Portsmouth Bypass
An Appalachian Development Highway

Stage 2 Submission

SCI-823-0917 L/R
SR823 over Portsmouth-Minford Road
Bridge Calculations

Portsmouth Bypass, Phase 1

SCI-823-6.81
PID 19415

July 31, 2009

PREPARED FOR:
Ohio Department of Transportation
District 9
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Chillicothe, Ohio 45601

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Project:		Computed:	DMP	Date:	6/18/2009
Subject:		Checked:		Date:	
Task:		Page:	1	of:	1
Job #:		No:			

Bearing Summary:

Abutments:

22" x 11" x 4 1/8 "

Minimum Depth: 4.125"+2" Load Plate + 4" Post + 1.5" Top Plate = 11 5/8"

Piers 1 and 3:

22" x 11" x 3 1/2"

Minimum Depth: 3.5"+2" Load Plate = 5 1/2"

Pier 2:

22" x 11" x 3 1/2"

Minimum Depth: 3.5"+2" Load Plate = 5 1/2"

No. of Draped Strands per Row	P_U/Strand (lb) [kN]	P_U/Unit (lb) [kN]
1	6000 [26.6]	48,000 [213.5]
2	4000 [17.7]	48,000 [213.5]
3	4000 [17.7]	48,000 [213.5]

Where:

P_U/Strand = (1.05)0.75 f'_s A_{PS} Tan ψ

P_U/Strand = (1.05)0.00075 f'_s A_{PS} Tan ψ

$$P_U / \text{Unit} = \sum_{i=1}^{n} \left(P_U / \text{Strand}\right)_i$$

and

f'_s = 270,000 psi [1860 MPa]

A_{PS} = Area of single strand (in^2) [mm^2]

n = no. of strands

ψ = Angle of strand inclination measured from horizontal

To minimize the uplift force, locate the hold down point as close as allowed to the midspan and limit the height of the draped strands at the beam ends to only the height required to control stresses. It is not necessary for the angle of inclination for each row of draped strands to be the same. The height of draped strands at beam ends and at midspan shall be multiples of 2" [50 mm]. Do not place straight strands above draped strands in the same vertical column.

302.5.2.3 CAMBER

A variable depth haunch shall be required to account for the effects of camber due to the design prestressing. This haunch depth shall include an additional 2 inches [50 mm] that may be sacrificed to account for differences between actual and design camber. This sacrificial depth shall not be included when determining the composite section properties; however, its weight shall be included in the dead load of the slab. Haunch concrete shall be included in the total volume of superstructure concrete for payment.

In establishing bridge seat elevations and assuring a minimum design slab thickness, allowance shall be made for camber due to prestressing as per the following:

A = Design slab thickness

B = Anticipated total mid-span camber due to the design prestressing force at time of release.

C = Mid-span deflection due to the self-weight of the beam.

D = Mid-span deflection due to dead load of the slab, diaphragms and other non-composite loads.

E = Mid-span deflection due to dead load of railing, sidewalk and other composite dead loads not including future wearing surface.

F = Adjustment for vertical curve. Positive for crest vertical curves.

G = Sacrificial haunch depth (2" [50 mm]).

H = Total topping thickness at beam bearings = A + 1.8B - 1.85C - D - E - F + G. If F > 1.8B - 1.85C - (D + E) then H = A + G

I = Total topping thickness at mid-span = A + G. If F > 1.8B - 1.85C - (D + E) then I = A - (1.8B - 1.85C) + D + E + F + G.

The gross moment of inertia for the non-composite beam shall be used to calculate the camber and deflection values for B, C and D. The moment of inertia for the composite section should be used to calculate value E.

The designer shall show a longitudinal superstructure cross section in the plans detailing the total topping thickness, including the design slab thickness and the haunch thickness at the centerline of spans and bearings. Provide the camber at the time of release (B-C), camber at the time of erection (1.8B – 1.85C), long term camber (2.45B – 2.40C), and a screed elevation table according to Section 302.2.3.

302.5.2.4 ANCHORAGE

One inch [25 mm] diameter anchors shall be provided at each fixed pier as shown on standard bridge drawing PSID-1-99.

Minimum number of anchors shall be 2 for each beam line.

The anchors shall be a minimum of 2'-0" [600 mm] long. Anchors shall be embedded a minimum of 1'-0" [300 mm] into the pier cap and 1'-0" [300 mm] into the field cast-in-place concrete pour which connects any two discontinuous prestressed I-beams in the same beam line into a continuous member. The anchors should be drilled in place at the centerline of the pier between the ends of adjoining prestressed I-beams. The designer should confirm the pier cap has reinforcing steel clearance to accept these anchors.

302.5.2.5 DECK SUPERSTRUCTURE AND PRECAST DECK PANEL

It is recommended that only cast-in-place concrete decks, Class S or HP Concrete be designed and used.

The precast panel alternative, previously used, has shown cracking problems at the joints between the panels and there are questions on the transfer of stresses in the finished deck

CAMBER/DEFLECTION

CAMBER AND DEFLECTIONS: SERVICE 1
(Span : 1, Beam : 1; Units: in)

	Release	Mult	Erection	Mult	Final
At 0.1 x L =	9.07 ft				
Prestress	0.871	1.80	1.569	2.45	2.135
Self Wt.	-0.308	1.85	-0.569	2.40	-0.738
Deck + Haunch			-0.245	1.00	-0.245
Prec. DL+ADL			-0.027	1.00	-0.027
Diaphragm			-0.002	1.00	-0.002
Comp. DL+ADL			-0.061	1.00	-0.061
Live Load(+I)					-0.123
Total	0.564		0.665		0.939

	Release	Mult	Erection	Mult	Final
At 0.2 x L =	18.98 ft				
Prestress	1.575	1.80	2.835	2.45	3.859
Self Wt.	-0.582	1.85	-1.077	2.40	-1.397
Deck + Haunch			-0.486	1.00	-0.486
Prec. DL+ADL			-0.053	1.00	-0.053
Diaphragm			-0.004	1.00	-0.004
Comp. DL+ADL			-0.108	1.00	-0.108
Load(+I)					-0.224
.al	0.993		1.108		1.588

	Release	Mult	Erection	Mult	Final
At 0.3 x L =	28.89 ft				
Prestress	2.095	1.80	3.771	2.45	5.132
Self Wt.	-0.797	1.85	-1.474	2.40	-1.913
Deck + Haunch			-0.674	1.00	-0.674
Prec. DL+ADL			-0.073	1.00	-0.073
Diaphragm			-0.005	1.00	-0.005
Comp. DL+ADL			-0.141	1.00	-0.141
Live Load(+I)					-0.299
Total	1.298		1.402		2.026

	Release	Mult	Erection	Mult	Final
At 0.4 x L =	38.80 ft				
Prestress	2.415	1.80	4.346	2.45	5.916
Self Wt.	-0.933	1.85	-1.727	2.40	-2.240
Deck + Haunch			-0.795	1.00	-0.795
Prec. DL+ADL			-0.087	1.00	-0.087
Diaphragm			-0.006	1.00	-0.006
Comp. DL+ADL			-0.157	1.00	-0.157
Live Load(+I)					-0.341
Total	1.481		1.575		2.291

	Release	Mult	Erection	Mult	Final
At 0.5 x L =	48.71 ft				
Prestress	2.522	1.80	4.540	2.45	6.179
Self Wt.	-0.980	1.85	-1.813	2.40	-2.352
k + Haunch			-0.836	1.00	-0.836
Prec. DL+ADL			-0.091	1.00	-0.091
Diaphragm			-0.007	1.00	-0.007
Comp. DL+ADL			-0.154	1.00	-0.154

	Release	Mult	Erection	Mult	Final
Live Load(+I)					-0.345
Total	1.542		1.639		2.394

	Release	Mult	Erection	Mult	Final
At 0.6 x L =	58.62 ft				
Prestress	2.415	1.80	4.346	2.45	5.916
Self Wt.	-0.933	1.85	-1.727	2.40	-2.240
Deck + Haunch			-0.795	1.00	-0.795
Prec. DL+ADL			-0.087	1.00	-0.087
Diaphragm			-0.006	1.00	-0.006
Comp. DL+ADL			-0.135	1.00	-0.135
Live Load(+I)					-0.314
Total	1.481		1.597		2.340

	Release	Mult	Erection	Mult	Final
At 0.7 x L =	68.52 ft				
Prestress	2.095	1.80	3.771	2.45	5.132
Self Wt.	-0.797	1.85	-1.474	2.40	-1.913
Deck + Haunch			-0.674	1.00	-0.674
Prec. DL+ADL			-0.073	1.00	-0.073
Diaphragm			-0.005	1.00	-0.005
Comp. DL+ADL			-0.102	1.00	-0.102
Live Load(+I)					-0.252
Total	1.298		1.441		2.112

	Release	Mult	Erection	Mult	Final
At 0.8 x L =	78.43 ft				
Prestress	1.575	1.80	2.835	2.45	3.859
Self Wt.	-0.582	1.85	-1.077	2.40	-1.397
Deck + Haunch			-0.486	1.00	-0.486
Prec. DL+ADL			-0.053	1.00	-0.053
Diaphragm			-0.004	1.00	-0.004
Comp. DL+ADL			-0.063	1.00	-0.063
Live Load(+I)					-0.170
Total	0.993		1.153		1.687

	Release	Mult	Erection	Mult	Final
At 0.9 x L =	88.34 ft				
Prestress	0.871	1.80	1.569	2.45	2.135
Self Wt.	-0.308	1.85	-0.569	2.40	-0.738
Deck + Haunch			-0.245	1.00	-0.245
Prec. DL+ADL			-0.027	1.00	-0.027
Diaphragm			-0.002	1.00	-0.002
Comp. DL+ADL			-0.025	1.00	-0.025
Live Load(+I)					-0.081
Total	0.564		0.700		1.017

Positive values indicate upward deflection.

CAMBER/DEFLECTION

CAMBER AND DEFLECTIONS: SERVICE 1
(Span : 1, Beam : 2; Units: in)

	Release	Mult	Erection	Mult	Final
At 0.1 x L =	9.07 ft				
Prestress	0.871	1.80	1.569	2.45	2.135
Self Wt.	-0.308	1.85	-0.569	2.40	-0.738
Deck + Haunch			-0.290	1.00	-0.290
Prec. DL+ADL			-0.032	1.00	-0.032
Diaphragm			-0.004	1.00	-0.004
Comp. DL+ADL			-0.061	1.00	-0.061
Live Load(+I)					-0.108
Total	0.564		0.612		0.902

	Release	Mult	Erection	Mult	Final
At 0.2 x L =	18.98 ft				
Prestress	1.575	1.80	2.835	2.45	3.859
Self Wt.	-0.582	1.85	-1.077	2.40	-1.397
Deck + Haunch			-0.575	1.00	-0.575
Prec. DL+ADL			-0.063	1.00	-0.063
Diaphragm			-0.008	1.00	-0.008
Comp. DL+ADL			-0.108	1.00	-0.108
Load(+I)					-0.195
Total	0.993		1.004		1.512

	Release	Mult	Erection	Mult	Final
At 0.3 x L =	28.89 ft				
Prestress	2.095	1.80	3.771	2.45	5.132
Self Wt.	-0.797	1.85	-1.474	2.40	-1.913
Deck + Haunch			-0.799	1.00	-0.799
Prec. DL+ADL			-0.088	1.00	-0.088
Diaphragm			-0.011	1.00	-0.011
Comp. DL+ADL			-0.141	1.00	-0.141
Live Load(+I)					-0.261
Total	1.298		1.257		1.919

	Release	Mult	Erection	Mult	Final
At 0.4 x L =	38.80 ft				
Prestress	2.415	1.80	4.346	2.45	5.916
Self Wt.	-0.933	1.85	-1.727	2.40	-2.240
Deck + Haunch			-0.942	1.00	-0.942
Prec. DL+ADL			-0.104	1.00	-0.104
Diaphragm			-0.013	1.00	-0.013
Comp. DL+ADL			-0.157	1.00	-0.157
Live Load(+I)					-0.298
Total	1.481		1.404		2.163

	Release	Mult	Erection	Mult	Final
At 0.5 x L =	48.71 ft				
Prestress	2.522	1.80	4.540	2.45	6.179
Self Wt.	-0.980	1.85	-1.813	2.40	-2.352
Deck + Haunch			-0.991	1.00	-0.991
Prec. DL+ADL			-0.109	1.00	-0.109
Diaphragm			-0.014	1.00	-0.014
Comp. DL+ADL			-0.154	1.00	-0.154

	Release	Mult	Erection	Mult	Final
Live Load(+I)					-0.302
Total	1.542		1.459		2.258

	Release	Mult	Erection	Mult	Final
At 0.6 x L =	58.62 ft				
Prestress	2.415	1.80	4.346	2.45	5.916
Self Wt.	-0.933	1.85	-1.727	2.40	-2.240
Deck + Haunch			-0.942	1.00	-0.942
Prec. DL+ADL			-0.104	1.00	-0.104
Diaphragm			-0.013	1.00	-0.013
Comp. DL+ADL			-0.135	1.00	-0.135
Live Load(+I)					-0.275
Total	1.481		1.426		2.208

	Release	Mult	Erection	Mult	Final
At 0.7 x L =	68.52 ft				
Prestress	2.095	1.80	3.771	2.45	5.132
Self Wt.	-0.797	1.85	-1.474	2.40	-1.913
Deck + Haunch			-0.799	1.00	-0.799
Prec. DL+ADL			-0.088	1.00	-0.088
Diaphragm			-0.011	1.00	-0.011
Comp. DL+ADL			-0.102	1.00	-0.102
Live Load(+I)					-0.220
Total	1.298		1.296		1.999

	Release	Mult	Erection	Mult	Final
At 0.8 x L =	78.43 ft				
Prestress	1.575	1.80	2.835	2.45	3.859
Self Wt.	-0.582	1.85	-1.077	2.40	-1.397
Deck + Haunch			-0.575	1.00	-0.575
Prec. DL+ADL			-0.063	1.00	-0.063
Diaphragm			-0.008	1.00	-0.008
Comp. DL+ADL			-0.063	1.00	-0.063
Live Load(+I)					-0.149
Total	0.993		1.049		1.604

	Release	Mult	Erection	Mult	Final
At 0.9 x L =	88.34 ft				
Prestress	0.871	1.80	1.569	2.45	2.135
Self Wt.	-0.308	1.85	-0.569	2.40	-0.738
Deck + Haunch			-0.290	1.00	-0.290
Prec. DL+ADL			-0.032	1.00	-0.032
Diaphragm			-0.004	1.00	-0.004
Comp. DL+ADL			-0.025	1.00	-0.025
Live Load(+I)					-0.071
Total	0.564		0.648		0.974

Positive values indicate upward deflection.

CAMBER/DEFLECTION

CAMBER AND DEFLECTIONS: SERVICE 1
(Span : 1, Beam : 3; Units: in)

	Release	Mult	Erection	Mult	Final
At 0.1 x L =	9.07 ft				
Prestress	0.871	1.80	1.569	2.45	2.135
Self Wt.	-0.308	1.85	-0.569	2.40	-0.738
Deck + Haunch			-0.290	1.00	-0.290
Prec. DL+ADL			-0.032	1.00	-0.032
Diaphragm			-0.004	1.00	-0.004
Comp. DL+ADL			-0.061	1.00	-0.061
Live Load(+I)					-0.130
Total	0.564		0.612		0.880

	Release	Mult	Erection	Mult	Final
At 0.2 x L =	18.98 ft				
Prestress	1.575	1.80	2.835	2.45	3.859
Self Wt.	-0.582	1.85	-1.077	2.40	-1.397
Deck + Haunch			-0.575	1.00	-0.575
Prec. DL+ADL			-0.063	1.00	-0.063
Diaphragm			-0.008	1.00	-0.008
Comp. DL+ADL			-0.108	1.00	-0.108
' Load(+I)					-0.235
ı .al	0.993		1.004		1.473

	Release	Mult	Erection	Mult	Final
At 0.3 x L =	28.89 ft				
Prestress	2.095	1.80	3.771	2.45	5.132
Self Wt.	-0.797	1.85	-1.474	2.40	-1.913
Deck + Haunch			-0.799	1.00	-0.799
Prec. DL+ADL			-0.088	1.00	-0.088
Diaphragm			-0.011	1.00	-0.011
Comp. DL+ADL			-0.141	1.00	-0.141
Live Load(+I)					-0.314
Total	1.298		1.257		1.866

	Release	Mult	Erection	Mult	Final
At 0.4 x L =	38.80 ft				
Prestress	2.415	1.80	4.346	2.45	5.916
Self Wt.	-0.933	1.85	-1.727	2.40	-2.240
Deck + Haunch			-0.942	1.00	-0.942
Prec. DL+ADL			-0.104	1.00	-0.104
Diaphragm			-0.013	1.00	-0.013
Comp. DL+ADL			-0.157	1.00	-0.157
Live Load(+I)					-0.358
Total	1.481		1.404		2.102

	Release	Mult	Erection	Mult	Final
At 0.5 x L =	48.71 ft				
Prestress	2.522	1.80	4.540	2.45	6.179
Self Wt.	-0.980	1.85	-1.813	2.40	-2.352
: + Haunch			-0.991	1.00	-0.991
Prec. DL+ADL			-0.109	1.00	-0.109
Diaphragm			-0.014	1.00	-0.014
Comp. DL+ADL			-0.154	1.00	-0.154

	Release	Mult	Erection	Mult	Final
Live Load(+I)					-0.363
Total	1.542		1.459		2.197

	Release	Mult	Erection	Mult	Final
At 0.6 x L =	58.62 ft				
Prestress	2.415	1.80	4.346	2.45	5.916
Self Wt.	-0.933	1.85	-1.727	2.40	-2.240
Deck + Haunch			-0.942	1.00	-0.942
Prec. DL+ADL			-0.104	1.00	-0.104
Diaphragm			-0.013	1.00	-0.013
Comp. DL+ADL			-0.135	1.00	-0.135
Live Load(+I)					-0.330
Total	1.481		1.426		2.153

	Release	Mult	Erection	Mult	Final
At 0.7 x L =	68.52 ft				
Prestress	2.095	1.80	3.771	2.45	5.132
Self Wt.	-0.797	1.85	-1.474	2.40	-1.913
Deck + Haunch			-0.799	1.00	-0.799
Prec. DL+ADL			-0.088	1.00	-0.088
Diaphragm			-0.011	1.00	-0.011
Comp. DL+ADL			-0.102	1.00	-0.102
Live Load(+I)					-0.265
Total	1.298		1.296		1.954

	Release	Mult	Erection	Mult	Final
At 0.8 x L =	78.43 ft				
Prestress	1.575	1.80	2.835	2.45	3.859
Self Wt.	-0.582	1.85	-1.077	2.40	-1.397
Deck + Haunch			-0.575	1.00	-0.575
Prec. DL+ADL			-0.063	1.00	-0.063
Diaphragm			-0.008	1.00	-0.008
Comp. DL+ADL			-0.063	1.00	-0.063
Live Load(+I)					-0.179
Total	0.993		1.049		1.574

	Release	Mult	Erection	Mult	Final
At 0.9 x L =	88.34 ft				
Prestress	0.871	1.80	1.569	2.45	2.135
Self Wt.	-0.308	1.85	-0.569	2.40	-0.738
Deck + Haunch			-0.290	1.00	-0.290
Prec. DL+ADL			-0.032	1.00	-0.032
Diaphragm			-0.004	1.00	-0.004
Comp. DL+ADL			-0.025	1.00	-0.025
Live Load(+I)					-0.085
Total	0.564		0.648		0.960

Positive values indicate upward deflection.

CAMBER/DEFLECTION

CAMBER AND DEFLECTIONS: SERVICE 1
(Span : 2, Beam : 1; Units: in)

	Release	Mult	Erection	Mult	Final
At 0.1 x L =	9.07 ft				
Prestress	0.871	1.80	1.569	2.45	2.135
Self Wt.	-0.308	1.85	-0.569	2.40	-0.738
Deck + Haunch			-0.245	1.00	-0.245
Prec. DL+ADL			-0.027	1.00	-0.027
Diaphragm			-0.002	1.00	-0.002
Comp. DL+ADL			0.003	1.00	0.003
Live Load(+I)					-0.075
Total	0.564		0.729		1.051

	Release	Mult	Erection	Mult	Final
At 0.2 x L =	18.98 ft				
Prestress	1.575	1.80	2.835	2.45	3.859
Self Wt.	-0.582	1.85	-1.077	2.40	-1.397
Deck + Haunch			-0.486	1.00	-0.486
Prec. DL+ADL			-0.053	1.00	-0.053
Diaphragm			-0.004	1.00	-0.004
Comp. DL+ADL			-0.008	1.00	-0.008
Live Load(+I)					-0.147
Total	0.993		1.208		1.765

	Release	Mult	Erection	Mult	Final
At 0.3 x L =	28.89 ft				
Prestress	2.095	1.80	3.771	2.45	5.132
Self Wt.	-0.797	1.85	-1.474	2.40	-1.913
Deck + Haunch			-0.674	1.00	-0.674
Prec. DL+ADL			-0.073	1.00	-0.073
Diaphragm			-0.005	1.00	-0.005
Comp. DL+ADL			-0.024	1.00	-0.024
Live Load(+I)					-0.208
Total	1.298		1.519		2.234

	Release	Mult	Erection	Mult	Final
At 0.4 x L =	38.80 ft				
Prestress	2.415	1.80	4.346	2.45	5.916
Self Wt.	-0.933	1.85	-1.727	2.40	-2.240
Deck + Haunch			-0.795	1.00	-0.795
Prec. DL+ADL			-0.087	1.00	-0.087
Diaphragm			-0.006	1.00	-0.006
Comp. DL+ADL			-0.038	1.00	-0.038
Live Load(+I)					-0.248
Total	1.481		1.694		2.502

	Release	Mult	Erection	Mult	Final
At 0.5 x L =	48.71 ft				
Prestress	2.522	1.80	4.540	2.45	6.179
Self Wt.	-0.980	1.85	-1.813	2.40	-2.352
Deck + Haunch			-0.836	1.00	-0.836
Prec. DL+ADL			-0.091	1.00	-0.091
Diaphragm			-0.007	1.00	-0.007
Comp. DL+ADL			-0.046	1.00	-0.046

	Release	Mult	Erection	Mult	Final
Live Load(+I)					-0.261
Total	1.542		1.748		2.587

	Release	Mult	Erection	Mult	Final
At 0.6 x L =	58.62 ft				
Prestress	2.415	1.80	4.346	2.45	5.916
Self Wt.	-0.933	1.85	-1.727	2.40	-2.240
Deck + Haunch			-0.795	1.00	-0.795
Prec. DL+ADL			-0.087	1.00	-0.087
Diaphragm			-0.006	1.00	-0.006
Comp. DL+ADL			-0.045	1.00	-0.045
Live Load(+I)					-0.244
Total	1.481		1.688		2.500

	Release	Mult	Erection	Mult	Final
At 0.7 x L =	68.52 ft				
Prestress	2.095	1.80	3.771	2.45	5.132
Self Wt.	-0.797	1.85	-1.474	2.40	-1.913
Deck + Haunch			-0.674	1.00	-0.674
Prec. DL+ADL			-0.073	1.00	-0.073
Diaphragm			-0.005	1.00	-0.005
Comp. DL+ADL			-0.036	1.00	-0.036
Live Load(+I)					-0.201
Total	1.298		1.507		2.229

	Release	Mult	Erection	Mult	Final
At 0.8 x L =	78.43 ft				
Prestress	1.575	1.80	2.835	2.45	3.859
Self Wt.	-0.582	1.85	-1.077	2.40	-1.397
Deck + Haunch			-0.486	1.00	-0.486
Prec. DL+ADL			-0.053	1.00	-0.053
Diaphragm			-0.004	1.00	-0.004
Comp. DL+ADL			-0.021	1.00	-0.021
Live Load(+I)					-0.138
Total	0.993		1.195		1.760

	Release	Mult	Erection	Mult	Final
At 0.9 x L =	88.34 ft				
Prestress	0.871	1.80	1.569	2.45	2.135
Self Wt.	-0.308	1.85	-0.569	2.40	-0.738
Deck + Haunch			-0.245	1.00	-0.245
Prec. DL+ADL			-0.027	1.00	-0.027
Diaphragm			-0.002	1.00	-0.002
Comp. DL+ADL			-0.007	1.00	-0.007
Live Load(+I)					-0.067
Total	0.564		0.719		1.049

Positive values indicate upward deflection.

CAMBER/DEFLECTION

CAMBER AND DEFLECTIONS: SERVICE 1
(Span : 2, Beam : 2; Units: in)

	Release	Mult	Erection	Mult	Final
At 0.1 x L =	9.07 ft				
Prestress	0.871	1.80	1.569	2.45	2.135
Self Wt.	-0.308	1.85	-0.569	2.40	-0.738
Deck + Haunch			-0.290	1.00	-0.290
Prec. DL+ADL			-0.032	1.00	-0.032
Diaphragm			-0.004	1.00	-0.004
Comp. DL+ADL			0.003	1.00	0.003
Live Load(+I)					-0.059
Total	0.564		0.676		1.014

	Release	Mult	Erection	Mult	Final
At 0.2 x L =	18.98 ft				
Prestress	1.575	1.80	2.835	2.45	3.859
Self Wt.	-0.582	1.85	-1.077	2.40	-1.397
Deck + Haunch			-0.575	1.00	-0.575
Prec. DL+ADL			-0.063	1.00	-0.063
Diaphragm			-0.008	1.00	-0.008
Comp. DL+ADL			-0.008	1.00	-0.008
Live Load(+I)					-0.117
Total	0.993		1.104		1.690

	Release	Mult	Erection	Mult	Final
At 0.3 x L =	28.89 ft				
Prestress	2.095	1.80	3.771	2.45	5.132
Self Wt.	-0.797	1.85	-1.474	2.40	-1.913
Deck + Haunch			-0.799	1.00	-0.799
Prec. DL+ADL			-0.088	1.00	-0.088
Diaphragm			-0.011	1.00	-0.011
Comp. DL+ADL			-0.024	1.00	-0.024
Live Load(+I)					-0.166
Total	1.298		1.374		2.131

	Release	Mult	Erection	Mult	Final
At 0.4 x L =	38.80 ft				
Prestress	2.415	1.80	4.346	2.45	5.916
Self Wt.	-0.933	1.85	-1.727	2.40	-2.240
Deck + Haunch			-0.942	1.00	-0.942
Prec. DL+ADL			-0.104	1.00	-0.104
Diaphragm			-0.013	1.00	-0.013
Comp. DL+ADL			-0.038	1.00	-0.038
Live Load(+I)					-0.198
Total	1.481		1.523		2.382

	Release	Mult	Erection	Mult	Final
At 0.5 x L =	48.71 ft				
Prestress	2.522	1.80	4.540	2.45	6.179
Self Wt.	-0.980	1.85	-1.813	2.40	-2.352
Deck + Haunch			-0.991	1.00	-0.991
Prec. DL+ADL			-0.109	1.00	-0.109
Diaphragm			-0.014	1.00	-0.014
Comp. DL+ADL			-0.046	1.00	-0.046

	Release	Mult	Erection	Mult	Final
Live Load(+I)					-0.208
Total	1.542		1.568		2.460

	Release	Mult	Erection	Mult	Final
At 0.6 x L =	58.62 ft				
Prestress	2.415	1.80	4.346	2.45	5.916
Self Wt.	-0.933	1.85	-1.727	2.40	-2.240
Deck + Haunch			-0.942	1.00	-0.942
Prec. DL+ADL			-0.104	1.00	-0.104
Diaphragm			-0.013	1.00	-0.013
Comp. DL+ADL			-0.045	1.00	-0.045
Live Load(+I)					-0.195
Total	1.481		1.517		2.378

	Release	Mult	Erection	Mult	Final
At 0.7 x L =	68.52 ft				
Prestress	2.095	1.80	3.771	2.45	5.132
Self Wt.	-0.797	1.85	-1.474	2.40	-1.913
Deck + Haunch			-0.799	1.00	-0.799
Prec. DL+ADL			-0.088	1.00	-0.088
Diaphragm			-0.011	1.00	-0.011
Comp. DL+ADL			-0.036	1.00	-0.036
Live Load(+I)					-0.160
Total	1.298		1.362		2.125

	Release	Mult	Erection	Mult	Final
At 0.8 x L =	78.43 ft				
Prestress	1.575	1.80	2.835	2.45	3.859
Self Wt.	-0.582	1.85	-1.077	2.40	-1.397
Deck + Haunch			-0.575	1.00	-0.575
Prec. DL+ADL			-0.063	1.00	-0.063
Diaphragm			-0.008	1.00	-0.008
Comp. DL+ADL			-0.021	1.00	-0.021
Live Load(+I)					-0.110
Total	0.993		1.091		1.684

	Release	Mult	Erection	Mult	Final
At 0.9 x L =	88.34 ft				
Prestress	0.871	1.80	1.569	2.45	2.135
Self Wt.	-0.308	1.85	-0.569	2.40	-0.738
Deck + Haunch			-0.290	1.00	-0.290
Prec. DL+ADL			-0.032	1.00	-0.032
Diaphragm			-0.004	1.00	-0.004
Comp. DL+ADL			-0.007	1.00	-0.007
Live Load(+I)					-0.053
Total	0.564		0.666		1.010

Positive values indicate upward deflection.

CAMBER/DEFLECTION

CAMBER AND DEFLECTIONS: SERVICE 1
(Span : 2, Beam : 3; Units: in)

	Release	Mult	Erection	Mult	Final
At 0.1 x L =	9.07 ft				
Prestress	0.871	1.80	1.569	2.45	2.135
Self Wt.	-0.308	1.85	-0.569	2.40	-0.738
Deck + Haunch			-0.290	1.00	-0.290
Prec. DL+ADL			-0.032	1.00	-0.032
Diaphragm			-0.004	1.00	-0.004
Comp. DL+ADL			0.003	1.00	0.003
Live Load(+I)					-0.069
Total	0.564		0.676		1.004

	Release	Mult	Erection	Mult	Final
At 0.2 x L =	18.98 ft				
Prestress	1.575	1.80	2.835	2.45	3.859
Self Wt.	-0.582	1.85	-1.077	2.40	-1.397
Deck + Haunch			-0.575	1.00	-0.575
Prec. DL+ADL			-0.063	1.00	-0.063
Diaphragm			-0.008	1.00	-0.008
Comp. DL+ADL			-0.008	1.00	-0.008
Live Load(+I)					-0.136
Total	0.993		1.104		1.671

	Release	Mult	Erection	Mult	Final
At 0.3 x L =	28.89 ft				
Prestress	2.095	1.80	3.771	2.45	5.132
Self Wt.	-0.797	1.85	-1.474	2.40	-1.913
Deck + Haunch			-0.799	1.00	-0.799
Prec. DL+ADL			-0.088	1.00	-0.088
Diaphragm			-0.011	1.00	-0.011
Comp. DL+ADL			-0.024	1.00	-0.024
Live Load(+I)					-0.193
Total	1.298		1.374		2.104

	Release	Mult	Erection	Mult	Final
At 0.4 x L =	38.80 ft				
Prestress	2.415	1.80	4.346	2.45	5.916
Self Wt.	-0.933	1.85	-1.727	2.40	-2.240
Deck + Haunch			-0.942	1.00	-0.942
Prec. DL+ADL			-0.104	1.00	-0.104
Diaphragm			-0.013	1.00	-0.013
Comp. DL+ADL			-0.038	1.00	-0.038
Live Load(+I)					-0.231
Total	1.481		1.523		2.349

	Release	Mult	Erection	Mult	Final
At 0.5 x L =	48.71 ft				
Prestress	2.522	1.80	4.540	2.45	6.179
Self Wt.	-0.980	1.85	-1.813	2.40	-2.352
Deck + Haunch			-0.991	1.00	-0.991
Prec. DL+ADL			-0.109	1.00	-0.109
Diaphragm			-0.014	1.00	-0.014
Comp. DL+ADL			-0.046	1.00	-0.046

	Release	Mult	Erection	Mult	Final
Live Load(+I)					-0.243
Total	1.542		1.568		2.426

	Release	Mult	Erection	Mult	Final
At 0.6 x L =	58.62 ft				
Prestress	2.415	1.80	4.346	2.45	5.916
Self Wt.	-0.933	1.85	-1.727	2.40	-2.240
Deck + Haunch			-0.942	1.00	-0.942
Prec. DL+ADL			-0.104	1.00	-0.104
Diaphragm			-0.013	1.00	-0.013
Comp. DL+ADL			-0.045	1.00	-0.045
Live Load(+I)					-0.227
Total	1.481		1.517		2.346

	Release	Mult	Erection	Mult	Final
At 0.7 x L =	68.52 ft				
Prestress	2.095	1.80	3.771	2.45	5.132
Self Wt.	-0.797	1.85	-1.474	2.40	-1.913
Deck + Haunch			-0.799	1.00	-0.799
Prec. DL+ADL			-0.088	1.00	-0.088
Diaphragm			-0.011	1.00	-0.011
Comp. DL+ADL			-0.036	1.00	-0.036
Live Load(+I)					-0.187
Total	1.298		1.362		2.099

	Release	Mult	Erection	Mult	Final
At 0.8 x L =	78.43 ft				
Prestress	1.575	1.80	2.835	2.45	3.859
Self Wt.	-0.582	1.85	-1.077	2.40	-1.397
Deck + Haunch			-0.575	1.00	-0.575
Prec. DL+ADL			-0.063	1.00	-0.063
Diaphragm			-0.008	1.00	-0.008
Comp. DL+ADL			-0.021	1.00	-0.021
Live Load(+I)					-0.129
Total	0.993		1.091		1.666

	Release	Mult	Erection	Mult	Final
At 0.9 x L =	88.34 ft				
Prestress	0.871	1.80	1.569	2.45	2.135
Self Wt.	-0.308	1.85	-0.569	2.40	-0.738
Deck + Haunch			-0.290	1.00	-0.290
Prec. DL+ADL			-0.032	1.00	-0.032
Diaphragm			-0.004	1.00	-0.004
Comp. DL+ADL			-0.007	1.00	-0.007
Live Load(+I)					-0.062
Total	0.564		0.666		1.001

Positive values indicate upward deflection.

Camber Calculations

		Slab t	PS camber		SW Deflection		DL1 Delf	DL2 Defl	VC	min haunch		
Span	Beam	A	B	1.8 B	C	1.85 C	D	E	F	G	H	I
1	1		2.522	4.5396	-0.98	-1.813	-0.934	-0.154		2		
	2		2.522	4.5396	-0.98	-1.813	-1.114	-0.154		2		
	3		2.522	4.5396	-0.98	-1.813	-1.114	-0.154		2		
	4		2.522	4.5396	-0.98	-1.813	-1.114	-0.154		2		
	5		2.522	4.5396	-0.98	-1.813	-0.934	-0.154		2		
2	1		2.522	4.5396	-0.98	-1.813	-0.934	-0.046		2		
	2		2.552	4.5936	-0.98	-1.813	-1.114	-0.046		2		
	3		2.522	4.5396	-0.98	-1.813	-1.114	-0.046		2		
	4		2.552	4.5936	-0.98	-1.813	-1.114	-0.046		2		
	5		2.522	4.5396	-0.98	-1.813	-0.934	-0.046		2		

		Span 1 & 4					Span 2 & 3				
For Geomath Input:		Beam 1	Beam 2	Beam 3	Beam 4	Beam 5	Beam 1	Beam 2	Beam 3	Beam 4	Beam 5
Camber (in)	1.8 B	4.5396	4.5396	4.5396	4.5396	4.5396	4.5396	4.5936	4.5396	4.5936	4.5396
Self Defl (in)	1.85 C	-1.813	-1.813	-1.813	-1.813	-1.813	-1.813	-1.813	-1.813	-1.813	-1.813
And't Defl (in)	D+E	-1.088	-1.268	-1.268	-1.268	-1.088	-0.98	-1.16	-1.16	-1.16	-0.98

		Span 1 & 4					Span 2 & 3				
For Geomath Input:		Beam 1	Beam 2	Beam 3	Beam 4	Beam 5	Beam 1	Beam 2	Beam 3	Beam 4	Beam 5
Camber (ft)	1.8 B	0.378	0.378	0.378	0.378	0.378	0.378	0.383	0.378	0.383	0.378
Self Defl (ft)	1.85 C	-0.151	-0.151	-0.151	-0.151	-0.151	-0.151	-0.151	-0.151	-0.151	-0.151
And't Defl (ft)	D+E	-0.091	-0.106	-0.106	-0.106	-0.091	-0.082	-0.097	-0.097	-0.097	-0.082

CAMBER/DEFLECTION

CAMBER AND DEFLECTIONS: SERVICE 1
(Span : 1, Beam : 1; Units: in)

	Release	Mult	Erection	Mult	Final
At 0.1 x L =	9.07 ft				
Prestress	0.871	1.80	1.569	2.45	2.135
Self Wt.	-0.308	1.85	-0.569	2.40	-0.738
Deck + Haunch			-0.263	1.00	-0.263
Prec. DL+ADL			-0.027	1.00	-0.027
Diaphragm			-0.002	1.00	-0.002
Comp. DL+ADL			-0.029	1.00	-0.029
Live Load(+I)					-0.111
Total	0.564		0.678		0.964

	Release	Mult	Erection	Mult	Final
At 0.2 x L =	18.98 ft				
Prestress	1.575	1.80	2.835	2.45	3.859
Self Wt.	-0.582	1.85	-1.077	2.40	-1.397
Deck + Haunch			-0.522	1.00	-0.522
Prec. DL+ADL			-0.053	1.00	-0.053
Diaphragm			-0.004	1.00	-0.004
Comp. DL+ADL			-0.058	1.00	-0.058
Live Load(+I)					-0.223
Total	0.993		1.122		1.603

	Release	Mult	Erection	Mult	Final
At 0.3 x L =	28.89 ft				
Prestress	2.095	1.80	3.771	2.45	5.132
Self Wt.	-0.797	1.85	-1.474	2.40	-1.913
Deck + Haunch			-0.725	1.00	-0.725
Prec. DL+ADL			-0.073	1.00	-0.073
Diaphragm			-0.005	1.00	-0.005
Comp. DL+ADL			-0.081	1.00	-0.081
Live Load(+I)					-0.312
Total	1.298		1.412		2.023

	Release	Mult	Erection	Mult	Final
At 0.4 x L =	38.80 ft				
Prestress	2.415	1.80	4.346	2.45	5.916
Self Wt.	-0.933	1.85	-1.727	2.40	-2.240
Deck + Haunch			-0.854	1.00	-0.854
Prec. DL+ADL			-0.087	1.00	-0.087
Diaphragm			-0.006	1.00	-0.006
Comp. DL+ADL			-0.095	1.00	-0.095
Live Load(+I)					-0.370
Total	1.481		1.578		2.264

	Release	Mult	Erection	Mult	Final
At 0.5 x L =	48.71 ft				
Prestress	2.522	1.80	4.540	2.45	6.179
Self Wt.	-0.980	1.85	-1.813	2.40	-2.352
Deck + Haunch			-0.898	1.00	-0.898
Prec. DL+ADL			-0.091	1.00	-0.091
Diaphragm			-0.007	1.00	-0.007
Comp. DL+ADL			-0.100	1.00	-0.100

	Release	Mult	Erection	Mult	Final
Live Load(+I)					-0.390
Total	1.542		1.631		2.341

	Release	Mult	Erection	Mult	Final
At 0.6 x L =	58.62 ft				
Prestress	2.415	1.80	4.346	2.45	5.916
Self Wt.	-0.933	1.85	-1.727	2.40	-2.240
Deck + Haunch			-0.854	1.00	-0.854
Prec. DL+ADL			-0.087	1.00	-0.087
Diaphragm			-0.006	1.00	-0.006
Comp. DL+ADL			-0.095	1.00	-0.095
Live Load(+I)					-0.370
Total	1.481		1.578		2.264

	Release	Mult	Erection	Mult	Final
At 0.7 x L =	68.52 ft				
Prestress	2.095	1.80	3.771	2.45	5.132
Self Wt.	-0.797	1.85	-1.474	2.40	-1.913
Deck + Haunch			-0.725	1.00	-0.725
Prec. DL+ADL			-0.073	1.00	-0.073
Diaphragm			-0.005	1.00	-0.005
Comp. DL+ADL			-0.081	1.00	-0.081
Live Load(+I)					-0.312
Total	1.298		1.412		2.023

	Release	Mult	Erection	Mult	Final
At 0.8 x L =	78.43 ft				
Prestress	1.575	1.80	2.835	2.45	3.859
Self Wt.	-0.582	1.85	-1.077	2.40	-1.397
Deck + Haunch			-0.522	1.00	-0.522
Prec. DL+ADL			-0.053	1.00	-0.053
Diaphragm			-0.004	1.00	-0.004
Comp. DL+ADL			-0.058	1.00	-0.058
Live Load(+I)					-0.223
Total	0.993		1.122		1.603

	Release	Mult	Erection	Mult	Final
At 0.9 x L =	88.34 ft				
Prestress	0.871	1.80	1.569	2.45	2.135
Self Wt.	-0.308	1.85	-0.569	2.40	-0.738
Deck + Haunch			-0.263	1.00	-0.263
Prec. DL+ADL			-0.027	1.00	-0.027
Diaphragm			-0.002	1.00	-0.002
Comp. DL+ADL			-0.029	1.00	-0.029
Live Load(+I)					-0.111
Total	0.564		0.678		0.964

Positive values indicate upward deflection.

CAMBER/DEFLECTION

CAMBER AND DEFLECTIONS: SERVICE 1
(Span : 1, Beam : 2; Units: in)

	Release	Mult	Erection	Mult	Final
At 0.1 x L =	9.07 ft				
Prestress	0.871	1.80	1.569	2.45	2.135
Self Wt.	-0.308	1.85	-0.569	2.40	-0.738
Deck + Haunch			-0.309	1.00	-0.309
Prec. DL+ADL			-0.032	1.00	-0.032
Diaphragm			-0.004	1.00	-0.004
Comp. DL+ADL			-0.029	1.00	-0.029
Live Load(+I)					-0.141
Total	0.564		0.626		0.882

	Release	Mult	Erection	Mult	Final
At 0.2 x L =	18.98 ft				
Prestress	1.575	1.80	2.835	2.45	3.859
Self Wt.	-0.582	1.85	-1.077	2.40	-1.397
Deck + Haunch			-0.612	1.00	-0.612
Prec. DL+ADL			-0.063	1.00	-0.063
Diaphragm			-0.008	1.00	-0.008
Comp. DL+ADL			-0.058	1.00	-0.058
Live Load(+I)					-0.282
Total	0.993		1.018		1.439

	Release	Mult	Erection	Mult	Final
At 0.3 x L =	28.89 ft				
Prestress	2.095	1.80	3.771	2.45	5.132
Self Wt.	-0.797	1.85	-1.474	2.40	-1.913
Deck + Haunch			-0.850	1.00	-0.850
Prec. DL+ADL			-0.088	1.00	-0.088
Diaphragm			-0.011	1.00	-0.011
Comp. DL+ADL			-0.081	1.00	-0.081
Live Load(+I)					-0.396
Total	1.298		1.267		1.795

	Release	Mult	Erection	Mult	Final
At 0.4 x L =	38.80 ft				
Prestress	2.415	1.80	4.346	2.45	5.916
Self Wt.	-0.933	1.85	-1.727	2.40	-2.240
Deck + Haunch			-1.001	1.00	-1.001
Prec. DL+ADL			-0.104	1.00	-0.104
Diaphragm			-0.013	1.00	-0.013
Comp. DL+ADL			-0.095	1.00	-0.095
Live Load(+I)					-0.468
Total	1.481		1.407		1.995

	Release	Mult	Erection	Mult	Final
At 0.5 x L =	48.71 ft				
Prestress	2.522	1.80	4.540	2.45	6.179
Self Wt.	-0.980	1.85	-1.813	2.40	-2.352
Deck + Haunch			-1.053	1.00	-1.053
Prec. DL+ADL			-0.109	1.00	-0.109
Diaphragm			-0.014	1.00	-0.014
Comp. DL+ADL			-0.100	1.00	-0.100

	Release	Mult	Erection	Mult	Final
Live Load(+I)					-0.494
Total	1.542		1.451		2.058

	Release	Mult	Erection	Mult	Final
At 0.6 x L =	58.62 ft				
Prestress	2.415	1.80	4.346	2.45	5.916
Self Wt.	-0.933	1.85	-1.727	2.40	-2.240
Deck + Haunch			-1.001	1.00	-1.001
Prec. DL+ADL			-0.104	1.00	-0.104
Diaphragm			-0.013	1.00	-0.013
Comp. DL+ADL			-0.095	1.00	-0.095
Live Load(+I)					-0.468
Total	1.481		1.407		1.995

	Release	Mult	Erection	Mult	Final
At 0.7 x L =	68.52 ft				
Prestress	2.095	1.80	3.771	2.45	5.132
Self Wt.	-0.797	1.85	-1.474	2.40	-1.913
Deck + Haunch			-0.850	1.00	-0.850
Prec. DL+ADL			-0.088	1.00	-0.088
Diaphragm			-0.011	1.00	-0.011
Comp. DL+ADL			-0.081	1.00	-0.081
Live Load(+I)					-0.396
Total	1.298		1.267		1.795

	Release	Mult	Erection	Mult	Final
At 0.8 x L =	78.43 ft				
Prestress	1.575	1.80	2.835	2.45	3.859
Self Wt.	-0.582	1.85	-1.077	2.40	-1.397
Deck + Haunch			-0.612	1.00	-0.612
Prec. DL+ADL			-0.063	1.00	-0.063
Diaphragm			-0.008	1.00	-0.008
Comp. DL+ADL			-0.058	1.00	-0.058
Live Load(+I)					-0.282
Total	0.993		1.018		1.439

	Release	Mult	Erection	Mult	Final
At 0.9 x L =	88.34 ft				
Prestress	0.871	1.80	1.569	2.45	2.135
Self Wt.	-0.308	1.85	-0.569	2.40	-0.738
Deck + Haunch			-0.309	1.00	-0.309
Prec. DL+ADL			-0.032	1.00	-0.032
Diaphragm			-0.004	1.00	-0.004
Comp. DL+ADL			-0.029	1.00	-0.029
Live Load(+I)					-0.141
Total	0.564		0.626		0.882

Positive values indicate upward deflection.

CAMBER/DEFLECTION

CAMBER AND DEFLECTIONS: SERVICE 1
(Span : 1, Beam : 3; Units: in)

	Release	Mult	Erection	Mult	Final
At 0.1 x L =	9.07 ft				
Prestress	0.871	1.80	1.569	2.45	2.135
Self Wt.	-0.308	1.85	-0.569	2.40	-0.738
Deck + Haunch			-0.309	1.00	-0.309
Prec. DL+ADL			-0.032	1.00	-0.032
Diaphragm			-0.004	1.00	-0.004
Comp. DL+ADL			-0.029	1.00	-0.029
Live Load(+I)					-0.141
Total	0.564		0.626		0.882

	Release	Mult	Erection	Mult	Final
At 0.2 x L =	18.98 ft				
Prestress	1.575	1.80	2.835	2.45	3.859
Self Wt.	-0.582	1.85	-1.077	2.40	-1.397
Deck + Haunch			-0.612	1.00	-0.612
Prec. DL+ADL			-0.063	1.00	-0.063
Diaphragm			-0.008	1.00	-0.008
Comp. DL+ADL			-0.058	1.00	-0.058
Live Load(+I)					-0.282
Total	0.993		1.018		1.439

	Release	Mult	Erection	Mult	Final
At 0.3 x L =	28.89 ft				
Prestress	2.095	1.80	3.771	2.45	5.132
Self Wt.	-0.797	1.85	-1.474	2.40	-1.913
Deck + Haunch			-0.850	1.00	-0.850
Prec. DL+ADL			-0.088	1.00	-0.088
Diaphragm			-0.011	1.00	-0.011
Comp. DL+ADL			-0.081	1.00	-0.081
Live Load(+I)					-0.396
Total	1.298		1.267		1.795

	Release	Mult	Erection	Mult	Final
At 0.4 x L =	38.80 ft				
Prestress	2.415	1.80	4.346	2.45	5.916
Self Wt.	-0.933	1.85	-1.727	2.40	-2.240
Deck + Haunch			-1.001	1.00	-1.001
Prec. DL+ADL			-0.104	1.00	-0.104
Diaphragm			-0.013	1.00	-0.013
Comp. DL+ADL			-0.095	1.00	-0.095
Live Load(+I)					-0.468
Total	1.481		1.407		1.995

	Release	Mult	Erection	Mult	Final
At 0.5 x L =	48.71 ft				
Prestress	2.522	1.80	4.540	2.45	6.179
Self Wt.	-0.980	1.85	-1.813	2.40	-2.352
Deck + Haunch			-1.053	1.00	-1.053
Prec. DL+ADL			-0.109	1.00	-0.109
Diaphragm			-0.014	1.00	-0.014
Comp. DL+ADL			-0.100	1.00	-0.100

	Release	Mult	Erection	Mult	Final
Live Load(+I)					-0.494
Total	1.542		1.451		2.058

	Release	Mult	Erection	Mult	Final
At 0.6 x L =	58.62 ft				
Prestress	2.415	1.80	4.346	2.45	5.916
Self Wt.	-0.933	1.85	-1.727	2.40	-2.240
Deck + Haunch			-1.001	1.00	-1.001
Prec. DL+ADL			-0.104	1.00	-0.104
Diaphragm			-0.013	1.00	-0.013
Comp. DL+ADL			-0.095	1.00	-0.095
Live Load(+I)					-0.468
Total	1.481		1.407		1.995

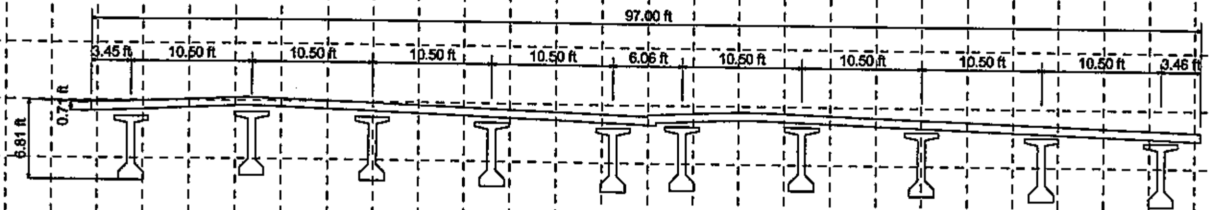
	Release	Mult	Erection	Mult	Final
At 0.7 x L =	68.52 ft				
Prestress	2.095	1.80	3.771	2.45	5.132
Self Wt.	-0.797	1.85	-1.474	2.40	-1.913
Deck + Haunch			-0.850	1.00	-0.850
Prec. DL+ADL			-0.088	1.00	-0.088
Diaphragm			-0.011	1.00	-0.011
Comp. DL+ADL			-0.081	1.00	-0.081
Live Load(+I)					-0.396
Total	1.298		1.267		1.795

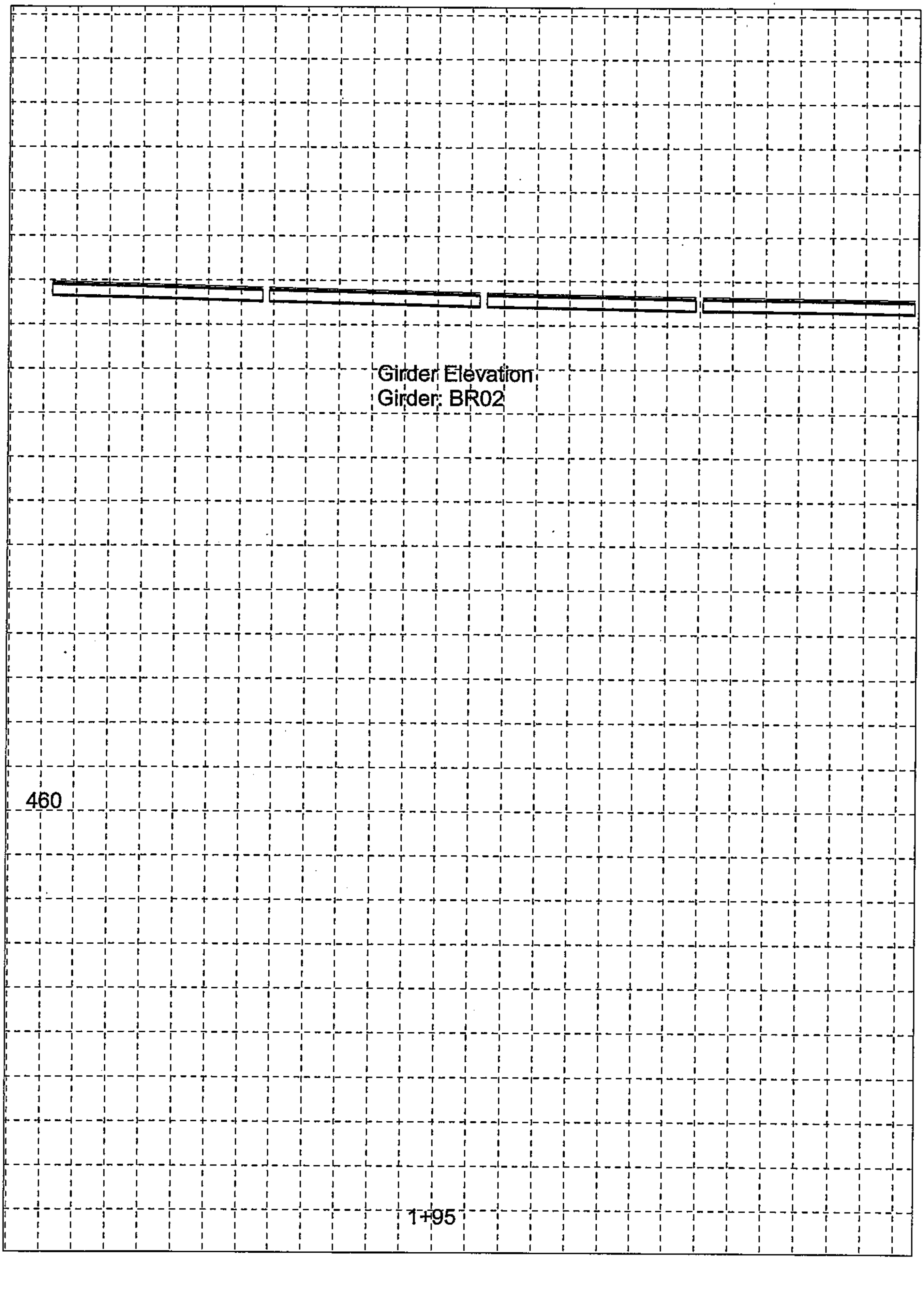
	Release	Mult	Erection	Mult	Final
At 0.8 x L =	78.43 ft				
Prestress	1.575	1.80	2.835	2.45	3.859
Self Wt.	-0.582	1.85	-1.077	2.40	-1.397
Deck + Haunch			-0.612	1.00	-0.612
Prec. DL+ADL			-0.063	1.00	-0.063
Diaphragm			-0.008	1.00	-0.008
Comp. DL+ADL			-0.058	1.00	-0.058
Live Load(+I)					-0.282
Total	0.993		1.018		1.439

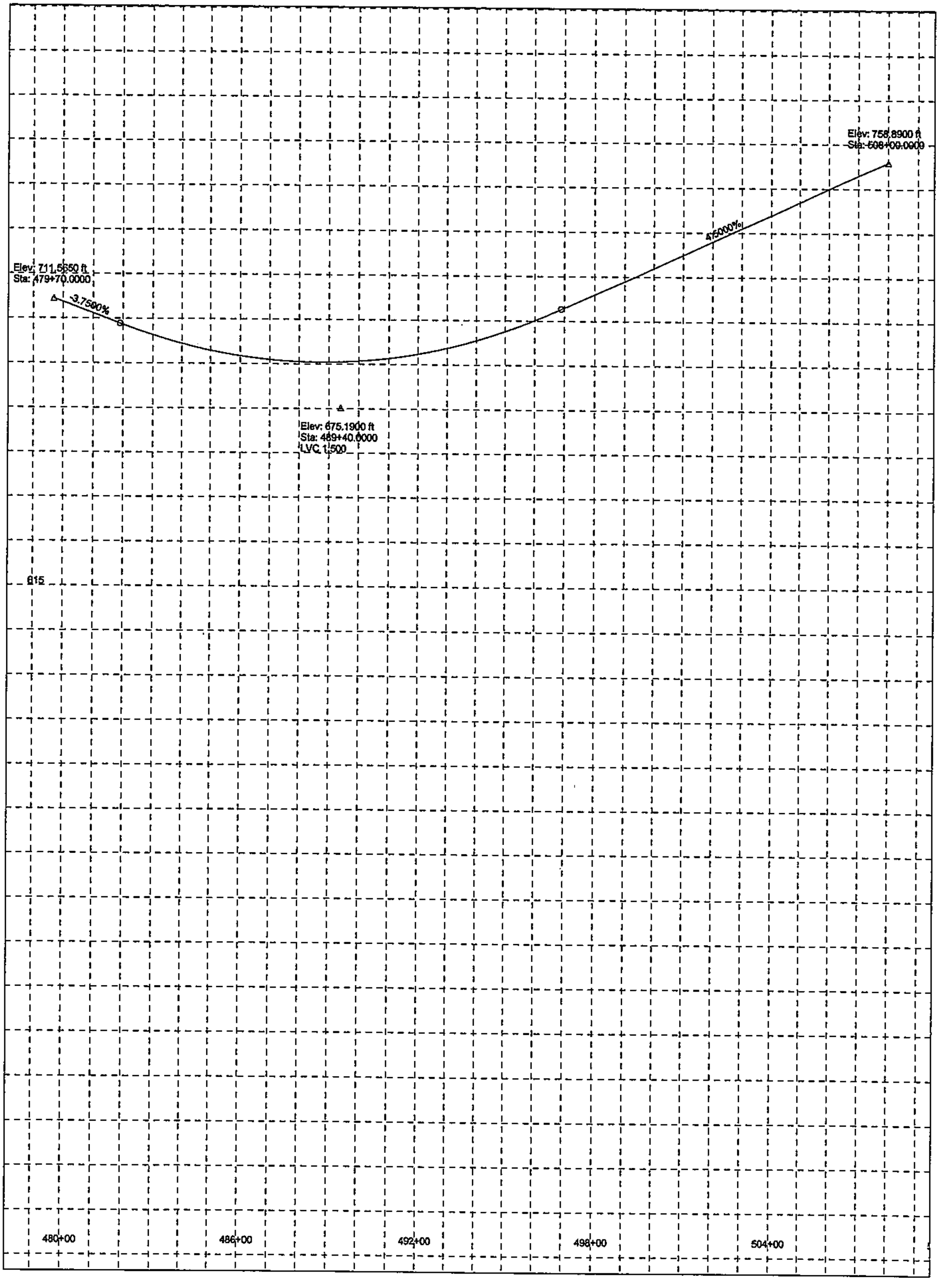
	Release	Mult	Erection	Mult	Final
At 0.9 x L =	88.34 ft				
Prestress	0.871	1.80	1.569	2.45	2.135
Self Wt.	-0.308	1.85	-0.569	2.40	-0.738
Deck + Haunch			-0.309	1.00	-0.309
Prec. DL+ADL			-0.032	1.00	-0.032
Diaphragm			-0.004	1.00	-0.004
Comp. DL+ADL			-0.029	1.00	-0.029
Live Load(+I)					-0.141
Total	0.564		0.626		0.882

Positive values indicate upward deflection.

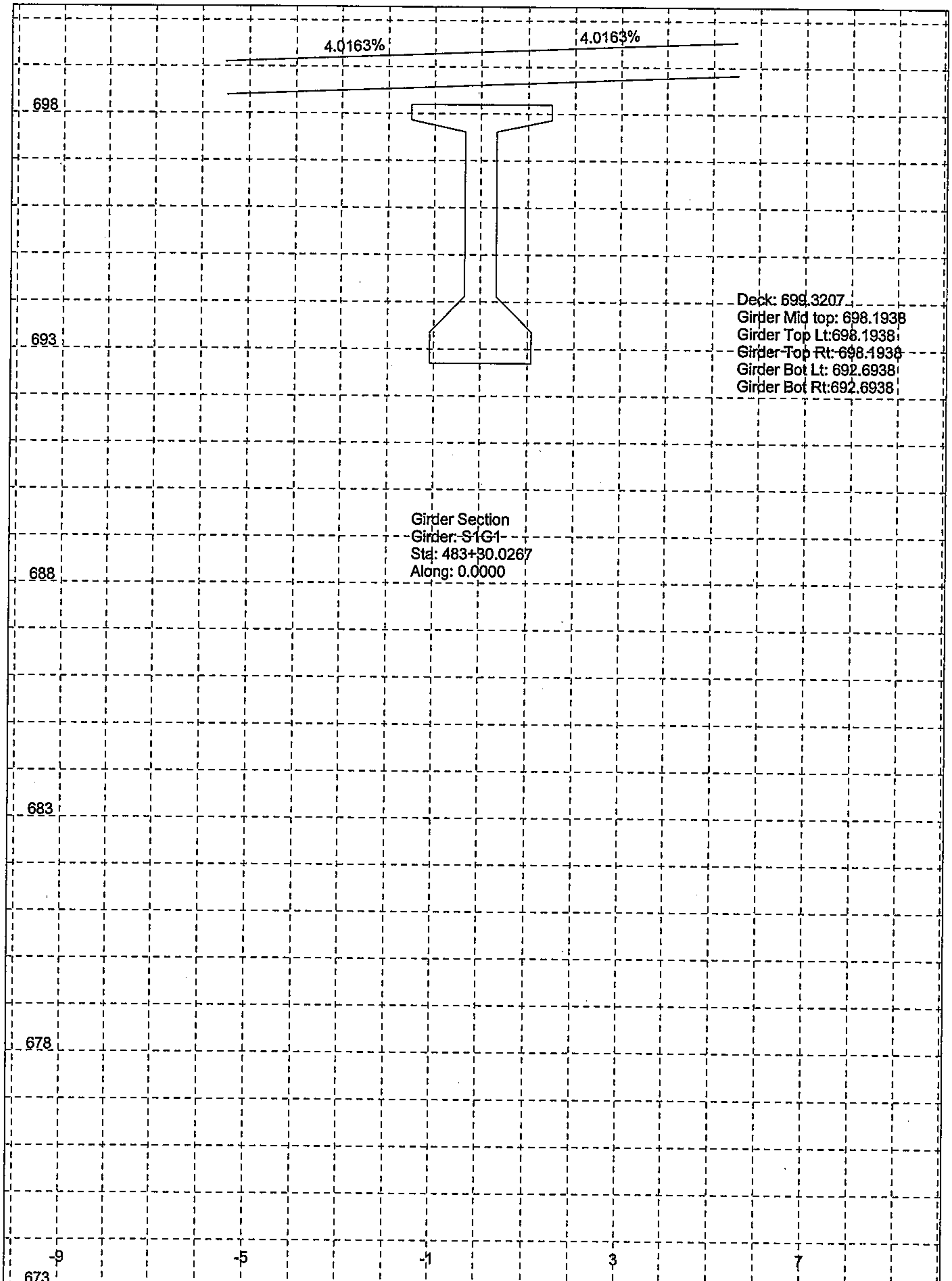
GEOMATH
INPUT/OUTPUT

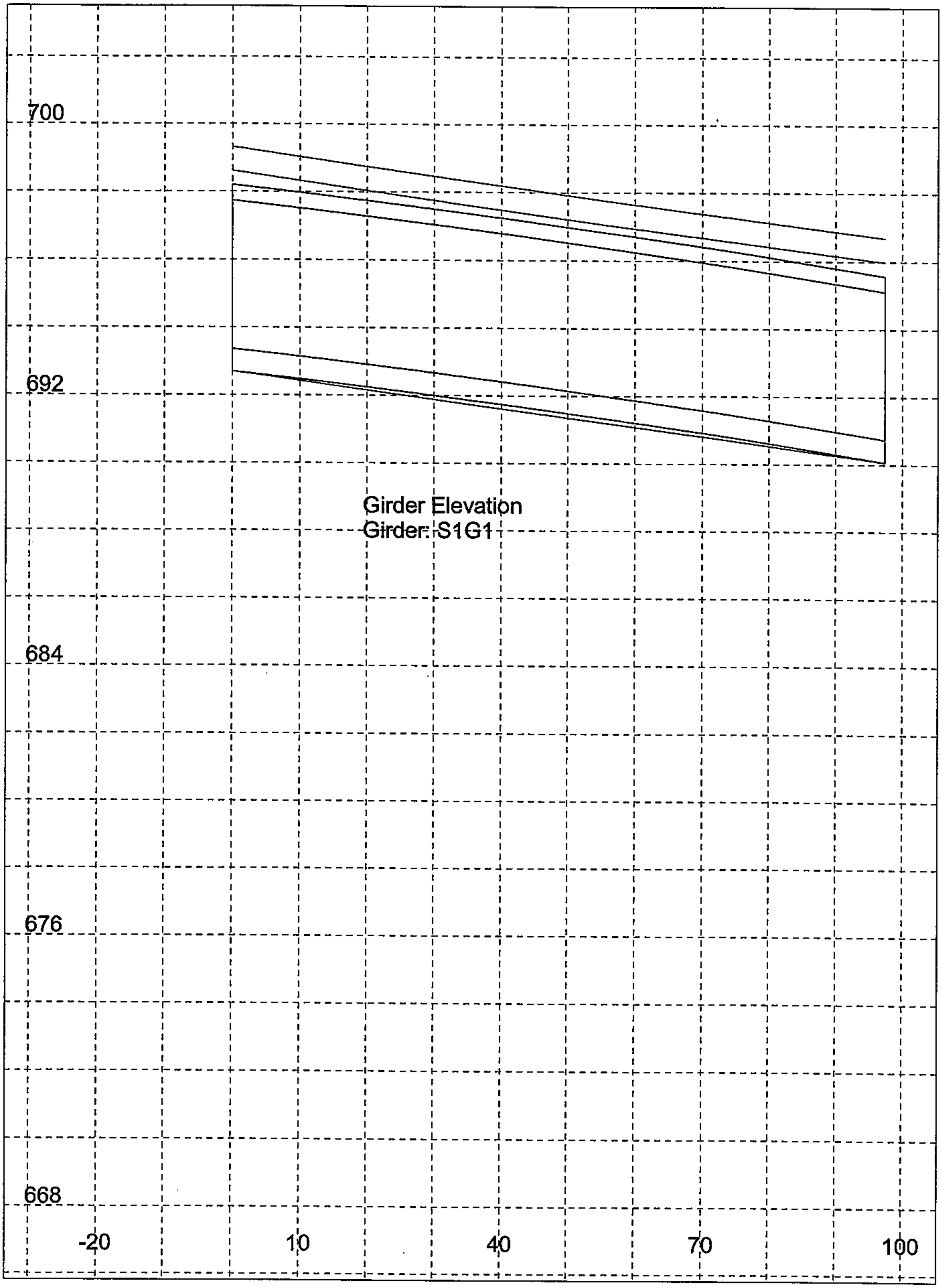

97.00 ft
3.45 ft
10.50 ft
10.50 ft
10.50 ft
10.50 ft
6.06 ft
10.50 ft
10.50 ft
10.50 ft
10.50 ft
3.46 ft
0.71 ft
6.81 ft


Girder Elevation
Girder: BR02
460
1+95

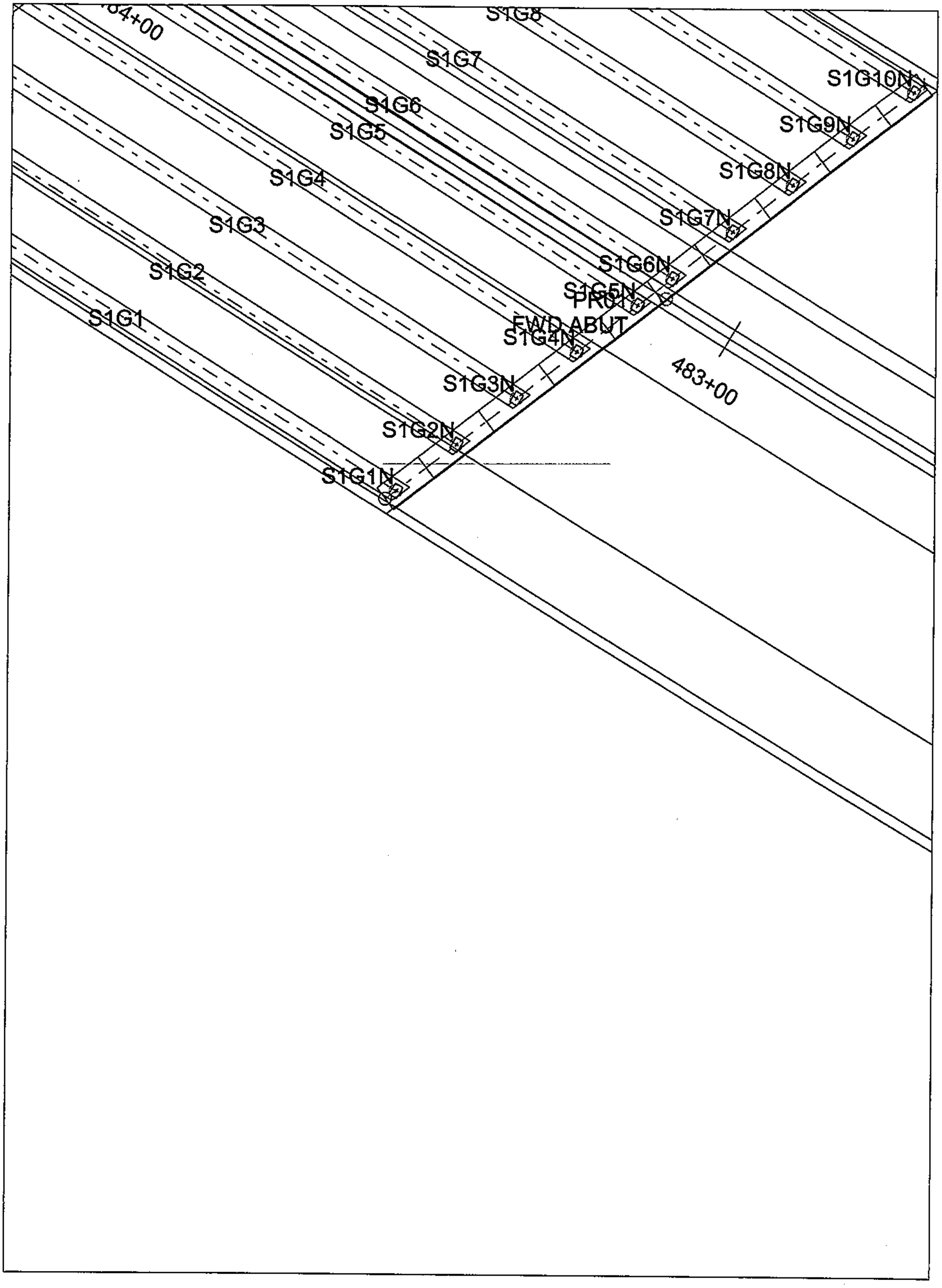


Elev: 711.5650 ft
Sta: 479+70.0000
-3.7500%
Elev: 675.1900 ft
Sta: 489+40.0000
LVC 1,500
4.5000%
Elev: 758.8900 ft
Sta: 508+00.0000
615
480+00
486+00
492+00
498+00
504+00


4.0163%
4.0163%
698
693
688
683
678
673
Deck: 699.3207
Girder Mid top: 698.1938
Girder Top Lt:698.1938
Girder Top Rt: 698.1938
Girder Bot Lt: 692.6938
Girder Bot Rt:692.6938
Girder Section
Girder: S1G1
Sta: 483+30.0267
Along: 0.0000
-9
-5
-1
3
7



Girder Elevation
Girder: S1G1
700
692
684
676
668
-20
10
40
70
100



484+00
S1G8
S1G7
S1G10N
S1G6
S1G5
S1G9N
S1G4
S1G8N
S1G3
S1G7N
S1G6N
S1G2
S1G5N
PR01
S1G1
FWD ABUT
S1G4N
483+00
S1G3N
S1G2N
S1G1N

Phone: | Sheet 1 of 1
Program: Leap Geomath® Ver: 8.0.0 (c) LEAP Software, Inc | Job No: | Date: 6/4/2009
Phone: 800-451-LEAP (5327) Web-Site: www.leapsoft.com | By:

Filename: C:\Export\PORTSMOUTH-MINFORD RD_REV 2 - split deck.gmd

Alignment ID: ALG02 SR823

Start Station: 465+00.0000

P.I.	North	East	Trans	Spiral-In	Spiral-Out	Radius
1	310,424.1000	1,861,654.6000	None			
2	310,991.6000	1,860,039.4000	SAS	225.0000	225.0000	5,729.5700
3	312,183.7000	1,858,671.4000	None			

***** End of Report *****

Feet Datafile Modification Date: 06/04/2009 09:07

Phone: | Sheet 1 of 1
Program: Leap Geomath® Ver: 8.0.0 (c) LEAP Software, Inc | Job No: | Date: 6/4/2009
Phone: 800-451-LEAP (5327) Web-Site: www.leapsoft.com | By:

Filename: C:\Export\PORTSMOUTH-MINFORD RD_REV 2 - split deck.gmd

Profile ID: PRF01 SR823

VPI	Station	Elevation	Trans	Parabola-1	Parabola-2
1	479+70.0000	711.5650	None		
2	489+40.0000	675.1900	Parabola	1,500.0000	
3	508+00.0000	758.8900	None		

***** End of Report *****

Feet Datafile Modification Date: 06/04/2009 09:07

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                                  Phone:               | Sheet  1 of  1
. .                                                    | Job No:
Program: Leap Geomath®  Ver: 8.0.0   (c) LEAP Software, Inc | Date:  6/4/2009
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Filename: C:\Export\PORTSMOUTH-MINFORD RD_REV 2 - split deck.gmd

Profile ID: PRF01 SR823

Elem          Start          End          Apex          Transition

  1  Sta   479+70.0000  481+90.0000          None  Length   220.0000
     Elev     711.5650     703.3150          None  Type      Tangent
     Grade     -0.0375      -0.0375

  2  Sta   481+90.0000  496+90.0000  488+71.8182  Length 1,500.0000
     Elev     703.3150     708.9400     690.5309  Type     Parabola
     Grade     -0.0375       0.0450

  3  Sta   496+90.0000  508+00.0000          None  Length 1,110.0000
     Elev     708.9400     758.8900          None  Type      Tangent
     Grade      0.0450       0.0450

                    ***** End of Report *****

Feet                     Datafile Modification Date:    06/04/2009  09:07
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                                  Phone:               | Sheet  1 of  1
. .                                                    | Job No:
Program: Leap Geomath®  Ver: 8.0.0   (c) LEAP Software, Inc | Date:  6/5/2009
Phone: 800-451-LEAP (5327)       Web-Site: www.leapsoft.com | By:
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Roadway ID: SR823 SR823rdw

