutment 1



Abutment 3

Backfill

Job	Forest Lakes	**Project No.**			
Description	Bridge Quantities	**Designed by:**	cwt	**Date**	20-Jan-21
		Checked by:		**Date**	

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CONCRETE

of spans = **1**

Abutment Beam Cap

~ included in substructure

Concrete Class = **D** (Enter 'B' or 'D')

~ backwall

Abutment # 1

				Class B	Class D	
Beam Area =	**242.00**	ft² (in elev.)	Volume =	0.00	11.20	yd³
Beam Width =	**15.00**	in				
# Beams =	**1**					

Abutment #2

				Class B	Class D	
Beam Area =	**242.00**	ft² (in elev.)	Volume =	0.00	11.20	yd³
Beam Width =	**15.00**	in				
# Beams =	**1**					

Abutment Diaphragm

~ included in superstructure

Concrete Class = **D** (Enter 'B' , 'D' or 'H')

Abutment # 1

				Class B	Class D	Class H
Diaphragm Area =	**570.00**	ft² (in elev.)	Volume =	0.00	0.00	0.00
Diaphragm Width =	**30.00**	in				
# Diaphragms =	**0**					
One Gdr Area =	**7.17**	ft²	Volume =	0.00	0.00	0.00
Number of gdrs =	**6**					
Length into diaph =	**20.00**	in (along skew)				

Abutment #2

				Class B	Class D	Class H
Diaphragm Area =	**570.00**	ft² (in elev.)	Volume =	0.00	0.00	0.00
Diaphragm Width =	**30.00**	in				
# Diaphragms =	**0**					
One Gdr Area =	**7.17**	ft²	Volume =	0.00	0.00	0.00
Number of gdrs =	**6**					
Length into diaph =	**20.00**	in (along skew)				

Approach Notch

~ included in superstructure

Concrete Class = **D** (Enter 'B' , 'D' or 'H')

				Class B	Class D	Class H
Notch area =	**1.70**	ft² (section)	Volume =	0.00	12.78	0.00
Notch length =	**101.50**	ft				
# Notches =	**2**					

Deck

~ included in superstructure

Concrete Class = **D** (Enter 'B' , 'D' or 'H')

				Class B	Class D	Class H
Deck out to out width =	**30.00**	ft	Volume =	0.00	148.04	0.00
Span Length (BF to BF) =	**199.86**	ft				
Deck thickness =	**8.00**	in				

Job	Forest Lakes	**Project No.**			
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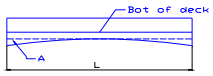
CONCRETE

Haunches

~ included in superstructure

Span L_1 =	**99.93**	ft	A_1 =	0.000	ft^2
# of $span_1$ =	**2**		A_2 =	0.000	ft^2
Span L_2 =	**0.00**	ft	A_{min-1} =	8.328	ft^2
# of $span_2$ =	**0**		A_{min-2} =	0.000	ft^2
Max $Haunch_1$ =	**1.00**	in	$A_{total-1}$ =	8.328	ft^2
Max $Haunch_2$ =	**0.00**	in	$A_{total-2}$ =	0.000	ft^2
Min $Haunch_1$ =	**1.00**	in	$Volume_1$ =	0.4	yd^3/gdr
Min $Haunch_2$ =	**0.00**	in	$Volume_2$ =	0.0	yd^3/gdr
Top flange width =	**15.00**	in			

	Class B	*Class D*	*Class H*
$Volume_{total}$ =	0.00	4.63	0.00



$$A=\frac{1}{6}(Hnch_{max}-Hnch_{min})L$$

Approach Slabs

~ included in Approach Slab

Concrete Class = **D** (Enter 'B' , 'D' or 'H')

				Class B	*Class D*	*Class H*
Approach Length =	**11.55**	ft	Volume =	0.00	25.24	0.00
Approach Width =	**29.50**	ft				
Approach thickness =	**12.00**	in				
Width of exp joint step up =	**0.00**	ft				
Height of exp joint step up =	**0.00**	in				
Length of exp joint step up =	**0.00**	ft				
Number of Approaches =	**2**					

Sleeper Slabs

~ included in Approach Slab

				Class B	*Class D*	*Class H*
Area =	**3.00**	ft^2	Volume =	0.00	9.27	0.00
Length =	**41.73**	ft				

Job	**Forest Lakes**	**Project No.**			
Description	**Bridge Quantities**	**Designed by:**	cwt	**Date**	20-Jan-21
		Checked by:		**Date**	

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CONCRETE

Integral Wings

Abut #1 ~ Right

Bottom of wing elev =	**7055.00**	
Top of wing elev @ FF =	**7069.08**	
Top of wing elev @ end =	**7069.20**	
Wing length from BF =	**15.42**	ft
Beam Height =	**10.00**	ft
average height =	14.140	ft
Class D height =	4.140	ft

Abut #1 ~ Left

Bottom of wing elev =	**7055.00**	
Top of wing elev @ FF =	**7068.36**	
Top of wing elev @ end =	**7068.61**	
Wing length from BF =	**23.75**	ft
Beam Height =	**10.00**	ft
average height =	13.485	ft
Class D height =	3.485	ft

~ total includes both wings

	Class B	*Class D*	*Class H*	
Volume =	0.00	14.51	0.00	yd^3 (substruct
Volume =	0.00	5.43	0.00	yd^3 (superstru

Abutment #2 ~ Right

Bottom of wing elev =	**7055.00**	
Top of wing elev @ FF =	**7067.09**	
Top of wing elev @ end =	**7066.85**	
Wing length from BF =	**22.50**	ft
Beam Height =	**10.00**	ft
average height =	11.970	ft
Class D height =	1.970	ft

Abutment #2 ~ Left

Bottom of wing elev =	**7055.00**	
Top of wing elev @ FF =	**7066.36**	
Top of wing elev @ end =	**7066.05**	
Wing length from BF =	**16.75**	ft
Beam Height =	**10.00**	ft
average height =	11.20	ft
Class D height =	1.205	ft

~ total includes both wings

	Class B	*Class D*	*Class H*	
Volume =	0.00	14.54	0.00	yd^3 (substruct
Volume =	0.00	2.39	0.00	yd^3 (superstru

Wing thickness = **1** ft

Job	**Forest Lakes**	**Project No.**			
Description	**Bridge Quantities**	**Designed by:**	cwt	**Date**	20-Jan-21
		Checked by:		**Date**	

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CONCRETE

Independant Wings

~ included in Substructure

Concrete Class = **D** (Enter 'B' or 'D')

Abut #1 ~ Right

h_1 =	**2.50**	ft
h_2 =	**2.50**	ft
w_1 =	**1.50**	ft
w_2=	**2.00**	ft
Length =	**0.00**	ft
h_{tot} =	5.00	
Expansion gap stub width =	**1.17**	ft
Expansion gap stub thickness =	**0.00**	ft
Total =	0.00	yd^3

Abut #1 ~ Left

h_1 =	**2.00**	ft
h_2 =	**4.00**	ft
w_1 =	**1.50**	ft
w_2=	**2.00**	ft
Length =	**0.00**	ft
h_{tot} =	6.00	
Expansion gap stub width =	**1.17**	ft
Expansion gap stub thickness =	**0.00**	ft
Total =	0.00	yd^3

	Class B	*Class D*	
Volume =	0.00	0.00	yd^3 (substructure)

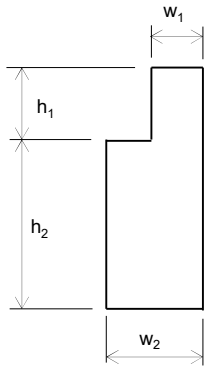
Abutment #2 ~ Right

h_1 =	**2.50**	ft
h_2 =	**2.50**	ft
w_1 =	**1.50**	ft
w_2=	**2.00**	ft
Length =	**0.00**	ft
h_{tot} =	5.00	
Expansion gap stub width =	**1.17**	ft
Expansion gap stub thickness =	**0.00**	ft
Total =	0.00	yd^3

Abutment #2 ~ Left

h_1 =	**2.00**	ft
h_2 =	**4.00**	ft
w_1 =	**1.50**	ft
w_2=	**2.00**	ft
Length =	**0.00**	ft
h_{tot} =	6.00	
Expansion gap stub width =	**1.17**	ft
Expansion gap stub thickness =	**0.00**	ft
Total =	0.00	yd^3

	Class B	*Class D*	
Volume =	0.00	0.00	yd^3 (substructure)



Wing Braces

Brace Area =	**1.41**	ft^2
Total Class B height =	40.000	ft
Total Class D Height =	9.800	ft

	Class B	*Class D*	*Class H*	
Volume =	0.00	2.09	0.00	yd^3 (substruct
Volume =	0.00	0.51	0.00	yd^3 (superstru

Job	Forest Lakes	**Project No.**			
Description	Bridge Quantities	**Designed by:**	cwt	**Date**	20-Jan-21
		Checked by:		**Date**	

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CONCRETE

Piers

Substrucure Concrete Class =	**D**	(Enter 'B' or 'D')
Diaphragm Concrete Class =	**D**	(Enter 'B' , 'D' or 'H')

~ Pier 2

# columns =	**3**			*Class B*	*Class D*	*Class H*	
Top Column elev =	**7060.45**		Volume =	0.00	34.09	0.00	yd^3 (substruct
Bot Column elev =	**7048.45**		Volume =	0.00	0.00	0.00	yd^3 (superstru
column diam =	**36.00**	in					
Area column =	7.07	ft^2					
Column height =	12.00	ft					
Total =	9.42	yd^3					
Beam Area =	**166.50**	ft^2 (in elev.)					
Beam Width =	**48.00**	in					
# Beams =	**1**						
Total =	24.7	yd^3					
Diaph Area =	**0.00**	ft^2 (in elev to bot of deck)					
Beam Width =	**0.00**	in					
# Beams =	**0**						
# gdr ends =	12						
One Gdr Area =	7.17	ft^2					
Length into diaph =	**0.00**	ft					
Gdr Volume =	0.00	yd^3					
Total =	0.0	yd^3					