                        CROSS SECTION REPORT
                        --------------------

Alignment: ALG02
Profile: PRF01
Cross-Section: XS01
Roadway Beginning Station: 482+00.0000
Roadway Ending Station: 489+00.0000
```

STATION	PGL-OFFSET	POINT	DIST-FR-PGL	GRADE	DESCRIPTION
482+00.0000	0.0000	1	-48.5000		
				0.040000	shld
		2	-47.0000		
				0.040000	shld
		3	-35.0000		
				-0.036000	lanes
		4	-11.0000		
				-0.036000	lanes
		5	-1.5000		
				-0.036000	lanes
		6	-0.0417		
				3.467800	shld
		7	0.0000		
				0.040000	shld
		8	1.5000		
				0.040000	shld
		9	8.5000		
				-0.036000	lanes
		10	11.0000		
				-0.036000	lanes
		11	47.0000		
				-0.036000	lanes
		12	48.5000		
483+75.0000	0.0000	1	-48.5000		
				0.040000	shld
		2	-47.0000		
				0.040000	shld
		3	-35.0000		
				-0.036000	lanes
		4	-11.0000		
				-0.036000	lanes
		5	-1.5000		
				-0.036000	lanes
		6	-0.0417		
				3.467800	shld
		7	0.0000		
				0.040000	shld
		8	1.5000		
				0.040000	shld
		9	8.5000		

Feet   Datafile Modification Date: 06/05/2009 09:19

Phone: | Sheet 2 of 3
Job No:
Program: Leap Geomath® Ver: 8.0.0 (c) LEAP Software, Inc | Date: 6/5/2009
Phone: 800-451-LEAP (5327) Web-Site: www.leapsoft.com | By:

Filename: C:\Export\PORTSMOUTH-MINFORD RD_TEMP - split deck.gmd

STATION	PGL-OFFSET	POINT	DIST-FR-PGL	GRADE	DESCRIPTION
				-0.036000	lanes
		10	11.0000		
				-0.036000	lanes
		11	47.0000		
				-0.036000	lanes
		12	48.5000		
485+50.0000	0.0000	1	-48.5000		
				0.040000	shld
		2	-47.0000		
				0.040000	shld
		3	-35.0000		
				-0.036000	lanes
		4	-11.0000		
				-0.036000	lanes
		5	-1.5000		
				-0.036000	lanes
		6	-0.0417		
				3.467800	shld
		7	0.0000		
				0.040000	shld
		8	1.5000		
				0.040000	shld
		9	8.5000		
				-0.036000	lanes
		10	11.0000		
				-0.036000	lanes
		11	47.0000		
				-0.036000	lanes
		12	48.5000		
487+25.0000	0.0000	1	-48.5000		
				0.040000	shld
		2	-47.0000		
				0.040000	shld
		3	-35.0000		
				-0.036000	lanes
		4	-11.0000		
				-0.036000	lanes
		5	-1.5000		
				-0.036000	lanes
		6	-0.0417		
				3.467800	shld
		7	0.0000		
				0.040000	shld
		8	1.5000		
				0.040000	shld
		9	8.5000		
				-0.036000	lanes
		10	11.0000		
				-0.036000	lanes
		11	47.0000		
				-0.036000	lanes

Feet Datafile Modification Date: 06/05/2009 09:19

Phone: | Sheet 3 of 3
Job No:
Program: Leap Geomath® Ver: 8.0.0 (c) LEAP Software, Inc | Date: 6/5/2009
Phone: 800-451-LEAP (5327) Web-Site: www.leapsoft.com | By:

Filename: C:\Export\PORTSMOUTH-MINFORD RD_TEMP - split deck.gmd

STATION	PGL-OFFSET	POINT	DIST-FR-PGL	GRADE	DESCRIPTION
		12	48.5000		
489+00.0000	0.0000	1	-48.5000		
				0.040000	shld
		2	-47.0000		
				0.040000	shld
		3	-35.0000		
				-0.036000	lanes
		4	-11.0000		
				-0.036000	lanes
		5	-1.5000		
				-0.036000	lanes
		6	-0.0417		
				3.467800	shld
		7	0.0000		
				0.040000	shld
		8	1.5000		
				0.040000	shld
		9	8.5000		
				-0.036000	lanes
		10	11.0000		
				-0.036000	lanes
		11	47.0000		
				-0.036000	lanes
		12	48.5000		

***** End of Report *****

Feet Datafile Modification Date: 06/05/2009 09:19

Phone: | Sheet 1 of 2
| Job No:
Program: Leap Geomath® Ver: 8.0.0 (c) LEAP Software, Inc | Date: 6/5/2009
Phone: 800-451-LEAP (5327) Web-Site: www.leapsoft.com | By:

Filename: C:\Export\PORTSMOUTH-MINFORD RD_TEMP - split deck.gmd

DECK ELEVATIONS ALONG GIRDER (EQUAL SPACINGS)

SPAN ID: PR01-PR02 ROADWAY: SR823 BETWEEN WRKPTS: PR01 - PR02 SPACES = 4

GIRDER	DISTANCE	STATION	OFFSET	ELEVATION
S1G1	97.4167			
		483+30.0267	-44.9131	699.3207
		483+54.1915	-44.8297	698.6200
		483+78.3565	-44.8490	697.9473
		484+02.5210	-44.9710	697.3027
		484+26.6840	-45.1957	696.6861
S1G2	97.4167			
		483+26.0741	-34.4335	699.8150
		483+50.2828	-34.3334	699.1009
		483+74.4919	-34.3362	698.4227
		483+98.7006	-34.4418	697.7804
		484+22.9079	-34.6504	697.1741
S1G3	97.4167			
		483+22.1071	-23.9567	699.5574
		483+46.3599	-23.8398	698.8361
		483+70.6132	-23.8260	698.1508
		483+94.8661	-23.9152	697.5017
		484+19.1179	-24.1076	696.8886
S1G4	97.4167			
		483+18.1257	-13.4826	699.3011
		483+42.4226	-13.3489	698.5726
		483+66.7202	-13.3184	697.8803
		483+91.0177	-13.3912	697.2242
		484+15.3141	-13.5673	696.6042
S1G5	97.4167			
		483+14.1297	-3.0113	699.0463
		483+38.4709	-2.8607	698.3105
		483+62.8130	-2.8135	697.6111
		483+87.1551	-2.8699	696.9479
		484+11.4962	-3.0296	696.3211
S1G6	97.4167			
		483+11.8158	3.0333	699.2763
		483+36.1827	3.1937	698.5486
		483+60.5505	3.2506	697.8493
		483+84.9184	3.2038	697.1785
		484+09.2854	3.0535	696.5363
S1G7	97.4167			

Feet Datafile Modification Date: 06/05/2009 09:19

Phone: | Sheet 2 of 2
| Job No:
Program: Leap Geomath® Ver: 8.0.0 (c) LEAP Software, Inc | Date: 6/5/2009
Phone: 800-451-LEAP (5327) Web-Site: www.leapsoft.com | By:

Filename: C:\Export\PORTSMOUTH-MINFORD RD_TEMP - split deck.gmd

GIRDER	DISTANCE	STATION	OFFSET	ELEVATION
		483+07.7967	13.5002	699.4392
		483+32.2082	13.6776	698.6919
		483+56.6207	13.7512	697.9811
		483+81.0333	13.7211	697.3069
		484+05.4453	13.5872	696.6691
S1G8	97.4167			
		483+03.7629	23.9642	699.1881
		483+28.2190	24.1587	698.4334
		483+52.6763	24.2492	697.7154
		483+77.1340	24.2357	697.0340
		484+01.5911	24.1183	696.3893
S1G9	97.4166			
		482+99.7142	34.4254	698.9384
		483+24.2151	34.6370	698.1764
		483+48.7174	34.7444	697.4511
		483+73.2202	34.7477	696.7625
		483+97.7226	34.6468	696.1107
S1G10	97.4166			
		482+95.6507	44.8837	698.6902
		483+20.1965	45.1125	697.9207
		483+44.7439	45.2369	697.1881
		483+69.2920	45.2570	696.4923
		483+93.8397	45.1727	695.8334

***** End of Report *****

Feet Datafile Modification Date: 06/05/2009 09:19

Phone:

Program: Leap Geomath Ver: 8.0.0 (c) LEAP Software, Inc | Sheet 1 of 2
Phone: 800-451-LEAP (5327) Web-Site: www.leapsoft.com | Job No:
Date: 6/5/2009
By:

Filename: C:\Export\PORTSMOUTH-MINFORD RD_TEMP - split deck.gmd

DECK ELEVATIONS ALONG GIRDER (EQUAL SPACINGS)

SPAN ID: PR02-PR03 ROADWAY: SR823 BETWEEN WRKPTS: PR02 - PR03 SPACES = 4

GIRDER	DISTANCE	STATION	OFFSET	ELEVATION
S2G1	97.4154			
		484+29.1448	-44.9184	696.6371
		484+53.3092	-44.8310	696.0683
		484+77.4740	-44.8463	695.5275
		485+01.6382	-44.9643	695.0148
		485+25.8010	-45.1850	694.5300
S2G2	97.4154			
		484+25.3969	-34.4382	697.1052
		484+49.6053	-34.3350	696.5232
		484+73.8142	-34.3346	695.9772
		484+98.0224	-34.4372	695.4670
		485+22.2295	-34.6426	694.9929
S2G3	97.4154			
		484+21.6354	-23.9605	696.8208
		484+45.8878	-23.8414	696.2322
		484+70.1408	-23.8254	695.6796
		484+94.3934	-23.9124	695.1631
		485+18.6449	-24.1025	694.6827
S2G4	97.4154			
		484+17.8601	-13.4854	696.5375
		484+42.1567	-13.3503	695.9423
		484+66.4540	-13.3185	695.3832
		484+90.7511	-13.3899	694.8603
		485+15.0472	-13.5647	694.3736
S2G5	97.4154			
		484+14.0711	-3.0127	696.2555
		484+38.4120	-2.8616	695.6536
		484+62.7538	-2.8139	695.0879
		484+87.0955	-2.8698	694.5585
		485+11.4363	-3.0291	694.0655
S2G6	97.4154			
		484+11.8770	3.0329	696.4697
		484+36.2436	3.1933	695.8761
		484+60.6111	3.2501	695.3109
		484+84.9787	3.2033	694.7743
		485+09.3454	3.0529	694.2662
S2G7	97.4154			

Feet Datafile Modification Date: 06/05/2009 09:19

Phone:

Program: Leap Geomath Ver: 8.0.0 (c) LEAP Software, Inc | Sheet 2 of 2
Phone: 800-451-LEAP (5327) Web-Site: www.leapsoft.com | Job No:
Date: 6/5/2009
By:

Filename: C:\Export\PORTSMOUTH-MINFORD RD_TEMP - split deck.gmd

GIRDER	DISTANCE	STATION	OFFSET	ELEVATION
		484+08.0661	13.5016	696.6052
		484+32.4772	13.6781	695.9926
		484+56.8894	13.7508	695.4164
		484+81.3018	13.7197	694.8768
		485+05.7134	13.5849	694.3738
S2G8	97.4154			
		484+04.2411	23.9678	696.3263
		484+28.6969	24.1604	695.7069
		484+53.1540	24.2491	695.1241
		484+77.6113	24.2338	694.5780
		485+02.0682	24.1146	694.0684
S2G9	97.4154			
		484+00.4021	34.4314	696.0488
		484+24.9028	34.6402	695.4225
		484+49.4048	34.7450	694.8330
		484+73.9072	34.7455	694.2802
		484+98.4093	34.6420	693.7642
S2G10	97.4154			
		483+96.5490	44.8924	695.7725
		484+21.0946	45.1176	695.1393
		484+45.6418	45.2384	694.5431
		484+70.1895	45.2549	693.9836
		484+94.7369	45.1670	693.4611

***** End of Report *****

Feet Datafile Modification Date: 06/05/2009 09:19

Phone:
Sheet 1 of 2
Job No:
Date: 6/5/2009
By:
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DECK ELEVATIONS ALONG GIRDER (EQUAL SPACINGS)

SPAN ID: PR03-PR04 ROADWAY: SR823 BETWEEN MRKPTS: PR03 - PR04 SPACES = 4

GIRDER	DISTANCE	STATION	OFFSET	ELEVATION
S3G1	97.4167			
		485+28.2725	-44.9228	694.4937
		485+52.4372	-44.8317	694.0568
		485+76.6023	-44.8433	693.6479
		486+00.7668	-44.9576	693.2670
		486+24.9300	-45.1746	692.9142
S3G2	97.4167			
		485+24.7268	-34.4421	694.9378
		485+48.9354	-34.3360	694.4880
		485+73.1445	-34.3328	694.0741
		485+97.3533	-34.4325	693.6961
		486+21.5607	-34.6351	693.3541
S3G3	97.4167			
		485+21.1682	-23.9635	694.6289
		485+45.4209	-23.8424	694.1730
		485+69.6742	-23.8244	693.7531
		485+93.9272	-23.9094	693.3693
		486+18.1790	-24.0976	693.0216
S3G4	97.4167			
		485+17.5966	-13.4872	694.3210
		485+41.8935	-13.3510	693.8589
		485+66.1911	-13.3181	693.4331
		485+90.4885	-13.3884	693.0434
		486+14.7850	-13.5620	692.6900
S3G5	97.4167			
		485+14.0119	-3.0131	694.0141
		485+38.3532	-2.8618	693.5459
		485+62.6952	-2.8139	693.1140
		485+87.0373	-2.8695	692.7185
		486+11.3784	-3.0285	692.3592
S3G6	97.4167			
		485+11.9362	3.0334	694.2139
		485+36.3031	3.1935	693.7543
		485+60.6710	3.2500	693.3233
		485+85.0388	3.2030	692.9207
		486+09.4058	3.0524	692.5467
S3G7	97.4167			

Feet Datafile Modification Date: 06/05/2009 09:19

Phone:
Sheet 2 of 2
Job No:
Date: 6/5/2009
By:
Program: Leap Geomath® Ver: 8.0.0 (c) LEAP Software, Inc
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GIRDER	DISTANCE	STATION	OFFSET	ELEVATION
		485+08.3309	13.5039	694.3242
		485+32.7423	13.6792	693.8462
		485+57.1548	13.7508	693.4047
		485+81.5675	13.7186	692.9958
		486+05.9795	13.5827	692.6314
S3G8	97.4167			
		485+04.7122	23.9721	694.0200
		485+29.1684	24.1628	693.5358
		485+53.6258	24.2495	693.0882
		485+78.0834	24.2322	692.6773
		486+02.5405	24.1109	692.3030
S3G9	97.4167			
		485+01.0803	34.4381	693.7169
		485+25.5814	34.6441	693.2264
		485+50.0837	34.7459	692.7727
		485+74.5865	34.7436	692.3557
		485+99.0888	34.6371	691.9755
S3G10	97.4167			
		484+97.4350	44.9018	693.4149
		485+21.9811	45.1231	692.9181
		485+46.5285	45.2402	692.4581
		485+71.0766	45.2529	692.0351
		485+95.6243	45.1612	691.6489

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Feet Datafile Modification Date: 06/05/2009 09:19

Phone:
Program: Leap Geomath® Ver: 8.0.0 (c) LEAP Software, Inc
Phone: 800-451-LEAP (5327) Web-Site: www.leapsoft.com
Sheet 1 of 2
Job No:
Date: 6/5/2009
By:

Filename: C:\Export\PORTSMOUTH-MINFORD RD_TEMP - split deck.gmd

DECK ELEVATIONS ALONG GIRDER (EQUAL SPACINGS)

SPAN ID: PR04-PR05 ROADWAY: SR823 BETWEEN WRKPTS: PR04 - PR05 SPACES = 4

GIRDER	DISTANCE	STATION	OFFSET	ELEVATION
S4G1	97.4056			
		486+27.4103	-44.9275	692.8905
		486+51.5723	-44.8329	692.5856
		486+75.7346	-44.8410	692.3086
		486+99.8964	-44.9518	692.0597
		487+24.0569	-45.1652	691.8387
S4G2	97.4056			
		486+24.0645	-34.4461	693.3130
		486+48.2703	-34.3374	692.9953
		486+72.4767	-34.3315	692.7136
		486+96.6826	-34.4285	692.4678
		487+20.8874	-34.6284	692.2580
S4G3	97.4056			
		486+20.7064	-23.9667	692.9818
		486+44.9563	-23.8438	692.6586
		486+69.2068	-23.8239	692.3715
		486+93.4571	-23.9071	692.1204
		487+17.7062	-24.0934	691.9054
S4G4	97.4056			
		486+17.3361	-13.4892	692.6515
		486+41.6302	-13.3521	692.3227
		486+65.9251	-13.3182	692.0302
		486+90.2197	-13.3875	691.7738
		487+14.5134	-13.5602	691.5536
S4G5	97.4056			
		486+13.9535	-3.0138	692.3220
		486+38.2919	-2.8623	691.9877
		486+62.6312	-2.8143	691.6896
		486+86.9705	-2.8698	691.4279
		487+11.3089	-3.0287	691.2024
S4G6	97.4056			
		486+11.9948	3.0336	692.5087
		486+36.3589	3.1933	692.1833
		486+60.7239	3.2495	691.8863
		486+85.0890	3.2021	691.6179
		487+09.4533	3.0511	691.3779
S4G7	97.4056			

Feet Datafile Modification Date: 06/05/2009 09:19

Phone:
Program: Leap Geomath® Ver: 8.0.0 (c) LEAP Software, Inc
Phone: 800-451-LEAP (5327) Web-Site: www.leapsoft.com
Sheet 2 of 2
Job No:
Date: 6/5/2009
By:

Filename: C:\Export\PORTSMOUTH-MINFORD RD_TEMP - split deck.gmd

GIRDER	DISTANCE	STATION	OFFSET	ELEVATION
		486+08.5926	13.5059	692.5961
		486+33.0013	13.6800	692.2529
		486+57.4110	13.7503	691.9461
		486+81.8209	13.7169	691.6758
		487+06.2301	13.5798	691.4421
S4G8	97.4056			
		486+05.1779	23.9762	692.2689
		486+29.6313	24.1647	691.9200
		486+54.0859	24.2492	691.6076
		486+78.5408	24.2299	691.3319
		487+02.9950	24.1066	691.0929
S4G9	97.4056			
		486+01.7507	34.4444	691.9427
		486+26.2489	34.6474	691.5880
		486+50.7485	34.7462	691.2700
		486+75.2485	34.7409	690.9888
		486+99.7480	34.6315	690.7444
S4G10	97.4056			
		485+98.3108	44.9106	691.6173
		486+22.8541	45.1281	691.2568
		486+47.3988	45.2413	690.9332
		486+71.9440	45.2501	690.6465
		486+96.4889	45.1547	690.3967

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Feet Datafile Modification Date: 06/05/2009 09:19

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Project: Portsmouth – Minford Rd Computed: DMP Date: 06/05/09 Job #:
Subject: Geomath Output Checked: Date: Page: 15 of 72

Phone:
Program: Leap Geomath Ver: 8.0.0 (c) LEAP Software, Inc
Phone: 800-451-LEAP (5327) Web-Site: www.leapsoft.com
Sheet 1 of 2
Job No:
Date: 6/5/2009
By:

Filename: C:\Export\PORTSMOUTH-MINFORD RD_TEMP - split deck.gmd

DECK ELEVATIONS ALONG OFFSETS (EQUAL SPACINGS)

SPAN ID: PR01-PR02 ROADWAY: SR823 BETWEEN PIERS : PR01 - PR02 SPACES = 4

OFFSET	DISTANCE	STATION	OFFSET	ELEVATION
1	98.5908			
		483+31.3760	-48.5000	699.1371
		483+55.8168	-48.5000	698.4270
		483+80.2577	-48.5000	697.7498
		484+04.6985	-48.5000	697.1054
		484+29.1393	-48.5000	696.4939
2	98.5943			
		483+30.8120	-47.0000	699.2138
		483+55.2600	-47.0000	698.5028
		483+79.7080	-47.0000	697.8247
		484+04.1560	-47.0000	697.1794
		484+28.6041	-47.0000	696.5670
3	98.6224			
		483+26.2882	-35.0000	699.8290
		483+50.7941	-35.0000	699.1102
		483+75.2999	-35.0000	698.4245
		483+99.8058	-35.0000	697.7718
		484+24.3117	-35.0000	697.1521
4	98.6791			
		483+17.1797	-11.0000	699.2406
		483+41.8022	-11.0000	698.5061
		483+66.4247	-11.0000	697.8050
		483+91.0472	-11.0000	697.1373
		484+15.6697	-11.0000	696.5029
5	98.7018			
		483+13.5516	-1.5000	699.0096
		483+38.2206	-1.5000	698.2689
		483+62.8896	-1.5000	697.5616
		483+87.5586	-1.5000	696.8879
		484+12.2276	-1.5000	696.2476
6	98.7053			
		483+12.9936	-0.0417	698.9743
		483+37.6697	-0.0417	698.2326
		483+62.3458	-0.0417	697.5244
		483+87.0220	-0.0417	696.8497
		484+11.6981	-0.0417	696.2085
7	98.7054			

Feet Datafile Modification Date: 06/05/2009 09:19

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Project: Portsmouth – Minford Rd Computed: DMP Date: 06/05/09 Job #:
Subject: Geomath Output Checked: Date: Page: 16 of 72

Phone:
Program: Leap Geomath Ver: 8.0.0 (c) LEAP Software, Inc
Phone: 800-451-LEAP (5327) Web-Site: www.leapsoft.com
Sheet 2 of 2
Job No:
Date: 6/5/2009
By:

Filename: C:\Export\PORTSMOUTH-MINFORD RD_TEMP - split deck.gmd

OFFSET	DISTANCE	STATION	OFFSET	ELEVATION
		483+12.9776	0.0000	699.2192
		483+37.6540	0.0000	698.3275
		483+62.3303	0.0000	697.6693
		483+87.0067	0.0000	696.9946
		484+11.6830	0.0000	696.3533
8	98.7090			
		483+12.4033	1.5000	699.1969
		483+37.0870	1.5000	698.4542
		483+61.7707	1.5000	697.7450
		483+86.4544	1.5000	697.0693
		484+11.1381	1.5000	696.4271
9	98.7258			
		483+09.7187	8.5000	699.5597
		483+34.4368	8.5000	698.8123
		483+59.1549	8.5000	698.0986
		483+83.8730	8.5000	697.4184
		484+08.5912	8.5000	696.7718
10	98.7318			
		483+08.7582	11.0000	699.4994
		483+33.4886	11.0000	698.7504
		483+58.2191	11.0000	698.0350
		483+82.9495	11.0000	697.3532
		484+07.6799	11.0000	696.7051
11	98.8196			
		482+94.8264	47.0000	698.6402
		483+19.7357	47.0000	697.8668
		483+44.6449	47.0000	697.1275
		483+69.5542	47.0000	696.4223
		483+94.4634	47.0000	695.7513
12	98.8233			
		482+94.2418	48.5000	698.6048
		483+19.1586	48.5000	697.8303
		483+44.0753	48.5000	697.0900
		483+68.9921	48.5000	696.3838
		483+93.9088	48.5000	695.7118

***** End of Report *****

Feet Datafile Modification Date: 06/05/2009 09:19

Phone:

Program: Leap Geomath® Ver: 8.0.0 (c) LEAP Software, Inc
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Sheet 1 of 2
Job No:
Date: 6/5/2009
By:

Filename: C:\Export\PORTSMOUTH-MINFORD RD_TEMP - split deck.gmd

DECK ELEVATIONS ALONG OFFSETS (EQUAL SPACINGS)

SPAN ID: PR02-PR03 ROADWAY: SR823 BETWEEN PIERS : PR02 - PR03 SPACES = 4

OFFSET	DISTANCE	STATION	OFFSET	ELEVATION
1	99.8958			
		484+29.1393	-48.5000	696.4939
		484+53.9036	-48.5000	695.9079
		484+78.6679	-48.5000	695.3555
		485+03.4322	-48.5000	694.8369
		485+28.1966	-48.5000	694.3520
2	99.8990			
		484+28.6041	-47.0000	696.5670
		484+53.3756	-47.0000	695.9800
		484+78.1471	-47.0000	695.4268
		485+02.9187	-47.0000	694.9073
		485+27.6902	-47.0000	694.4216
3	99.9245			
		484+24.3117	-35.0000	697.1521
		484+49.1412	-35.0000	696.5580
		484+73.9706	-35.0000	695.9977
		484+98.8001	-35.0000	695.4713
		485+23.6295	-35.0000	694.9789
4	99.9761			
		484+15.6697	-11.0000	696.5029
		484+40.6158	-11.0000	695.8941
		484+65.5620	-11.0000	695.3196
		484+90.5081	-11.0000	694.7793
		485+15.4542	-11.0000	694.2733
5	99.9967			
		484+12.2276	-1.5000	696.2476
		484+37.2202	-1.5000	695.6330
		484+62.2129	-1.5000	695.0528
		484+87.2055	-1.5000	694.5069
		485+12.1982	-1.5000	693.9954
6	99.9999			
		484+11.6981	-0.0417	696.2085
		484+36.6979	-0.0417	695.5930
		484+61.6977	-0.0417	695.0219
		484+86.6975	-0.0417	694.4652
		485+11.6973	-0.0417	693.9528
7	100.0000			

Feet Datafile Modification Date: 06/05/2009 09:19

Phone:

Program: Leap Geomath® Ver: 8.0.0 (c) LEAP Software, Inc
Phone: 800-451-LEAP (5327) Web-Site: www.leapsoft.com

Sheet 2 of 2
Job No:
Date: 6/5/2009
By:

Filename: C:\Export\PORTSMOUTH-MINFORD RD_TEMP - split deck.gmd

OFFSET	DISTANCE	STATION	OFFSET	ELEVATION
		484+11.6830	0.0000	696.3533
		484+36.6830	0.0000	695.7378
		484+61.6830	0.0000	695.1567
		484+86.6830	0.0000	694.6100
		485+11.6830	0.0000	694.0976
8	100.0033			
		484+11.1381	1.5000	696.4271
		484+36.1455	1.5000	695.8107
		484+61.1528	1.5000	695.2287
		484+86.1602	1.5000	694.6810
		485+11.1676	1.5000	694.1678
9	100.0186			
		484+08.5912	8.5000	696.7718
		484+33.6330	8.5000	696.1511
		484+58.6748	8.5000	695.5648
		484+83.7165	8.5000	695.0130
		485+08.7583	8.5000	694.4958
10	100.0241			
		484+07.6799	11.0000	696.7051
		484+32.7340	11.0000	696.0828
		484+57.7882	11.0000	695.4950
		484+82.8423	11.0000	694.9417
		485+07.8964	11.0000	694.4230
11	100.1039			
		483+94.4634	47.0000	695.7513
		484+19.6964	47.0000	695.1063
		484+44.9293	47.0000	694.4963
		484+70.1623	47.0000	693.9214
		484+95.3952	47.0000	693.3815
12	100.1072			
		483+93.9088	48.5000	695.7118
		484+19.1493	48.5000	695.0659
		484+44.3898	48.5000	694.4550
		484+69.6302	48.5000	693.8792
		484+94.8707	48.5000	693.3384

***** End of Report *****

Feet Datafile Modification Date: 06/05/2009 09:19

Phone:
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Program: Leap Geomath® Ver: 8.0.0 (c) LEAP Software, Inc | Sheet 1 of 2 | Job No: | Date: 6/5/2009
Phone: 800-451-LEAP (5327) Web-Site: www.leapsoft.com | By:

Filename: C:\Export\PORTSMOUTH-MINFORD RD_TEMP - split deck.gmd

DECK ELEVATIONS ALONG OFFSETS (EQUAL SPACINGS)

SPAN ID: PR03-PR04 ROADWAY: SR823 BETWEEN PIERS : PR03 - PR04 SPACES = 4

OFFSET	DISTANCE	STATION	OFFSET	ELEVATION
1	99.9070			
		485+28.1966	-48.5000	694.3520
		485+52.9636	-48.5000	693.9008
		485+77.7307	-48.5000	693.4831
		486+02.4978	-48.5000	693.0996
		486+27.2649	-48.5000	692.7496
2	99.9098			
		485+27.6902	-47.0000	694.4216
		485+52.4644	-47.0000	693.9696
		485+77.2387	-47.0000	693.5513
		486+02.0129	-47.0000	693.1668
		486+26.7871	-47.0000	692.8160
3	99.9326			
		485+23.6295	-35.0000	694.9789
		485+48.4610	-35.0000	694.5203
		485+73.2925	-35.0000	694.0957
		485+98.1239	-35.0000	693.7049
		486+22.9554	-35.0000	693.3481
4	99.9787			
		485+15.4542	-11.0000	694.2733
		485+40.4010	-11.0000	693.8014
		485+65.3478	-11.0000	693.3638
		485+90.2946	-11.0000	692.9604
		486+15.2413	-11.0000	692.5913
5	99.9971			
		485+12.1982	-1.5000	693.9954
		485+37.1909	-1.5000	693.5182
		485+62.1836	-1.5000	693.0754
		485+87.1763	-1.5000	692.6670
		486+12.1691	-1.5000	692.2929
6	99.9999			
		485+11.6973	-0.0417	693.9528
		485+36.6971	-0.0417	693.4748
		485+61.6969	-0.0417	693.0312
		485+86.6967	-0.0417	692.6220
		486+11.6965	-0.0417	692.2472
7	100.0000			

Feet Datafile Modification Date: 06/05/2009 09:19

Phone:
. .
Program: Leap Geomath® Ver: 8.0.0 (c) LEAP Software, Inc | Sheet 2 of 2 | Job No: | Date: 6/5/2009
Phone: 800-451-LEAP (5327) Web-Site: www.leapsoft.com | By:

Filename: C:\Export\PORTSMOUTH-MINFORD RD_TEMP - split deck.gmd

OFFSET	DISTANCE	STATION	OFFSET	ELEVATION
		485+11.6830	0.0000	694.0976
		485+36.6830	0.0000	693.6196
		485+61.6830	0.0000	693.1760
		485+86.6830	0.0000	692.7667
		486+11.6830	0.0000	692.3918
8	100.0029			
		485+11.1676	1.5000	694.1678
		485+36.1748	1.5000	693.6890
		485+61.1821	1.5000	693.2445
		485+86.1894	1.5000	692.8345
		486+11.1967	1.5000	692.4588
9	100.0166			
		485+08.7583	8.5000	694.4958
		485+33.7996	8.5000	694.0130
		485+58.8409	8.5000	693.5647
		485+83.8822	8.5000	693.1509
		486+08.9235	8.5000	692.7715
10	100.0215			
		485+07.8964	11.0000	694.4230
		485+32.9499	11.0000	693.9388
		485+58.0033	11.0000	693.4891
		485+83.0568	11.0000	693.0739
		486+08.1103	11.0000	692.6933
11	100.0927			
		484+95.3952	47.0000	693.3815
		485+20.6254	47.0000	692.8767
		485+45.8555	47.0000	692.4068
		485+71.0856	47.0000	691.9720
		485+96.3158	47.0000	691.5722
12	100.0957			
		484+94.8707	48.5000	693.3384
		485+20.1083	48.5000	692.8327
		485+45.3458	48.5000	692.3620
		485+70.5834	48.5000	691.9263
		485+95.8209	48.5000	691.5257

***** End of Report *****

Feet Datafile Modification Date: 06/05/2009 09:19

Phone:

Program: Leap Geomath® Ver: 8.0.0 (c) LEAP Software, Inc
Phone: 800-451-LEAP (5327) Web-Site: www.leapsoft.com

Sheet 1 of 2
Job No:
Date: 6/5/2009
By:

Filename: C:\Export\PORTSMOUTH-MINFORD RD_TEMP - split deck.gmd

DECK ELEVATIONS ALONG OFFSETS (EQUAL SPACINGS)

SPAN ID: PR04-PR05 ROADWAY: SR823 BETWEEN PIERS : PR04 - PR05 SPACES = 4

OFFSET	DISTANCE	STATION	OFFSET	ELEVATION
1	98.6204			
		486+27.2649	-48.5000	692.7496
		486+51.7131	-48.5000	692.4372
		486+76.1612	-48.5000	692.1577
		487+00.6094	-48.5000	691.9110
		487+25.0575	-48.5000	691.6972
2	98.6229			
		486+26.7871	-47.0000	692.8160
		486+51.2422	-47.0000	692.5029
		486+75.6974	-47.0000	692.2227
		487+00.1525	-47.0000	691.9753
		487+24.6076	-47.0000	691.7609
3	98.6429			
		486+22.9554	-35.0000	693.3481
		486+47.4664	-35.0000	693.0291
		486+71.9774	-35.0000	692.7432
		486+96.4884	-35.0000	692.4903
		487+20.9993	-35.0000	692.2704
4	98.6833			
		486+15.2413	-11.0000	692.5913
		486+39.8649	-11.0000	692.2605
		486+64.4884	-11.0000	691.9630
		486+89.1120	-11.0000	691.6989
		487+13.7355	-11.0000	691.4681
5	98.6994			
		486+12.1691	-1.5000	692.2929
		486+36.8375	-1.5000	691.9574
		486+61.5059	-1.5000	691.6553
		486+86.1743	-1.5000	691.3867
		487+10.8427	-1.5000	691.1515
6	98.7019			
		486+11.6965	-0.0417	692.2472
		486+36.3718	-0.0417	691.9109
		486+61.0471	-0.0417	691.6081
		486+85.7224	-0.0417	691.3388
		487+10.3977	-0.0417	691.1030
7	98.7020			

Feet Datafile Modification Date: 06/05/2009 09;19

Phone:

Program: Leap Geomath® Ver: 8.0.0 (c) LEAP Software, Inc
Phone: 800-451-LEAP (5327) Web-Site: www.leapsoft.com

Sheet 2 of 2
Job No:
Date: 6/5/2009
By:

Filename: C:\Export\PORTSMOUTH-MINFORD RD_TEMP - split deck.gmd

OFFSET	DISTANCE	STATION	OFFSET	ELEVATION
		486+11.6830	0.0000	692.3918
		486+36.3585	0.0000	692.0555
		486+61.0340	0.0000	691.7527
		486+85.7095	0.0000	691.4834
		487+10.3850	0.0000	691.2476
8	98.7046			
		486+11.1967	1.5000	692.4588
		486+35.8793	1.5000	692.1218
		486+60.5619	1.5000	691.8182
		486+85.2445	1.5000	691.5482
		487+09.9271	1.5000	691.3116
9	98.7165			
		486+08.9235	8.5000	692.7715
		486+33.6393	8.5000	692.4310
		486+58.3551	8.5000	692.1240
		486+83.0709	8.5000	691.8506
		487+07.7867	8.5000	691.6108
10	98.7208			
		486+08.1103	11.0000	692.6933
		486+32.8379	11.0000	692.3515
		486+57.5656	11.0000	692.0433
		486+82.2933	11.0000	691.7687
		487+07.0210	11.0000	691.5278
11	98.7833			
		485+96.3158	47.0000	691.5722
		486+21.2159	47.0000	691.2120
		486+46.1159	47.0000	690.8858
		486+71.0160	47.0000	690.5938
		486+95.9161	47.0000	690.3358
12	98.7859			
		485+95.8209	48.5000	691.5257
		486+20.7282	48.5000	691.1647
		486+45.6356	48.5000	690.8378
		486+70.5429	48.5000	690.5450
		486+95.4502	48.5000	690.2863

***** End of Report *****

Feet Datafile Modification Date: 06/05/2009 09;19

Phone:
Program: Leap Geomath® Ver: 8.0.0 (c) LEAP Software, Inc
Phone: 800-451-LEAP (5327) Web-Site: www.leapsoft.com

Sheet 1 of 1
Job No:
Date: 6/5/2009
By:

Filename: C:\Export\PORTSMOUTH-MINFORD RD_TEMP - split deck.gmd

GIRDER VERTICAL GEOMETRY

SPAN ID: PR01-PR02 ROADWAY: SR823
MIN BUILD-UP,in: 2.0000 DECK THICK,in: 8.5000

GIRDER ID: S1G2 BRG CO-ORDS ELEVATION DAP HEIGHT
AZIMUTH, deg: N 301.844092 North East (ft) (ft)
WPT-WPT LEN,ft: 97.4167 Start: 311,118.0637 1,859,964.8303 693.1931 0.0000
PR-PR LEN,ft: 98.7080 End: 311,169.4616 1,859,882.0761 690.5522 0.0000

GIRDER TYPE:MODIFIED AASHTO TYPE 4 CAMBER,in : 4.5360 TOTAL DEFL,in: 3.0840
TOP WIDTH,in: 36.0000 BOT WIDTH,in: 26.0000 HEIGHT,in: 66.0000

DECK SLOPE ,ft/ft Start: -0.012165 End: -0.007119 Avg: -0.009642
GIRDER PITCH,ft/ft: -0.027109 ROLL,deg: 0.000000

CHECK POINT	DIST ALONG CENTERLINE WPT-WPT (ft)	FINAL DECK ELEVATION (ft)	SCREED ELEVATION (ft)	GIRDER TOP ELEVATION (ERECTED) (ft)	SCREED HT. ABOVE GIRDER (ft)
1	0.0000	699.8150	699.8150	698.6931	1.1220
2	24.3542	699.1009	699.2936	698.3163	0.9773
3	48.7083	698.4227	698.6797	697.7506	0.9291
4	73.0625	697.7804	697.9732	696.9959	0.9773
5	97.4167	697.1741	697.1741	696.0522	1.1220

BUILD-UP	THICKNESS,in	LOCATION,ft	SIDE
MINIMUM:	2.000	48.1487	R
MAXIMUM:	4.964	0.0000	M

CHECK POINT	DIST ALONG CENTERLINE END-END (ft)	BUILD-UP LEFT (in)	CL (in)	RIGHT (in)
1	0.0000	4.7813	5.0434	4.4533
2	24.7707	3.1080	3.2475	2.6280
3	49.5414	2.5344	2.6487	2.0000
4	74.3122	3.0610	3.2473	2.5695
5	99.0829	4.6878	5.0434	4.3369

***** End of Report *****

Feet Datafile Modification Date: 06/05/2009 09:19

Phone:
Program: Leap Geomath® Ver: 8.0.0 (c) LEAP Software, Inc
Phone: 800-451-LEAP (5327) Web-Site: www.leapsoft.com

Sheet 1 of 1
Job No:
Date: 6/5/2009
By:

Filename: C:\Export\PORTSMOUTH-MINFORD RD_TEMP - split deck.gmd

GIRDER VERTICAL GEOMETRY

SPAN ID: PR01-PR02 ROADWAY: SR823
MIN BUILD-UP,in: 2.0000 DECK THICK,in: 8.5000

GIRDER ID: S1G3 BRG CO-ORDS ELEVATION DAP HEIGHT
AZIMUTH, deg: N 301.844075 North East (ft) (ft)
WPT-WPT LEN,ft: 97.4167 Start: 311,124.9184 1,859,973.7002 692.9352 0.0000
PR-PR LEN,ft: 98.7080 End: 311,176.3163 1,859,890.9460 690.2664 0.0000

GIRDER TYPE:MODIFIED AASHTO TYPE 4 CAMBER,in : 4.5360 TOTAL DEFL,in: 3.0840
TOP WIDTH,in: 36.0000 BOT WIDTH,in: 26.0000 HEIGHT,in: 66.0000

DECK SLOPE ,ft/ft Start: -0.035791 End: -0.036247 Avg: -0.036019
GIRDER PITCH,ft/ft: -0.027396 ROLL,deg: 0.000000

CHECK POINT	DIST ALONG CENTERLINE WPT-WPT (ft)	FINAL DECK ELEVATION (ft)	SCREED ELEVATION (ft)	GIRDER TOP ELEVATION (ERECTED) (ft)	SCREED HT. ABOVE GIRDER (ft)
1	0.0000	699.5574	699.5574	698.4352	1.1222
2	24.3542	698.8361	699.0288	698.0515	0.9773
3	48.7083	698.1508	698.4078	697.4788	0.9290
4	73.0625	697.5017	697.6944	696.7171	0.9773
5	97.4167	696.8886	696.8886	695.7664	1.1222

BUILD-UP	THICKNESS,in	LOCATION,ft	SIDE
MINIMUM:	2.000	48.1487	R
MAXIMUM:	5.753	98.8094	L

CHECK POINT	DIST ALONG CENTERLINE END-END (ft)	BUILD-UP LEFT (in)	CL (in)	RIGHT (in)
1	0.0000	5.6364	5.0461	4.4564
2	24.7707	3.8678	3.2480	2.6288
3	49.5414	3.2975	2.6484	2.0000
4	74.3122	3.9259	3.2477	2.5702
5	99.0829	5.7531	5.0461	4.3398

***** End of Report *****

Feet Datafile Modification Date: 06/05/2009 09:19

Phone:

Program: Leap Geomath® Ver: 8.0.0 (c) LEAP Software, Inc | Sheet 1 of 1
Phone: 800-451-LEAP (5327) Web-Site: www.leapsoft.com | Job No: | Date: 6/5/2009 | By:

Filename: C:\Export\PORTSMOUTH-MINFORD RD_TEMP - split deck.gmd

GIRDER VERTICAL GEOMETRY

SPAN ID: PR01-PR02 ROADWAY: SR823
MIN BUILD-UP, in: 2.0000 DECK THICK, in: 8.5000

GIRDER ID: SIG4		BRG CO-ORDS North	BRG CO-ORDS East	ELEVATION (ft)	DAP HEIGHT (ft)
AZIMUTH, deg: N 301.844081					
WPT-WPT LEN, ft: 97.4167	Start:	311,131.7730	1,859,982.5701	692.6787	0.0000
PR-PR LEN, ft: 98.7080	End:	311,183.1710	1,859,899.8159	689.9818	0.0000

GIRDER TYPE: MODIFIED AASHTO TYPE 4 CAMBER, in : 4.5360 TOTAL DEFL, in: 3.0840
TOP WIDTH, in: 36.0000 BOT WIDTH, in: 26.0000 HEIGHT, in: 66.0000

DECK SLOPE , ft/ft Start: -0.035768 End: -0.036233 Avg: -0.036000
GIRDER PITCH, ft/ft: -0.027684 ROLL, deg: 0.000000

CHECK POINT	DIST ALONG CENTERLINE WPT-WPT (ft)	FINAL DECK ELEVATION (ft)	SCREED ELEVATION (ft)	GIRDER TOP ELEVATION (ERECTED) (ft)	SCREED HT. ABOVE GIRDER (ft)
1	0.0000	699.3011	699.3011	698.1787	1.1224
2	24.3542	698.5726	698.7654	697.7880	0.9774
3	48.7083	697.8803	698.1373	697.2083	0.9290
4	73.0625	697.2242	697.4169	696.4396	0.9773
5	97.4167	696.6042	696.6042	695.4818	1.1224

BUILD-UP	THICKNESS, in	LOCATION, ft	SIDE
MINIMUM:	2.000	48.1487	R
MAXIMUM:	5.756	98.8094	L

CHECK POINT	DIST ALONG CENTERLINE END-END (ft)	BUILD-UP LEFT (in)	BUILD-UP CL (in)	BUILD-UP RIGHT (in)
1	0.0000	5.6386	5.0487	4.4596
2	24.7707	3.8678	3.2484	2.6297
3	49.5414	3.2969	2.6481	2.0000
4	74.3122	3.9260	3.2481	2.5709
5	99.0829	5.7556	5.0488	4.3426

***** End of Report *****

Feet Datafile Modification Date: 06/05/2009 09:19

Phone:

Program: Leap Geomath® Ver: 8.0.0 (c) LEAP Software, Inc | Sheet 1 of 1
Phone: 800-451-LEAP (5327) Web-Site: www.leapsoft.com | Job No: | Date: 6/5/2009 | By:

Filename: C:\Export\PORTSMOUTH-MINFORD RD_TEMP - split deck.gmd

GIRDER VERTICAL GEOMETRY

SPAN ID: PR01-PR02 ROADWAY: SR823
MIN BUILD-UP, in: 2.0000 DECK THICK, in: 8.5000

GIRDER ID: SIG5		BRG CO-ORDS North	BRG CO-ORDS East	ELEVATION (ft)	DAP HEIGHT (ft)
AZIMUTH, deg: N 301.844086					
WPT-WPT LEN, ft: 97.4167	Start:	311,138.6277	1,859,991.4400	692.4087	0.0000
PR-PR LEN, ft: 98.7080	End:	311,190.0257	1,859,908.6858	689.6835	0.0000

GIRDER TYPE: MODIFIED AASHTO TYPE 4 CAMBER, in : 4.5360 TOTAL DEFL, in: 2.9040
TOP WIDTH, in: 36.0000 BOT WIDTH, in: 26.0000 HEIGHT, in: 66.0000

DECK SLOPE , ft/ft Start: -0.035744 End: -0.036218 Avg: -0.035981
GIRDER PITCH, ft/ft: -0.027974 ROLL, deg: 0.000000

CHECK POINT	DIST ALONG CENTERLINE WPT-WPT (ft)	FINAL DECK ELEVATION (ft)	SCREED ELEVATION (ft)	GIRDER TOP ELEVATION (ERECTED) (ft)	SCREED HT. ABOVE GIRDER (ft)
1	0.0000	699.0463	699.0463	697.9087	1.1376
2	24.3542	698.3105	698.4920	697.5109	0.9811
3	48.7083	697.6111	697.8531	696.9241	0.9290
4	73.0625	696.9479	697.1294	696.1483	0.9811
5	97.4167	696.3211	696.3211	695.1835	1.1376

BUILD-UP	THICKNESS, in	LOCATION, ft	SIDE
MINIMUM:	2.000	48.2487	R
MAXIMUM:	5.949	98.8094	L

CHECK POINT	DIST ALONG CENTERLINE END-END (ft)	BUILD-UP LEFT (in)	BUILD-UP CL (in)	BUILD-UP RIGHT (in)
1	0.0000	5.8228	5.2376	4.6532
2	24.7707	3.9123	3.2953	2.6792
3	49.5414	3.2962	2.6477	2.0000
4	74.3122	3.9748	3.2950	2.6160
5	99.0829	5.9485	5.2376	4.5275

***** End of Report *****

Feet Datafile Modification Date: 06/05/2009 09:19

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                                   Phone:                    | Sheet   1 of   1
. .                                                          | Job No:
Program: Leap Geomath®   Ver: 8.0.0    (c) LEAP Software, Inc | Date:    6/5/2009
Phone: 800-451-LEAP (5327)          Web-Site: www.leapsoft.com | By:
--------------------------------------------------------------------------------

Filename: C:\Export\PORTSMOUTH-MINFORD RD_TEMP - split deck.gmd


                          GIRDER VERTICAL GEOMETRY
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SPAN ID: PR01-PR02                  ROADWAY: SR823
MIN BUILD-UP,in: 2.0000        DECK THICK,in: 8.5000

GIRDER ID: S1G6                              BRG CO-ORDS        ELEVATION DAP HEIGHT
AZIMUTH, deg: N 301.844086             North          East        (ft)      (ft)
WPT-WPT LEN,ft: 97.4167 Start:   311,142.5855 1,859,996.5613   692.6483   0.0000
 PR-PR  LEN,ft: 98.7080   End:   311,193.9834 1,859,913.8071   689.9083   0.0000

GIRDER TYPE:MODIFIED AASHTO TYPE 4 CAMBER,in   :    4.5360 TOTAL DEFL,in:    2.9040
TOP WIDTH,in:            36.0000 BOT WIDTH,in:    26.0000 HEIGHT,in:          66.0000

DECK SLOPE  ,ft/ft Start:      0.040267 End:           0.039787 Avg:   0.040027
GIRDER PITCH,ft/ft:           -0.028127                     ROLL,deg:   0.000000


      DIST ALONG                          GIRDER TOP   SCREED
      CENTERLINE FINAL DECK    SCREED     ELEVATION   HT. ABOVE
CHECK  WPT-WPT   ELEVATION   ELEVATION   (ERECTED)    GIRDER
POINT   (ft)        (ft)        (ft)        (ft)        (ft)
-------------------------------------------------------------

1        0.0000   699.2763   699.2763   698.1483     1.1280
2       24.3542   698.5486   698.7301   697.7468     0.9832
3       48.7083   697.8493   698.0913   697.1563     0.9350
4       73.0625   697.1785   697.3600   696.3768     0.9832
5       97.4167   696.5363   696.5363   695.4083     1.1280

BUILD-UP           THICKNESS,in  LOCATION,ft   SIDE
 MINIMUM:                2.000      49.2679      L
 MAXIMUM:                5.895      -1.3927      R


      DIST ALONG    ---------- BUILD-UP----------
      CENTERLINE
CHECK  END-END      LEFT        CL         RIGHT
POINT   (ft)        (in)        (in)        (in)
-------------------------------------------------

1        0.0000     4.3373     5.1160     5.8953
2       24.7707     2.5699     3.3190     4.0688
3       49.5414     2.0000     2.7198     3.4402
4       74.3122     2.6281     3.3187     4.0100
5       99.0829     4.4544     5.1160     5.7783

                     ***** End of Report *****


Feet                        Datafile Modification Date:    06/05/2009  09:19
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                                   Phone:                    | Sheet   1 of   1
. .                                                          | Job No:
Program: Leap Geomath®   Ver: 8.0.0    (c) LEAP Software, Inc | Date:    6/5/2009
Phone: 800-451-LEAP (5327)          Web-Site: www.leapsoft.com | By:
--------------------------------------------------------------------------------

Filename: C:\Export\PORTSMOUTH-MINFORD RD_TEMP - split deck.gmd


                          GIRDER VERTICAL GEOMETRY
                          ------------------------

SPAN ID: PR01-PR02                  ROADWAY: SR823
MIN BUILD-UP,in: 2.0000        DECK THICK,in: 8.5000

GIRDER ID: S1G8                              BRG CO-ORDS        ELEVATION DAP HEIGHT
AZIMUTH, deg: N 301.844097             North          East        (ft)      (ft)
WPT-WPT LEN,ft: 97.4167 Start:   311,156.2948 1,860,014.3011   692.5649   0.0000
 PR-PR  LEN,ft: 98.7080   End:   311,207.6928 1,859,931.5469   689.7661   0.0000

GIRDER TYPE:MODIFIED AASHTO TYPE 4 CAMBER,in   :    4.5360 TOTAL DEFL,in:    3.0840
TOP WIDTH,in:            36.0000 BOT WIDTH,in:    26.0000 HEIGHT,in:          66.0000

DECK SLOPE  ,ft/ft Start:     -0.035681 End:          -0.036180 Avg:  -0.035930
GIRDER PITCH,ft/ft:           -0.028730                     ROLL,deg:   0.000000


      DIST ALONG                          GIRDER TOP   SCREED
      CENTERLINE FINAL DECK    SCREED     ELEVATION   HT. ABOVE
CHECK  WPT-WPT   ELEVATION   ELEVATION   (ERECTED)    GIRDER
POINT   (ft)        (ft)        (ft)        (ft)        (ft)
-------------------------------------------------------------

1        0.0000   699.1881   699.1881   698.0649     1.1232
2       24.3542   698.4334   698.6262   697.6487     0.9775
3       48.7083   697.7154   697.9724   697.0435     0.9289
4       73.0625   697.0340   697.2268   696.2493     0.9775
5       97.4167   696.3893   696.3893   695.2661     1.1232

BUILD-UP           THICKNESS,in  LOCATION,ft   SIDE
 MINIMUM:                2.000      48.1487      R
 MAXIMUM:                5.765      98.8094      L


      DIST ALONG    ---------- BUILD-UP----------
      CENTERLINE
CHECK  END-END      LEFT        CL         RIGHT
POINT   (ft)        (in)        (in)        (in)
-------------------------------------------------

1        0.0000     5.6464     5.0584     4.4711
2       24.7707     3.8678     3.2499     2.6327
3       49.5414     3.2944     2.6468     2.0000
4       74.3122     3.9265     3.2456     2.5733
5       99.0829     5.7645     5.0584     4.3530

                     ***** End of Report *****


Feet                        Datafile Modification Date:    06/05/2009  09:19
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Phone:

| Sheet 1 of 1
| Job No:
| Date: 6/5/2009
| By:

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Filename: C:\Export\PORTSMOUTH-MINFORD RD_TEMP - split deck.gmd

GIRDER VERTICAL GEOMETRY

SPAN ID: PR01-PR02 ROADWAY: SR823
MIN BUILD-UP,in: 2.0000 DECK THICK,in: 8.5000

GIRDER ID: S1G9		BRG CO-ORDS North	BRG CO-ORDS East	ELEVATION (ft)	DAP HEIGHT (ft)
AZIMUTH, deg: N 301.844103					
WPT-WPT LEN,ft: 97.4166	Start:	311,163.1495	1,860,023.1710	692.3150	0.0000
PR-PR LEN,ft: 98.7080	End:	311,214.5475	1,859,940.4168	689.4873	0.0000

GIRDER TYPE:MODIFIED AASHTO TYPE 4 CAMBER,in : 4.5360 TOTAL DEFL,in: 3.0840
TOP WIDTH,in: 36.0000 BOT WIDTH,in: 26.0000 HEIGHT,in: 66.0000

DECK SLOPE ,ft/ft Start: -0.035655 End: -0.036164 Avg: -0.035910
GIRDER PITCH,ft/ft: -0.029027 ROLL,deg: 0.000000

CHECK POINT	DIST ALONG CENTERLINE WPT-WPT (ft)	FINAL DECK ELEVATION (ft)	SCREED ELEVATION (ft)	GIRDER TOP ELEVATION (ERECTED) (ft)	SCREED HT. ABOVE GIRDER (ft)
1	0.0000	698.9384	698.9384	697.8150	1.1234
2	24.3542	698.1764	698.3691	697.3916	0.9775
3	48.7083	697.4511	697.7081	696.7792	0.9289
4	73.0625	696.7625	696.9552	695.9778	0.9775
5	97.4166	696.1107	696.1107	694.9873	1.1234

BUILD-UP	THICKNESS,in	LOCATION,ft	SIDE
MINIMUM:	2.000	48.1487	R
MAXIMUM:	5.767	98.8094	L

CHECK POINT	DIST ALONG CENTERLINE END-END (ft)	BUILD-UP LEFT (in)	BUILD-UP CL (in)	BUILD-UP RIGHT (in)
1	0.0000	5.6486	5.0611	4.4743
2	24.7707	3.8677	3.2503	2.6336
3	49.5414	3.2936	2.6464	2.0000
4	74.3122	3.9266	3.2500	2.5740
5	99.0829	5.7670	5.0611	4.3559

***** End of Report *****

Feet Datafile Modification Date: 06/05/2009 09:19

Phone:

| Sheet 1 of 1
| Job No:
| Date: 6/5/2009
| By:

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GIRDER VERTICAL GEOMETRY

SPAN ID: PR01-PR02 ROADWAY: SR823
MIN BUILD-UP,in: 2.0000 DECK THICK,in: 8.5000

GIRDER ID: S1G10		BRG CO-ORDS North	BRG CO-ORDS East	ELEVATION (ft)	DAP HEIGHT (ft)
AZIMUTH, deg: N 301.844108					
WPT-WPT LEN,ft: 97.4166	Start:	311,170.0042	1,860,032.0409	692.0516	0.0000
PR-PR LEN,ft: 98.7080	End:	311,221.4022	1,859,949.2867	689.1948	0.0000

GIRDER TYPE:MODIFIED AASHTO TYPE 4 CAMBER,in : 4.5360 TOTAL DEFL,in: 2.9040
TOP WIDTH,in: 36.0000 BOT WIDTH,in: 26.0000 HEIGHT,in: 66.0000

DECK SLOPE ,ft/ft Start: -0.035629 End: -0.036148 Avg: -0.035889
GIRDER PITCH,ft/ft: -0.029326 ROLL,deg: 0.000000

CHECK POINT	DIST ALONG CENTERLINE WPT-WPT (ft)	FINAL DECK ELEVATION (ft)	SCREED ELEVATION (ft)	GIRDER TOP ELEVATION (ERECTED) (ft)	SCREED HT. ABOVE GIRDER (ft)
1	0.0000	698.6902	698.6902	697.5516	1.1386
2	24.3542	697.9207	698.1022	697.1209	0.9813
3	48.7083	697.1881	697.4301	696.5012	0.9288
4	73.0625	696.4923	696.6738	695.6925	0.9813
5	97.4166	695.8334	695.8334	694.6948	1.1386

BUILD-UP	THICKNESS,in	LOCATION,ft	SIDE
MINIMUM:	2.000	48.1487	R
MAXIMUM:	5.960	98.8094	L

CHECK POINT	DIST ALONG CENTERLINE END-END (ft)	BUILD-UP LEFT (in)	BUILD-UP CL (in)	BUILD-UP RIGHT (in)
1	0.0000	5.8328	5.2500	4.6680
2	24.7707	3.9121	3.2972	2.6831
3	49.5414	3.2929	2.6460	2.0000
4	74.3121	3.9754	3.2969	2.6191
5	99.0829	5.9599	5.2500	4.5408

***** End of Report *****

Feet Datafile Modification Date: 06/05/2009 09:19

Phone:
Sheet 1 of 1
Job No:
Program: Leap Geomath® Ver: 8.0.0 (c) LEAP Software, Inc Date: 6/5/2009
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Filename: C:\Export\PORTSMOUTH-MINFORD RD_TEMP - split deck.gmd

GIRDER VERTICAL GEOMETRY

SPAN ID: PR01-PR02 ROADWAY: SR823
MIN BUILD-UP,in: 2.0000 DECK THICK,in: 8.5000

GIRDER ID: S1G7		BRG CO-ORDS North	BRG CO-ORDS East	ELEVATION (ft)	DAP HEIGHT (ft)
AZIMUTH, deg: N 301.844092					
WPT-WPT LEN,ft: 97.4167	Start:	311,149.4402	1,860,005.4312	692.8163	0.0000
PR-PR LEN,ft: 98.7080	End:	311,200.8381	1,859,922.6770	690.0462	0.0000

GIRDER TYPE:MODIFIED AASHTO TYPE 4 CAMBER,in : 4.5360 TOTAL DEFL,in: 3.0840
TOP WIDTH,in: 36.0000 BOT WIDTH,in: 26.0000 HEIGHT,in: 66.0000

DECK SLOPE ,ft/ft Start: -0.035706 End: -0.036195 Avg: -0.035950
GIRDER PITCH,ft/ft: -0.028435 ROLL,deg: 0.000000

CHECK POINT	DIST ALONG CENTERLINE WPT-WPT (ft)	FINAL DECK ELEVATION (ft)	SCREED ELEVATION (ft)	GIRDER TOP ELEVATION (ERECTED) (ft)	SCREED HT. ABOVE GIRDER (ft)
1	0.0000	699.4392	699.4392	698.3163	1.1229
2	24.3542	698.6919	698.8847	697.9072	0.9774
3	48.7083	697.9811	698.2381	697.3092	0.9289
4	73.0625	697.3069	697.4996	696.5222	0.9774
5	97.4167	696.6691	696.6691	695.5462	1.1229

BUILD-UP	THICKNESS,in	LOCATION,ft	SIDE
MINIMUM:	2.000	48.1487	R
MAXIMUM:	5.762	98.8094	L

CHECK POINT	DIST ALONG CENTERLINE END-END (ft)	BUILD-UP LEFT (in)	BUILD-UP CL (in)	BUILD-UP RIGHT (in)
1	0.0000	5.6443	5.0557	4.4678
2	24.7707	3.8678	3.2495	2.6319
3	49.5414	3.2951	2.6472	2.0000
4	74.3122	3.9264	3.2493	2.5726
5	99.0829	5.7620	5.0557	4.3501

***** End of Report *****

Feet Datafile Modification Date: 06/05/2009 09:19

Phone:
Sheet 1 of 1
Job No:
Program: Leap Geomath® Ver: 8.0.0 (c) LEAP Software, Inc Date: 6/5/2009
Phone: 800-451-LEAP (5327) Web-Site: www.leapsoft.com By:

Filename: C:\Export\PORTSMOUTH-MINFORD RD_TEMP - split deck.gmd

GIRDER VERTICAL GEOMETRY

SPAN ID: PR02-PR03 ROADWAY: SR823
MIN BUILD-UP,in: 2.0000 DECK THICK,in: 8.5000

GIRDER ID: S2G1		BRG CO-ORDS North	BRG CO-ORDS East	ELEVATION (ft)	DAP HEIGHT (ft)
AZIMUTH, deg: N 302.844616					
WPT-WPT LEN,ft: 97.4154	Start:	311,164.1736	1,859,871.2637	690.0012	0.0000
PR-PR LEN,ft: 99.9981	End:	311,217.0081	1,859,789.4206	687.8941	0.0000

GIRDER TYPE:MODIFIED AASHTO TYPE 4 CAMBER,in : 4.5360 TOTAL DEFL,in: 2.7960
TOP WIDTH,in: 36.0000 BOT WIDTH,in: 26.0000 HEIGHT,in: 66.0000

DECK SLOPE ,ft/ft Start: 0.040137 End: 0.039787 Avg: 0.039962
GIRDER PITCH,ft/ft: -0.021629 ROLL,deg: 0.000000

CHECK POINT	DIST ALONG CENTERLINE WPT-WPT (ft)	FINAL DECK ELEVATION (ft)	SCREED ELEVATION (ft)	GIRDER TOP ELEVATION (ERECTED) (ft)	SCREED HT. ABOVE GIRDER (ft)
1	0.0000	696.6371	696.6371	695.5012	1.1359
2	24.3538	696.0683	696.2430	695.2579	0.9852
3	48.7077	695.5275	695.7605	694.8256	0.9349
4	73.0615	695.0148	695.1895	694.2044	0.9851
5	97.4154	694.5300	694.5300	693.3941	1.1359

BUILD-UP	THICKNESS,in	LOCATION,ft	SIDE
MINIMUM:	2.000	49.2377	L
MAXIMUM:	5.991	-1.3631	R

CHECK POINT	DIST ALONG CENTERLINE END-END (ft)	BUILD-UP LEFT (in)	BUILD-UP CL (in)	BUILD-UP RIGHT (in)
1	0.0000	4.4387	5.2143	5.9905
2	24.7704	2.5956	3.3426	4.0903
3	49.5408	2.0000	2.7186	3.4379
4	74.3113	2.6520	3.3424	4.0335
5	99.0817	4.5519	5.2143	5.8773

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Feet Datafile Modification Date: 06/05/2009 09:19

Phone:
Program: Leap Geomath® Ver: 8.0.0 (c) LEAP Software, Inc
Phone: 800-451-LEAP (5327) Web-Site: www.leapsoft.com
Sheet 1 of 1
Job No:
Date: 6/5/2009
By:

Filename: C:\Export\PORTSMOUTH-MINFORD RD_TEMP - split deck.gmd

GIRDER VERTICAL GEOMETRY

SPAN ID: PR02-PR03 ROADWAY: SR823
MIN BUILD-UP,in: 2.0000 DECK THICK,in: 8.5000

GIRDER ID: S202		BRG CO-ORDS North	BRG CO-ORDS East	ELEVATION (ft)	DAP HEIGHT (ft)
AZIMUTH, deg: N 302.844616					
WPT-WPT LEN,ft: 97.4154	Start:	311,170.9849	1,859,880.0774	690.4743	0.0000
PR-PR LEN,ft: 99.9981	End:	311,223.8193	1,859,798.2344	688.3620	0.0000

GIRDER TYPE:MODIFIED AASHTO TYPE 4 CAMBER,in : 4.5360 TOTAL DEFL,in: 2.9760
TOP WIDTH,in: 36.0000 BOT WIDTH,in: 26.0000 HEIGHT,in: 66.0000

DECK SLOPE ,ft/ft Start: -0.012077 End: -0.007255 Avg: -0.009666
GIRDER PITCH,ft/ft: -0.021684 ROLL,deg: 0.000000

CHECK POINT	DIST ALONG CENTERLINE WPT-WPT (ft)	FINAL DECK ELEVATION (ft)	SCREED ELEVATION (ft)	GIRDER TOP ELEVATION (ERECTED) (ft)	SCREED HT. ABOVE GIRDER (ft)
1	0.0000	697.1052	697.1052	695.9743	1.1309
2	24.3538	696.5232	696.7092	695.7297	0.9795
3	48.7077	695.9772	696.2252	695.2961	0.9290
4	73.0615	695.4670	695.6530	694.6735	0.9795
5	97.4154	694.9929	694.9929	693.8620	1.1309

BUILD-UP	THICKNESS,in	LOCATION,ft	SIDE
MINIMUM:	2.000	48.1778	R
MAXIMUM:	5.071	97.4154	M

CHECK POINT	DIST ALONG CENTERLINE END-END (ft)	BUILD-UP LEFT (in)	BUILD-UP CL (in)	BUILD-UP RIGHT (in)
1	0.0000	4.8892	5.1548	4.5636
2	24.7704	3.1345	3.2752	2.6552
3	49.5408	2.5354	2.6445	2.0000
4	74.3113	3.0922	3.2750	2.5981
5	99.0817	4.8051	5.1548	4.4498

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Feet Datafile Modification Date: 06/05/2009 09:19

Phone:
Program: Leap Geomath® Ver: 8.0.0 (c) LEAP Software, Inc
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Sheet 1 of 1
Job No:
Date: 6/5/2009
By:

Filename: C:\Export\PORTSMOUTH-MINFORD RD_TEMP - split deck.gmd

GIRDER VERTICAL GEOMETRY

SPAN ID: PR02-PR03 ROADWAY: SR823
MIN BUILD-UP,in: 2.0000 DECK THICK,in: 8.5000

GIRDER ID: S203		BRG CO-ORDS North	BRG CO-ORDS East	ELEVATION (ft)	DAP HEIGHT (ft)
AZIMUTH, deg: N 302.844616					
WPT-WPT LEN,ft: 97.4154	Start:	311,177.7961	1,859,888.6911	690.1896	0.0000
PR-PR LEN,ft: 99.9981	End:	311,230.6306	1,859,807.0481	688.0516	0.0000

GIRDER TYPE:MODIFIED AASHTO TYPE 4 CAMBER,in : 4.5360 TOTAL DEFL,in: 2.9760
TOP WIDTH,in: 36.0000 BOT WIDTH,in: 26.0000 HEIGHT,in: 66.0000

DECK SLOPE ,ft/ft Start: -0.035826 End: -0.036190 Avg: -0.036008
GIRDER PITCH,ft/ft: -0.021948 ROLL,deg: 0.000000

CHECK POINT	DIST ALONG CENTERLINE WPT-WPT (ft)	FINAL DECK ELEVATION (ft)	SCREED ELEVATION (ft)	GIRDER TOP ELEVATION (ERECTED) (ft)	SCREED HT. ABOVE GIRDER (ft)
1	0.0000	696.8208	696.8208	695.6896	1.1312
2	24.3538	696.2322	696.4182	695.4386	0.9796
3	48.7077	695.6796	695.9276	694.9986	0.9290
4	73.0615	695.1631	695.3491	694.3696	0.9795
5	97.4154	694.6827	694.6827	693.5516	1.1312

BUILD-UP	THICKNESS,in	LOCATION,ft	SIDE
MINIMUM:	2.000	48.1778	R
MAXIMUM:	5.863	98.7785	L

CHECK POINT	DIST ALONG CENTERLINE END-END (ft)	BUILD-UP LEFT (in)	BUILD-UP CL (in)	BUILD-UP RIGHT (in)
1	0.0000	5.7490	5.1575	4.5668
2	24.7704	3.8960	3.2757	2.6561
3	49.5408	3.2971	2.6483	2.0000
4	74.3113	3.9528	3.2755	2.5988
5	99.0817	5.8630	5.1576	4.4527

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Feet Datafile Modification Date: 06/05/2009 09:19

Phone:

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Sheet 1 of 1
Job No:
Date: 6/5/2009
By:

Filename: C:\Export\PORTSMOUTH-MINFORD RD_TEMP - split deck.gmd

GIRDER VERTICAL GEOMETRY

SPAN ID: PR02-PR03 ROADWAY: SR823
MIN BUILD-UP,in: 2.0000 DECK THICK,in: 8.5000

GIRDER ID: S2G4		BRG CO-ORDS North	East	ELEVATION (ft)	DAP HEIGHT (ft)
AZIMUTH, deg: N 302.844616					
WPT-WPT LEN,ft: 97.4154	Start:	311,184.6074	1,859,897.7049	689.9062	0.0000
PR-PR LEN,ft: 99.9981	End:	311,237.4419	1,859,815.8618	687.7422	0.0000

GIRDER TYPE:MODIFIED AASHTO TYPE 4 CAMBER,in : 4.5360 TOTAL DEFL,in: 2.9760
TOP WIDTH,in: 36.0000 BOT WIDTH,in: 26.0000 HEIGHT,in: 66.0000

DECK SLOPE ,ft/ft Start: -0.035808 End: -0.036180 Avg: -0.035994
GIRDER PITCH,ft/ft: -0.022213 ROLL,deg: 0.000000

CHECK POINT	DIST ALONG CENTERLINE WPT-WPT (ft)	FINAL DECK ELEVATION (ft)	SCREED ELEVATION (ft)	GIRDER TOP ELEVATION (ERECTED) (ft)	SCREED HT. ABOVE GIRDER (ft)
1	0.0000	696.5375	696.5375	695.4062	1.1314
2	24.3538	695.9423	696.1283	695.1487	0.9796
3	48.7077	695.3832	695.6312	694.7022	0.9290
4	73.0615	694.8603	695.0463	694.0667	0.9796
5	97.4154	694.3736	694.3736	693.2422	1.1314

BUILD-UP	THICKNESS,in	LOCATION,ft	SIDE
MINIMUM:	2.000	48.1778	R
MAXIMUM:	5.866	98.7785	L

CHECK POINT	DIST ALONG CENTERLINE END-END (ft)	BUILD-UP LEFT (in)	CL (in)	RIGHT (in)
1	0.0000	5.7514	5.1603	4.5699
2	24.7704	3.8962	3.2762	2.6569
3	49.5408	3.2966	2.6480	2.0000
4	74.3113	3.9531	3.2760	2.5995
5	99.0817	5.8657	5.1604	4.4556

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Feet Datafile Modification Date: 06/05/2009 09:19

Phone:

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Sheet 1 of 1
Job No:
Date: 6/5/2009
By:

Filename: C:\Export\PORTSMOUTH-MINFORD RD_TEMP - split deck.gmd

GIRDER VERTICAL GEOMETRY

SPAN ID: PR02-PR03 ROADWAY: SR823
MIN BUILD-UP,in: 2.0000 DECK THICK,in: 8.5000

GIRDER ID: S2G5		BRG CO-ORDS North	East	ELEVATION (ft)	DAP HEIGHT (ft)
AZIMUTH, deg: N 302.844616					
WPT-WPT LEN,ft: 97.4154	Start:	311,191.4187	1,859,906.5186	689.6089	0.0000
PR-PR LEN,ft: 99.9981	End:	311,244.2532	1,859,824.6756	687.4189	0.0000

GIRDER TYPE:MODIFIED AASHTO TYPE 4 CAMBER,in : 4.5360 TOTAL DEFL,in: 2.7960
TOP WIDTH,in: 36.0000 BOT WIDTH,in: 26.0000 HEIGHT,in: 66.0000

DECK SLOPE ,ft/ft Start: -0.035789 End: -0.036170 Avg: -0.035980
GIRDER PITCH,ft/ft: -0.022481 ROLL,deg: 0.000000

CHECK POINT	DIST ALONG CENTERLINE WPT-WPT (ft)	FINAL DECK ELEVATION (ft)	SCREED ELEVATION (ft)	GIRDER TOP ELEVATION (ERECTED) (ft)	SCREED HT. ABOVE GIRDER (ft)
1	0.0000	696.2555	696.2555	695.1089	1.1466
2	24.3538	695.6536	695.8283	694.8449	0.9834
3	48.7077	695.0879	695.3209	694.3919	0.9290
4	73.0615	694.5585	694.7333	693.7499	0.9834
5	97.4154	694.0655	694.0655	692.9189	1.1466

BUILD-UP	THICKNESS,in	LOCATION,ft	SIDE
MINIMUM:	2.000	48.1778	R
MAXIMUM:	6.059	98.7785	L

CHECK POINT	DIST ALONG CENTERLINE END-END (ft)	BUILD-UP LEFT (in)	CL (in)	RIGHT (in)
1	0.0000	5.9360	5.3493	4.7633
2	24.7704	3.9409	3.3232	2.7063
3	49.5408	3.2961	2.6477	2.0000
4	74.3113	4.0020	3.3230	2.6448
5	99.0817	6.0586	5.3493	4.6408

***** End of Report *****

Feet Datafile Modification Date: 06/05/2009 09:19

Phone:

Program: Leap Geomath® Ver: 8.0.0 (c) LEAP Software, Inc
Phone: 800-451-LEAP (5327) Web-Site: www.leapsoft.com

Sheet 1 of 1
Job No:
Date: 6/5/2009
By:

Filename: C:\Export\PORTSMOUTH-MINFORD RD_TEMP - split deck.gmd

GIRDER VERTICAL GEOMETRY

SPAN ID: PR02-PR03 ROADWAY: SR823
MIN BUILD-UP,in: 2.0000 DECK THICK,in: 8.5000

GIRDER ID: S2G6		BRG CO-ORDS North	BRG CO-ORDS East	ELEVATION (ft)	DAP HEIGHT (ft)
AZIMUTH, deg: N 302.844616					
WPT-WPT LEN,ft: 97.4154	Start:	311,195.3514	1,859,911.6075	689.8327	0.0000
PR-PR LEN,ft: 99.9981	End:	311,248.1859	1,859,829.7644	687.6292	0.0000

GIRDER TYPE:MODIFIED AASHTO TYPE 4 CAMBER,in : 4.5360 TOTAL DEFL,in: 2.7960
TOP WIDTH,in: 36.0000 BOT WIDTH,in: 26.0000 HEIGHT,in: 66.0000

DECK SLOPE ,ft/ft Start: 0.040219 End: 0.039833 Avg: 0.040026
GIRDER PITCH,ft/ft: -0.022620 ROLL,deg: 0.000000

CHECK POINT	DIST ALONG CENTERLINE WPT-WPT (ft)	FINAL DECK ELEVATION (ft)	SCREED ELEVATION (ft)	GIRDER TOP ELEVATION (ERECTED) (ft)	SCREED HT. ABOVE GIRDER (ft)
1	0.0000	696.4697	696.4697	695.3327	1.1370
2	24.3538	695.8761	696.0508	695.0653	0.9855
3	48.7077	695.3109	695.5439	694.6089	0.9350
4	73.0615	694.7743	694.9490	693.9635	0.9855
5	97.4154	694.2662	694.2662	693.1292	1.1370

BUILD-UP	THICKNESS,in	LOCATION,ft	SIDE
MINIMUM:	2.000	49.2377	L
MAXIMUM:	6.006	-1.3631	R

CHECK POINT	DIST ALONG CENTERLINE END-END (ft)	BUILD-UP LEFT (in)	BUILD-UP CL (in)	BUILD-UP RIGHT (in)
1	0.0000	4.4504	5.2277	6.0057
2	24.7704	2.5984	3.3469	4.0960
3	49.5408	2.0000	2.7198	3.4402
4	74.3113	2.6554	3.3466	4.0385
5	99.0817	4.5648	5.2277	5.8913

***** End of Report *****

Feet Datafile Modification Date: 06/05/2009 09:19

Phone:

Program: Leap Geomath® Ver: 8.0.0 (c) LEAP Software, Inc
Phone: 800-451-LEAP (5327) Web-Site: www.leapsoft.com

Sheet 1 of 1
Job No:
Date: 6/5/2009
By:

Filename: C:\Export\PORTSMOUTH-MINFORD RD_TEMP - split deck.gmd

GIRDER VERTICAL GEOMETRY

SPAN ID: PR02-PR03 ROADWAY: SR823
MIN BUILD-UP,in: 2.0000 DECK THICK,in: 8.5000

GIRDER ID: S2G7		BRG CO-ORDS North	BRG CO-ORDS East	ELEVATION (ft)	DAP HEIGHT (ft)
AZIMUTH, deg: N 302.844616					
WPT-WPT LEN,ft: 97.4154	Start:	311,202.1627	1,859,920.4212	689.9732	0.0000
PR-PR LEN,ft: 99.9981	End:	311,254.9971	1,859,838.5782	687.7418	0.0000

GIRDER TYPE:MODIFIED AASHTO TYPE 4 CAMBER,in : 4.5360 TOTAL DEFL,in: 2.9760
TOP WIDTH,in: 36.0000 BOT WIDTH,in: 26.0000 HEIGHT,in: 66.0000

DECK SLOPE ,ft/ft Start: -0.035759 End: -0.036154 Avg: -0.035956
GIRDER PITCH,ft/ft: -0.022906 ROLL,deg: 0.000000

CHECK POINT	DIST ALONG CENTERLINE WPT-WPT (ft)	FINAL DECK ELEVATION (ft)	SCREED ELEVATION (ft)	GIRDER TOP ELEVATION (ERECTED) (ft)	SCREED HT. ABOVE GIRDER (ft)
1	0.0000	696.6052	696.6052	695.4732	1.1320
2	24.3538	695.9926	696.1786	695.1989	0.9797
3	48.7077	695.4164	695.6644	694.7355	0.9289
4	73.0615	694.8768	695.0628	694.0831	0.9797
5	97.4154	694.3738	694.3738	693.2418	1.1320

BUILD-UP	THICKNESS,in	LOCATION,ft	SIDE
MINIMUM:	2.000	48.1778	R
MAXIMUM:	5.873	98.7785	L

CHECK POINT	DIST ALONG CENTERLINE END-END (ft)	BUILD-UP LEFT (in)	BUILD-UP CL (in)	BUILD-UP RIGHT (in)
1	0.0000	5.7576	5.1675	4.5782
2	24.7704	3.8966	3.2775	2.6591
3	49.5408	3.2953	2.6473	2.0000
4	74.3113	3.9539	3.2773	2.6013
5	99.0817	5.8726	5.1676	4.4632

***** End of Report *****

Feet Datafile Modification Date: 06/05/2009 09:19

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                         Phone:                    | Sheet   1 of   1
. .                                                | Job No:
Program: Leap Geomath®   Ver: 8.0.0   (c) LEAP Software, Inc | Date:   6/5/2009
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Filename: C:\Export\PORTSMOUTH-MINFORD RD_TEMP - split deck.gmd


                      GIRDER VERTICAL GEOMETRY
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SPAN ID: PR02-PR03                 ROADWAY: SR823
MIN BUILD-UP,in: 2.0000        DECK THICK,in: 8.5000

GIRDER ID: S2G8                        BRG CO-ORDS        ELEVATION DAP HEIGHT
AZIMUTH, deg: N 302.844616        North          East       (ft)      (ft)
WPT-WPT LEN,ft: 97.4154 Start:  311,208.9739 1,859,929.2349  689.6942   0.0000
 PR-PR  LEN,ft: 99.9981   End:  311,261.8084 1,859,847.3919  687.4363   0.0000

GIRDER TYPE:MODIFIED AASHTO TYPE 4 CAMBER,in  :    4.5360 TOTAL DEFL,in:    2.9760
TOP WIDTH,in:          36.0000 BOT WIDTH,in:   26.0000 HEIGHT,in:         66.0000

DECK SLOPE  ,ft/ft Start:     -0.035739 End:          -0.036143 Avg:  -0.035941
GIRDER PITCH,ft/ft:           -0.023178                  ROLL,deg:   0.000000
```

CHECK POINT	DIST ALONG CENTERLINE WPT-WPT (ft)	FINAL DECK ELEVATION (ft)	SCREED ELEVATION (ft)	GIRDER TOP ELEVATION (ERECTED) (ft)	SCREED HT. ABOVE GIRDER (ft)
1	0.0000	696.3263	696.3263	695.1942	1.1322
2	24.3538	695.7069	695.8929	694.9132	0.9797
3	48.7077	695.1241	695.3721	694.4432	0.9289
4	73.0615	694.5780	694.7640	693.7842	0.9797
5	97.4154	694.0684	694.0684	692.9363	1.1322

BUILD-UP	THICKNESS,in	LOCATION,ft	SIDE
MINIMUM:	2.000	48.1778	R
MAXIMUM:	5.875	98.7785	L

CHECK POINT	DIST ALONG CENTERLINE END-END (ft)	BUILD-UP LEFT (in)	BUILD-UP CL (in)	BUILD-UP RIGHT (in)
1	0.0000	5.7599	5.1704	4.5815
2	24.7704	3.8968	3.2780	2.6599
3	49.5408	3.2947	2.6470	2.0000
4	74.3113	3.9542	3.2778	2.6020
5	99.0817	5.8753	5.1704	4.4661

***** End of Report *****

Feet   Datafile Modification Date: 06/05/2009   09:19


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                         Phone:                    | Sheet   1 of   1
. .                                                | Job No:
Program: Leap Geomath®   Ver: 8.0.0   (c) LEAP Software, Inc | Date:   6/5/2009
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Filename: C:\Export\PORTSMOUTH-MINFORD RD_TEMP - split deck.gmd


                      GIRDER VERTICAL GEOMETRY
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SPAN ID: PR02-PR03                 ROADWAY: SR823
MIN BUILD-UP,in: 2.0000        DECK THICK,in: 8.5000

GIRDER ID: S2G9                        BRG CO-ORDS        ELEVATION DAP HEIGHT
AZIMUTH, deg: N 302.844616        North          East       (ft)      (ft)
WPT-WPT LEN,ft: 97.4154 Start:  311,215.7852 1,859,938.0487  689.4164   0.0000
 PR-PR  LEN,ft: 99.9981   End:  311,268.6197 1,859,856.2056  687.1318   0.0000

GIRDER TYPE:MODIFIED AASHTO TYPE 4 CAMBER,in  :    4.5360 TOTAL DEFL,in:    2.9760
TOP WIDTH,in:          36.0000 BOT WIDTH,in:   26.0000 HEIGHT,in:         66.0000

DECK SLOPE  ,ft/ft Start:     -0.035718 End:          -0.036131 Avg:  -0.035925
GIRDER PITCH,ft/ft:           -0.023452                  ROLL,deg:   0.000000
```

CHECK POINT	DIST ALONG CENTERLINE WPT-WPT (ft)	FINAL DECK ELEVATION (ft)	SCREED ELEVATION (ft)	GIRDER TOP ELEVATION (ERECTED) (ft)	SCREED HT. ABOVE GIRDER (ft)
1	0.0000	696.0488	696.0488	694.9164	1.1324
2	24.3538	695.4225	695.6085	694.6287	0.9798
3	48.7077	694.8330	695.0810	694.1521	0.9289
4	73.0615	694.2802	694.4662	693.4865	0.9798
5	97.4154	693.7642	693.7642	692.6318	1.1324

BUILD-UP	THICKNESS,in	LOCATION,ft	SIDE
MINIMUM:	2.000	48.1778	R
MAXIMUM:	5.878	98.7785	L

CHECK POINT	DIST ALONG CENTERLINE END-END (ft)	BUILD-UP LEFT (in)	BUILD-UP CL (in)	BUILD-UP RIGHT (in)
1	0.0000	5.7623	5.1732	4.5847
2	24.7704	3.8969	3.2785	2.6608
3	49.5408	3.2942	2.6468	2.0000
4	74.3113	3.9545	3.2782	2.6027
5	99.0817	5.8780	5.1732	4.4691

***** End of Report *****

Feet   Datafile Modification Date: 06/05/2009   09:19

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                                        Phone:                 | Sheet   1 of   1
. .                                                            | Job No:
Program: Leap Geomath®   Ver: 8.0.0    (c) LEAP Software, Inc  | Date:   6/5/2009
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Filename: C:\Export\PORTSMOUTH-MINFORD RD_TEMP - split deck.gmd
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GIRDER VERTICAL GEOMETRY

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SPAN ID: PR02-PR03                   ROADWAY: SR823
MIN BUILD-UP,in: 2.0000          DECK THICK,in: 8.5000

GIRDER ID: S2G10                           BRG CO-ORDS          ELEVATION DAP HEIGHT
AZIMUTH, deg: N 302.844616            North          East          (ft)       (ft)
WPT-WPT LEN,ft: 97.4154 Start:   311,222.5965 1,859,946.8624   689.1249    0.0000
 PR-PR  LEN,ft: 99.9981   End:   311,275.4310 1,859,865.0194   686.8135    0.0000

GIRDER TYPE:MODIFIED AASHTO TYPE 4 CAMBER,in   :     4.5360 TOTAL DEFL,in:    2.7960
TOP WIDTH,in:            36.0000 BOT WIDTH,in:     26.0000 HEIGHT,in:          66.0000

DECK SLOPE  ,ft/ft Start:      -0.035698 End:            -0.036120 Avg:  -0.035909
GIRDER PITCH,ft/ft:            -0.023727                          ROLL,deg:   0.000000
```

CHECK POINT	DIST ALONG CENTERLINE WPT-WPT (ft)	FINAL DECK ELEVATION (ft)	SCREED ELEVATION (ft)	GIRDER TOP ELEVATION (ERECTED) (ft)	SCREED HT. ABOVE GIRDER (ft)
1	0.0000	695.7725	695.7725	694.6249	1.1476
2	24.3538	695.1393	695.3141	694.3305	0.9836
3	48.7077	694.5431	694.7761	693.8472	0.9289
4	73.0615	693.9836	694.1584	693.1748	0.9836
5	97.4154	693.4611	693.4611	692.3135	1.1476

BUILD-UP	THICKNESS,in	LOCATION,ft	SIDE
MINIMUM:	2.000	48.1778	R
MAXIMUM:	6.071	98.7785	L

CHECK POINT	DIST ALONG CENTERLINE END-END (ft)	BUILD-UP LEFT (in)	BUILD-UP CL (in)	BUILD-UP RIGHT (in)
1	0.0000	5.9469	5.3622	4.7782
2	24.7704	3.9416	3.3255	2.7102
3	49.5408	3.2936	2.6664	2.0000
4	74.3113	4.0033	3.3252	2.6479
5	99.0817	6.0709	5.3622	4.6542

***** End of Report *****

Feet   Datafile Modification Date: 06/05/2009 09:19


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                                        Phone:                 | Sheet   1 of   1
. .                                                            | Job No:
Program: Leap Geomath®   Ver: 8.0.0    (c) LEAP Software, Inc  | Date:   6/5/2009
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Filename: C:\Export\PORTSMOUTH-MINFORD RD_TEMP - split deck.gmd
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GIRDER VERTICAL GEOMETRY

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SPAN ID: PR04-PR05                   ROADWAY: SR823
MIN BUILD-UP,in: 2.0000          DECK THICK,in: 8.5000

GIRDER ID: S4G1                            BRG CO-ORDS          ELEVATION DAP HEIGHT
AZIMUTH, deg: N 304.844251            North          East          (ft)       (ft)
WPT-WPT LEN,ft: 97.4056 Start:   311,274.4761 1,859,704.6581   686.2636    0.0000
 PR-PR  LEN,ft: 98.6969   End:   311,330.1286 1,859,624.7165   685.2118    0.0000

GIRDER TYPE:MODIFIED AASHTO TYPE 4 CAMBER,in   :     4.5360 TOTAL DEFL,in:    2.9040
TOP WIDTH,in:            36.0000 BOT WIDTH,in:     26.0000 HEIGHT,in:          66.0000