~ Pier 3

# columns =	**0**			*Class B*	*Class D*	*Class H*	
Top Column elev =	**4835.46**		Volume =	0.00	0.00	0.00	yd^3 (substruct
Bot Column elev =	**4822.40**		Volume =	0.00	0.00	0.00	yd^3 (superstru
column diam =	**42.00**	in					
Area column =	9.62	ft^2					
Column height =	13.06	ft					
Total =	0.00	yd^3					
Beam Area =	**256.20**	ft^2 (in elev.)					
Beam Width =	**48.00**	in					
# Beams =	**0**						
Total =	0.0	yd^3					
Diaph Area =	**232.00**	ft^2 (in elev to bot of deck)					
Beam Width =	**48.00**	in					
# Beams =	**0**						
# gdr ends =	12						
One Gdr Area =	7.17	ft^2					
Length into diaph =	**0.00**	ft					
Gdr Volume =	0.00	yd^3					
Total =	0.0	yd^3					

Job	Forest Lakes	**Project No.**			
Description	Bridge Quantities	**Designed by:**	cwt	**Date**	20-Jan-21
		Checked by:		**Date**	

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CONCRETE

Sidewalks

~ included in Superstructure

Concrete Class = **D** (Enter 'B' , 'D' or 'H')

				Class B	Class D	Class H	
Width =	**5.50**	ft	Volume =	0.00	25.31	0.00	yd^3
Flowline height =	**6.00**	in					
Deck edge height =	**7.33**	in					
Section Area =	3.05	ft^2					
Length =	**223.67**	ft					
# sidewalks =	**1**						

Curb

~ included in Superstructure

Concrete Class = **D** (Enter 'B' , 'D' or 'H')

				Class B	Class D	Class H	
Width =	**0.50**	ft	Volume =	0.00	2.07	0.00	yd^3
Flowline height =	**6.00**	in					
Deck edge height =	**6.00**	in					
Section Area =	0.25	ft^2					
Length =	**223.67**	ft					
# sidewalks =	**1**						

Median

~ included in Superstructure

Concrete Class = **D** (Enter 'B' , 'D' or 'H')

				Class B	Class D	Class H	
Plan area =	**0.00**	ft^2	Volume =	0.00	0.00	0.00	yd^3
Height =	**0.00**	in					

Pilasters

~ included in Superstructure

Concrete Class = **D** (Enter 'B' , 'D' or 'H')

				Class B	Class D	Class H	
Width =	**48.00**	in					
Length =	**48.00**	in	Volume =	0.00	0.00	0.00	yd^3
Height =	**20.00**	ft					
# Pilasters =	**0**						

				Class B	Class D	Class H	
Width =	**0.00**	in					
Length =	**0.00**	in	Volume =	0.00	0.00	0.00	yd^3
Height =	**0.00**	ft					
# Pilasters =	**0**						

				Class B	Class D	Class H	
Width =	**0.00**	in					
Length =	**0.00**	in	Volume =	0.00	0.00	0.00	yd^3
Height =	**0.00**	ft					
# Pilasters =	**0**						

Blisters

~ included in Superstructure

Concrete Class = **D** (Enter 'B' , 'D' or 'H')

				Class B	Class D	Class H	
Plan area =	**8.00**	ft^2	Volume =	0.00	0.00	0.00	yd^3
Height =	**10.00**	in					
# blisters =	**0**						

Job	Forest Lakes	**Project No.**			
Description	Bridge Quantities	**Designed by:**	cwt	**Date**	20-Jan-21
		Checked by:		**Date**	

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CONCRETE

Misc. Superstructure

~ included in Superstructure

(overlook)

Concrete Class = **D** (Enter 'B' , 'D' or 'H')

				Class B	*Class D*	*Class H*	
Area =	**57.50**	ft^2	Volume =	0.00	0.00	0.00	yd^3
Length =	**0.67**	ft					
# =	**0**						

Misc. Substructure

~ included in Substructure

Concrete Class = **D** (Enter 'B' or 'D')

				Class B	*Class D*	
Area =	**0.00**	ft^2				
Length =	**0.00**	ft	Volume =	0.00	0.00	yd^3
# =	**0**					

Concrete Class B (yd^3)		Concrete Class D (yd^3)		Concrete Class H (yd^3)	
Superstructure	0.0	Superstructure	201.2	Superstructure	0.0
Abutment 1	0.0	Abutment 1	26.8	Approach Slab	0.0
Abutment 2	0.0	Abutment 2	26.8		
Pier 2	0.0	Pier 2	34.1		
Pier 3	0.0	Pier 3	0.0		
Pier 4	0.0	Pier 4	0.0		
Pier 5	0.0	Pier 5	0.0		
Approach Slab	0.0	Approach Slab	34.5		
Misc. Substructure	0.0	Misc. Substructure	0.0		
Total	0.0	Total	323.3	Total	0.0

Job	Forest Lakes	**Project No.**			
Description	Bridge Quantities	**Designed by:**	cwt	**Date**	20-Jan-21
		Checked by:		**Date**	

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QUANTITIES

206 Structure Excavation - (CY)

~ See add'l Calculations

206 Structure Backfill (Class 1) - (CY)

~ See add'l Calculations

206 Structure Backfill (Class 2) - (CY)

~ See add'l Calculations

206 Removal of Bridge - (LS)

# of bridges to remove = **0**

206 Shoring (Area 1) - (LS)

Name of Area = **Area 1**

# of Shoring areas = **0**

206 Shoring (Area 2) - (LS)

Name of Area = **Area 2**

# of Shoring areas = **0**

206 Mechanical Reinforcement of Soil - (CY)

~ See add'l Calculations

403 Hot Bituminous Pavement - (Ton)

~ if you have an expansion device, take 1' out of length of due to step up of approach slab.

Width = **64.00** ft (to limit of hbp)

Approach Length = **19.00** ft (from BF) Approach = 0.00 tons

Approaches = **0**

Bridge Length = **0.00** ft (BF to BF)

Superstructure = 0.00 tons

g_{hbp} = **146.70** pcf

thickness hbp = **3.00** in Total = 0.00 tons

Use _____ Ton

Job	**Forest Lakes**	**Project No.**			
Description	**Bridge Quantities**	**Designed by:**	cwt	**Date**	20-Jan-21
		Checked by:		**Date**	

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QUANTITIES

503 Steel PilingHP 12x53 - (LF)

Pile Size = **HP 12x53**

~ Abutment 1

Top Pile Elev =	**7054.00**	ft (max)	Pile tip Elev =	**7028.00**	ft
Top Pile Elev =	**7054.00**	ft (min)	# Piles =	**32**	ea
Top Pile Elev =	7054.00	ft (avg)	L =	26.00	ft / pile

Pile Length = 832 ft

Use _____ LF

~ Abutment #2

Top Pile Elev =	**7054.00**	ft (max)	Pile tip Elev =	**7024.00**	ft
Top Pile Elev =	**7054.00**	ft (min)	# Piles =	**32**	ea
Top Pile Elev =	7054.00	ft (avg)	L =	30.00	ft / pile

Pile Length = 960 ft

Use _____ LF

503 Steel PilingHP 12x84 - (LF)

Pile Size = **HP 12x84**

~ Abutment 1

Top Pile Elev =	**5028.80**	ft (max)	Pile tip Elev =	**4989.00**	ft
Top Pile Elev =	**5028.20**	ft (min)	# Piles =	**0**	ea
Top Pile Elev =	5028.50	ft (avg)	L =	39.50	ft / pile

Pile Length = 0 ft

Use _____ LF

~ Abutment #2

Top Pile Elev =	**5032.60**	ft (max)	Pile tip Elev =	**4989.00**	ft
Top Pile Elev =	**5031.10**	ft (min)	# Piles =	**0**	ea
Top Pile Elev =	5031.85	ft (avg)	L =	42.85	ft / pile

Pile Length = 0 ft

Use _____ LF

Job	**Forest Lakes**	**Project No.**			
Description	**Bridge Quantities**	**Designed by:**	cwt	**Date**	20-Jan-21
		Checked by:		**Date**	

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QUANTITIES

503 Drilled Caisson (42") - (LF)

Caisson diameter = **42** in

~ Pier 2

Top Caisson Elev =	**7048.80**	ft (max)	Caisson tip Elev =	**7018.50**	ft
Top Caisson Elev =	**7048.80**	ft (min)	# Caissons =	**6**	ea
Top Caisson Elev =	7048.80	ft (avg)	L =	30.30	ft / caisson

Caisson Length = 181.8 ft

Use _____ LF

~ Pier 3

Top Caisson Elev =	**4822.40**	ft (max)	Caisson tip Elev =	**4785.50**	ft
Top Caisson Elev =	**4822.40**	ft (min)	# Caissons =	**0**	ea
Top Caisson Elev =	4822.40	ft (avg)	L =	36.90	ft / caisson

Caisson Length = 0 ft

Use _____ LF

~ Pier 4

Top Caisson Elev =	**4822.40**	ft (max)	Caisson tip Elev =	**4785.50**	ft
Top Caisson Elev =	**4822.40**	ft (min)	# Caissons =	**0**	ea
Top Caisson Elev =	4822.40	ft (avg)	L =	36.90	ft / caisson

Caisson Length = 0 ft

Use _____ LF

~ Pier 5

Top Caisson Elev =	**5010.00**	ft (max)	Caisson tip Elev =	**4959.00**	ft
Top Caisson Elev =	**5010.00**	ft (min)	# Caissons =	**0**	ea
Top Caisson Elev =	5010.00	ft (avg)	L =	51.00	ft / caisson