DECK SLOPE  ,ft/ft Start:       0.040079 End:             0.039910 Avg:   0.039995
GIRDER PITCH,ft/ft:            -0.010798                          ROLL,deg:   0.000000
```

CHECK POINT	DIST ALONG CENTERLINE WPT-WPT (ft)	FINAL DECK ELEVATION (ft)	SCREED ELEVATION (ft)	GIRDER TOP ELEVATION (ERECTED) (ft)	SCREED HT. ABOVE GIRDER (ft)
1	0.0000	692.8905	692.8905	691.7636	1.1270
2	24.3514	692.5856	692.7671	691.7841	0.9829
3	48.7028	692.3086	692.5506	691.6157	0.9349
4	73.0542	692.0597	692.2412	691.2582	0.9829
5	97.4056	691.8387	691.8387	690.7118	1.1270

BUILD-UP	THICKNESS,in	LOCATION,ft	SIDE
MINIMUM:	2.000	49.1739	L
MAXIMUM:	5.870	-1.3049	R

CHECK POINT	DIST ALONG CENTERLINE END-END (ft)	BUILD-UP LEFT (in)	BUILD-UP CL (in)	BUILD-UP RIGHT (in)
1	0.0000	4.3363	5.1029	5.8700
2	24.7676	2.5724	3.3153	4.0586
3	49.5353	2.0000	2.7193	3.4391
4	74.3029	2.6192	3.3151	4.0115
5	99.0705	4.4301	5.1028	5.7760

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Feet   Datafile Modification Date: 06/05/2009 09:19

Phone:

Program: Leap Geomath® Ver: 8.0.0 (c) LEAP Software, Inc
Phone: 800-451-LEAP (5327) Web-Site: www.leapsoft.com

Sheet 1 of 1
Job No:
Date: 6/5/2009
By:

Filename: C:\Export\PORTSMOUTH-MINFORD RD_TEMP - split deck.gmd

GIRDER VERTICAL GEOMETRY

SPAN ID: PR04-PR05 ROADWAY: SR823
MIN BUILD-UP,in: 2.0000 DECK THICK,in: 8.5000

GIRDER ID: S4G2		BRG CO-ORDS North	BRG CO-ORDS East	ELEVATION (ft)	DAP HEIGHT (ft)
AZIMUTH, deg: N 304.844251					
WPT-WPT LEN,ft: 97.4056	Start:	311,281.2083	1,859,713.3695	686.6911	0.0000
PR-PR LEN,ft: 98.6969	End:	311,336.8607	1,859,633.4279	685.6361	0.0000

GIRDER TYPE:MODIFIED AASHTO TYPE 4 CAMBER,in : 4.5360 TOTAL DEFL,in: 3.0840
TOP WIDTH,in: 36.0000 BOT WIDTH,in: 26.0000 HEIGHT,in: 66.0000

DECK SLOPE ,ft/ft Start: -0.011942 End: -0.007499 Avg: -0.009720
GIRDER PITCH,ft/ft: -0.010831 ROLL,deg: 0.000000

CHECK POINT	DIST ALONG CENTERLINE WPT-WPT (ft)	FINAL DECK ELEVATION (ft)	SCREED ELEVATION (ft)	GIRDER TOP ELEVATION (ERECTED) (ft)	SCREED HT. ABOVE GIRDER (ft)
1	0.0000	693.3130	693.3130	692.1911	1.1219
2	24.3514	692.9953	693.1881	692.2109	0.9772
3	48.7028	692.7136	692.9706	692.0416	0.9290
4	73.0542	692.4678	692.6606	691.6834	0.9772
5	97.4056	692.2580	692.2580	691.1361	1.1219

BUILD-UP	THICKNESS,in	LOCATION,ft	SIDE
MINIMUM:	2.000	48.2304	R
MAXIMUM:	4.963	0.0000	M

CHECK POINT	DIST ALONG CENTERLINE END-END (ft)	BUILD-UP LEFT (in)	BUILD-UP CL (in)	BUILD-UP RIGHT (in)
1	0.0000	4.7784	5.0424	4.4419
2	24.7676	3.1081	3.2468	2.6223
3	49.5353	2.5376	2.6481	2.0000
4	74.3029	3.0669	3.2466	2.5750
5	99.0705	4.6962	5.0423	4.3474

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Feet Datafile Modification Date: 06/05/2009 09:19

Phone:

Program: Leap Geomath® Ver: 8.0.0 (c) LEAP Software, Inc
Phone: 800-451-LEAP (5327) Web-Site: www.leapsoft.com

Sheet 1 of 1
Job No:
Date: 6/5/2009
By:

Filename: C:\Export\PORTSMOUTH-MINFORD RD_TEMP - split deck.gmd

GIRDER VERTICAL GEOMETRY

SPAN ID: PR04-PR05 ROADWAY: SR823
MIN BUILD-UP,in: 2.0000 DECK THICK,in: 8.5000

GIRDER ID: S4G3		BRG CO-ORDS North	BRG CO-ORDS East	ELEVATION (ft)	DAP HEIGHT (ft)
AZIMUTH, deg: N 304.844251					
WPT-WPT LEN,ft: 97.4056	Start:	311,287.9405	1,859,722.0808	686.3597	0.0000
PR-PR LEN,ft: 98.6969	End:	311,343.5929	1,859,642.1393	685.2833	0.0000

GIRDER TYPE:MODIFIED AASHTO TYPE 4 CAMBER,in : 4.5360 TOTAL DEFL,in: 3.0840
TOP WIDTH,in: 36.0000 BOT WIDTH,in: 26.0000 HEIGHT,in: 66.0000

DECK SLOPE ,ft/ft Start: -0.035901 End: -0.036081 Avg: -0.035991
GIRDER PITCH,ft/ft: -0.011050 ROLL,deg: 0.000000

CHECK POINT	DIST ALONG CENTERLINE WPT-WPT (ft)	FINAL DECK ELEVATION (ft)	SCREED ELEVATION (ft)	GIRDER TOP ELEVATION (ERECTED) (ft)	SCREED HT. ABOVE GIRDER (ft)
1	0.0000	692.9818	692.9818	691.8597	1.1221
2	24.3514	692.6586	692.8514	691.8742	0.9773
3	48.7028	692.3715	692.6285	691.6995	0.9290
4	73.0542	692.1204	692.3132	691.3359	0.9773
5	97.4056	691.9054	691.9054	690.7833	1.1221

BUILD-UP	THICKNESS,in	LOCATION,ft	SIDE
MINIMUM:	2.000	48.2304	R
MAXIMUM:	5.741	98.7092	L

CHECK POINT	DIST ALONG CENTERLINE END-END (ft)	BUILD-UP LEFT (in)	BUILD-UP CL (in)	BUILD-UP RIGHT (in)
1	0.0000	5.6461	5.0453	4.4451
2	24.7676	3.8722	3.2474	2.6232
3	49.5353	3.2965	2.6480	2.0000
4	74.3029	3.9193	3.2473	2.5757
5	99.0705	5.7406	5.0452	4.3503

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Feet Datafile Modification Date: 06/05/2009 09:19

Phone:

Program: Leap Geomath® Ver: 8.0.0 (c) LEAP Software, Inc
Phone: 800-451-LEAP (5327) Web-Site: www.leapsoft.com

Sheet 1 of 1
Job No:
Date: 6/5/2009
By:

Filename: C:\Export\PORTSHOUTH-MINFORD RD_TEMP - split deck.gmd

GIRDER VERTICAL GEOMETRY

SPAN ID: PR04-PR05 ROADWAY: SR823
MIN BUILD-UP,in: 2.0000 DECK THICK,in: 8.5000

GIRDER ID: S4G4		BRG CO-ORDS North	BRG CO-ORDS East	ELEVATION (ft)	DAP HEIGHT (ft)
AZIMUTH, deg: N 304.844251					
WPT-WPT LEN,ft: 97.4056	Start:	311,294.6727	1,859,730.7922	686.0291	0.0000
PR-PR LEN,ft: 98.6969	End:	311,350.3251	1,859,650.8507	684.9312	0.0000

GIRDER TYPE:MODIFIED AASHTO TYPE 4 CAMBER,in : 4.5360 TOTAL DEFL,in: 3.0840
TOP WIDTH,in: 36.0000 BOT WIDTH,in: 26.0000 HEIGHT,in: 66.0000

DECK SLOPE ,ft/ft Start: -0.035891 End: -0.036078 Avg: -0.035984
GIRDER PITCH,ft/ft: -0.011271 ROLL,deg: 0.000000

CHECK POINT	DIST ALONG CENTERLINE WPT-WPT (ft)	FINAL DECK ELEVATION (ft)	SCREED ELEVATION (ft)	GIRDER TOP ELEVATION (ERECTED) (ft)	SCREED HT. ABOVE GIRDER (ft)
1	0.0000	692.6515	692.6515	691.5291	1.1224
2	24.3514	692.3227	692.5155	691.5381	0.9773
3	48.7028	692.0302	692.2872	691.3582	0.9290
4	73.0542	691.7738	691.9665	690.9892	0.9773
5	97.4056	691.5536	691.5536	690.4312	1.1224

BUILD-UP	THICKNESS,in	LOCATION,ft	SIDE
MINIMUM:	2.000	48.2304	R
MAXIMUM:	5.744	98.7092	L

CHECK POINT	DIST ALONG CENTERLINE END-END (ft)	BUILD-UP LEFT (in)	BUILD-UP CL (in)	BUILD-UP RIGHT (in)
1	0.0000	5.6488	5.0683	4.4483
2	24.7676	3.8726	3.2481	2.6240
3	49.5353	3.2963	2.6479	2.0000
4	74.3029	3.9199	3.2479	2.5764
5	99.0705	5.7436	5.0482	4.3533

***** End of Report *****

Feet Datafile Modification Date: 06/05/2009 09:19

Phone:

Program: Leap Geomath® Ver: 8.0.0 (c) LEAP Software, Inc
Phone: 800-451-LEAP (5327) Web-Site: www.leapsoft.com

Sheet 1 of 1
Job No:
Date: 6/5/2009
By:

Filename: C:\Export\PORTSMOUTH-MINFORD RD_TEMP - split deck.gmd

GIRDER VERTICAL GEOMETRY

SPAN ID: PR04-PR05 ROADWAY: SR823
MIN BUILD-UP,in: 2.0000 DECK THICK,in: 8.5000

GIRDER ID: S4G5		BRG CO-ORDS North	BRG CO-ORDS East	ELEVATION (ft)	DAP HEIGHT (ft)
AZIMUTH, deg: N 304.844251					
WPT-WPT LEN,ft: 97.4056	Start:	311,301.4048	1,859,739.5036	685.6844	0.0000
PR-PR LEN,ft: 98.6969	End:	311,357.0573	1,859,659.5621	684.5648	0.0000

GIRDER TYPE:MODIFIED AASHTO TYPE 4 CAMBER,in : 4.5360 TOTAL DEFL,in: 2.9040
TOP WIDTH,in: 36.0000 BOT WIDTH,in: 26.0000 HEIGHT,in: 66.0000

DECK SLOPE ,ft/ft Start: -0.035880 End: -0.036075 Avg: -0.035978
GIRDER PITCH,ft/ft: -0.011494 ROLL,deg: 0.000000

CHECK POINT	DIST ALONG CENTERLINE WPT-WPT (ft)	FINAL DECK ELEVATION (ft)	SCREED ELEVATION (ft)	GIRDER TOP ELEVATION (ERECTED) (ft)	SCREED HT. ABOVE GIRDER (ft)
1	0.0000	692.3220	692.3220	691.1844	1.1376
2	24.3514	691.9877	692.1692	691.1880	0.9811
3	48.7028	691.6896	691.9316	691.0026	0.9290
4	73.0542	691.4279	691.6094	690.6282	0.9811
5	97.4056	691.2024	691.2024	690.0648	1.1376

BUILD-UP	THICKNESS,in	LOCATION,ft	SIDE
MINIMUM:	2.000	48.2304	R
MAXIMUM:	5.936	98.7092	L

CHECK POINT	DIST ALONG CENTERLINE END-END (ft)	BUILD-UP LEFT (in)	BUILD-UP CL (in)	BUILD-UP RIGHT (in)
1	0.0000	5.8342	5.2375	4.6413
2	24.7676	3.9179	3.2953	2.6732
3	49.5353	3.2961	2.6478	2.0000
4	74.3029	3.9688	3.2951	2.6219
5	99.0705	5.9363	5.2373	4.5389

***** End of Report *****

Feet Datafile Modification Date: 06/05/2009 09:19

Phone:
Program: Leap Geomath® Ver: 8.0.0 (c) LEAP Software, Inc | Sheet 1 of 1
Phone: 800-451-LEAP (5327) Web-Site: www.leapsoft.com | Job No:
| Date: 6/5/2009
| By:

Filename: C:\Export\PORTSMOUTH-MINFORD RD_TEMP - split deck.gmd

GIRDER VERTICAL GEOMETRY

SPAN ID: PR04-PR05 ROADWAY: SR823
MIN BUILD-UP,in: 2.0000 DECK THICK,in: 8.5000

GIRDER ID: S4G6		BRG CO-ORDS North	East	ELEVATION (ft)	DAP HEIGHT (ft)
AZIMUTH, deg: N 304.844256					
WPT-WPT LEN,ft: 97.4056	Start:	311,305.2919	1,859,744.5334	685.8807	0.0000
PR-PR LEN,ft: 98.6969	End:	311,360.9443	1,859,664.5919	684.7499	0.0000

GIRDER TYPE:MODIFIED AASHTO TYPE 4 CAMBER,in : 4.5360 TOTAL DEFL,in: 2.9040
TOP WIDTH,in: 36.0000 BOT WIDTH,in: 26.0000 HEIGHT,in: 66.0000

DECK SLOPE ,ft/ft Start: 0.040123 End: 0.039924 Avg: 0.040023
GIRDER PITCH,ft/ft: -0.011609 ROLL,deg: 0.000000

CHECK POINT	DIST ALONG CENTERLINE WPT-WPT (ft)	FINAL DECK ELEVATION (ft)	SCREED ELEVATION (ft)	GIRDER TOP ELEVATION (ERECTED) (ft)	SCREED HT. ABOVE GIRDER (ft)
1	0.0000	692.5087	692.5087	691.3807	1.1280
2	24.3514	692.1833	692.3648	691.3815	0.9832
3	48.7028	691.8863	692.1283	691.1933	0.9350
4	73.0542	691.6179	691.7994	690.8161	0.9832
5	97.4056	691.3779	691.3779	690.2499	1.1280

BUILD-UP	THICKNESS,in	LOCATION,ft	SIDE
MINIMUM:	2.000	49.1739	L
MAXIMUM:	5.884	-1.3049	R

CHECK POINT	DIST ALONG CENTERLINE END-END (ft)	BUILD-UP LEFT (in)	BUILD-UP CL (in)	BUILD-UP RIGHT (in)
1	0.0000	4.3483	5.1159	5.8840
2	24.7676	2.5753	3.3189	4.0630
3	49.5353	2.0000	2.7198	3.4401
4	74.3029	2.6225	3.3187	4.0154
5	99.0705	4.4430	5.1158	5.7890

***** End of Report *****

Feet Datafile Modification Date: 06/05/2009 09:19

Phone:
Program: Leap Geomath® Ver: 8.0.0 (c) LEAP Software, Inc | Sheet 1 of 1
Phone: 800-451-LEAP (5327) Web-Site: www.leapsoft.com | Job No:
| Date: 6/5/2009
| By:

Filename: C:\Export\PORTSMOUTH-MINFORD RD_TEMP - split deck.gmd

GIRDER VERTICAL GEOMETRY

SPAN ID: PR04-PR05 ROADWAY: SR823
MIN BUILD-UP,in: 2.0000 DECK THICK,in: 8.5000

GIRDER ID: S4G7		BRG CO-ORDS North	East	ELEVATION (ft)	DAP HEIGHT (ft)
AZIMUTH, deg: N 304.844256					
WPT-WPT LEN,ft: 97.4056	Start:	311,312.0240	1,859,753.2448	685.9731	0.0000
PR-PR LEN,ft: 98.6969	End:	311,367.6765	1,859,673.3032	684.8191	0.0000

GIRDER TYPE:MODIFIED AASHTO TYPE 4 CAMBER,in : 4.5360 TOTAL DEFL,in: 3.0840
TOP WIDTH,in: 36.0000 BOT WIDTH,in: 26.0000 HEIGHT,in: 66.0000

DECK SLOPE ,ft/ft Start: -0.035864 End: -0.036070 Avg: -0.035967
GIRDER PITCH,ft/ft: -0.011848 ROLL,deg: 0.000000

CHECK POINT	DIST ALONG CENTERLINE WPT-WPT (ft)	FINAL DECK ELEVATION (ft)	SCREED ELEVATION (ft)	GIRDER TOP ELEVATION (ERECTED) (ft)	SCREED HT. ABOVE GIRDER (ft)
1	0.0000	692.5961	692.5961	691.4731	1.1230
2	24.3514	692.2529	692.4456	691.4681	0.9775
3	48.7028	691.9461	692.2031	691.2741	0.9290
4	73.0542	691.6758	691.8686	690.8911	0.9775
5	97.4056	691.4421	691.4421	690.3191	1.1230

BUILD-UP	THICKNESS,in	LOCATION,ft	SIDE
MINIMUM:	2.000	48.2304	R
MAXIMUM:	5.751	98.7092	L

CHECK POINT	DIST ALONG CENTERLINE END-END (ft)	BUILD-UP LEFT (in)	BUILD-UP CL (in)	BUILD-UP RIGHT (in)
1	0.0000	5.6559	5.0560	4.4566
2	24.7676	3.8739	3.2498	2.6262
3	49.5353	3.2957	2.6476	2.0000
4	74.3029	3.9214	3.2496	2.5782
5	99.0705	5.7513	5.0559	4.3610

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Feet Datafile Modification Date: 06/05/2009 09:19

Phone:

Program: Leap Geomath® Ver: 8.0.0 (c) LEAP Software, Inc
Phone: 800-451-LEAP (5327) Web-Site: www.leapsoft.com

Sheet 1 of 1
Job No:
Date: 6/5/2009
By:

Filename: C:\Export\PORTSMOUTH-MINFORD RD_TEMP - split deck.gmd

GIRDER VERTICAL GEOMETRY

SPAN ID: PR04-PR05 ROADWAY: SR823
MIN BUILD-UP,in: 2.0000 DECK THICK,in: 8.5000

GIRDER ID: S4G8		BRG CO-ORDS North	BRG CO-ORDS East	ELEVATION (ft)	DAP HEIGHT (ft)
AZIMUTH, deg: N 304.844256					
WPT-WPT LEN,ft: 97.4056	Start:	311,318.7562	1,859,761.9562	685.6457	0.0000
PR-PR LEN,ft: 98.6969	End:	311,374.4087	1,859,682.0146	684.4696	0.0000

GIRDER TYPE:MODIFIED AASHTO TYPE 4 CAMBER,in : 4.5360 TOTAL DEFL,in: 3.0840
TOP WIDTH,in: 36.0000 BOT WIDTH,in: 26.0000 HEIGHT,in: 66.0000

DECK SLOPE ,ft/ft Start: -0.035853 End: -0.036066 Avg: -0.035960
GIRDER PITCH,ft/ft: -0.012074 ROLL,deg: 0.000000

CHECK POINT	DIST ALONG CENTERLINE WPT-WPT (ft)	FINAL DECK ELEVATION (ft)	SCREED ELEVATION (ft)	GIRDER TOP ELEVATION (ERECTED) (ft)	SCREED HT. ABOVE GIRDER (ft)
1	0.0000	692.2689	692.2689	691.1457	1.1232
2	24.3514	691.9200	692.1127	691.1352	0.9775
3	48.7028	691.6076	691.8646	690.9357	0.9290
4	73.0542	691.3319	691.5247	690.5472	0.9775
5	97.4056	691.0929	691.0929	689.9696	1.1232

BUILD-UP	THICKNESS,in	LOCATION,ft	SIDE
MINIMUM:	2.000	48.2304	R
MAXIMUM:	5.754	98.7092	L

CHECK POINT	DIST ALONG CENTERLINE END-END (ft)	BUILD-UP LEFT (in)	BUILD-UP CL (in)	BUILD-UP RIGHT (in)
1	0.0000	5.6586	5.0590	4.4599
2	24.7676	3.8743	3.2504	2.6270
3	49.5353	3.2956	2.6475	2.0000
4	74.3029	3.9220	3.2502	2.5789
5	99.0705	5.7543	5.0589	4.3640

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Feet Datafile Modification Date: 06/05/2009 09:19

Phone:

Program: Leap Geomath® Ver: 8.0.0 (c) LEAP Software, Inc
Phone: 800-451-LEAP (5327) Web-Site: www.leapsoft.com

Sheet 1 of 1
Job No:
Date: 6/5/2009
By:

Filename: C:\Export\PORTSMOUTH-MINFORD RD_TEMP - split deck.gmd

GIRDER VERTICAL GEOMETRY

SPAN ID: PR04-PR05 ROADWAY: SR823
MIN BUILD-UP,in: 2.0000 DECK THICK,in: 8.5000

GIRDER ID: S4G10		BRG CO-ORDS North	BRG CO-ORDS East	ELEVATION (ft)	DAP HEIGHT (ft)
AZIMUTH, deg: N 304.844256					
WPT-WPT LEN,ft: 97.4056	Start:	311,332.2206	1,859,779.3789	684.9786	0.0000
PR-PR LEN,ft: 98.6969	End:	311,387.8730	1,859,699.4374	683.7580	0.0000

GIRDER TYPE:MODIFIED AASHTO TYPE 4 CAMBER,in : 4.5360 TOTAL DEFL,in: 2.9040
TOP WIDTH,in: 36.0000 BOT WIDTH,in: 26.0000 HEIGHT,in: 66.0000

DECK SLOPE ,ft/ft Start: -0.035830 End: -0.036058 Avg: -0.035944
GIRDER PITCH,ft/ft: -0.012531 ROLL,deg: 0.000000

CHECK POINT	DIST ALONG CENTERLINE WPT-WPT (ft)	FINAL DECK ELEVATION (ft)	SCREED ELEVATION (ft)	GIRDER TOP ELEVATION (ERECTED) (ft)	SCREED HT. ABOVE GIRDER (ft)
1	0.0000	691.6173	691.6173	690.4786	1.1387
2	24.3514	691.2568	691.4383	690.4570	0.9814
3	48.7028	690.9332	691.1752	690.2463	0.9289
4	73.0542	690.6465	690.8280	689.8467	0.9814
5	97.4056	690.3967	690.3967	689.2580	1.1387

BUILD-UP	THICKNESS,in	LOCATION,ft	SIDE
MINIMUM:	2.000	48.2304	R
MAXIMUM:	5.950	98.7092	L

CHECK POINT	DIST ALONG CENTERLINE END-END (ft)	BUILD-UP LEFT (in)	BUILD-UP CL (in)	BUILD-UP RIGHT (in)
1	0.0000	5.8468	5.2512	4.6562
2	24.7676	3.9200	3.2983	2.6771
3	49.5353	3.2949	2.6472	2.0000
4	74.3029	3.9715	3.2981	2.6251
5	99.0705	5.9500	5.2511	4.5527

***** End of Report *****

Feet Datafile Modification Date: 06/05/2009 09:19

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                              Phone:                 | Sheet  1 of  1
, ,                                                  | Job No:
Program: Leap Geomath®  Ver: 8.0.0   (c) LEAP Software, Inc | Date:  6/5/2009
Phone: 800-451-LEAP (5327)       Web-Site: www.leapsoft.com | By:
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Filename: C:\Export\PORTSMOUTH-MINFORD RD_TEMP - split deck.gmd


                    GIRDER VERTICAL GEOMETRY
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SPAN ID: PR04-PR05                  ROADWAY: SR823
MIN BUILD-UP,in: 2.0000         DECK THICK,in: 8.5000

GIRDER ID: S409                         BRG CO-ORDS        ELEVATION DAP HEIGHT
AZIMUTH, deg: N 304.844256         North          East        (ft)       (ft)
WPT-WPT LEN,ft: 97.4056 Start:   311,325.4884 1,859,770.6675   685.3192   0.0000
 PR-PR  LEN,ft: 98.6969   End:   311,381.1408 1,859,690.7260   684.1209   0.0000

GIRDER TYPE:MODIFIED AASHTO TYPE 4 CAMBER,in   :    4.5360 TOTAL DEFL,in:    3.0840
TOP WIDTH,in:          36.0000 BOT WIDTH,in:    26.0000 HEIGHT,in:         66.0000

DECK SLOPE  ,ft/ft Start:     -0.035842 End:          -0.036062 Avg:  -0.035952
GIRDER PITCH,ft/ft:           -0.012302                         ROLL,deg:   0.000000


     DIST ALONG                        GIRDER TOP   SCREED
     CENTERLINE FINAL DECK    SCREED   ELEVATION  HT. ABOVE
CHECK  WPT-WPT   ELEVATION  ELEVATION  (ERECTED)   GIRDER
POINT    (ft)       (ft)       (ft)       (ft)       (ft)
-----------------------------------------------------------

1       0.0000   691.9427   691.9427   690.8192    1.1235
2      24.3514   691.5880   691.7807   690.8031    0.9776
3      48.7028   691.2700   691.5270   690.5981    0.9289
4      73.0542   690.9888   691.1816   690.2040    0.9776
5      97.4056   690.7444   690.7444   689.6209    1.1235

BUILD-UP        THICKNESS,in  LOCATION,ft   SIDE
 MINIMUM:           2.000       48.2306      R
 MAXIMUM:           5.757       98.7092      L
.

     DIST ALONG    ---------- BUILD-UP-----------
     CENTERLINE
CHECK  END-END      LEFT        CL        RIGHT
POINT   (ft)        (in)       (in)       (in)
-------------------------------------------------

1       0.0000     5.6614     5.0620     4.4631
2      24.7676     3.8748     3.2511     2.6279
3      49.5353     3.2951     2.6473     2.0000
4      74.3029     3.9226     3.2509     2.5797
5      99.0705     5.7573     5.0619     4.3670

                  ***** End of Report *****


Feet                        Datafile Modification Date:    06/05/2009  09:19
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                              Phone:                 | Sheet  1 of  1
, ,                                                  | Job No:
Program: Leap Geomath®  Ver: 8.0.0   (c) LEAP Software, Inc | Date:  6/5/2009
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Filename: C:\Export\PORTSMOUTH-MINFORD RD_TEMP - split deck.gmd


                    GIRDER VERTICAL GEOMETRY
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SPAN ID: PR03-PR04                  ROADWAY: SR823
MIN BUILD-UP,in: 2.0000         DECK THICK,in: 8.5000

GIRDER ID: S307                         BRG CO-ORDS        ELEVATION DAP HEIGHT
AZIMUTH, deg: N 303.844618         North          East        (ft)       (ft)
WPT-WPT LEN,ft: 97.4167 Start:   311,256.3629 1,859,836.3511   687.6922   0.0000
 PR-PR  LEN,ft: 99.9981   End:   311,310.6184 1,859,755.4416   685.9994   0.0000

GIRDER TYPE:MODIFIED AASHTO TYPE 4 CAMBER,in   :    4.5360 TOTAL DEFL,in:    2.9760
TOP WIDTH,in:          36.0000 BOT WIDTH,in:    26.0000 HEIGHT,in:         66.0000

DECK SLOPE  ,ft/ft Start:     -0.035811 End:          -0.036112 Avg:  -0.035962
GIRDER PITCH,ft/ft:           -0.017377                         ROLL,deg:   0.000000


     DIST ALONG                        GIRDER TOP   SCREED
     CENTERLINE FINAL DECK    SCREED   ELEVATION  HT. ABOVE
CHECK  WPT-WPT   ELEVATION  ELEVATION  (ERECTED)   GIRDER
POINT    (ft)       (ft)       (ft)       (ft)       (ft)
-----------------------------------------------------------

1       0.0000   694.3242   694.3242   693.1922    1.1320
2      24.3542   693.8462   694.0322   693.0525    0.9797
3      48.7083   693.4087   693.6527   692.7238    0.9290
4      73.0625   692.9998   693.1858   692.2061    0.9797
5      97.4167   692.6314   692.6314   691.4994    1.1320

BUILD-UP        THICKNESS,in  LOCATION,ft   SIDE
 MINIMUM:           2.000       48.2076      R
 MAXIMUM:           5.869       98.7505      L

     DIST ALONG    ---------- BUILD-UP-----------
     CENTERLINE
CHECK  END-END      LEFT        CL        RIGHT
POINT   (ft)        (in)       (in)       (in)
-------------------------------------------------

1       0.0000     5.7617     5.1677     4.5744
2      24.7707     3.8987     3.2776     2.6571
3      49.5415     3.2955     2.6475     2.0000
4      74.3122     3.9522     3.2774     2.6032
5      99.0829     5.8690     5.1678     4.4670

                  ***** End of Report *****


Feet                        Datafile Modification Date:    06/05/2009  09:19
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                                   Phone:                  | Sheet   1 of   1
. .                                                        | Job No:
Program: Leap Geomath®   Ver: 8.0.0    (c) LEAP Software, Inc | Date:   6/5/2009
Phone: 800-451-LEAP (5327)        Web-Site: www.leapsoft.com | By:
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Filename: C:\Export\PORTSMOUTH-MINFORD RD_TEMP - split deck.gmd


                    GIRDER VERTICAL GEOMETRY
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SPAN ID: PR03-PR04                 ROADWAY: SR823
MIN BUILD-UP,in: 2.0000        DECK THICK,in: 8.5000

GIRDER ID: S1G8                          BRG CO-ORDS        ELEVATION DAP HEIGHT
AZIMUTH, deg: N 303.844618           North          East        (ft)       (ft)
WPT-WPT LEN,ft: 97.4167 Start:   311,263.1334 1,859,845.1120  687.3878   0.0000
 FR-FR  LEN,ft: 99.9981   End:   311,317.3889 1,859,764.2025  685.6707   0.0000

GIRDER TYPE:MODIFIED AASHTO TYPE 4 CAMBER,in  :     4.5360 TOTAL DEFL,in:    2.9760
TOP WIDTH,in:            36.0000 BOT WIDTH,in:    26.0000 HEIGHT,in:         66.0000

DECK SLOPE  ,ft/ft Start:      -0.035796 End:            -0.036105 Avg:  -0.035951
GIRDER PITCH,ft/ft:            -0.017626                        ROLL,deg:   0.000000
```

CHECK POINT	DIST ALONG CENTERLINE WPT-WPT (ft)	FINAL DECK ELEVATION (ft)	SCREED ELEVATION (ft)	GIRDER TOP ELEVATION (ERECTED) (ft)	SCREED HT. ABOVE GIRDER (ft)
1	0.0000	694.0200	694.0200	692.8878	1.1322
2	24.3542	693.5358	693.7218	692.7420	0.9798
3	48.7083	693.0882	693.3362	692.4073	0.9289
4	73.0625	692.6773	692.8633	691.8835	0.9797
5	97.4167	692.3030	692.3030	691.1707	1.1322

BUILD-UP	THICKNESS,in	LOCATION,ft	SIDE
MINIMUM:	2.000	48.2076	R
MAXIMUM:	5.872	98.7505	L

CHECK POINT	DIST ALONG CENTERLINE END-END (ft)	BUILD-UP LEFT (in)	BUILD-UP CL (in)	BUILD-UP RIGHT (in)
1	0.0000	5.7642	5.1707	4.5777
2	24.7707	3.8990	3.2782	2.6580
3	49.5415	3.2951	2.6473	2.0000
4	74.3122	3.9526	3.2780	2.6039
5	99.0829	5.8719	5.1707	4.4700

***** End of Report *****

Feet   Datafile Modification Date: 06/05/2009 09:19


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                                   Phone:                  | Sheet   1 of   1
. .                                                        | Job No:
Program: Leap Geomath®   Ver: 8.0.0    (c) LEAP Software, Inc | Date:   6/5/2009
Phone: 800-451-LEAP (5327)        Web-Site: www.leapsoft.com | By:
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Filename: C:\Export\PORTSMOUTH-MINFORD RD_TEMP - split deck.gmd


                    GIRDER VERTICAL GEOMETRY
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SPAN ID: PR03-PR04                 ROADWAY: SR823
MIN BUILD-UP,in: 2.0000        DECK THICK,in: 8.5000

GIRDER ID: S3G9                          BRG CO-ORDS        ELEVATION DAP HEIGHT
AZIMUTH, deg: N 303.844618           North          East        (ft)       (ft)
WPT-WPT LEN,ft: 97.4167 Start:   311,269.9039 1,859,853.8730  687.0845   0.0000
 FR-FR  LEN,ft: 99.9981   End:   311,324.1593 1,859,772.9635  685.3430   0.0000

GIRDER TYPE:MODIFIED AASHTO TYPE 4 CAMBER,in  :     4.5360 TOTAL DEFL,in:    2.9760
TOP WIDTH,in:            36.0000 BOT WIDTH,in:    26.0000 HEIGHT,in:         66.0000

DECK SLOPE  ,ft/ft Start:      -0.035781 End:            -0.036097 Avg:  -0.035939
GIRDER PITCH,ft/ft:            -0.017876                        ROLL,deg:   0.000000
```

CHECK POINT	DIST ALONG CENTERLINE WPT-WPT (ft)	FINAL DECK ELEVATION (ft)	SCREED ELEVATION (ft)	GIRDER TOP ELEVATION (ERECTED) (ft)	SCREED HT. ABOVE GIRDER (ft)
1	0.0000	693.7169	693.7169	692.5845	1.1324
2	24.3542	693.2264	693.4124	692.4326	0.9798
3	48.7083	692.7727	693.0207	692.0917	0.9289
4	73.0625	692.3557	692.5417	691.5619	0.9798
5	97.4167	691.9755	691.9755	690.8430	1.1324

BUILD-UP	THICKNESS,in	LOCATION,ft	SIDE
MINIMUM:	2.000	48.2076	R
MAXIMUM:	5.875	98.7505	L

CHECK POINT	DIST ALONG CENTERLINE END-END (ft)	BUILD-UP LEFT (in)	BUILD-UP CL (in)	BUILD-UP RIGHT (in)
1	0.0000	5.7668	5.1736	4.5809
2	24.7707	3.8993	3.2788	2.6588
3	49.5415	3.2947	2.6471	2.0000
4	74.3122	3.9531	3.2786	2.6047
5	99.0829	5.8747	5.1736	4.4730

***** End of Report *****

Feet   Datafile Modification Date: 06/05/2009 09:19

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                                   Phone:                       | Sheet   1 of   1
. .                                                             | Job No:
Program: Leap Geomath®   Ver: 8.0.0    (c) LEAP Software, Inc  | Date:   6/5/2009
Phone: 800-451-LEAP (5327)          Web-Site: www.leapsoft.com | By:
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Filename: C:\Export\PORTSMOUTH-MINFORD RD_TEMP - split deck.gmd


                     GIRDER VERTICAL GEOMETRY
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SPAN ID: PR03-PR04                  ROADWAY: SR823
MIN BUILD-UP,in: 2.0000        DECK THICK,in: 8.5000

GIRDER ID: S3G10                         BRG CO-ORDS          ELEVATION DAP HEIGHT
AZIMUTH, deg: N 303.844618           North          East         (ft)      (ft)
WPT-WPT LEN,ft: 97.4167 Start:   311,276.6743 1,859,862.6339   686.7672   0.0000
 PR-PR  LEN,ft: 99.9981   End:   311,330.9298 1,859,781.7244   685.0012   0.0000

GIRDER TYPE:MODIFIED AASHTO TYPE 4 CAMBER,in   :    4.5360 TOTAL DEFL,in:    2.7960
TOP WIDTH,in:            36.0000 BOT WIDTH,in:   26.0000 HEIGHT,in:         66.0000

DECK SLOPE  ,ft/ft Start:      -0.035765 End:          -0.036090 Avg:  -0.035927
GIRDER PITCH,ft/ft:            -0.018129                      ROLL,deg:   0.000000


      DIST ALONG                        GIRDER TOP   SCREED
      CENTERLINE FINAL DECK    SCREED   ELEVATION  HT. ABOVE
CHECK  WPT-WPT   ELEVATION  ELEVATION  (ERECTED)    GIRDER
POINT    (ft)       (ft)       (ft)       (ft)       (ft)
--------------------------------------------------------------

1         0.0000   693.4149   693.4149   692.2672     1.1477
2        24.3542   692.9181   693.0928   692.1092     0.9836
3        48.7083   692.4581   692.6911   691.7622     0.9289
4        73.0625   692.0351   692.2098   691.2262     0.9836
5        97.4167   691.6489   691.6489   690.5012     1.1477

BUILD-UP          THICKNESS,in  LOCATION,ft   SIDE
 MINIMUM:                2.000      48.2076     R
 MAXIMUM:                6.068      98.7505     L


      DIST ALONG    ---------- BUILD-UP-----------
      CENTERLINE
CHECK  END-END      LEFT       CL        RIGHT
POINT   (ft)        (in)      (in)       (in)
--------------------------------------------------

1        0.0000     5.9518    5.3627     4.7742
2       24.7707     3.9443    3.3259     2.7081
3       49.5415     3.2943    2.6468     2.0000
4       74.3122     4.0019    3.3257     2.6500
5       99.0829     6.0676    5.3627     4.6585

                  ***** End of Report *****



Feet                         Datafile Modification Date:    06/05/2009   09:19
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                                   Phone:                       | Sheet   1 of   1
. .                                                             | Job No:
Program: Leap Geomath®   Ver: 8.0.0    (c) LEAP Software, Inc  | Date:   6/5/2009
Phone: 800-451-LEAP (5327)          Web-Site: www.leapsoft.com | By:
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Filename: C:\Export\PORTSMOUTH-MINFORD RD_TEMP - split deck.gmd


                     GIRDER VERTICAL GEOMETRY
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SPAN ID: PR03-PR04                  ROADWAY: SR823
MIN BUILD-UP,in: 2.0000        DECK THICK,in: 8.5000

GIRDER ID: S3G1                          BRG CO-ORDS          ELEVATION DAP HEIGHT
AZIMUTH, deg: N 303.844618           North          East         (ft)      (ft)
WPT-WPT LEN,ft: 97.4167 Start:   311,218.6015 1,859,787.4881   687.8577   0.0000
 PR-PR  LEN,ft: 99.9981   End:   311,272.8569 1,859,706.5786   686.2782   0.0000

GIRDER TYPE:MODIFIED AASHTO TYPE 4 CAMBER,in   :    4.5360 TOTAL DEFL,in:    2.7960
TOP WIDTH,in:            36.0000 BOT WIDTH,in:   26.0000 HEIGHT,in:         66.0000

DECK SLOPE  ,ft/ft Start:       0.040109 End:           0.039849 Avg:   0.039979
GIRDER PITCH,ft/ft:            -0.016214                      ROLL,deg:   0.000000


      DIST ALONG                        GIRDER TOP   SCREED
      CENTERLINE FINAL DECK    SCREED   ELEVATION  HT. ABOVE
CHECK  WPT-WPT   ELEVATION  ELEVATION  (ERECTED)    GIRDER
POINT    (ft)       (ft)       (ft)       (ft)       (ft)
--------------------------------------------------------------

1         0.0000   694.4937   694.4937   693.3577     1.1359
2        24.3542   694.0568   694.2315   693.2463     0.9852
3        48.7083   693.6479   693.8809   692.9460     0.9349
4        73.0625   693.2670   693.4418   692.4566     0.9852
5        97.4167   692.9142   692.9142   691.7782     1.1359

BUILD-UP          THICKNESS,in  LOCATION,ft   SIDE
 MINIMUM:                2.000      49.2090     L
 MAXIMUM:                5.987      -1.3338     R


      DIST ALONG    ---------- BUILD-UP-----------
      CENTERLINE
CHECK  END-END      LEFT       CL        RIGHT
POINT   (ft)        (in)      (in)       (in)
--------------------------------------------------

1        0.0000     4.4424    5.2146     5.9873
2       24.7707     2.5975    3.3430     4.0890
3       49.5415     2.0000    2.7190     3.4385
4       74.3122     2.6501    3.3428     4.0360
5       99.0829     4.5480    5.2146     5.8817

                  ***** End of Report *****



Feet                         Datafile Modification Date:    06/05/2009   09:19
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Phone:

Program: Leap Geomath® Ver: 8.0.0 (c) LEAP Software, Inc | Sheet 1 of 1
Phone: 800-451-LEAP (5327) Web-Site: www.leapsoft.com | Job No: | Date: 6/5/2009 | By:

Filename: C:\Export\PORTSMOUTH-MINFORD RD_TEMP - split deck.gmd

GIRDER VERTICAL GEOMETRY

SPAN ID: PR03-PR04 ROADWAY: SR823
MIN BUILD-UP,in: 2.0000 DECK THICK,in: 8.5000

GIRDER ID: S3G2

		BRG CO-ORDS North	BRG CO-ORDS East	ELEVATION (ft)	DAP HEIGHT (ft)
AZIMUTH, deg: N 303.844618					
WPT-WPT LEN,ft: 97.4167	Start:	311,225.3719	1,859,796.2490	688.3069	0.0000
PR-PR LEN,ft: 99.9981	End:	311,279.6274	1,859,715.3395	686.7232	0.0000

GIRDER TYPE:MODIFIED AASHTO TYPE 4 CAMBER,in : 4.5360 TOTAL DEFL,in: 2.9760
TOP WIDTH,in: 36.0000 BOT WIDTH,in: 26.0000 HEIGHT,in: 66.0000

DECK SLOPE ,ft/ft Start: -0.012012 End: -0.007387 Avg: -0.009699
GIRDER PITCH,ft/ft: -0.016257 ROLL,deg: 0.000000

CHECK POINT	DIST ALONG CENTERLINE WPT-WPT (ft)	FINAL DECK ELEVATION (ft)	SCREED ELEVATION (ft)	GIRDER TOP ELEVATION (ERECTED) (ft)	SCREED HT. ABOVE GIRDER (ft)
1	0.0000	694.9378	694.9378	693.8069	1.1309
2	24.3542	694.4880	694.6740	693.6945	0.9795
3	48.7083	694.0741	694.3221	693.3930	0.9290
4	73.0625	693.6961	693.8821	692.9026	0.9795
5	97.4167	693.3541	693.3541	692.2232	1.1309

BUILD-UP	THICKNESS,in	LOCATION,ft	SIDE
MINIMUM:	2.000	48.2076	R
MAXIMUM:	5.071	0.0000	M

CHECK POINT	DIST ALONG CENTERLINE END-END (ft)	BUILD-UP LEFT (in)	BUILD-UP CL (in)	BUILD-UP RIGHT (in)
1	0.0000	4.8888	5.1545	4.5597
2	24.7707	3.1349	3.2749	2.6533
3	49.5415	2.5367	2.6483	2.0000
4	74.3122	3.0944	3.2748	2.6001
5	99.0829	4.8081	5.1545	4.4536

***** End of Report *****

Feet Datafile Modification Date: 06/05/2009 09:19

Phone:

Program: Leap Geomath® Ver: 8.0.0 (c) LEAP Software, Inc | Sheet 1 of 1
Phone: 800-451-LEAP (5327) Web-Site: www.leapsoft.com | Job No: | Date: 6/5/2009 | By:

Filename: C:\Export\PORTSMOUTH-MINFORD RD_TEMP - split deck.gmd

GIRDER VERTICAL GEOMETRY

SPAN ID: PR03-PR04 ROADWAY: SR823
MIN BUILD-UP,in: 2.0000 DECK THICK,in: 8.5000

GIRDER ID: S3G3

		BRG CO-ORDS North	BRG CO-ORDS East	ELEVATION (ft)	DAP HEIGHT (ft)
AZIMUTH, deg: N 303.844618					
WPT-WPT LEN,ft: 97.4167	Start:	311,232.1424	1,859,805.0100	687.9977	0.0000
PR-PR LEN,ft: 99.9981	End:	311,286.3979	1,859,724.1005	686.3904	0.0000

GIRDER TYPE:MODIFIED AASHTO TYPE 4 CAMBER,in : 4.5360 TOTAL DEFL,in: 2.9760
TOP WIDTH,in: 36.0000 BOT WIDTH,in: 26.0000 HEIGHT,in: 66.0000

DECK SLOPE ,ft/ft Start: -0.035863 End: -0.036135 Avg: -0.035999
GIRDER PITCH,ft/ft: -0.016499 ROLL,deg: 0.000000

CHECK POINT	DIST ALONG CENTERLINE WPT-WPT (ft)	FINAL DECK ELEVATION (ft)	SCREED ELEVATION (ft)	GIRDER TOP ELEVATION (ERECTED) (ft)	SCREED HT. ABOVE GIRDER (ft)
1	0.0000	694.6289	694.6289	693.4977	1.1311
2	24.3542	694.1730	694.3590	693.3794	0.9796
3	48.7083	693.7531	694.0011	693.0721	0.9290
4	73.0625	693.3693	693.5553	692.5758	0.9795
5	97.4167	693.0216	693.0216	691.8904	1.1311

BUILD-UP	THICKNESS,in	LOCATION,ft	SIDE
MINIMUM:	2.000	48.2076	R
MAXIMUM:	5.859	98.7505	L

CHECK POINT	DIST ALONG CENTERLINE END-END (ft)	BUILD-UP LEFT (in)	BUILD-UP CL (in)	BUILD-UP RIGHT (in)
1	0.0000	5.7525	5.1574	4.5629
2	24.7707	3.8975	3.2755	2.6541
3	49.5415	3.2968	2.6481	2.0000
4	74.3122	3.9506	3.2754	2.6007
5	99.0829	5.8589	5.1574	4.4565

***** End of Report *****

Feet Datafile Modification Date: 06/05/2009 09:19

Phone: | Sheet 1 of 1 | Job No: | Date: 6/5/2009 | By:

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GIRDER VERTICAL GEOMETRY

SPAN ID: PR03-PR04 ROADWAY: SR823
MIN BUILD-UP,in: 2.0000 DECK THICK,in: 8.5000

GIRDER ID: S3G4		BRG CO-ORDS North	BRG CO-ORDS East	ELEVATION (ft)	DAP HEIGHT (ft)
AZIMUTH, deg: N 303.844618					
WPT-WPT LEN,ft: 97.4167	Start:	311,238.9129	1,859,813.7709	687.6896	0.0000
PR-PR LEN,ft: 99.9981	End:	311,293.1683	1,859,732.8614	686.0586	0.0000

GIRDER TYPE:MODIFIED AASHTO TYPE 4 CAMBER,in : 4.5360 TOTAL DEFL,in: 2.9760
TOP WIDTH,in: 36.0000 BOT WIDTH,in: 26.0000 HEIGHT,in: 66.0000

DECK SLOPE ,ft/ft Start: -0.035849 End: -0.036129 Avg: -0.035989
GIRDER PITCH,ft/ft: -0.016742 ROLL,deg: 0.000000

CHECK POINT	DIST ALONG CENTERLINE WPT-WPT (ft)	FINAL DECK ELEVATION (ft)	SCREED ELEVATION (ft)	GIRDER TOP ELEVATION (ERECTED) (ft)	SCREED HT. ABOVE GIRDER (ft)
1	0.0000	694.3210	694.3210	693.1896	1.1314
2	24.3542	693.8589	694.0449	693.0653	0.9796
3	48.7083	693.4331	693.6811	692.7521	0.9290
4	73.0625	693.0434	693.2294	692.2498	0.9796
5	97.4167	692.6900	692.6900	691.5586	1.1314

BUILD-UP	THICKNESS,in	LOCATION,ft	SIDE
MINIMUM:	2.000	48.2076	R
MAXIMUM:	5.862	98.7505	L

CHECK POINT	DIST ALONG CENTERLINE END-END (ft)	BUILD-UP LEFT (in)	BUILD-UP CL (in)	BUILD-UP RIGHT (in)
1	0.0000	5.7550	5.1603	4.5661
2	24.7707	3.8979	3.2761	2.6550
3	49.5415	3.2965	2.6479	2.0000
4	74.3122	3.9510	3.2760	2.6014
5	99.0829	5.8617	5.1603	4.4594

***** End of Report *****

Feet Datafile Modification Date: 06/05/2009 09:19

Phone: | Sheet 1 of 1 | Job No: | Date: 6/5/2009 | By:

Program: Leap Geomath® Ver: 8.0.0 (c) LEAP Software, Inc
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GIRDER VERTICAL GEOMETRY

SPAN ID: PR03-PR04 ROADWAY: SR823
MIN BUILD-UP,in: 2.0000 DECK THICK,in: 8.5000

GIRDER ID: S3G5		BRG CO-ORDS North	BRG CO-ORDS East	ELEVATION (ft)	DAP HEIGHT (ft)
AZIMUTH, deg: N 303.844618					
WPT-WPT LEN,ft: 97.4167	Start:	311,245.6833	1,859,822.5318	687.3675	0.0000
PR-PR LEN,ft: 99.9981	End:	311,299.9388	1,859,741.6223	685.7126	0.0000

GIRDER TYPE:MODIFIED AASHTO TYPE 4 CAMBER,in : 4.5360 TOTAL DEFL,in: 2.7960
TOP WIDTH,in: 36.0000 BOT WIDTH,in: 26.0000 HEIGHT,in: 66.0000

DECK SLOPE ,ft/ft Start: -0.035835 End: -0.036123 Avg: -0.035979
GIRDER PITCH,ft/ft: -0.016987 ROLL,deg: 0.000000

CHECK POINT	DIST ALONG CENTERLINE WPT-WPT (ft)	FINAL DECK ELEVATION (ft)	SCREED ELEVATION (ft)	GIRDER TOP ELEVATION (ERECTED) (ft)	SCREED HT. ABOVE GIRDER (ft)
1	0.0000	694.0141	694.0141	692.8675	1.1466
2	24.3542	693.5459	693.7207	692.7373	0.9834
3	48.7083	693.1140	693.3470	692.4181	0.9290
4	73.0625	692.7185	692.8932	691.9098	0.9834
5	97.4167	692.3592	692.3592	691.2126	1.1466

BUILD-UP	THICKNESS,in	LOCATION,ft	SIDE
MINIMUM:	2.000	48.2076	R
MAXIMUM:	6.055	98.7505	L

CHECK POINT	DIST ALONG CENTERLINE END-END (ft)	BUILD-UP LEFT (in)	BUILD-UP CL (in)	BUILD-UP RIGHT (in)
1	0.0000	5.9400	5.3494	4.7593
2	24.7707	3.9429	3.3232	2.7042
3	49.5415	3.2961	2.6477	2.0000
4	74.3122	3.9999	3.3231	2.6468
5	99.0829	6.0545	5.3494	4.6448

***** End of Report *****

Feet Datafile Modification Date: 06/05/2009 09:19

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                                  Phone:                 | Sheet   1 of   1
. .                                                      | Job No:
Program: Leap Geomath®   Ver: 8.0.0    (c) LEAP Software, Inc | Date:   6/5/2009
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Filename: C:\Export\PORTSMOUTH-MINFORD RD_TEMP - split deck.gmd


                       GIRDER VERTICAL GEOMETRY
                       ------------------------

SPAN ID: PR03-PR04                   ROADWAY: SR823
MIN BUILD-UP,in: 2.0000         DECK THICK,in: 8.5000

GIRDER ID: S3G6                          BRG CO-ORDS         ELEVATION DAP HEIGHT
AZIMUTH, deg: N 303.844618          North          East         (ft)       (ft)
WPT-WPT LEN,ft: 97.4167 Start:   311,249.5925 1,859,827.5902   687.5769   0.0000
 PR-PR  LEN,ft: 99.9981   End:   311,303.8479 1,859,746.6807   685.9097   0.0000

GIRDER TYPE:MODIFIED AASHTO TYPE 4 CAMBER,in   :     4.5360 TOTAL DEFL,in:    2.7960
TOP WIDTH,in:           36.0000 BOT WIDTH,in:    26.0000 HEIGHT,in:         66.0000

DECK SLOPE  ,ft/ft Start:       0.040171 End:            0.039879 Avg:   0.040025
GIRDER PITCH,ft/ft:            -0.017115                    ROLL,deg:   0.000000

     DIST ALONG                           GIRDER TOP   SCREED
     CENTERLINE FINAL DECK    SCREED    ELEVATION  HT. ABOVE
CHECK  WPT-WPT   ELEVATION  ELEVATION  (ERECTED)   GIRDER
POINT    (ft)      . (ft)      (ft)        (ft)       (ft)
------------------------------------------------------------

1          0.0000   694.2139   694.2139   693.0769     1.1370
2         24.3542   693.7543   693.9291   692.9436     0.9855
3         48.7083   693.3233   693.5563   692.6213     0.9350
4         73.0625   692.9207   693.0954   692.1100     0.9855
5         97.4167   692.5467   692.5467   691.4097     1.1370

BUILD-UP          THICKNESS,in  LOCATION,ft   SIDE
 MINIMUM:                2.000      49.2050     L
 MAXIMUM:                6.002      -1.3338     R

     DIST ALONG    ---------- BUILD-UP-----------
     CENTERLINE
CHECK  END-END       LEFT        CL         RIGHT
POINT    (ft)        (in)       (in)        (in)
-------------------------------------------------

1          0.0000     4.4542     5.2277     6.0019
2         24.7707     2.6003     3.3469     4.0940
3         49.5415     2.0000     2.7198     3.4401
4         74.3122     2.6535     3.3467     4.0404
5         99.0829     4.5609     5.2278     5.8951

                  ***** End of Report *****


Feet                         Datafile Modification Date:    06/05/2009  09:19
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                                  Phone:                 | Sheet   1 of   1
. .                                                      | Job No:
Program: Leap Geomath®   Ver: 8.0.0    (c) LEAP Software, Inc | Date:   6/5/2009
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                       GIRDER VERTICAL GEOMETRY
                       ------------------------

SPAN ID: PR01-PR02                   ROADWAY: SR823
MIN BUILD-UP,in: 2.0000         DECK THICK,in: 8.5000

GIRDER ID: S1G1                          BRG CO-ORDS         ELEVATION DAP HEIGHT
AZIMUTH, deg: N 301.844086          North          East         (ft)       (ft)
WPT-WPT LEN,ft: 97.4167 Start:   311,111.2090 1,859,955.9604   692.6938   0.0000
 PR-PR  LEN,ft: 98.7080   End:   311,162.6070 1,859,873.2062   690.0592   0.0000

GIRDER TYPE:MODIFIED AASHTO TYPE 4 CAMBER,in   :     4.5360 TOTAL DEFL,in:    2.9040
TOP WIDTH,in:           36.0000 BOT WIDTH,in:    26.0000 HEIGHT,in:         66.0000

DECK SLOPE  ,ft/ft Start:       0.040163 End:            0.039722 Avg:   0.039943
GIRDER PITCH,ft/ft:            -0.027045                    ROLL,deg:   0.000000

     DIST ALONG                           GIRDER TOP   SCREED
     CENTERLINE FINAL DECK    SCREED    ELEVATION  HT. ABOVE
CHECK  WPT-WPT   ELEVATION  ELEVATION  (ERECTED)   GIRDER
POINT    (ft)        (ft)      (ft)        (ft)       (ft)
------------------------------------------------------------

1          0.0000   699.3207   699.3207   698.1938     1.1269
2         24.3542   698.6200   698.8015   697.8186     0.9829
3         48.7083   697.9473   698.1893   697.2545     0.9349
4         73.0625   697.3027   697.4842   696.5013     0.9829
5         97.4167   696.6861   696.6861   695.5592     1.1269

BUILD-UP          THICKNESS,in  LOCATION,ft   SIDE
 MINIMUM:                2.000      49.2679     L
 MAXIMUM:                5.980      -1.3927     R

     DIST ALONG    ---------- BUILD-UP-----------
     CENTERLINE
CHECK  END-END       LEFT        CL         RIGHT
POINT    (ft)        (in)       (in)        (in)
-------------------------------------------------

1          0.0000     4.3258     5.1023     5.8795
2         24.7707     2.5671     3.3144     4.0624
3         49.5414     2.0000     2.7182     3.4372
4         74.3122     2.6247     3.3141     4.0042
5         99.0829     4.4416     5.1023     5.7637

                  ***** End of Report *****


Feet                         Datafile Modification Date:    06/05/2009  09:19
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                         Phone:                | Sheet   1 of   1
 , ,                                           | Job No:
Program: Leap Geomath®   Ver: 8.0.0   (c) LEAP Software, Inc | Date:   6/5/2009
Phone: 800-451-LEAP (5327)      Web-Site: www.leapsoft.com | By:
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Filename: C:\Export\PORTSMOUTH-MINFORD RD_TEMP - split deck.gmd

PIER AND BEAM SEAT REPORT

```
PIER ID: PR02                  ROADWAY: SR823                  ALIGNMENT :ALG02
PIER DIMS  > DIST-L1:    -50.0000 DIST-L2:   50.0000 LEN:   100.0000 WIDTH:   5.0000
ALN/PIER-CL> STATION:     484+11.6830 PIER-AZIMUTH:     N 52.303056
             ALN-AZM:   N 302.343544 ALN-PIER SKEW:  109.959511
PGL/PIER-CL> STATION:     484+11.6830 OFFSET:              0.0000 DIST:    50.0000
             PGL-AZM:   N 302.343544 PGL-PIER SKEW:  109.959511
PIER CENTER>           311,192.6853N PGL/PIER-CL>       311,192.6853N
                     1,859,910.1487E                  1,859,910.1487E
```

CAP SECTION DATA

ID	DIST-along	DEPTH	TOP ELEV	BOT ELEV
Rect	0.0000	4.0000	689.5428	685.5428
Rect	7.6565	4.0000	690.0160	686.0160
Rect	18.8309	4.0000	689.7313	685.7313
Rect	30.0053	4.0000	689.4478	685.4478
Rect	41.1797	4.0000	689.1506	685.1506
Rect	50.0003	4.0000	689.3744	685.3744
Rect	58.8060	4.0000	689.5149	685.5149
Rect	69.9804	4.0000	689.2358	685.2358
Rect	81.1548	4.0000	688.9580	684.9580
Rect	92.3292	4.0000	688.6665	684.6665
Rect	100.0000	4.0000	688.6665	684.6665

Feet   Datafile Modification Date: 06/05/2009 09:19


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                         Phone:                | Sheet   2 of   2
 , ,                                           | Job No:
Program: Leap Geomath®   Ver: 8.0.0   (c) LEAP Software, Inc | Date:   6/5/2009
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Filename: C:\Export\PORTSMOUTH-MINFORD RD_TEMP - split deck.gmd

BEAM SEAT LOCATIONS

LEFT				RIGHT			
ID	DIST-along	OFFSET	ELEVATION	ID	DIST-along	OFFSET	ELEVATION

BEAM SEAT LOCATIONS

LEFT				RIGHT			
ID	DIST-along	OFFSET	ELEVATION	ID	DIST-along	OFFSET	ELEVATION
S2G1	1.7975	-1.2176	689.5428	S1G1	2.3766	1.2099	689.5428
S2G2	12.9364	-1.2176	690.0160	S1G2	13.5865	1.2099	690.0160
S2G3	24.0753	-1.2176	689.7313	S1G3	24.7964	1.2099	689.7313
S2G4	35.2142	-1.2176	689.4478	S1G4	36.0063	1.2099	689.4478
S2G5	46.3531	-1.2176	689.1506	S1G5	47.2162	1.2099	689.1506
S2G6	52.7845	-1.2176	689.3744	S1G6	53.6885	1.2099	689.3744
S2G7	63.9234	-1.2176	689.5149	S1G7	64.8984	1.2099	689.5149
S2G8	75.0624	-1.2176	689.2358	S1G8	76.1083	1.2099	689.2358
S2G9	86.2013	-1.2176	688.9580	S1G9	87.3182	1.2099	688.9580
S2G10	97.3402	-1.2176	688.6665	S1G10	98.5281	1.2099	688.6665

***** End of Report *****

Feet   Datafile Modification Date: 06/05/2009 09:19

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                    Phone:                        | Sheet   1 of   1
                                                  | Job No:
Program: Leap Geomath®   Ver: 8.0.0   (c) LEAP Software, Inc | Date:   6/5/2009
Phone: 800-451-LEAP (5327)    Web-Site: www.leapsoft.com     | By:
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PIER AND BEAM SEAT REPORT

```
PIER ID: PR03                  ROADWAY: SR823                 ALIGNMENT :AL002
PIER DIMS  > DIST-L1:   -50.0000 DIST-L2:   50.0000 LEN:   100.0000 WIDTH:  5.0000
ALN/PIER-CL> STATION:    485+11.6830  PIER-AZIMUTH:    N 52.303056
             ALN-AZM:  N 303.343546  ALN-PIER SKEW:  108.959510
PGL/PIER-CL> STATION:    485+11.6830  OFFSET:              0.0000 DIST:    50.0000
             PGL-AZM:  N 303.343546  PGL-PIER SKEW:  108.959510
PIER CENTER>           311,246.9193N  PGL/PIER-CL>        311,246.9193N
                     1,859,826.1343E                    1,859,826.1343E
```

CAP SECTION DATA

ID	DIST-along	DEPTH	TOP ELEV	BOT ELEV
Rect	0.0000	4.0000	687.3994	683.3994
Rect	7.9185	4.0000	687.8486	683.8486
Rect	19.0241	4.0000	687.5394	683.5394
Rect	30.1296	4.0000	687.2313	683.2313
Rect	41.2351	4.0000	686.9091	682.9091
Rect	50.0010	4.0000	687.1186	683.1186
Rect	58.7528	4.0000	687.2338	683.2338
Rect	69.8583	4.0000	686.9295	682.9295
Rect	80.9639	4.0000	686.6261	682.6261
Rect	92.0694	4.0000	686.3089	682.3089
Rect	100.0000	4.0000	686.3089	682.3089

Feet   Datafile Modification Date: 06/05/2009 09:19


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                    Phone:                        | Sheet   2 of   2
                                                  | Job No:
Program: Leap Geomath®   Ver: 8.0.0   (c) LEAP Software, Inc | Date:   6/5/2009
Phone: 800-451-LEAP (5327)    Web-Site: www.leapsoft.com     | By:
```

Filename: C:\Export\PORTSMOUTH-MINFORD RD_TEMP - split deck.gmd

BEAM SEAT LOCATIONS

LEFT				RIGHT			
ID	DIST-along	OFFSET	ELEVATION	ID	DIST-along	OFFSET	ELEVATION

BEAM SEAT LOCATIONS

LEFT				RIGHT			
ID	DIST-along	OFFSET	ELEVATION	ID	DIST-along	OFFSET	ELEVATION
S3G1	2.1050	-1.2249	687.3994	S2G1	2.6598	1.2176	687.3994
S3G2	13.1772	-1.2249	687.8486	S2G2	13.7987	1.2176	687.8486
S3G3	24.2494	-1.2249	687.5394	S2G3	24.9377	1.2176	687.5394
S3G4	35.3215	-1.2249	687.2313	S2G4	36.0766	1.2176	687.2313
S3G5	46.3937	-1.2249	686.9091	S2G5	47.2155	1.2176	686.9091
S3G6	52.7866	-1.2249	687.1186	S2G6	53.6469	1.2176	687.1186
S3G7	63.8587	-1.2249	687.2338	S2G7	64.7858	1.2176	687.2338
S3G8	74.9309	-1.2249	686.9295	S2G8	75.9247	1.2176	686.9295
S3G9	86.0031	-1.2249	686.6261	S2G9	87.0636	1.2176	686.6261
S3G10	97.0753	-1.2249	686.3089	S2G10	98.2025	1.2176	686.3089

***** End of Report *****

Feet   Datafile Modification Date: 06/05/2009 09:19

Phone:

Program: Leap Geomath® Ver: 8.0.0 (c) LEAP Software, Inc | Sheet 1 of 1
Job No:
Phone: 800-451-LEAP (5327) Web-Site: www.leapsoft.com | Date: 6/5/2009
By:

Filename: C:\Export\PORTSMOUTH-MINFORD RD_TEMP - split deck.gmd

PIER AND BEAM SEAT REPORT

```
PIER ID: PR01                     ROADWAY: SR823                ALIGNMENT :ALG02
PIER DIMS  > DIST-L1:   -50.0000 DIST-L2:    50.0000 LEN:   100.0000 WIDTH:  4.0000
ALN/PIER-CL> STATION:    483+12.9776  PIER-AZIMUTH:    N 52.303056
             ALN-AZM:   N 301.356489  ALN-PIER SKEW:  110.946566
PGL/PIER-CL> STATION:    483+12.9776  OFFSET:                0.0000 DIST:    50.0000
             PGL-AZM:   N 301.356489  PGL-PIER SKEW:  110.946566
PIER CENTER>             311,140.5993N  PGL/PIER-CL>          311,140.5993N
                       1,859,993.9912E                      1,859,993.9912E
```

CAP SECTION DATA

ID	DIST-along	DEPTH	TOP ELEV	BOT ELEV
Rect	0.0000	4.0000	691.7355	687.7355
Rect	7.5411	4.0000	692.2347	688.2347
Rect	18.7510	4.0000	691.9769	687.9769
Rect	29.9609	4.0000	691.7204	687.7204
Rect	41.1708	4.0000	691.4503	687.4503
Rect	50.0119	4.0000	691.6900	687.6900
Rect	58.8530	4.0000	691.8579	687.8579
Rect	70.0629	4.0000	691.6066	687.6066
Rect	81.2728	4.0000	691.3567	687.3567
Rect	92.4827	4.0000	691.0933	687.0933
Rect	100.0000	4.0000	691.0933	687.0933

Feet Datafile Modification Date: 06/05/2009 09:19

Phone:

Program: Leap Geomath® Ver: 8.0.0 (c) LEAP Software, Inc | Sheet 2 of 2
Job No:
Phone: 800-451-LEAP (5327) Web-Site: www.leapsoft.com | Date: 6/5/2009
By:

Filename: C:\Export\PORTSMOUTH-MINFORD RD_TEMP - split deck.gmd

BEAM SEAT LOCATIONS

LEFT				RIGHT			
ID	DIST-along	OFFSET	ELEVATION	ID	DIST-along	OFFSET	ELEVATION

BEAM SEAT LOCATIONS

LEFT				RIGHT			
ID	DIST-along	OFFSET	ELEVATION	ID	DIST-along	OFFSET	ELEVATION
S1G1	1.9361	0.0000	691.7355				
S1G2	13.1460	0.0000	692.2347				
S1G3	24.3559	0.0000	691.9769				
S1G4	35.5658	0.0000	691.7204				
S1G5	46.7757	0.0000	691.4503				
S1G6	53.2481	0.0000	691.6900				
S1G7	64.4580	0.0000	691.8579				
S1G8	75.6679	0.0000	691.6066				
S1G9	86.8777	0.0000	691.3567				
S1G10	98.0876	0.0000	691.0933				

***** End of Report *****

Feet Datafile Modification Date: 06/05/2009 09:19

```
                                Phone:                        | Sheet   1 of   1
. .                                                           | Job No:
Program: Leap Geomath®   Ver: 8.0.0    (c) LEAP Software, Inc | Date:   6/5/2009
Phone: 800-451-LEAP (5327)         Web-Site: www.leapsoft.com | By:
------------------------------------------------------------------------------

Filename: C:\Export\PORTSMOUTH-MINFORD RD_TEMP - split deck.gmd


                    PIER AND BEAM SEAT REPORT
                    -------------------------

PIER ID: PR05                  ROADWAY: SR823              ALIGNMENT :ALG02
PIER DIMS  > DIST-L1:   -50.0000 DIST-L2:   50.0000 LEN:  100.0000 WIDTH:  4.0000
ALN/PIER-CL> STATION:    487+10.3850  PIER-AZIMUTH:    N 52.303056
             ALN-AZM:  N 305.330569  ALN-PIER SKEW:  106.972487
PGL/PIER-CL> STATION:    487+10.3850  OFFSET:              0.0000 DIST:    50.0000
             PGL-AZM:  N 305.330569  PGL-PIER SKEW:  106.972487
PIER CENTER>             311,358.9936N  PGL/PIER-CL>        311,358.9936N
                       1,859,662.0676E                    1,859,662.0676E
```

CAP SECTION DATA

ID	DIST-along	DEPTH	TOP ELEV	BOT ELEV
Rect	0.0000	4.0000	684.2534	680.2534
Rect	8.3000	4.0000	684.6778	680.6778
Rect	19.3096	4.0000	684.3250	680.3250
Rect	30.3191	4.0000	683.9729	679.9729
Rect	41.3287	4.0000	683.6065	679.6065
Rect	50.0118	4.0000	683.7916	679.7916
Rect	58.6950	4.0000	683.8608	679.8608
Rect	69.7045	4.0000	683.5113	679.5113
Rect	80.7141	4.0000	683.1626	679.1626
Rect	91.7236	4.0000	682.7997	678.7997
Rect	100.0000	4.0000	682.7997	678.7997

Feet   Datafile Modification Date: 06/05/2009 09:19


```
                                Phone:                        | Sheet   2 of   2
. .                                                           | Job No:
Program: Leap Geomath®   Ver: 8.0.0    (c) LEAP Software, Inc | Date:   6/5/2009
Phone: 800-451-LEAP (5327)         Web-Site: www.leapsoft.com | By:
------------------------------------------------------------------------------

Filename: C:\Export\PORTSMOUTH-MINFORD RD_TEMP - split deck.gmd
```

BEAM SEAT LOCATIONS

LEFT				RIGHT			
ID	DIST-along	OFFSET	ELEVATION	ID	DIST-along	OFFSET	ELEVATION

BEAM SEAT LOCATIONS

LEFT				RIGHT			
ID	DIST-along	OFFSET	ELEVATION	ID	DIST-along	OFFSET	ELEVATION
				S4G1	2.7952	0.0000	684.2534
				S4G2	13.8048	0.0000	684.6778
				S4G3	24.8143	0.0000	684.3250
				S4G4	35.8239	0.0000	683.9729
				S4G5	46.8335	0.0000	683.6065
				S4G6	53.1902	0.0000	683.7916
				S4G7	64.1997	0.0000	683.8608
				S4G8	75.2093	0.0000	683.5113
				S4G9	86.2189	0.0000	683.1626
				S4G10	97.2284	0.0000	682.7997

***** End of Report *****

Feet   Datafile Modification Date: 06/05/2009 09:19

Program: Leap Geomath Ver: 8.0.0 (c) LEAP Software, Inc
Phone: 800-451-LEAP (5327) Phone: Web-Site: www.leapsoft.com

Sheet 1 of 1
Job No:
Date: 6/5/2009
By:

Filename: C:\Export\PORTSMOUTH-MINFORD RD_TEMP - split deck.gmd

PIER AND BEAM SEAT REPORT

```
PIER ID: PR04                ROADWAY: SR823              ALIGNMENT :ALG02
PIER DIMS  > DIST-L1:    -50.0000 DIST-L2:   50.0000 LEN:   100.0000 WIDTH:  5.0000
ALN/PIER-CL> STATION:    486+11.6830 PIER-AZIMUTH:     N 52.303056
             ALN-AZM:    N 304.343547  ALN-PIER SKEW:  107.959508
PGL/PIER-CL> STATION:    486+11.6830 OFFSET:           0.0000 DIST:     50.0000
             PGL-AZM:    N 304.343547  PGL-PIER SKEW:  107.959508
PIER CENTER>          311,302.6113N PGL/PIER-CL>       311,302.6113N
                    1,859,743.0792E                  1,859,743.0792E
```

CAP SECTION DATA

ID	DIST-along	DEPTH	TOP ELEV	BOT ELEV
Rect	0.0000	4.0000	685.8052	681.8052
Rect	8.1644	4.0000	686.2328	682.2328
Rect	19.2052	4.0000	685.9013	681.9013
Rect	30.2461	4.0000	685.5708	681.5708
Rect	41.2869	4.0000	685.2261	681.2261
Rect	50.0014	4.0000	685.4224	681.4224
Rect	58.7026	4.0000	685.5148	681.5148
Rect	69.7435	4.0000	685.1874	681.1874
Rect	80.7843	4.0000	684.8609	680.8609
Rect	91.8252	4.0000	684.5203	680.5203
Rect	100.0000	4.0000	684.5203	680.5203

Feet Datafile Modification Date: 06/05/2009 09:19

Program: Leap Geomath Ver: 8.0.0 (c) LEAP Software, Inc
Phone: 800-451-LEAP (5327) Phone: Web-Site: www.leapsoft.com

Sheet 2 of 2
Job No:
Date: 6/5/2009
By:

Filename: C:\Export\PORTSMOUTH-MINFORD RD_TEMP - split deck.gmd

BEAM SEAT LOCATIONS

LEFT				RIGHT			
ID	DIST-along	OFFSET	ELEVATION	ID	DIST-along	OFFSET	ELEVATION

BEAM SEAT LOCATIONS

LEFT				RIGHT			
ID	DIST-along	OFFSET	ELEVATION	ID	DIST-along	OFFSET	ELEVATION
S4G1	2.3948	-1.2318	685.8052	S3G1	2.9243	1.2237	685.8052
S4G2	13.4044	-1.2318	686.2328	S3G2	13.9965	1.2237	686.2328
S4G3	24.4139	-1.2318	685.9013	S3G3	25.0687	1.2237	685.9013
S4G4	35.4235	-1.2318	685.5708	S3G4	36.1408	1.2237	685.5708
S4G5	46.4331	-1.2318	685.2261	S3G5	47.2130	1.2237	685.2261
S4G6	52.7898	-1.2318	685.4224	S3G6	53.6059	1.2237	685.4224
S4G7	63.7993	-1.2318	685.5148	S3G7	64.6780	1.2237	685.5148
S4G8	74.8089	-1.2318	685.1874	S3G8	75.7502	1.2237	685.1874
S4G9	85.8184	-1.2318	684.8609	S3G9	86.8224	1.2237	684.8609
S4G10	96.8280	-1.2318	684.5203	S3G10	97.8946	1.2237	684.5203

***** End of Report *****

Feet Datafile Modification Date: 06/05/2009 09:19

			GEOMATH OUTPUT - Bottom of Bearing Pad Elevation - Girder Location									
			1	2	3	4	5	6	7	8	9	10
Span 1	Near	Abut.	691.736	692.235	691.977	691.720	691.450	691.690	691.858	691.607	691.357	691.093
	Far	Pier 1	689.543	690.016	689.731	689.448	689.151	689.374	689.515	689.236	688.958	688.667
Span 2	Near		689.543	690.016	689.731	689.448	689.151	689.374	689.515	689.236	688.958	688.667
	Far	Pier 2	687.399	687.849	687.539	687.231	686.909	687.119	687.234	686.930	686.626	686.309
Span 3	Near		687.399	687.849	687.539	687.231	686.909	687.119	687.234	686.930	686.626	686.309
	Far	Pier 3	685.805	686.233	685.901	685.571	685.226	685.422	685.515	685.187	684.861	684.520
Span 4	Near		685.805	686.233	685.901	685.571	685.226	685.422	685.515	685.187	684.861	684.520
	Far	Abut.	684.253	684.678	684.325	683.973	683.607	683.792	683.861	683.511	683.163	682.800

Notes:
Abutments - bearings are based on 4" elastomeric bearings + 1.5" top plate, minimum 4" support post and 2" bottom plate for a total bearing height of 11.5"
Piers - bearings are based on 3.5" elastomeric bearings + 2" (@ CL bearing) bevel plate for a total bearing height of 5.5"
Due to vertical curve, all minimum haunch locations are at or near mid-span, rather than at the bearings

HDR ONE COMPANY *Many Solutions*™	Project:	SCI 823-0917	Computed:	DMP	Date:	6/5/2009
	Subject:	Mirford Rd Crossing	Checked:		Date:	
	Task:	Geomath Bearing Elevation Data Sorting	Page:	1	of:	3
	Job #:		No:			

C:\PWworking\PITT\d0187425\Portsmouth 0917 - Bearing Elevations.xls

PR01

CAP SECTION DATA

ID	DIST-along	DEPTH	TOP ELEV	BOT ELEV
Rect	0.0000	4.0000	691.736	691.736
Rect	7.5411	4.0000	692.235	692.235
Rect	18.7510	4.0000	691.977	691.977
Rect	29.9609	4.0000	691.720	691.720
Rect	41.1708	4.0000	691.450	691.450
Rect	50.0119	4.0000	691.690	691.690
Rect	58.8530	4.0000	691.858	691.858
Rect	70.0629	4.0000	691.607	691.607
Rect	81.2728	4.0000	691.357	691.357
Rect	92.4827	4.0000	691.093	691.093
Rect	100.0000	4.0000	691.093	691.093

PR02

CAP SECTION DATA

ID	DIST-along	DEPTH	TOP ELEV	BOT ELEV
Rect	0.0000	4.0000	689.543	689.543
Rect	7.6565	4.0000	690.016	690.016
Rect	18.8309	4.0000	689.731	689.731
Rect	30.0053	4.0000	689.448	689.448
Rect	41.1797	4.0000	689.151	689.151
Rect	50.0003	4.0000	689.374	689.374
Rect	58.8060	4.0000	689.515	689.515
Rect	69.9804	4.0000	689.236	689.236

Rect	81.1548	4.0000	688.958	688.958
Rect	92.3292	4.0000	688.667	688.667
Rect	100.0000	4.0000	688.667	688.667

PR03

CAP SECTION DATA

ID	DIST-along	DEPTH	TOP ELEV	BOT ELEV
Rect	0.0000	4.0000	687.399	687.399
Rect	7.9185	4.0000	687.849	687.849
Rect	19.0241	4.0000	687.539	687.539
Rect	30.1296	4.0000	687.231	687.231
Rect	41.2351	4.0000	686.909	686.909
Rect	50.0010	4.0000	687.119	687.119
Rect	58.7528	4.0000	687.234	687.234
Rect	69.8583	4.0000	686.930	686.930
Rect	80.9639	4.0000	686.626	686.626
Rect	92.0694	4.0000	686.309	686.309
Rect	100.0000	4.0000	686.309	686.309

PR04

CAP SECTION DATA

ID	DIST-along	DEPTH	TOP ELEV	BOT ELEV
Rect	0.0000	4.0000	685.805	685.805
Rect	8.1644	4.0000	686.233	686.233
Rect	19.2052	4.0000	685.901	685.901
Rect	30.2461	4.0000	685.571	685.571

Rect	41.2869	4.0000	685.226	685.226
Rect	50.0014	4.0000	685.422	685.422
Rect	58.7026	4.0000	685.515	685.515
Rect	69.7435	4.0000	685.187	685.187
Rect	80.7843	4.0000	684.861	684.861
Rect	91.8252	4.0000	684.520	684.520
Rect	100.0000	4.0000	684.520	684.520

PR05

CAP SECTION DATA

ID	DIST-along	DEPTH	TOP ELEV	BOT ELEV
Rect	0.0000	4.0000	684.253	684.253
Rect	8.3000	4.0000	684.678	684.678
Rect	19.3096	4.0000	684.325	684.325
Rect	30.3191	4.0000	683.973	683.973
Rect	41.3287	4.0000	683.607	683.607
Rect	50.0118	4.0000	683.792	683.792
Rect	58.6950	4.0000	683.861	683.861
Rect	69.7045	4.0000	683.511	683.511
Rect	80.7141	4.0000	683.163	683.163
Rect	91.7236	4.0000	682.800	682.800
Rect	100.0000	4.0000	682.800	682.800

EASTBOUND SCREED TABLE

SPAN POINT		C/L BEARING REAR ABUTMENT	1/4	1/2	3/4	PIER 1A	PIER 1B	1/4	1/2	3/4	PIER 2A	PIER 2B	1/4	1/2	3/4	PIER 3A	PIER 3B	1/4	1/2	3/4	C/L BEARING FORWARD ABUTMENT
LEFT TOE OF PARAPET	STATION	483+30.81	483+55.26	483+79.71	484+04.16	484+28.60	484+28.60	484+53.38	484+78.15	485+02.92	485+27.69	485+27.69	485+52.46	485+77.24	486+02.01	486+26.79	486+26.79	486+51.24	486+75.70	487+00.15	487+24.61
	TOP OF SLAB ELEV.	699.21	698.50	697.82	697.18	696.57	696.57	695.98	695.43	694.91	694.42	694.42	693.97	693.56	693.17	692.82	692.82	692.50	692.22	691.98	691.76
	DEFLECTION	0.00	0.182	0.242	0.182	0.000	0.000	0.176	0.233	0.176	0.000	0.000	0.176	0.233	0.176	0.000	0.000	0.182	0.242	0.182	0.000
	SCREED ELEV.	699.21	698.68	698.07	697.36	696.57	696.57	696.15	695.66	695.08	694.42	694.42	694.14	693.78	693.34	692.82	692.82	692.68	692.46	692.16	691.76
BEAM 1	STATION	483+30.03	483+54.19	483+78.36	484+02.52	484+26.68	484+29.14	484+53.31	484+77.47	485+01.64	485+25.80	485+28.27	485+52.44	485+76.60	486+00.77	486+24.93	486+27.41	486+51.57	486+75.73	486+99.90	487+24.06
	TOP OF SLAB ELEV.	699.32	698.62	697.95	697.30	696.69	696.64	696.07	695.53	695.01	694.53	694.49	694.06	693.66	693.27	692.91	692.89	692.59	692.31	692.06	691.84
	DEFLECTION	0.00	0.182	0.242	0.182	0.000	0.000	0.176	0.233	0.175	0.000	0.000	0.176	0.233	0.176	0.000	0.000	0.182	0.242	0.182	0.000
	SCREED ELEV.	699.32	698.80	698.19	697.48	696.69	696.64	696.24	695.76	695.19	694.53	694.49	694.23	693.88	693.44	692.91	692.89	692.77	692.55	692.24	691.84
CROWN POINT	STATION	483+26.29	483+50.79	483+75.30	483+99.81	484+24.31	484+24.31	484+49.14	484+73.97	484+98.80	485+23.63	485+23.63	485+48.46	485+73.29	485+98.12	486+22.96	486+22.96	486+47.47	486+71.98	486+96.49	487+21.00
	TOP OF SLAB ELEV.	699.83	699.11	698.42	697.77	697.16	697.16	696.56	696.00	695.47	694.96	694.96	694.52	694.10	693.70	693.36	693.36	693.03	692.74	692.49	692.27
	DEFLECTION	0.00	0.193	0.257	0.193	0.000	0.000	0.186	0.248	0.186	0.000	0.000	0.186	0.248	0.186	0.000	0.000	0.193	0.257	0.193	0.000
	SCREED ELEV.	699.83	699.30	698.68	697.96	697.16	697.15	696.74	696.25	695.66	694.96	694.96	694.71	694.34	693.89	693.36	693.36	693.22	693.00	692.68	692.27
BEAM 2	STATION	483+26.07	483+50.28	483+74.49	483+98.70	484+22.91	484+25.40	484+49.61	484+73.81	484+98.02	485+22.23	485+24.73	485+48.94	485+73.14	485+97.35	486+21.56	486+24.06	486+48.27	486+72.48	486+96.68	487+20.89
	TOP OF SLAB ELEV.	699.8150	699.10	698.42	697.78	697.17	697.11	696.52	695.98	695.47	694.99	694.94	694.49	694.07	693.70	693.36	693.31	693.00	692.71	692.47	692.26
	DEFLECTION	0.0000	0.193	0.257	0.193	0.000	0.000	0.186	0.248	0.186	0.000	0.000	0.186	0.248	0.186	0.000	0.000	0.193	0.257	0.193	0.000
	SCREED ELEV.	699.8160	699.29	698.68	697.97	697.17	697.11	696.71	696.23	695.65	694.99	694.94	694.67	694.32	693.88	693.36	693.31	693.19	692.97	692.66	692.26
BEAM 3	STATION	483+22.11	483+46.36	483+70.61	483+94.87	484+19.12	484+21.64	484+45.89	484+70.14	484+94.39	485+18.64	485+21.17	485+45.42	485+69.67	485+93.93	486+18.18	486+20.71	486+44.96	486+69.21	486+93.46	487+17.71
	TOP OF SLAB ELEV.	699.5674	698.84	698.15	697.50	696.89	696.82	696.23	695.68	695.18	694.68	694.63	694.17	693.75	693.37	693.02	692.96	692.66	692.37	692.12	691.91
	DEFLECTION	0.0000	0.193	0.257	0.193	0.000	0.000	0.186	0.248	0.186	0.000	0.000	0.186	0.248	0.186	0.000	0.000	0.193	0.257	0.193	0.000
	SCREED ELEV.	699.5674	699.03	698.41	697.69	696.89	696.82	696.42	695.93	695.36	694.68	694.63	694.36	694.00	693.56	693.02	692.96	692.85	692.63	692.31	691.91
BEAM 4	STATION	483+18.13	483+42.42	483+66.72	483+91.02	484+15.31	484+17.86	484+42.16	484+66.45	484+90.75	485+15.06	485+17.60	485+41.89	485+66.19	485+90.49	486+14.79	486+17.34	486+41.63	486+65.93	486+90.22	487+14.51
	TOP OF SLAB ELEV.	699.3011	698.57	697.88	697.22	696.60	696.54	695.94	695.38	694.86	694.37	694.32	693.86	693.43	693.04	692.69	692.65	692.32	692.03	691.77	691.56
	DEFLECTION	0.0000	0.193	0.257	0.193	0.000	0.000	0.186	0.248	0.186	0.000	0.000	0.186	0.248	0.186	0.000	0.000	0.193	0.257	0.193	0.000
	SCREED ELEV.	699.3011	698.77	698.14	697.42	696.60	696.54	696.13	695.63	695.05	694.37	694.32	694.04	693.68	693.23	692.69	692.65	692.62	692.29	691.97	691.65
PROFILE GRADE	STATION	483+17.18	483+41.80	483+66.42	483+91.05	484+15.67	484+15.67	484+40.62	484+65.58	484+90.61	485+15.45	485+15.45	485+40.40	485+65.35	485+90.29	486+15.24	486+15.24	486+39.86	486+64.49	486+89.11	487+13.74
	TOP OF SLAB ELEV.	699.2406	698.51	697.81	697.14	696.50	696.50	695.89	695.32	694.78	694.27	694.27	693.80	693.36	692.96	692.59	692.59	692.26	691.96	691.70	691.47
	DEFLECTION	0.0000	0.190	0.253	0.190	0.000	0.000	0.183	0.244	0.183	0.000	0.000	0.183	0.244	0.183	0.000	0.000	0.190	0.263	0.190	0.000
	SCREED ELEV.	699.2406	698.70	698.06	697.33	696.50	696.50	696.06	695.56	694.96	694.27	694.27	693.98	693.61	693.14	692.59	692.59	692.45	692.22	691.89	691.47
BEAM 5	STATION	483+14.13	483+38.47	483+62.81	483+87.16	484+11.50	484+14.07	484+38.41	484+62.75	484+87.10	485+11.44	485+14.01	485+38.36	485+62.70	485+87.04	486+11.38	486+13.96	486+38.29	486+62.63	486+86.97	487+11.31
	TOP OF SLAB Elev.	699.0463	698.31	697.61	696.95	696.32	696.26	695.65	695.09	694.56	694.07	694.01	693.55	693.11	692.72	692.36	692.32	691.99	691.69	691.43	691.20
	DEFLECTION	0.0000	0.181	0.242	0.182	0.000	0.000	0.176	0.233	0.175	0.000	0.000	0.175	0.233	0.176	0.000	0.000	0.182	0.242	0.182	0.000
	SCREED ELEV.	699.0463	698.49	697.85	697.13	696.32	696.26	695.83	695.32	694.73	694.07	694.01	693.72	693.36	692.89	692.36	692.32	692.17	691.93	691.61	691.20
RIGHT TOE OF PARAPET	STATION	483+13.55	483+38.22	483+62.89	483+87.56	484+12.23	484+12.23	484+37.22	484+62.21	484+87.21	485+12.20	485+12.20	485+37.19	485+62.18	485+87.18	486+12.17	486+12.17	486+36.84	486+61.51	486+86.17	487+10.84
	TOP OF SLAB ELEV.	699.0096	698.27	697.56	696.89	696.25	696.25	695.63	695.06	694.51	694.00	694.00	693.52	693.08	692.67	692.29	692.29	691.96	691.66	691.39	691.15
	DEFLECTION	0.0000	0.181	0.242	0.182	0.000	0.000	0.175	0.233	0.176	0.000	0.000	0.176	0.233	0.176	0.000	0.000	0.182	0.242	0.182	0.000
	SCREED ELEV.	699.0096	698.45	697.80	697.07	696.25	696.25	695.81	695.29	694.68	694.00	694.00	693.69	693.31	692.84	692.29	692.29	692.14	691.90	691.57	691.15

Crown Point to Girder 1	10.0
Crown Point to Girder 2	0.5
PGL to Girder 4	2.5
PGL to Girder 5	8.0