Caisson Length = 0 ft

Use _____ LF

Job	Forest Lakes	**Project No.**			
Description	Bridge Quantities	**Designed by:**	cwt	**Date**	20-Jan-21
		Checked by:		**Date**	

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QUANTITIES

513 Vane Grate Inlet Special (5 foot) - (EA)

# inlets =	**0**	

514 Pedestrian Railing (Steel) - (LF)

~ includes curb, stone accent pilaster and reinforcement

Approach Length =	**10.00**	ft
# Approaches =	**0**	
Span L =	**108.00**	ft
# spans =	**1**	
Span L =	**0.00**	ft
# spans =	**0**	
Total =	108.00	

Use _____ LF

515 Waterproofing (Membrane) - (SY)

Width =	**64.00**	ft (to limit of hbp)			
Approach Length =	**19.00**	ft (from BF)	Approach =	0.00	sy
# Approaches =	**0**				
Bridge Length =	**0.00**	ft (BF to BF)	Superstructure =	0.00	sy
			Total =	0.00	sy

Use _____ SY

515 Concrete Sealer - (SY)

Width =	**60.00**	ft (to limit of hbp)			
Approach Length =	**20.00**	ft (from BF)	Approach =	0.00	sy
# Approaches =	**0**				
Bridge Length =	**0.00**	ft (BF to BF)	Superstructure =	0.00	sy
			Total =	0.00	sy

Use _____ SY

Job	Forest Lakes	**Project No.**			
Description	Bridge Quantities	**Designed by:**	cwt	**Date**	20-Jan-21
		Checked by:		**Date**	

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QUANTITIES

518 Bridge Expansion Device (0-4) - (LF)

~ Abutment 1

Approach width = **60.00** ft
skew = **45.00** degrees

L = 84.85 ft

Use _____ SY

~ Abutment #2

Approach width = **120.00** ft
skew = **45.00** degrees

L = 169.71 ft

Use _____ SY

601 Concrete Class B (Bridge) - (CY)

~ See add'l Calculations

601 Concrete Class D (Bridge) - (CY)

~ See add'l Calculations

Job	Forest Lakes	**Designed by:**	cwt	**Date:**	21-Jan-21
Description	Abutment Quantities	**Checked by:**		**Date:**	
Project No.					

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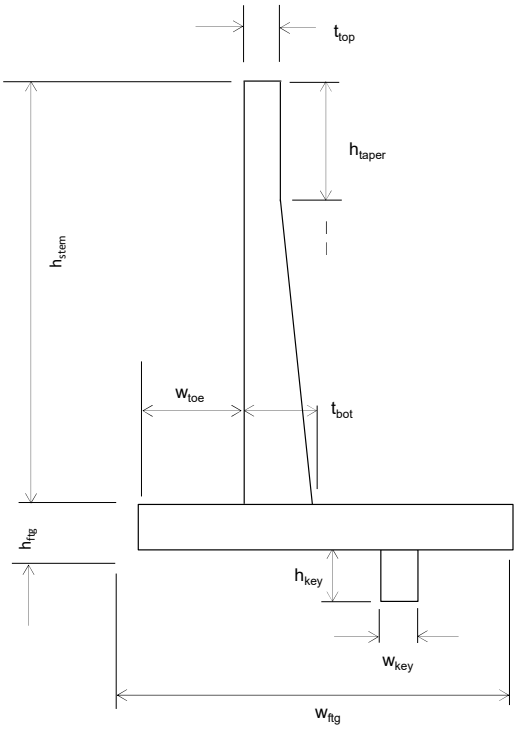
Cantilever Retaining Wall Quantities
Sections 1 thru 10

Concrete and Reinforcing



Job	Forest Lakes		**Designed by:**	cwt	**Date:** 21-Jan-21
Description	Abutment Quantities		**Checked by:**		**Date:**
Project No.					

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Cantilever Retaining Wall Quantities
Sections 1 thru 10

Wall Section 1 Have Section = **y**

CLASS D CONCRETE

Avg Stem Ht (h_{stem}) =	**10**	ft
Stem thickness top (t_{top}) =	**38.00**	in
Stem thickness bottom (t_{bot}) =	**38.00**	in
Distance to taper (h_{taper}) =	**0.00**	ft
Stem Area =	31.67	ft^2
Footing Width (w_{ftg}) =	**8.67**	ft
Footing t (h_{ftg}) =	**24.00**	in
Toe width (w_{toe}) =	**2.00**	ft
Key depth (h_{key})=	**0.00**	in
Key width (w_{key})=	**0.00**	in
Footing Area =	17.34	ft^2
Form Liner t =	**0**	in
% Form Liner to consider =	**0.00%**	
Form Liner Area =	0.00	ft^2
Staining =	**n**	
Top of ftg to staining =	**0.00**	ft
Length =	**105**	ft

$Area_{wall}$ =	49.01	ft^2/ft (not including form liner)
$Area_{staining}$ =	0.00	ft^2
$Area_{FLiner}$ =	0.00	ft^2
$Volume_{FLiner}$ =	0.00	yd^3
$Volume_{total}$ =	190.58	yd^3 (includes form liner)
$Volume_{total}$ =	190.58	yd^3 (does not include form liner)

Job	**Forest Lakes**	**Designed by:**	**cwt**	**Date:**	**21-Jan-21**
Description	**Abutment Quantities**	**Checked by:**		**Date:**	
Project No.					

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Cantilever Retaining Wall Quantities
Sections 1 thru 10

REINFORCEMENT

Wall Section 1

Stem			bar #	spa (in)	lb / ft	# bars	Weight
vert front side	**9.75**		**5**	**9**	1.043	141	1433.9
vert fill side (top - a bar)	**12.75**		**5**	**9**	1.043	141	1875.1
vert fill side (top - short a bar)	**0.00**		**0**	**12**	0	106	0.0
vert fill side (middle - b bar)	**0.00**		**0**	**12**	0	106	0.0
vert fill side (middle - short b bar)	**0.00**		**0**	**12**	0	106	0.0
tie bars in steam	**3.83**		**4**	**48**	0.668	54	138.2
stem hat bars top	**0.83**	**2.83**	**5**	**9**	1.043	141	660.3
horiz front side	**107.50**		**5**	**9**	1.043	14	1569.7
stem top horiz	**107.50**		**5**	**9**	1.043	2	224.2
horiz fill side	**107.50**		**5**	**9**	1.043	14	1569.7

Footing			bar #	spa (in)	lb / ft	# bars	Weight
Top horiz	**8.34**		**5**	**12**	1.043	106	922.1
Bottom horiz	**8.34**		**6**	**12**	1.502	106	1327.8
Top Long	**107.50**		**5**	**13**	1.043	9	1009.1
Bot Long	**107.50**		**5**	**15**	1.043	8	897.0
to Stem Fill Face (c bar)	**1.00**	**4.25**	**5**	**9**	1.043	141	772.1
to Stem Fill Face (short c bar)	**1.00**	**1.75**	**0**	**12**	0	106	0.0
dowel into stem front face	**5.25**		**5**	**9**	1.043	141	772.1
acute corner bars	**4.33**		**5**	**12**	1.043	28	126.5
acute corner bars	**11.75**		**5**	**12**	1.043	4	49.0

Shear Key			bar #	spa (in)	lb / ft	# bars	Weight
Longit.	**105.00**		**0**	**24**	0	-2	0.0
Vert	**0.00**	**-0.50** **1.58**	**0**	**12**	0	106	0.0

Total = 13346.7 lbs

Job	Forest Lakes		**Designed by:**	cwt	**Date:** 21-Jan-21
Description	Abutment Quantities		**Checked by:**		**Date:**
Project No.					

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Cantilever Retaining Wall Quantities
Sections 1 thru 10

Wall Section 2 Have Section = **y**

CLASS D CONCRETE

Avg Stem Ht (h_{stem}) =	**8**	ft
Stem thickness top (t_{top}) =	**38.00**	in
Stem thickness bottom (t_{bot}) =	**38.00**	in
Distance to taper (h_{taper}) =	**0.00**	ft
Stem Area =	25.33	ft^2
Footing Width (w_{ftg}) =	**8.67**	ft
Footing t (h_{ftg}) =	**24.00**	in
Toe width (w_{toe}) =	**2.00**	ft
Key depth (h_{key})=	**0.00**	in
Key width (w_{key})=	**0.00**	in
Footing Area =	17.34	ft^2
Form Liner t =	**0**	in
% Form Liner to consider =	**0.00%**	
Form Liner Area =	0.00	ft^2
Staining =	**n**	
Top of ftg to staining =	**0.50**	ft
Length =	**105**	ft

$Area_{wall}$ =	42.67	ft^2/ft (not including form liner)
$Area_{staining}$ =	0.00	ft^2
$Area_{FLiner}$ =	0.00	ft^2
$Volume_{FLiner}$ =	0.00	yd^3
$Volume_{total}$ =	165.95	yd^3 (includes form liner)
$Volume_{total}$ =	165.95	yd^3 (does not include form liner)

Job	**Forest Lakes**	**Designed by:**	**cwt**	**Date:**	**21-Jan-21**
Description	**Abutment Quantities**	**Checked by:**		**Date:**	
Project No.					