WESTBOUND SCREED TABLE

SPAN POINT		C/L BEARING REAR ABUTMENT	1/4	1/2	3/4	PIER 1A	PIER 1B	1/4	1/2	3/4	PIER 2A	PIER 2B	1/4	1/2	3/4	PIER 3A	PIER 3B	1/4	1/2	3/4	C/L BEARING FORWARD ABUTMENT
LEFT TOE OF PARAPET	STATION	483+12.40	483+37.09	483+61.77	483+86.45	484+11.14	484+11.14	484+36.16	484+61.15	484+86.16	485+11.17	485+11.17	485+36.17	485+61.18	485+86.19	486+11.20	486+11.20	486+35.88	486+60.56	486+85.24	487+09.9271
	TOP OF SLAB ELEV.	699.20	698.45	697.75	697.07	696.43	696.43	695.81	695.23	694.66	694.17	694.17	693.69	693.24	692.83	692.46	692.46	692.12	691.82	691.56	691.3116
	DEFLECTION	0.000	0.182	0.242	0.182	0.000	0.000	0.175	0.233	0.175	0.000	0.000	0.175	0.233	0.175	0.000	0.000	0.181	0.242	0.182	0.0000
	SCREED ELEV.	699.20	698.64	697.99	697.25	696.43	696.43	695.99	695.46	694.84	694.17	694.17	693.86	693.48	693.01	692.46	692.46	692.30	692.06	691.73	691.3116
BEAM 6	STATION	483+11.42	483+36.18	483+60.66	483+84.92	484+09.29	484+11.86	484+36.24	484+60.61	484+84.98	485+09.35	485+11.94	485+36.30	485+60.67	485+85.04	486+09.41	486+11.99	486+36.36	486+60.72	486+85.09	487+09.4633
	TOP OF SLAB ELEV.	699.26	698.55	697.85	697.18	696.54	696.47	695.88	695.31	694.77	694.27	694.21	693.75	693.32	692.92	692.55	692.51	692.18	691.89	691.62	691.3779
	DEFLECTION	0.000	0.182	0.242	0.182	0.000	0.000	0.175	0.233	0.175	0.000	0.000	0.175	0.233	0.175	0.000	0.000	0.181	0.242	0.182	0.0000
	SCREED ELEV.	699.26	698.73	698.09	697.36	696.54	696.47	696.05	695.54	694.95	694.27	694.21	693.93	693.55	693.10	692.55	692.51	692.36	692.13	691.80	691.3779
CROWN POINT	STATION	483+09.72	483+34.44	483+59.15	483+83.87	484+08.59	484+08.59	484+33.63	484+58.67	484+83.72	485+08.76	485+08.76	485+33.80	485+58.84	485+83.88	486+08.92	486+08.92	486+33.64	486+58.38	486+83.07	487+07.7867
	TOP OF SLAB ELEV.	699.56	698.81	698.10	697.42	696.77	696.77	696.16	695.56	695.01	694.50	694.50	694.01	693.56	693.15	692.77	692.77	692.43	692.12	691.85	691.6106
	DEFLECTION	0.000	0.187	0.249	0.187	0.000	0.000	0.180	0.240	0.180	0.000	0.000	0.180	0.240	0.180	0.000	0.000	0.187	0.249	0.187	0.0000
	SCREED ELEV.	699.56	699.00	698.35	697.61	696.77	696.77	696.33	695.80	695.19	694.50	694.50	694.19	693.80	693.33	692.77	692.77	692.62	692.37	692.04	691.6106
PROFILE GRADE	STATION	483+08.76	483+33.49	483+58.22	483+82.95	484+07.68	484+07.68	484+32.73	484+57.79	484+82.84	485+07.90	485+07.90	485+32.95	485+58.00	485+83.05	486+08.11	486+08.11	486+32.84	486+57.57	486+82.29	487+07.0210
	TOP OF SLAB ELEV.	699.50	698.75	698.04	697.36	696.71	696.71	696.08	695.50	694.94	694.42	694.42	693.94	693.49	693.07	692.69	692.69	692.35	692.04	691.77	691.6276
	DEFLECTION	0.000	0.190	0.253	0.189	0.000	0.000	0.183	0.244	0.183	0.000	0.000	0.183	0.244	0.183	0.000	0.000	0.190	0.253	0.190	0.0000
	SCREED ELEV.	699.50	698.94	698.29	697.54	696.71	696.71	696.27	695.74	695.12	694.42	694.42	694.12	693.73	693.26	692.69	692.69	692.54	692.30	691.96	691.6276
BEAM 7	STATION	483+07.80	483+32.21	483+56.62	483+81.03	484+05.45	484+08.07	484+32.48	484+56.89	484+81.30	485+05.71	485+08.33	485+32.74	485+57.16	485+81.57	486+06.98	486+08.59	486+33.00	486+57.41	486+81.82	487+06.2301
	TOP OF SLAB ELEV.	699.44	698.69	697.98	697.31	696.67	696.61	695.99	695.42	694.86	694.37	694.32	693.85	693.40	693.00	692.63	692.60	692.25	691.95	691.68	691.4421
	DEFLECTION	0.000	0.193	0.257	0.193	0.000	0.000	0.186	0.248	0.186	0.000	0.000	0.186	0.248	0.186	0.000	0.000	0.193	0.257	0.193	0.0000
	SCREED ELEV.	699.44	698.88	698.24	697.50	696.67	696.61	696.18	695.66	695.06	694.37	694.32	694.03	693.65	693.19	692.63	692.60	692.45	692.20	691.87	691.4421
BEAM 8	STATION	483+03.76	483+28.22	483+52.68	483+77.13	484+01.59	484+04.24	484+28.70	484+53.15	484+77.61	485+02.07	485+04.71	485+29.17	485+53.63	485+78.08	486+02.54	486+05.18	486+29.63	486+54.09	486+78.54	487+02.9950
	TOP OF SLAB ELEV.	699.19	698.43	697.72	697.03	696.39	696.33	695.71	695.12	694.58	694.07	694.02	693.54	693.09	692.68	692.30	692.27	691.92	691.61	691.33	691.0929
	DEFLECTION	0.000	0.193	0.257	0.193	0.000	0.000	0.186	0.248	0.186	0.000	0.000	0.186	0.248	0.186	0.000	0.000	0.193	0.257	0.193	0.0000
	SCREED ELEV.	699.19	698.63	697.97	697.23	696.39	696.33	695.89	695.37	694.76	694.07	694.02	693.72	693.34	692.86	692.30	692.27	692.11	691.86	691.52	691.0929
BEAM 9	STATION	482+99.71	483+24.22	483+48.72	483+73.22	483+97.72	484+00.40	484+24.90	484+49.40	484+73.91	484+98.41	485+01.08	485+25.58	485+50.06	485+74.59	485+99.09	486+01.75	486+26.25	486+50.75	486+75.25	486+99.7480
	TOP OF SLAB ELEV.	698.94	698.18	697.45	696.76	696.11	696.05	695.42	694.83	694.28	693.76	693.72	693.23	692.77	692.36	691.96	691.94	691.59	691.27	690.99	690.7444
	DEFLECTION	0.000	0.193	0.257	0.193	0.000	0.000	0.186	0.248	0.186	0.000	0.000	0.186	0.248	0.186	0.000	0.000	0.193	0.257	0.193	0.0000
	SCREED ELEV.	698.94	698.37	697.71	696.96	696.11	696.05	695.61	695.08	694.47	693.76	693.72	693.41	693.02	692.54	691.96	691.94	691.78	691.53	691.18	690.7444
BEAM 10	STATION	482+95.66	483+20.20	483+44.74	483+69.29	483+93.84	483+96.55	484+21.09	484+45.64	484+70.19	484+94.74	484+97.44	485+21.98	485+46.53	485+71.06	485+95.62	485+98.31	486+22.86	486+47.40	486+71.94	486+96.4659
	TOP OF SLAB Elev.	698.69	697.92	697.19	696.49	695.83	695.77	695.14	694.54	693.98	693.46	693.41	692.92	692.46	692.04	691.65	691.62	691.26	690.93	690.65	690.3967
	DEFLECTION	0.000	0.182	0.242	0.182	0.000	0.000	0.176	0.233	0.176	0.000	0.000	0.176	0.233	0.176	0.000	0.000	0.182	0.242	0.182	0.0000
	SCREED ELEV.	698.69	698.10	697.43	696.67	695.83	695.77	695.31	694.78	694.16	693.46	693.41	693.09	692.69	692.21	691.65	691.62	691.44	691.18	690.83	690.3967
RIGHT TOE OF PARAPET	STATION	482+94.83	483+19.74	483+44.64	483+69.55	483+94.46	483+94.46	484+19.70	484+44.93	484+70.16	484+95.40	484+95.40	485+20.63	485+45.86	485+71.09	485+96.32	485+96.32	486+21.22	486+46.12	486+71.02	486+95.9161
	TOP OF SLAB ELEV.	698.64	697.87	697.13	696.42	695.75	695.75	695.11	694.50	693.92	693.38	693.38	692.88	692.41	691.97	691.67	691.67	691.21	690.89	690.59	690.3358
	DEFLECTION	0.000	0.182	0.242	0.182	0.000	0.000	0.175	0.233	0.175	0.000	0.000	0.175	0.233	0.175	0.000	0.000	0.182	0.242	0.182	0.0000
	SCREED ELEV.	698.64	698.05	697.37	696.60	695.75	695.75	695.28	694.73	694.10	693.36	693.38	693.05	692.64	692.15	691.67	691.67	691.39	691.13	690.78	690.3358

Crown Point to Girder 1	5.0
Crown Point to Girder 2	5.5
PGL to Girder 4	7.5
PGL to Girder 5	3.0

GEOMATH
SPOT-CHECKS

Project: Portsmouth - Minford	Computed: DMP	Date:	6/5/2009
Subject: Geometry	Checked:	Date:	
Task: Geomath Spot Checks	Page:	of:	
Job #:	No:		

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Vertical Curve Data:

$g1 := -3.75\%$ $\quad VPC := 703.315ft$ $\quad STA_c := 48190.00ft$

$g2 := 4.5\%$ $\quad VPI := 675.190ft$ $\quad STA_i := 48940.00ft$

$L := 1500ft$ $\quad VPT := 708.940ft$ $\quad STA_t := 49690.00ft$

$$r := \frac{g2 - g1}{L} = 5.5 \times 10^{-5} \cdot ft^{-1} \qquad Y(x) := VPC + g1 \cdot x + \left(\frac{r}{2}\right) \cdot x^2$$

Location 1: Span 1 Deck and Bearing elevation at Girder 1

Station of Girder 1 at CL of Bearing: $STA_{1n} := 48312.978ft + 17.08059ft$ $\quad x_1 := STA_{1n} - STA_c$

$STA_{1n} = 48330.06 \cdot ft$ $\quad x_1 = 140.059 \cdot ft$

$Y(x_1) = 698.602 \cdot ft$

Offset to Girder 1 at CL: $Off_{1n} := 44.90106ft$

Accross Deck Cross Sections:

split offset: $v1_1 := -1.75in = -0.146 \cdot ft$

3.6% slope: $v2_1 := 3.6\% \cdot 35ft = 1.26 \cdot ft$

-4.0% slope: $v3_1 := -4.0\% \cdot (Off_{1n} - 35ft) = -0.396 \cdot ft$

Deck Elevation at Bearing: $D_{1n} := Y(x_1) + v1_1 + v2_1 + v3_1 = 699.32 \cdot ft$

Geomath Deck Elevation:

$STA_{g1n} := 48330.0267ft$

$Off_{g1n} := 44.9131ft$

$D_{g1n} := 699.3207ft$

Differences:

$STA_{g1n} - STA_{1n} = -0.383 \cdot in$

$Off_{g1n} - Off_{1n} = 0.144 \cdot in$

$D_{g1n} - D_{1n} = 0.004 \cdot in$

Location 2: Span 1 Deck and Bearing elevation at Girder 2

Station of Girder 1 at CL of Bearing: $STA_{2n} := 48326.0741ft$ $x_2 := STA_{2n} - STA_c$

$STA_{2n} = 48326.07 \cdot ft$ $x_2 = 136.074 \cdot ft$

$Y(x_2) = 698.721 \cdot ft$

Offset to Girder 1 at CL: $Off_{2n} := 34.4335ft$

Accross Deck Cross Sections: split offset: $v1_2 := -1.75in = -0.146 \cdot ft$

3.6% slope: $v2_2 := 3.6\% \cdot Off_{2n} = 1.24 \cdot ft$

Deck Elevation at Bearing: $D_{2n} := Y(x_2) + v1_2 + v2_2 = 699.815 \cdot ft$

Geomath Deck Elevation: $STA_{g2n} := 48326.0741ft$

$Off_{g2n} := 34.4335ft$

$D_{g2n} := 699.8150ft$

Difference: $D_{g2n} - D_{2n} = -0.002 \cdot in$

Location 5: Span 1 Deck and Bearing elevation at Girder 5

Station of Girder 1 at CL of Bearing: $STA_{5n} := 48314.1297ft$ $x_{5n} := STA_{5n} - STA_c$

$STA_{5n} = 48314.13 \cdot ft$ $x_{5n} = 124.13 \cdot ft$

$Y(x_{5n}) = 699.084 \cdot ft$

Offset to Girder 1 at CL: $Off_{5n} := 3.0113ft$

Accross Deck Cross Sections: split offset: $v1 := -1.75in = -0.146 \cdot ft$

3.6% slope: $v2 := 3.6\% \cdot Off_{5n} = 0.108 \cdot ft$

Deck Elevation at Bearing: $D_{5n} := Y(x_{5n}) + v1 + v2 = 699.046 \cdot ft$

Geomath Deck Elevation: $STA_{g5n} := 48314.1297ft$

$Off_{g5n} := 3.0113ft$

$D_{g5n} := 699.0463ft$

Difference: $D_{g5n} - D_{5n} = -0.002 \cdot in$

Location 6: Span 1 Deck and Bearing elevation at Girder 6

Station of Girder 1 at CL of Bearing: $STA_{6n} := 48311.8158ft$ $\quad x_{6n} := STA_{6n} - STA_c$

$STA_{6n} = 48311.82 \cdot ft$ $\quad x_{6n} = 121.816 \cdot ft$

$Y(x_{6n}) = 699.155 \cdot ft$

Offset to Girder 1 at CL: $Off_{6n} := 3.0333ft$

Accross Deck Cross Sections: 4.0% slope: $v3 := 4.0\% \cdot (Off_{6n})$ $\quad v3 = 0.121 \cdot ft$

Deck Elevation at Bearing: $D_{6n} := Y(x_{6n}) + v3 = 699.276 \cdot ft$

Geomath Deck Elevation:

$STA_{g6n} := 48311.8158ft$

$Off_{g6n} := 3.0333ft$

$D_{g6n} := 699.2763ft$

Differences: $D_{g6n} - D_{6n} = -0.000 \cdot in$

Location 10: Span 1 Deck and Bearing elevation at Girder 10

Station of Girder 1 at CL of Bearing: $STA_{10n} := 48312.978ft - 17.35891ft$ $\quad x_{10} := STA_{10n} - STA_c$

$STA_{10n} = 48295.62 \cdot ft$ $\quad x_{10} = 105.619 \cdot ft$

$Y(x_{10}) = 699.661 \cdot ft$

Offset to Girder 1 at CL: $Off_{10n} := 44.87151ft$

Accross Deck Cross Sections:

4.0% slope: $v2 := 4.0\% \cdot 8.5 \cdot ft = 0.34 \cdot ft$

-3.6% slope: $v3 := -3.6\% \cdot (Off_{10n} - 8.5ft) = -1.309 \cdot ft$

Deck Elevation at Bearing: $D_{10n} := Y(x_{10}) + v2 + v3 = 698.692 \cdot ft$

Geomath Deck Elevation:

$STA_{g10n} := 48295.6507ft$

$Off_{g10n} := 44.8837ft$

$D_{g10n} := 698.6902ft$

Differences:

$STA_{g10n} - STA_{10n} = 0.379 \cdot in$

$Off_{g10n} - Off_{10n} = 0.146 \cdot in$

$D_{g10n} - D_{10n} = -0.018 \cdot in$

Location 3: Span 4 Deck and Bearing elevation at Girder 10

Station of Girder 1 at CL of Bearing: $STA_{10f} := 48696.4889ft$ $\quad x_{10f} := STA_{10f} - STA_c$

$STA_{10f} = 48696.49 \cdot ft$ $\quad x_{10f} = 506.489 \cdot ft$

$Y(x_{10f}) = 691.376 \cdot ft$

Offset to Girder 1 at CL: $Off_{10f} := 45.1547ft$

Accross Deck Cross Sections:

4.0% slope: $v2 := 4.0\% \cdot 8.5 \cdot ft = 0.34 \cdot ft$

-3.6% slope: $v3 := -3.6\% \cdot (Off_{10f} - 8.5ft) = -1.32 \cdot ft$

Deck Elevation at Bearing: $D_{10f} := Y(x_{10f}) + v2 + v3 = 690.397 \cdot ft$

Geomath Deck Elevation:

$STA_{g10f} := 48696.4889ft$

$Off_{g10f} := 45.1547ft$

$D_{g10f} := 690.3967ft$

Differences: $D_{g10f} - D_{10f} = 0.000 \cdot in$

Location 4: Span 4 Deck and Bearing elevation at Girder 1

Station of Girder 1 at CL of Bearing: $STA_{1f} := 48627.4103ft$ $\quad x_{1f} := STA_{1f} - STA_c$

$STA_{1f} = 48627.41 \cdot ft$ $\quad x_{1f} = 437.41 \cdot ft$

$Y(x_{1f}) = 692.174 \cdot ft$

Offset to Girder 1 at CL: $Off_{1f} := 44.9275ft$

Accross Deck Cross Sections:

split offset: $v1 := -1.75in = -0.146 \cdot ft$

3.6% slope: $v2 := 3.6\% \cdot 35ft = 1.26 \cdot ft$

-4.0% slope: $v3 := -4.0\% \cdot (Off_{1f} - 35ft) = -0.397 \cdot ft$

Deck Elevation at Bearing: $D_{1f} := Y(x_{1f}) + v1 + v2 + v3 = 692.891 \cdot ft$

Geomath Deck Elevation:

$STA_{g1f} := 48627.4103ft$

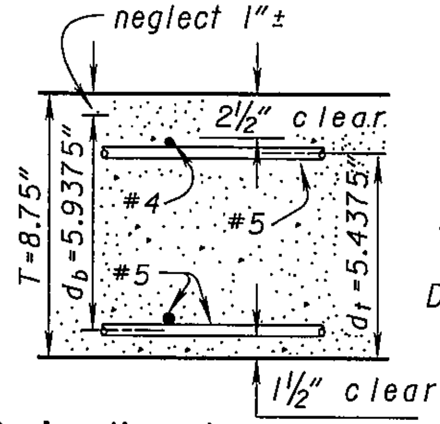
$Off_{g1f} := 44.9275ft$

$D_{g1f} := 692.8905ft$

Differences: $D_{g1f} - D_{1f} = -0.002 \cdot in$

Deck Design

Sample problem : Using load factor design procedures determine the slab thickness and main reinforcement for a deck slab with an 9'-6" stringer spacing and an HS25-44 loading.



S = 9'-6" minus 6"= 9'-0"

Tmin.= (S+17)/(36) =0.72' = 8.67"> 8½", use 8¾"

f'_c = 4500 psi

f_y = 60000 psi

ϕ= 0.9 (8.16.1.2.2)⊕

Z = 130 k/in(top), 170 k/in(bottom) (8.16.8.4)⊕

n = 8 Impact = 30%

Dead load W :

Slab = (0.73')(1.0')(0.15 k/ft²)= 0.110 k/ft

FWS = 60 p.s.f.(1.0')= 0.060 k/ft

TOTAL DEAD LOAD (W) = 0.170 k/ft

Design Moments :

DL = (0.125)(W)(S^2)(0.8)= (0.125)(0.170)(9.0^2)(0.8)= 1.38 ft-k

LL + I = (S+2)(20)(1.3)(0.8)/32= 7.15 ft-k (3.24.3.1)⊕

Mu = 1.3[DL+1.67(LL+I)]= 1.3[1.38+1.67(7.15)]= 17.32 ft-k (3.22)⊕

Mw = Service load moment= DL + LL+I = 8.53 ft-k

$$\rho = \frac{(0.85)f'_c}{f_y}\left[1-\sqrt{1-\frac{2R}{(0.85)f'_c}}\right] \qquad K = [2\rho n+(\rho n)^2]^{1/2} - \rho n \qquad j = 1-(K/3)$$

Top Reinforcement	**Bottom Reinforcement**
R= Mu/ϕbd²	
R= (17.32)(1000)/(0.9)(1)(5.438²) = 650.77 psi	R= (17.32)(1000)/(0.9)(1)(5.938²) = 545.79 psi
ρ= 0.01196	ρ= 0.00985
As= (0.01196)(12)(5.438)= 0.78 in²/ft	As= (0.00985)(12)(5.938)= 0.70 in²/ft
Try #5 bars at 4.75" in (As=0.78 in²/ft)	Try #5 bars at 5.25" in (As=0.71 in²/ft)

Check steel spacing (8.16.8.4)⊕

f_s (all.)= $z/(d_c A)^{1/3} \leq 0.6f_y$

Top	Bottom
d_c=2+(0.625/2)=2.312 in	d_c=1.5+(0.625/2)=1.812 in
A=2(2.312 x 4.75)=21.96 in²/ft	A=2(1.812 x 5.25)=19.03 in²/ft
f_s (all.)= 130/[(2.312)(21.96)]$^{1/3}$ ≤0.6(60) = 35.11 ksi ≤ 36.0 ksi	f_s (all.)= 170/[(1.812)(19.03)]$^{1/3}$ ≤36.0 ksi = 52.23, use 36.0 ksi max.
f_s (act.)= Mw/As jd	
f_s (act.)=(8.53)(12)/(0.78)(0.89)(5.438) = 27.11 ksi (OK)	f_s (act.)=(8.53)(12)/(0.71)(0.89)(5.938) = 27.28 ksi (OK)
✡Use #5 bars @ 4.75"c/c (As=0.78 in²/ft)	✡Use #5 bars @ 4.75"c/c (As=0.78 in²/ft)

Prepared	Checked	Traced	Date
RZ	SAM	RZ	12-08-99

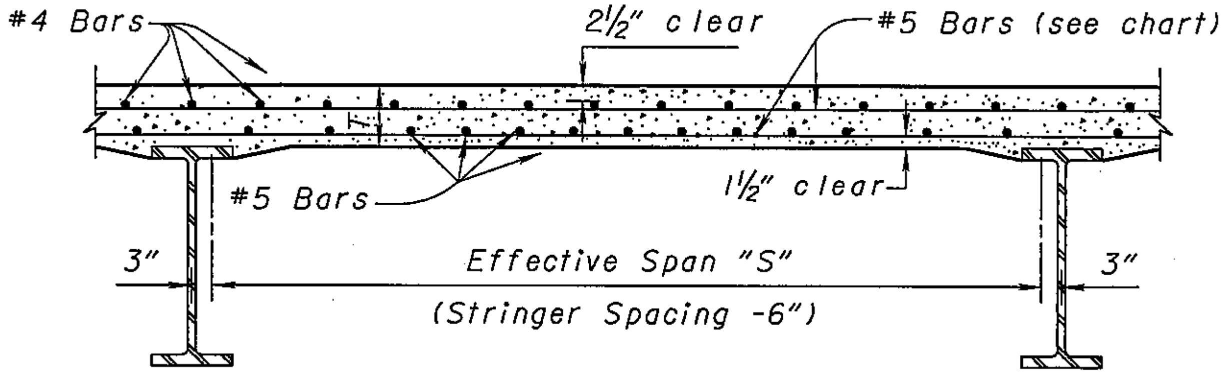
⊕ AASHTO

✡Top and bottom bars shall coincide based on BDM Section 302.2.4.2

Figure 312

ODOT EXAMPLE

TRANSVERSE SLAB DESIGN* - HS25-44



EXAMPLE: Stringer spacing of 9'-6"

S= 9'-6" minus 6"= 9'-0"

T= 8¾", As (top)= 0.78 in^2/ft, As (bott.)= 0.71 in^2/ft

PRIMARY REINFORCEMENT: (SEE SEC. 302.2.4.2)

Use #5 bars (top & bott.), both at 4.75" c/c, As=0.78 in^2

DISTRIBUTIONAL REINFORCEMENT:

As (top)=(0.33)(0.78)=0.26 in^2 /ft

Use #4 bars at 13 equal spaces (As= 0.27 in^2 /ft)

As (bott.) : $220/\sqrt{S}$ =73.33%, use 67% max. (3.24.10.2)⊕

= (0.67)(0.78)= 0.52 in^2 /ft in mid-half of span

= (0.50)(0.52)= 0.26 in^2 /ft in each outer quarter (3.24.10.3)⊕

Use 9 #5 bars at 7" c/c in mid-half of span and 2 #5 bar in each outer quarter.

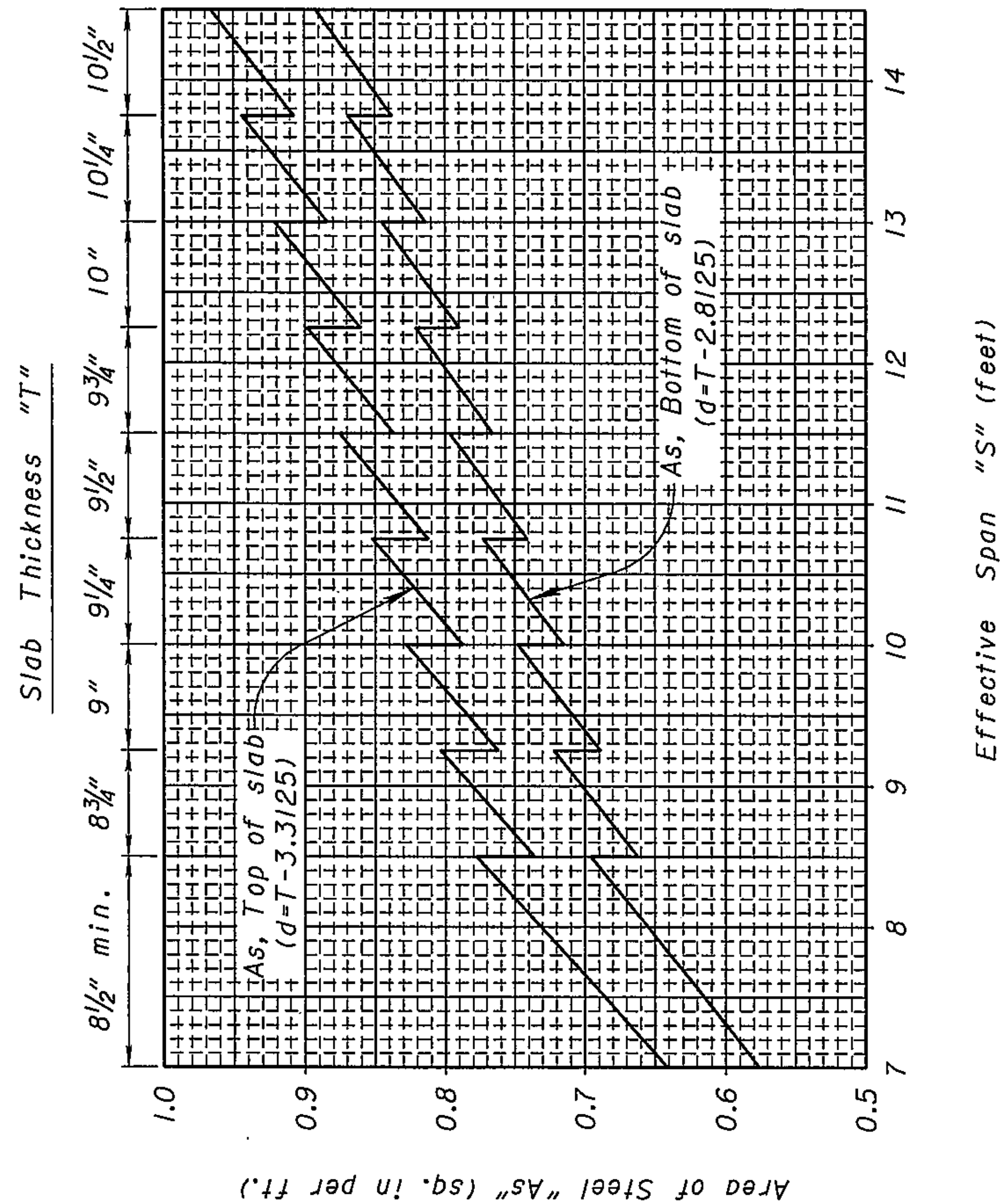
Prepared	Checked	Traced	Date
RZ	SAM	RZ	12-08-99

⊕ AASHTO

* By load factor procedures. For design data and sample problem, see Fig. 312

Figure 313

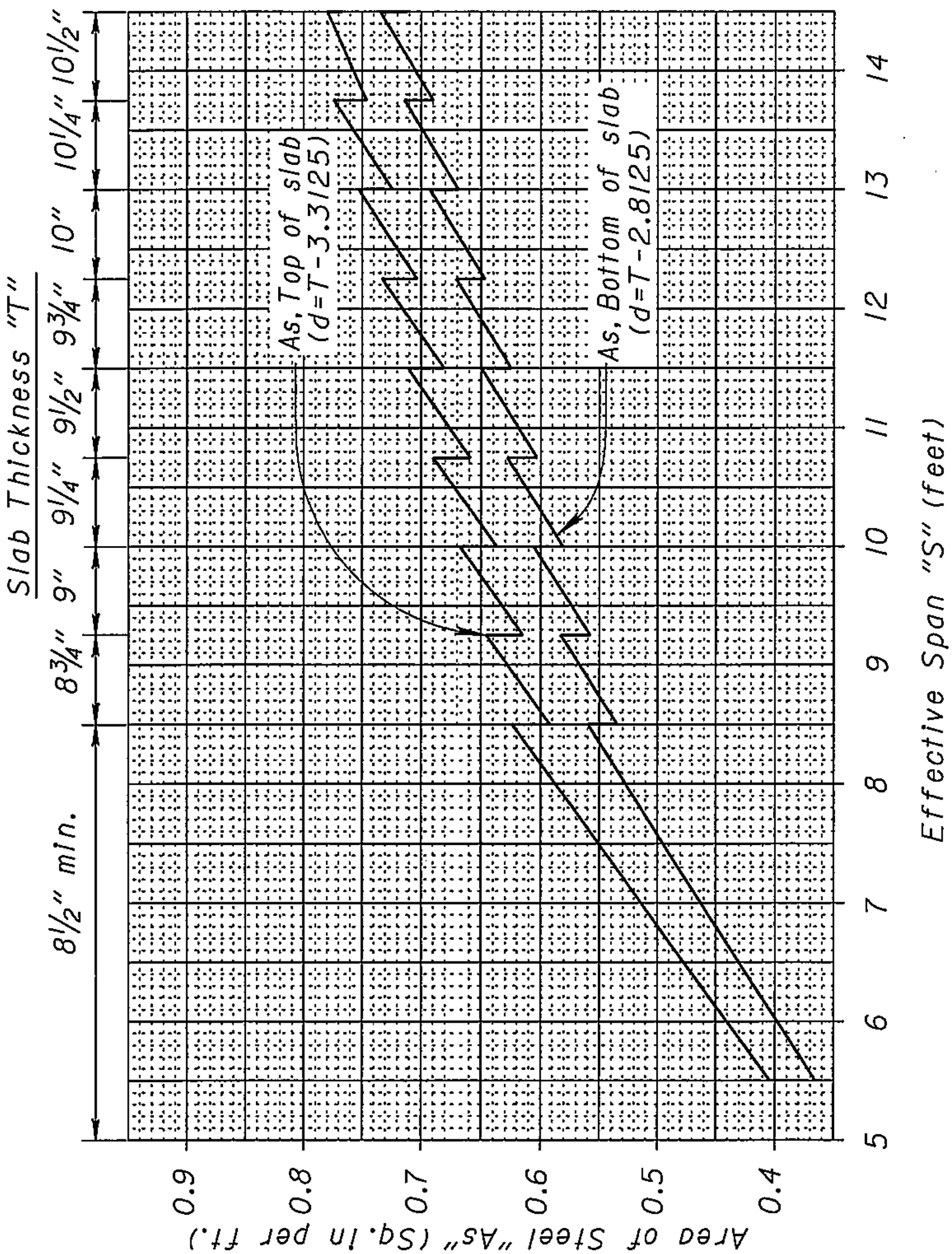
Prepared	Checked	Traced	Date
RZ	SAM	RZ	12-08-99



Note: This Figure is for the design of a reinforced concrete deck on new steel beams/girders using HS25.

Figure 314A

Prepared	Checked	Traced	Date
REZA	LMW	REZA	11-27-94



Note: This Figure is for the design of a reinforced concrete deck on existing steel beams/girders using HS20-44.

Figure 314B

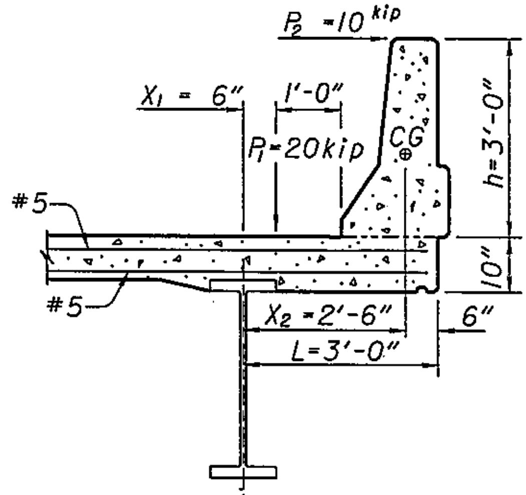
CANTILEVER SLAB DESIGN

Sample Problem: Using load factor design procedures, determine whether the reinforcing steel design given in the previous example is adequate to sustain a 3'-0" cantilever slab carrying a 36" deflector parapet and an HS25-44 loading.

P_1 = 20 Kip (3.24.3)●
P_2 = 10 kip (2.7.1.3)●

Truck Load Distribution Factor:
$E_1 = 0.8\ X_1 + 3.75$ (3.24.5.1.1)●
$E_1 = 0.8\ (0.5) + 3.75 = 4.15$

Railing Load Distribution Factor:
$E_2 = 0.8\ X_2 + 5.0$ (3.24.5.2)●
$E_2 = 0.8\ (2.5) + 5.0 = 7.0$



Uniform Dead Load: (per ft of length)
Slab = w_1 = (0.83)(1.0)(0.15) = 0.125 Kip/ft
F.W.S. = w_2 = 60 psf(1.0) = 0.060 Kip/ft

Concentrated Dead Load: (per ft of length)
Parapet = P = 0.47 Kip (located @ CG)

Dead Load Moment:

$$DLM = \tfrac{1}{2} w_1 L^2 + \tfrac{1}{2} w_2 (L - 1.5)^2 + P(L - 0.5)$$

$$DLM = \tfrac{1}{2}(0.125)(3.00)^2 + \tfrac{1}{2}(0.06)(3.0 - 1.5)^2 + 0.47(3.00 - 0.5) = 1.81 \text{ Kip-ft}$$

Live Load Moment:

$$\text{Truck Load Moment + Impact} = TLM + I = 1.3\ X_1 \left(\frac{P_1}{E_1}\right)$$

$$TLM + I = 1.3\ (0.5)\ \frac{20}{4.15} = 3.13 \text{ Kip-ft}$$

$$\text{Railing Load Moment} = RLM = h \left(\frac{P_2}{E_2}\right)$$

$$RLM = 3.0 \left(\frac{10.0}{7.0}\right) = 4.29 \text{ Kip-ft}$$

Live Load Moment = Greater of TLM+I & RLM = 4.29 kip-ft

Design Moments:

$$M_u = 1.3\ [\ DLM + 1.67\ LLM\ ]$$

$$M_u = 1.3\ [\ 1.81 + 1.67\ (4.29)] = 11.67 \text{ Kip-ft}$$

$$M_w = \text{Service Load Moment} = DLM + LLM$$

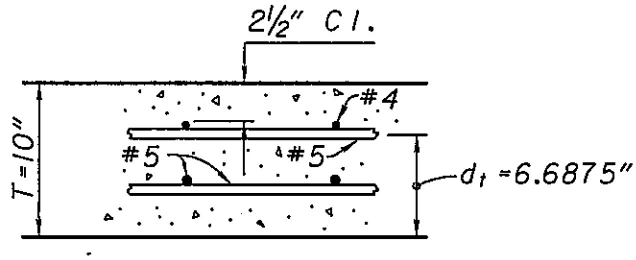
$$M_w = 1.81 + 4.29 = 6.10 \text{ Kip-ft}$$

CHECK TOP REINFORCEMENT

●AASHTO

Prepared	Checked	Traced	Date
RZ	SAM	RZ	12-08-99

CANTILEVER SLAB DESIGN



f'_c = 4500 psi
f_y = 60000 psi
ϕ = 0.9 (8.16.1.2.2) ⊕
Z = 130 kip/in (top steel) (8.16.8.4) ⊕

$R = M_u / \phi b d^2 = 11.67 (1000) / 0.9 (1) (6.6875)^2 = 289.94$ psi
$\rho = 0.00503$ (see fig. 312)
$A_s = \rho b d = 0.00503 (12) (6.6875) = 0.40 \text{ in}^2/\text{ft} < 0.78 \text{ in}^2/\text{ft}$ ★ ok

Check Steel Spacing (8.16.8.4) ⊕

$$f_{s\,(ALL)} = \frac{Z}{(d_c \; A)^{1/3}} \leq 0.6 f_y$$

$d_c = 2 + (0.625/2) = 2.312$ in
$A = 2(2.312 \times 4.75) = 21.96 \text{ in}^2/\text{ft}$

$$f_{s\,(ALL)} = \frac{130}{[(2.312)(21.96)]^{1/3}} = 35.11 \text{ ksi}$$

$$f_{s\,(ACT)} = \frac{M_w}{A_s \; j \; d_t}$$

$$f_{s\,(ACT)} = \frac{6.10\ (12)}{(0.78)\ (0.91)\ (6.6875)} = 15.42 \text{ ksi} < 35.11 \text{ ksi ok}$$

★ - Steel reinforcing ratio for top steel taken from Transverse Slab Design example (#5 bars @ 4.75").

⊕ AASHTO

Prepared	Checked	Traced	Date
RZ	SAM	RZ	12-08-99

Figure 316

Job No.	45878	No.

HDR Computation

HDR

Project	S.R 823 over Portsmoutn- Minford (S.R. 139)	Computed	EJM	Date	7/7/2008
Subject	Transverse Slab Design	Checked	DMP	Date	7/1/09
Task	Typical Reinforcing	Sheet		Of	

CAST-IN-PLACE CONCRETE DECK SLAB DESIGN - LFD

REFS: AASHTO & ODOT BDM (LFD)

GEOMETRY

S	**10.50**	ft	Girder spacing (ctr to ctr); 4' < S < 15'
Seff	**7.50**	ft	Effective Span Length
Wrdwy	**48.46**	ft	Width of roadway (one side of the Bridge)
Tmin	**8.17**	in	Min Deck Thickness
Tmin Used	**8.50**	in	Deck Thickness used
Wb	**0.864**	k/ft	Weight Per barrier (there are 2 barriers) from Conspan
Width slab	**1.00**	ft	1ft strip
CLR_{top}	**2.5**	in	Clearance to top bars (Using design thickness)
CLR_{bot}	**1.5**	in	Clearance to bottom bars
b_f	**3.00**	ft	Girder top flange width
t_w	**8.00**	in	Girder web thickness
d_{top}=	**5.188**	in	Assume # 4 long bars and #5 transv. Bars
d_{bot}=	**5.688**		Assume # 4 long bars and #5 transv. Bars

MATERIAL PROPERTIES

fy	**60**	ksi	Reinforcing steel yield strength
E_s	**29,000**	ksi	Reinforcing steel modulus of elasticity
E_c	3,824	ksi	Concrete modulus of elasticity (for normal weight concrete)
n	8		Modular Ratio
f'c	**4.5**	ksi	Concrete compression strength
w_c	**150**	pcf	Concrete unit weight

LOADS AND FACTORS

ϕ_f	**0.90**		Flexural resistance factor (AASHTO 8.16.1.2.2
Φ_s	**0.85**		Shear
IM	**0.30**	%	Impact
Ztop	**130.00**	k/in	Severe Exposure AASHTO 8.16.8.4
Zbot	**170.00**	k/in	Moderate Exposure AASHTO 8.16.8.4
Slab	**0.106**	k/ft	Weight of Conc. Slab (1ft Strip)
w_{ws}	**0.06**	psf	Wearing surface unit weight
W_{DL}	**0.166**	k/ft	Total Dead Load
P_{LL}	**20.0**	k	Live load wheel load (HS 25)

DESIGN MOMENTS

M_{DL}	0.94	k-ft	Dead Load Moment (.8*WL^2/8)
M_{LL}	6.175	k-ft	Live Load Moment (.8*IM*(S+2)*P_{25})/32 - AASHTO 3.24.3.1
Mu	14.62	k-ft	Total Moment
Mw	7.11	k-ft	Service Load Moment

Job No.	45878	No.	

HDR Computation

HDR

Project	S.R 823 over Portsmoutn- Minford (S.R. 139)	Computed	EJM	Date	7/7/2008
Subject	Transverse Slab Design	Checked		Date	
Task	Typical Reinforcing	Sheet		Of	

TOP REINFORCEMENT

R	603.72	psi	
ρ	0.01101		Steel Ratio
As	0.69	in^2/ft	
Top transverse reinforcing:			**#5** @ **5** in A_s = 0.744 in^2 OK

BOTTOM REINFORCEMENT

R	502.24		
ρ	0.00901		
As	0.61	in^2	
Bottom transverse reinforcing:			**#5** @ **6** in A_s = 0.620 in^2 OK

CHECK STEEL SPACING (8.16.8.4)

f_s (all.) = $z/(d_cA)^{\wedge(1/3)}$,=.6f_y			
.6fy=	36	ksi	
Top Reinforcement			
d_c	2.313	in	Distance form extreme tension fiber to middle of closest bar
A	23.125	in^2 / ft	Effective tension area
f_s (all.)	34.506	ksi	Use Service Load **34.506** ksi
f_s (actual) = Mw/ (As* j*d)			
K	0.334		K= (2ρn+(ρn)^2)^.5-ρn
j	0.889		1-(K/3)
f_s (actual)	26.993	ksi	**OK**
Bottom Reinforcement			
d_c	1.813	in	
A	21.750	in^2	
f_s (all.)	49.950	ksi	Use Service Load **36** ksi
f_s (actual) = Mw/ (As* j*d)			
K	0.308		
j	0.897		
f_s (actual)	27.192	ksi	**OK**
As per BDM (302.2.4.2)3 top and bottom bars shall coincide in a vertical plane			
Use	**#5**	@	5 A_s = 0.744 in^2 **Top & Bottom Main Reinf.**

Job No.	45878	No.

HDR Computation

Project	S.R 823 over Portsmoutn- Minford (S.R. 139)	Computed	EJM	Date	7/7/2008
Subject	Transverse Slab Design	Checked		Date	
Task	Typical Reinforcing	Sheet		Of	

DISTRIBUTIONAL REINFORCEMENT BDM 302.2.4.1

A_s Top	0.248	in^2/ft	Approx 1/3 of main reinf.				
Spacing	9.677	in					
# of bars	11						
# of spaces	10						
A_s Provided	0.3	in^2/ft					
Use	**#4**	@	**9**	in	A_s =	0.3 in^2	
A_s Bottom: 220/√Seff, Max 67%			AASHTO 3.24.10.2				
220/√Seff	0.80	Use	**0.67**				
A_s Bottom	0.50	in^2/ft	In mid-half of span				
Use	**#6**	@	**9**	in	A_s =	0.59 in^2	
A_s Bottom	0.25	in^2/ft	In each outer quarter		AASHTO 3.24.10.3		
Use	**#5**	@	**12**	in	A_s =	0.310 in^2	2 # 5 at outer quarter

Job No.	45878	No.

HDR Computation

HDR

Project	S.R 823 over Portsmoutn- Minford (S.R. 139)	Computed EJM	Date 7/7/2008
Subject	Cantilever Slab Design	Checked	Date
Task	Typical Reinforcing	Sheet	Of

CAST-IN-PLACE CONCRETE CANTILEVER SLAB DESIGN - LFD

REFS: AASHTO & ODOT BDM (LFD)

GEOMETRY

Tslab	10.00	in	Edge slab thickness
Width slab	1.00	ft	1ft strip
X	2.96	ft	Dist from C.L. of fascia girder to end of slab (Per Conspan calcs)
X1	0.46	ft	Dist. From load to point of support
X2	2.36	ft	Dist. From C.G of barrier to C.L. of Fascia Girder
H	3.500	ft	Height of Barrier
CLR_{top}	2.5	in	Clearance to top bars (Using design thickness)
CLR_{bot}	1.5	in	Clearance to bottom bars
b_f	3.00	ft	Girder top flange width
t_w	8.00	in	Girder web thickness
d_{top}=	6.688	in	Assume # 4 long bars and #5 transv. Bars

MATERIAL PROPERTIES

fy	60	ksi	Reinforcing steel yield strength
E_s	29,000	ksi	Reinforcing steel modulus of elasticity
E_c	3,824	ksi	Concrete modulus of elasticity (for normal weight concrete)
n	8		Modular Ratio
f'c	4.5	ksi	Concrete compression strength
w_c	150	pcf	Concrete unit weight

LOADS AND FACTORS

ϕ_f	0.90		Flexural resistance factor (AASHTO 8.16.1.2.2
P1	20.00	Kips	HS-25 Load is a 1ft from toe barrier
P2	10.00	Kips	AASHTO 2.7.1.3
E1	4.12		Truck Load Distribution AASHTO 3.24.5.1.1
E2	6.89		Railing Load Distribution AASHTO 3.24.5.2
w_{ws}	0.06	psf	Wearing surface unit weight
Slab	0.125	kip/ft	weight of slab
P	0.864	k/ft	Concentrated Dead Load of Barrier & noise Wall (per Conspan Calcs)
Ztop	130.00	k/in	Severe Exposure AASHTO 8.16.8.4

Job No.	45878	No.

HDR Computation

Project	S.R 823 over Portsmoutn- Minford (S.R. 139)	Computed	EJM	Date	7/7/2008
Subject	Cantilever Slab Design	Checked		Date	
Task	Typical Reinforcing	Sheet		Of	

DESIGN MOMENTS

Dead Load Moments			
M_{dl}	2.77	kip-ft	Moment due to Slab, Wearing Surface, Barrier & Noise Wall
Live Load Moment			
TLM	2.90	kip-ft	Truck Load Moment
RLM	5.08	kip-ft	Railing Load Moment
M_{LL}	5.08	kip-ft	Live Load Moment greater of TLM & RLM
Mu	14.63	kip-ft	
Mw	7.85	kip-ft	Service Load Moment
R	363.56	psi	
ρ	0.01		
As	0.51	in^2/ft	**OK**

Use same reinforcing from Transverse Slab Design

Use	***#5***	@	***6***	A_s = 0.620 in^2	**Top & Bottom Main Reinf.**

CHECK STEEL SPACING (8.16.8.4)

f_s (all.) = $z/(d_cA)$^(1/3) ,=.6f_y					
.6fy=	36 ksi				
TOP REINFORCEMENT					
d_c	2.31	in	Distance form extreme tension fiber to middle of closest bar		
A	27.75	in^2 / ft	Effective tension area		
f_s (all.)	32.47	ksi	Use Service Load	**32.47**	ksi
f_s (actual) = Mw/ (As* j*d)					
K	0.27		K= (2ρn+(ρn)^2)^.5-ρn		
j	0.91		1-(K/3)		
f_s (actual)	24.94	ksi	**OK**		

Project: Project	Computed: ~~Initials~~ DMP	Date: 7/2/2009
Subject: Subject	Checked:	Date:
Task: Task	Page:	of:
Job #: Job #	No:	

HDR | ONE COMPANY *Many Solutions* SM

Required Negative Moment (continuity) Steel: (SEE FOLLOWING PAGES)

Over Pier 1 & 3: $A_{s1} := 12.937in^2$ 10' from Pier 1 & 3: $A_{10s1} := 5.179in^2$

Over Pier 2: $A_{s2} := 10.525in^2$ 10' from Pier 2: $A_{10s2} := 3.219in^2$

Spacing of Negative Moment (continuity) Steel:

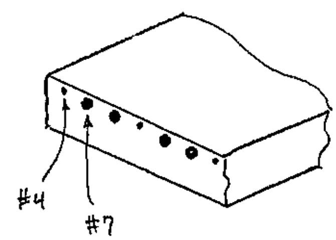
Top Longitudinal continuity reinforcement (#4) are spaced at 9"
Thus for even 3" spacing, two (2) bars cab be placed per every 9"

$$s_c := \frac{9in}{1} = 9\,in$$

Effective Width of Girder Slab:

Exterior Girder: $ew_e := 8.177ft$ (See CONSPAN Input Calculations)

Interior Girder: $ew_i := 10.5ft$ (See CONSPAN Input Calculations)



Number of Spaces per effective width

Exterior Girder: $n_e := \mathrm{floor}\left(\frac{ew_e}{s_c}\right) = 10$ ("floor" command = "round down")

Interior Girder: $n_i := \mathrm{floor}\left(\frac{ew_i}{s_c}\right) = 14$

Required Bar Area:

Over Pier 1 & 3:

Exterior Girder: $\boxed{A_{e1} := \frac{A_{s1}}{n_e} = 1.29\,in^2}$ 2 #7 @ 4.5" Interior Girder: $A_{i1} := \frac{A_{s1}}{n_i} = 0.92\,in^2$

Over Pier 2:

Exterior Girder: $A_{e2} := \frac{A_{s2}}{n_e} = 1.05\,in^2$ Interior Girder: $A_{i2} := \frac{A_{s2}}{n_i} = 0.75\,in^2$

10' from Pier 1 & 3:

Exterior Girder: $\boxed{A_{10e1} := \frac{A_{10s1}}{n_e} = 0.52\,in^2}$ 1 #7 @ 9" Interior Girder: $A_{10i1} := \frac{A_{10s1}}{n_i} = 0.37\,in^2$

10' from Pier 2:

Exterior Girder: $A_{10e2} := \frac{A_{10s2}}{n_e} = 0.32\,in^2$ Interior Girder: $A10_{i2} := \frac{A_{10s2}}{n_i} = 0.23\,in^2$

REINFORCED DESIGN

REINFORCED DESIGN - Span : 1, Beam : 1, FACTORED 1 (fy = 60.00 ksi, phi = 0.9)

(a) NEGATIVE MOMENTS ALONG SPAN (Non-composite Moment effects are INCLUDED in Mu)

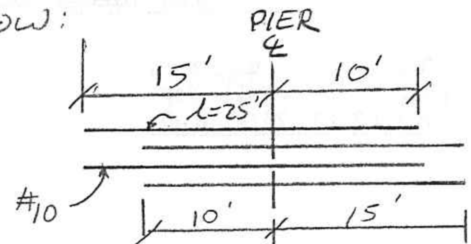
Negative Moment Continuity Steel:

#bars	Size	Dist. from Top (in)	Area (in2)	Start (ft)	End (ft)
4	US#10[M32]	1.50	5.08	85.0000	100.0000
7	US#10[M32]	1.50	8.89	95.0000	100.0000

EXTERIOR BEAM

CONSERVATIVELY ALTERNATE 11-#10 BARS OVER EACH BEAM AS SHOWN BELOW:

f'c (ksi)	b (in)	bw (in)
7000.00 (Art. 9.7.2.3.2)	26.00;	8.00



	Dist (ft)	Mu-reqd (k.ft)	hf (in)	d (in)	d' (in)	1.2*Mcr (k.ft)	Asb (in2)	Ast-r (in2)	Ast-p (in2)	M-prvd (k.ft)
1	0.00	0.0	12.50	74.50	4.25	-0.0	0.000	0.000	0.000	-0.0
2	10.74	0.0	12.50	74.50	4.25	-0.0	0.000	0.000	0.000	-0.0
3	20.65	0.0	12.50	74.50	4.25	-0.0	0.000	0.000	0.000	-0.0
4	30.56	0.0	12.50	74.50	4.25	-0.0	0.000	0.000	0.000	-0.0
5	40.47	0.0	12.50	74.50	4.25	-0.0	0.000	0.000	0.000	-0.0
6	50.37	0.0	12.50	74.50	4.25	-0.0	0.000	0.000	0.000	-0.0
7	60.28	0.0	12.50	74.50	4.25	-0.0	0.000	0.000	0.000	-0.0
8	70.19	0.0	12.50	74.50	4.25	-0.0	0.000	0.000	0.000	-0.0
9	80.10	0.0	12.50	74.50	4.25	-0.0	0.000	0.000	0.000	-0.0
10	90.01	-1258.8	8.00	75.00	2.00	-2782.5	0.000	5.026	5.080	-1692.0
11	100.00	-4220.2	8.00	75.00	2.00	-2782.5	0.000	12.937	13.970	-4544.6

(b) POSITIVE MOMENTS AT PIERS

NONE

REINFORCED DESIGN

REINFORCED DESIGN - Span : 2, Beam : 1, FACTORED 1 (fy = 60.00 ksi, phi = 0.9)

(a) NEGATIVE MOMENTS ALONG SPAN (Non-composite Moment effects are INCLUDED in Mu)

EXTERIOR BEAM

Negative Moment Continuity Steel:

#bars	Size	Dist. from Top (in)	Area (in2)	Start (ft)	End (ft)
4	US#10[M32]	1.50	5.08	85.0000	100.0000
7	US#10[M32]	1.50	8.89	95.0000	100.0000
4	US#10[M32]	1.50	5.08	0.0000	15.0000
7	US#10[M32]	1.50	8.89	0.0000	5.0000

f'c (ksi)	b (in)	bw (in)
7000.00 (Art. 9.7.2.3.2)	26.00;	8.00

Sec	Dist (ft)	Mu-reqd (k.ft)	hf (in)	d (in)	d' (in)	1.2*Mcr (k.ft)	Asb (in2)	Ast-r (in2)	Ast-p (in2)	M-prvd (k.ft)
1	0.00	-4220.1	8.00	75.00	2.00	-2782.5	0.000	12.937	13.970	-4544.6
2	10.74	-1296.7	8.00	75.00	2.00	-2782.5	0.000	5.179	**5.080***	-1692.0
3	20.65	0.0	12.50	74.50	4.25	-0.0	0.000	0.000	0.000	-0.0
4	30.56	0.0	12.50	74.50	4.25	-0.0	0.000	0.000	0.000	-0.0
5	40.47	0.0	12.50	74.50	4.25	-0.0	0.000	0.000	0.000	-0.0
6	50.37	0.0	12.50	74.50	4.25	-0.0	0.000	0.000	0.000	-0.0
7	60.28	0.0	12.50	74.50	4.25	-0.0	0.000	0.000	0.000	-0.0
8	70.19	0.0	12.50	74.50	4.25	-0.0	0.000	0.000	0.000	-0.0
9	80.10	0.0	12.50	74.50	4.25	-0.0	0.000	0.000	0.000	-0.0
10	90.01	-810.0	8.00	75.00	2.00	-2782.5	0.000	3.219	5.080	-1692.0
11	100.00	-3455.5	8.00	75.00	2.00	-2782.5	0.000	10.525	13.970	-4544.6

(b) POSITIVE MOMENTS AT PIERS

NONE

REINFORCED DESIGN

REINFORCED DESIGN - Span : 1, Beam : 2, FACTORED 1 (fy = 60.00 ksi, phi = 0.9)

(a) NEGATIVE MOMENTS ALONG SPAN (Non-composite Moment effects are INCLUDED in Mu)

INTERIOR BEAM

Negative Moment Continuity Steel:

#bars	Size	Dist. from Top (in)	Area (in2)	Start (ft)	End (ft)
4	US#10[M32]	1.50	5.08	85.0000	100.0000
7	US#10[M32]	1.50	8.89	95.0000	100.0000

f'c (ksi)	b (in)	bw (in)
7000.00 (Art. 9.7.2.3.2)	26.00;	8.00

	Dist (ft)	Mu-reqd (k.ft)	hf (in)	d (in)	d' (in)	1.2*Mcr (k.ft)	Asb (in2)	Ast-r (in2)	Ast-p (in2)	M-prvd (k.ft)
1	0.00	0.0	12.50	74.50	4.25	-0.0	0.000	0.000	0.000	-0.0
2	10.74	0.0	12.50	74.50	4.25	-0.0	0.000	0.000	0.000	-0.0
3	20.65	0.0	12.50	74.50	4.25	-0.0	0.000	0.000	0.000	-0.0
4	30.56	0.0	12.50	74.50	4.25	-0.0	0.000	0.000	0.000	-0.0
5	40.47	0.0	12.50	74.50	4.25	-0.0	0.000	0.000	0.000	-0.0
6	50.37	0.0	12.50	74.50	4.25	-0.0	0.000	0.000	0.000	-0.0
7	60.28	0.0	12.50	74.50	4.25	-0.0	0.000	0.000	0.000	-0.0
8	70.19	0.0	12.50	74.50	4.25	-0.0	0.000	0.000	0.000	-0.0
9	80.10	0.0	12.50	74.50	4.25	-0.0	0.000	0.000	0.000	-0.0
10	90.01	-944.5	8.00	75.00	2.00	-3148.0	0.000	3.759	5.080	-1692.0
11	100.00	-3855.4	8.00	75.00	2.00	-3148.0	0.000	11.782	13.970	-4544.6

(b) POSITIVE MOMENTS AT PIERS

NONE

REINFORCED DESIGN

REINFORCED DESIGN - Span : 2, Beam : 2, FACTORED 1 (fy = 60.00 ksi, phi = 0.9)

(a) NEGATIVE MOMENTS ALONG SPAN (Non-composite Moment effects are INCLUDED in Mu)

INTERIOR BEAM

Negative Moment Continuity Steel:

#bars	Size	Dist. from Top (in)	Area (in2)	Start (ft)	End (ft)
4	US#10[M32]	1.50	5.08	85.0000	100.0000
7	US#10[M32]	1.50	8.89	95.0000	100.0000
4	US#10[M32]	1.50	5.08	0.0000	15.0000
7	US#10[M32]	1.50	8.89	0.0000	5.0000

f'c (ksi)	b (in)	bw (in)
7000.00 (Art. 9.7.2.3.2)	26.00;	8.00

Sec	Dist (ft)	Mu-reqd (k.ft)	hf (in)	d (in)	d' (in)	1.2*Mcr (k.ft)	Asb (in2)	Ast-r (in2)	Ast-p (in2)	M-prvd (k.ft)
1	0.00	-3855.0	8.00	75.00	2.00	-3148.0	0.000	11.781	13.970	-4544.6
2	10.74	-877.1	8.00	75.00	2.00	-3148.0	0.000	3.488	5.080	-1692.0
3	20.65	0.0	12.50	74.50	4.25	-0.0	0.000	0.000	0.000	-0.0
4	30.56	0.0	12.50	74.50	4.25	-0.0	0.000	0.000	0.000	-0.0
5	40.47	0.0	12.50	74.50	4.25	-0.0	0.000	0.000	0.000	-0.0
6	50.37	0.0	12.50	74.50	4.25	-0.0	0.000	0.000	0.000	-0.0
7	60.28	0.0	12.50	74.50	4.25	-0.0	0.000	0.000	0.000	-0.0
8	70.19	0.0	12.50	74.50	4.25	-0.0	0.000	0.000	0.000	-0.0
9	80.10	0.0	12.50	74.50	4.25	-0.0	0.000	0.000	0.000	-0.0
10	90.01	-548.8	8.00	75.00	2.00	-3148.0	0.000	2.175	5.080	-1692.0
11	100.00	-3212.9	8.00	75.00	2.00	-3148.0	0.000	9.766	13.970	-4544.6

(b) POSITIVE MOMENTS AT PIERS

NONE

Beam Design

BEAM DESIGN
GENERAL INPUT

Project: SCI 823-6.81	Computed: DMP	Date: 5/19/2009	
Subject: Minford Road	Checked: JSW	Date: 7/27/09	
Task: CONSPAN input	Page:	of:	
Job #:	No:		

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General Geometry, from Phase 1 Framing Plan & Typical Section

Deck Overall Width:		$d_w := 48ft + 5.5in$	$d_w = 48.458\,ft$
Travelway:		$rdw := 9.5ft + 3\cdot 12ft$	$rdw = 45.5\,ft$
		Sufficient for 3 design lanes at 12ft	
Number of Beams:		$N := 5$	$N = 5$
Beam Spacing:		$beams := 4\cdot(10\cdot ft + 4in)$ 6	$beams = \cancel{41.333}\,ft$ 42.000'
Web thickness:		$t_{web} := 8in$	$t_{web} = 8\cdot in$
Right Overhang:	max	$oh_{rmax} := 3ft + 6.375in$	$oh_{rmax} = 3.531\,ft$
	min	$oh_{rmin} := 2ft + 11.125in$	$oh_{rmin} = 2.927\,ft$
Left Overhang:	max	$oh_{lmax} := d_w - oh_{rmin} - beams$	$oh_{lmax} = 4.198\,ft$
	min	$oh_{rmin} := d_w - oh_{rmax} - beams$	$oh_{rmin} = 3.594\,ft$

CONSPAN does not allow for varying overhang widths, set left overhang at 2.927ft and right overhang at 3.531ft to capture a conservative overhang load on left beam.

Right Overhang:	$oh_r := oh_{rmin}$	$oh_r = 3.594\,ft$
Left Overhang:	$oh_l := oh_{lmax}$	$oh_l = 4.198\,ft$
Right Curb:	$curb_r := 1.5ft$	$curb_r = 1.5\,ft$
Left Curb:	$curb_l := d_w - rdw - curb_r$	$curb_l = 1.458\,ft$
Deck Tickness (for wieght):	$t_{deck} := 8.5in$	$t_{deck} = 8.5\cdot in$
Haunch (initial Assumption)	$haunch_t := 6in$	$haunch_t = 0.5\,ft$
Haunch width:	$w_{haunch} := 36in$	$w_{haunch} = 36\cdot in$
Span Length (brg-brg):	$S_b := 99ft + 1in$	$S_b = 99.083\,ft$
End-End of Girders:	$S_{end} := 99ft + 7in$	$S_{end} = 99.583\,ft$

Material Properties

Weight of Concrete:	$w_c := 150\cdot pcf$		$w_c = 150\cdot pcf$
Deck Concrete:	$f_{c\_d} := 4.5ksi$		$f_{c\_d} = 4.5\cdot ksi$
Beam Concrete - Inital:	$f_{g\_i} := 5ksi$	(ODOT Standard Dwg PSID-I-99, sheet 8/8)	$f_{g\_i} = 5\cdot ksi$
Beam Concrete - Final:	$f_{g\_f} := 7ksi$	(ODOT Standard Dwg PSID-I-99, sheet 8/8)	$f_{g\_f} = 7\cdot ksi$

Modified AASHTO Type 4 Beam (72") using Straight Stands (debonded)

ASTM A416 Grade 270 Low Relaxation uncoated 7 wire strands, either 0.153 in^2 or 0.167 in^2

Project:	SCI823-6.81	Computed:	DMP	Date:	5/19/2009
Subject:	Minford Road	Checked:	JSW	Date:	7/27/09
Task:	CONSPAN Input	Page:		of:	
Job #:		No:			

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Loads

Dead Loads: In addition to self weight

Future Wearing surface: $fws := 60pcf$ (ODOT BDM 301.4.1) $fws = 60 \cdot pcf$

Diaphragms MC18x42.7: (ODOT Standard Dwg PSID-I-99, sheet 6/8) $dia := 42.7plf \cdot \left(\frac{beams}{N-1} - t_{web}\right)$ $dia = 0.413 \cdot kip$

Load to outside girder: $dia_o := \frac{1}{2} dia$ $dia_o = 0.206 \cdot kip$

Concrete Barrier, Outside Edge:

Bridge Railing, Standard Dwg SBR-I-99

Cross Section Area of Barrier: $A_{bar} := 4.26ft^2$ $A_{bar} = 4.26\,ft^2$

Weight of Barrier: $w_{bar} := A_{bar} \cdot w_c$ $w_{bar} = 639 \cdot plf$

Outside Edge Noise Wall (see attached):

weight: $nw := 225plf$

wind effect: $nw_{wind} := 42plf$ (Max)

Total: $nw_{tot} := nw + nw_{wind} = 267\,plf$

Total Barrier Load, Outside Edge: $w_{bar\_o} := w_{bar} + nw_{tot} = 906\,plf$

Concrete Barrier, Inside Edge:

Bridge Railing, Simialr to Roadway Concrete Median Barrier (See sheet 564/571 - Trans Systems)

Cross Section Area of Barrier: $A_{bar} := (6.625in \cdot 57in + 0.5 \cdot 10.875in \cdot 57in)$ $A_{bar} = 4.775\,ft^2$

Weight of Barrier: $w_{bar\_i} := A_{bar} \cdot w_c$ $w_{bar} = 639 \cdot plf$

Note: ODOT does not use stay-in-place forms (BDM 302.2.6)

Live Loads:

LFD: Design for HS-25 loading

Effective Slab Width:

1/4 of the span Length: $0.25 \cdot (S_b) = 24.771\,ft$

12 times the deck thickness + 1/2 top flange width: $12 \cdot (8.5in) + 36in = 11.5\,ft$

C-C spacing of beams: $\frac{beams}{N-1} = 10.333\,ft$

$$\min\left[0.25 \cdot (95ft), 12 \cdot (8.5in) + 36in, \frac{beams}{N-1}\right] = 10.333\,ft$$

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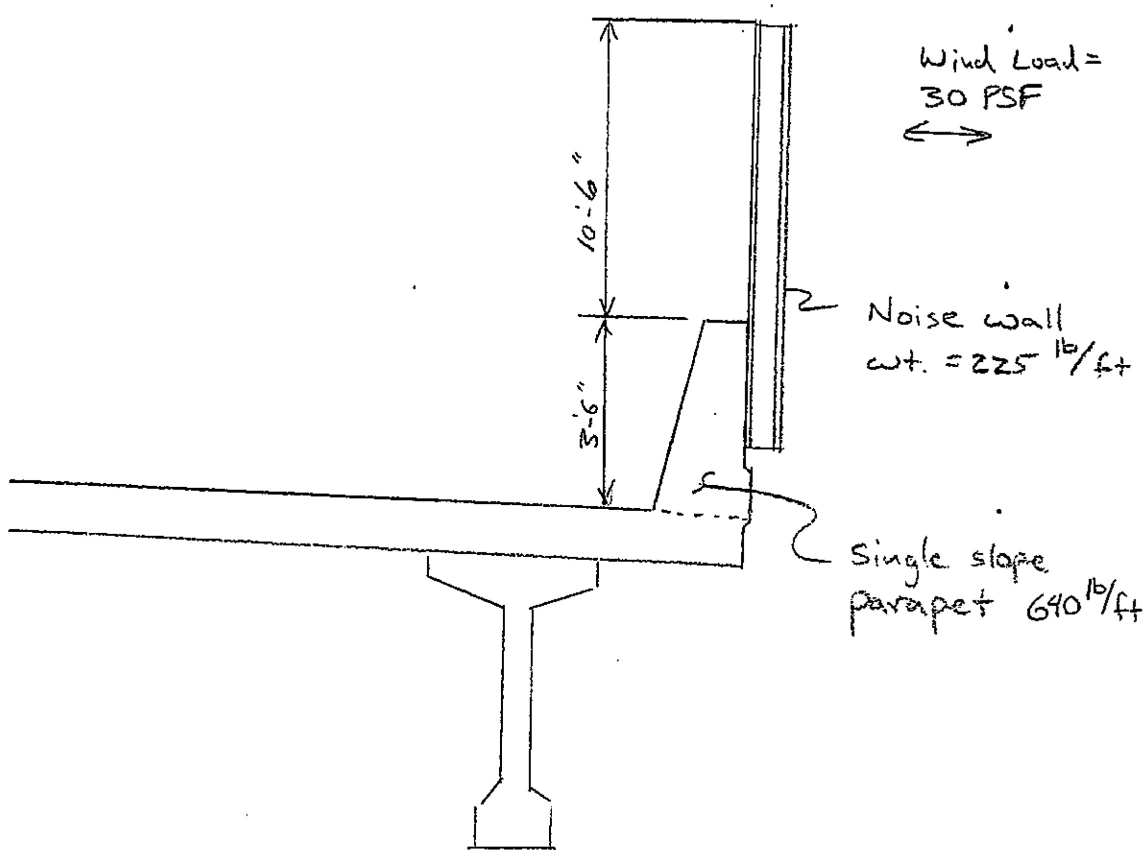
Project:	SCI-823-0197	Computed:	CHN	Date:	5/6/08
Subject:		Checked:	DMP	Date:	9/30/08
Task:		Page:		of:	
Job #:		No:			



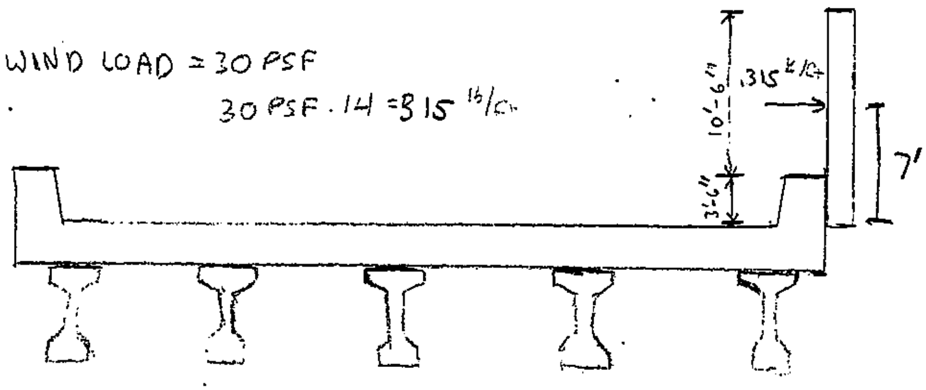
Σ plf = 640 plf + 225 plf

= 865 plf

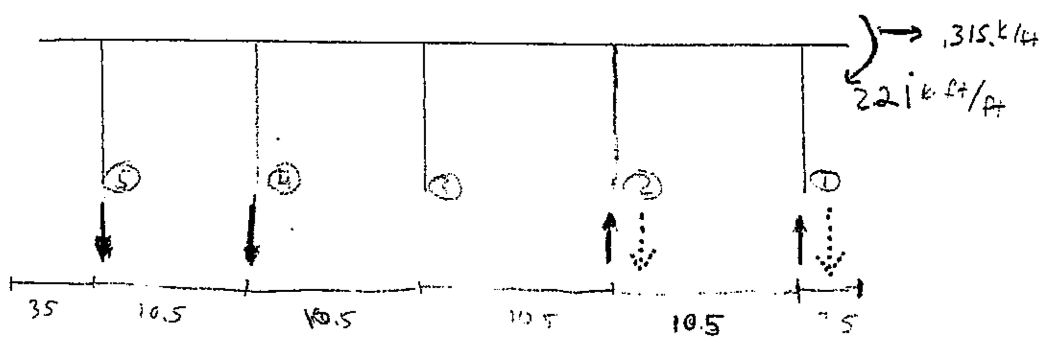
Project: ODOT SCI 823-0197	Computed: JSW	Date: 6-10-08
Subject: CONCRETE I-BEAM DESIGN	Checked: DMP	Date: 9/30/08
Task: NOISE BARRIER WIND LOAD	Page:	of:
Job #:	No:	

WIND LOAD = 30 PSF

30 PSF · 14 = 315 lb/ft



MOMENT = .315 k/ft · 7 ft = 2.21 k·ft/ft



$I_{BEAM} = 2((S_{pa_1})^2 + (S_{pa_2})^2)$

$S_{pa_1} = 10.5'$ $\quad S_{pa_2} = 21'$

$I_{BEAM} = 2(10.5^2 + 21^2) = 2(110.25 + 441) = 1102.5\ ft^2$

$\dfrac{M_W \cdot L}{I_{BEAM}}$

③ = 0

[-21] [-0.042]

① $\dfrac{2.21\ k\cdot ft/ft \cdot 3.5\ ft}{1102.5\ ft^2} = .007\ k/ft$

[10.5] [0.021]

④ $\dfrac{2.21\ k\cdot ft/ft \cdot 35'}{1102.5\ ft^2} = .07\ k/ft$

[-10.5] [-0.021]

② $\dfrac{2.21\ k\cdot ft/ft \cdot 13.5\ ft}{1102.5\ ft^2} = .027\ k/ft$

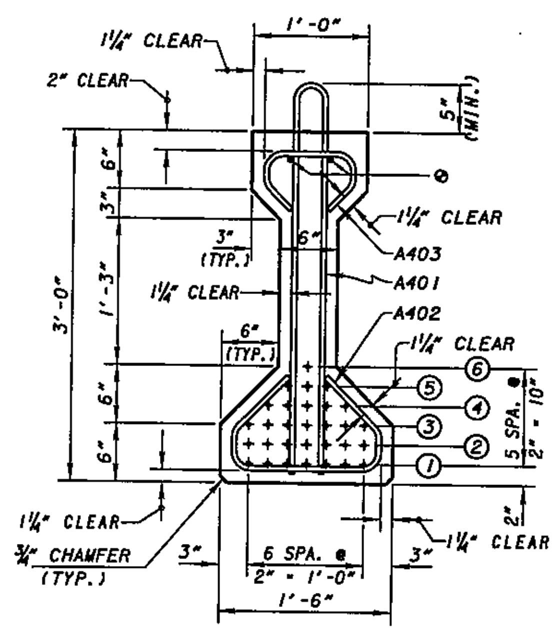
[21] [0.042]

⑤ $\dfrac{2.21\ k\cdot ft/ft \cdot 45.5'}{1102.5\ ft^2} = .091\ k/ft$ ←

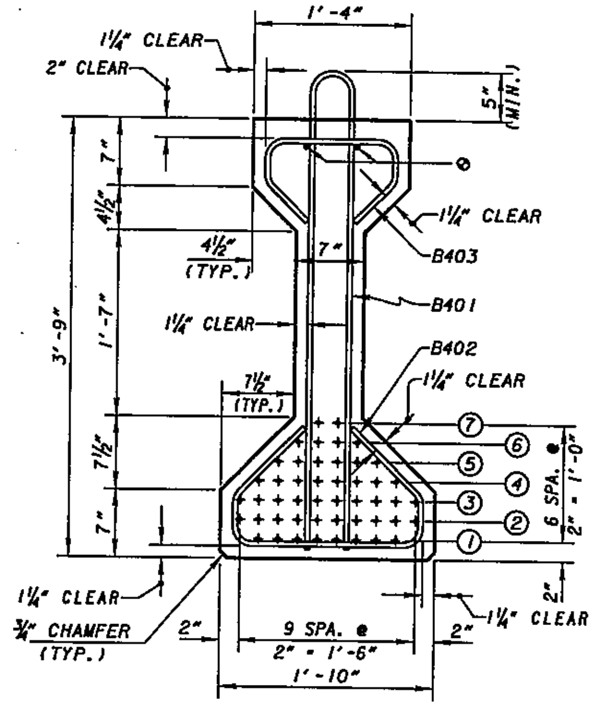
$\boxed{.091\ k/ft \text{ Controls}}$

[0.042]

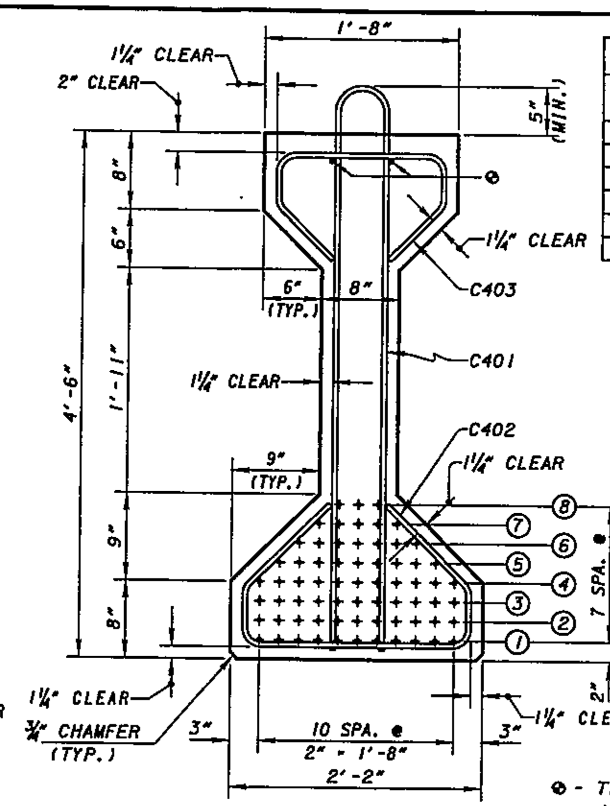
BEAM STANDARDS



AASHTO TYPE 2
(30 STRANDS MAXIMUM)



AASHTO TYPE 3
(48 STRANDS MAXIMUM)



AASHTO TYPE 4
(68 STRANDS MAXIMUM)

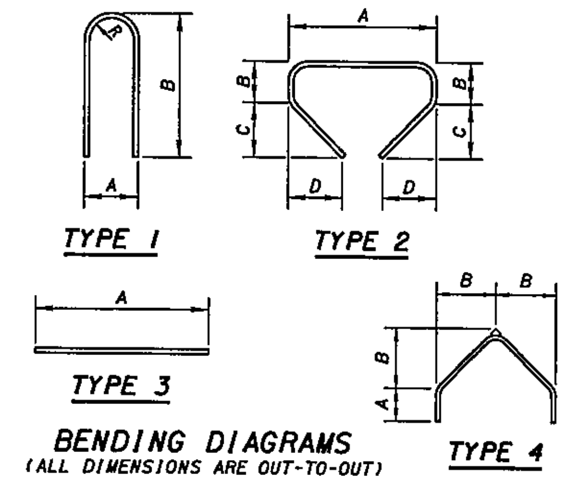
⊗ - THE NUMBER OF BARS SHALL BE PROVIDED AS SHOWN. BAR SIZE SHALL BE DETERMINED BY ANALYSIS.

SECTION PROPERTIES

SECTION	AREA (in^2)	WEIGHT (lb/ft)	Yb (in)	Yt (in)	I (in^4)	Sb (in^3)	St (in^3)	Vol/Sur (in)
AASHTO TYPE 2	369	384	15.83	20.17	50,979	3,221	2,527	3.371
AASHTO TYPE 3	560	583	20.27	24.73	125,390	6,185	5,071	4.056
AASHTO TYPE 4	789	822	24.73	29.27	260,741	10,542	8,909	4.741
MODIFIED AASHTO TYPE 4 (60")	860	896	28.74	31.26	384,705	13,385	12,307	4.089
MODIFIED AASHTO TYPE 4 (66")	908	946	31.58	34.42	492,212	15,588	14,299	4.085
MODIFIED AASHTO TYPE 4 (72")	956	996	34.43	37.57	616,018	17,893	16,396	4.080

NUMBER OF STRANDS PER ROW										CONCRETE STRENGTHS		401 BARS REQ'D	402 BARS REQ'D	403 BARS REQ'D	404 BARS REQ'D
BEAM MARK	ROW NUMBER ①	②	③	④	⑤	⑥	⑦	⑧	TOTAL STRANDS	f'ci	f'c				

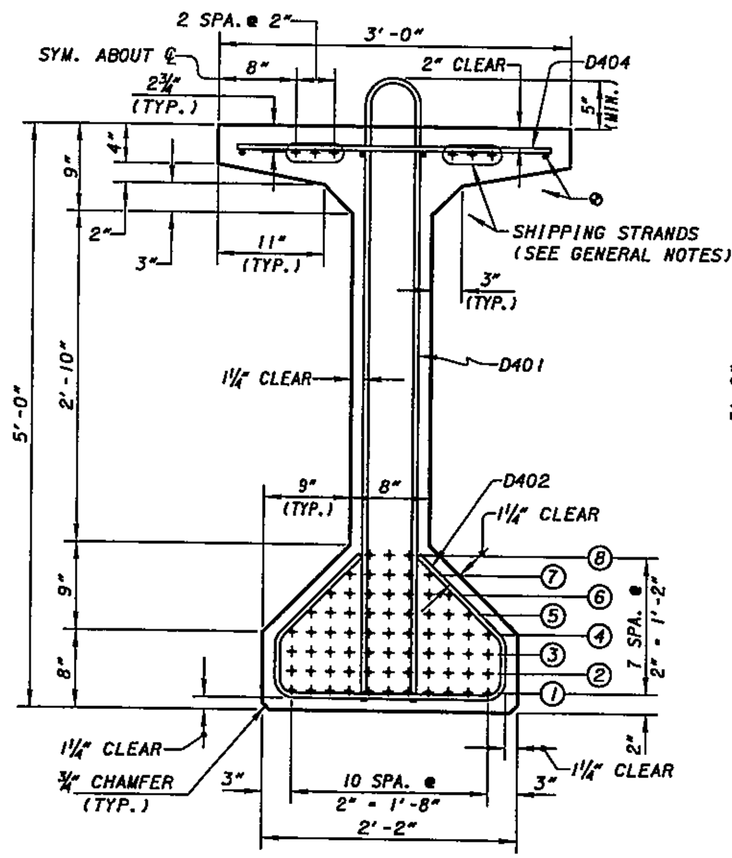
(THIS TABLE SHALL BE REPRODUCED IN THE PROJECT PLANS.)



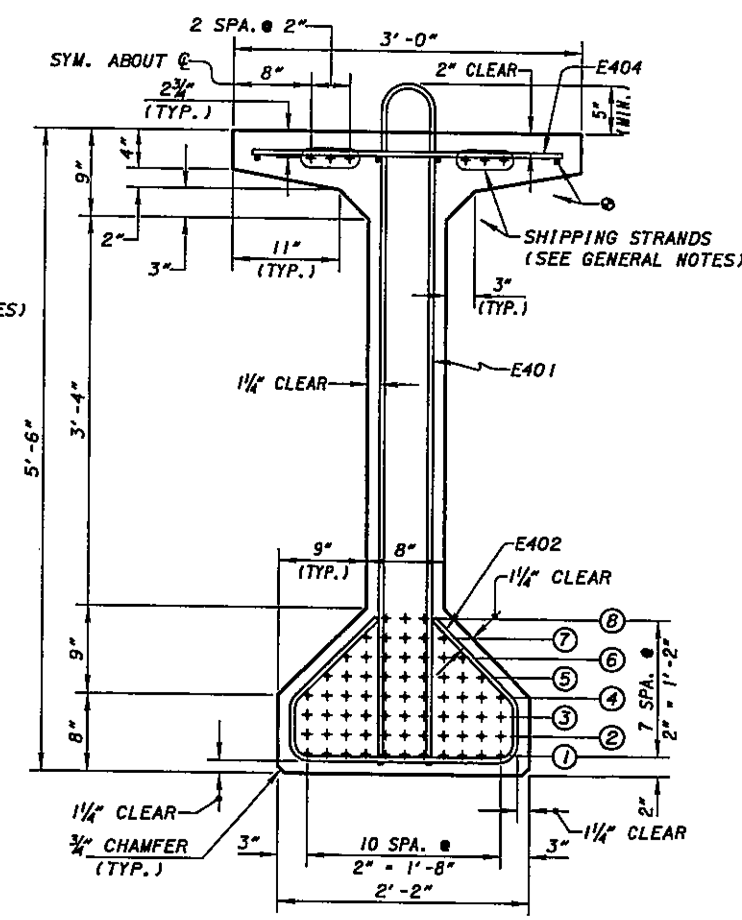
BENDING DIAGRAMS
(ALL DIMENSIONS ARE OUT-TO-OUT)

MARK	TYPE	DIMENSIONS A	B	C	D	R
AASHTO TYPE 2						
A401	1	3½"	3'-4"			1¼"
A402	2	1'-3½"	4¼"	5½"	5½"	
A403	2	9½"	3½"	2½"	2½"	
A405	4	4¼"	7¾"			
AASHTO TYPE 3						
B401	1	4½"	4'-1"			1¾"
B402	2	1'-7½"	5¼"	7"	7"	
B403	2	1'-1½"	4½"	4"	4"	
B405	4	5¼"	9¾"			
AASHTO TYPE 4						
C401	1	5½"	4'-10"			2¼"
C402	2	1'-11½"	6¼"	8½"	8½"	
C403	2	1'-5½"	5½"	5½"	5½"	
C405	4	6¼"	11¾"			
MODIFIED AASHTO TYPE 4 (60")						
D401	1	5½"	5'-4"			2¼"
D402	2	1'-11½"	6¼"	8½"	8½"	
D404	3	2'-8"				
D405	4	6¼"	11¾"			
MODIFIED AASHTO TYPE 4 (66")						
E401	1	5½"	5'-10"			2¼"
E402	2	1'-11½"	6¼"	8½"	8½"	
E404	3	2'-8"				
E405	4	6¼"	11¾"			
MODIFIED AASHTO TYPE 4 (72")						
F401	1	5½"	6'-4"			2¼"
F402	2	1'-11½"	6¼"	8½"	8½"	
F404	3	2'-8"				
F405	4	6¼"	11¾"			

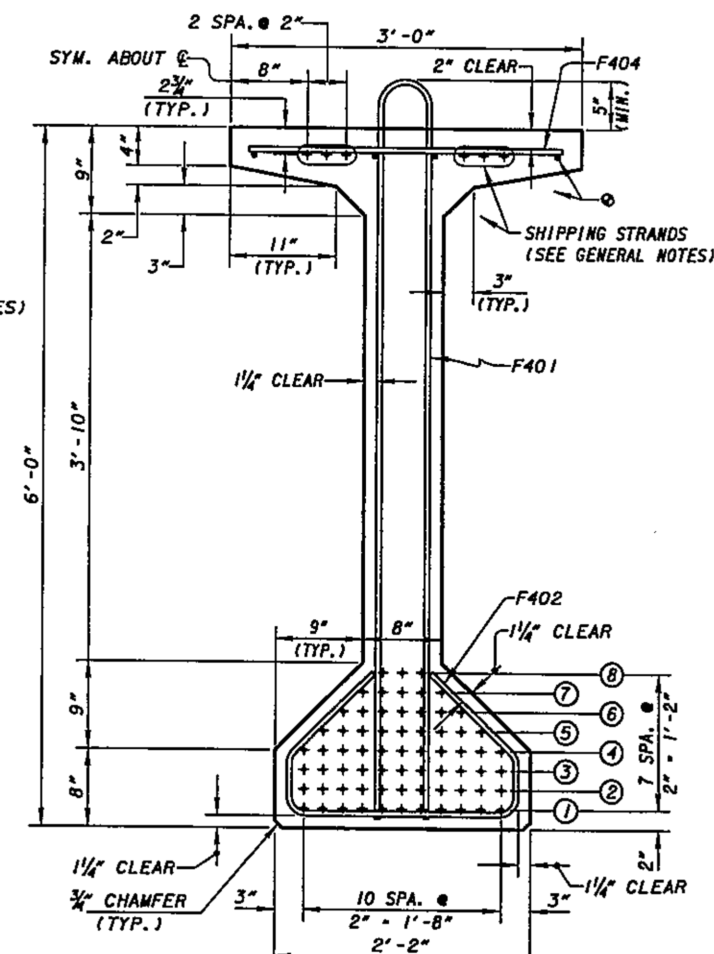
BAR SIZE IS INDICATED IN THE BAR MARK. THE FIRST LETTER IDENTIFIES THE BAR LOCATION, THE NEXT DIGIT INDICATES THE INCH-POUND BAR SIZE AND THE REMAINING DIGITS ITS SEQUENCE NUMBER. ALL STEEL SHALL BE EPOXY COATED.



MODIFIED AASHTO TYPE 4 (60")
(68 STRANDS MAXIMUM)



MODIFIED AASHTO TYPE 4 (66")
(68 STRANDS MAXIMUM)



MODIFIED AASHTO TYPE 4 (72")
(68 STRANDS MAXIMUM)

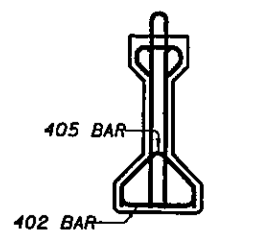
DESIGN AGENCY
OFFICE OF STRUCTURAL ENGINEERING

STATE OF OHIO DEPARTMENT OF TRANSPORTATION
Brad Fagrell
ADMINISTRATOR
09-07-99
DATE

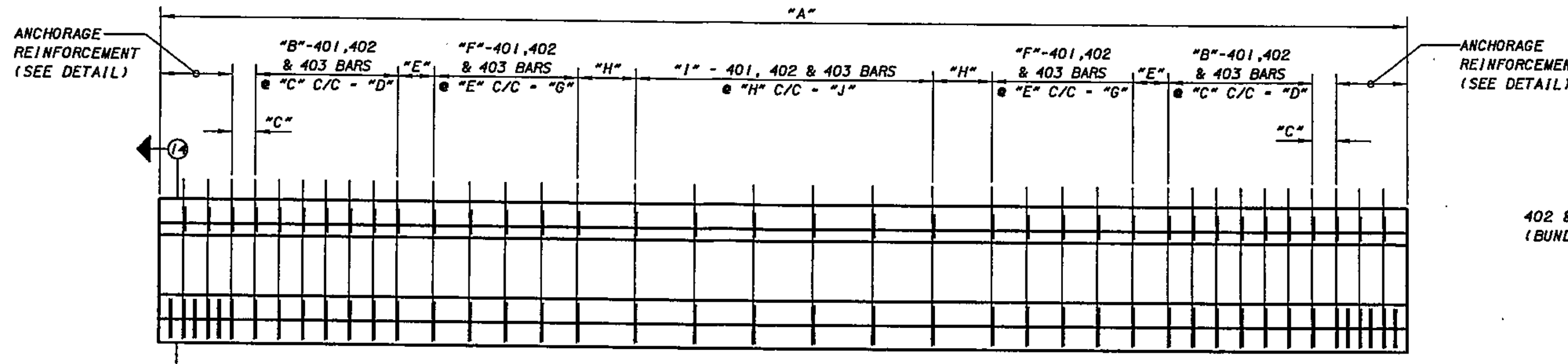
REVIEWED LMW
CHECKED JS/WTL
PSID-1-99
DESIGNED SAM
DRAWN SAM
REVISIONS 10-20-00 07-19-02 07-18-03 04-20-07

STANDARD
PRESTRESSED CONCRETE I-BEAM BRIDGE DETAILS

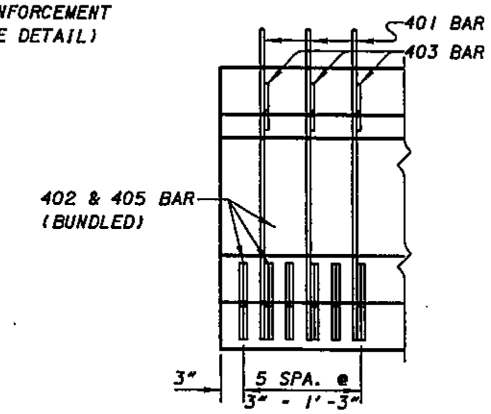
1/8



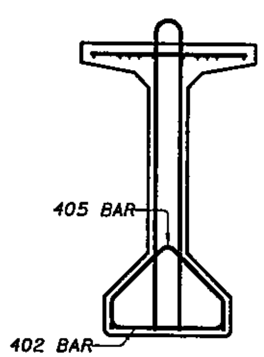
SECTION 14-14



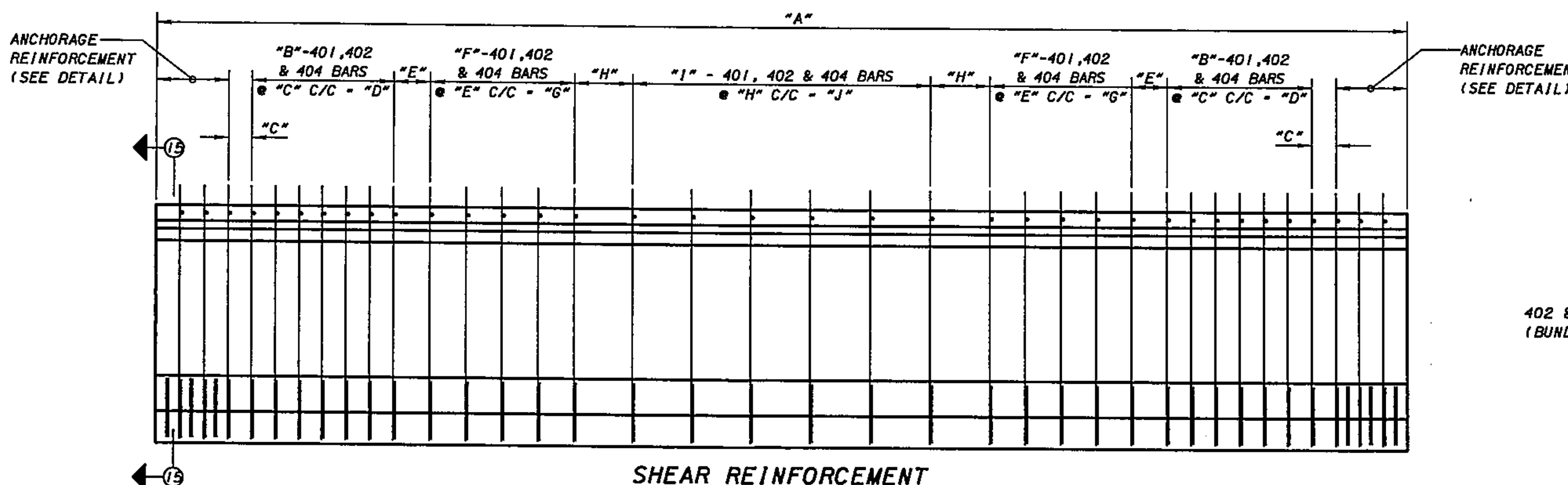
SHEAR REINFORCEMENT
AASHTO TYPES 2, 3 & 4



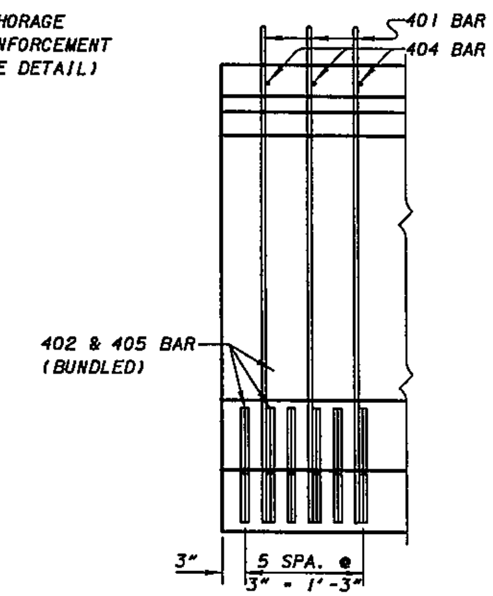
ANCHORAGE REINFORCEMENT
AASHTO TYPES 2, 3 & 4



SECTION 15-15



SHEAR REINFORCEMENT
MODIFIED AASHTO TYPE 4 I-GIRDERS



ANCHORAGE REINFORCEMENT
MODIFIED AASHTO TYPE 4 I-GIRDERS

STIRRUP SPACING: A SUGGESTED ARRANGEMENT FOR STIRRUP SPACING IS SHOWN. THE DESIGNER HAS THE OPTION OF USING AN ALTERNATE ARRANGEMENT IF IT IS MORE EFFICIENT.

BEAM DIMENSIONS

BEAM MARK	NO. REQ'D	DIMENSIONS A	B	C	D	E	F	G	H	I	J	APPROXIMATE WEIGHT (LBS)

(COMPLETED TABLE SHALL BE REPRODUCED IN THE PROJECT PLANS.)

ANCHORAGE ZONE REINFORCEMENT: THE REINFORCEMENT SHOWN IS DESIGNED TO RESIST 4 PERCENT OF A PRESTRESSING FORCE GENERATED BY THE MAXIMUM NUMBER OF ½" DIA. OVERSIZED STRANDS ALLOWED PER SECTION LOCATED IN THE BOTTOM FLANGE. THE REINFORCEMENT IS ACTING AT A UNIT STRESS EQUAL TO 20 KSI.

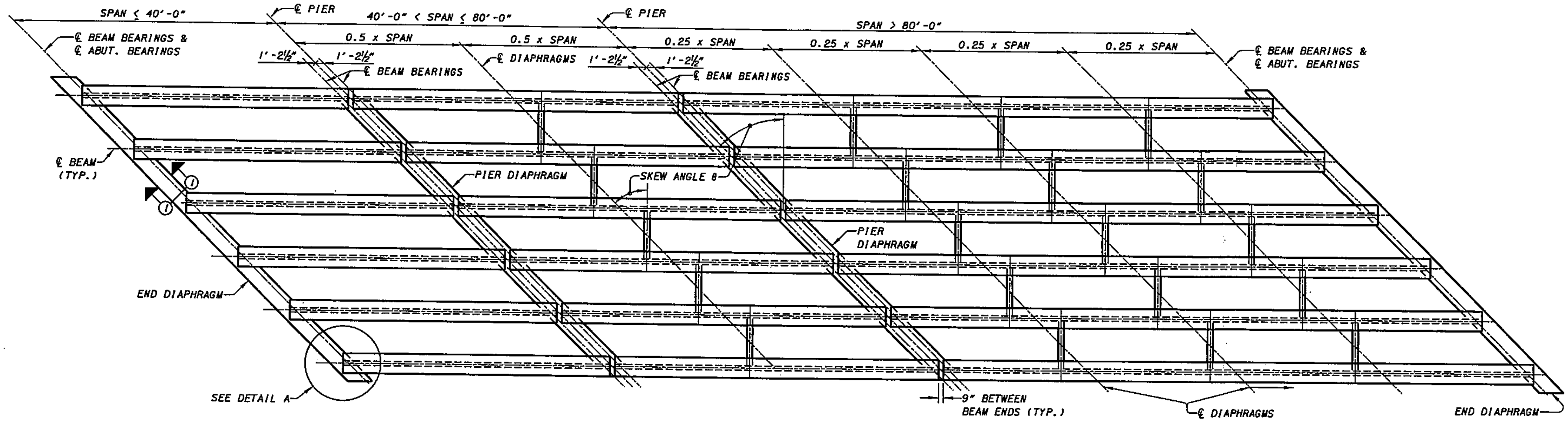
DESIGN AGENCY
OFFICE OF STRUCTURAL ENGINEERING

STATE OF OHIO DEPARTMENT OF TRANSPORTATION
Brad Fagrell
ADMINISTRATOR
09-07-99
DATE

REVIEWED LMW
CHECKED JS/WTL
DESIGNED SAM
DRAWN SAM
PSID-1-99

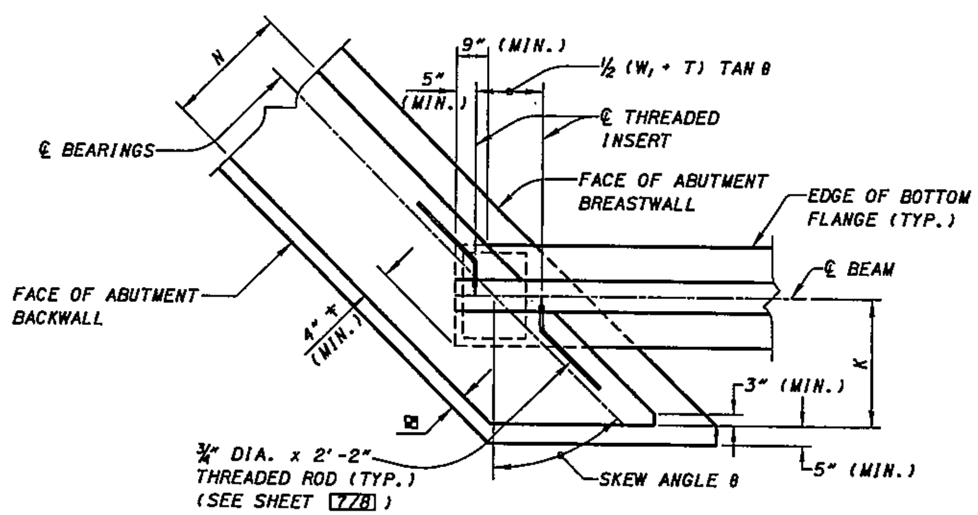
REVISIONS
10-20-00
07-19-02
07-18-03
04-20-07

STANDARD
PRESTRESSED CONCRETE I-BEAM
BRIDGE DETAILS

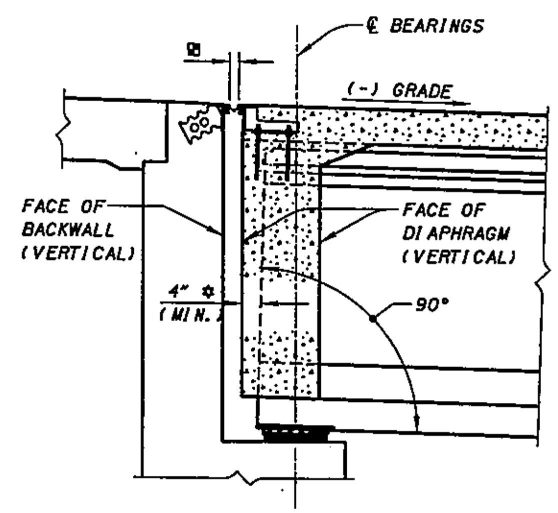


TYPICAL FRAMING PLAN

S - BEAM SPACING

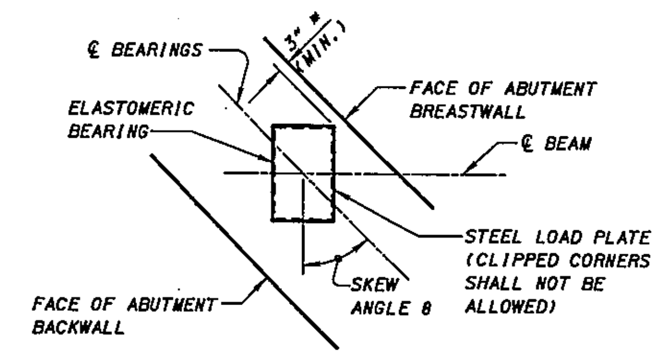


DETAIL A

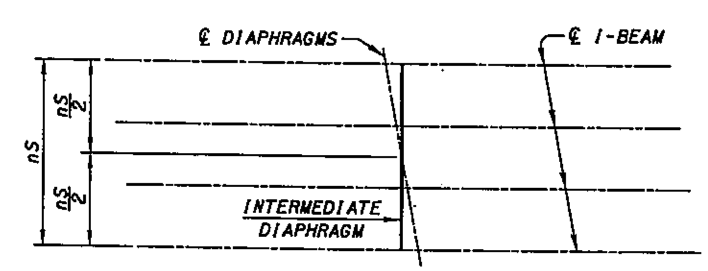


SECTION 1-1

(POSITIVE GRADE IS SIMILAR)

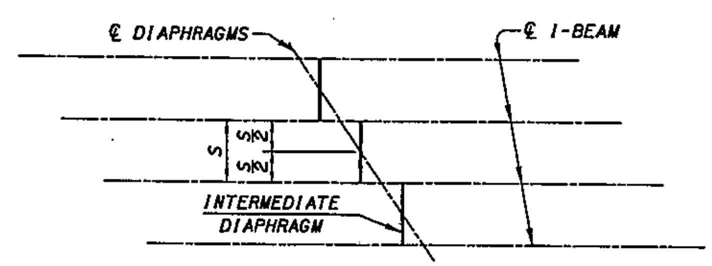


BEARING ORIENTATION AT ABUTMENTS



PLAN FOR SKEW ANGLES ≤ 10°

n = NO. OF BEAM SPACES



PLAN FOR SKEW ANGLES > 10°

LEGEND

- ✝ - DISTANCE SHALL BE MEASURED FROM THE LARGER OF THE TOP OR BOTTOM FLANGE WIDTH.
- ⊠ - SEE STANDARD DRAWING EXJ-6-95 FOR DIMENSION DEFINITION.
- N = LARGER OF { 4" + W_1 SIN θ + 9" COS θ ; 4" + ½ W_1 SIN θ + ½ W_2 SIN θ + 9" COS θ ; 18" }
- W_1 = BOTTOM FLANGE WIDTH
- W_2 = TOP FLANGE WIDTH
- T = THICKNESS OF WEB
- K = ½ W_2 + 15"
- ✡ - THIS DIMENSION IS MEASURED FROM THE VERTICAL FACE OF THE END DIAPHRAGM TO THE NEAREST POINT ON THE END OF THE BEAM.
- * - MEASURED TO STEEL LOAD PLATE, IF STEEL LOAD PLATE IS USED, OTHERWISE MEASURED TO ELASTOMERIC BEARING.

SEE SHEET 4/8 FOR BEARING DETAILS.

SEE SHEET 5/8 FOR CAST-IN-PLACE CONCRETE DIAPHRAGMS

SEE SHEET 6/8 FOR STEEL INTERMEDIATE DIAPHRAGMS.

DESIGN AGENCY: OFFICE OF STRUCTURAL ENGINEERING

STATE OF OHIO DEPARTMENT OF TRANSPORTATION

09-07-99 DATE

ADMINISTRATOR

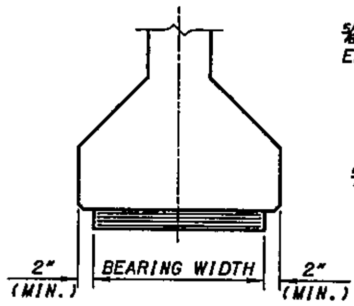
REVIEWED LMW | CHECKED JS/WTL | DESIGNED SAM | DRAWN SAM

PSID-1-99

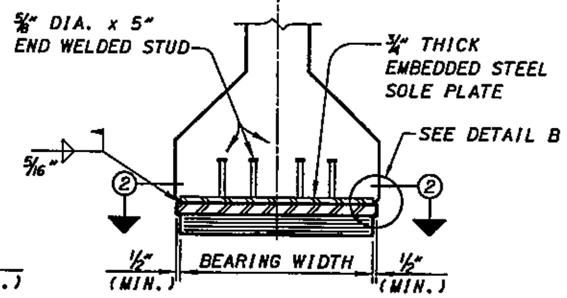
REVISIONS 10-20-00, 07-19-02, 07-18-03, 04-20-07

STANDARD

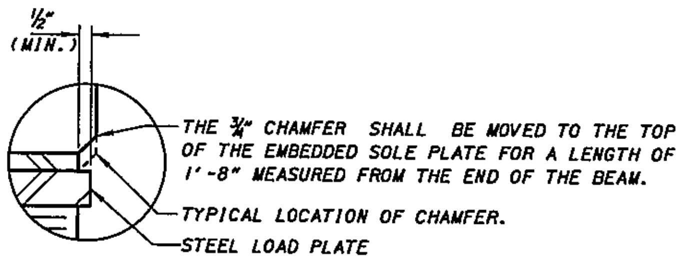
PRESTRESSED CONCRETE I-BEAM BRIDGE DETAILS



END VIEW
(BEARING WITH NO LOAD PLATE)

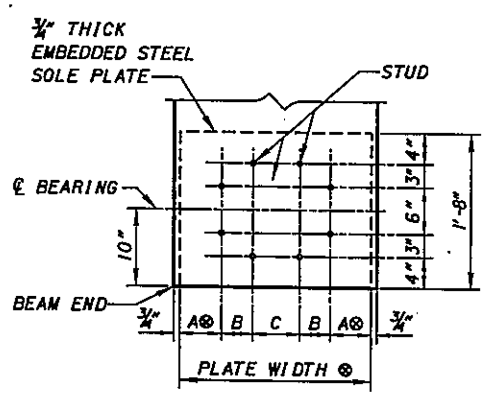


END VIEW
(BEARING WITH LOAD PLATE)



DETAIL B

STEEL LOAD PLATES: A LAMINATED ELASTOMERIC BEARING WITHOUT A LOAD PLATE SHOULD BE THE FIRST OPTION UNLESS ROTATIONAL AND/OR GRADE REQUIREMENTS DICTATE THE USE OF A LOAD PLATE. A VULCANIZED BEVELED LOAD PLATE IS REQUIRED WHEN THE ROTATIONAL CAPACITY OF A BEARING IS EXCEEDED UNDER ANY LOADING CONDITION. WHEN A LOAD PLATE IS REQUIRED, THE FABRICATOR SHALL INSTALL THE EMBEDDED SOLE PLATE TO ALLOW FOR FIELD INSTALLATION OF THE BEARING. DURING FIELD WELDING, CONTROL THE TEMPERATURE AT THE ELASTOMER BONDED SURFACE TO A MAXIMUM OF 300° F AS DETERMINED BY THE USE OF PYROMETRIC STICKS OR OTHER TEMPERATURE MONITORING DEVICES.

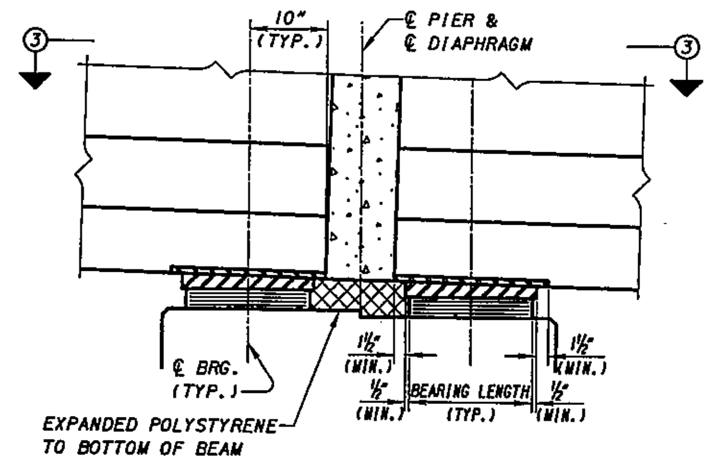


SECTION ②-②
(BEARING AND LOAD PLATE NOT SHOWN)

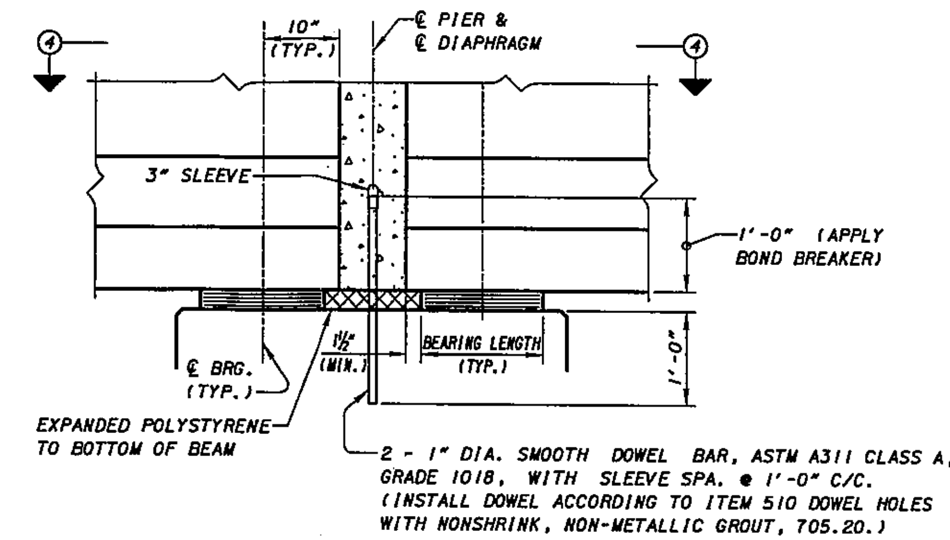
BOTTOM FLANGE WIDTH	PLATE WIDTH	A⊗	B	C
1'-6"	1'-4½"	3¼"	2"	6"
1'-10"	1'-8½"	4¼"	4"	4"
2'-2"	2'-0½"	5¼"	4"	6"

NOTE - END WELDED STUDS MAY BE MOVED SLIGHTLY IN ORDER TO AVOID REINFORCING STEEL AND PRESTRESSING STRANDS.

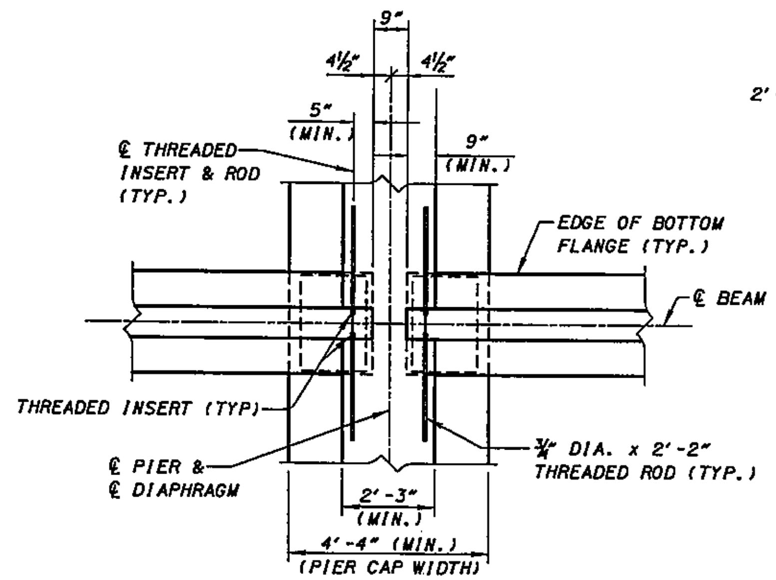
⊗ - IN ORDER TO ALLOW FOR FIT-UP, THE PLATE WIDTH MAY BE DECREASED BY 3/8". DIMENSION "A" SHALL BE CORRECTED ACCORDINGLY.



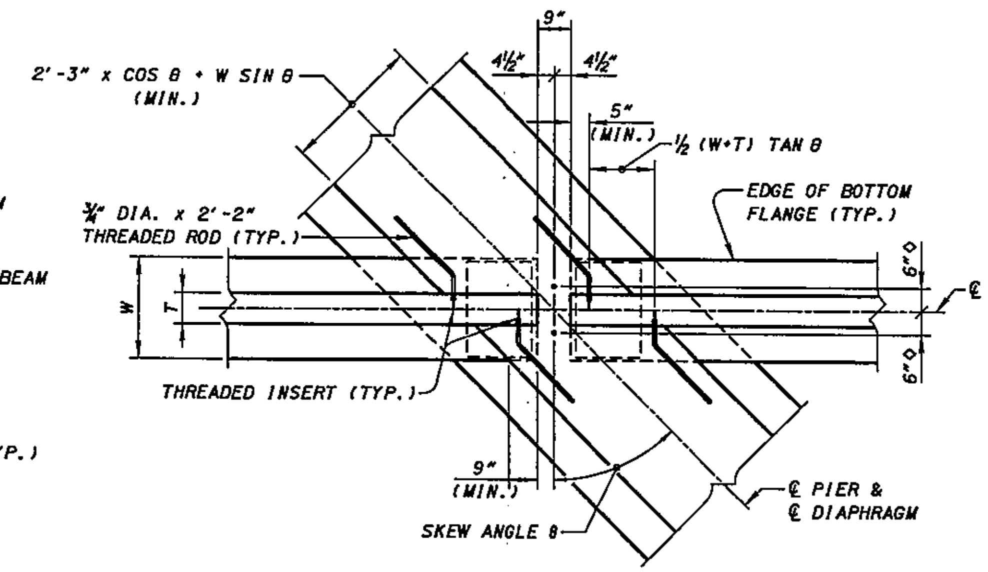
EXPANSION PIER DETAIL
(BEARING WITH LOAD PLATE)



FIXED PIER DETAIL
(BEARING WITH NO LOAD PLATE)



VIEW ③-③
(NO SKEW)

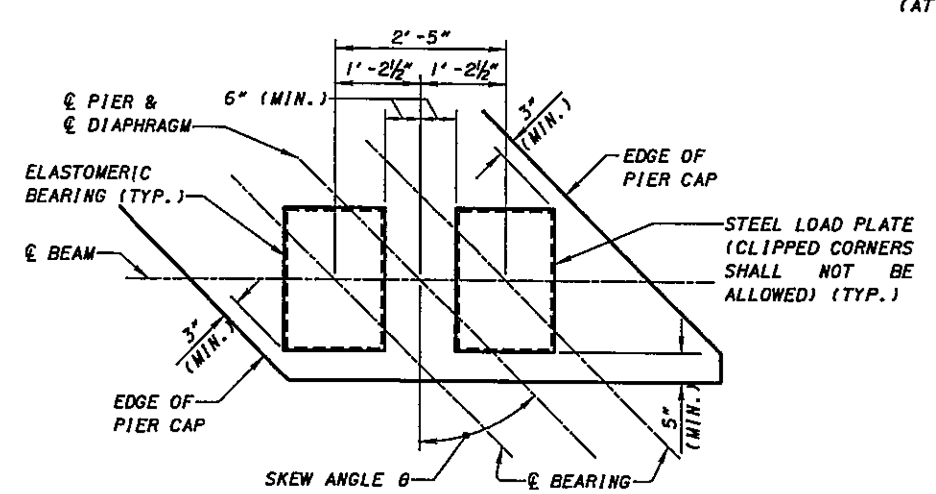


VIEW ④-④
(AT SKEWED PIER)

◇ - MEASURED TO CENTER OF 1" DIA. SMOOTH DOWEL BARS. DOWEL BARS SHALL BE OMITTED AT EXPANSION PIERS.

W - WIDTH OF BOTTOM FLANGE

T - THICKNESS OF WEB



BEARING ORIENTATION AT PIERS
(BEAM NOT SHOWN)

SEE SHEET 5 / 8 FOR PIER DIAPHRAGM DETAILS.

SEE SHEET 7 / 8 FOR THREADED INSERT AND ROD DETAILS.

DESIGN AGENCY
OFFICE OF STRUCTURAL ENGINEERING

STATE OF OHIO DEPARTMENT OF TRANSPORTATION
Brad Fagrell
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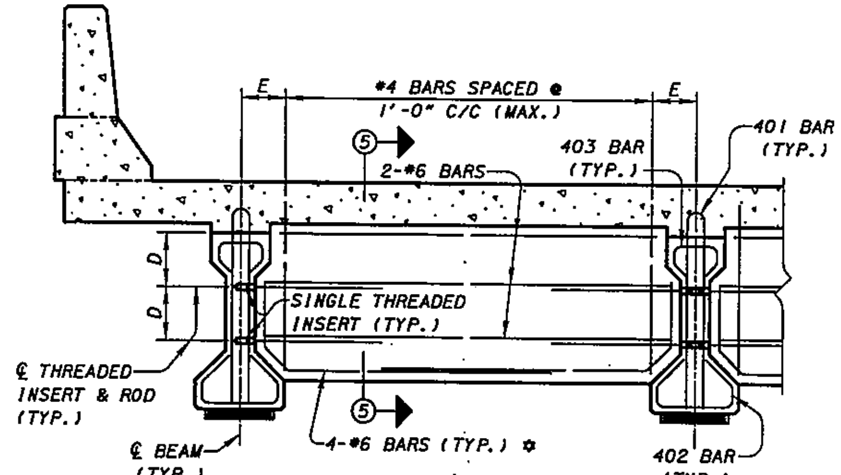
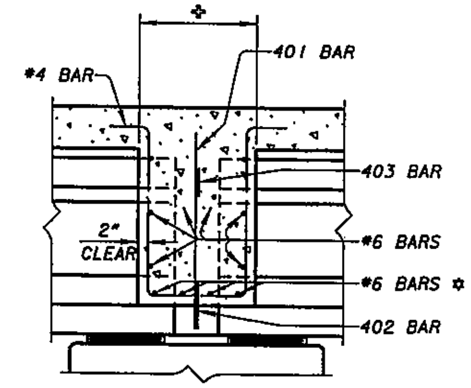
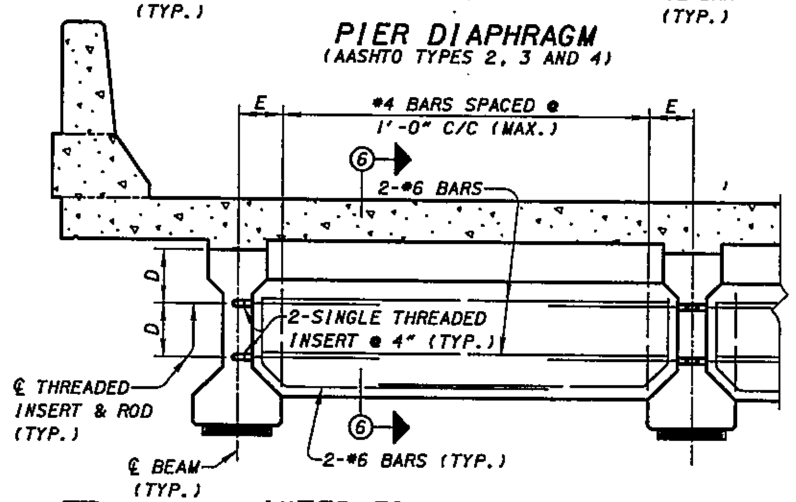
STANDARD
PRESTRESSED CONCRETE I-BEAM
BRIDGE DETAILS



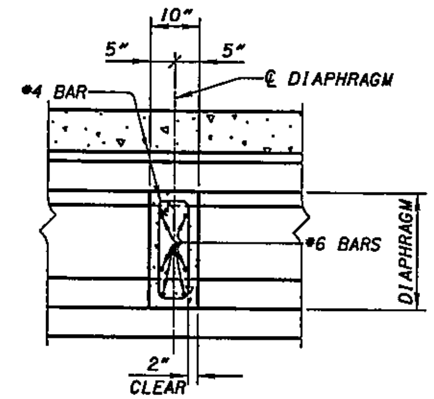
PIER DIAPHRAGM
(AASHTO TYPES 2, 3 AND 4)



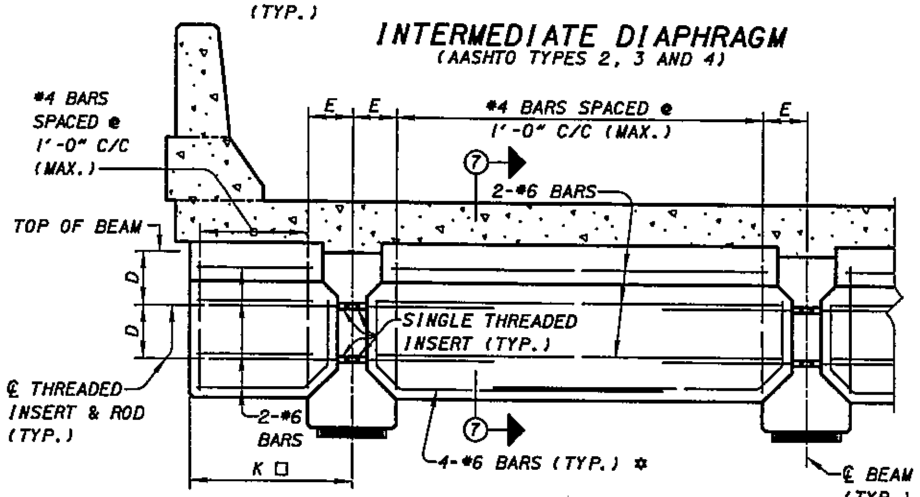
SECTION 5-5
(PARTIAL PIER SHOWN)



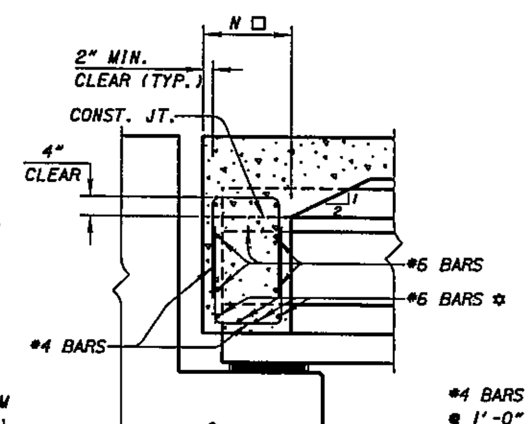
INTERMEDIATE DIAPHRAGM
(AASHTO TYPES 2, 3 AND 4)



SECTION 6-6



END DIAPHRAGM
(AASHTO TYPES 2, 3 AND 4)



SECTION 7-7
(PARTIAL ABUTMENT SHOWN)

SECTION	DIM. D	DIM. E
AASHTO TYPE 2	11"	9"
AASHTO TYPE 3	1'-2"	11"
AASHTO TYPE 4	1'-5"	1'-1"
MODIFIED AASHTO TYPE 4 (60")	1'-3"	1'-8"
MODIFIED AASHTO TYPE 4 (66")	1'-6"	1'-8"
MODIFIED AASHTO TYPE 4 (72")	1'-9"	1'-8"

ALL VERTICAL BARS SHALL BE PLACED PARALLEL TO BEAMS.

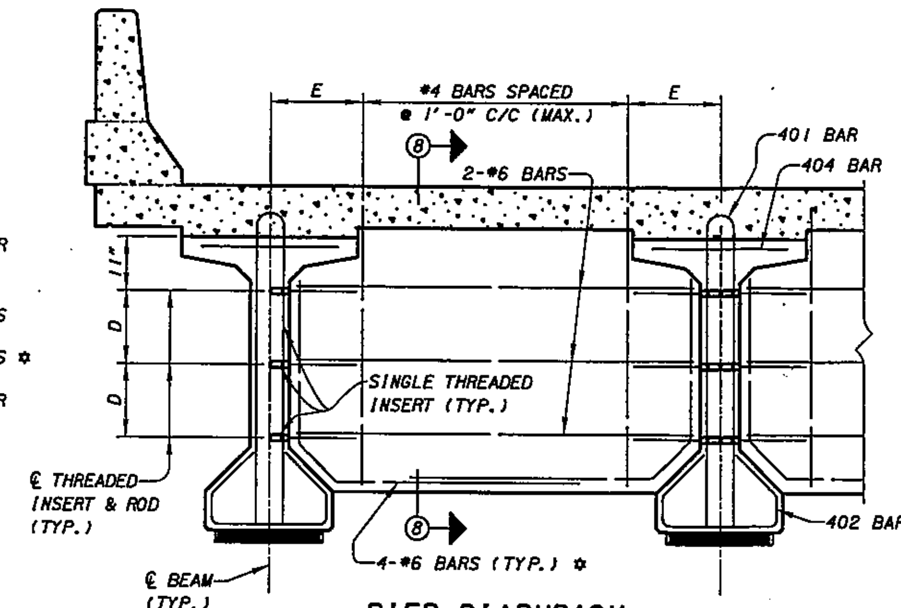
✢ - REFER TO SHEET [4/8] FOR DIMENSION DEFINITION.

□ - REFER TO SHEET [3/8] FOR DIMENSION DEFINITION.

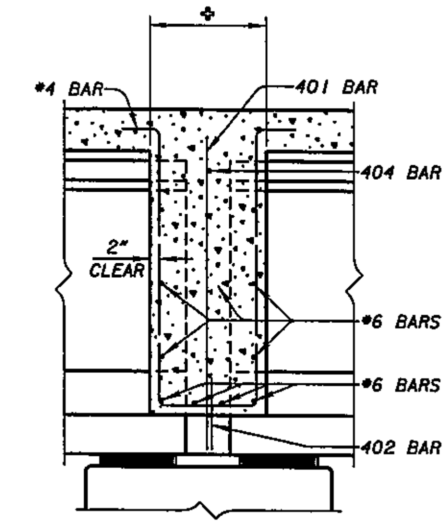
✡ - FOR BEAM SPACINGS EXCEEDING 9'-0", USE 4-#8 BARS.

REFER TO SHEET [7/8] FOR THREADED INSERT AND STRAND EXTENSION DETAILS.

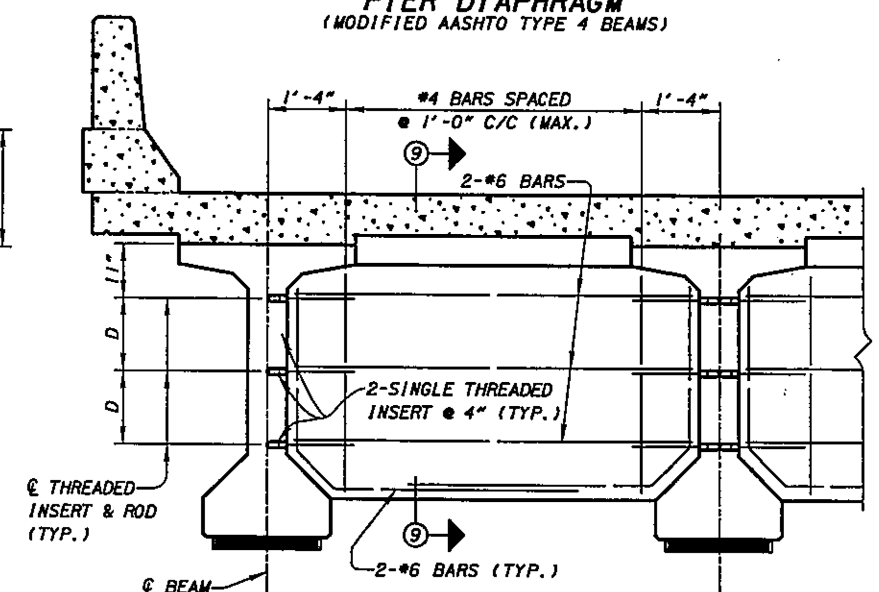
REFER TO SHEET [1/8] FOR 401, 402, 403 & 404 BENDING DIAGRAMS.



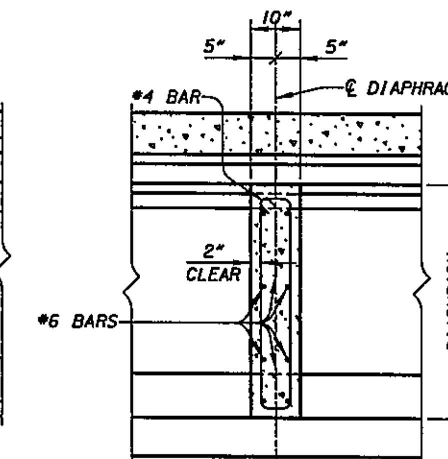
PIER DIAPHRAGM
(MODIFIED AASHTO TYPE 4 BEAMS)



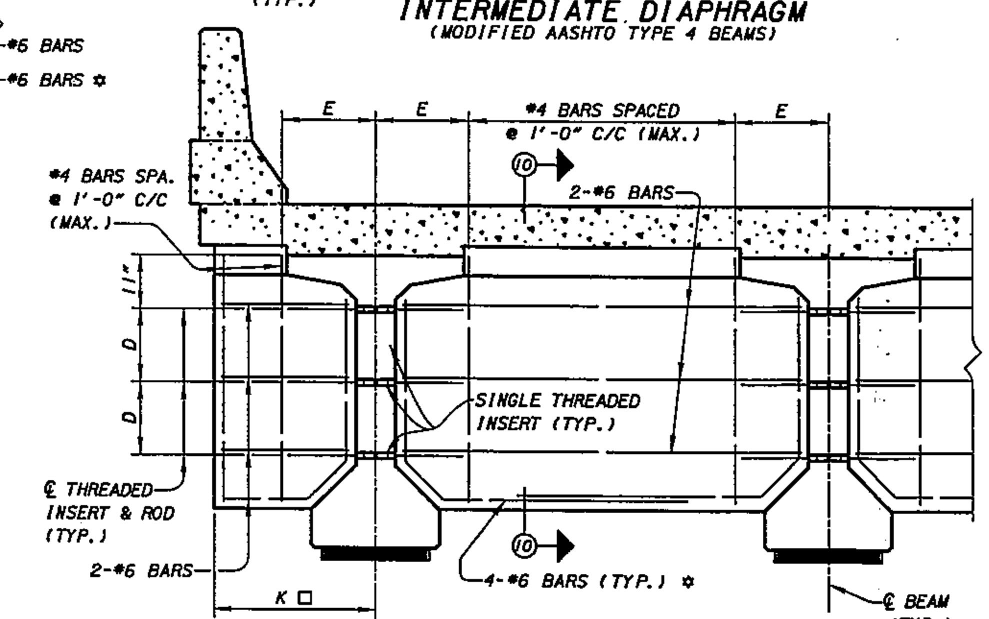
SECTION 8-8
(PARTIAL PIER SHOWN)



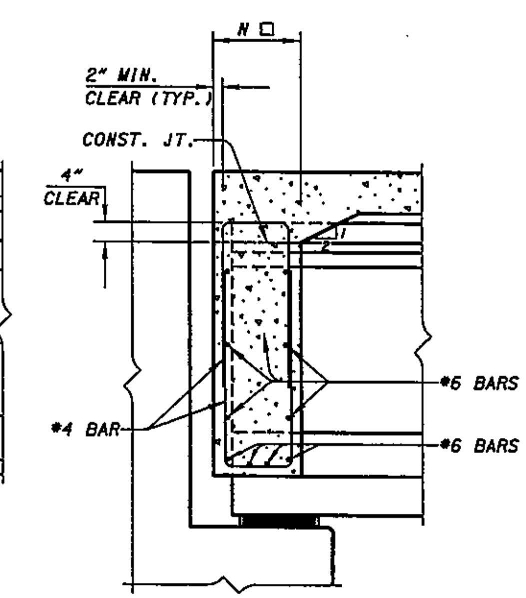
INTERMEDIATE DIAPHRAGM
(MODIFIED AASHTO TYPE 4 BEAMS)



SECTION 9-9



END DIAPHRAGM
(MODIFIED AASHTO TYPE 4 BEAMS)



SECTION 10-10
(PARTIAL ABUTMENT SHOWN)

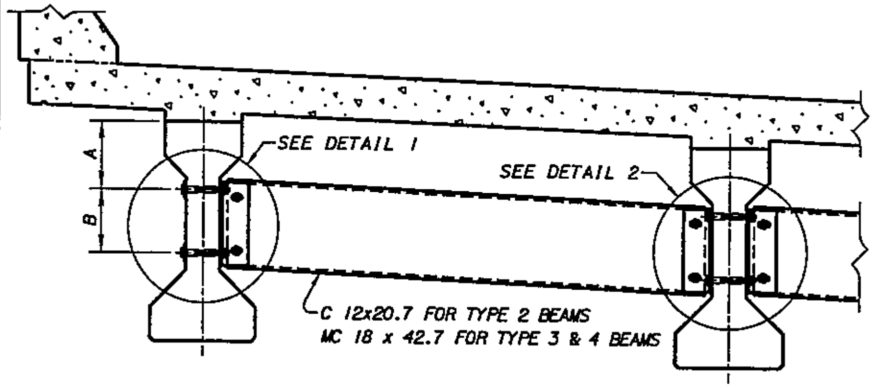
DESIGN AGENCY
OFFICE OF
STRUCTURAL ENGINEERING

STATE OF OHIO DEPARTMENT OF TRANSPORTATION
09-07-99
DATE
ADMINISTRATOR

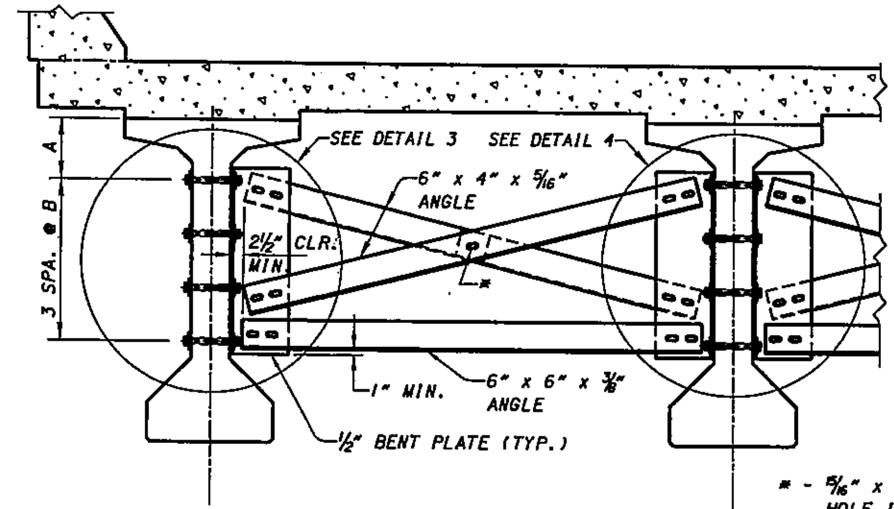
REVIEWED LWH
CHECKED JS/WTL
DESIGNED SAM
DRAWN SAM
REVISIONS 10-20-00 07-19-02 07-18-03 04-20-07

PSID-1-99

STANDARD
PRESTRESSED CONCRETE I-BEAM
BRIDGE DETAILS

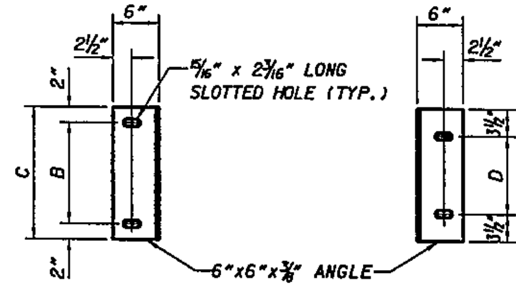


INTERMEDIATE DIAPHRAGM
(AASHTO TYPES 2, 3 AND 4)

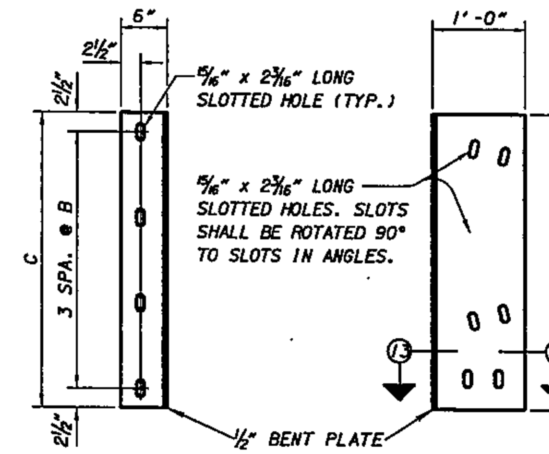


INTERMEDIATE DIAPHRAGM
(MODIFIED AASHTO TYPE 4 BEAMS)

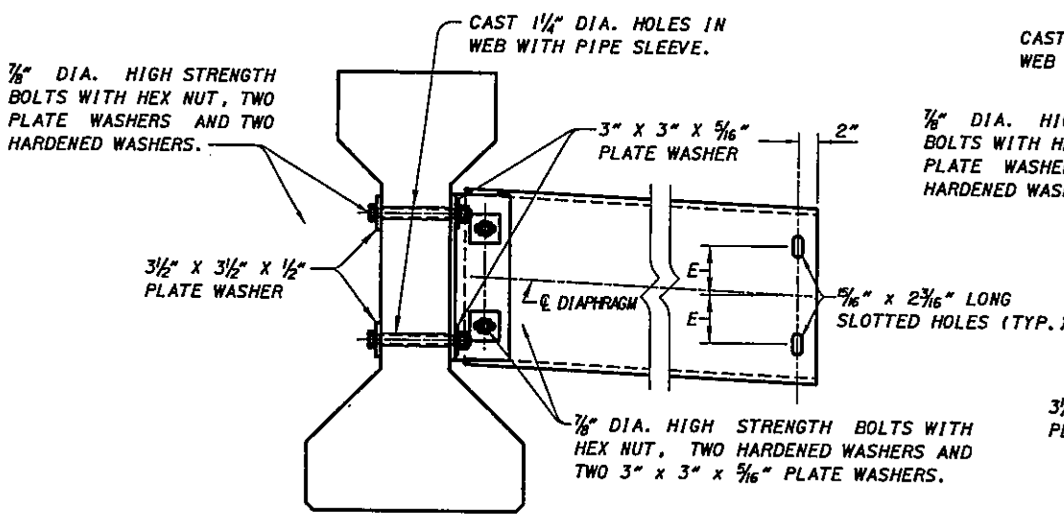
* - 5/16" x 2 3/16" LONG SLOTTED HOLE IN EACH ANGLE AND ½" FILL PLATE



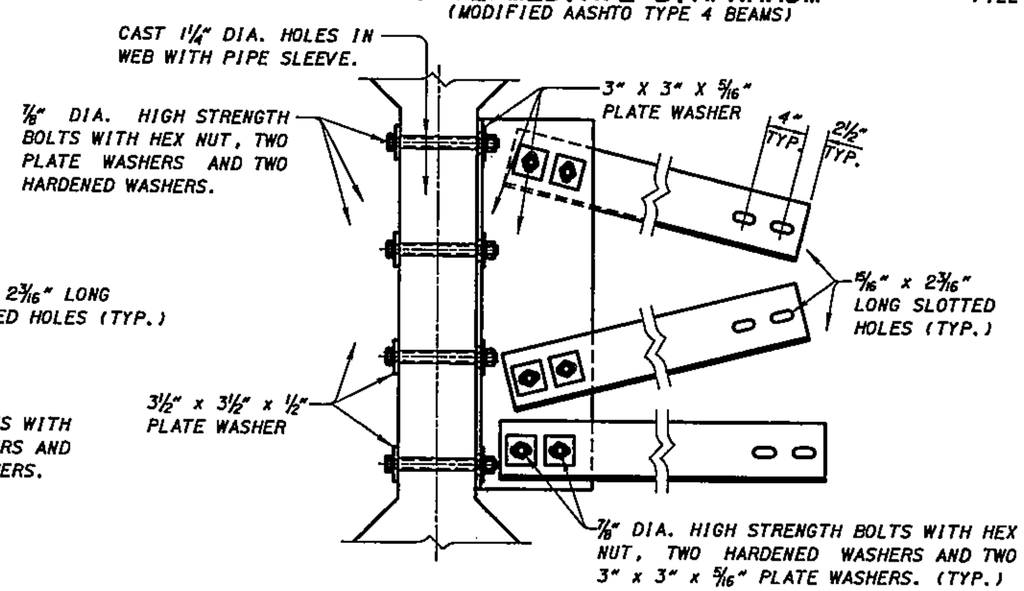
DIAPHRAGM SUPPORT
(FOR 36", 45" & 54" BEAMS)



DIAPHRAGM SUPPORT
(FOR 60", 66" & 72" BEAMS)



DETAIL 1
DETAIL 1 SHALL BE USED AT THE FASCIA BEAM AND ALL INTERIOR BEAMS WHEN THE SKEW ANGLE EXCEEDS 10°.

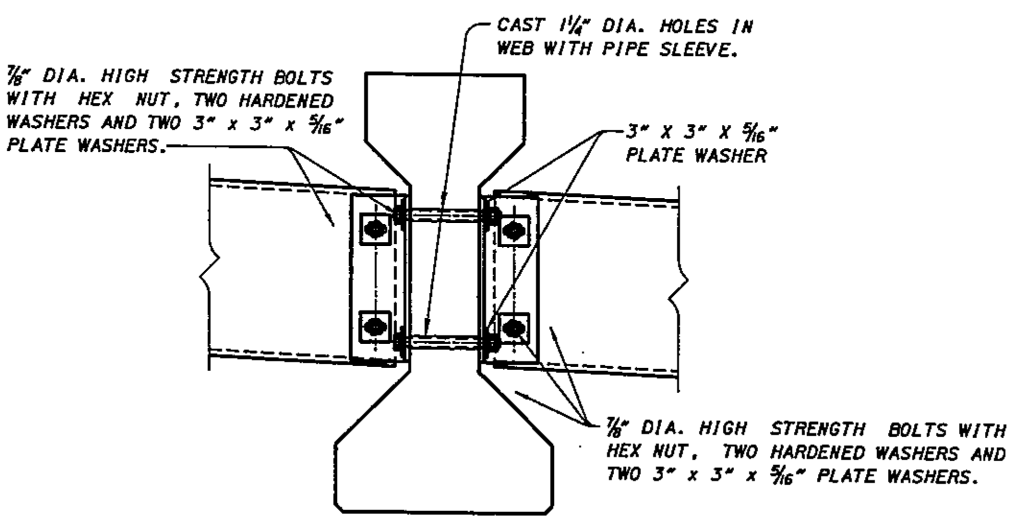


DETAIL 3
DETAIL 3 SHALL BE USED AT THE FASCIA BEAM AND ALL INTERIOR BEAMS WHEN THE SKEW ANGLE EXCEEDS 10°.

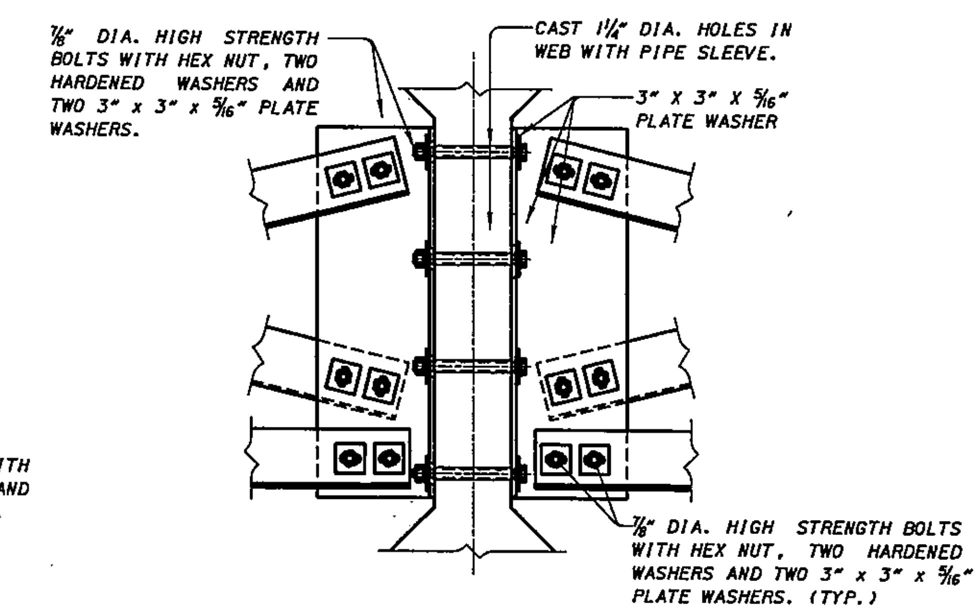
SECTION 13-13

DIMENSIONS

BEAM HEIGHT	A	B	C	D	E
36"	1'-0"	9"	1'-1"	6"	3"
45"	1'-2½"	1'-1"	1'-5"	10"	5"
54"	1'-5"	1'-5"	1'-9"	1'-2"	7"
60"	1'-0½"	9"	2'-8"	-	-
66"	1'-0½"	11"	3'-2"	-	-
72"	1'-0½"	1'-1"	3'-8"	-	-



DETAIL 2
DETAIL 2 SHALL BE USED AT INTERIOR BEAMS WHEN THE SKEW ANGLE IS 10° OR LESS.



DETAIL 4
DETAIL 4 SHALL BE USED AT INTERIOR BEAMS WHEN THE SKEW ANGLE IS 10° OR LESS.

NOTES

ALL STRUCTURAL STEEL, INCLUDING BOLTS, NUTS AND WASHERS, SHALL MEET THE FABRICATION AND ERECTION REQUIREMENTS SPECIFIED IN 513. THE DEPARTMENT WILL CONSIDER THESE COSTS TO BE INCIDENTAL TO ITEM 515, INTERMEDIATE DIAPHRAGMS.

ALL STRUCTURAL STEEL SHALL BE ASTM A709, GRADE 36 OR 50, GALVANIZED ACCORDING TO 711.02.

ALL BOLTS ARE 7/8" DIA. ASTM A325, TYPE 1. ALL BOLTS, NUTS AND WASHERS SHALL BE GALVANIZED ACCORDING TO 711.02.

LOCATE BOLT HOLES IN THE I-BEAM WEBS TO AVOID PRESTRESS PRESTRESSING STRANDS.

DESIGN AGENCY: OFFICE OF STRUCTURAL ENGINEERING

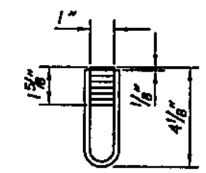
STATE OF OHIO DEPARTMENT OF TRANSPORTATION
09-07-99 DATE
ADMINISTRATOR

REVIEWED WTL | CHECKED LMW | DESIGNED SAM | DRAWN SAM

PSID-1-99

REVISIONS 10-20-00, 07-19-02, 07-18-03, 04-20-07

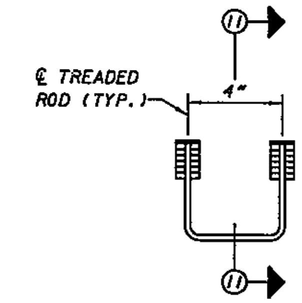
STANDARD PRESTRESSED CONCRETE I-BEAM BRIDGE DETAILS

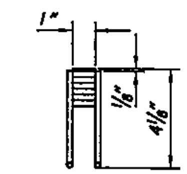


SINGLE THREADED INSERT

(3,000 LB PROOF LOAD)

NOTE - THE GIRDER FABRICATOR MAY USE DOUBLE THREADED INSERTS IN LIEU OF TWO SINGLE INSERTS SPACED AT 4" ON CENTER AT THE CONCRETE INTERMEDIATE DIAPHRAGM LOCATIONS.

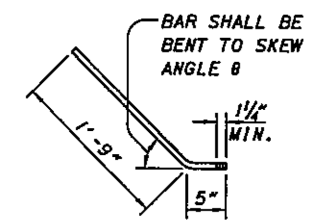




SECTION 11-11

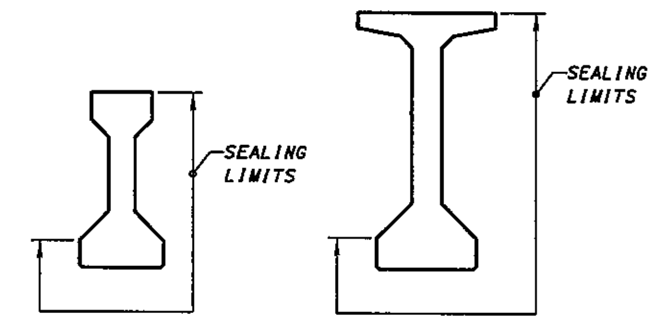
DOUBLE THREADED INSERT

(6,000 LB PROOF LOAD)

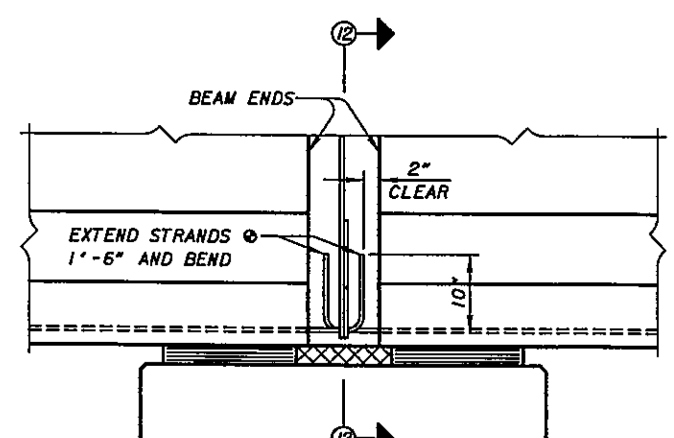


¾" DIA. x 2'-2" THREADED ROD

SHALL CONFORM TO 709.01, 709.03 OR 709.05 WITH THREADS FORMED PRIOR TO GALVANIZING.

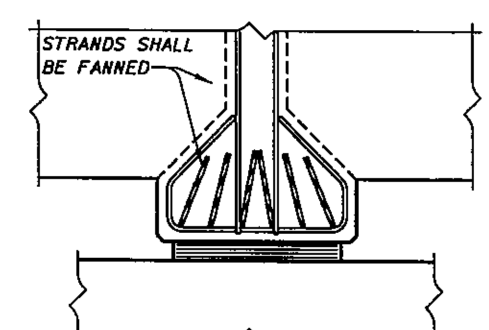


SEALING OF FASCIA BEAMS



EXTENDED STRAND DETAIL

⊗ - THE NUMBER OF STRANDS TO BE BENT SHALL BE THE LARGER OF ONE HALF THE NUMBER OF ROW 1 STRANDS OR THE NUMBER OF STRANDS SUFFICIENT TO RESIST THE POSITIVE LIVE LOAD MOMENT AT THE PIER. ALTERNATE STRANDS IN ABUTTING BEAMS TO AVOID INTERFERENCE.



SECTION 12-12

(PARTIAL PIER AND DIAPHRAGM SHOWN)

DESIGN AGENCY
OFFICE OF STRUCTURAL ENGINEERING

STATE OF OHIO DEPARTMENT OF TRANSPORTATION
Brad Fagrell
ADMINISTRATOR
09-07-99
DATE

REVIEWED LMW
CHECKED JS/WTL
DESIGNED SAM
DRAWN SAM
PSID-1-99

REVISIONS
10-20-00
07-19-02
07-18-03
04-20-07

STANDARD
PRESTRESSED CONCRETE I-BEAM
BRIDGE DETAILS

GENERAL: THIS STANDARD DRAWING PROVIDES DESIGN AND GENERAL CONSTRUCTION DETAILS FOR PRESTRESSED CONCRETE I-BEAM BRIDGES. THE DETAILS IN THIS STANDARD ARE APPLICABLE TO STRUCTURES WITH BEAM SPACINGS LESS THAN 14'-0" AND SKEWS LESS THAN 45°. THE PROJECT PLANS FOR EACH STRUCTURE SHALL INCLUDE THE FOLLOWING DETAILS:

1. THE DESIGNER SHALL CHOOSE A 28-DAY CONCRETE STRENGTH BETWEEN 5500 PSI AND 7000 PSI, A RELEASE STRENGTH BETWEEN 4000 PSI AND 5000 PSI AND A NOMINAL STRAND AREA OF 0.153 IN^2 OR 0.167 IN^2. THE VALUES CHOSEN BY THE DESIGNER SHALL BE LISTED IN THE STRUCTURE GENERAL NOTES.
2. A TRANSVERSE CROSS-SECTION THROUGH THE DECK, DETAILING (AT A MINIMUM) THE I-BEAM SPACING, DECK THICKNESS, HAUNCH DIMENSIONS, DECK REINFORCING AND COVER.
3. FRAMING PLAN SHOWING (AT A MINIMUM) SPAN LENGTHS, BEAM SPACINGS, SKEW ANGLE, DIAPHRAGM LOCATIONS, AND CENTERLINES OF BEARINGS.
4. BEAM ELEVATION AND SECTION VIEWS FOR EACH BEAM DETAILING BEAM LENGTHS, BEAM HEIGHT, STRAND LOCATIONS AND NUMBER, STRAND DEBONDING LENGTHS, CROSS SECTION OF I-BEAM ENDS SHOWING NUMBER AND LOCATION OF BENT UP ANCHOR STRANDS, REINFORCING STEEL, INSERT LOCATIONS AND EMBEDDED STEEL PLATES (IF ANY).
5. VARIABLE HAUNCH THICKNESSES AND SCREED ELEVATIONS.
6. LAMINATED ELASTOMERIC BEARING DETAILS, INCLUDING DIMENSIONS, DUROMETER AND LOAD PLATE (IF ANY).
7. DETAILS OF END AND PIER DIAPHRAGMS, INCLUDING DIMENSIONS, REINFORCING STEEL SIZE AND SPACING.
8. EXPANSION JOINT DETAILS.
9. DETAILS OF ABUTMENTS AND PIERS, INCLUDING DOWEL ROD POSITIONS, CENTERLINE OF BEAM BEARINGS, ORIENTATION OF BEARINGS AND FIXED DOWEL REQUIREMENTS.
10. ALL PLAN QUANTITY ITEMS REQUIRED TO PROPERLY COVER THE COST OF FABRICATION, ERECTION AND CONSTRUCTION OF THE BEAMS.
11. PLAN NOTES, INCLUDING BUT NOT LIMITED TO, CONCRETE PLACEMENT SEQUENCE.
12. ALL OTHER DETAILS AND INFORMATION NECESSARY TO COMPLETE THE PLANS.

IT IS NOT INTENDED THAT DETAILS SHOWN ON THIS STANDARD DRAWING BE REPEATED ON THE PROJECT PLANS EXCEPT AS MAY BE REQUIRED FOR CLARITY.

DESIGN CRITERIA:

DESIGN SPECIFICATIONS: THIS STANDARD DRAWING CONFORMS TO "STANDARD SPECIFICATIONS FOR HIGHWAY BRIDGES" ADOPTED BY THE AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS, 1996, INCLUDING THE 1997, 1998, 1999 AND 2000 INTERIM SPECIFICATIONS AND THE ODOT BRIDGE DESIGN MANUAL.

DESIGN LOADING:
DEAD LOAD - 60 LB/FT^2 (FUTURE WEARING SURFACE)
LIVE LOAD - HS-25 AND THE ALTERNATE MILITARY LOADING

DESIGN STRESSES:
PRESTRESSED CONCRETE - F'C = * (28-DAY)
F'CI = ** (RELEASE)

DIAPHRAGM CONCRETE - F'C = 4500 PSI

REINFORCING STEEL - MIN. YIELD STRENGTH = 60 KSI.

PRESTRESSING STRAND - FURNISH MATERIAL CONFORMING TO 711.27 (ASTM A416), GRADE 270, LOW RELAXATION, UNCOATED, SEVEN WIRE STRAND. STRANDS SHALL BE ½ INCH DIAMETER WITH A TOTAL CROSS-SECTIONAL AREA OF EITHER 0.153 IN^2 OR 0.167 IN^2.***

STRUCTURAL STEEL - ASTM A709, GRADE 36 OR 50

* - THE DESIGNER SHALL SPECIFY A 28-DAY COMPRESSIVE STRENGTH IN THE RANGE OF 5500 PSI MINIMUM TO 7000 PSI MAXIMUM AND LIST THE VALUE IN THE STRUCTURE'S GENERAL NOTES.

** - THE DESIGNER SHALL SPECIFY A RELEASE STRENGTH IN THE RANGE OF 4000 PSI MINIMUM TO 5000 PSI MAXIMUM AND LIST THE VALUE IN THE STRUCTURE'S GENERAL NOTES.

*** - THE DESIGNER SHALL SPECIFY ONLY THE STRAND AREA USED IN THE DESIGN IN THE STRUCTURE'S GENERAL NOTES.

THE DESIGNER SHALL NOT SPECIFY MORE THAN ONE STRAND SIZE, ONE RELEASE STRENGTH AND ONE 28-DAY STRENGTH IN A SINGLE STRUCTURE.

DECK REINFORCING: THE DESIGNER SHALL DESIGN THE DECK REINFORCING OVER THE PIERS TO RESIST THE NEGATIVE MOMENTS INDUCED BY ANY SUPERIMPOSED DEAD LOADS AND LIVE LOADS.

LAP SPLICES FOR REINFORCING STEEL IN I-BEAMS AND DIAPHRAGMS SHALL BE:
2'-0" IN LENGTH FOR #4 BARS
2'-6" IN LENGTH FOR #5 BARS
3'-0" IN LENGTH FOR #6 BARS
5'-0" IN LENGTH FOR #8 BARS

FABRICATION AND CONSTRUCTION REQUIREMENTS:

ERECTION PROCEDURE: THE CONTRACTOR SHALL SUBMIT PLANS FOR ERECTION AND HANDLING PROCEDURES ACCORDING TO 501.05.

ERECTION AND LIFTING DEVICES: THE GIRDER FABRICATOR IS RESPONSIBLE FOR THE DESIGN OF A LIFTING SYSTEM FOR HANDLING I-BEAMS. AS A MINIMUM, THE FABRICATOR SHALL USE TWO LIFT POINTS; ONE WITHIN 5 FEET OF EACH END. THE FABRICATOR SHALL SHOW THE LIFTING SYSTEM ON THE SHOP DRAWINGS AND USE A FACTOR OF SAFETY OF FOUR IN THE DESIGN. REFER TO PART 5 OF THE PCI HANDBOOK.

TEMPORARY STABILITY FOR DECK PLACEMENT: THE ERECTION PROCEDURE SHALL INCLUDE ANY ADDITIONAL TEMPORARY DIAPHRAGMS OR SUPPORTS NEEDED TO ASSURE THE I-BEAMS WILL REMAIN STABLE BEFORE, DURING AND THROUGH COMPLETION OF THE PLACEMENT OF THE CONCRETE DECK.

THE PLACEMENT OF DECK CONCRETE SHALL NOT PROCEED UNTIL ALL INTERMEDIATE DIAPHRAGMS HAVE BEEN PROPERLY INSTALLED. CONCRETE INTERMEDIATE DIAPHRAGMS SHALL BE COMPLETED AT LEAST 48 HOURS BEFORE DECK PLACEMENT BEGINS.

CAST-IN-PLACE DECK CONCRETE: THOROUGHLY CLEAN THE TOP SURFACE OF THE BEAMS OF ALL DIRT, DUST, LAITANCE OR OTHER FOREIGN MATERIALS WITH WATER, AIR UNDER PRESSURE OR ANY OTHER METHOD THAT PRODUCES SATISFACTORY RESULTS. THOROUGHLY DRENCH THE SURFACE WITH CLEAN WATER. BEFORE PLACING THE CONCRETE, ALLOW THE SURFACE TO DRY TO A DAMP CONDITION.

THE DESIGNER SHALL INCLUDE A DECK POUR SEQUENCE IN THE PLANS FOR MULTI-SPAN, CONTINUOUS BRIDGES. TWO CONSTRUCTION JOINTS SPACED AT 8'-0", PARALLEL TO AND CENTERED ABOUT THE PIERS ARE REQUIRED. DO NOT PLACE CONCRETE BETWEEN THESE CONSTRUCTION JOINTS PRIOR TO THE PLACEMENT OF CONCRETE IN EACH ADJACENT SPAN. UPON COMPLETION OF THE CONCRETE PLACEMENT IN THE ADJACENT SPANS, PLACE THE DIAPHRAGM AND DECK CONCRETE BETWEEN THE CONSTRUCTION JOINTS. SEAL THE JOINTS WITH A 2'-0" WIDE STRIP OF HIGH MOLECULAR WEIGHT METHACRYLATE RESIN ACCORDING TO 511.22.

CONTINUOUS DECK POUR PROCEDURES, WHICH PROCEED FROM END TO END OF THE BRIDGE AND PLACE THE PIER DIAPHRAGM CONCRETE CONCURRENTLY WITH THE DECK CONCRETE, MAYBE APPROVED BY THE DIRECTOR IF THE PLACEMENT SUBMITTAL CAN ASSURE THAT THE DECK CONCRETE IN ADJACENT SPANS WILL BE PLACED BEFORE THE PIER DIAPHRAGM CONCRETE HAS REACHED ITS INITIAL SET.

THE FABRICATOR SHALL INTENTIONALLY ROUGHEN THE SURFACE OF THE I-BEAM TOP FLANGES TO BE INCORPORATED INTO THE DECK CONCRETE TO A DEPTH OF APPROXIMATELY ¼" BEFORE THE CONCRETE HAS REACHED ITS INITIAL SET.

GALVANIZING: GALVANIZE ALL STRUCTURAL STEEL, DOWEL BARS, PIPE SLEEVES, BOLTS, STUDS, INSERTS, THREADED RODS, NUTS AND WASHERS, EMBEDDED SOLE PLATES AND BEARING LOAD PLATES (IF ANY) ACCORDING TO 711.02.

SEALING OF FASCIA BEAMS: SEAL THE FASCIA I-BEAM WITH AN EPOXY-URETHANE SEALER AS SHOWN ON SHEET 7 OF 8. THE DEPARTMENT WILL PAY FOR ACCEPTED QUANTITIES SEPARATELY UNDER SEALING OF CONCRETE SURFACES.

DIAPHRAGMS: ALL END AND PIER DIAPHRAGMS SHALL BE CAST-IN-PLACE. THE INTERMEDIATE DIAPHRAGMS MAY BE CAST-IN-PLACE AS SHOWN ON SHEET 5 OF 8 OR GALVANIZED STEEL AS SHOWN ON SHEET 6 OF 8. ONLY ONE TYPE OF INTERMEDIATE DIAPHRAGM MAY BE USED PER STRUCTURE. DIAPHRAGMS ARE NOT REQUIRED IN SPANS UP TO, AND INCLUDING, 40 FEET. DIAPHRAGMS ARE REQUIRED AT MID-SPAN FOR SPANS 40-80 FEET AND AT QUARTER POINTS FOR SPANS GREATER THAN 80 FEET. THE DESIGN PLANS SHALL SHOW THE CENTERLINE LOCATION OF EACH INTERMEDIATE DIAPHRAGM. THE FABRICATOR SHALL SHOW LOCATIONS OF INSERTS OR HOLES IN THE I-BEAMS FOR ALL DIAPHRAGM CONNECTIONS AND DETAILS FOR GALVANIZED STEEL DIAPHRAGMS IN THE SHOP DRAWINGS.

ALL STRUCTURAL STEEL, INCLUDING BOLTS, NUTS, WASHERS AND PLATE WASHERS FOR INTERMEDIATE DIAPHRAGMS SHALL CONFORM TO THE REQUIREMENTS OF 513.

CONCRETE FOR INTERMEDIATE DIAPHRAGMS SHALL CONFORM TO THE REQUIREMENTS OF 511. UNLESS OTHERWISE SPECIFIED, CONCRETE SHALL BE CLASS S.

ALTERNATE DESIGNS: AT NO EXPENSE TO THE PROJECT AND UPON WRITTEN ACCEPTANCE AND APPROVAL OF THE DIRECTOR, THE CONTRACTOR MAY SUBSTITUTE ALTERNATE DESIGNS FOR DETAILS AND I-BEAM SECTIONS TO THOSE SHOWN IN THE PLANS. IF AN ALTERNATE DESIGN IS APPROVED, THE CONTRACTOR SHALL ASSUME RESPONSIBILITY FOR THE REVISION OF THE PROJECT PLANS. THE DEPARTMENT WILL NOT PAY FOR DESIGN COSTS OR COSTS ASSOCIATED WITH PLAN MODIFICATIONS. THE CONTRACTOR SHALL SUBMIT THE ALTERNATE DESIGN TO THE DIRECTOR FOR ACCEPTANCE AT LEAST 30 DAYS BEFORE CONSTRUCTION BEGINS.

SHIPPING STRANDS:
THE FABRICATOR MAY ADD SHIPPING STRANDS AT THE LOCATIONS SHOWN ON SHEET 1 OF 8. THESE SHIPPING STRANDS SHALL BE DEBONDED FOR THE ENTIRE LENGTH OF THE BEAM EXCEPT FOR THE LAST 10'-0" AT EACH END. THE STRANDS SHALL BE CUT AFTER ALL HANDLING OPERATIONS ARE COMPLETE.

BASIS OF PAYMENT: IN ADDITION TO THE ITEMS LISTED IN 515.18, THE DEPARTMENT WILL CONSIDER ALL COSTS ASSOCIATED WITH FOLLOWING ITEMS TO BE INCIDENTAL TO THE COST OF THE I-BEAMS: THREADED RODS; BEARING SOLE PLATES; TEMPORARY BRACING; AND FIXED ANCHOR DOWELS.

THE DEPARTMENT WILL PAY FOR PIER AND ABUTMENT DIAPHRAGMS SEPARATELY UNDER ITEM 511, CONCRETE FOR STRUCTURES.