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Cantilever Retaining Wall Quantities
Sections 1 thru 10

REINFORCEMENT

Wall Section 2

Stem			bar #	spa (in)	lb / ft	# bars	Weight
vert front side	**7.75**		**5**	**9**	1.043	141	1139.7
vert fill side (top - a bar)	**10.75**		**5**	**9**	1.043	141	1580.9
vert fill side (top - short a bar)	**-5.92**		**0**	**12**	0	106	0.0
vert fill side (middle - b bar)	**5.75**		**0**	**12**	0	106	0.0
vert fill side (middle - short b bar)	**4.25**		**0**	**12**	0	106	0.0
tie bars in steam	**3.83**		**4**	**48**	0.668	54	138.2
stem hat bars top	**0.83**	**2.83**	**5**	**9**	1.043	141	660.3
horiz top stem	**107.50**		**5**	**9**	1.043	2	224.2
horiz front side	**107.50**		**5**	**9**	1.043	12	1345.5
horiz fill side	**107.50**		**5**	**9**	1.043	12	1345.5

Footing			bar #	spa (in)	lb / ft	# bars	Weight
Top horiz	**8.34**		**5**	**12**	1.043	106	922.1
Bottom horiz	**8.34**		**6**	**12**	1.502	106	1327.8
Top Long	**107.50**		**5**	**13**	1.043	9	1009.1
Bot Long	**107.50**		**5**	**15**	1.043	8	897.0
to Stem Fill Face (c bar)	**1.00**	**4.25**	**5**	**9**	1.043	141	772.1
to Stem Fill Face (short c bar)	**1.00**	**8.25**	**0**	**12**	0	106	0.0
dowel into stem front face	**5.25**		**5**	**9**	1.043	141	772.1
acute corner bars	**4.33**		**5**	**12**	1.043	28	126.5
acute corner bars	**11.75**		**5**	**12**	1.043	4	49.0

Shear Key							
			bar #	spa (in)	lb / ft	# bars	Weight
Longit.	**105.00**		**0**	**24**	0	-2	0.0
Vert	**0.00**	**-0.50** **1.58**	**0**	**12**	0	106	0.0

Total = 12309.9 lbs

BAR LIST -- Backwall (1 side)

Epoxy	Bar Mark	Location	No. Req'd	Total Length	Type	Dimensions A	Dimensions B	Dimensions C
E	4A001	Long - Backwall	24	53.17	-	53.17		
E	4A002	Top Backwall U bar	105	4.67	2	2	0.67	
E	5A003	Approach slab bar	60	3.16	1	2.33	0.83	
E	5A004	Corbel	103	6.5	-	6.5		
E	4A005	Dowel in backwall	105	4	-	4		
E	4A006	Stem tie bar	54	5.17	-	5.17		
E	4A007	Median stub	2	12	-	12		
E	4A008	Median stub	9	4.67	-	4.67		

BAR SUMMARY

EPOXY		BLACK	
2531.64 ft #4 @ .668 #/ft =	1691 #	0 ft #4 @ .668 #/ft =	0 #
859.1 ft #5 @ 1.043 #/ft =	896 #	0 ft #5 @ 1.043 #/ft =	0 #
0 ft #6 @ 1.502 #/ft =	0 #	0 ft #6 @ 1.502 #/ft =	0 #
0 ft #7 @ 2.044 #/ft =	0 #	0 ft #7 @ 2.044 #/ft =	0 #
0 ft #8 @ 2.670 #/ft =	0 #	0 ft #8 @ 2.670 #/ft =	0 #
0 ft #9 @ 3.400 #/ft =	0 #	0 ft #9 @ 3.400 #/ft =	0 #
0 ft #10 @ 4.303 #/ft =	0 #	0 ft #10 @ 4.303 #/ft =	0 #
0 ft #11 @ 5.313 #/ft =	0 #	0 ft #11 @ 5.313 #/ft =	0 #
	Total Epoxy = 2587 #		Total Black = 0 #

BAR LIST -- APPROACH SLAB 1 only

Epoxy	Bar Mark	Location	No. Req'd	Total Length	Type	Dimensions A	B	C	D	G
E	4Z001	Longitudinal - top	20	12.65	8	0.5	9.65	1		
E	6Z002	Longitudinal - bot	59	9.65	-	9.65				
E	5Z003	Lateral -top	9	41.33	-	41.33				
E	5Z004	Lateral -bot	9	41.33	-	41.33				
E	5Z006	Sleeper slab - long	6	41.33	-	41.33				
E	4Z007	Sleeper slab - stirrup	28	7	-	7				

BAR SUMMARY

EPOXY		BLACK	
449 ft #4 @ .668 #/ft =	300 #	0 ft #4 @ .668 #/ft =	0 #
991.92 ft #5 @ 1.043 #/ft =	1035 #	0 ft #5 @ 1.043 #/ft =	0 #
569.35 ft #6 @ 1.502 #/ft =	855 #	0 ft #6 @ 1.502 #/ft =	0 #
0 ft #7 @ 2.044 #/ft =	0 #	0 ft #7 @ 2.044 #/ft =	0 #
0 ft #8 @ 2.670 #/ft =	0 #	0 ft #8 @ 2.670 #/ft =	0 #
0 ft #9 @ 3.400 #/ft =	0 #	0 ft #9 @ 3.400 #/ft =	0 #
0 ft #10 @ 4.303 #/ft =	0 #	0 ft #10 @ 4.303 #/ft =	0 #
0 ft #11 @ 5.313 #/ft =	0 #	0 ft #11 @ 5.313 #/ft =	0 #
Total Epoxy =	2190 #	Total Black =	0 #