DESIGN AGENCY
OFFICE OF
STRUCTURAL ENGINEERING

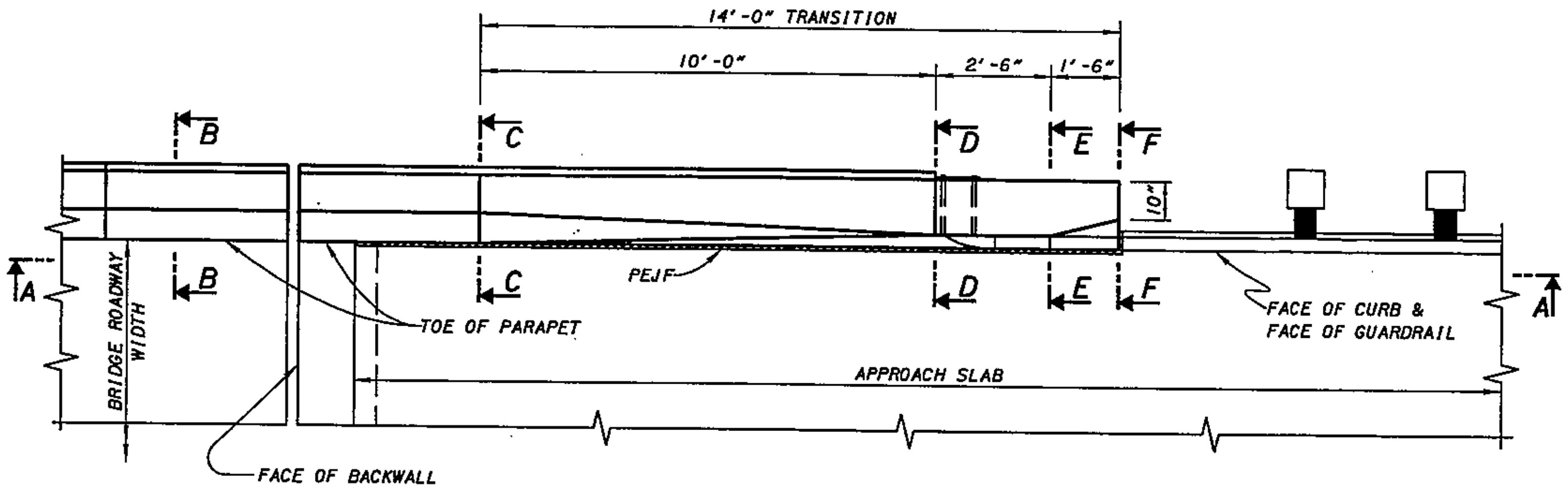
STATE OF OHIO DEPARTMENT OF TRANSPORTATION
Brad Fagrell
ADMINISTRATOR
09-07-99
DATE

DESIGNED SAM | CHECKED JS/WTL | REVIEWED LMW
DRAWN SAM
PSID-1-99

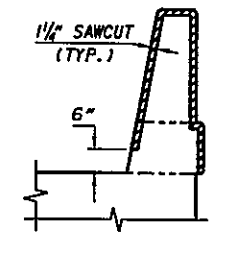
REVISIONS
10-20-00
07-19-02
07-18-03
04-20-07

STANDARD
PRESTRESSED CONCRETE I-BEAM
BRIDGE DETAILS

LEGEND: N.S. - NEAR SIDE
F.S. - FAR SIDE



PART PLAN AT ABUTMENT



DETAIL A
(Section through sawcut)
Sawcut Perimeter = 7'-6"

DESIGN SPECIFICATIONS: "STANDARD SPECIFICATIONS FOR HIGHWAY BRIDGES" ADOPTED BY AASHTO, 1996, AND THE ODOT BRIDGE DESIGN MANUAL.

DESIGN DATA:
CONCRETE - COMPRESSIVE STRENGTH 4500 PSI.
REINFORCING STEEL - MINIMUM YIELD STRENGTH = 60,000 PSI.

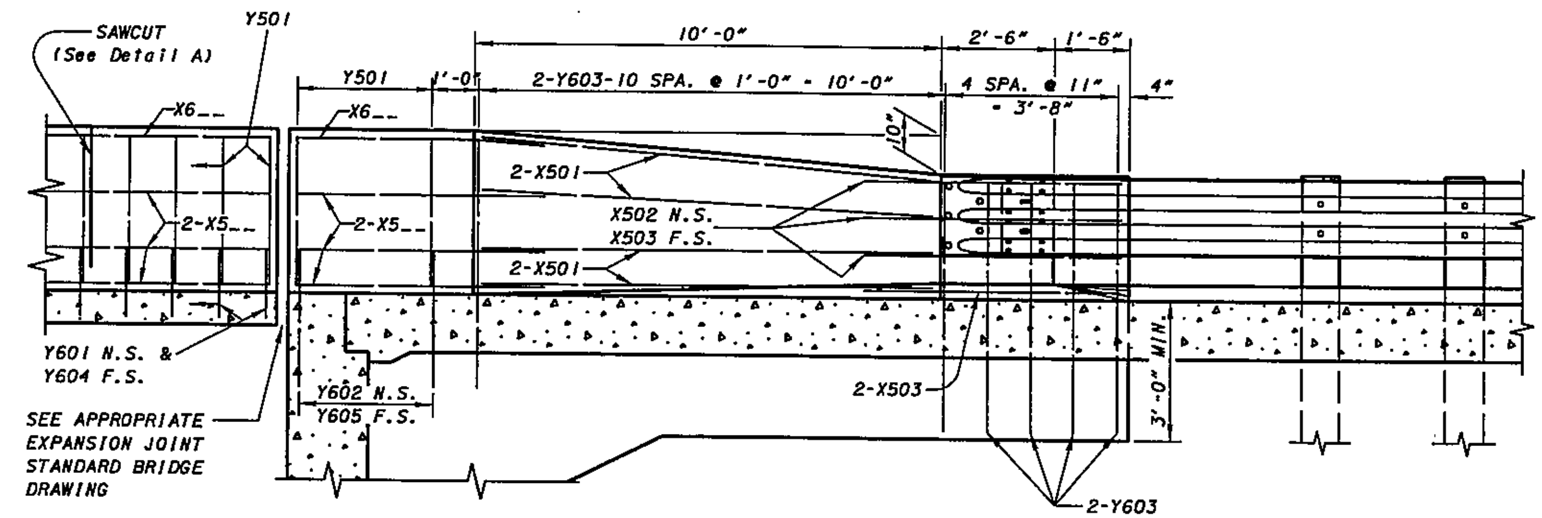
CONTROL JOINTS FOR CONCRETE PARAPETS: SAWCUT 1¼" DEEP CONTROL JOINTS ALONG THE PERIMETER OF THE PARAPET AS SOON AS THE SAW CAN BE OPERATED WITHOUT DAMAGING THE CONCRETE.

USE AN EDGE GUIDE, FENCE OR JIG TO ENSURE THAT THE CUT JOINT IS STRAIGHT, TRUE AND ALIGNED ON ALL FACES OF THE PARAPET. THE JOINT WIDTH SHALL BE THE WIDTH OF THE SAW BLADE, A NOMINAL WIDTH OF ¼ INCH.

PLACE CONTROL JOINTS AT A MINIMUM OF 6'-0" AND A MAXIMUM OF 10'-0" CENTERS.

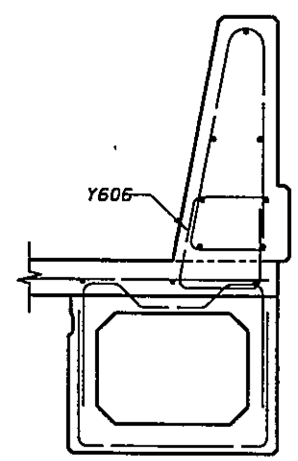
SEAL THE PERIMETER OF THE CONTROL JOINT TO A MINIMUM DEPTH OF ONE INCH WITH A POLYURETHANE OR POLYMERIC MATERIAL CONFORMING TO ASTM C920, TYPE S. LEAVE THE BOTTOM ONE-HALF INCH OF BOTH THE INSIDE AND OUTSIDE FACES OF THE PARAPET UNSEALED TO ALLOW ANY WATER WHICH MAY ENTER THE JOINT TO ESCAPE.

FOR BRIDGE TERMINAL ASSEMBLY SEE STANDARD CONSTRUCTION DRAWING GR-3.1 AND GR-3.2.



SECTION A-A

VERTICAL BARS SHALL BE SPACED AT 1'-0" MAXIMUM.
(See Project Plans)

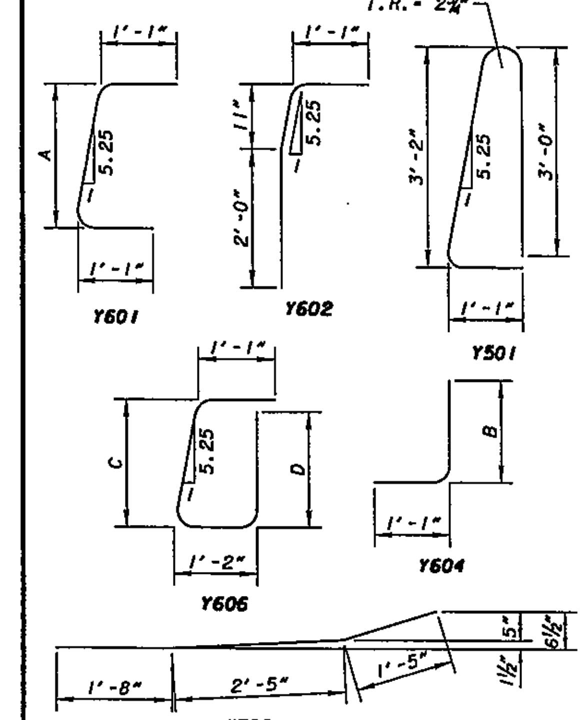


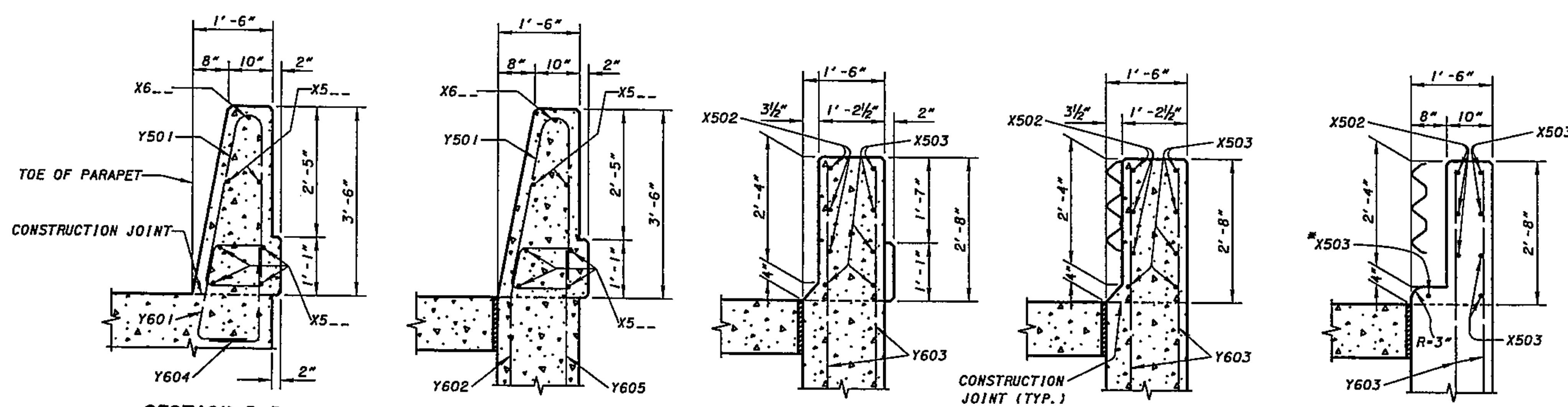
BOX BEAM REINFORCING DETAIL
(Composite Deck)

Volume of 14'-0" transition section is 1.89 yd^3

REINFORCING BAR LIST					
MARK	LENGTH	SHP.	MARK	LENGTH	SHP.
X501	10'-0"	STR.	Y501	7'-5"	BT.
X502	5'-6"	BT.			
X503	5'-6"	STR.	Y601	A+2'-0"	BT.
			Y602	3'-11"	BT.
X5__	⊕	STR.	Y603	5'-4"	STR.
			Y604	B+11"	BT.
X6__	⊕	STR.	Y605	2'-11"	STR.
			Y606	C+D+2'-0"	BT.

⊕ - SEE PROJECT PLANS





SECTION B-B
(except box beam)
Area = 4.26 ft^2

SECTION C-C

SECTION D-D

SECTION E-E

SECTION F-F

* FIELD BEND IF NECESSARY

DESIGN AGENCY: OFFICE OF STRUCTURAL ENGINEERING

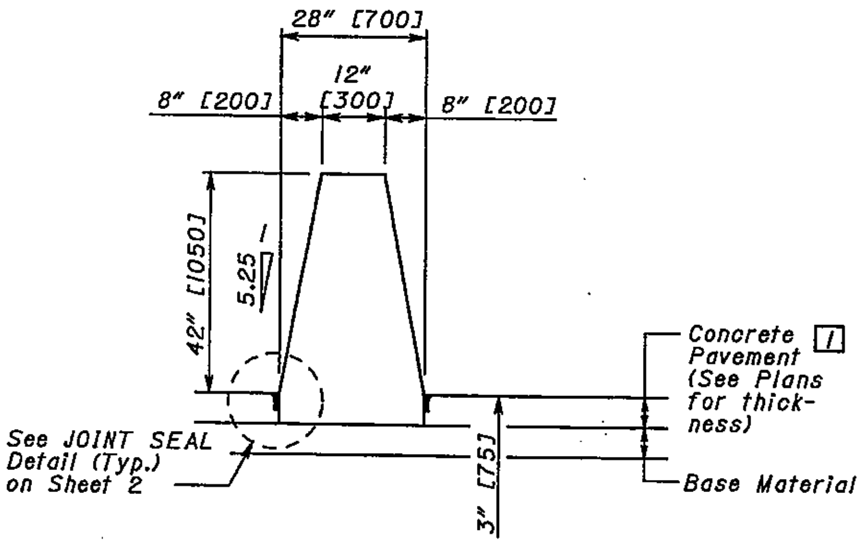
STATE OF OHIO DEPARTMENT OF TRANSPORTATION
Brad Fagrell
ADMINISTRATOR
01-12-99
DATE

REVISIONS	DESIGNED	DRAWN	CHECKED	REVIEWED
07-19-02	RZ/SAM	RZ/SAM	JS	WTL

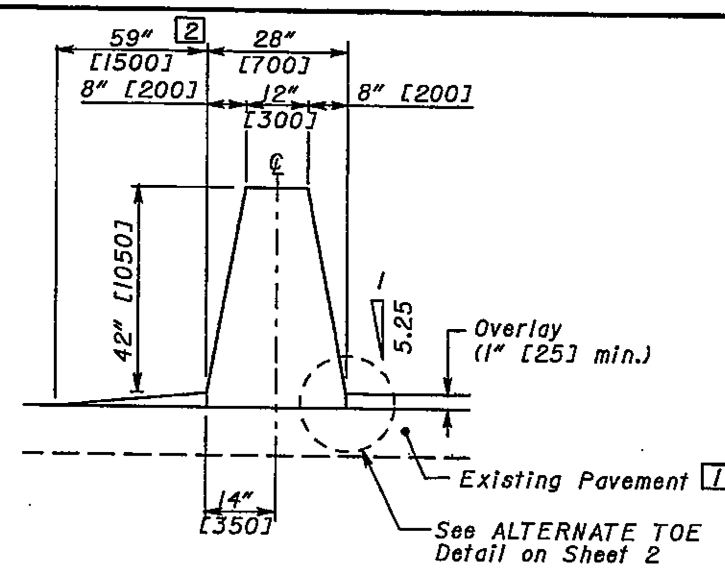
SBR-1-99

STANDARD
BRIDGE RAILING
SINGLE SLOPE DEFLECTOR PARAPET TYPE
42"

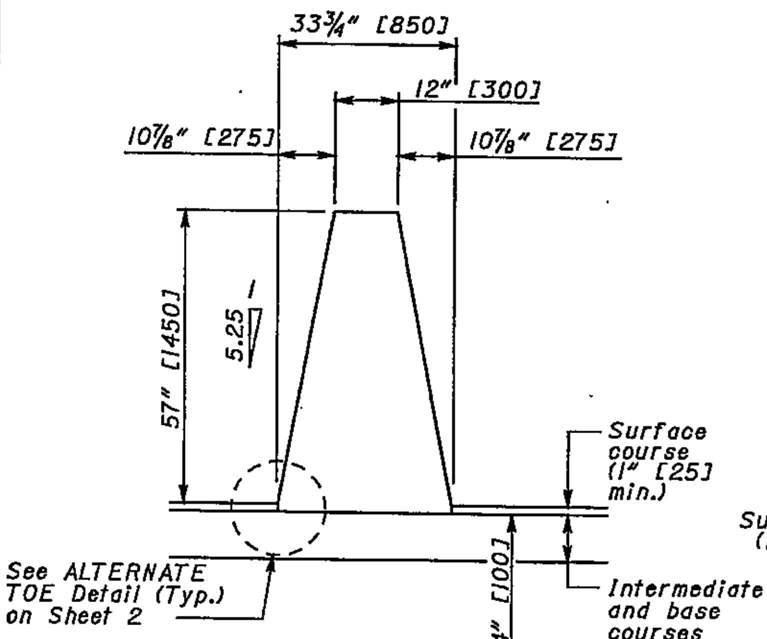
1/1



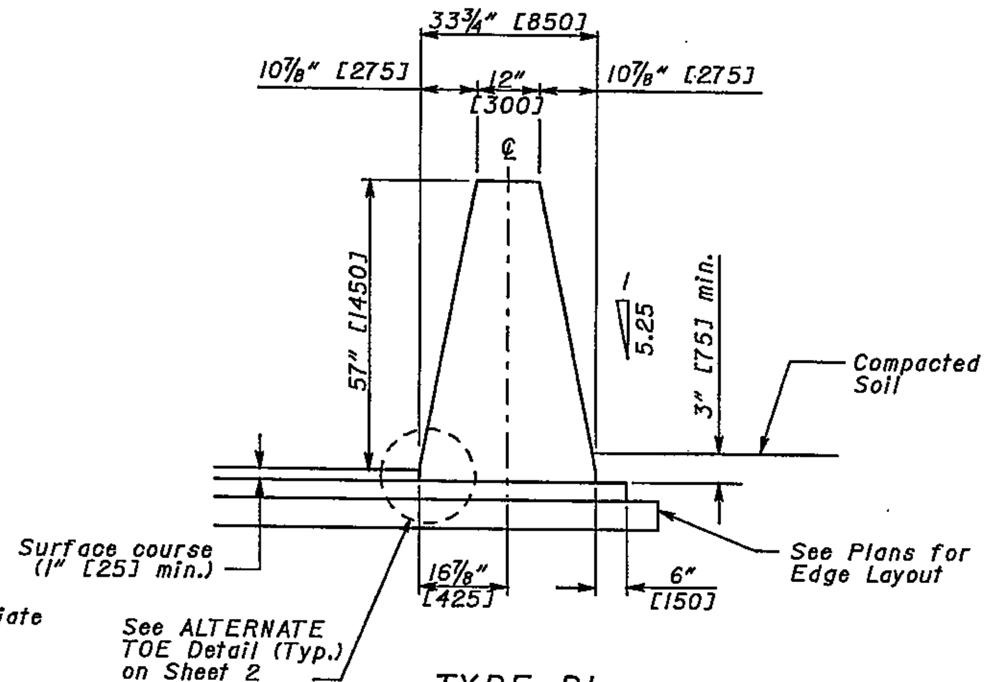
TYPE B
(SHOWN WITH NEW CONCRETE PAVEMENT)



TYPE B
(SHOWN WITH EXISTING PAVEMENT)



TYPE BI
(SHOWN WITH NEW ASPHALT PAVEMENT)



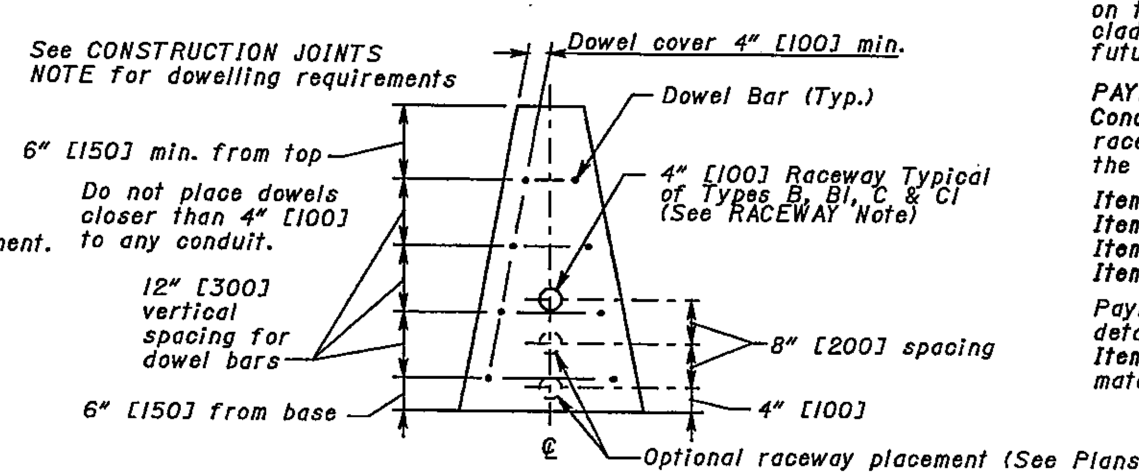
TYPE BI
(SHOWN WITH PAVEMENT ON ONE SIDE ONLY)

LEGEND

1 See DOWELING DETAILS on Sheet 2 for alternate construction with concrete pavement.

2 See ADJOINING PAVEMENT Note.

See Sheet 2 for Types C and CI.



RACEWAY AND DOWEL BAR PLACEMENT

NOTES

SINGLE SLOPE CONCRETE BARRIER may be cast-in-place or slip formed. See Sheet 2 for Types C and CI. See SCD RM-4.5 for Type D barrier. See SCD RM-4.6 for End Sections.

MATERIALS: Construct using Class C concrete. Construct top and end edges with either a 1" [25] radius or ¾" [19] chamfer, except at light pole foundations.

CONTRACTION JOINTS: Maximum allowable spacing of unsealed joints is 20' [6.0 m] throughout the run of the barrier. Construct joints by using metal inserts inside the forms, preformed full width joint filler, a grooving tool, or by sawing. Inserts, tooled, or sawed joints will have a 3" [75] depth. Construct all joints for the full height of the barrier. Saw as soon as curing will allow to prevent spalling. When used in conjunction with concrete pavement, match joints to those in the concrete pavement but not exceeding the maximum allowable spacing.

ADJOINING PAVEMENT: When the barrier is constructed in conjunction with new asphalt pavement, place it directly on the intermediate course. Construct the surface course directly against the barrier. Set barrier placed on existing pavement with a continuous wedge of surface material tapering from a 1" [25] minimum thickness at the toe of the barrier to zero. For bidirectional installations construct the wedge on both sides of the barrier. For unidirectional installations, construct the wedge on the traveled way side and the width may be reduced to 12" [300] minimum.

When the barrier is constructed in conjunction with new concrete pavement, place it directly on the base material. Construct the concrete slab against the barrier.

Barrier may be placed on top of existing concrete pavement and doweled as shown in DOWELING DETAILS (see Sheet 2). When pavement is to be constructed on one side of the barrier only, then compacted soil on the opposite side must be placed against the barrier at a minimum height of 3" [75].

SEALING JOINTS: Use a butt longitudinal joint between the barrier and adjoining concrete pavement sealed with CMS 705.04 joint sealer. See detail on Sheet 2.

TRANSITIONS: Make linear transitions between different types of barrier within a 20' [6.0 m] length.

CONSTRUCTION JOINTS: Barrier runs with abutting vertical surfaces at either required or permissible construction joints are to be dowelled to each other by use of ¾" [19] dia. by 18" [450] long epoxy coated deformed dowel bars as per CMS 622.02. Bars are to be placed as shown on the RACEWAY and DOWEL BAR PLACEMENT detail on this sheet. Provide a 4" clearance to barrier surfaces and to any raceways.

STATION MARKINGS: Impress markings in the "green" concrete on both sides at the top of the barrier. The cost is incidental to the unit cost bid for this barrier.

RACEWAY: Locate as shown on in RACEWAY PLACEMENT Detail, unless otherwise directed by the Engineer. Ensure that the electrical raceway is clear of obstructions.

Cost of the 4" [100] polyvinyl chloride raceway is included where shown on the plans. The cost for additional raceways and No. 10 AWG copper-clad or aluminum-clad wire is also included where shown on the plans for future installation of circuits.

PAYMENT will be made at the unit price bid per Foot [Meter] for Item 622 - Concrete Barrier, Single Slope, Type ____ . Include all materials, labor, raceways, dowel holes, markings and other incidentals necessary to construct the barrier, except as follows:

Item 604 Barrier Median Inlet	20 ft. [6 meters]
Item 625 Light Pole Foundation or Pullbox	4 ft. [1.2 meters]
Item 630 Overhead Sign Support Foundation	10 ft. [3 meters]
Item 630 Barrier Wall Assembly	10 ft. [3 meters].

Payment for any reinforced end anchors, as shown on the END ANCHORAGE details shown on sheet 2, will be made at the unit price bid per Each for Item 622 - Concrete Barrier End Anchor, Reinforced. This includes all materials, labor, and other incidentals necessary to construct this anchor.

THIS DRAWING REPLACES RM-4.3 DATED 4-18-03.

OHIO DEPARTMENT OF TRANSPORTATION
ROADWAY DESIGN ENGINEER
1-19-07
DATE

STDS. ENGR. D. Focke

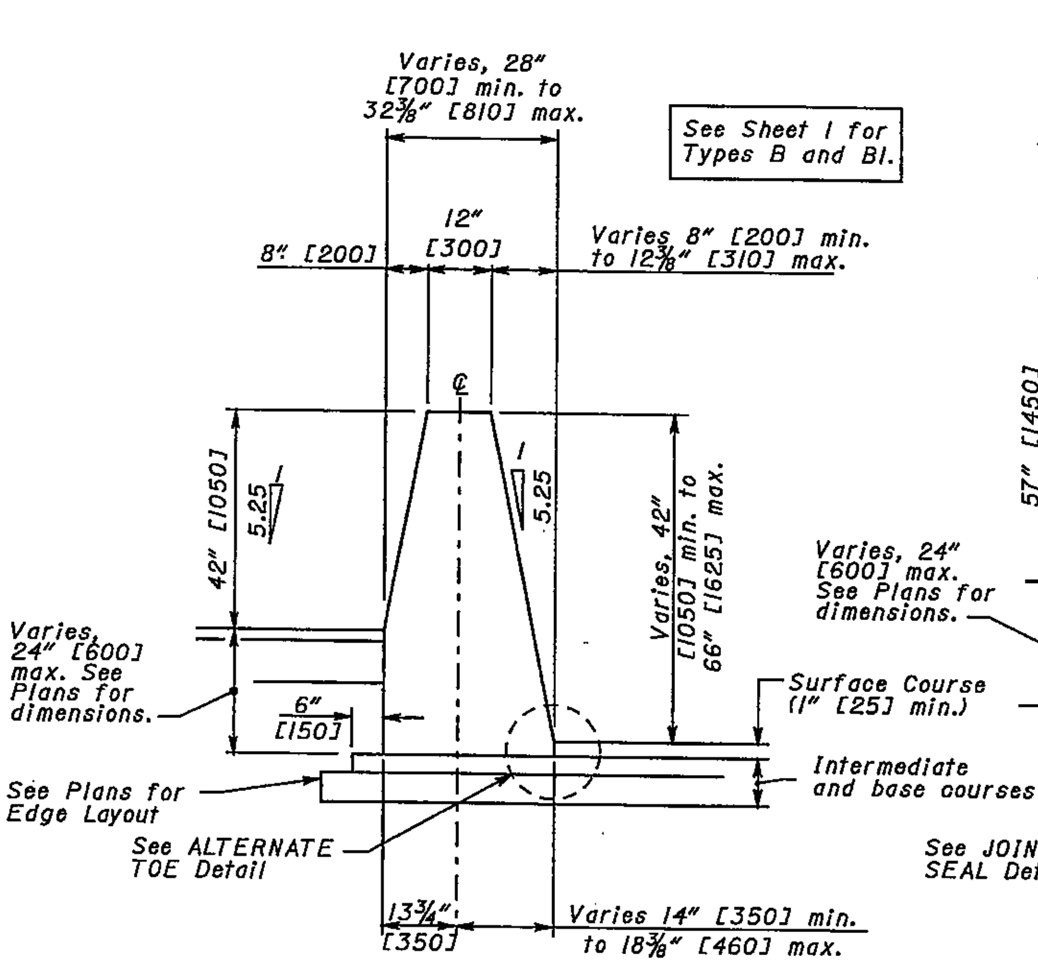
All metric dimensions (in brackets [ ]) are in millimeters unless otherwise noted.

ROADWAY ENGINEERING SERVICES

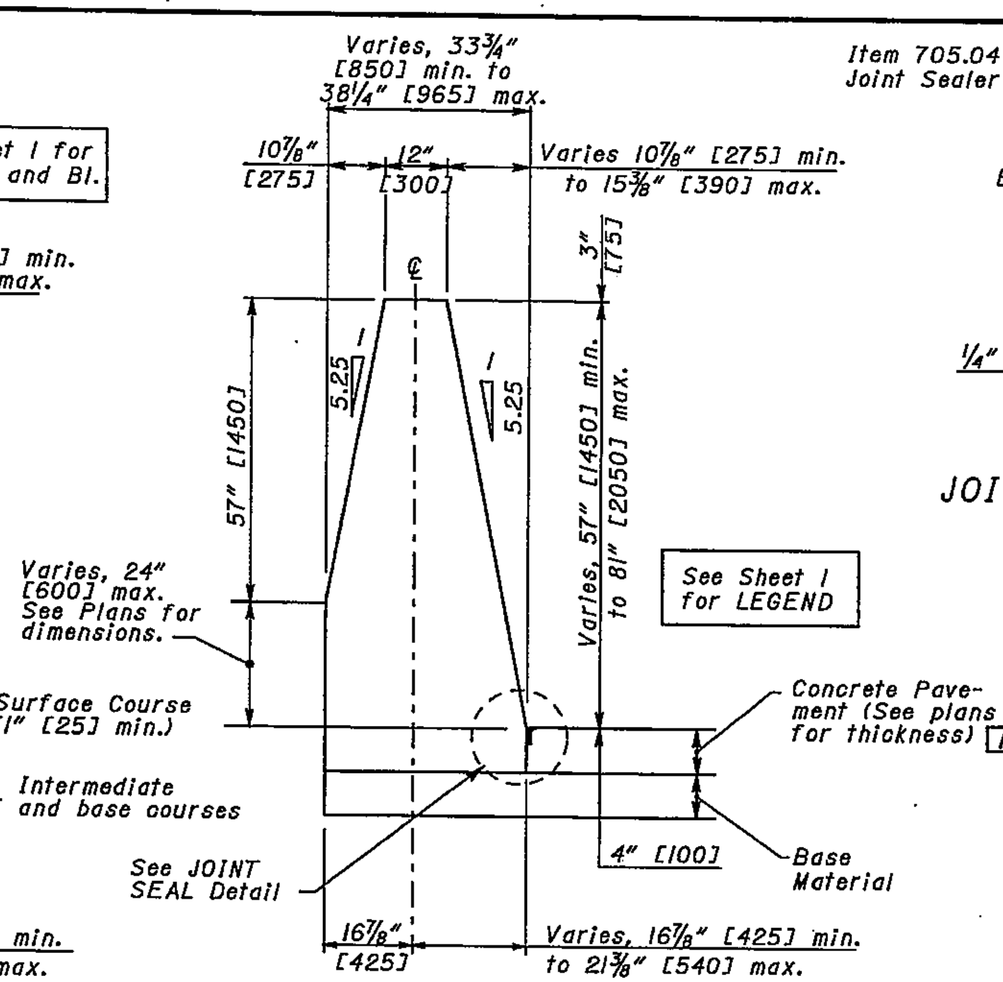
STANDARD ROADWAY CONSTRUCTION DRAWING
SINGLE SLOPE BARRIER, TYPES B, C, BI, & CI

NUMBER RM-4.3

1/2



TYPE C
(SHOWN WITH NEW ASPHALT PAVEMENT)



TYPE C1
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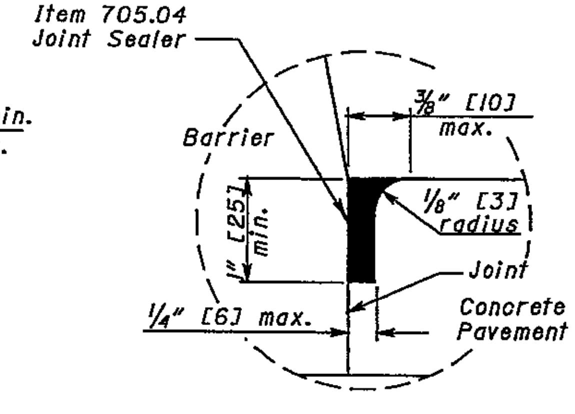
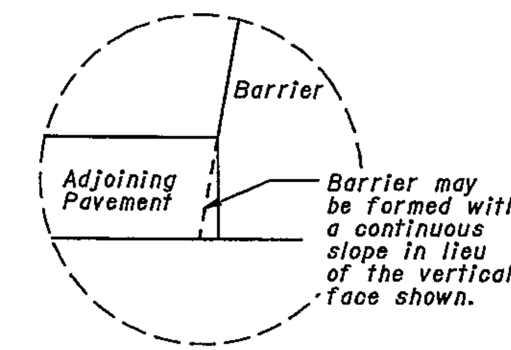


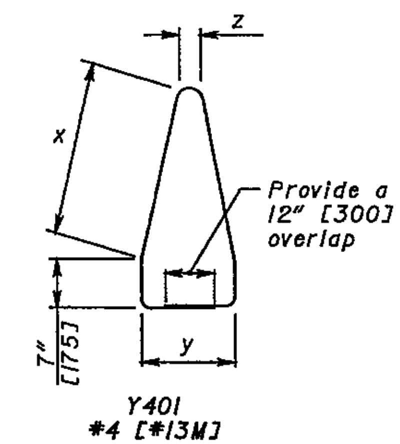
JOINT SEAL DETAIL



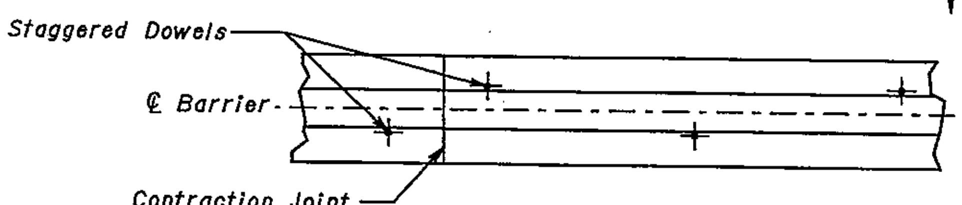
ALTERNATE TOE DETAIL

Dimensions for Y401 (English)				
Barrier Type	x	y	z	Length
B	37"	24"	8"	10'-10"
B1	51"	24"	8"	13'-2"

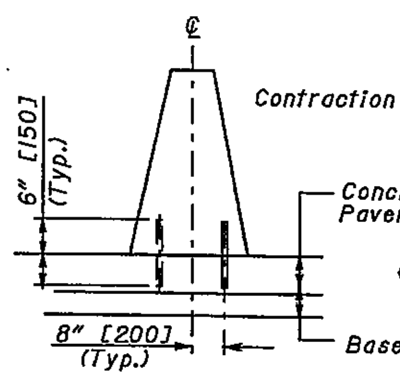
Dimensions for Y401 (Metric)				
Barrier Type	x	y	z	Length
B	940	600	200	3300
B1	1300	600	200	4000



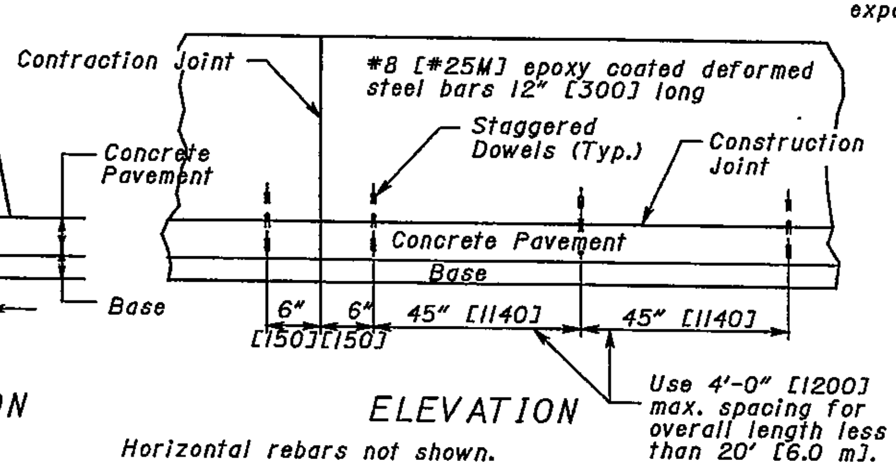
Y401 STEEL LIST & BENDING DIAGRAM
Steel dimensions for Types C and C1 barriers are not shown.



PLAN



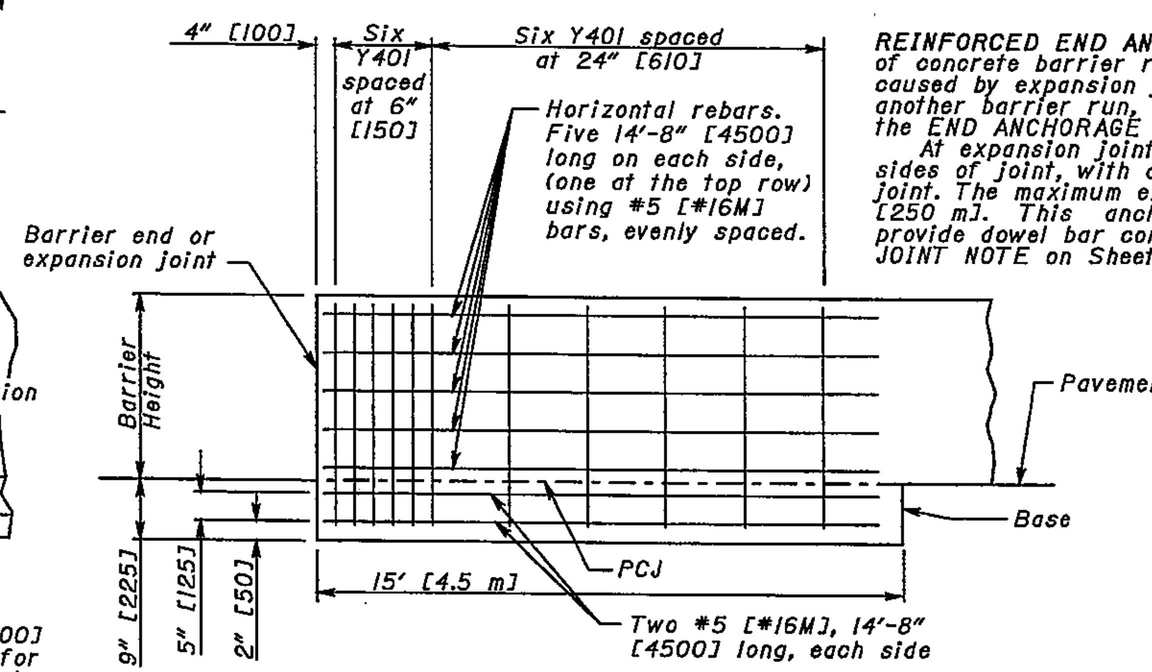
SECTION



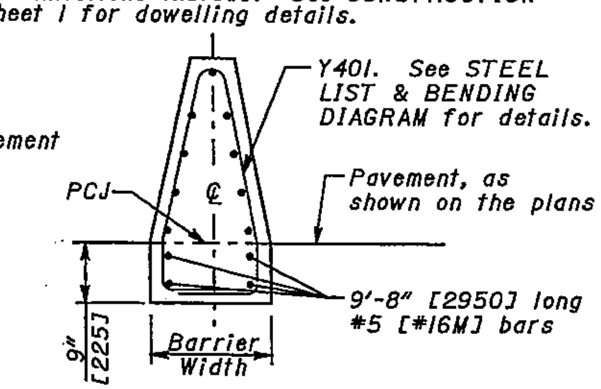
ELEVATION
Horizontal rebars not shown.

DOWELING DETAILS
See ADJOINING PAVEMENT Notes on Sheet 1

REINFORCED END ANCHORAGES are required at the ends of concrete barrier runs and at interruptions in barrier caused by expansion joints. When barrier does not abut another barrier run, construct the last 15' [4.5 m] using the END ANCHORAGE Detail as shown here.
At expansion joints, construct an End Anchorage on both sides of joint, with a maximum gap of 2" [50] for the open joint. The maximum expansion joint spacing shall be 800' [250 m]. This anchorage is not needed at contruction joints, provide dowel bar connections instead. See CONSTRUCTION JOINT NOTE on Sheet 1 for dowelling details.



ELEVATION

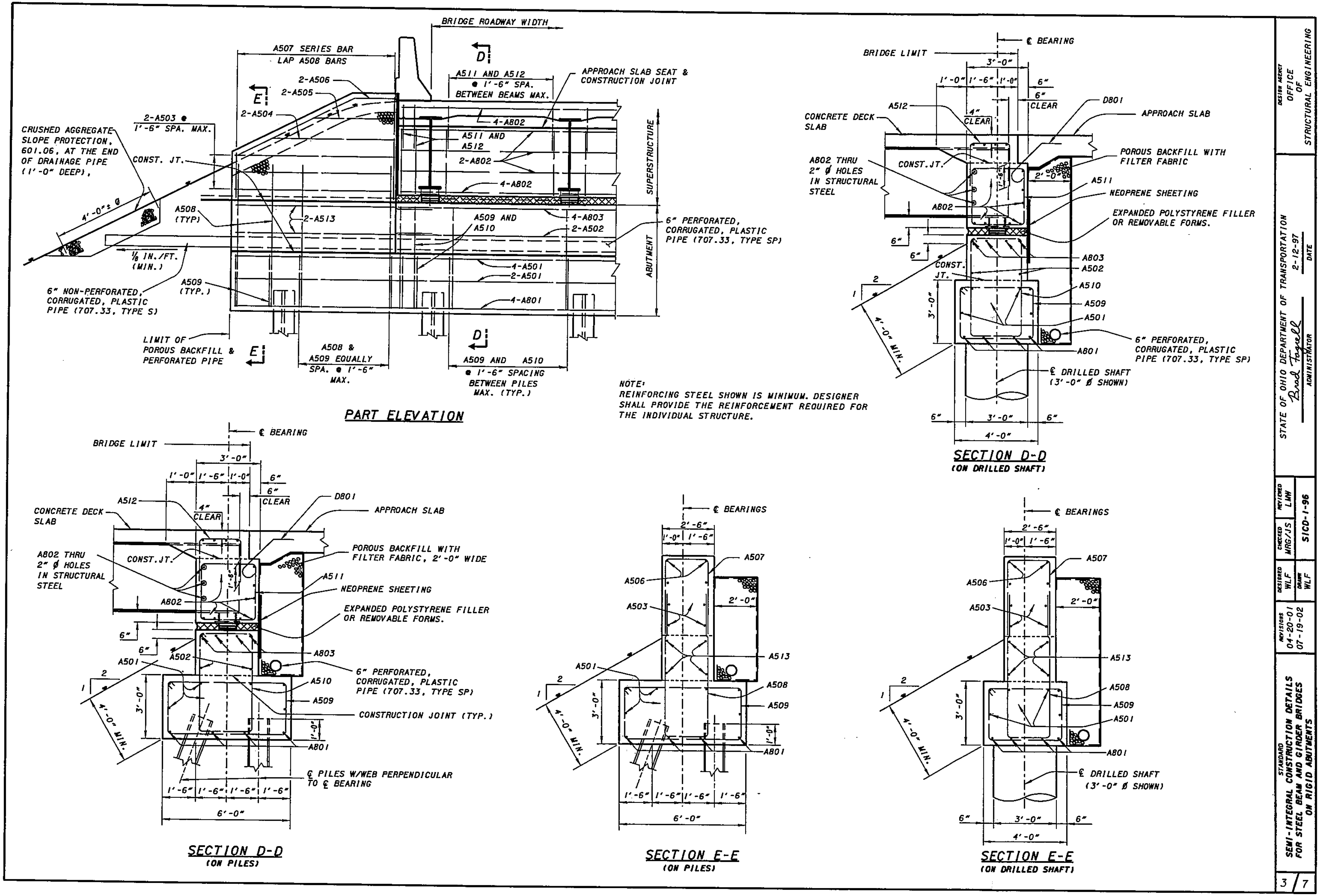


SECTION

END ANCHORAGE

THIS DRAWING REPLACES RM-4.3 DATED 4-18-03.

OHIO DEPARTMENT OF TRANSPORTATION
ROADWAY DESIGN ENGINEER
1-19-07
DATE
STDS. ENGR. D. Focke
All metric dimensions (in brackets [ ]) are in millimeters unless otherwise noted.
ROADWAY ENGINEERING SERVICES
STANDARD ROADWAY CONSTRUCTION DRAWING
SINGLE SLOPE BARRIER, TYPES B, C, B1, & C1
NUMBER RM-4.3



BRIDGE ROADWAY WIDTH
A507 SERIES BAR
LAP A508 BARS
2-A506
2-A505
2-A504
2-A503 @ 1'-6" SPA. MAX.
CRUSHED AGGREGATE SLOPE PROTECTION, 601.06, AT THE END OF DRAINAGE PIPE (1'-0" DEEP).
CONST. JT.
4'-0"± Ø
A508 (TYP)
2-A513
1/8 IN./FT. (MIN.)
6" NON-PERFORATED, CORRUGATED, PLASTIC PIPE (707.33, TYPE S)
A509 (TYP.)
LIMIT OF POROUS BACKFILL & PERFORATED PIPE
A508 & A509 EQUALLY SPA. @ 1'-6" MAX.
A511 AND A512 @ 1'-6" SPA. BETWEEN BEAMS MAX.
APPROACH SLAB SEAT & CONSTRUCTION JOINT
4-A802
A511 AND A512
2-A802
4-A802
A509 AND A510
4-A803
2-A502
4-A501
2-A501
4-A801
A509 AND A510 @ 1'-6" SPACING BETWEEN PILES MAX. (TYP.)
SUPERSTRUCTURE
ABUTMENT
6" PERFORATED, CORRUGATED, PLASTIC PIPE (707.33, TYPE SP)
PART ELEVATION
NOTE:
REINFORCING STEEL SHOWN IS MINIMUM. DESIGNER SHALL PROVIDE THE REINFORCEMENT REQUIRED FOR THE INDIVIDUAL STRUCTURE.
℄ BEARING
BRIDGE LIMIT
3'-0"
1'-0" 1'-6" 1'-0"
6"
6" CLEAR
4" CLEAR
A512
D801
APPROACH SLAB
CONCRETE DECK SLAB
A802 THRU 2" Ø HOLES IN STRUCTURAL STEEL
CONST. JT.
A802
POROUS BACKFILL WITH FILTER FABRIC
2'-0"
A511
NEOPRENE SHEETING
EXPANDED POLYSTYRENE FILLER OR REMOVABLE FORMS.
A803
A502
A510
A509
A501
A801
6" PERFORATED, CORRUGATED, PLASTIC PIPE (707.33, TYPE SP)
℄ DRILLED SHAFT (3'-0" Ø SHOWN)
4'-0" MIN.
3'-0"
4'-0"
SECTION D-D
(ON DRILLED SHAFT)
POROUS BACKFILL WITH FILTER FABRIC, 2'-0" WIDE
CONSTRUCTION JOINT (TYP.)
℄ PILES W/WEB PERPENDICULAR TO ℄ BEARING
1'-6" 1'-6" 1'-6" 1'-6"
6'-0"
SECTION D-D
(ON PILES)
℄ BEARINGS
2'-6"
1'-0" 1'-6"
A507
A506
A503
A513
A508
1'-0"
SECTION E-E
(ON PILES)
SECTION E-E
(ON DRILLED SHAFT)
DESIGN AGENCY
OFFICE OF STRUCTURAL ENGINEERING
STATE OF OHIO DEPARTMENT OF TRANSPORTATION
2-12-97
DATE
ADMINISTRATOR
REVIEWED LMW
CHECKED MRG/JS
DESIGNED WLF
DRAWN WLF
REVISIONS 04-20-01 07-19-02
SICD-1-96
STANDARD
SEMI-INTEGRAL CONSTRUCTION DETAILS FOR STEEL BEAM AND GIRDER BRIDGES ON RIGID ABUTMENTS
3/7

BEAM DESIGN
CONSPAN

REPRESENTATIVE
RESULTS/DESIGNS

SPAN 1
BEAMS 1, 3, 5
CONTINUOUS
SPAN 2
BEAM 3
CONTINUOUS

SPAN 1
BEAM 3
SIMPLE SPAN

PROPERTIES

Span: 1, Beam: 1

PRECAST DATA:

Section Id:	ODOT AASHTO Type 4 66 MOD						
Type:	I-Girder						
Flng width:	Top =	36.000	in	Bot =	26.000	in	
thick:	Top =	4.000	in	Bot =	8.000	in	
Stems:	No =	1					
	Top =	8.000	in				
	Bot =	8.000	in				
Shear width:	=	8.000	in				
Wide top Flange:	No						

GENERAL BRIDGE DATA:

Bridge Width	=	48.46	ft
Curb-to-curb	=	45.50	ft
Beam Spac. Lt./Rt	=	3.50/ 10.50	ft
Lane width	=	12.00	ft
Number of lanes	=	3	
Interior/Exterior	=	Exterior	

TOPPING DATA:

Deck	Thickness	=	8.500	in	
Suppl.	Thickness	=	0.000	in	
Haunch:					
	Thickness	=	4.000	in	
	Width	=	36.000	in	
Effective	width	=	105.000	in	(Art. 8.10.1)

GENERAL LOAD DATA:

Dead loads on precast:
UNITS: (Point: kips, Location: ft)
(Line: klf)

Type	Mag.	Loc.
Line	0.109	-

Diaphragm loads:
(kips, ft)

Mag.	Loc.
0.21	24.75
0.21	49.50
0.21	74.75

Dead loads on composite: See Project info for composite loads

GENERAL SPAN DATA:

Overall length =	99.083	ft
Release length =	99.083	ft
Design length =	97.083	ft

KERN POINTS:

Upper =	48.39	in
Lower =	15.69	in

DISTRIBUTION FACTORS (Art. 3.23):

Live Moment (Group 1) :	0.714	(Calculated)	
Live Shear (Group 1) :	0.714	(Calculated)	

Dead Loads and Pedestrian Load distributed equally to all beams (Art. 3.23.2.3.1.1)

Pedestrian:	0.200	(Calculated)
Comp. DL:	0.200	(Calculated)
Comp. ADL:	0.200	(Calculated)
Suppl. DL:	0.200	(Calculated)
Suppl. ADL:	0.200	(Calculated)
Suppl:	0.200	(Calculated)

RESISTANCE FACTORS (Art. 9.14):

Flexure Reinforced:	0.90
Flexure Prestressed:	1.00
Shear:	0.90

Span: 1, Beam: 1

SECTION PROPERTIES:

?

	PRECAST		COMPOSITE		
Area:	893.0	in2	1724.0	in2	#
Total Height:	66.00	in	78.50	in	
Mom. of Inertia (Ixx):	480161	in4	1258051	in4	#
Ht. of c.g.:	31.10	in	51.48	in	#
Density:	150.00	pcf	150.00	pcf	
Self-weight:	930.2	plf	2009.9	plf	
Mom. of Inertia (Iyy):	36314.0	in4			
Poisson's Ratio:	0.2				

(#) Of Total Section using Ect/Ec = 0.8018

Use transformed strand and rebar: No

Span: 1, Beam: 1
STRESS LIMITS (Art. 9.15.2):

STRESS LIMITS AT FINAL 1 (P/S + DL + LL) (Art. 9.15.2.2 a):

			PRECAST		DECK	
Strength		=	7000.00	psi	4500.00	psi
Max Comp,	Top	=	4200.00	psi	2700.00	psi
Pos Mom,	Bot	=	4200.00	psi		
Neg Mom,	Bot	=	4200.00	psi		
Max Tens,	Top	=	-502.00	psi	-503.12	psi
Max Tens,	Bot	=	-502.00	psi		
Crk Tens,	Bot	=	-627.50	psi		
Elasticity		=	5072.2	ksi	4066.8	ksi

STRESS LIMITS AT FINAL 2 (P/S + DL) (Art. 9.15.2.2 b):

			PRECAST		DECK	
Max Comp,	Top	=	2800.00	psi	1800.00	psi
Pos Mom,	Bot	=	2800.00	psi		
Neg Mom,	Bot	=	2800.00	psi		

STRESS LIMITS AT FINAL 3 (50% P/S + 50% DL + LL) (Art. 9.15.2.2 c):

			PRECAST		DECK	
Max Comp,	Top	=	2800.00	psi	1800.00	psi
Pos Mom,	Bot	=	2800.00	psi		
Neg Mom,	Bot	=	2800.00	psi		

AT RELEASE (Art. 9.15.2.1):

			PRECAST	
Strength		=	5000.00	psi
Max Comp,	Top	=	3000.00	psi
Max Comp,	Bot	=	3000.00	psi
Max Tens,	Top	=	-200.00	psi
w/reinf		=	-530.33	psi
Max Tens,	Bot	=	-0.00	psi
Elasticity		=	4286.8	ksi

Span: 1, Beam: 1

PRESTRESSED STEEL:

42 strands, 1/2-270K-LL, Low relaxation strands
Depressed at 0.40L (39.63 ft from member end)

END PATTERN (Ycg = 12.29 in):

11 @ 2.000 in	11 @ 4.000 in	8 @ 6.000 in	6 @ 8.000 in
3 @ 54.000 in	3 @ 64.000 in		

MID PATTERN (Ycg = 4.86 in):
(A) Draped:

3 @ 6.000 in	3 @ 8.000 in	

(B) Straight:

11 @ 2.000 in	11 @ 4.000 in	8 @ 6.000 in	6 @ 8.000 in

Strand Diameter	=	0.500	in	Ult. Strength	(f's)	=	270.0	ksi			
Strand Area	=	0.153	in2	Initial Prestress		=	0.75	f's	=	202.5	ksi
Total Strand Area	=	6.426	in2	Initial Pull		=	1301.3	kips			
Trans. Len,bonded	=	2.083	ft	Dev. Len, bonded		=	10.616	ft			
Trans. Len,debonded	=	2.083	ft	Dev. Len, debonded		=	13.270	ft			
Holddown Force	=	20.202	kips	Beam Shrtng (PL/AE)		=	0.370	in			

REINFORCING STEEL:

	Tension	steel:	
fy	=	60.0	ksi
Es	=	29000	ksi
fs	=	24.0	ksi

Stirrups:

# legs	Size	fy (ksi)	Area (in2)	Spacing (in)	Start (ft)	End (ft)
2	US#4[M13]	60.0	0.40	6.00	0.0000	7.9711
2	US#4[M13]	60.0	0.40	12.00	7.9711	46.4446
2	US#4[M13]	60.0	0.40	24.00	46.4460	52.6387
2	US#4[M13]	60.0	0.40	12.00	52.6387	91.1122
2	US#4[M13]	60.0	0.40	6.00	91.1122	99.0833

LOSSES

Note: Values are calculated at Midspan

Str. area	=	6.4260	in2
Ycg	=	4.86	in
P_init	=	1301.3	kips
Ecc	=	26.24	in
Hours to release	=	18.00	
Rel. Humid.(RH)	=	75.0	%
Es	=	28500.0	ksi
Eci	=	4287	ksi

AASHTO LOSSES

			Release			Final	(Art. 9.16.2)
Steel relaxation	*	1600.47	psi	CRs (Eq 9-10A)	2189.42	psi	
Elastic Shortening		15276.95	psi	ES (Eq 9-6)	15276.95	psi	(Fcir=2297.88 psi)
Concrete shrinkage		0.00	psi	SH (Eq 9-4)	5750.00	psi	
Concrete creep		0.00	psi	CRc (Eq 9-9)	19907.62	psi	(Fcds=-1095.28 psi)
Total		16877.42	psi	(8.33 %)	43123.99	psi	(21.30 %)

* Steel relax. before release - Ref: PCI Journal Vol. 20, No. 4, Jul-Aug 1975

SHEAR/MOMENT ENVELOPE (&REACTIONS)

SHEAR AND MOMENT ENVELOPE : Span : 1, Beam : 1, SERVICE 1
Shears: kips, Moments: kft

		Bearing	Trans	H/2	0.10L	0.20L	0.30L	0.40L	Midspan
Location,	ft	0.00	1.08	3.27	8.91	18.82	28.72	38.63	48.54
Self wt. :	M	0.0	48.4	142.7	365.3	685.0	913.3	1050.3	1095.9
	V	45.2	44.1	42.1	36.9	27.7	18.4	9.2	0.0
Prec. :	M	-0.0	5.7	16.8	43.0	80.6	107.4	123.5	128.9
DL+ADL	V	5.3	5.2	5.0	4.3	3.3	2.2	1.1	0.0
Deck :	M	0.0	56.1	165.6	424.0	795.0	1060.0	1219.0	1272.0
+ Haunch	V	52.4	51.2	48.9	42.8	32.1	21.4	10.7	0.0
Diaphragm :	M	0.0	0.3	1.0	2.7	5.8	8.0	9.0	9.9
	V	0.3	0.3	0.3	0.3	0.3	0.1	0.1	0.1
Comp. :	M	-0.0	16.9	49.8	127.4	238.9	318.5	366.3	382.2
DL+ADL	V	15.7	15.4	14.7	12.9	9.6	6.4	3.2	0.0
LL + I :	M+	0.0	75.3	221.7	564.0	1043.1	1366.2	1558.6	1605.3
	V	71.2	70.4	68.5	63.8	56.4	48.9	36.1	28.2
LL + I :	M-	-0.0	-0.0	-0.0	0.0	0.0	0.0	0.0	0.0
	V	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LL + I :	Vmx	71.2	70.4	68.5	63.8	56.4	48.9	41.2	33.4
	M	0.0	75.3	221.7	564.0	1043.1	1366.2	1533.1	1544.0
Total :	M+	0.0	202.7	597.7	1526.5	2848.3	3773.4	4326.7	4494.2
	V	0.0	186.6	179.4	161.0	129.3	97.4	60.4	28.3
Total :	M-	-0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	V	190.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total :	Vmx	190.1	186.6	179.4	161.0	129.3	97.4	65.5	33.5
	M	-0.0	202.7	597.7	1526.5	2848.3	3773.4	4301.2	4433.0

		0.60L	0.70L	0.80L	0.90L	H/2	Trans	Bearing
Location,	ft	58.45	68.36	78.27	88.17	93.81	96.00	97.08
Self wt. :	M	1050.3	913.3	685.0	365.3	142.7	48.4	0.0
	V	9.2	18.4	27.7	36.9	42.1	44.1	45.2
Prec. :	M	123.5	107.4	80.6	43.0	16.8	5.7	0.0
DL+ADL	V	1.1	2.2	3.3	4.3	5.0	5.2	5.3
Deck :	M	1219.0	1060.0	795.0	424.0	165.6	56.1	0.0
+ Haunch	V	10.7	21.4	32.1	42.8	48.9	51.2	52.4
Diaphragm :	M	9.0	7.9	6.1	2.9	1.1	0.3	-0.0
	V	0.1	0.1	0.3	0.3	0.3	0.3	0.3
Comp. :	M	366.3	318.5	238.9	127.4	49.8	16.9	-0.0
DL+ADL	V	3.2	6.4	9.6	12.9	14.7	15.4	15.7
LL + I :	M+	1558.6	1366.2	1043.1	564.0	221.7	75.3	0.0
	V	36.1	48.9	56.4	63.8	68.5	70.4	71.2
LL + I :	M-	0.0	0.0	0.0	0.0	-0.0	-0.0	-0.0
	V	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LL + I :	Vmx	41.2	48.9	56.4	63.8	68.5	70.4	71.2
	M	1533.1	1366.2	1043.1	564.0	221.7	75.3	0.0
Total :	M+	4326.7	3773.3	2848.6	1526.6	597.7	202.7	0.0
	V	60.4	97.4	129.3	161.0	179.4	186.6	190.1
Total :	M-	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	V	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total :	Vmx	65.5	97.4	129.3	161.0	179.4	186.6	190.1
	M	4301.2	3773.3	2848.6	1526.6	597.7	202.7	0.0

REACTIONS (kips), SERVICE 1

Load Type	Left Support	Right Support
Self Wt.	45.2	45.2
Deck+Haunch	52.4	52.4
Diaphragm	0.3	0.3
Prec.DL+ADL	5.3	5.3
Comp. DL+ADL	78.7	78.7
Supplemental	0.0	0.0
Supp. DL+ADL	0.0	0.0
Live	81.3	81.3
Pedestrian	0.0	0.0

Upward reactions are positive.
Live Load reactions are per lane with no distribution factor and no impact.
Non-composite load types are per beam.
Composite, Supplemental, and Pedestrian load types are per total bridge width.

SHEAR AND MOMENT ENVELOPE : Span : 1, Beam : 1, FACTORED 1
Shears: kips, Moments: kft

		Bearing	Trans	H/2	0.10L	0.20L	0.30L	0.40L	Midspan
Location,	ft	0.00	1.08	3.27	8.91	18.82	28.72	38.63	48.54
Self wt. :	M	0.0	62.9	185.5	474.9	890.5	1187.3	1365.3	1424.7
	V	58.7	57.4	54.7	47.9	35.9	24.0	12.0	0.0
Prec. :	M	-0.0	7.4	21.8	55.9	104.7	139.6	160.6	167.6
DL+ADL	V	6.9	6.7	6.4	5.6	4.2	2.8	1.4	0.0
Deck :	M	0.0	73.0	215.3	551.3	1033.5	1378.0	1584.7	1653.6
+ Haunch	V	68.1	66.6	63.5	55.6	41.7	27.8	13.9	0.0
Diaphragm :	M	0.0	0.4	1.3	3.6	7.5	10.4	11.7	12.9
	V	0.4	0.4	0.4	0.4	0.4	0.1	0.1	0.1
Comp. :	M	-0.0	21.9	64.7	165.6	310.5	414.0	476.1	496.8
DL+ADL	V	20.5	20.0	19.1	16.7	12.5	8.4	4.2	0.0
LL + I :	M+	0.0	163.5	481.4	1224.4	2264.6	2965.9	3383.7	3485.0
	V	154.5	152.7	148.7	138.5	122.4	106.1	78.3	61.3
LL + I :	M-	-0.0	-0.0	-0.0	0.0	0.0	0.0	0.0	0.0
	V	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LL + I :	Vmx	154.5	152.7	148.7	138.5	122.4	106.1	89.5	72.6
	M	0.0	163.5	481.4	1224.4	2264.6	2965.9	3328.4	3352.0
Total :	M+	0.0	329.2	970.1	2475.7	4611.4	6095.3	6982.2	7240.7
	V	0.0	303.9	292.9	264.8	217.2	169.2	109.9	61.4
Total :	M-	-0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	V	309.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total :	Vmx	309.2	303.9	292.9	264.8	217.2	169.2	121.1	72.7
	M	-0.0	329.2	970.1	2475.7	4611.4	6095.3	6926.9	7107.7

		0.60L	0.70L	0.80L	0.90L	H/2	Trans	Bearing
Location,	ft	58.45	68.36	78.27	88.17	93.81	96.00	97.08
Self wt. :	M	1365.3	1187.3	890.5	474.9	185.5	62.9	0.0
	V	12.0	24.0	35.9	47.9	54.7	57.4	58.7

		0.60L	0.70L	0.80L	0.90L	H/2	Trans	Bearing
Prec. :	M	160.6	139.6	104.7	55.9	21.8	7.4	0.0
DL+ADL	V	1.4	2.8	4.2	5.6	6.4	6.7	6.9
Deck :	M	1584.7	1378.0	1033.5	551.3	215.3	73.0	0.0
+ Haunch	V	13.9	27.8	41.7	55.6	63.5	66.6	68.1
Diaphragm :	M	11.7	10.3	7.9	3.7	1.4	0.5	-0.0
	V	0.1	0.1	0.4	0.4	0.4	0.4	0.4
Comp. :	M	476.1	414.0	310.5	165.6	64.7	21.9	-0.0
DL+ADL	V	4.2	8.4	12.5	16.7	19.1	20.0	20.5
LL + I :	M+	3383.7	2965.9	2264.6	1224.4	481.4	163.5	0.0
	V	78.3	106.1	122.4	138.5	148.7	152.7	154.5
LL + I :	M-	0.0	0.0	0.0	0.0	-0.0	-0.0	-0.0
	V	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LL + I :	Vmx	89.5	106.1	122.4	138.5	148.7	152.7	154.5
	M	3328.4	2965.9	2264.6	1224.4	481.4	163.5	0.0
Total :	M+	6982.3	6095.2	4611.7	2475.9	970.2	329.2	0.0
	V	109.9	169.2	217.2	264.8	292.9	303.9	309.2
Total :	M-	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	V	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total :	Vmx	121.1	169.2	217.2	264.8	292.9	303.9	309.2
	M	6926.9	6095.2	4611.7	2475.9	970.2	329.2	0.0

REACTIONS (kips), FACTORED 1

Load Type	Left Support	Right Support
Self Wt.	58.7	58.7
Deck+Haunch	68.1	68.1
Diaphragm	0.4	0.4
Prec.DL+ADL	6.9	6.9
Comp. DL+ADL	102.4	102.4
Supplemental	0.0	0.0
Supp. DL+ADL	0.0	0.0
Live	176.6	176.6
Pedestrian	0.0	0.0

Upward reactions are positive.
Live Load reactions are per lane with no distribution factor and no impact.
Non-composite load types are per beam.
Composite, Supplemental, and Pedestrian load types are per total bridge width.

POSITIVE ENVELOPE STRESSES

Span : 1, Beam : 1, SERVICE 1

RELEASE STRESSES, (psi) (LOSS = 8.33 %)

	Trans	0.10L /0.90L	0.20L /0.80L	0.30L /0.70L	0.40L /0.60L	Midspan
Location, ft	2.08	9.91	19.82	29.72	39.63	49.54
Self Wt.						
Precast-top	82.0	358.4	637.2	836.4	955.8	995.7
Bottom	-73.1	-319.4	-567.8	-745.3	-851.8	-887.2
Prestress						
Precast-top	-329.3	-456.4	-617.5	-778.5	-939.5	-939.5
Bottom	2819.5	2932.8	3076.3	3219.7	3363.2	3363.2
Total						
Precast-top	-247.3	-98.0	19.8	57.9	16.4	56.2
Bottom	2746.4	2613.4	2508.4	2474.4	2511.5	2476.0
As_top (in2)	0.991	0.000	0.000	0.000	0.000	0.000

Span : 1, Beam : 1, SERVICE 1

POSITIVE ENVELOPE STRESSES, (psi) (LOSS = 21.30%)

	Bearing	Trans	H/2	0.10L /0.90L	0.20L /0.80L	0.30L /0.70L	0.40L /0.60L	Midspan
Location, ft	0.00	1.08	3.27	8.91	18.82	28.72	38.63	48.54
Prestress								
Precast-top	-128.5	-282.7	-313.2	-391.9	-530.1	-668.4	-806.6	-806.6
Bottom	1155.5	2420.8	2448.0	2518.1	2641.3	2764.5	2887.7	2887.7
Self wt.								
Precast-top	0.0	42.2	124.5	318.6	597.4	796.6	916.0	955.9
Bottom	-0.0	-37.6	-110.9	-284.0	-532.4	-709.8	-816.3	-851.8
Prec. DL+ADL								
Precast-top	0.0	5.0	14.6	37.5	70.3	93.7	107.7	112.4
Bottom	-0.0	-4.4	-13.0	-33.4	-62.6	-83.5	-96.0	-100.2
Diaphragm								
Precast-top	-0.0	0.3	0.9	2.5	5.3	7.0	7.9	8.7
Bottom	-0.0	-0.3	-0.8	-2.2	-4.7	-6.2	-7.0	-7.7
Deck + Haunch								

		Bearing	Trans	H/2	0.10L /0.90L	0.20L /0.80L	0.30L /0.70L	0.40L /0.60L	Midspan
Precast-top		-0.0	49.0	144.5	369.9	693.4	924.6	1063.2	1109.5
Bottom		-0.0	-43.6	-128.7	-329.6	-617.9	-823.9	-947.5	-988.7
Comp. DL+ADL									
Topping-top		-0.0	3.5	10.3	26.3	49.4	65.8	75.7	79.0
Precast-top		-0.0	2.3	6.9	17.6	33.1	44.1	50.7	52.9
Bottom		0.0	-8.3	-24.4	-62.6	-117.3	-156.4	-179.9	-187.7
LL+I(+)									
Topping-top		0.0	15.6	45.8	116.5	215.5	282.3	322.1	331.7
Precast-top		0.0	10.4	30.7	78.1	144.5	189.2	215.8	222.3
Bottom		-0.0	-37.0	-108.9	-277.0	-512.2	-670.9	-765.4	-788.3
Final 1 (P/S + DL	+ LL)								
Topping-top		-0.0	19.1	56.1	142.9	264.9	348.1	397.7	410.7
Precast-top		-128.5	-173.5	8.9	432.3	1013.8	1386.7	1554.8	1655.0
Bottom		1155.5	2289.6	2061.1	1529.4	794.1	313.8	75.6	-36.7
Final 2 (P/S + DL)									
Topping-top		-0.0	3.5	10.3	26.3	49.4	65.8	75.7	79.0
Precast-top		-128.5	-184.0	-21.8	354.2	869.4	1197.5	1339.0	1432.7
Bottom		1155.5	2326.6	2170.0	1806.4	1306.3	984.6	841.0	751.6
Final 3 (50% P/S	+ 50%	DL + LL)							
Topping-top		0.0	17.3	51.0	129.7	240.2	315.2	359.9	371.2
Precast-top		-64.2	-81.6	19.8	255.2	579.1	788.0	885.3	938.7
Bottom		577.8	1126.3	976.1	626.2	140.9	-178.5	-344.9	-412.5

VERTICAL/HORIZONTAL SHEAR

VERTICAL SHEAR (Art. 9.20) - Span : 1, Beam : 1, FACTORED 1

Location (ft) fpe (psi) Vc (kips)	fd (psi) Vs-rqrd (kips)	Vd (kips) Mcr (k.ft) Vs-max (kips)	Md (k.ft) d (in) Av-com (in2/ft)	Ml(k.ft) Vci-com (kips) Av-min (in2/ft)	Vu (kips) Vci-min (kips) Av (in2/ft)	Mu(k.ft) Vci (kips) Av-prvd (in2/ft)	Vmu (kips) fpc (psi) Vn/Vu	Mmax (k.ft) Vp (kips) MaxSpc (in)	Vi (kips) Vcw (kips) Vs-crit (kips)
Bearing :	1.00	118.9	0.0	0.0	292.9	0.0	309.2	0.0	190.2
1155.5	0.0	3375.4	66.40	10000.0	75.6	10000.0	154.0	7.6	187.7
187.7	137.7	355.6	0.41	0.08	0.41	0.80	1.393	24.0	177.8
Transfer :	2.08	116.3	127.4	75.3	292.9	329.2	303.9	201.8	187.6
2420.8	-94.2	5760.2	66.60	5499.7	75.8	5499.7	368.3	15.9	230.8
230.8	94.6	356.6	0.28	0.08	0.28	0.80	1.528	24.0	178.3
H/2 :	4.27	110.9	375.9	221.7	292.9	970.1	292.9	594.2	182.0
2448.0	-277.9	5441.4	67.01	1804.2	76.3	1804.2	460.3	15.9	246.9
246.9	78.5	358.8	0.23	0.08	0.23	0.80	1.582	24.0	179.4
0.1L :	9.91	97.2	962.5	564.0	264.8	2475.7	264.8	1513.2	167.7
2518.1	-711.6	4701.0	68.07	645.3	77.5	645.3	673.6	15.9	285.4
285.4	8.8	364.5	0.03	0.08	0.08	0.40	1.433	24.0	182.2
0.2L :	19.82	72.9	1805.2	1043.1	217.2	4611.4	217.2	2806.2	144.3
2641.3	-1334.7	3683.0	69.93	290.4	79.6	290.4	965.3	15.9	341.7
290.4	0.0	374.4	0.00	0.08	0.08	0.40	1.783	24.0	187.2
0.3L :	29.72	48.5	2407.2	1366.2	169.2	6095.3	169.2	3688.1	120.6
2764.5	-1779.8	3027.4	71.79	176.4	81.7	176.4	1150.7	15.9	382.3
176.4	11.6	384.4	0.03	0.08	0.08	0.40	1.702	24.0	192.2
0.4L :	39.63	24.3	2768.0	1558.6	121.1	6982.2	109.9	4214.2	85.6
2887.7	-2046.6	2735.0	73.64	109.4	83.8	109.4	1229.4	0.0	389.8
109.4	25.1	394.3	0.07	0.08	0.08	0.40	1.908	24.0	197.2
0.5L :	49.54	0.1	2889.0	1605.3	72.7	7240.7	61.4	4351.7	61.3
2887.7	-2136.0	2552.9	73.64	65.6	83.8	83.8	1282.9	0.0	399.3
83.8	0.0	394.3	0.00	0.08	0.08	0.20	1.948	24.0	197.2
0.6L :	59.45	24.3	2768.1	1558.6	121.1	6982.3	109.9	4214.2	85.6
2887.7	-2046.7	2734.9	73.64	109.4	83.8	109.4	1229.4	0.0	389.8
109.4	25.1	394.3	0.07	0.08	0.08	0.40	1.908	24.0	197.2
0.7L :	69.36	48.5	2407.1	1366.2	169.2	6095.2	169.2	3688.0	120.6
2764.5	-1779.8	3027.6	71.79	176.4	81.7	176.4	1150.6	15.9	382.3
176.4	11.6	384.4	0.03	0.08	0.08	0.40	1.702	24.0	192.2

Location (ft) fpe (psi) Vc (kips)	fd (psi) Vs-rqrd (kips)	Vd (kips) Mcr (k.ft) Vs-max (kips)	Md (k.ft) d (in) Av-com (in2/ft)	Ml(k.ft) Vci-com (kips) Av-min (in2/ft)	Vu (kips) Vci-min (kips) Av (in2/ft)	Mu(k.ft) Vci (kips) Av-prvd (in2/ft)	Vmu (kips) fpc (psi) Vn/Vu	Mmax (k.ft) Vp (kips) MaxSpc (in)	Vi (kips) Vcw (kips) Vs-crit (kips)
0.8L :	79.27	73.0	1805.5	1043.1	217.2	4611.7	217.2	2806.2	144.3
2641.3	-1334.9	3682.5	69.93	290.4	79.6	290.4	965.5	15.9	341.8
290.4	0.0	374.4	0.00	0.08	0.08	0.40	1.782	24.0	187.2
0.9L :	89.17	97.2	962.6	564.0	264.8	2475.9	264.8	1513.2	167.7
2518.1	-711.7	4700.8	68.07	645.3	77.5	645.3	673.7	15.9	285.4
285.4	8.8	364.5	0.03	0.08	0.08	0.40	1.433	24.0	182.2
H/2 :	94.81	111.0	376.0	221.7	292.9	970.2	292.9	594.2	182.0
2448.0	-278.0	5441.4	67.01	1804.2	76.3	1804.2	460.3	15.9	246.9
246.9	78.5	358.8	0.23	0.08	0.23	0.80	1.582	24.0	179.4
Transfer :	97.00	116.3	127.4	75.3	292.9	329.2	303.9	201.8	187.6
2420.8	-94.2	5760.2	66.60	5499.6	75.8	5499.6	368.3	15.9	230.8
230.8	94.7	356.6	0.28	0.08	0.28	0.80	1.528	24.0	178.3
Bearing :	98.08	118.9	0.0	0.0	292.9	0.0	309.2	0.0	190.2
1155.5	-0.0	3375.4	66.40	10000.0	75.6	10000.0	154.0	7.6	187.7
187.7	137.7	355.6	0.41	0.08	0.41	0.80	1.393	24.0	177.8

ANCHORAGE ZONE REINFORCEMENT (Art. 9.22.1)
Span : 1, Beam : 1

Fpi,	kips	=	1301.26
fs,	ksi	=	20.00
d/4,	in	=	13.43
Abrst_rqrd,	in2	=	2.60

HORIZONTAL SHEAR (Art. 9.20.4) - Span : 1, Beam : 1
(Beam and Slab effects are INCLUDED in Vu).

Location (ft) bv (in)		fsy (ksi)	Vu (kips)	Vnh-req (psi)	d (in)	Surf (in2/ft)	s_max (in)	Avh-min (in2/ft)	Avh-sm (in2/ft)	Avh-rg (in2/ft)
Bearing :	0.00									
36.00		60.00	309.2	128.51	74.25	432.00	24.00	0.360	1.233	0.360

HDR Engineering, Inc.
8404 Indian Hills Dr Omaha NE 68114

File Name: 100-100-100-100 Type IV66 simple_revised span draped ba... .csl

Location (ft)		bv (in)	fsy (ksi)	Vu (kips)	Vnh-req (psi)	d (in)	Surf (in2/ft)	s_max (in)	Avh-min (in2/ft)	Avh-sm (in2/ft)	Avh-rg (in2/ft)
Transfer :	1.08	36.00	60.00	303.9	140.82	66.60	432.00	24.00	0.360	1.455	0.360
H/2 :	3.27	36.00	60.00	292.9	134.89	67.01	432.00	24.00	0.360	1.348	0.360
0.1L :	8.91	36.00	60.00	264.8	120.07	68.07	432.00	24.00	0.360	1.081	0.360
0.2L :	18.82	36.00	60.00	217.2	95.88	69.93	432.00	24.00	0.360	0.646	0.360
0.3L :	28.72	36.00	60.00	169.2	72.73	71.79	432.00	24.00	0.360	0.360	0.000
0.4L :	38.63	36.00	60.00	121.1	50.75	73.64	432.00	24.00	0.360	0.360	0.000
0.5L :	48.54	36.00	60.00	72.7	30.48	73.64	432.00	24.00	0.360	0.360	0.000
0.6L :	58.45	36.00	60.00	121.1	50.76	73.64	432.00	24.00	0.360	0.360	0.000
0.7L :	68.36	36.00	60.00	169.2	72.73	71.79	432.00	24.00	0.360	0.360	0.000
0.8L :	78.27	36.00	60.00	217.2	95.89	69.93	432.00	24.00	0.360	0.646	0.360
0.9L :	88.17	36.00	60.00	264.8	120.08	68.07	432.00	24.00	0.360	1.081	0.360
H/2 :	93.81	36.00	60.00	292.9	134.90	67.01	432.00	24.00	0.360	1.348	0.360
Transfer :	96.00	36.00	60.00	303.9	140.83	66.60	432.00	24.00	0.360	1.455	0.360
Bearing :	97.08	36.00	60.00	309.2	143.71	66.40	432.00	24.00	0.360	1.507	0.360

CAMBER/DEFLECTION

CAMBER AND DEFLECTIONS: SERVICE 1
(Span : 1, Beam : 1; Units: in)

	Release	Mult	Erection	Mult	Final
At 0.1 x L =	8.91 ft				
Prestress	0.871	1.80	1.569	2.45	2.135
Self Wt.	-0.308	1.85	-0.569	2.40	-0.738
Deck + Haunch			-0.256	1.00	-0.256
Supplemental			0.000	1.00	0.000
Prec. DL+ADL			-0.026	1.00	-0.026
Diaphragm			-0.002	1.00	-0.002
Comp. DL+ADL			-0.028	1.00	-0.028
Supp. DL+ADL			0.000	1.00	0.000
Live Load(+I)					-0.109
Total	0.564		0.687		0.976

	Release	Mult	Erection	Mult	Final
At 0.2 x L =	18.82 ft				
Prestress	1.575	1.80	2.835	2.45	3.859
Self Wt.	-0.582	1.85	-1.077	2.40	-1.397
Deck + Haunch			-0.512	1.00	-0.512
Supplemental			0.000	1.00	0.000
Prec. DL+ADL			-0.052	1.00	-0.052
Diaphragm			-0.004	1.00	-0.004
Comp. DL+ADL			-0.057	1.00	-0.057
Supp. DL+ADL			0.000	1.00	0.000
Live Load(+I)					-0.219
Total	0.993		1.134		1.618

	Release	Mult	Erection	Mult	Final
At 0.3 x L =	28.72 ft				
Prestress	2.095	1.80	3.771	2.45	5.132
Self Wt.	-0.797	1.85	-1.474	2.40	-1.913
Deck + Haunch			-0.714	1.00	-0.714
Supplemental			0.000	1.00	0.000
Prec. DL+ADL			-0.072	1.00	-0.072
Diaphragm			-0.005	1.00	-0.005
Comp. DL+ADL			-0.079	1.00	-0.079
Supp. DL+ADL			0.000	1.00	0.000
Live Load(+I)					-0.309
Total	1.298		1.425		2.040

	Release	Mult	Erection	Mult	Final
At 0.4 x L =	38.63 ft				
Prestress	2.415	1.80	4.346	2.45	5.916
Self Wt.	-0.933	1.85	-1.727	2.40	-2.240
Deck + Haunch			-0.842	1.00	-0.842
Supplemental			0.000	1.00	0.000
Prec. DL+ADL			-0.085	1.00	-0.085
Diaphragm			-0.006	1.00	-0.006
Comp. DL+ADL			-0.094	1.00	-0.094
Supp. DL+ADL			0.000	1.00	0.000

	Release	Mult	Erection	Mult	Final
Live Load(+I)					-0.366
Total	1.481		1.592		2.283

	Release	Mult	Erection	Mult	Final
At 0.5 x L =	48.54 ft				
Prestress	2.522	1.80	4.540	2.45	6.179
Self Wt.	-0.980	1.85	-1.813	2.40	-2.352
Deck + Haunch			-0.886	1.00	-0.886
Supplemental			0.000	1.00	0.000
Prec. DL+ADL			-0.090	1.00	-0.090
Diaphragm			-0.007	1.00	-0.007
Comp. DL+ADL			-0.099	1.00	-0.099
Supp. DL+ADL			0.000	1.00	0.000
Live Load(+I)					-0.386
Total	1.542		1.646		2.360

	Release	Mult	Erection	Mult	Final
At 0.6 x L =	58.45 ft				
Prestress	2.415	1.80	4.346	2.45	5.916
Self Wt.	-0.933	1.85	-1.727	2.40	-2.240
Deck + Haunch			-0.842	1.00	-0.842
Supplemental			0.000	1.00	0.000
Prec. DL+ADL			-0.085	1.00	-0.085
Diaphragm			-0.006	1.00	-0.006
Comp. DL+ADL			-0.094	1.00	-0.094
Supp. DL+ADL			0.000	1.00	0.000
Live Load(+I)					-0.366
Total	1.481		1.592		2.283

	Release	Mult	Erection	Mult	Final
At 0.7 x L =	68.36 ft				
Prestress	2.095	1.80	3.771	2.45	5.132
Self Wt.	-0.797	1.85	-1.474	2.40	-1.913
Deck + Haunch			-0.714	1.00	-0.714
Supplemental			0.000	1.00	0.000
Prec. DL+ADL			-0.072	1.00	-0.072
Diaphragm			-0.005	1.00	-0.005
Comp. DL+ADL			-0.079	1.00	-0.079
Supp. DL+ADL			0.000	1.00	0.000
Live Load(+I)					-0.309
Total	1.298		1.425		2.040

	Release	Mult	Erection	Mult	Final
At 0.8 x L =	78.27 ft				
Prestress	1.575	1.80	2.835	2.45	3.859
Self Wt.	-0.582	1.85	-1.077	2.40	-1.397
Deck + Haunch			-0.512	1.00	-0.512
Supplemental			0.000	1.00	0.000
Prec. DL+ADL			-0.052	1.00	-0.052
Diaphragm			-0.004	1.00	-0.004
Comp. DL+ADL			-0.057	1.00	-0.057
Supp. DL+ADL			0.000	1.00	0.000
Live Load(+I)					-0.219
Total	0.993		1.134		1.618

	Release	Mult	Erection	Mult	Final
At 0.9 x L =	88.17 ft				
Prestress	0.871	1.80	1.569	2.45	2.135
Self Wt.	-0.308	1.85	-0.569	2.40	-0.738
Deck + Haunch			-0.256	1.00	-0.256
Supplemental			0.000	1.00	0.000
Prec. DL+ADL			-0.026	1.00	-0.026
Diaphragm			-0.002	1.00	-0.002
Comp. DL+ADL			-0.028	1.00	-0.028
Supp. DL+ADL			0.000	1.00	0.000
Live Load(+I)					-0.109
Total	0.564		0.687		0.976

Positive values indicate upward deflection.

ULTIMATE MOMENT

ULTIMATE - Span : 1, Beam : 1, FACTORED 1
(Mu-prvd computed by AASHTO equations, Art. 9.17/9.18)

(f'c_eff, ksi = 4.50; beta1 = 0.825)

Location (ft)	A*s in2	Ycg in	p*(A*s/bd)	f*su ksi	a in	Mu-prvd k.ft	Mu-rqrd k.ft	Mcr k.ft	Crkg Ratio	Mu-p/r Ratio
Transfer	1.08									
	1.261	11.90	0.00018	269.0	0.8	1870.7	329.2	6143.2	0.305	5.68
H/2	3.27									
	2.585	11.49	0.00037	268.0	1.7	3818.0	970.1	6072.9	0.629	3.94
0.1L	8.91									
	5.998	10.43	0.00084	265.4	4.0	8760.8	2475.7	5919.1	1.480	-
0.2L	18.82									
	6.426	8.57	0.00088	265.2	4.2	9623.1	4611.4	5743.8	1.675	-
0.3L	28.72									
	6.426	6.71	0.00085	265.3	4.2	9891.4	6095.3	5690.2	1.738	-
0.4L	38.63									
	6.426	4.86	0.00083	265.4	4.2	10159.6	6982.2	5758.6	1.764	-
0.5L	48.54									
	6.426	4.86	0.00083	265.4	4.2	10159.6	7240.7	5697.4	1.783	-
0.6L	58.45									
	6.426	4.86	0.00083	265.4	4.2	10159.6	6982.3	5758.6	1.764	-
0.7L	68.36									
	6.426	6.71	0.00085	265.3	4.2	9891.4	6095.2	5690.3	1.738	-
0.8L	78.27									
	6.426	8.57	0.00088	265.2	4.2	9623.1	4611.7	5743.6	1.675	-
0.9L	88.17									
	5.998	10.43	0.00084	265.4	4.0	8760.8	2475.9	5919.0	1.480	-
H/2	93.81									
	2.585	11.49	0.00037	268.0	1.7	3818.0	970.2	6072.9	0.629	3.94
Transfer	96.00									
	1.261	11.90	0.00018	269.0	0.8	1870.7	329.2	6143.2	0.305	5.68

DETENSIONING

Span : 1, Beam : 1; Groups 1-23; Units: psi

Grp	Str		Ys,in		2.08ft
1	2	E	2.00	Ft	25.547
		M	2.00	Fb	97.522
2	2	E	64.00	Ft	212.827
		M	8.00	Fb	50.920
3	1	E	64.00	Ft	306.468
		M	8.00	Fb	27.619
4	2	E	54.00	Ft	454.200
		M	6.00	Fb	16.260
5	1	E	54.00	Ft	528.066
		M	6.00	Fb	10.580
6	2	E	8.00	Ft	496.304
		M	8.00	Fb	159.171
7	2	E	8.00	Ft	464.542
		M	8.00	Fb	307.761
8	2	E	8.00	Ft	432.781
		M	8.00	Fb	456.351
9	2	E	6.00	Ft	392.762
		M	6.00	Fb	612.300
10	2	E	6.00	Ft	352.744
		M	6.00	Fb	768.248
11	2	E	6.00	Ft	312.725
		M	6.00	Fb	924.197
12	2	E	6.00	Ft	272.706
		M	6.00	Fb	1080.145
13	2	E	4.00	Ft	224.431
		M	4.00	Fb	1243.451
14	2	E	4.00	Ft	176.155
		M	4.00	Fb	1406.758
15	2	E	4.00	Ft	127.880
		M	4.00	Fb	1570.064
16	2	E	4.00	Ft	79.604
		M	4.00	Fb	1733.370
17	2	E	4.00	Ft	31.329
		M	4.00	Fb	1896.677
18	1	E	4.00	Ft	7.191
		M	4.00	Fb	1978.330
19	2	E	2.00	Ft	-49.342
		M	2.00	Fb	2148.994
20	2	E	2.00	Ft	-105.874
		M	2.00	Fb	2319.658
21	2	E	2.00	Ft	-162.407
		M	2.00	Fb	2490.322
22	2	E	2.00	Ft	-218.939
		M	2.00	Fb	2660.986
23	1	E	2.00	Ft	-247.205
		M	2.00	Fb	2746.318

DESIGN SUMMARY

Span: 1, Beam: 1, Exterior beam

Beam type:		
	I-Girder,	ODOT AASHTO Type 4 66 MOD
Precast Length,	ft	99.08
Release Length,	ft	99.08
Strand Pattern:	Straight/Draped	Depr. Point: 0.40 L
Strand:	1/2-270K-LL	
Strand Type:	Low Relaxation	
Strand Es,	ksi:	28500.0
No. of strands:	42	
	Draped:	6
	Straight:	36
Concrete Strength:		
	f'ci:	5000.0 psi
	f'c:	7000.0 psi
	f'ct:	4500.0 psi
Initial losses:	8.33 %	
Final losses:	21.30 %	

Specification	Allowable	Computed	Status
Release Stresses (psi) (Art. 9.15.2.1)			
Precast Top w/ no reinf.	-200.00		
Precast Top w/ reinf.	-530.33	-247.31	OK
Precast Bot (compression)	3000.00	2746.41	OK
Factored 1	Provided	Required	
Ult. Moment (k.ft)	10159.61	7240.68	OK
Debonding Limits	Allowable	Computed	
Max. Debond per Row	40.00 %	0.00 %	OK
Max. Debond Total	25.00 %	0.00 %	OK

Positive Moment Envelope Stresses (psi)

Specification	Final 1 Allow	Comp	Final 2 Allow	Comp	Final 3 Allow	Comp
Service 1						
Topping Top	2700.0/-503.1	410.7 / -0.0	1800.0	79.0	1800.0	371.2

Specification	Final 1 Allow	Comp	Final 2 Allow	Comp	Final 3 Allow	Comp
Precast Top	4200.0/-502.0	1655.0 /-173.5	2800.0	1432.7	2800.0	938.7
Precast Bot	4200.0/-502.0	2289.6 / -36.7	2800.0	2326.6	2800.0	1126.3

CAMBER / DEFLECTION: (PCI Design Handbook - 4th Ed.- Table 4.6.2)
0.5 x L = 48.54 ft

		Release	Mult	Erection	Mult	Final
Prestress	:	2.522	1.80	4.540	2.45	6.179
Self Wt.	:	-0.980	1.85	-1.813	2.40	-2.352
Deck + Haunch	:			-0.886	1.00	-0.886
Supplemental	:			0.000	1.00	0.000
Prec. DL+ADL	:			-0.090	1.00	-0.090
Diaphragm	:			-0.007	1.00	-0.007
Comp. DL+ADL	:			-0.099	1.00	-0.099
Supp. DL+ADL	:			0.000	1.00	0.000
Live Load	:					-0.386
Total	:	1.542		1.646		2.360

Positive values indicate upward deflection.

PROPERTIES

Span: 1, Beam: 3

PRECAST DATA:

Section Id:	ODOT AASHTO Type 4 66 MOD					
Type:	I-Girder					
Flng width:	Top =	36.000	in	Bot =	26.000	in
thick:	Top =	4.000	in	Bot =	8.000	in
Stems:	No =	1				
	Top =	8.000	in			
	Bot =	8.000	in			
Shear width:	=	8.000	in			
Wide top Flange:	No					

GENERAL BRIDGE DATA:

Bridge Width	=	48.46	ft
Curb-to-curb	=	45.50	ft
Beam Spac. Lt./Rt	=	10.50/ 10.50	ft
Lane width	=	12.00	ft
Number of lanes	=	3	
Interior/Exterior	=	Interior	

TOPPING DATA:

Deck	Thickness	=	8.500	in	
Suppl.	Thickness	=	0.000	in	
Haunch:					
	Thickness	=	4.000	in	
	Width	=	36.000	in	
Effective	width	=	126.000	in	(Art. 8.10.1)

GENERAL LOAD DATA:

Dead loads on precast:
UNITS: (Point: kips, Location: ft)
(Line: klf)

Type	Mag.	Loc.
Line	0.131	-

Diaphragm loads:
(kips, ft)

Mag.	Loc.
0.42	24.75
0.42	49.50
0.42	74.25

Dead loads on composite: See Project info for composite loads

GENERAL SPAN DATA:

Overall length =	99.083	ft
Release length =	99.083	ft
Design length =	97.083	ft

KERN POINTS:

Upper =	48.39	in
Lower =	15.69	in

DISTRIBUTION FACTORS (Art. 3.23):

Live Moment (Group 1) :	0.955	(Calculated)
Live Shear (Group 1) :	0.955	(Calculated)

Dead Loads and Pedestrian Load distributed equally to all beams (Art. 3.23.2.3.1.1)

Pedestrian:	0.200	(Calculated)
Comp. DL:	0.200	(Calculated)
Comp. ADL:	0.200	(Calculated)
Suppl. DL:	0.200	(Calculated)
Suppl. ADL:	0.200	(Calculated)
Suppl:	0.200	(Calculated)

RESISTANCE FACTORS (Art. 9.14):

Flexure Reinforced:	0.90
Flexure Prestressed:	1.00
Shear:	0.90

Span: 1, Beam: 3

SECTION PROPERTIES:

	PRECAST		COMPOSITE		
Area:	893.0	in2	1867.2	in2	#
Total Height:	66.00	in	78.50	in	
Mom. of Inertia (Ixx):	480161	in4	1327420	in4	#
Ht. of c.g.:	31.10	in	53.23	in	#
Density:	150.00	pcf	150.00	pcf	
Self-weight:	930.2	plf	2195.8	plf	
Mom. of Inertia (Iyy):	36314.0	in4			
Poisson's Ratio:	0.2				

(#) Of Total Section using Ect/Ec = 0.8018

Use transformed strand and rebar: No

Span: 1, Beam: 3
STRESS LIMITS (Art. 9.15.2):

STRESS LIMITS AT FINAL 1 (P/S + DL + LL) (Art. 9.15.2.2 a):

			PRECAST		DECK	
Strength		=	7000.00	psi	4500.00	psi
Max Comp,	Top	=	4200.00	psi	2700.00	psi
Pos Mom,	Bot	=	4200.00	psi		
Neg Mom,	Bot	=	4200.00	psi		
Max Tens,	Top	=	-502.00	psi	-503.12	psi
Max Tens,	Bot	=	-502.00	psi		
Crk Tens,	Bot	=	-627.50	psi		
Elasticity		=	5072.2	ksi	4066.8	ksi

STRESS LIMITS AT FINAL 2 (P/S + DL) (Art. 9.15.2.2 b):

			PRECAST		DECK	
Max Comp,	Top	=	2800.00	psi	1800.00	psi
Pos Mom,	Bot	=	2800.00	psi		
Neg Mom,	Bot	=	2800.00	psi		

STRESS LIMITS AT FINAL 3 (50% P/S + 50% DL + LL) (Art. 9.15.2.2 c):

			PRECAST		DECK	
Max Comp,	Top	=	2800.00	psi	1800.00	psi
Pos Mom,	Bot	=	2800.00	psi		
Neg Mom,	Bot	=	2800.00	psi		

AT RELEASE (Art. 9.15.2.1):

			PRECAST	
Strength		=	5000.00	psi
Max Comp,	Top	=	3000.00	psi
Max Comp,	Bot	=	3000.00	psi
Max Tens,	Top	=	-200.00	psi
w/reinf		=	-530.33	psi
Max Tens,	Bot	=	-0.00	psi
Elasticity		=	4286.8	ksi

Span: 1, Beam: 3

PRESTRESSED STEEL:

42 strands, 1/2-270K-LL, Low relaxation strands
Depressed at 0.40L (39.63 ft from member end)

END PATTERN (Ycg = 12.29 in):

11 @ 2.000 in	11 @ 4.000 in	8 @ 6.000 in	6 @ 8.000 in
3 @ 54.000 in	3 @ 64.000 in		

MID PATTERN (Ycg = 4.86 in):
(A) Draped:

3 @ 6.000 in	3 @ 8.000 in	

(B) Straight:

11 @ 2.000 in	11 @ 4.000 in	8 @ 6.000 in	6 @ 8.000 in

Strand Diameter	=	0.500	in	Ult. Strength	(f's)	=	270.0	ksi			
Strand Area	=	0.153	in2	Initial Prestress		=	0.75	f's	=	202.5	ksi
Total Strand Area	=	6.426	in2	Initial Pull		=	1301.3	kips			
Trans. Len,bonded	=	2.083	ft	Dev. Len, bonded		=	10.618	ft			
Trans. Len,debonded	=	2.083	ft	Dev. Len, debonded		=	13.272	ft			
Holddown Force	=	20.202	kips	Beam Shrtng (PL/AE)		=	0.370	in			

REINFORCING STEEL:

Tension	steel:		
fy	=	60.0	ksi
Es	=	29000	ksi
fs	=	24.0	ksi

Stirrups:

# legs	Size	fy (ksi)	Area (in2)	Spacing (in)	Start (ft)	End (ft)
2	US#4[M13]	60.0	0.40	6.00	0.0000	7.9711
2	US#4[M13]	60.0	0.40	12.00	7.9711	46.4446
2	US#4[M13]	60.0	0.40	24.00	46.4460	52.6387
2	US#4[M13]	60.0	0.40	12.00	52.6387	91.1122
2	US#4[M13]	60.0	0.40	6.00	91.1122	99.0833

LOSSES

Note: Values are calculated at Midspan

Str. area	=	6.4260	in2
Ycg	=	4.86	in
P_init	=	1301.3	kips
Ecc	=	26.24	in
Hours to release	=	18.00	
Rel. Humid.(RH)	=	75.0	%
Es	=	28500.0	ksi
Eci	=	4287	ksi

AASHTO LOSSES

		Release				Final	(Art. 9.16.2)
Steel relaxation	*	1600.47	psi	CRs (Eq 9-10A)	2246.91	psi	
Elastic Shortening		15276.95	psi	ES (Eq 9-6)	15276.95	psi	(Fcir=2297.88 psi)
Concrete shrinkage		0.00	psi	SH (Eq 9-4)	5750.00	psi	
Concrete creep		0.00	psi	CRc (Eq 9-9)	18757.86	psi	(Fcds=-1259.53 psi)
Total		16877.42	psi	(8.33 %)	42031.72	psi	(20.76 %)

* Steel relax. before release - Ref: PCI Journal Vol. 20, No. 4, Jul-Aug 1975

SHEAR/MOMENT ENVELOPE (&REACTIONS)

SHEAR AND MOMENT ENVELOPE : Span : 1, Beam : 3, SERVICE 1
Shears: kips, Moments: kft

		Bearing	Trans	H/2	0.10L	0.20L	0.30L	0.40L	Midspan
Location,	ft	0.00	1.08	3.27	8.91	18.82	28.72	38.63	48.54
Self wt. :	M	0.0	48.4	142.7	365.3	685.0	913.3	1050.3	1095.9
	V	45.2	44.1	42.1	36.9	27.7	18.4	9.2	0.0
Prec. :	M	0.0	6.8	20.1	51.5	96.6	128.8	148.1	154.6
DL+ADL	V	6.4	6.2	5.9	5.2	3.9	2.6	1.3	0.0
Deck :	M	0.0	65.8	194.2	497.1	932.0	1242.6	1429.0	1491.1
+ Haunch	V	61.4	60.1	57.3	50.2	37.6	25.1	12.5	0.0
Diaphragm :	M	-0.0	0.7	2.0	5.5	11.6	16.1	18.0	20.0
	V	0.6	0.6	0.6	0.6	0.6	0.2	0.2	0.2
Comp. :	M	-0.0	16.9	49.8	127.4	238.9	318.5	366.3	382.2
DL+ADL	V	15.7	15.4	14.7	12.9	9.6	6.4	3.2	0.0
LL + I :	M+	0.0	100.7	296.3	753.7	1394.0	1825.7	2082.9	2145.2
	V	95.1	94.0	91.5	85.3	75.3	65.3	48.2	37.7
LL + I :	M-	-0.0	-0.0	-0.0	0.0	0.0	0.0	0.0	0.0
	V	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LL + I :	Vmx	95.1	94.0	91.5	85.3	75.3	65.3	55.1	44.7
	M	0.0	100.7	296.3	753.7	1394.0	1825.7	2048.8	2063.4
Total :	M+	0.0	239.2	705.1	1800.5	3358.0	4444.9	5094.5	5289.0
	V	0.0	220.5	212.2	191.0	154.8	118.0	74.7	37.9
Total :	M-	-0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	V	224.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total :	Vmx	224.5	220.5	212.2	191.0	154.8	118.0	81.6	44.9
	M	-0.0	239.2	705.1	1800.5	3358.0	4444.9	5060.4	5207.1

		0.60L	0.70L	0.80L	0.90L	H/2	Trans	Bearing
Location,	ft	58.45	68.36	78.27	88.17	93.81	96.00	97.08
Self wt. :	M	1050.3	913.3	685.0	365.3	142.7	48.4	0.0
	V	9.2	18.4	27.7	36.9	42.1	44.1	45.2
Prec. :	M	148.1	128.8	96.6	51.5	20.1	6.8	-0.0
DL+ADL	V	1.3	2.6	3.9	5.2	5.9	6.2	6.4
Deck :	M	1429.0	1242.6	932.0	497.1	194.2	65.8	0.0
+ Haunch	V	12.5	25.1	37.6	50.2	57.3	60.1	61.4
Diaphragm :	M	18.2	16.0	12.1	5.7	2.1	0.7	-0.0
	V	0.2	0.2	0.6	0.6	0.6	0.6	0.6
Comp. :	M	366.3	318.5	238.9	127.4	49.8	16.9	-0.0
DL+ADL	V	3.2	6.4	9.6	12.9	14.7	15.4	15.7
LL + I :	M+	2082.9	1825.7	1394.0	753.7	296.3	100.7	0.0
	V	48.2	65.3	75.3	85.3	91.5	94.0	95.1
LL + I :	M-	0.0	0.0	0.0	0.0	-0.0	-0.0	-0.0
	V	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LL + I :	Vmx	55.1	65.3	75.3	85.3	91.5	94.0	95.1
	M	2048.8	1825.7	1394.0	753.7	296.3	100.7	0.0
Total :	M+	5094.7	4444.8	3358.5	1800.8	705.2	239.2	0.0
	V	74.7	118.1	154.8	191.0	212.2	220.5	224.5
Total :	M-	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	V	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total :	Vmx	81.6	118.1	154.8	191.0	212.2	220.5	224.5
	M	5060.6	4444.8	3358.5	1800.8	705.2	239.2	0.0

REACTIONS (kips), SERVICE 1

Load Type	Left Support	Right Support
Self Wt.	45.2	45.2
Deck+Haunch	61.4	61.4
Diaphragm	0.6	0.6
Prec.DL+ADL	6.4	6.4
Comp. DL+ADL	78.7	78.7
Supplemental	0.0	0.0
Supp. DL+ADL	0.0	0.0
Live	81.3	81.3
Pedestrian	0.0	0.0

Upward reactions are positive.
Live Load reactions are per lane with no distribution factor and no impact.
Non-composite load types are per beam.
Composite, Supplemental, and Pedestrian load types are per total bridge width.

SHEAR AND MOMENT ENVELOPE : Span : 1, Beam : 3, FACTORED 1
Shears: kips, Moments: kft

		Bearing	Trans	H/2	0.10L	0.20L	0.30L	0.40L	Midspan
Location,	ft	0.00	1.08	3.27	8.91	18.82	28.72	38.63	48.54
Self wt. :	M	0.0	62.9	185.5	474.9	890.5	1187.3	1365.3	1424.7
	V	58.7	57.4	54.7	47.9	35.9	24.0	12.0	0.0
Prec. :	M	0.0	8.9	26.2	67.0	125.6	167.5	192.6	200.9
DL+ADL	V	8.3	8.1	7.7	6.8	5.1	3.4	1.7	0.0
Deck :	M	0.0	85.6	252.4	646.2	1211.5	1615.4	1857.7	1938.4
+ Haunch	V	79.9	78.1	74.5	65.2	48.9	32.6	16.3	0.0
Diaphragm :	M	-0.0	0.9	2.6	7.2	15.1	20.9	23.4	26.0
	V	0.8	0.8	0.8	0.8	0.8	0.3	0.3	0.3
Comp. :	M	-0.0	21.9	64.7	165.6	310.5	414.0	476.1	496.8
DL+ADL	V	20.5	20.0	19.1	16.7	12.5	8.4	4.2	0.0
LL + I :	M+	0.0	218.5	643.3	1636.3	3026.3	3963.5	4521.9	4657.3
	V	206.5	204.1	198.7	185.1	163.6	141.7	104.6	81.9
LL + I :	M-	-0.0	-0.0	-0.0	0.0	0.0	0.0	0.0	0.0
	V	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LL + I :	Vmx	206.5	204.1	198.7	185.1	163.6	141.7	119.6	97.0
	M	0.0	218.5	643.3	1636.3	3026.3	3963.5	4447.9	4479.5
Total :	M+	0.0	398.6	1174.8	2997.2	5579.6	7368.5	8437.1	8744.1
	V	0.0	368.5	355.5	322.5	266.8	210.3	139.0	82.1
Total :	M-	-0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	V	374.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total :	Vmx	374.7	368.5	355.5	322.5	266.8	210.3	154.0	97.3
	M	-0.0	398.6	1174.8	2997.2	5579.6	7368.5	8363.1	8566.4

		0.60L	0.70L	0.80L	0.90L	H/2	Trans	Bearing
Location,	ft	58.45	68.36	78.27	88.17	93.81	96.00	97.08
Self wt. :	M	1365.3	1187.3	890.5	474.9	185.5	62.9	0.0
	V	12.0	24.0	35.9	47.9	54.7	57.4	58.7

		0.60L	0.70L	0.80L	0.90L	H/2	Trans	Bearing
Prec. :	M	192.6	167.5	125.6	67.0	26.2	8.9	-0.0
DL+ADL	V	1.7	3.4	5.1	6.8	7.7	8.1	8.3
Deck :	M	1857.7	1615.4	1211.5	646.2	252.4	85.6	0.0
+ Haunch	V	16.3	32.6	48.9	65.2	74.5	78.1	79.9
Diaphragm :	M	23.6	20.8	15.7	7.4	2.7	0.9	-0.0
	V	0.3	0.3	0.8	0.8	0.8	0.8	0.8
Comp. :	M	476.1	414.0	310.5	165.6	64.7	21.9	-0.0
DL+ADL	V	4.2	8.4	12.5	16.7	19.1	20.0	20.5
LL + I :	M+	4521.9	3963.5	3026.3	1636.3	643.3	218.5	0.0
	V	104.6	141.7	163.6	185.1	198.7	204.1	206.5
LL + I :	M-	0.0	0.0	0.0	0.0	-0.0	-0.0	-0.0
	V	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LL + I :	Vmx	119.6	141.7	163.6	185.1	198.7	204.1	206.5
	M	4447.9	3963.5	3026.3	1636.3	643.3	218.5	0.0
Total :	M+	8437.3	7368.4	5580.2	2997.5	1174.9	398.7	0.0
	V	139.1	210.3	266.9	322.5	355.6	368.5	374.7
Total :	M-	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	V	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total :	Vmx	154.0	210.3	266.9	322.5	355.6	368.5	374.7
	M	8363.3	7368.4	5580.2	2997.5	1174.9	398.7	0.0

REACTIONS (kips), FACTORED 1

Load Type	Left Support	Right Support
Self Wt.	58.7	58.7
Deck+Haunch	79.9	79.9
Diaphragm	0.8	0.8
Prec.DL+ADL	8.3	8.3
Comp. DL+ADL	102.4	102.4
Supplemental	0.0	0.0
Supp. DL+ADL	0.0	0.0
Live	176.6	176.6
Pedestrian	0.0	0.0

Upward reactions are positive.
Live Load reactions are per lane with no distribution factor and no impact.
Non-composite load types are per beam.
Composite, Supplemental, and Pedestrian load types are per total bridge width.

POSITIVE ENVELOPE STRESSES

Span : 1, Beam : 3, SERVICE 1

RELEASE STRESSES, (psi) (LOSS = 8.33 %)

		Trans	0.10L /0.90L	0.20L /0.80L	0.30L /0.70L	0.40L /0.60L	Midspan
Location, ft		2.08	9.91	19.82	29.72	39.63	49.54
Self Wt.							
Precast-top		82.0	358.4	637.2	836.4	955.8	995.7
Bottom		-73.1	-319.4	-567.8	-745.3	-851.8	-887.2
Prestress							
Precast-top		-329.3	-456.4	-617.5	-778.5	-939.5	-939.5
Bottom		2819.5	2932.8	3076.3	3219.7	3363.2	3363.2
Total							
Precast-top		-247.3	-98.0	19.8	57.9	16.4	56.2
Bottom		2746.4	2613.4	2508.4	2474.4	2511.5	2476.0
As_top (in2)		0.991	0.000	0.000	0.000	0.000	0.000

Span : 1, Beam : 3, SERVICE 1

POSITIVE ENVELOPE STRESSES, (psi) (LOSS = 20.76%)

		Bearing	Trans	H/2	0.10L /0.90L	0.20L /0.80L	0.30L /0.70L	0.40L /0.60L	Midspan
Location, ft		0.00	1.08	3.27	8.91	18.82	28.72	38.63	48.54
Prestress									
Precast-top		-129.3	-284.7	-315.4	-394.6	-533.8	-673.0	-812.2	-812.2
Bottom		1163.4	2437.4	2464.8	2535.3	2659.4	2783.4	2907.5	2907.5
Self wt.									
Precast-top		0.0	42.2	124.5	318.6	597.4	796.6	916.0	955.9
Bottom		-0.0	-37.6	-110.9	-284.0	-532.4	-709.8	-816.3	-851.8
Prec. DL+ADL									
Precast-top		-0.0	6.0	17.6	44.9	84.3	112.4	129.2	134.8
Bottom		0.0	-5.3	-15.6	-40.0	-75.1	-100.1	-115.1	-120.1
Diaphragm									
Precast-top		-0.0	0.6	1.8	5.0	10.5	14.0	15.9	17.4
Bottom		-0.0	-0.5	-1.6	-4.4	-9.4	-12.5	-14.1	-15.5
Deck + Haunch									

		Bearing	Trans	H/2	0.10L /0.90L	0.20L /0.80L	0.30L /0.70L	0.40L /0.60L	Midspan
Precast-top		-0.0	57.4	169.4	433.5	812.9	1083.8	1246.4	1300.5
Bottom		-0.0	-51.2	-150.9	-386.3	-724.4	-965.8	-1110.6	-1158.9
Comp. DL+ADL									
Topping-top		-0.0	3.1	9.1	23.3	43.8	58.3	67.1	70.0
Precast-top		-0.0	1.9	5.7	14.7	27.6	36.8	42.3	44.1
Bottom		0.0	-8.1	-23.9	-61.3	-114.9	-153.3	-176.2	-183.9
LL+I(+)									
Topping-top		0.0	18.4	54.3	138.1	255.4	334.4	381.6	393.0
Precast-top		0.0	11.6	34.2	87.0	161.0	210.8	240.5	247.7
Bottom		-0.0	-48.4	-142.6	-362.7	-670.7	-878.5	-1002.2	-1032.2
Final 1 (P/S + DL	+ LL)								
Topping-top		0.0	21.5	63.4	161.4	299.1	392.8	448.7	463.0
Precast-top		-129.3	-164.9	37.8	509.3	1159.9	1581.3	1778.1	1888.3
Bottom		1163.4	2286.2	2019.1	1396.6	532.5	-36.5	-327.2	-455.1
Final 2 (P/S + DL)									
Topping-top		-0.0	3.1	9.1	23.3	43.8	58.3	67.1	70.0
Precast-top		-129.3	-176.6	3.6	422.3	998.9	1370.5	1537.6	1640.6
Bottom		1163.4	2334.7	2161.7	1759.2	1203.2	841.9	675.0	577.2
Final 3 (50% P/S	+ 50%	DL + LL)							
Topping-top		0.0	20.0	58.8	149.7	277.2	363.6	415.1	428.0
Precast-top		-64.7	-76.7	36.0	298.2	660.4	896.1	1009.3	1068.0
Bottom		581.7	1118.9	938.3	517.0	-69.1	-457.5	-664.7	-743.6

VERTICAL/HORIZONTAL SHEAR

VERTICAL SHEAR (Art. 9.20) - Span : 1, Beam : 3, FACTORED 1

Location (ft) / fpe (psi) / Vc (kips)	fd (psi) / Vs-rqrd (kips)	Vd (kips) / Mcr (k.ft) / Vs-max (kips)	Md (k.ft) / d (in) / Av-com (in2/ft)	Ml(k.ft) / Vci-com (kips) / Av-min (in2/ft)	Vu (kips) / Vci-min (kips) / Av (in2/ft)	Mu(k.ft) / Vci (kips) / Av-prvd (in2/ft)	Vmu (kips) / fpc (psi) / Vn/Vu	Mmax (k.ft) / Vp (kips) / MaxSpc (in)	Vi (kips) / Vcw (kips) / Vs-crit (kips)
Bearing :	1.00	129.3	0.0	0.0	355.5	0.0	374.7	0.0	245.3
1163.4	0.0	3461.2	66.40	10000.0	75.6	10000.0	120.9	7.7	182.5
182.5	212.5	355.6	0.64	0.08	0.64	0.80	1.134	12.0	177.8
Transfer :	2.08	126.5	138.5	100.7	355.5	398.6	368.5	260.1	242.0
2437.4	-102.7	5895.4	66.60	5639.3	75.8	5639.3	309.4	16.0	221.5
221.5	173.5	356.6	0.52	0.08	0.52	0.80	1.235	24.0	178.3
H/2 :	4.27	120.7	408.8	296.3	355.5	1174.8	355.5	766.0	234.9
2464.8	-303.0	5536.0	67.01	1845.2	76.3	1845.2	421.2	16.0	240.7
240.7	154.3	358.8	0.46	0.08	0.46	0.80	1.288	24.0	179.4
0.1L :	9.91	105.7	1046.8	753.7	322.5	2997.2	322.5	1950.4	216.8
2535.3	-775.9	4699.8	68.07	655.5	77.5	655.5	680.9	16.0	286.7
286.7	71.6	364.5	0.21	0.08	0.21	0.40	1.180	24.0	182.2
0.2L :	19.82	79.4	1964.0	1394.0	266.8	5579.6	266.8	3615.5	187.4
2659.4	-1455.8	3544.6	69.93	291.2	79.6	291.2	1038.2	16.0	354.1
291.2	5.2	374.4	0.01	0.08	0.08	0.40	1.454	24.0	187.2
0.3L :	29.72	52.7	2619.2	1825.7	210.3	7368.5	210.3	4749.3	157.6
2783.4	-1941.5	2793.0	71.79	174.2	81.7	174.2	1268.2	16.0	402.7
174.2	59.4	384.4	0.17	0.08	0.17	0.40	1.360	24.0	192.2
0.4L :	39.63	26.5	3011.7	2082.9	154.0	8437.1	139.0	5425.4	112.6
2907.5	-2232.3	2446.4	73.64	106.8	83.8	106.8	1370.6	0.0	414.8
106.8	64.3	394.3	0.17	0.08	0.17	0.40	1.485	24.0	197.2
0.5L :	49.54	0.2	3143.8	2145.2	97.3	8744.1	82.1	5600.4	81.9
2907.5	-2330.3	2242.8	73.64	62.6	83.8	83.8	1434.8	0.0	426.1
83.8	24.3	394.3	0.07	0.08	0.08	0.20	1.457	24.0	197.2
0.6L :	59.45	26.5	3011.8	2082.9	154.0	8437.3	139.1	5425.5	112.6
2907.5	-2232.5	2446.1	73.64	106.8	83.8	106.8	1370.6	0.0	414.8
106.8	64.3	394.3	0.17	0.08	0.17	0.40	1.485	24.0	197.2
0.7L :	69.36	52.8	2619.1	1825.7	210.3	7368.4	210.3	4749.3	157.6
2783.4	-1941.4	2793.2	71.79	174.3	81.7	174.3	1268.2	16.0	402.7
174.3	59.4	384.4	0.17	0.08	0.17	0.40	1.360	24.0	192.2

Location (ft) fpe (psi) Vc (kips)	fd (psi) Vs-rqrd (kips)	Vd (kips) Mcr (k.ft) Vs-max (kips)	Md (k.ft) d (in) Av-com (in2/ft)	Ml(k.ft) Vci-com (kips) Av-min (in2/ft)	Vu (kips) Vci-min (kips) Av (in2/ft)	Mu(k.ft) Vci (kips) Av-prvd (in2/ft)	Vmu (kips) fpc (psi) Vn/Vu	Mmax (k.ft) Vp (kips) MaxSpc (in)	Vi (kips) Vcw (kips) Vs-crit (kips)
0.8L :	79.27	79.5	1964.5	1394.0	266.9	5580.2	266.9	3615.7	187.4
2659.4	-1456.2	3543.9	69.93	291.2	79.6	291.2	1038.4	16.0	354.1
291.2	5.3	374.4	0.02	0.08	0.08	0.40	1.454	24.0	187.2
0.9L :	89.17	105.7	1047.1	753.7	322.5	2997.5	322.5	1950.4	216.8
2535.3	-776.1	4699.5	68.07	655.5	77.5	655.5	681.0	16.0	286.7
286.7	71.6	364.5	0.21	0.08	0.21	0.40	1.180	24.0	182.2
H/2 :	94.81	120.7	408.9	296.3	355.6	1174.9	355.6	766.0	234.9
2464.8	-303.1	5535.9	67.01	1845.2	76.3	1845.2	421.3	16.0	240.8
240.8	154.3	358.8	0.46	0.08	0.46	0.80	1.288	24.0	179.4
Transfer :	97.00	126.5	138.6	100.7	355.6	398.7	368.5	260.1	242.0
2437.4	-102.7	5895.4	66.60	5639.2	75.8	5639.2	309.5	16.0	221.5
221.5	173.6	356.6	0.52	0.08	0.52	0.80	1.235	24.0	178.3
Bearing :	98.08	129.3	0.0	0.0	355.6	0.0	374.7	0.0	245.3
1163.4	-0.0	3461.2	66.40	10000.0	75.6	10000.0	120.9	7.7	182.5
182.5	212.6	355.6	0.64	0.08	0.64	0.80	1.134	12.0	177.8

ANCHORAGE ZONE REINFORCEMENT (Art. 9.22.1)
Span : 1, Beam : 3

Fpi,	kips	=	1301.26
fs,	ksi	=	20.00
d/4,	in	=	13.43
Abrst_rqrd,	in2	=	2.60

HORIZONTAL SHEAR (Art. 9.20.4) - Span : 1, Beam : 3
(Beam and Slab effects are INCLUDED in Vu).

Location (ft) bv (in)		fsy (ksi)	Vu (kips)	Vnh-req (psi)	d (in)	Surf (in2/ft)	s_max (in)	Avh-min (in2/ft)	Avh-sm (in2/ft)	Avh-rg (in2/ft)
Bearing :	0.00									
36.00		60.00	374.7	155.73	74.25	432.00	24.00	0.360	1.723	0.360

Program: CONSPAN® Version: 7.1.1	HDR Engineering, Inc. 8404 Indian Hills Dr Omaha NE 68114 Copyright © LEAP Software, Inc. 1984 - 2007. www.leapsoft.com 1-800-451-5327	Sheet: DS-14 Job No: By: DMP - check revision Date: Apr/30/2008 CKD: JSW Date: 7/27/09

File Name: 100-100-100-100 Type IV66 simple_revised span draped ba... .csl

Location (ft) bv (in)		fsy (ksi)	Vu (kips)	Vnh-req (psi)	d (in)	Surf (in2/ft)	s_max (in)	Avh-min (in2/ft)	Avh-sm (in2/ft)	Avh-rg (in2/ft)
Transfer :	1.08									
36.00		60.00	368.5	170.76	66.60	432.00	24.00	0.360	1.994	0.360
H/2 :	3.27									
36.00		60.00	355.5	163.74	67.01	432.00	24.00	0.360	1.867	0.360
0.1L :	8.91									
36.00		60.00	322.5	146.23	68.07	432.00	24.00	0.360	1.552	0.360
0.2L :	18.82									
36.00		60.00	266.8	117.77	69.93	432.00	24.00	0.360	1.040	0.360
0.3L :	28.72									
36.00		60.00	210.3	90.42	71.79	432.00	24.00	0.360	0.548	0.360
0.4L :	38.63									
36.00		60.00	154.0	64.54	73.64	432.00	24.00	0.360	0.360	0.000
0.5L :	48.54									
36.00		60.00	97.3	40.77	73.64	432.00	24.00	0.360	0.360	0.000
0.6L :	58.45									
36.00		60.00	154.0	64.55	73.64	432.00	24.00	0.360	0.360	0.000
0.7L :	68.36									
36.00		60.00	210.3	90.44	71.79	432.00	24.00	0.360	0.548	0.360
0.8L :	78.27									
36.00		60.00	266.9	117.78	69.93	432.00	24.00	0.360	1.040	0.360
0.9L :	88.17									
36.00		60.00	322.5	146.24	68.07	432.00	24.00	0.360	1.552	0.360
H/2 :	93.81									
36.00		60.00	355.6	163.76	67.01	432.00	24.00	0.360	1.868	0.360
Transfer :	96.00									
36.00		60.00	368.5	170.77	66.60	432.00	24.00	0.360	1.994	0.360
Bearing :	97.08									
36.00		60.00	374.7	174.16	66.40	432.00	24.00	0.360	2.055	0.360

CAMBER/DEFLECTION

CAMBER AND DEFLECTIONS: SERVICE 1
(Span : 1, Beam : 3; Units: in)

	Release	Mult	Erection	Mult	Final
At 0.1 x L =	8.91 ft				
Prestress	0.871	1.80	1.569	2.45	2.135
Self Wt.	-0.308	1.85	-0.569	2.40	-0.738
Deck + Haunch			-0.300	1.00	-0.300
Supplemental			0.000	1.00	0.000
Prec. DL+ADL			-0.031	1.00	-0.031
Diaphragm			-0.004	1.00	-0.004
Comp. DL+ADL			-0.028	1.00	-0.028
Supp. DL+ADL			0.000	1.00	0.000
Live Load(+I)					-0.138
Total	0.564		0.636		0.896

	Release	Mult	Erection	Mult	Final
At 0.2 x L =	18.82 ft				
Prestress	1.575	1.80	2.835	2.45	3.859
Self Wt.	-0.582	1.85	-1.077	2.40	-1.397
Deck + Haunch			-0.600	1.00	-0.600
Supplemental			0.000	1.00	0.000
Prec. DL+ADL			-0.062	1.00	-0.062
Diaphragm			-0.008	1.00	-0.008
Comp. DL+ADL			-0.057	1.00	-0.057
Supp. DL+ADL			0.000	1.00	0.000
Live Load(+I)					-0.278
Total	0.993		1.031		1.457

	Release	Mult	Erection	Mult	Final
At 0.3 x L =	28.72 ft				
Prestress	2.095	1.80	3.771	2.45	5.132
Self Wt.	-0.797	1.85	-1.474	2.40	-1.913
Deck + Haunch			-0.837	1.00	-0.837
Supplemental			0.000	1.00	0.000
Prec. DL+ADL			-0.087	1.00	-0.087
Diaphragm			-0.011	1.00	-0.011
Comp. DL+ADL			-0.079	1.00	-0.079
Supp. DL+ADL			0.000	1.00	0.000
Live Load(+I)					-0.391
Total	1.298		1.283		1.815

	Release	Mult	Erection	Mult	Final
At 0.4 x L =	38.63 ft				
Prestress	2.415	1.80	4.346	2.45	5.916
Self Wt.	-0.933	1.85	-1.727	2.40	-2.240
Deck + Haunch			-0.987	1.00	-0.987
Supplemental			0.000	1.00	0.000
Prec. DL+ADL			-0.102	1.00	-0.102
Diaphragm			-0.013	1.00	-0.013
Comp. DL+ADL			-0.094	1.00	-0.094
Supp. DL+ADL			0.000	1.00	0.000

	Release	Mult	Erection	Mult	Final
Live Load(+I)					-0.463
Total	1.481		1.424		2.017

	Release	Mult	Erection	Mult	Final
At 0.5 x L =	48.54 ft				
Prestress	2.522	1.80	4.540	2.45	6.179
Self Wt.	-0.980	1.85	-1.813	2.40	-2.352
Deck + Haunch			-1.039	1.00	-1.039
Supplemental			0.000	1.00	0.000
Prec. DL+ADL			-0.108	1.00	-0.108
Diaphragm			-0.013	1.00	-0.013
Comp. DL+ADL			-0.099	1.00	-0.099
Supp. DL+ADL			0.000	1.00	0.000
Live Load(+I)					-0.489
Total	1.542		1.469		2.080

	Release	Mult	Erection	Mult	Final
At 0.6 x L =	58.45 ft				
Prestress	2.415	1.80	4.346	2.45	5.916
Self Wt.	-0.933	1.85	-1.727	2.40	-2.240
Deck + Haunch			-0.987	1.00	-0.987
Supplemental			0.000	1.00	0.000
Prec. DL+ADL			-0.102	1.00	-0.102
Diaphragm			-0.013	1.00	-0.013
Comp. DL+ADL			-0.094	1.00	-0.094
Supp. DL+ADL			0.000	1.00	0.000
Live Load(+I)					-0.463
Total	1.481		1.424		2.017

	Release	Mult	Erection	Mult	Final
At 0.7 x L =	68.36 ft				
Prestress	2.095	1.80	3.771	2.45	5.132
Self Wt.	-0.797	1.85	-1.474	2.40	-1.913
Deck + Haunch			-0.837	1.00	-0.837
Supplemental			0.000	1.00	0.000
Prec. DL+ADL			-0.087	1.00	-0.087
Diaphragm			-0.011	1.00	-0.011
Comp. DL+ADL			-0.079	1.00	-0.079
Supp. DL+ADL			0.000	1.00	0.000
Live Load(+I)					-0.391
Total	1.298		1.283		1.815

	Release	Mult	Erection	Mult	Final
At 0.8 x L =	78.27 ft				
Prestress	1.575	1.80	2.835	2.45	3.859
Self Wt.	-0.582	1.85	-1.077	2.40	-1.397
Deck + Haunch			-0.600	1.00	-0.600
Supplemental			0.000	1.00	0.000
Prec. DL+ADL			-0.062	1.00	-0.062
Diaphragm			-0.008	1.00	-0.008
Comp. DL+ADL			-0.057	1.00	-0.057
Supp. DL+ADL			0.000	1.00	0.000
Live Load(+I)					-0.278
Total	0.993		1.031		1.457

	Release	Mult	Erection	Mult	Final
At 0.9 x L =	88.17 ft				
Prestress	0.871	1.80	1.569	2.45	2.135
Self Wt.	-0.308	1.85	-0.569	2.40	-0.738
Deck + Haunch			-0.300	1.00	-0.300
Supplemental			0.000	1.00	0.000
Prec. DL+ADL			-0.031	1.00	-0.031
Diaphragm			-0.004	1.00	-0.004
Comp. DL+ADL			-0.028	1.00	-0.028
Supp. DL+ADL			0.000	1.00	0.000
Live Load(+I)					-0.138
Total	0.564		0.636		0.896

Positive values indicate upward deflection.

ULTIMATE MOMENT

ULTIMATE - Span : 1, Beam : 3, FACTORED 1
(Mu-prvd computed by AASHTO equations, Art. 9.17/9.18)

(f'c_eff, ksi = 4.50; beta1 = 0.825)

Location (ft)	A*s in2	Ycg in	p*(A*s/bd)	f*su ksi	a in	Mu-prvd k.ft	Mu-rqrd k.ft	Mcr k.ft	Crkg Ratio	Mu-p/r Ratio
Transfer	1.08									
	1.261	11.90	0.00015	269.2	0.7	1873.6	398.6	6294.8	0.298	4.70
H/2	3.27									
	2.585	11.49	0.00031	268.3	1.4	3830.7	1174.8	6205.6	0.617	3.26
0.1L	8.91									
	5.997	10.43	0.00070	266.2	3.3	8829.2	2997.2	6007.5	1.470	-
0.2L	18.82									
	6.426	8.57	0.00073	266.0	3.5	9702.8	5579.6	5769.5	1.682	-
0.3L	28.72									
	6.426	6.71	0.00071	266.1	3.5	9971.2	7368.5	5673.1	1.758	-
0.4L	38.63									
	6.426	4.86	0.00069	266.2	3.5	10239.5	8437.1	5718.8	1.790	-
0.5L	48.54									
	6.426	4.86	0.00069	266.2	3.5	10239.5	8744.1	5647.3	1.813	-
0.6L	58.45									
	6.426	4.86	0.00069	266.2	3.5	10239.5	8437.3	5718.7	1.791	-
0.7L	68.36									
	6.426	6.71	0.00071	266.1	3.5	9971.2	7368.4	5673.2	1.758	-
0.8L	78.27									
	6.426	8.57	0.00073	266.0	3.5	9702.8	5580.2	5769.2	1.682	-
0.9L	88.17									
	5.997	10.43	0.00070	266.2	3.3	8829.2	2997.5	6007.3	1.470	-
H/2	93.81									
	2.585	11.49	0.00031	268.3	1.4	3830.7	1174.9	6205.6	0.617	3.26
Transfer	96.00									
	1.261	11.90	0.00015	269.2	0.7	1873.6	398.7	6294.7	0.298	4.70

DETENSIONING

Span : 1, Beam : 3; Groups 1-23; Units: psi

Grp	Str		Ys,in		2.08ft
1	2	E	2.00	Ft	25.547
		M	2.00	Fb	97.522
2	2	E	64.00	Ft	212.827
		M	8.00	Fb	50.920
3	1	E	64.00	Ft	306.468
		M	8.00	Fb	27.619
4	2	E	54.00	Ft	454.200
		M	6.00	Fb	16.260
5	1	E	54.00	Ft	528.066
		M	6.00	Fb	10.580
6	2	E	8.00	Ft	496.304
		M	8.00	Fb	159.171
7	2	E	8.00	Ft	464.542
		M	8.00	Fb	307.761
8	2	E	8.00	Ft	432.781
		M	8.00	Fb	456.351
9	2	E	6.00	Ft	392.762
		M	6.00	Fb	612.300
10	2	E	6.00	Ft	352.744
		M	6.00	Fb	768.248
11	2	E	6.00	Ft	312.725
		M	6.00	Fb	924.197
12	2	E	6.00	Ft	272.706
		M	6.00	Fb	1080.145
13	2	E	4.00	Ft	224.431
		M	4.00	Fb	1243.451
14	2	E	4.00	Ft	176.155
		M	4.00	Fb	1406.758
15	2	E	4.00	Ft	127.880
		M	4.00	Fb	1570.064
16	2	E	4.00	Ft	79.604
		M	4.00	Fb	1733.370
17	2	E	4.00	Ft	31.329
		M	4.00	Fb	1896.677
18	1	E	4.00	Ft	7.191
		M	4.00	Fb	1978.330
19	2	E	2.00	Ft	-49.342
		M	2.00	Fb	2148.994
20	2	E	2.00	Ft	-105.874
		M	2.00	Fb	2319.658
21	2	E	2.00	Ft	-162.407
		M	2.00	Fb	2490.322
22	2	E	2.00	Ft	-218.939
		M	2.00	Fb	2660.986
23	1	E	2.00	Ft	-247.205
		M	2.00	Fb	2746.318

DESIGN SUMMARY

Span: 1, Beam: 3, Interior beam

Beam type:		
	I-Girder,	ODOT AASHTO Type 4 66 MOD
Precast Length,	ft	99.08
Release Length,	ft	99.08
Strand Pattern:	Straight/Draped	Depr. Point: 0.40 L
Strand:	1/2-270K-LL	
Strand Type:	Low Relaxation	
Strand Es,	ksi:	28500.0
No. of strands:	42	
	Draped:	6
	Straight:	36
Concrete Strength:		
	f'ci:	5000.0 psi
	f'c:	7000.0 psi
	f'ct:	4500.0 psi
Initial losses:	8.33 %	
Final losses:	20.76 %	

Specification	Allowable	Computed	Status
Release Stresses (psi) (Art. 9.15.2.1)			
Precast Top w/ no reinf.	-200.00		
Precast Top w/ reinf.	-530.33	-247.31	OK
Precast Bot (compression)	3000.00	2746.41	OK
Factored 1	Provided	Required	
Ult. Moment (k.ft)	10239.47	8744.15	OK
Debonding Limits	Allowable	Computed	
Max. Debond per Row	40.00 %	0.00 %	OK
Max. Debond Total	25.00 %	0.00 %	OK

Positive Moment Envelope Stresses (psi)

Specification	Final 1 Allow	Comp	Final 2 Allow	Comp	Final 3 Allow	Comp
Service 1						
Topping Top	2700.0/-503.1	463.0 / 0.0	1800.0	70.0	1800.0	428.0

Specification	Final 1 Allow	Comp	Final 2 Allow	Comp	Final 3 Allow	Comp
Precast Top	4200.0/-502.0	1888.3 /-164.9	2800.0	1640.6	2800.0	1068.0
Precast Bot	4200.0/-502.0	2286.2 /-455.1	2800.0	2334.7	2800.0	1118.9

CAMBER / DEFLECTION: (PCI Design Handbook - 4th Ed.- Table 4.6.2)
0.5 x L = 48.54 ft

		Release	Mult	Erection	Mult	Final
Prestress	:	2.522	1.80	4.540	2.45	6.179
Self Wt.	:	-0.980	1.85	-1.813	2.40	-2.352
Deck + Haunch	:			-1.039	1.00	-1.039
Supplemental	:			0.000	1.00	0.000
Prec. DL+ADL	:			-0.108	1.00	-0.108
Diaphragm	:			-0.013	1.00	-0.013
Comp. DL+ADL	:			-0.099	1.00	-0.099
Supp. DL+ADL	:			0.000	1.00	0.000
Live Load	:					-0.489
Total	:	1.542		1.469		2.080

Positive values indicate upward deflection.

PROPERTIES

Span: 1, Beam: 5

PRECAST DATA:

Section Id:	ODOT AASHTO Type 4 66 MOD						
Type:	I-Girder						
Flng width:		Top =	36.000	in	Bot =	26.000	in
thick:		Top =	4.000	in	Bot =	8.000	in
Stems:		No =	1				
		Top =	8.000	in			
		Bot =	8.000	in			
Shear width:		=	8.000	in			
Wide top Flange:		No					

GENERAL BRIDGE DATA:

Bridge Width	=	48.46	ft
Curb-to-curb	=	45.50	ft
Beam Spac. Lt./Rt	=	10.50/ 2.96	ft
Lane width	=	12.00	ft
Number of lanes	=	3	
Interior/Exterior	=	Exterior	

TOPPING DATA:

Deck	Thickness	=	8.500	in	
Suppl.	Thickness	=	0.000	in	
Haunch:					
	Thickness	=	4.000	in	
	Width	=	36.000	in	
Effective	width	=	98.500	in	(Art. 8.10.1)

GENERAL LOAD DATA:

Dead loads on precast:
UNITS: (Point: kips, Location: ft)
(Line: klf)

Type	Mag.	Loc.
Line	0.103	-

Diaphragm loads:
(kips, ft)

Mag.	Loc.
0.21	24.75
0.21	49.50
0.21	74.25

Dead loads on composite: See Project info for composite loads

GENERAL SPAN DATA:

Overall length =	99.083	ft
Release length =	99.083	ft
Design length =	97.083	ft

KERN POINTS:

Upper =	48.39	in
Lower =	15.69	in

DISTRIBUTION FACTORS (Art. 3.23):

Live Moment (Group 1) :	0.667	(Calculated)	
Live Shear (Group 1) :	0.667	(Calculated)	

Dead Loads and Pedestrian Load distributed equally to all beams (Art. 3.23.2.3.1.1)

Pedestrian:	0.200	(Calculated)
Comp. DL:	0.200	(Calculated)
Comp. ADL:	0.200	(Calculated)
Suppl. DL:	0.200	(Calculated)
Suppl. ADL:	0.200	(Calculated)
Suppl:	0.200	(Calculated)

RESISTANCE FACTORS (Art. 9.14):

Flexure Reinforced:	0.90
Flexure Prestressed:	1.00
Shear:	0.90

Span: 1, Beam: 5

SECTION PROPERTIES:

	PRECAST		COMPOSITE		
Area:	893.0	in2	1679.7	in2	#
Total Height:	66.00	in	78.50	in	
Mom. of Inertia (Ixx):	480161	in4	1234212	in4	#
Ht. of c.g.:	31.10	in	50.88	in	#
Density:	150.00	pcf	150.00	pcf	
Self-weight:	930.2	plf	1952.3	plf	
Mom. of Inertia (Iyy):	36314.0	in4			
Poisson's Ratio:	0.2				

(#) Of Total Section using Ect/Ec = 0.8018

Use transformed strand and rebar: No

Span: 1, Beam: 5
STRESS LIMITS (Art. 9.15.2):

STRESS LIMITS AT FINAL 1 (P/S + DL + LL) (Art. 9.15.2.2 a):

			PRECAST		DECK	
Strength		=	7000.00	psi	4500.00	psi
Max Comp,	Top	=	4200.00	psi	2700.00	psi
Pos Mom,	Bot	=	4200.00	psi		
Neg Mom,	Bot	=	4200.00	psi		
Max Tens,	Top	=	-502.00	psi	-503.12	psi
Max Tens,	Bot	=	-502.00	psi		
Crk Tens,	Bot	=	-627.50	psi		
Elasticity		=	5072.2	ksi	4066.8	ksi

STRESS LIMITS AT FINAL 2 (P/S + DL) (Art. 9.15.2.2 b):

			PRECAST		DECK	
Max Comp,	Top	=	2800.00	psi	1800.00	psi
Pos Mom,	Bot	=	2800.00	psi		
Neg Mom,	Bot	=	2800.00	psi		

STRESS LIMITS AT FINAL 3 (50% P/S + 50% DL + LL) (Art. 9.15.2.2 c):

			PRECAST		DECK	
Max Comp,	Top	=	2800.00	psi	1800.00	psi
Pos Mom,	Bot	=	2800.00	psi		
Neg Mom,	Bot	=	2800.00	psi		

AT RELEASE (Art. 9.15.2.1):

			PRECAST	
Strength		=	5000.00	psi
Max Comp,	Top	=	3000.00	psi
Max Comp,	Bot	=	3000.00	psi
Max Tens,	Top	=	-200.00	psi
w/reinf		=	-530.33	psi
Max Tens,	Bot	=	-0.00	psi
Elasticity		=	4286.8	ksi

Span: 1, Beam: 5

PRESTRESSED STEEL:

42 strands, 1/2-270K-LL, Low relaxation strands
Depressed at 0.40L (39.63 ft from member end)

END PATTERN (Ycg = 12.29 in):

11 @ 2.000 in	11 @ 4.000 in	8 @ 6.000 in	6 @ 8.000 in
3 @ 54.000 in	3 @ 64.000 in		

MID PATTERN (Ycg = 4.86 in):
(A) Draped:

3 @ 6.000 in	3 @ 8.000 in		

(B) Straight:

11 @ 2.000 in	11 @ 4.000 in	8 @ 6.000 in	6 @ 8.000 in

Strand Diameter	=	0.500	in	Ult. Strength	(f's)	=	270.0	ksi			
Strand Area	=	0.153	in2	Initial Prestress		=	0.75	f's	=	202.5	ksi
Total Strand Area	=	6.426	in2	Initial Pull		=	1301.3	kips			
Trans. Len,bonded	=	2.083	ft	Dev. Len, bonded		=	10.611	ft			
Trans. Len,debonded	=	2.083	ft	Dev. Len, debonded		=	13.264	ft			
Holddown Force	=	20.202	kips	Beam Shrtng (PL/AE)		=	0.370	in			

REINFORCING STEEL:

	Tension	steel:	
fy	=	60.0	ksi
Es	=	29000	ksi
fs	=	24.0	ksi

Stirrups:

# legs	Size	fy (ksi)	Area (in2)	Spacing (in)	Start (ft)	End (ft)
2	US#4[M13]	60.0	0.40	6.00	0.0000	7.9711
2	US#4[M13]	60.0	0.40	12.00	7.9711	46.4446
2	US#4[M13]	60.0	0.40	24.00	46.4460	52.6387
2	US#4[M13]	60.0	0.40	12.00	52.6387	91.1122
2	US#4[M13]	60.0	0.40	6.00	91.1122	99.0833

LOSSES

Note: Values are calculated at Midspan

Str. area	=	6.4260	in2
Ycg	=	4.86	in
P_init	=	1301.3	kips
Ecc	=	26.24	in
Hours to release	=	18.00	
Rel. Humid.(RH)	=	75.0	%
Es	=	28500.0	ksi
Eci	=	4287	ksi

AASHTO LOSSES

		Release				Final		(Art. 9.16.2)
Steel relaxation	*	1600.47	psi	CRs (Eq 9-10A)	2172.40	psi	
Elastic Shortening		15276.95	psi	ES (Eq 9-6)	15276.95	psi	(Fcir=2297.88 psi)
Concrete shrinkage		0.00	psi	SH (Eq 9-4)	5750.00	psi	
Concrete creep		0.00	psi	CRc (Eq 9-9)	20248.11	psi	(Fcds=-1046.64 psi)
Total		16877.42	psi	(8.33 %)	43447.46	psi	(21.46 %)

* Steel relax. before release - Ref: PCI Journal Vol. 20, No. 4, Jul-Aug 1975

SHEAR/MOMENT ENVELOPE (&REACTIONS)

SHEAR AND MOMENT ENVELOPE : Span : 1, Beam : 5, SERVICE 1
Shears: kips, Moments: kft

		Bearing	Trans	H/2	0.10L	0.20L	0.30L	0.40L	Midspan
Location,	ft	0.00	1.08	3.27	8.91	18.82	28.72	38.63	48.54
Self wt. :	M	0.0	48.4	142.7	365.3	685.0	913.3	1050.3	1095.9
	V	45.2	44.1	42.1	36.9	27.7	18.4	9.2	0.0
Prec. :	M	0.0	5.3	15.7	40.3	75.6	100.7	115.8	120.9
DL+ADL	V	5.0	4.9	4.6	4.1	3.0	2.0	1.0	0.0
Deck :	M	0.0	53.2	156.8	401.4	752.7	1003.5	1154.0	1204.2
+ Haunch	V	49.6	48.5	46.3	40.5	30.4	20.3	10.1	0.0
Diaphragm :	M	-0.0	0.3	1.0	2.8	5.8	8.0	9.0	10.0
	V	0.3	0.3	0.3	0.3	0.3	0.1	0.1	0.1
Comp. :	M	-0.0	16.9	49.8	127.4	238.9	318.5	366.3	382.2
DL+ADL	V	15.7	15.4	14.7	12.9	9.6	6.4	3.2	0.0
LL + I :	M+	0.0	70.3	207.0	526.4	973.6	1275.1	1454.7	1498.2
	V	66.4	65.7	63.9	59.5	52.6	45.6	33.7	26.3
LL + I :	M-	-0.0	-0.0	-0.0	0.0	0.0	0.0	0.0	0.0
	V	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LL + I :	Vmx	66.4	65.7	63.9	59.5	52.6	45.6	38.5	31.2
	M	0.0	70.3	207.0	526.4	973.6	1275.1	1430.9	1441.1
Total :	M+	0.0	194.4	573.0	1463.6	2731.4	3619.1	4150.1	4311.4
	V	0.0	178.9	171.9	154.2	123.7	92.9	57.3	26.4
Total :	M-	-0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	V	182.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total :	Vmx	182.2	178.9	171.9	154.2	123.7	92.9	62.1	31.3
	M	-0.0	194.4	573.0	1463.6	2731.4	3619.1	4126.3	4254.3

		0.60L	0.70L	0.80L	0.90L	H/2	Trans	Bearing
Location,	ft	58.45	68.36	78.27	88.17	93.81	96.00	97.08
Self wt. :	M	1050.3	913.3	685.0	365.3	142.7	48.4	0.0
	V	9.2	18.4	27.7	36.9	42.1	44.1	45.2
Prec. :	M	115.8	100.7	75.6	40.3	15.7	5.3	-0.0
DL+ADL	V	1.0	2.0	3.0	4.1	4.6	4.9	5.0
Deck :	M	1154.0	1003.5	752.7	401.4	156.8	53.2	0.0
+ Haunch	V	10.1	20.3	30.4	40.5	46.3	48.5	49.6
Diaphragm :	M	9.1	8.0	6.0	2.9	1.1	0.3	-0.0
	V	0.1	0.1	0.3	0.3	0.3	0.3	0.3
Comp. :	M	366.3	318.5	238.9	127.4	49.8	16.9	-0.0
DL+ADL	V	3.2	6.4	9.6	12.9	14.7	15.4	15.7
LL + I :	M+	1454.7	1275.1	973.6	526.4	207.0	70.3	0.0
	V	33.7	45.6	52.6	59.5	63.9	65.7	66.4
LL + I :	M-	0.0	0.0	0.0	0.0	-0.0	-0.0	-0.0
	V	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LL + I :	Vmx	38.5	45.6	52.6	59.5	63.9	65.7	66.4
	M	1430.9	1275.1	973.6	526.4	207.0	70.3	0.0
Total :	M+	4150.2	3619.1	2731.7	1463.7	573.1	194.4	0.0
	V	57.3	92.9	123.7	154.2	172.0	178.9	182.3
Total :	M-	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	V	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total :	Vmx	62.2	92.9	123.7	154.2	172.0	178.9	182.3
	M	4126.4	3619.1	2731.7	1463.7	573.1	194.4	0.0

REACTIONS (kips), SERVICE 1

Load Type	Left Support	Right Support
Self Wt.	45.2	45.2
Deck+Haunch	49.6	49.6
Diaphragm	0.3	0.3
Prec.DL+ADL	5.0	5.0
Comp. DL+ADL	78.7	78.7
Supplemental	0.0	0.0
Supp. DL+ADL	0.0	0.0
Live	81.3	81.3
Pedestrian	0.0	0.0

Upward reactions are positive.
Live Load reactions are per lane with no distribution factor and no impact.
Non-composite load types are per beam.
Composite, Supplemental, and Pedestrian load types are per total bridge width.

SHEAR AND MOMENT ENVELOPE : Span : 1, Beam : 5, FACTORED 1
Shears: kips, Moments: kft

		Bearing	Trans	H/2	0.10L	0.20L	0.30L	0.40L	Midspan
Location,	ft	0.00	1.08	3.27	8.91	18.82	28.72	38.63	48.54
Self wt. :	M	0.0	62.9	185.5	474.9	890.5	1187.3	1365.3	1424.7
	V	58.7	57.4	54.7	47.9	35.9	24.0	12.0	0.0
Prec. :	M	0.0	6.9	20.5	52.4	98.2	131.0	150.6	157.1
DL+ADL	V	6.5	6.3	6.0	5.3	4.0	2.6	1.3	0.0
Deck :	M	0.0	69.1	203.9	521.9	978.5	1304.6	1500.3	1565.5
+ Haunch	V	64.5	63.1	60.2	52.7	39.5	26.3	13.2	0.0
Diaphragm :	M	-0.0	0.4	1.3	3.6	7.6	10.4	11.7	13.0
	V	0.4	0.4	0.4	0.4	0.4	0.1	0.1	0.1
Comp. :	M	-0.0	21.9	64.7	165.6	310.5	414.0	476.1	496.8
DL+ADL	V	20.5	20.0	19.1	16.7	12.5	8.4	4.2	0.0
LL + I :	M+	0.0	152.6	449.3	1142.8	2113.6	2768.2	3158.2	3252.7
	V	144.2	142.6	138.8	129.3	114.2	99.0	73.1	57.2
LL + I :	M-	-0.0	-0.0	-0.0	0.0	0.0	0.0	0.0	0.0
	V	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LL + I :	Vmx	144.2	142.6	138.8	129.3	114.2	99.0	83.5	67.8
	M	0.0	152.6	449.3	1142.8	2113.6	2768.2	3106.5	3128.6
Total :	M+	0.0	313.9	925.2	2361.2	4398.8	5815.5	6662.2	6909.9
	V	0.0	289.7	279.2	252.3	206.6	160.4	103.8	57.3
Total :	M-	-0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	V	294.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total :	Vmx	294.8	289.7	279.2	252.3	206.6	160.4	114.3	67.9
	M	-0.0	313.9	925.2	2361.2	4398.8	5815.5	6610.6	6785.7

		0.60L	0.70L	0.80L	0.90L	H/2	Trans	Bearing
Location,	ft	58.45	68.36	78.27	88.17	93.81	96.00	97.08
Self wt. :	M	1365.3	1187.3	890.5	474.9	185.5	62.9	0.0
	V	12.0	24.0	35.9	47.9	54.7	57.4	58.7

		0.60L	0.70L	0.80L	0.90L	H/2	Trans	Bearing
Prec. :	M	150.6	131.0	98.2	52.4	20.5	6.9	-0.0
DL+ADL	V	1.3	2.6	4.0	5.3	6.0	6.3	6.5
Deck :	M	1500.3	1304.6	978.5	521.9	203.9	69.1	0.0
+ Haunch	V	13.2	26.3	39.5	52.7	60.2	63.1	64.5
Diaphragm :	M	11.8	10.4	7.9	3.7	1.4	0.5	-0.0
	V	0.1	0.1	0.4	0.4	0.4	0.4	0.4
Comp. :	M	476.1	414.0	310.5	165.6	64.7	21.9	-0.0
DL+ADL	V	4.2	8.4	12.5	16.7	19.1	20.0	20.5
LL + I :	M+	3158.2	2768.2	2113.6	1142.8	449.3	152.6	0.0
	V	73.1	99.0	114.2	129.3	138.8	142.6	144.2
LL + I :	M-	0.0	0.0	0.0	0.0	-0.0	-0.0	-0.0
	V	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LL + I :	Vmx	83.5	99.0	114.2	129.3	138.8	142.6	144.2
	M	3106.5	2768.2	2113.6	1142.8	449.3	152.6	0.0
Total :	M+	6662.3	5815.4	4399.1	2361.4	925.2	313.9	0.0
	V	103.9	160.4	206.6	252.3	279.2	289.8	294.8
Total :	M-	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	V	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total :	Vmx	114.3	160.4	206.6	252.3	279.2	289.8	294.8
	M	6610.7	5815.4	4399.1	2361.4	925.2	313.9	0.0

REACTIONS (kips), FACTORED 1

Load Type	Left Support	Right Support
Self Wt.	58.7	58.7
Deck+Haunch	64.5	64.5
Diaphragm	0.4	0.4
Prec.DL+ADL	6.5	6.5
Comp. DL+ADL	102.4	102.4
Supplemental	0.0	0.0
Supp. DL+ADL	0.0	0.0
Live	176.6	176.6
Pedestrian	0.0	0.0

Upward reactions are positive.
Live Load reactions are per lane with no distribution factor and no impact.
Non-composite load types are per beam.
Composite, Supplemental, and Pedestrian load types are per total bridge width.

POSITIVE ENVELOPE STRESSES

Span : 1, Beam : 5, SERVICE 1

RELEASE STRESSES, (psi) (LOSS = 8.33 %)

	Trans	0.10L /0.90L	0.20L /0.80L	0.30L /0.70L	0.40L /0.60L	Midspan
Location, ft	2.08	9.91	19.82	29.72	39.63	49.54
Self Wt.						
Precast-top	82.0	358.4	637.2	836.4	955.8	995.7
Bottom	-73.1	-319.4	-567.8	-745.3	-851.8	-887.2
Prestress						
Precast-top	-329.3	-456.4	-617.5	-778.5	-939.5	-939.5
Bottom	2819.5	2932.8	3076.3	3219.7	3363.2	3363.2
Total						
Precast-top	-247.3	-98.0	19.8	57.9	16.4	56.2
Bottom	2746.4	2613.4	2508.4	2474.4	2511.5	2476.0
As_top (in2)	0.991	0.000	0.000	0.000	0.000	0.000

Span : 1, Beam : 5, SERVICE 1

POSITIVE ENVELOPE STRESSES, (psi) (LOSS = 21.46%)

		Bearing	Trans	H/2	0.10L /0.90L	0.20L /0.80L	0.30L /0.70L	0.40L /0.60L	Midspan
Location, ft		0.00	1.08	3.27	8.91	18.82	28.72	38.63	48.54
Prestress									
Precast-top		-128.2	-282.2	-312.6	-391.1	-529.1	-667.0	-805.0	-805.0
Bottom		1153.2	2415.9	2443.0	2513.0	2635.9	2758.9	2881.8	2881.8
Self wt.									
Precast-top		0.0	42.2	124.5	318.6	597.4	796.6	916.0	955.9
Bottom		-0.0	-37.6	-110.9	-284.0	-532.4	-709.8	-816.3	-851.8
Prec. DL+ADL									
Precast-top		-0.0	4.7	13.7	35.1	65.9	87.9	101.0	105.4
Bottom		0.0	-4.1	-12.2	-31.3	-58.7	-78.3	-90.0	-94.0
Diaphragm									
Precast-top		-0.0	0.3	0.9	2.5	5.3	7.0	7.9	8.7
Bottom		-0.0	-0.3	-0.8	-2.2	-4.7	-6.2	-7.1	-7.8
Deck + Haunch									

		Bearing	Trans	H/2	0.10L /0.90L	0.20L /0.80L	0.30L /0.70L	0.40L /0.60L	Midspan
Precast-top		-0.0	46.4	136.8	350.1	656.5	875.3	1006.6	1050.3
Bottom		-0.0	-41.3	-121.9	-312.0	-585.0	-780.0	-897.0	-936.0
Comp. DL+ADL									
Topping-top		-0.0	3.6	10.7	27.4	51.4	68.6	78.9	82.3
Precast-top		-0.0	2.5	7.3	18.7	35.1	46.8	53.8	56.2
Bottom		0.0	-8.3	-24.6	-63.0	-118.2	-157.6	-181.2	-189.1
LL+I(+)									
Topping-top		0.0	15.1	44.6	113.3	209.6	274.5	313.2	322.6
Precast-top		0.0	10.3	30.4	77.4	143.1	187.4	213.8	220.2
Bottom		-0.0	-34.8	-102.4	-260.4	-481.6	-630.8	-719.6	-741.2
Final 1 (P/S + DL	+ LL)								
Topping-top		-0.0	18.8	55.3	140.8	261.1	343.1	392.1	404.9
Precast-top		-128.2	-175.8	1.0	411.4	974.2	1333.9	1494.3	1591.8
Bottom		1153.2	2289.4	2070.2	1560.0	855.3	396.2	170.6	62.1
Final 2 (P/S + DL)									
Topping-top		-0.0	3.6	10.7	27.4	51.4	68.6	78.9	82.3
Precast-top		-128.2	-186.2	-29.4	334.1	831.1	1146.5	1280.4	1371.5
Bottom		1153.2	2324.2	2172.5	1820.4	1337.0	1027.0	890.2	803.3
Final 3 (50% P/S	+ 50%	DL + LL)							
Topping-top		0.0	17.0	49.9	127.1	235.3	308.8	352.6	363.7
Precast-top		-64.1	-82.7	15.7	244.4	558.7	760.7	854.1	906.0
Bottom		576.6	1127.3	983.9	649.8	186.8	-117.3	-274.5	-339.6

VERTICAL/HORIZONTAL SHEAR

VERTICAL SHEAR (Art. 9.20) - Span : 1, Beam : 5, FACTORED 1

Location (ft) fpe (psi) Vc (kips)	fd (psi) Vs-rqrd (kips)	Vd (kips) Mcr (k.ft) Vs-max (kips)	Md (k.ft) d (in) Av-com (in2/ft)	Ml(k.ft) Vci-com (kips) Av-min (in2/ft)	Vu (kips) Vci-min (kips) Av (in2/ft)	Mu(k.ft) Vci (kips) Av-prvd (in2/ft)	Vmu (kips) fpc (psi) Vn/Vu	Mmax (k.ft) Vp (kips) MaxSpc (in)	Vi (kips) Vcw (kips) Vs-crit (kips)
Bearing :	1.00	115.8	0.0	0.0	279.2	0.0	294.8	0.0	179.0
1153.2	0.0	3345.8	66.40	10000.0	75.6	10000.0	165.3	7.6	189.5
189.5	120.7	355.6	0.36	0.08	0.36	0.80	1.467	24.0	177.8
Transfer :	2.08	113.2	124.1	70.3	279.2	313.9	289.7	189.8	176.5
2415.9	-91.7	5713.0	66.60	5451.9	75.8	5451.9	388.9	15.9	234.1
234.1	76.2	356.6	0.23	0.08	0.23	0.80	1.613	24.0	178.3
H/2 :	4.27	108.0	366.1	207.0	279.2	925.2	279.2	559.1	171.2
2443.0	-270.4	5406.4	67.01	1790.1	76.3	1790.1	475.0	15.9	249.3
249.3	61.0	358.8	0.18	0.08	0.18	0.80	1.668	24.0	179.4
0.1L :	9.91	94.6	937.2	526.4	252.3	2361.2	252.3	1424.0	157.7
2513.0	-692.5	4694.8	68.07	641.7	77.5	641.7	674.5	15.9	285.5
285.5	0.0	364.5	0.00	0.08	0.08	0.40	1.504	24.0	182.2
0.2L :	19.82	71.0	1757.9	973.6	206.6	4398.8	206.6	2641.0	135.5
2635.9	-1298.8	3717.6	69.93	289.9	79.6	289.9	946.9	15.9	338.6
289.9	0.0	374.4	0.00	0.08	0.08	0.40	1.872	24.0	187.2
0.3L :	29.72	47.2	2344.1	1275.1	160.4	5815.5	160.4	3471.4	113.2
2758.9	-1731.9	3090.6	71.79	176.8	81.7	176.8	1119.1	15.9	376.8
176.8	1.4	384.4	0.00	0.08	0.08	0.40	1.798	24.0	192.2
0.4L :	39.63	23.7	2695.4	1454.7	114.3	6662.2	103.8	3966.8	80.2
2881.8	-1991.5	2814.4	73.64	110.1	83.8	110.1	1191.0	0.0	383.0
110.1	16.9	394.3	0.05	0.08	0.08	0.40	2.027	24.0	197.2
0.5L :	49.54	0.1	2813.2	1498.2	67.9	6909.9	57.3	4096.6	57.2
2881.8	-2078.5	2638.5	73.64	66.5	83.8	83.8	1241.3	0.0	391.9
83.8	0.0	394.3	0.00	0.08	0.08	0.20	2.087	24.0	197.2
0.6L :	59.45	23.7	2695.5	1454.7	114.3	6662.3	103.9	3966.8	80.2
2881.8	-1991.6	2814.3	73.64	110.1	83.8	110.1	1191.0	0.0	383.0
110.1	16.9	394.3	0.05	0.08	0.08	0.40	2.027	24.0	197.2
0.7L :	69.36	47.3	2344.0	1275.1	160.4	5815.4	160.4	3471.4	113.2
2758.9	-1731.9	3090.7	71.79	176.9	81.7	176.9	1119.1	15.9	376.8
176.9	1.4	384.4	0.00	0.08	0.08	0.40	1.797	24.0	192.2

Location (ft) fpe (psi) Vc (kips)	fd (psi) Vs-rqrd (kips)	Vd (kips) Mcr (k.ft) Vs-max (kips)	Md (k.ft) d (in) Av-com (in2/ft)	Ml(k.ft) Vci-com (kips) Av-min (in2/ft)	Vu (kips) Vci-min (kips) Av (in2/ft)	Mu(k.ft) Vci (kips) Av-prvd (in2/ft)	Vmu (kips) fpc (psi) Vn/Vu	Mmax (k.ft) Vp (kips) MaxSpc (in)	Vi (kips) Vcw (kips) Vs-crit (kips)
0.8L :	79.27	71.0	1758.1	973.6	206.6	4399.1	206.6	2641.0	135.6
2635.9	-1299.0	3717.3	69.93	289.9	79.6	289.9	947.0	15.9	338.6
289.9	0.0	374.4	0.00	0.08	0.08	0.40	1.872	24.0	187.2
0.9L :	89.17	94.6	937.3	526.4	252.3	2361.4	252.3	1424.0	157.7
2513.0	-692.5	4694.6	68.07	641.7	77.5	641.7	674.6	15.9	285.5
285.5	0.0	364.5	0.00	0.08	0.08	0.40	1.504	24.0	182.2
H/2 :	94.81	108.0	366.1	207.0	279.2	925.2	279.2	559.1	171.2
2443.0	-270.5	5406.4	67.01	1790.1	76.3	1790.1	475.0	15.9	249.3
249.3	61.0	358.8	0.18	0.08	0.18	0.80	1.668	24.0	179.4
Transfer :	97.00	113.2	124.1	70.3	279.2	313.9	289.8	189.9	176.5
2415.9	-91.7	5712.9	66.60	5451.8	75.8	5451.8	388.9	15.9	234.1
234.1	76.2	356.6	0.23	0.08	0.23	0.80	1.613	24.0	178.3
Bearing :	98.08	115.8	0.0	0.0	279.2	0.0	294.8	0.0	179.0
1153.2	-0.0	3345.8	66.40	10000.0	75.6	10000.0	165.3	7.6	189.5
189.5	120.7	355.6	0.36	0.08	0.36	0.80	1.467	24.0	177.8

ANCHORAGE ZONE REINFORCEMENT (Art. 9.22.1)
Span : 1, Beam : 5

Fpi,	kips	=	1301.26
fs,	ksi	=	20.00
d/4,	in	=	13.43
Abrst_rqrd,	in2	=	2.60

HORIZONTAL SHEAR (Art. 9.20.4) - Span : 1, Beam : 5
(Beam and Slab effects are INCLUDED in Vu).

Location (ft) bv (in)		fsy (ksi)	Vu (kips)	Vnh-req (psi)	d (in)	Surf (in2/ft)	s_max (in)	Avh-min (in2/ft)	Avh-sm (in2/ft)	Avh-rg (in2/ft)
Bearing :	0.00									
36.00		60.00	294.8	122.54	74.25	432.00	24.00	0.360	1.126	0.360

Location (ft)										
bv (in)		fsy (ksi)	Vu (kips)	Vnh-req (psi)	d (in)	Surf (in2/ft)	s_max (in)	Avh-min (in2/ft)	Avh-sm (in2/ft)	Avh-rg (in2/ft)
Transfer :	1.08									
36.00		60.00	289.7	134.27	66.60	432.00	24.00	0.360	1.337	0.360
H/2 :	3.27									
36.00		60.00	279.2	128.59	67.01	432.00	24.00	0.360	1.235	0.360
0.1L :	8.91									
36.00		60.00	252.3	114.38	68.07	432.00	24.00	0.360	0.979	0.360
0.2L :	18.82									
36.00		60.00	206.6	91.18	69.93	432.00	24.00	0.360	0.561	0.360
0.3L :	28.72									
36.00		60.00	160.4	68.97	71.79	432.00	24.00	0.360	0.360	0.000
0.4L :	38.63									
36.00		60.00	114.3	47.90	73.64	432.00	24.00	0.360	0.360	0.000
0.5L :	48.54									
36.00		60.00	67.9	28.45	73.64	432.00	24.00	0.360	0.360	0.000
0.6L :	58.45									
36.00		60.00	114.3	47.91	73.64	432.00	24.00	0.360	0.360	0.000
0.7L :	68.36									
36.00		60.00	160.4	68.98	71.79	432.00	24.00	0.360	0.360	0.000
0.8L :	78.27									
36.00		60.00	206.6	91.19	69.93	432.00	24.00	0.360	0.561	0.360
0.9L :	88.17									
36.00		60.00	252.3	114.39	68.07	432.00	24.00	0.360	0.979	0.360
H/2 :	93.81									
36.00		60.00	279.2	128.59	67.01	432.00	24.00	0.360	1.235	0.360
Transfer :	96.00									
36.00		60.00	289.8	134.27	66.60	432.00	24.00	0.360	1.337	0.360
Bearing :	97.08									
36.00		60.00	294.8	137.03	66.40	432.00	24.00	0.360	1.387	0.360

CAMBER/DEFLECTION

CAMBER AND DEFLECTIONS: SERVICE 1
(Span : 1, Beam : 5; Units: in)

	Release	Mult	Erection	Mult	Final
At 0.1 x L =	8.91 ft				
Prestress	0.871	1.80	1.569	2.45	2.135
Self Wt.	-0.308	1.85	-0.569	2.40	-0.738
Deck + Haunch			-0.242	1.00	-0.242
Supplemental			0.000	1.00	0.000
Prec. DL+ADL			-0.024	1.00	-0.024
Diaphragm			-0.002	1.00	-0.002
Comp. DL+ADL			-0.028	1.00	-0.028
Supp. DL+ADL			0.000	1.00	0.000
Live Load(+I)					-0.103
Total	0.564		0.702		0.996

	Release	Mult	Erection	Mult	Final
At 0.2 x L =	18.82 ft				
Prestress	1.575	1.80	2.835	2.45	3.859
Self Wt.	-0.582	1.85	-1.077	2.40	-1.397
Deck + Haunch			-0.485	1.00	-0.485
Supplemental			0.000	1.00	0.000
Prec. DL+ADL			-0.049	1.00	-0.049
Diaphragm			-0.004	1.00	-0.004
Comp. DL+ADL			-0.057	1.00	-0.057
Supp. DL+ADL			0.000	1.00	0.000
Live Load(+I)					-0.209
Total	0.993		1.164		1.659

	Release	Mult	Erection	Mult	Final
At 0.3 x L =	28.72 ft				
Prestress	2.095	1.80	3.771	2.45	5.132
Self Wt.	-0.797	1.85	-1.474	2.40	-1.913
Deck + Haunch			-0.676	1.00	-0.676
Supplemental			0.000	1.00	0.000
Prec. DL+ADL			-0.068	1.00	-0.068
Diaphragm			-0.005	1.00	-0.005
Comp. DL+ADL			-0.079	1.00	-0.079
Supp. DL+ADL			0.000	1.00	0.000
Live Load(+I)					-0.294
Total	1.298		1.468		2.098

	Release	Mult	Erection	Mult	Final
At 0.4 x L =	38.63 ft				
Prestress	2.415	1.80	4.346	2.45	5.916
Self Wt.	-0.933	1.85	-1.727	2.40	-2.240
Deck + Haunch			-0.797	1.00	-0.797
Supplemental			0.000	1.00	0.000
Prec. DL+ADL			-0.080	1.00	-0.080
Diaphragm			-0.006	1.00	-0.006
Comp. DL+ADL			-0.094	1.00	-0.094
Supp. DL+ADL			0.000	1.00	0.000

	Release	Mult	Erection	Mult	Final
Live Load(+I)					-0.348
Total	1.481		1.643		2.351

	Release	Mult	Erection	Mult	Final
At 0.5 x L =	48.54 ft				
Prestress	2.522	1.80	4.540	2.45	6.179
Self Wt.	-0.980	1.85	-1.813	2.40	-2.352
Deck + Haunch			-0.839	1.00	-0.839
Supplemental			0.000	1.00	0.000
Prec. DL+ADL			-0.084	1.00	-0.084
Diaphragm			-0.007	1.00	-0.007
Comp. DL+ADL			-0.099	1.00	-0.099
Supp. DL+ADL			0.000	1.00	0.000
Live Load(+I)					-0.367
Total	1.542		1.699		2.432

	Release	Mult	Erection	Mult	Final
At 0.6 x L =	58.45 ft				
Prestress	2.415	1.80	4.346	2.45	5.916
Self Wt.	-0.933	1.85	-1.727	2.40	-2.240
Deck + Haunch			-0.797	1.00	-0.797
Supplemental			0.000	1.00	0.000
Prec. DL+ADL			-0.080	1.00	-0.080
Diaphragm			-0.006	1.00	-0.006
Comp. DL+ADL			-0.094	1.00	-0.094
Supp. DL+ADL			0.000	1.00	0.000
Live Load(+I)					-0.348
Total	1.481		1.643		2.351

	Release	Mult	Erection	Mult	Final
At 0.7 x L =	68.36 ft				
Prestress	2.095	1.80	3.771	2.45	5.132
Self Wt.	-0.797	1.85	-1.474	2.40	-1.913
Deck + Haunch			-0.676	1.00	-0.676
Supplemental			0.000	1.00	0.000
Prec. DL+ADL			-0.068	1.00	-0.068
Diaphragm			-0.005	1.00	-0.005
Comp. DL+ADL			-0.079	1.00	-0.079
Supp. DL+ADL			0.000	1.00	0.000
Live Load(+I)					-0.294
Total	1.298		1.468		2.098

	Release	Mult	Erection	Mult	Final
At 0.8 x L =	78.27 ft				
Prestress	1.575	1.80	2.835	2.45	3.859
Self Wt.	-0.582	1.85	-1.077	2.40	-1.397
Deck + Haunch			-0.485	1.00	-0.485
Supplemental			0.000	1.00	0.000
Prec. DL+ADL			-0.049	1.00	-0.049
Diaphragm			-0.004	1.00	-0.004
Comp. DL+ADL			-0.057	1.00	-0.057
Supp. DL+ADL			0.000	1.00	0.000
Live Load(+I)					-0.209
Total	0.993		1.164		1.659

	Release	Mult	Erection	Mult	Final
At 0.9 x L =	88.17 ft				
Prestress	0.871	1.80	1.569	2.45	2.135
Self Wt.	-0.308	1.85	-0.569	2.40	-0.738
Deck + Haunch			-0.242	1.00	-0.242
Supplemental			0.000	1.00	0.000
Prec. DL+ADL			-0.024	1.00	-0.024
Diaphragm			-0.002	1.00	-0.002
Comp. DL+ADL			-0.028	1.00	-0.028
Supp. DL+ADL			0.000	1.00	0.000
Live Load(+I)					-0.103
Total	0.564		0.702		0.996

Positive values indicate upward deflection.