BAR LIST -- Pier 2 (one side)

Epoxy	Bar Mark	Location	No. Req'd	Total Length	Type	Dimensions A	Dimensions B	Dimensions C
E	9P001	Top Cap Steel	10	48.21	-	48.21		
E	9P002	Bot Cap Steel	10	48.21	-	48.21		
E	5P003	Side Steel	8	48.21	-	48.21		
E	5P004	End Steel horiz	12	6.67	2	1.5	3.67	
E	5P005	Double Stirrups	172	11.006	6	2.67	2.5	0.333
E	5P006	Single Stirrups	6	6.17	2	2.67	0.83	
E	5P009	End Steel vert	12	6.67	2	1.5	3.67	
E	10P007	Column Vertical Steel	33	14.75	-	14.75		
E	5P008	Column Stirrups	39	10.31	9	2.67	1.92	

BAR SUMMARY

EPOXY		BLACK	
0 ft #4 @ .668 #/ft =	0 #	0 ft #4 @ .668 #/ft =	0 #
2877.82604 ft #5 @ 1.043 #/ft =	3002 #	0 ft #5 @ 1.043 #/ft =	0 #
0 ft #6 @ 1.502 #/ft =	0 #	0 ft #6 @ 1.502 #/ft =	0 #
0 ft #7 @ 2.044 #/ft =	0 #	0 ft #7 @ 2.044 #/ft =	0 #
0 ft #8 @ 2.670 #/ft =	0 #	0 ft #8 @ 2.670 #/ft =	0 #
964.2 ft #9 @ 3.400 #/ft =	3278 #	0 ft #9 @ 3.400 #/ft =	0 #
486.75 ft #10 @ 4.303 #/ft =	2094 #	0 ft #10 @ 4.303 #/ft =	0 #
0 ft #11 @ 5.313 #/ft =	0 #	0 ft #11 @ 5.313 #/ft =	0 #
Total Epoxy =	8374 #	Total Black =	0 #

BAR LIST -- Wingwalls

Epoxy	Bar Mark	Location	No. Req'd	Total Length	Type	Dimensions A	B	C	D
E	7W001	Wing A - Long front face	28	19.5	-	19.5			
E	8W002	Wing A - Long back face	28	19.5	-	19.5			
E	6W003	Wing A - Vert	80	13.67	-	13.67			
E	6W004	Wing A - backwall	28	7	-	7			
E	6W005	Wing A - backwall	28	8.5	-	8.5			
E	7W001	Wing B - Long front face	28	28	-	28			
E	8W002	Wing B - Long back face	28	28	-	28			
E	6W003	Wing B - Vert	112	13	-	13			
E	6W004	Wing B - backwall	28	7	-	7			
E	6W005	Wing B - backwall	28	8.5	-	8.5			
E	6W006	Wing B - Wing brace	28	9	-	9			
E	7W001	Wing C - Long front face	24	26.67	-	26.67			
E	8W002	Wing C - Long back face	24	26.67	-	26.67			
E	6W003	Wing C - Vert	108	11.58	-	11.58			
E	6W004	Wing C - backwall	24	7	-	7			
E	6W005	Wing C - backwall	24	8.5	-	8.5			
E	6W006	Wing C - Wing brace	24	9	-	9			
E	7W001	Wing D - Long front face	22	21	-	21			
E	8W002	Wing D - Long back face	22	21	-	21			
E	6W003	Wing D - Vert	84	10.58	-	10.58			
E	6W005	Wing D - backwall	22	7	-	7			
E	6W008	Wing D - backwall	22	8.5	-	8.5			

BAR SUMMARY

EPOXY		BLACK	
0 ft #4 @ .668 #/ft =	0 #	0 ft #4 @ .668 #/ft =	0 #
0 ft #5 @ 1.043 #/ft =	0 #	0 ft #5 @ 1.043 #/ft =	0 #
6737.96 ft #6 @ 1.502 #/ft =	10120 #	0 ft #6 @ 1.502 #/ft =	0 #
2432.08 ft #7 @ 2.044 #/ft =	4971 #	0 ft #7 @ 2.044 #/ft =	0 #
2432.08 ft #8 @ 2.670 #/ft =	6494 #	0 ft #8 @ 2.670 #/ft =	0 #
0 ft #9 @ 3.400 #/ft =	0 #	0 ft #9 @ 3.400 #/ft =	0 #
0 ft #10 @ 4.303 #/ft =	0 #	0 ft #10 @ 4.303 #/ft =	0 #
0 ft #11 @ 5.313 #/ft =	0 #	0 ft #11 @ 5.313 #/ft =	0 #
	Total Epoxy = 21585 #		Total Black = 0 #