ULTIMATE MOMENT

ULTIMATE - Span : 1, Beam : 5, FACTORED 1
(Mu-prvd computed by AASHTO equations, Art. 9.17/9.18)

(f'c_eff, ksi = 4.50; beta1 = 0.825)

Location (ft)	A*s in2	Ycg in	p*(A*s/bd)	f*su ksi	a in	Mu-prvd k.ft	Mu-rqrd k.ft	Mcr k.ft	Crkg Ratio	Mu-p/r Ratio
Transfer	1.08									
	1.262	11.90	0.00019	268.9	0.9	1870.4	313.9	6090.7	0.307	5.96
H/2	3.27									
	2.586	11.49	0.00039	267.8	1.8	3814.7	925.2	6026.2	0.633	4.12
0.1L	8.91									
	6.001	10.43	0.00089	265.1	4.2	8737.6	2361.2	5885.7	1.485	-
0.2L	18.82									
	6.426	8.57	0.00093	264.9	4.5	9591.8	4398.8	5729.2	1.674	-
0.3L	28.72									
	6.426	6.71	0.00091	265.0	4.5	9859.9	5815.5	5688.4	1.733	-
0.4L	38.63									
	6.426	4.86	0.00089	265.1	4.5	10128.1	6662.2	5763.5	1.757	-
0.5L	48.54									
	6.426	4.86	0.00089	265.1	4.5	10128.1	6909.9	5705.3	1.775	-
0.6L	58.45									
	6.426	4.86	0.00089	265.1	4.5	10128.1	6662.3	5763.5	1.757	-
0.7L	68.36									
	6.426	6.71	0.00091	265.0	4.5	9859.9	5815.4	5688.4	1.733	-
0.8L	78.27									
	6.426	8.57	0.00093	264.9	4.5	9591.8	4399.1	5729.1	1.674	-
0.9L	88.17									
	6.001	10.43	0.00089	265.1	4.2	8737.6	2361.4	5885.6	1.485	-
H/2	93.81									
	2.586	11.49	0.00039	267.8	1.8	3814.7	925.2	6026.1	0.633	4.12
Transfer	96.00									
	1.262	11.90	0.00019	268.9	0.9	1870.4	313.9	6090.7	0.307	5.96

DETENSIONING

Span : 1, Beam : 5; Groups 1-23; Units: psi

Grp	Str		Ys,in		2.08ft
1	2	E	2.00	Ft	25.547
		M	2.00	Fb	97.522
2	2	E	64.00	Ft	212.827
		M	8.00	Fb	50.920
3	1	E	64.00	Ft	306.468
		M	8.00	Fb	27.619
4	2	E	54.00	Ft	454.200
		M	6.00	Fb	16.260
5	1	E	54.00	Ft	528.066
		M	6.00	Fb	10.580
6	2	E	8.00	Ft	496.304
		M	8.00	Fb	159.171
7	2	E	8.00	Ft	464.542
		M	8.00	Fb	307.761
8	2	E	8.00	Ft	432.781
		M	8.00	Fb	456.351
9	2	E	6.00	Ft	392.762
		M	6.00	Fb	612.300
10	2	E	6.00	Ft	352.744
		M	6.00	Fb	768.248
11	2	E	6.00	Ft	312.725
		M	6.00	Fb	924.197
12	2	E	6.00	Ft	272.706
		M	6.00	Fb	1080.145
13	2	E	4.00	Ft	224.431
		M	4.00	Fb	1243.451
14	2	E	4.00	Ft	176.155
		M	4.00	Fb	1406.758
15	2	E	4.00	Ft	127.880
		M	4.00	Fb	1570.064
16	2	E	4.00	Ft	79.604
		M	4.00	Fb	1733.370
17	2	E	4.00	Ft	31.329
		M	4.00	Fb	1896.677
18	1	E	4.00	Ft	7.191
		M	4.00	Fb	1978.330
19	2	E	2.00	Ft	-49.342
		M	2.00	Fb	2148.994
20	2	E	2.00	Ft	-105.874
		M	2.00	Fb	2319.658
21	2	E	2.00	Ft	-162.407
		M	2.00	Fb	2490.322
22	2	E	2.00	Ft	-218.939
		M	2.00	Fb	2660.986
23	1	E	2.00	Ft	-247.205
		M	2.00	Fb	2746.318

DESIGN SUMMARY

Span: 1, Beam: 5, Exterior beam

Beam type:		
	I-Girder,	ODOT AASHTO Type 4 66 MOD
Precast Length,	ft	99.08
Release Length,	ft	99.08
Strand Pattern:	Straight/Draped	Depr. Point: 0.40 L
Strand:	1/2-270K-LL	
Strand Type:	Low Relaxation	
Strand Es,	ksi:	28500.0
No. of strands:	42	
	Draped:	6
	Straight:	36
Concrete Strength:		
	f'ci:	5000.0 psi
	f'c:	7000.0 psi
	f'ct:	4500.0 psi
Initial losses:	8.33 %	
Final losses:	21.46 %	

Specification	Allowable	Computed	Status
Release Stresses (psi) (Art. 9.15.2.1)			
Precast Top w/ no reinf.	-200.00		
Precast Top w/ reinf.	-530.33	-247.31	OK
Precast Bot (compression)	3000.00	2746.41	OK
Factored 1	Provided	Required	
Ult. Moment (k.ft)	10128.14	6909.85	OK
Debonding Limits	Allowable	Computed	
Max. Debond per Row	40.00 %	0.00 %	OK
Max. Debond Total	25.00 %	0.00 %	OK

Positive Moment Envelope Stresses (psi)

Specification	Final 1 Allow	Comp	Final 2 Allow	Comp	Final 3 Allow	Comp
Service 1						
Topping Top	2700.0/-503.1	404.9 / -0.0	1800.0	82.3	1800.0	363.7

Specification	Final 1 Allow	Comp	Final 2 Allow	Comp	Final 3 Allow	Comp
Precast Top	4200.0/-502.0	1591.8 /-175.8	2800.0	1371.5	2800.0	906.0
Precast Bot	4200.0/-502.0	2289.4 / 62.1	2800.0	2324.2	2800.0	1127.3

CAMBER / DEFLECTION: (PCI Design Handbook - 4th Ed.- Table 4.6.2)
0.5 x L = 48.54 ft

		Release	Mult	Erection	Mult	Final
Prestress	:	2.522	1.80	4.540	2.45	6.179
Self Wt.	:	-0.980	1.85	-1.813	2.40	-2.352
Deck + Haunch	:			-0.839	1.00	-0.839
Supplemental	:			0.000	1.00	0.000
Prec. DL+ADL	:			-0.084	1.00	-0.084
Diaphragm	:			-0.007	1.00	-0.007
Comp. DL+ADL	:			-0.099	1.00	-0.099
Supp. DL+ADL	:			0.000	1.00	0.000
Live Load	:					-0.367
Total	:	1.542		1.699		2.432

Positive values indicate upward deflection.

HDR | ONE COMPANY *Many Solutions*™

Project:	SCI 823-0917	Computed: DMP	Date: 9/30/08
Subject:	MINFORD ROAD CROSSING	Checked: JSW	Date: 7/27/09
Task:	TOP CONTINUOUS STEEL	Page:	of:
Job #:		No:	

REQ'D A_s (in^2)

		@ 89.67'	@ 100'	@ 10.41'
PIER 1	BEAM 1	4.387	12.400	5.028
	2	3.028	11.280	3.372
	3	4.383	12.709	4.656
	4	3.140	10.959	3.257
	5	4.253	11.522	4.603
PIER 2	BEAM 1	2.815	10.120	2.871
	2	1.533	9.751	1.595
	3	2.747	10.925	2.709
	4	1.642	9.751	1.512
	5	2.703	9.837	2.552
PIER 3	BEAM 1	4.900	12.079	4.447
	2	3.280	10.948	3.080
	3	4.698	12.707	4.331
	4	3.424	11.293	2.996
	5	4.807	11.855	4.092

PROVIDE MINIMUM STEEL AS FOLLOWS:

PIER 1,3:	FROM 85' to 15' : $5.028\ in^2$	SAY	4 #10	$= 5.06\ in^2$
	FROM 95' to 5' : $12.709\ in^2$	SAY	11 #10	$= 13.92\ in^2$
PIER 2:	FROM 85' to 15' : $2.871\ in^2$	SAY	3 #10	$= 3.79\ in^2$
	FROM 95' to 5' : $10.925\ in^2$	SAY	9 #10	$= 11.39\ in^2$

∴ USE 4 #10 & 11 #10 OVER ALL PIERS

Program: CONSPAN® Version: 7.1.1	HDR Engineering, Inc. 8404 Indian Hills Dr Omaha NE 68114 Copyright © LEAP Software, Inc. 1984 - 2007. www.leapsoft.com 1-800-451-5327	Sheet: DS-1 Job No: By: DMP - check revision Date: Apr/30/2008 CKD: JSW Date: 7/27/09

File Name: 100-100-100-100 Type IV66 continuous_revised spans drap... .csl

SHEAR/MOMENT ENVELOPE (&REACTIONS)

SHEAR AND MOMENT ENVELOPE : Span : 1, Beam : 1, SERVICE 1
Shears: kips, Moments: kft

END SPAN
EXTERIOR BEAM

		Bearing	Trans	H/2	0.10L	0.20L	0.30L	0.40L	Midspan
Location,	ft	0.00	1.08	3.27	8.91	18.82	28.72	38.63	48.54
Self wt. :	M	0.0	48.4	142.7	365.3	685.0	913.3	1050.3	1095.9
	V	45.2	44.1	42.1	36.9	27.7	18.4	9.2	0.0
Prec. :	M	-0.0	5.7	16.8	43.0	80.5	107.4	123.5	128.9
DL+ADL	V	5.3	5.2	5.0	4.3	3.3	2.2	1.1	0.0
Deck :	M	0.0	56.1	165.6	424.0	795.0	1060.0	1219.0	1272.0
+ Haunch	V	52.4	51.2	48.9	42.8	32.1	21.4	10.7	0.0
Diaphragm :	M	-0.0	0.3	1.0	2.8	5.8	8.0	9.0	10.0
	V	0.3	0.3	0.3	0.3	0.3	0.1	0.1	0.1
Comp. :	M	47.9	81.3	145.8	293.9	490.2	605.3	639.0	591.3
DL+ADL	V	31.3	30.4	28.6	23.9	15.7	7.5	0.7	8.9
LL + I :	M+	107.5	182.3	326.3	653.9	1112.3	1362.7	1466.6	1428.9
	V	65.7	61.1	51.5	26.4	16.6	1.6	8.2	38.4
LL + I :	M-	-9.5	-16.3	-29.9	-64.2	-127.9	-191.5	-258.3	-325.3
	V	62.9	56.2	42.5	6.4	6.5	6.4	6.5	6.7
LL + I :	Vmx	69.2	68.4	66.5	61.8	52.9	42.4	33.6	43.6
	M	107.7	182.4	325.7	647.7	1082.6	1308.9	1358.8	1382.9
Total :	M+	155.4	374.2	798.3	1782.9	3168.9	4056.7	4507.4	4527.1
	V	200.2	192.4	176.4	134.7	95.6	51.2	30.0	47.4
Total :	M-	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	V	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total :	Vmx	203.7	199.7	191.4	170.0	132.0	92.0	55.4	52.6
	M	155.6	374.3	797.7	1776.6	3139.2	4002.8	4399.6	4481.0

		0.60L	0.70L	0.80L	0.90L	H/2	Trans	Bearing
Location,	ft	58.45	68.36	78.27	88.17	93.81	96.00	97.08
Self wt. :	M	1050.3	913.3	685.0	365.3	142.7	48.4	0.0
	V	9.2	18.4	27.7	36.9	42.1	44.1	45.2
Prec. :	M	123.5	107.4	80.5	43.0	16.8	5.7	0.0
DL+ADL	V	1.1	2.2	3.3	4.3	5.0	5.2	5.3
Deck :	M	1219.0	1060.0	795.0	424.0	165.6	56.1	0.0
+ Haunch	V	10.7	21.4	32.1	42.8	48.9	51.2	52.4
Diaphragm :	M	9.1	8.0	6.0	2.9	1.1	0.3	-0.0
	V	0.1	0.1	0.3	0.3	0.3	0.3	0.3
Comp. :	M	462.4	252.1	-39.5	-412.4	-660.9	-764.4	-817.1
DL+ADL	V	17.1	25.3	33.5	41.7	46.4	48.2	49.1
LL + I :	M+	1274.0	984.9	613.2	236.1	165.6	153.0	149.8
	V	8.3	16.7	24.5	6.8	3.9	2.8	2.2
LL + I :	M-	-389.8	-459.7	-528.3	-773.8	-1068.3	-1208.1	-1282.8
	V	6.5	6.5	6.6	46.0	56.0	59.9	61.7
LL + I :	Vmx	50.2	59.3	68.2	75.3	77.9	79.0	79.4
	M	1193.4	937.1	571.0	124.4	-100.8	-183.1	-222.8
Total :	M+	4138.3	3325.7	2140.3	658.9	0.0	0.0	0.0
	V	46.5	84.1	121.3	132.9	0.0	0.0	0.0
Total :	M-	0.0	0.0	0.0	-351.1	-1403.0	-1862.0	-2099.9
	V	0.0	0.0	0.0	172.1	198.7	209.0	214.0
Total :	Vmx	88.4	126.7	165.0	201.4	220.6	228.1	231.8
	M	4057.7	3277.9	2098.1	547.2	-435.5	-836.9	-1039.9

REACTIONS (kips), SERVICE 1

Load Type		Left Support	Right Support
Self Wt.		45.2	45.2
Deck+Haunch		52.4	52.4
Diaphragm		0.3	0.3
Prec.DL+ADL		5.3	5.3
Comp. DL+ADL		162.7	473.4
Supplemental		0.0	0.0
Supp. DL+ADL		-0.0	-0.0
Live	(Max)	79.4	130.4
Live	(Min)	-6.8	-11.1
Pedestrian	(Max)	-0.0	-0.0
Pedestrian	(Min)	-0.0	-0.0

Upward reactions are positive.
Live Load reactions are per lane with no distribution factor and no impact.
Non-composite load types are per beam.
Composite, Supplemental, and Pedestrian load types are per total bridge width.

SHEAR AND MOMENT ENVELOPE : Span : 1, Beam : 1, FACTORED 1
Shears: kips, Moments: kft

		Bearing	Trans	H/2	0.10L	0.20L	0.30L	0.40L	Midspan
Location,	ft	0.00	1.08	3.27	8.91	18.82	28.72	38.63	48.54
Self wt. :	M	0.0	62.9	185.5	474.9	890.5	1187.3	1365.3	1424.7
	V	58.7	57.4	54.7	47.9	35.9	24.0	12.0	0.0
Prec. :	M	-0.0	7.4	21.8	55.8	104.7	139.6	160.5	167.5
DL+ADL	V	6.9	6.7	6.4	5.6	4.2	2.8	1.4	0.0
Deck :	M	0.0	73.0	215.3	551.3	1033.5	1378.0	1584.7	1653.6
+ Haunch	V	68.1	66.6	63.5	55.6	41.7	27.8	13.9	0.0
Diaphragm :	M	-0.0	0.4	1.3	3.6	7.6	10.4	11.7	13.0
	V	0.4	0.4	0.4	0.4	0.4	0.1	0.1	0.1
Comp. :	M	62.2	105.7	189.6	382.0	637.3	786.8	830.7	768.7
DL+ADL	V	40.7	39.5	37.2	31.1	20.4	9.8	0.9	11.6
LL + I :	M+	233.3	395.8	708.5	1419.7	2414.8	2958.4	3184.0	3102.2
	V	142.7	132.7	111.9	57.4	36.1	3.4	17.8	83.3
LL + I :	M-	-20.6	-35.4	-65.0	-139.3	-277.7	-415.8	-560.9	-706.3
	V	136.6	122.1	92.2	13.8	14.2	14.0	14.2	14.5
LL + I :	Vmx	150.2	148.4	144.4	134.2	114.9	92.1	72.9	94.7
	M	233.8	396.1	707.1	1406.1	2350.4	2841.5	2950.0	3002.3
Total :	M+	295.6	645.2	1322.1	2887.3	5088.4	6460.6	7137.0	7129.8
	V	317.5	303.3	274.2	198.1	138.8	67.9	46.1	95.0
Total :	M-	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	V	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total :	Vmx	325.0	319.1	306.7	274.9	217.7	156.6	101.3	106.4
	M	296.0	645.5	1320.7	2873.7	5023.9	6343.7	6902.9	7029.9

		0.60L	0.70L	0.80L	0.90L	H/2	Trans	Bearing
Location,	ft	58.45	68.36	78.27	88.17	93.81	96.00	97.08

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Sheet: DS-3
Job No:
By: DMP - check revision
Date: Apr/30/2008
CKD: JSW
Date: 7/27/09

File Name: 100-100-100-100 Type IV66 continuous_revised spans drap... .csl

		0.60L	0.70L	0.80L	0.90L	H/2	Trans	Bearing
Self wt. :	M	1365.3	1187.3	890.5	474.9	185.5	62.9	0.0
	V	12.0	24.0	35.9	47.9	54.7	57.4	58.7
Prec. :	M	160.5	139.6	104.7	55.8	21.8	7.4	0.0
DL+ADL	V	1.4	2.8	4.2	5.6	6.4	6.7	6.9
Deck :	M	1584.7	1378.0	1033.5	551.3	215.3	73.0	0.0
+ Haunch	V	13.9	27.8	41.7	55.6	63.5	66.6	68.1
Diaphragm :	M	11.8	10.4	7.9	3.7	1.4	0.5	-0.0
	V	0.1	0.1	0.4	0.4	0.4	0.4	0.4
Comp. :	M	601.1	327.8	-51.3	-536.1	-859.2	-993.7	-1062.3
DL+ADL	V	22.3	32.9	43.6	54.3	60.3	62.7	63.9
LL + I :	M+	2765.8	2138.2	1331.3	512.6	359.5	332.1	325.3
	V	18.1	36.3	53.1	14.8	8.4	6.0	4.8
LL + I :	M-	-846.2	-997.9	-1146.9	-1680.0	-2319.3	-2622.9	-2784.9
	V	14.1	14.2	14.4	99.9	121.6	130.0	133.9
LL + I :	Vmx	108.9	128.6	148.0	163.5	169.2	171.5	172.5
	M	2590.9	2034.5	1239.5	270.1	-218.8	-397.5	-483.6
Total :	M+	6489.4	5181.3	3316.5	1062.2	0.0	0.0	0.0
	V	67.8	123.9	179.0	178.6	0.0	0.0	0.0
Total :	M-	0.0	0.0	0.0	-1130.4	-2754.4	-3472.9	-3847.2
	V	0.0	0.0	0.0	263.8	307.0	323.8	332.0
Total :	Vmx	158.6	216.3	273.9	327.4	354.7	365.4	370.5
	M	6314.4	5077.6	3224.8	819.7	-653.9	-1247.5	-1545.9

REACTIONS (kips), FACTORED 1

Load Type		Left Support	Right Support
Self Wt.		58.7	58.7
Deck+Haunch		68.1	68.1
Diaphragm		0.4	0.4
Prec.DL+ADL		6.9	6.9
Comp. DL+ADL		211.5	615.4
Supplemental		0.0	0.0
Supp. DL+ADL		-0.0	-0.0
Live	(Max)	172.5	283.0
Live	(Min)	-14.9	-24.1
Pedestrian	(Max)	-0.0	-0.0
Pedestrian	(Min)	-0.0	-0.0

Upward reactions are positive.
Live Load reactions are per lane with no distribution factor and no impact.
Non-composite load types are per beam.
Composite, Supplemental, and Pedestrian load types are per total bridge width.

LEAP Program: CONSPAN® Version: 7.1.1	HDR Engineering, Inc. 8404 Indian Hills Dr Omaha NE 68114 Copyright © LEAP Software, Inc. 1984 - 2007. www.leapsoft.com 1-800-451-5327	Sheet: DS-4 Job No: By: DMP - check revision Date: Apr/30/2008 CKD: JGW Date: 7/27/09

File Name: 100-100-100-100 Type IV66 continuous_revised spans drap... .csl

DESIGN SUMMARY

Span: 1, Beam: 1, Exterior beam

Beam type:		
	I-Girder,	ODOT AASHTO Type 4 66 MOD
Precast Length,	ft	99.08
Release Length,	ft	99.08
Strand Pattern:	Straight/Draped	Depr. Point: 0.40 L
Strand:	1/2-270K-LL	
Strand Type:	Low Relaxation	
Strand Es,	ksi:	28500.0
No. of strands:	42	
	Draped:	6
	Straight:	36
Concrete Strength:		
	f'ci:	5000.0 psi
	f'c:	7000.0 psi
	f'ct:	4500.0 psi
Initial losses:	8.33 %	
Final losses:	20.99 %	

Specification	Allowable	Computed	Status
Release Stresses (psi) (Art. 9.15.2.1)			
Precast Top w/ no reinf.	-200.00		
Precast Top w/ reinf.	-530.33	-247.31	OK
Precast Bot (compression)	3000.00	2746.41	OK
Factored 1	Provided	Required	
Ult. Moment (k.ft)	10159.61	7137.00	OK
Debonding Limits	Allowable	Computed	
Max. Debond per Row	40.00 %	0.00 %	OK
Max. Debond Total	25.00 %	0.00 %	OK

Positive Moment Envelope Stresses (psi)

Specification	Final 1 Allow	Comp	Final 2 Allow	Comp	Final 3 Allow	Comp
Service 1						
Topping Top	2700.0/-503.1	435.1 / 32.1	1800.0	132.0	1800.0	369.1

Specification	Final 1 Allow	Comp	Final 2 Allow	Comp	Final 3 Allow	Comp
Precast Top	4200.0/-502.0	1656.5 /-150.9	2800.0	1458.6	2800.0	927.2
Precast Bot	4200.0/-502.0	2214.8 / -41.6	2800.0	2304.4	2800.0	1062.6

Negative Moment Envelope Stresses (psi)

Specification	Final 1 Allow	Comp	Final 2 Allow	Comp	Final 3 Allow	Comp
Service 1						
Topping Top	2700.0/-503.1	55.0 /-433.9	1800.0	122.2	1800.0	-6.1
Precast Top	4200.0/-502.0	1413.5 /-460.6	2800.0	1458.6	2800.0	684.2
Precast Bot	4200.0/-502.0	3312.9 / 819.9	2800.0	2719.6	2800.0	1953.1

CAMBER / DEFLECTION: (PCI Design Handbook - 4th Ed.- Table 4.6.2)
0.5 x L = 48.54 ft

		Release	Mult	Erection	Mult	Final
Prestress	:	2.522	1.80	4.540	2.45	6.179
Self Wt.	:	-0.980	1.85	-1.813	2.40	-2.352
Deck + Haunch	:			-0.886	1.00	-0.886
Supplemental	:			0.000	1.00	0.000
Prec. DL+ADL	:			-0.090	1.00	-0.090
Diaphragm	:			-0.007	1.00	-0.007
Comp. DL+ADL	:			-0.138	1.00	-0.138
Supp. DL+ADL	:			0.000	1.00	0.000
Live Load	:					-0.322
Total	:	1.542		1.607		2.385

Positive values indicate upward deflection.

SHEAR/MOMENT ENVELOPE (&REACTIONS)

SHEAR AND MOMENT ENVELOPE : Span : 1, Beam : 3, SERVICE 1
Shears: kips, Moments: kft

END SPAN
INTERIOR BEAM

		Bearing	Trans	H/2	0.10L	0.20L	0.30L	0.40L	Midspan
Location,	ft	0.00	1.08	3.27	8.91	18.82	28.72	38.63	48.54
Self wt. :	M	0.0	48.4	142.7	365.3	685.0	913.3	1050.3	1095.9
	V	45.2	44.1	42.1	36.9	27.7	18.4	9.2	0.0
Prec. :	M	-0.0	6.8	20.1	51.5	96.6	128.9	148.2	154.6
DL+ADL	V	6.4	6.2	5.9	5.2	3.9	2.6	1.3	0.0
Deck :	M	0.0	65.8	194.2	497.1	932.0	1242.6	1429.0	1491.1
+ Haunch	V	61.4	60.1	57.3	50.2	37.6	25.1	12.5	0.0
Diaphragm :	M	-0.0	0.7	2.0	5.5	11.6	16.1	18.0	20.0
	V	0.6	0.6	0.6	0.6	0.6	0.2	0.2	0.2
Comp. :	M	47.9	81.3	145.8	293.9	490.2	605.3	639.0	591.3
DL+ADL	V	31.3	30.4	28.6	23.9	15.7	7.5	0.7	8.9
LL + I :	M+	120.8	203.8	361.0	703.4	1164.5	1385.3	1507.2	1448.0
	V	82.6	76.2	63.3	31.1	18.8	1.9	10.7	45.0
LL + I :	M-	-7.5	-13.0	-24.2	-54.0	-107.8	-165.4	-228.8	-298.8
	V	79.1	70.1	52.1	7.5	7.4	7.7	8.5	7.8
LL + I :	Vmx	87.0	85.3	81.6	72.8	59.9	51.0	43.9	51.1
	M	121.0	204.0	360.3	696.6	1133.4	1330.5	1396.4	1401.4
Total :	M+	168.7	406.8	865.9	1916.7	3379.9	4291.3	4791.6	4801.0
	V	227.5	217.7	197.8	147.9	104.3	55.7	34.7	54.1
Total :	M-	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	V	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total :	Vmx	231.8	226.7	216.2	189.5	145.4	104.8	67.9	60.2
	M	168.9	406.9	865.1	1910.0	3348.8	4236.6	4680.8	4754.3

		0.60L	0.70L	0.80L	0.90L	H/2	Trans	Bearing
Location,	ft	58.45	68.36	78.27	88.17	93.81	96.00	97.08
Self wt. :	M	1050.3	913.3	685.0	365.3	142.7	48.4	0.0
	V	9.2	18.4	27.7	36.9	42.1	44.1	45.2
Prec. :	M	148.2	128.9	96.6	51.5	20.1	6.8	-0.0
DL+ADL	V	1.3	2.6	3.9	5.2	5.9	6.2	6.4
Deck :	M	1429.0	1242.6	932.0	497.1	194.2	65.8	0.0
+ Haunch	V	12.5	25.1	37.6	50.2	57.3	60.1	61.4
Diaphragm :	M	18.2	16.0	12.1	5.7	2.1	0.7	-0.0
	V	0.2	0.2	0.6	0.6	0.6	0.6	0.6
Comp. :	M	462.4	252.1	-39.5	-412.4	-660.9	-764.4	-817.1
DL+ADL	V	17.1	25.3	33.5	41.7	46.4	48.2	49.1
LL + I :	M+	1291.0	1010.6	634.8	251.2	166.7	150.6	145.8
	V	10.1	19.6	27.9	7.9	4.7	3.4	2.7
LL + I :	M-	-358.0	-441.7	-534.6	-824.0	-1118.9	-1257.4	-1330.9
	V	7.9	7.7	7.6	53.6	67.8	73.6	76.4
LL + I :	Vmx	60.6	69.4	77.9	87.7	94.4	97.2	98.4
	M	1209.3	955.9	588.7	132.5	-105.5	-190.5	-231.1
Total :	M+	4399.0	3563.4	2321.0	758.4	0.0	0.0	0.0
	V	50.4	91.2	131.3	142.5	0.0	0.0	0.0
Total :	M-	0.0	0.0	0.0	-316.7	-1420.7	-1900.1	-2148.1
	V	0.0	0.0	0.0	188.2	220.2	232.9	239.2
Total :	Vmx	101.0	141.1	181.2	222.3	246.8	256.5	261.1
	M	4317.3	3508.7	2274.9	639.7	-407.3	-833.3	-1048.3

REACTIONS (kips), SERVICE 1

Load Type		Left Support	Right Support
Self Wt.		45.2	45.2
Deck+Haunch		61.4	61.4
Diaphragm		0.6	0.6
Prec.DL+ADL		6.4	6.4
Comp. DL+ADL		162.7	473.4
Supplemental		0.0	0.0
Supp. DL+ADL		-0.0	-0.0
Live	(Max)	79.4	130.4
Live	(Min)	-6.8	-11.1
Pedestrian	(Max)	-0.0	-0.0
Pedestrian	(Min)	-0.0	-0.0

Upward reactions are positive.
Live Load reactions are per lane with no distribution factor and no impact.
Non-composite load types are per beam.
Composite, Supplemental, and Pedestrian load types are per total bridge width.

SHEAR AND MOMENT ENVELOPE : Span : 1, Beam : 3, FACTORED 1
Shears: kips, Moments: kft

		Bearing	Trans	H/2	0.10L	0.20L	0.30L	0.40L	Midspan
Location,	ft	0.00	1.08	3.27	8.91	18.82	28.72	38.63	48.54
Self wt. :	M	0.0	62.9	185.5	474.9	890.5	1187.3	1365.3	1424.7
	V	58.7	57.4	54.7	47.9	35.9	24.0	12.0	0.0
Prec. :	M	-0.0	8.9	26.2	67.0	125.6	167.5	192.6	201.0
DL+ADL	V	8.3	8.1	7.7	6.8	5.1	3.4	1.7	0.0
Deck :	M	0.0	85.6	252.4	646.2	1211.5	1615.4	1857.7	1938.4
+ Haunch	V	79.9	78.1	74.5	65.2	48.9	32.6	16.3	0.0
Diaphragm :	M	-0.0	0.9	2.6	7.2	15.1	20.9	23.4	26.0
	V	0.8	0.8	0.8	0.8	0.8	0.3	0.3	0.3
Comp. :	M	62.2	105.7	189.6	382.0	637.3	786.8	830.7	768.7
DL+ADL	V	40.7	39.5	37.2	31.1	20.4	9.8	0.9	11.6
LL + I :	M+	262.2	442.5	783.7	1527.1	2528.1	3007.4	3272.2	3143.6
	V	179.4	165.5	137.3	67.6	40.8	4.1	23.3	97.7
LL + I :	M-	-16.3	-28.1	-52.4	-117.2	-234.1	-359.0	-496.7	-648.8
	V	171.7	152.3	113.2	16.3	16.0	16.8	18.5	16.9
LL + I :	Vmx	188.8	185.1	177.3	157.9	130.1	110.7	95.4	111.0
	M	262.7	442.8	782.1	1512.4	2460.6	2888.6	3031.6	3042.3
Total :	M+	324.5	706.4	1440.0	3104.4	5408.1	6785.3	7541.9	7502.5
	V	367.7	349.4	312.3	219.4	152.0	74.1	54.4	109.5
Total :	M-	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	V	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total :	Vmx	377.2	369.0	352.2	309.7	241.2	180.7	126.6	122.8
	M	325.0	706.7	1438.5	3089.7	5340.6	6666.4	7301.4	7401.2

		0.60L	0.70L	0.80L	0.90L	H/2	Trans	Bearing
Location,	ft	58.45	68.36	78.27	88.17	93.81	96.00	97.08

		0.60L	0.70L	0.80L	0.90L	H/2	Trans	Bearing
Self wt. :	M	1365.3	1187.3	890.5	474.9	185.5	62.9	0.0
	V	12.0	24.0	35.9	47.9	54.7	57.4	58.7
Prec. :	M	192.6	167.5	125.6	67.0	26.2	8.9	-0.0
DL+ADL	V	1.7	3.4	5.1	6.8	7.7	8.1	8.3
Deck :	M	1857.7	1615.4	1211.5	646.2	252.4	85.6	0.0
+ Haunch	V	16.3	32.6	48.9	65.2	74.5	78.1	79.9
Diaphragm :	M	23.6	20.8	15.7	7.4	2.7	0.9	-0.0
	V	0.3	0.3	0.8	0.8	0.8	0.8	0.8
Comp. :	M	601.1	327.8	-51.3	-536.1	-859.2	-993.7	-1062.3
DL+ADL	V	22.3	32.9	43.6	54.3	60.3	62.7	63.9
LL + I :	M+	2802.8	2194.0	1378.2	545.3	361.8	326.9	316.6
	V	21.8	42.5	60.7	17.2	10.2	7.4	5.9
LL + I :	M-	-777.3	-958.9	-1160.7	-1788.8	-2429.2	-2729.8	-2889.5
	V	17.1	16.6	16.4	116.3	147.2	159.8	165.9
LL + I :	Vmx	131.6	150.7	169.0	190.4	205.0	210.9	213.7
	M	2625.5	2075.3	1278.1	287.6	-229.1	-413.7	-501.8
Total :	M+	6843.2	5512.7	3570.3	1204.8	0.0	0.0	0.0
	V	74.3	135.7	195.0	192.2	0.0	0.0	0.0
Total :	M-	0.0	0.0	0.0	-1129.4	-2821.5	-3565.4	-3951.7
	V	0.0	0.0	0.0	291.3	345.4	366.9	377.5
Total :	Vmx	184.1	243.9	303.4	365.4	403.1	418.0	425.2
	M	6665.9	5394.0	3470.1	947.0	-621.5	-1249.2	-1564.0

REACTIONS (kips), FACTORED 1

Load Type		Left Support	Right Support
Self Wt.		58.7	58.7
Deck+Haunch		79.9	79.9
Diaphragm		0.8	0.8
Prec.DL+ADL		8.3	8.3
Comp. DL+ADL		211.5	615.4
Supplemental		0.0	0.0
Supp. DL+ADL		-0.0	-0.0
Live	(Max)	172.5	283.0
Live	(Min)	-14.9	-24.1
Pedestrian	(Max)	-0.0	-0.0
Pedestrian	(Min)	-0.0	-0.0

Upward reactions are positive.
Live Load reactions are per lane with no distribution factor and no impact.
Non-composite load types are per beam.
Composite, Supplemental, and Pedestrian load types are per total bridge width.

DESIGN SUMMARY

Span: 1, Beam: 3, Interior beam

Beam type:		
	I-Girder,	ODOT AASHTO Type 4 66 MOD
Precast Length,	ft	99.08
Release Length,	ft	99.08
Strand Pattern:	Straight/Draped	Depr. Point: 0.40 L
Strand:	1/2-270K-LL	
Strand Type:	Low Relaxation	
Strand Es,	ksi:	28500.0
No. of strands:	42	
	Draped:	6
	Straight:	36
Concrete Strength:		
	f'ci:	5000.0 psi
	f'c:	7000.0 psi
	f'ct:	4500.0 psi
Initial losses:	8.33 %	
Final losses:	20.46 %	

Specification	Allowable	Computed	Status
Release Stresses (psi) (Art. 9.15.2.1)			
Precast Top w/ no reinf.	-200.00		
Precast Top w/ reinf.	-530.33	-247.31	OK
Precast Bot (compression)	3000.00	2746.41	OK
Factored 1	Provided	Required	
Ult. Moment (k.ft)	10239.48	7541.90	OK
Debonding Limits	Allowable	Computed	
Max. Debond per Row	40.00 %	0.00 %	OK
Max. Debond Total	25.00 %	0.00 %	OK

Positive Moment Envelope Stresses (psi)

Specification	Final 1 Allow	Comp	Final 2 Allow	Comp	Final 3 Allow	Comp
Service 1						
Topping Top	2700.0/-503.1	393.2 / 30.9	1800.0	117.1	1800.0	334.6

Specification	Final 1 Allow	Comp	Final 2 Allow	Comp	Final 3 Allow	Comp
Precast Top	4200.0/-502.0	1829.0 /-146.7	2800.0	1661.8	2800.0	998.1
Precast Bot	4200.0/-502.0	2214.9 /-209.2	2800.0	2312.9	2800.0	1058.4

Negative Moment Envelope Stresses (psi)

Specification	Final 1 Allow	Comp	Final 2 Allow	Comp	Final 3 Allow	Comp
Service 1						
Topping Top	2700.0/-503.1	53.6 /-393.5	1800.0	108.3	1800.0	-0.6
Precast Top	4200.0/-502.0	1627.2 /-413.1	2800.0	1661.8	2800.0	796.4
Precast Bot	4200.0/-502.0	3324.9 / 631.3	2800.0	2719.9	2800.0	1965.0

CAMBER / DEFLECTION: (PCI Design Handbook - 4th Ed.- Table 4.6.2)
0.5 x L = 48.54 ft

		Release	Mult	Erection	Mult	Final
Prestress	:	2.522	1.80	4.540	2.45	6.179
Self Wt.	:	-0.980	1.85	-1.813	2.40	-2.352
Deck + Haunch	:			-1.039	1.00	-1.039
Supplemental	:			0.000	1.00	0.000
Prec. DL+ADL	:			-0.108	1.00	-0.108
Diaphragm	:			-0.013	1.00	-0.013
Comp. DL+ADL	:			-0.138	1.00	-0.138
Supp. DL+ADL	:			0.000	1.00	0.000
Live Load	:					-0.340
Total	:	1.542		1.430		2.190

Positive values indicate upward deflection.

HDR Engineering, Inc.
8404 Indian Hills Dr Omaha NE 68114

Sheet: DS-1
Job No:

Program: CONSPAN®
Version: 7.1.1

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By: DMP - check revision
Date: Apr/30/2008
CKD: JSW
Date: 7/27/09

File Name: 100-100-100-100 Type IV66 continuous_revised spans drap... .csl

SHEAR/MOMENT ENVELOPE (&REACTIONS)

SHEAR AND MOMENT ENVELOPE : Span : 2, Beam : 1, SERVICE 1
Shears: kips, Moments: kft

INTERNAL SPAN
EXTERIOR BEAM

		Bearing	Trans	H/2	0.10L	0.20L	0.30L	0.40L	Midspan
Location,	ft	0.00	1.08	3.27	8.91	18.82	28.72	38.63	48.54
Self wt. :	M	0.0	48.4	142.7	365.3	685.0	913.3	1050.3	1095.9
	V	45.2	44.1	42.1	36.9	27.7	18.4	9.2	0.0
Prec. :	M	-0.0	5.7	16.8	43.0	80.5	107.4	123.5	128.9
DL+ADL	V	5.3	5.2	5.0	4.3	3.3	2.2	1.1	0.0
Deck :	M	0.0	56.1	165.6	424.0	795.0	1060.0	1219.0	1272.0
+ Haunch	V	52.4	51.2	48.9	42.8	32.1	21.4	10.7	0.0
Diaphragm :	M	0.0	0.3	1.0	2.8	5.8	8.0	9.0	10.0
	V	0.3	0.3	0.3	0.3	0.3	0.1	0.1	0.1
Comp. :	M	-821.9	-775.7	-685.3	-470.5	-156.9	75.4	226.3	296.0
DL+ADL	V	43.1	42.2	40.4	35.8	27.5	19.3	11.1	2.9
LL + I :	M+	161.1	154.6	156.1	223.9	638.1	956.9	1154.3	1184.0
	V	12.3	14.8	7.9	32.7	24.3	9.8	0.1	29.4
LL + I :	M-	-1283.6	-1214.0	-1084.1	-814.1	-654.6	-545.9	-526.5	-489.8
	V	58.2	55.5	50.1	36.3	10.8	1.9	1.9	1.9
LL + I :	Vmx	76.4	75.5	73.5	68.5	60.7	51.4	41.4	34.4
	M	-145.2	-102.5	-15.8	211.2	627.2	924.8	1082.0	1134.8
Total :	M+	0.0	0.0	0.0	588.5	2047.5	3121.0	3782.5	3986.7
	V	0.0	0.0	0.0	152.7	115.2	71.2	32.3	32.4
Total :	M-	-2105.6	-1879.2	-1443.2	-449.5	0.0	0.0	0.0	0.0
	V	204.5	198.6	186.7	156.4	0.0	0.0	0.0	0.0
Total :	Vmx	222.8	218.7	210.2	188.6	151.5	112.9	73.6	37.4
	M	-967.1	-767.7	-374.9	575.7	2036.7	3088.9	3710.1	3937.5

		0.60L	0.70L	0.80L	0.90L	H/2	Trans	Bearing
Location,	ft	58.45	68.36	78.27	88.17	93.81	96.00	97.08
Self wt. :	M	1050.3	913.3	685.0	365.3	142.7	48.4	0.0
	V	9.2	18.4	27.7	36.9	42.1	44.1	45.2
Prec. :	M	123.5	107.4	80.5	43.0	16.8	5.7	0.0
DL+ADL	V	1.1	2.2	3.3	4.3	5.0	5.2	5.3
Deck :	M	1219.0	1060.0	795.0	424.0	165.6	56.1	0.0
+ Haunch	V	10.7	21.4	32.1	42.8	48.9	51.2	52.4
Diaphragm :	M	9.1	8.0	6.0	2.9	1.1	0.3	-0.0
	V	0.1	0.1	0.3	0.3	0.3	0.3	0.3
Comp. :	M	284.3	191.3	16.9	-238.8	-418.3	-496.5	-537.0
DL+ADL	V	5.3	13.5	21.7	29.9	34.6	36.4	37.3
LL + I :	M+	1127.0	929.0	621.6	343.0	313.1	316.1	320.6
	V	1.0	10.7	25.4	5.7	8.6	9.7	10.2
LL + I :	M-	-471.4	-458.1	-535.8	-692.6	-945.3	-1066.0	-1130.6
	V	1.8	1.9	8.9	34.5	48.0	53.2	55.7
LL + I :	Vmx	41.4	51.8	62.1	71.1	74.8	76.2	76.8
	M	1035.6	873.5	577.6	165.1	-53.7	-135.7	-175.8
Total :	M+	3813.2	3209.0	2205.1	939.5	221.0	0.0	0.0
	V	27.4	66.3	110.5	119.9	139.4	0.0	0.0
Total :	M-	0.0	0.0	0.0	-96.2	-1037.4	-1452.0	-1667.6
	V	0.0	0.0	0.0	148.8	178.8	190.5	196.1
Total :	Vmx	67.8	107.4	147.1	185.3	205.6	213.5	217.3
	M	3721.8	3153.4	2161.1	761.5	270.3	-26.8	-176.8

REACTIONS (kips), SERVICE 1

Load Type		Left Support	Right Support
Self Wt.		45.2	45.2
Deck+Haunch		52.4	52.4
Diaphragm		0.3	0.3
Prec.DL+ADL		5.3	5.3
Comp. DL+ADL		473.4	384.6
Supplemental		0.0	0.0
Supp. DL+ADL		-0.0	-0.0
Live	(Max)	130.4	123.9
Live	(Min)	-11.1	-22.6
Pedestrian	(Max)	-0.0	-0.0
Pedestrian	(Min)	-0.0	-0.0

Upward reactions are positive.
Live Load reactions are per lane with no distribution factor and no impact.
Non-composite load types are per beam.
Composite, Supplemental, and Pedestrian load types are per total bridge width.

SHEAR AND MOMENT ENVELOPE : Span : 2, Beam : 1, FACTORED 1
Shears: kips, Moments: kft

		Bearing	Trans	H/2	0.10L	0.20L	0.30L	0.40L	Midspan
Location,	ft	0.00	1.08	3.27	8.91	18.82	28.72	38.63	48.54
Self wt. :	M	0.0	62.9	185.5	474.9	890.5	1187.3	1365.3	1424.7
	V	58.7	57.4	54.7	47.9	35.9	24.0	12.0	0.0
Prec. :	M	-0.0	7.4	21.8	55.8	104.7	139.6	160.5	167.5
DL+ADL	V	6.9	6.7	6.4	5.6	4.2	2.8	1.4	0.0
Deck :	M	0.0	73.0	215.3	551.3	1033.5	1378.0	1584.7	1653.6
+ Haunch	V	68.1	66.6	63.5	55.6	41.7	27.8	13.9	0.0
Diaphragm :	M	0.0	0.4	1.3	3.6	7.6	10.4	11.7	13.0
	V	0.4	0.4	0.4	0.4	0.4	0.1	0.1	0.1
Comp. :	M	-1068.5	-1008.4	-890.9	-611.7	-204.0	98.0	294.2	384.8
DL+ADL	V	56.1	54.9	52.6	46.5	35.8	25.1	14.5	3.8
LL + I :	M+	349.8	335.7	338.8	486.1	1385.3	2077.4	2506.0	2570.4
	V	26.7	32.2	17.2	70.9	52.8	21.3	0.1	63.8
LL + I :	M-	-2786.8	-2635.6	-2353.5	-1767.4	-1421.1	-1185.1	-1143.0	-1063.3
	V	126.3	120.5	108.7	78.8	23.4	4.1	4.1	4.1
LL + I :	Vmx	165.9	164.0	159.6	148.8	131.7	111.7	89.9	74.7
	M	-315.2	-222.5	-34.2	458.5	1361.8	2007.8	2349.0	2463.6
Total :	M+	0.0	0.0	0.0	960.0	3217.5	4890.8	5922.6	6214.0
	V	0.0	0.0	0.0	227.0	170.9	101.1	42.0	67.7
Total :	M-	-3855.3	-3500.3	-2820.4	-1293.5	0.0	0.0	0.0	0.0
	V	316.5	306.6	286.4	234.9	0.0	0.0	0.0	0.0
Total :	Vmx	356.2	350.0	337.3	304.9	249.8	191.6	131.8	78.6
	M	-1383.7	-1087.2	-501.1	932.4	3194.0	4821.2	5765.6	6107.2

		0.60L	0.70L	0.80L	0.90L	H/2	Trans	Bearing
Location,	ft	58.45	68.36	78.27	88.17	93.81	96.00	97.08

		0.60L	0.70L	0.80L	0.90L	H/2	Trans	Bearing
Self wt. :	M	1365.3	1187.3	890.5	474.9	185.5	62.9	0.0
	V	12.0	24.0	35.9	47.9	54.7	57.4	58.7
Prec. :	M	160.5	139.6	104.7	55.8	21.8	7.4	0.0
DL+ADL	V	1.4	2.8	4.2	5.6	6.4	6.7	6.9
Deck :	M	1584.7	1378.0	1033.5	551.3	215.3	73.0	0.0
+ Haunch	V	13.9	27.8	41.7	55.6	63.5	66.6	68.1
Diaphragm :	M	11.8	10.4	7.9	3.7	1.4	0.5	-0.0
	V	0.1	0.1	0.4	0.4	0.4	0.4	0.4
Comp. :	M	369.6	248.6	22.0	-310.4	-543.8	-645.4	-698.1
DL+ADL	V	6.9	17.5	28.2	38.9	45.0	47.3	48.5
LL + I :	M+	2446.7	2017.0	1349.5	744.7	679.8	686.2	696.0
	V	2.2	23.2	55.2	12.4	18.6	21.0	22.2
LL + I :	M-	-1023.4	-994.6	-1163.2	-1503.6	-2052.2	-2314.3	-2454.5
	V	4.0	4.0	19.3	75.0	104.1	115.4	120.8
LL + I :	Vmx	89.8	112.6	134.8	154.4	162.3	165.5	166.8
	M	2248.4	1896.3	1253.9	358.4	-116.6	-294.7	-381.6
Total :	M+	5938.7	4980.9	3408.0	1520.1	560.1	184.5	0.0
	V	36.5	95.4	165.8	160.9	188.7	199.5	0.0
Total :	M-	0.0	0.0	0.0	-728.3	-2171.9	-2816.1	-3152.6
	V	0.0	0.0	0.0	223.5	274.2	293.9	303.4
Total :	Vmx	124.1	184.8	245.3	302.9	332.4	344.0	349.5
	M	5740.4	4860.2	3312.5	1133.8	304.6	-153.1	-383.0

REACTIONS (kips), FACTORED 1

Load Type		Left Support	Right Support
Self Wt.		58.7	58.7
Deck+Haunch		68.1	68.1
Diaphragm		0.4	0.4
Prec.DL+ADL		6.9	6.9
Comp. DL+ADL		615.4	500.0
Supplemental		0.0	0.0
Supp. DL+ADL		-0.0	-0.0
Live	(Max)	283.0	269.0
Live	(Min)	-24.1	-49.0
Pedestrian	(Max)	-0.0	-0.0
Pedestrian	(Min)	-0.0	-0.0

Upward reactions are positive.
Live Load reactions are per lane with no distribution factor and no impact.
Non-composite load types are per beam.
Composite, Supplemental, and Pedestrian load types are per total bridge width.

DESIGN SUMMARY

Span: 2, Beam: 1, Exterior beam

Beam type:		
	I-Girder,	ODOT AASHTO Type 4 66 MOD
Precast Length,	ft	99.08
Release Length,	ft	99.08
Strand Pattern:	Straight/Draped	Depr. Point: 0.40 L
Strand:	1/2-270K-LL	
Strand Type:	Low Relaxation	
Strand Es,	ksi:	28500.0
No. of strands:	42	
	Draped:	6
	Straight:	36
Concrete Strength:		
	f'ci:	5000.0 psi
	f'c:	7000.0 psi
	f'ct:	4500.0 psi
Initial losses:	8.33 %	
Final losses:	21.42 %	

Specification	Allowable	Computed	Status
Release Stresses (psi) (Art. 9.15.2.1)			
Precast Top w/ no reinf.	-200.00		
Precast Top w/ reinf.	-530.33	-247.31	OK
Precast Bot (compression)	3000.00	2746.41	OK
Factored 1	Provided	Required	
Ult. Moment (k.ft)	10159.61	6213.98	OK
Debonding Limits	Allowable	Computed	
Max. Debond per Row	40.00 %	0.00 %	OK
Max. Debond Total	25.00 %	0.00 %	OK

Positive Moment Envelope Stresses (psi)

Specification	Final 1 Allow	Comp	Final 2 Allow	Comp	Final 3 Allow	Comp
Service 1						
Topping Top	2700.0/-503.1	305.8 / -44.7	1800.0	61.2	1800.0	275.2

Specification	Final 1 Allow	Comp	Final 2 Allow	Comp	Final 3 Allow	Comp
Precast Top	4200.0/-502.0	1586.1 /-210.8	2800.0	1422.1	2800.0	875.0
Precast Bot	4200.0/-502.0	2419.6 / 207.9	2800.0	2574.8	2800.0	1132.2

Negative Moment Envelope Stresses (psi)

Specification	Final 1 Allow	Comp	Final 2 Allow	Comp	Final 3 Allow	Comp
Service 1						
Topping Top	2700.0/-503.1	-40.0 /-435.1	1800.0	61.2	1800.0	-70.6
Precast Top	4200.0/-502.0	1354.3 /-461.4	2800.0	1422.1	2800.0	643.2
Precast Bot	4200.0/-502.0	3308.1 /1029.8	2800.0	2711.9	2800.0	1952.1

CAMBER / DEFLECTION: (PCI Design Handbook - 4th Ed.- Table 4.6.2)
0.5 x L = 48.54 ft

		Release	Mult	Erection	Mult	Final
Prestress	:	2.522	1.80	4.540	2.45	6.179
Self Wt.	:	-0.980	1.85	-1.813	2.40	-2.352
Deck + Haunch	:			-0.886	1.00	-0.886
Supplemental	:			0.000	1.00	0.000
Prec. DL+ADL	:			-0.090	1.00	-0.090
Diaphragm	:			-0.007	1.00	-0.007
Comp. DL+ADL	:			-0.040	1.00	-0.040
Supp. DL+ADL	:			0.000	1.00	0.000
Live Load	:					-0.244
Total	:	1.542		1.704		2.560

Positive values indicate upward deflection.

SHEAR/MOMENT ENVELOPE (&REACTIONS)

SHEAR AND MOMENT ENVELOPE : Span : 2, Beam : 3, SERVICE 1
Shears: kips, Moments: kft

INTERIOR SPAN
INTERIOR BEAM

		Bearing	Trans	H/2	0.10L	0.20L	0.30L	0.40L	Midspan
Location,	ft	0.00	1.08	3.27	8.91	18.82	28.72	38.63	48.54
Self wt. :	M	0.0	48.4	142.7	365.3	685.0	913.3	1050.3	1095.9
	V	45.2	44.1	42.1	36.9	27.7	18.4	9.2	0.0
Prec. :	M	0.0	6.8	20.1	51.5	96.6	128.9	148.2	154.6
DL+ADL	V	6.4	6.2	5.9	5.2	3.9	2.6	1.3	0.0
Deck :	M	0.0	65.8	194.2	497.1	932.0	1242.6	1429.0	1491.1
+ Haunch	V	61.4	60.1	57.3	50.2	37.6	25.1	12.5	0.0
Diaphragm :	M	0.0	0.7	2.0	5.5	11.6	16.1	18.0	20.0
	V	0.6	0.6	0.6	0.6	0.6	0.2	0.2	0.2
Comp. :	M	-821.9	-775.7	-685.3	-470.5	-156.9	75.4	226.3	296.0
DL+ADL	V	43.1	42.2	40.4	35.8	27.5	19.3	11.1	2.9
LL + I :	M+	157.9	153.8	160.1	248.6	692.3	1001.7	1193.3	1237.7
	V	15.3	18.3	9.7	39.1	28.4	11.6	0.1	36.9
LL + I :	M-	-1321.9	-1247.1	-1108.0	-821.0	-633.0	-504.9	-464.7	-456.7
	V	72.3	68.7	61.4	43.4	12.6	2.2	2.3	2.3
LL + I :	Vmx	95.0	93.5	90.1	82.0	70.8	60.8	51.0	43.2
	M	-149.5	-105.3	-16.1	213.0	649.9	940.7	1099.2	1186.3
Total :	M+	0.0	0.0	0.0	697.5	2260.5	3377.9	4065.1	4295.3
	V	0.0	0.0	0.0	167.7	125.8	77.2	34.5	40.0
Total :	M-	-2143.8	-1901.1	-1434.2	-372.1	0.0	0.0	0.0	0.0
	V	229.0	222.0	207.8	172.0	0.0	0.0	0.0	0.0
Total :	Vmx	251.7	246.8	236.5	210.6	168.2	126.5	85.4	46.3
	M	-971.4	-759.3	-342.3	661.9	2218.2	3316.8	3971.0	4243.9

		0.60L	0.70L	0.80L	0.90L	H/2	Trans	Bearing
Location,	ft	58.45	68.36	78.27	88.17	93.81	96.00	97.08
Self wt. :	M	1050.3	913.3	685.0	365.3	142.7	48.4	0.0
	V	9.2	18.4	27.7	36.9	42.1	44.1	45.2
Prec. :	M	148.2	128.9	96.6	51.5	20.1	6.8	0.0
DL+ADL	V	1.3	2.6	3.9	5.2	5.9	6.2	6.4
Deck :	M	1429.0	1242.6	932.0	497.1	194.2	65.8	0.0
+ Haunch	V	12.5	25.1	37.6	50.2	57.3	60.1	61.4
Diaphragm :	M	18.2	16.0	12.1	5.7	2.1	0.7	-0.0
	V	0.2	0.2	0.6	0.6	0.6	0.6	0.6
Comp. :	M	284.3	191.3	16.9	-238.8	-418.3	-496.5	-537.0
DL+ADL	V	5.3	13.5	21.7	29.9	34.6	36.4	37.3
LL + I :	M+	1178.2	978.2	655.3	367.7	312.9	307.0	306.9
	V	1.3	12.8	29.8	6.7	10.5	12.0	12.7
LL + I :	M-	-439.6	-444.8	-542.7	-735.1	-1023.2	-1162.6	-1237.5
	V	2.3	2.2	10.4	40.8	58.7	66.0	69.5
LL + I :	Vmx	53.3	62.4	72.6	84.0	91.5	94.6	96.0
	M	1082.7	913.6	608.9	175.2	-58.1	-148.0	-192.4
Total :	M+	4108.0	3470.2	2397.9	1048.6	253.7	0.0	0.0
	V	29.9	72.7	121.3	129.5	151.1	0.0	0.0
Total :	M-	0.0	0.0	0.0	-54.2	-1082.4	-1537.4	-1774.5
	V	0.0	0.0	0.0	163.6	199.3	213.4	220.4
Total :	Vmx	81.9	122.2	164.1	206.8	232.1	242.1	246.9
	M	4012.5	3405.6	2351.5	856.1	298.8	-28.0	-193.5

REACTIONS (kips), SERVICE 1

Load Type		Left Support	Right Support
Self Wt.		45.2	45.2
Deck+Haunch		61.4	61.4
Diaphragm		0.6	0.6
Prec.DL+ADL		6.4	6.4
Comp. DL+ADL		473.4	384.6
Supplemental		0.0	0.0
Supp. DL+ADL		-0.0	-0.0
Live	(Max)	130.4	123.9
Live	(Min)	-11.1	-22.6
Pedestrian	(Max)	-0.0	-0.0
Pedestrian	(Min)	-0.0	-0.0

Upward reactions are positive.
Live Load reactions are per lane with no distribution factor and no impact.
Non-composite load types are per beam.
Composite, Supplemental, and Pedestrian load types are per total bridge width.

SHEAR AND MOMENT ENVELOPE : Span : 2, Beam : 3, FACTORED 1
Shears: kips, Moments: kft

		Bearing	Trans	H/2	0.10L	0.20L	0.30L	0.40L	Midspan
Location,	ft	0.00	1.08	3.27	8.91	18.82	28.72	38.63	48.54
Self wt. :	M	0.0	62.9	185.5	474.9	890.5	1187.3	1365.3	1424.7
	V	58.7	57.4	54.7	47.9	35.9	24.0	12.0	0.0
Prec. :	M	0.0	8.9	26.2	67.0	125.6	167.5	192.6	201.0
DL+ADL	V	8.3	8.1	7.7	6.8	5.1	3.4	1.7	0.0
Deck :	M	0.0	85.6	252.4	646.2	1211.5	1615.4	1857.7	1938.4
+ Haunch	V	79.9	78.1	74.5	65.2	48.9	32.6	16.3	0.0
Diaphragm :	M	0.0	0.9	2.6	7.2	15.1	20.9	23.4	26.0
	V	0.8	0.8	0.8	0.8	0.8	0.3	0.3	0.3
Comp. :	M	-1068.5	-1008.4	-890.9	-611.7	-204.0	98.0	294.2	384.8
DL+ADL	V	56.1	54.9	52.6	46.5	35.8	25.1	14.5	3.8
LL + I :	M+	342.8	334.0	347.6	539.7	1502.9	2174.7	2590.8	2687.0
	V	33.2	39.8	21.0	84.8	61.7	25.1	0.2	80.1
LL + I :	M-	-2869.8	-2707.4	-2405.4	-1782.4	-1374.3	-1096.1	-1008.9	-991.5
	V	156.9	149.1	133.3	94.3	27.3	4.8	5.0	5.1
LL + I :	Vmx	206.3	202.9	195.7	178.0	153.8	132.0	110.7	93.7
	M	-324.6	-228.6	-35.0	462.4	1411.0	2042.2	2386.3	2575.4
Total :	M+	0.0	0.0	0.0	1123.3	3541.6	5263.7	6324.1	6661.9
	V	0.0	0.0	0.0	252.0	188.2	110.5	44.9	84.2
Total :	M-	-3938.3	-3557.6	-2829.5	-1198.8	0.0	0.0	0.0	0.0
	V	360.7	348.4	323.6	261.5	0.0	0.0	0.0	0.0
Total :	Vmx	410.0	402.2	386.0	345.2	280.3	217.4	155.4	97.8
	M	-1393.1	-1078.8	-459.1	1046.0	3449.8	5131.2	6119.6	6550.3

		0.60L	0.70L	0.80L	0.90L	H/2	Trans	Bearing
Location,	ft	58.45	68.36	78.27	88.17	93.81	96.00	97.08

		0.60L	0.70L	0.80L	0.90L	H/2	Trans	Bearing
Self wt. :	M	1365.3	1187.3	890.5	474.9	185.5	62.9	0.0
	V	12.0	24.0	35.9	47.9	54.7	57.4	58.7
Prec. :	M	192.6	167.5	125.6	67.0	26.2	8.9	0.0
DL+ADL	V	1.7	3.4	5.1	6.8	7.7	8.1	8.3
Deck :	M	1857.7	1615.4	1211.5	646.2	252.4	85.6	0.0
+ Haunch	V	16.3	32.6	48.9	65.2	74.5	78.1	79.9
Diaphragm :	M	23.6	20.8	15.7	7.4	2.7	0.9	-0.0
	V	0.3	0.3	0.8	0.8	0.8	0.8	0.8
Comp. :	M	369.6	248.6	22.0	-310.4	-543.8	-645.4	-698.1
DL+ADL	V	6.9	17.5	28.2	38.9	45.0	47.3	48.5
LL + I :	M+	2557.8	2123.7	1422.7	798.2	679.2	666.4	666.2
	V	2.8	27.9	64.6	14.6	22.8	26.1	27.7
LL + I :	M-	-954.3	-965.7	-1178.2	-1596.0	-2221.4	-2524.0	-2686.7
	V	5.1	4.8	22.6	88.6	127.5	143.2	150.9
LL + I :	Vmx	115.8	135.5	157.6	182.4	198.7	205.4	208.4
	M	2350.4	1983.5	1322.0	380.4	-126.2	-321.4	-417.7
Total :	M+	6366.6	5363.3	3688.1	1683.4	602.3	179.2	0.0
	V	40.0	105.7	183.6	174.2	205.5	217.8	0.0
Total :	M-	0.0	0.0	0.0	-710.8	-2298.3	-3011.3	-3384.8
	V	0.0	0.0	0.0	248.2	310.2	334.9	347.1
Total :	Vmx	152.9	213.3	276.6	342.0	381.4	397.1	404.6
	M	6159.3	5223.1	3587.3	1265.6	337.8	-165.3	-419.1

REACTIONS (kips), FACTORED 1

Load Type		Left Support	Right Support
Self Wt.		58.7	58.7
Deck+Haunch		79.9	79.9
Diaphragm		0.8	0.8
Prec.DL+ADL		8.3	8.3
Comp. DL+ADL		615.4	500.0
Supplemental		0.0	0.0
Supp. DL+ADL		-0.0	-0.0
Live	(Max)	283.0	269.0
Live	(Min)	-24.1	-49.0
Pedestrian	(Max)	-0.0	-0.0
Pedestrian	(Min)	-0.0	-0.0

Upward reactions are positive.
Live Load reactions are per lane with no distribution factor and no impact.
Non-composite load types are per beam.
Composite, Supplemental, and Pedestrian load types are per total bridge width.

DESIGN SUMMARY

Span: 2, Beam: 3, Interior beam

Beam type:		
	I-Girder,	ODOT AASHTO Type 4 66 MOD
Precast Length,	ft	99.08
Release Length,	ft	99.08
Strand Pattern:	Straight/Draped	Depr. Point: 0.40 L
Strand:	1/2-270K-LL	
Strand Type:	Low Relaxation	
Strand Es,	ksi:	28500.0
No. of strands:	42	
	Draped:	6
	Straight:	36
Concrete Strength:		
	f'ci:	5000.0 psi
	f'c:	7000.0 psi
	f'ct:	4500.0 psi
Initial losses:	8.33 %	
Final losses:	20.88 %	

Specification	Allowable	Computed	Status
Release Stresses (psi) (Art. 9.15.2.1)			
Precast Top w/ no reinf.	-200.00		
Precast Top w/ reinf.	-530.33	-247.31	OK
Precast Bot (compression)	3000.00	2746.41	OK
Factored 1	Provided	Required	
Ult. Moment (k.ft)	10239.47	6661.92	OK
Debonding Limits	Allowable	Computed	
Max. Debond per Row	40.00 %	0.00 %	OK
Max. Debond Total	25.00 %	0.00 %	OK

Positive Moment Envelope Stresses (psi)

Specification	Final 1 Allow	Comp	Final 2 Allow	Comp	Final 3 Allow	Comp
Service 1						
Topping Top	2700.0/-503.1	280.9 / -42.2	1800.0	54.2	1800.0	253.8

Specification	Final 1 Allow	Comp	Final 2 Allow	Comp	Final 3 Allow	Comp
Precast Top	4200.0/-502.0	1774.9 /-200.0	2800.0	1632.0	2800.0	958.9
Precast Bot	4200.0/-502.0	2430.2 / 18.5	2800.0	2577.9	2800.0	1141.2

Negative Moment Envelope Stresses (psi)

Specification	Final 1 Allow	Comp	Final 2 Allow	Comp	Final 3 Allow	Comp
Service 1						
Topping Top	2700.0/-503.1	-29.4 /-392.7	1800.0	54.2	1800.0	-56.6
Precast Top	4200.0/-502.0	1579.3 /-411.7	2800.0	1632.0	2800.0	763.3
Precast Bot	4200.0/-502.0	3312.3 / 833.8	2800.0	2712.3	2800.0	1956.2

CAMBER / DEFLECTION: (PCI Design Handbook - 4th Ed.- Table 4.6.2)
0.5 x L = 48.54 ft

		Release	Mult	Erection	Mult	Final
Prestress	:	2.522	1.80	4.540	2.45	6.179
Self Wt.	:	-0.980	1.85	-1.813	2.40	-2.352
Deck + Haunch	:			-1.039	1.00	-1.039
Supplemental	:			0.000	1.00	0.000
Prec. DL+ADL	:			-0.108	1.00	-0.108
Diaphragm	:			-0.013	1.00	-0.013
Comp. DL+ADL	:			-0.040	1.00	-0.040
Supp. DL+ADL	:			0.000	1.00	0.000
Live Load	:					-0.227
Total	:	1.542		1.527		2.400

Positive values indicate upward deflection.

PROPERTIES

Span: 2, Beam: 3

PRECAST DATA:

Section Id	ODOT AASHTO Type 4 66 MOD						
Type	I-Girder						
Flng width		Top	36.000	in	Bot	26.000	in
thick		Top	4.000	in	Bot	8.000	in
Stems		No	1				
		Top	8.000	in			
		Bot	8.000	in			
Shear width			8.000	in			
Wide top Flange		NO					

GENERAL BRIDGE DATA:

Bridge Width	48.46	ft
Curb-to-curb	45.50	ft
Beam Spac. Lt./Rt	10.50/ 10.50	ft
Lane width	12.00	ft
Number of lanes	3	
Interior/Exterior	Interior	
Start Skew Angle	19.00	degrees
End Skew Angle	19.00	degrees

TOPPING DATA:

Deck	Thickness	8.500	in	
Haunch:				
	Thickness	2.000	in	
	Width	36.000	in	
Effective	width	126.000	in	(Art. 8.10.1)

GENERAL LOAD DATA:

Dead loads on precast:
UNITS: (Point: kips, Location: ft)
(Line: klf)

Type	Mag.	Loc.
Line	0.131	-

Diaphragm loads:
(kips, ft)

Mag.	Loc.
0.42	24.75
0.42	49.50
0.42	74.25

Dead loads on composite: See Project info for composite loads

GENERAL SPAN DATA:

Overall length	99.083	ft
Release length	99.083	ft
Design length	97.417	ft

KERN POINTS:

Upper	48.39	in
Lower	15.69	in

DISTRIBUTION FACTORS:

For Live Load, computed using Refined Methods of Analysis:

Location	+ve Moment		-ve Moment		Shear	
	Group 1/1B	Group 1/1A	Group 1/1B	Group 1/1A	Group 1/1B	Group 1/1A
0.0L	0.438	0.750	0.851	0.408	0.641	0.976
0.1L	0.423	0.816	0.818	0.376	0.570	0.910
0.2L	0.417	0.836	0.780	0.347	0.539	0.895
0.3L	0.397	0.820	0.745	0.322	0.578	0.904
0.4L	0.396	0.818	0.711	0.300	0.610	0.931
0.5L	0.395	0.817	0.725	0.308	0.593	0.933
0.6L	0.398	0.822	0.763	0.333	0.536	0.875
0.7L	0.418	0.837	0.802	0.362	0.520	0.872
0.8L	0.431	0.825	0.844	0.397	0.524	0.885
0.9L	0.431	0.825	0.877	0.434	0.576	0.923
1.0L	0.312	0.727	0.881	0.437	0.643	0.977

Dead Loads and Pedestrian Load distributed equally to all beams (Art. 3.23.2.3.1.1)

Pedestrian	0.200	(Calculated)
Comp. DL	0.200	(Calculated)
Comp. ADL	0.200	(Calculated)

RESISTANCE FACTORS (Art. 9.14):

Flexure Reinforced	0.90
Flexure Prestressed	1.00
Shear	0.90

Span: 2, Beam: 3

SECTION PROPERTIES:

	PRECAST		COMPOSITE		
Area	893.0	in2	1809.4	in2	#
Total Height	66.00	in	76.50	in	
Mom. of Inertia (Ixx)	480161	in4	1240443	in4	#
Ht. of c.g.	31.10	in	51.77	in	#
Density	150.00	pcf	150.00	pcf	
Self-weight	930.2	plf	2120.8	plf	
Mom. of Inertia (Iyy)	36314.0	in4			
Poisson's Ratio	0.2				

(#) Of Total Section using Ect/Ec = 0.8018

Use transformed strand and rebar: No

Span: 2, Beam: 3
STRESS LIMITS (Art. 9.15.2):

STRESS LIMITS AT FINAL 1 (P/S + DL + LL) (Art. 9.15.2.2 a):

	PRECAST		DECK	
Strength	7000.00	psi	4500.00	psi
Max Comp, Top	4200.00	psi	2700.00	psi
Pos Mom, Bot	4200.00	psi		
Neg Mom, Bot	4200.00	psi		
Max Tens, Top	-502.00	psi	-503.12	psi
Max Tens, Bot	-502.00	psi		
Crk Tens, Bot	-627.50	psi		
Elasticity	5072.2	ksi	4066.8	ksi

STRESS LIMITS AT FINAL 2 (P/S + DL) (Art. 9.15.2.2 b):

	PRECAST		DECK	
Max Comp, Top	2800.00	psi	1800.00	psi
Pos Mom, Bot	2800.00	psi		
Neg Mom, Bot	2800.00	psi		

STRESS LIMITS AT FINAL 3 (50% P/S + 50% DL + LL) (Art. 9.15.2.2 c):

	PRECAST		DECK	
Max Comp, Top	2800.00	psi	1800.00	psi
Pos Mom, Bot	2800.00	psi		
Neg Mom, Bot	2800.00	psi		

AT RELEASE (Art. 9.15.2.1):

	PRECAST	
Strength	5000.00	psi
Max Comp, Top	5000.00	psi
Max Comp, Bot	3000.00	psi
Max Tens, Top	-200.00	psi
w/reinf	-530.33	psi
Max Tens, Bot	-0.00	psi
Elasticity	4286.8	ksi

Span: 2, Beam: 3

PRESTRESSED STEEL:

42 strands, 1/2-270K-LL, Low relaxation strands
Depressed at 0.40L (39.63 ft from member end)

END PATTERN (Ycg = 12.29 in):

11 @ 2.000 in	11 @ 4.000 in	8 @ 6.000 in	6 @ 8.000 in
3 @ 54.000 in	3 @ 64.000 in		

MID PATTERN (Ycg = 4.86 in):
(A) Draped:

3 @ 6.000 in	3 @ 8.000 in	

(B) Straight:

11 @ 2.000 in	11 @ 4.000 in	8 @ 6.000 in	6 @ 8.000 in

Strand Diameter	0.500	in
Strand Area	0.153	in2
Total Strand Area	6.426	in2
Trans. Len,bonded	2.083	ft
Trans. Len,debonded	2.083	ft
Dev. Len, bonded	10.633	ft
Dev. Len, debonded	13.292	ft
Holddown Force	20.202	kips
Holddown Force	270.0	ksi
Initial Prestress = 0.75f's	202.5	ksi
Initial Pull	1301.3	kips
Beam Shrtng (PL/AE)	0.370	in

REINFORCING STEEL:

Tension	steel:	
fy	60.0	ksi
Es	29000	ksi
fs	24.0	ksi

Stirrups:

# legs	Size	fy (ksi)	Area (in2)	Spacing (in)	Start (ft)	End (ft)
2	US#4[M13]	60.0	0.40	6.00	0.0000	7.9711
2	US#4[M13]	60.0	0.40	12.00	7.9711	46.4446
2	US#4[M13]	60.0	0.40	24.00	46.4446	52.6387
2	US#4[M13]	60.0	0.40	12.00	52.6387	91.1122
2	US#4[M13]	60.0	0.40	6.00	91.1122	99.0833

LOSSES

Note: Values are calculated at Midspan

Str. area	6.4260	in2
Ycg	4.86	in
P_init	1301.3	kips
Ecc	26.24	in
Hours to release	18.00	
Rel. Humid.(RH)	75.0	%

Es	28500.0	ksi
Eci	4287	ksi

AASHTO LOSSES

		Release				Final	(Art. 9.16.2)
Steel relaxation	*	1600.47	psi	CRs (Eq 9-10A)	2220.20	psi	
Elastic Shortening		15276.95	psi	ES (Eq 9-6)	15276.95	psi	(Fcir=2297.88 psi)
Concrete shrinkage		0.00	psi	SH (Eq 9-4)	5750.00	psi	
Concrete creep		0.00	psi	CRc (Eq 9-9)	19292.12	psi	(Fcds=-1183.21 psi)
Total		16877.42	psi	(8.33 %)	42539.27	psi	(21.01 %)

* Steel relax. before release - Ref: PCI Journal Vol. 20, No. 4, Jul-Aug 1975

SHEAR/MOMENT ENVELOPE (&REACTIONS)

SHEAR AND MOMENT ENVELOPE : Span : 2, Beam : 3, SERVICE 1
Shears: kips, Moments: kft

		Bearing	Trans	H/2	0.10L	0.20L	0.30L	0.40L	Midspan
Location,	ft	0.00	1.25	3.19	9.07	18.98	28.89	38.80	48.71
Self wt. :	M	0.0	55.9	139.7	372.9	692.5	920.8	1057.8	1103.5
	V	45.3	44.1	42.3	36.9	27.7	18.4	9.2	0.0
Prec. :	M	0.0	7.9	19.7	52.6	97.7	129.9	149.3	155.7
DL+ADL	V	6.4	6.2	6.0	5.2	3.9	2.6	1.3	0.0
Deck :	M	0.0	71.6	178.8	477.3	886.4	1178.6	1353.9	1412.4
+ Haunch	V	58.0	56.5	54.2	47.2	35.4	23.6	11.8	0.0
Diaphragm :	M	0.0	0.8	2.0	5.6	11.8	16.2	18.1	20.1
	V	0.6	0.6	0.6	0.6	0.6	0.2	0.2	0.2
Comp. :	M	-856.1	-800.3	-716.5	-481.9	-155.3	85.9	241.7	312.0
DL+ADL	V	45.2	44.1	42.4	37.3	28.7	20.0	11.4	2.8
LL + I :	M+	158.6	155.9	161.7	260.1	700.8	1004.8	1193.0	1233.0
	V	15.6	19.0	24.1	39.0	28.4	11.6	0.1	12.6
LL + I :	M-	-1309.7	-1224.5	-1102.8	-807.9	-629.2	-504.1	-464.0	-456.0
	V	71.9	67.8	61.6	43.4	12.6	2.2	2.3	2.3
LL + I :	Vmx	94.7	93.0	90.1	82.0	70.8	60.8	51.0	43.2
	M	-131.7	-80.5	-1.5	237.3	671.4	958.3	1113.2	1174.0
Total :	M+	0.0	0.0	0.0	686.5	2233.8	3336.2	4013.8	4236.6
	V	0.0	0.0	0.0	166.2	124.6	76.4	34.0	15.5
Total :	M-	-2165.8	-1888.7	-1479.1	-381.4	0.0	0.0	0.0	0.0
	V	227.4	219.4	207.1	170.6	0.0	0.0	0.0	0.0
Total :	Vmx	250.2	244.5	235.7	209.1	167.0	125.7	84.9	46.1
	M	-987.8	-744.7	-377.8	663.7	2204.5	3289.7	3934.0	4177.6

		0.60L	0.70L	0.80L	0.90L	H/2	Trans	Bearing
Location,	ft	58.62	68.52	78.43	88.34	94.23	96.17	97.42
Self wt. :	M	1057.8	920.8	692.5	372.9	139.7	55.9	0.0
	V	9.2	18.4	27.7	36.9	42.3	44.1	45.3
Prec. :	M	149.3	129.9	97.7	52.6	19.7	7.9	0.0
DL+ADL	V	1.3	2.6	3.9	5.2	6.0	6.2	6.4
Deck :	M	1353.9	1178.6	886.4	477.3	178.8	71.6	0.0
+ Haunch	V	11.8	23.6	35.4	47.2	54.2	56.5	58.0
Diaphragm :	M	18.3	16.1	12.2	5.8	2.0	0.8	-0.0
	V	0.2	0.2	0.6	0.6	0.6	0.6	0.6
Comp. :	M	296.8	196.2	10.1	-261.4	-461.9	-535.3	-584.6
DL+ADL	V	5.8	14.5	23.1	31.7	36.8	38.5	39.6
LL + I :	M+	1174.0	983.6	634.3	365.1	311.3	307.1	307.5
	V	45.7	56.2	66.9	28.9	20.2	17.2	15.2
LL + I :	M-	-462.1	-466.6	-574.4	-776.3	-1073.9	-1193.9	-1277.2
	V	2.2	2.1	10.2	43.8	61.5	67.5	71.4
LL + I :	Vmx	51.6	62.1	73.2	86.0	93.4	95.9	97.5
	M	1143.2	971.8	647.7	213.7	-67.8	-162.2	-223.6
Total :	M+	4050.1	3425.3	2333.1	1012.3	189.6	0.0	0.0
	V	74.1	115.5	157.6	150.5	160.2	0.0	0.0
Total :	M-	0.0	0.0	0.0	-129.1	-1195.5	-1593.0	-1861.8
	V	0.0	0.0	0.0	165.4	201.4	213.6	221.3
Total :	Vmx	79.9	121.4	163.9	207.6	233.4	242.0	247.4
	M	4019.2	3413.4	2346.6	860.9	271.2	-26.9	-224.0

BENTLEY

Program:
CONSPAN® Rating
Version: 8.0.2

By: DMP - check revision
Date: Apr/30/2008
CKD:
Date:

File Name: 100-100-100-100 Type IV66 continuous_REV 1... .csl

REACTIONS (kips), SERVICE 1

Load Type		Left Support	Right Support
Self Wt.		45.3	45.3
Deck+Haunch		58.0	58.0
Diaphragm		0.6	0.6
Prec.DL+ADL		6.4	6.4
Comp. DL+ADL		497.4	404.1
Live	(Max)	130.4	123.9
Live	(Min)	-11.1	-22.6
Pedestrian	(Max)	-0.0	-0.0
Pedestrian	(Min)	-0.0	-0.0

Upward reactions are positive.
Live Load reactions are per lane with no distribution factor and no impact.
Non-composite load types are per beam.
Composite and Pedestrian load types are per total bridge width.

SHEAR AND MOMENT ENVELOPE : Span : 2, Beam : 3, FACTORED 1
Shears: kips, Moments: kft

		Bearing	Trans	H/2	0.10L	0.20L	0.30L	0.40L	Midspan
Location,	ft	0.00	1.25	3.19	9.07	18.98	28.89	38.80	48.71
Self wt. :	M	0.0	72.7	181.6	484.7	900.3	1197.1	1375.1	1434.5
	V	58.9	57.4	55.0	47.9	35.9	24.0	12.0	0.0
Prec. :	M	0.0	10.3	25.6	68.4	127.0	168.9	194.0	202.4
DL+ADL	V	8.3	8.1	7.8	6.8	5.1	3.4	1.7	0.0
Deck :	M	0.0	93.0	232.4	620.4	1152.3	1532.2	1760.1	1836.1
+ Haunch	V	75.4	73.5	70.5	61.3	46.0	30.7	15.3	0.0
Diaphragm :	M	0.0	1.0	2.6	7.3	15.3	21.0	23.6	26.2
	V	0.8	0.8	0.8	0.8	0.8	0.3	0.3	0.3
Comp. :	M	-1112.9	-1040.4	-931.4	-626.5	-201.9	111.7	314.2	405.5
DL+ADL	V	58.7	57.3	55.1	48.5	37.3	26.0	14.8	3.6
LL + I :	M+	344.2	338.4	351.2	564.7	1521.3	2181.5	2590.0	2676.8
	V	33.9	41.3	52.4	84.8	61.7	25.1	0.2	27.3
LL + I :	M-	-2843.5	-2658.5	-2394.2	-1753.9	-1366.1	-1094.5	-1007.4	-990.0
	V	156.0	147.3	133.7	94.3	27.3	4.8	5.0	5.1
LL + I :	Vmx	205.6	201.8	195.7	178.0	153.7	132.0	110.7	93.7
	M	-285.9	-174.8	-3.2	515.1	1457.7	2080.4	2416.8	2548.7
Total :	M+	0.0	0.0	0.0	1119.0	3514.3	5212.3	6257.0	6581.5
	V	0.0	0.0	0.0	250.1	186.8	109.4	44.3	31.1
Total :	M-	-3956.4	-3521.9	-2883.4	-1199.5	0.0	0.0	0.0	0.0
	V	358.2	344.4	322.9	259.6	0.0	0.0	0.0	0.0
Total :	Vmx	407.7	398.9	384.9	343.3	278.8	216.3	154.8	97.6
	M	-1398.8	-1038.2	-492.4	1069.5	3450.7	5111.3	6083.9	6453.4

		0.60L	0.70L	0.80L	0.90L	H/2	Trans	Bearing
Location,	ft	58.62	68.52	78.43	88.34	94.23	96.17	97.42
Self wt. :	M	1375.1	1197.1	900.3	484.7	181.6	72.7	0.0
	V	12.0	24.0	35.9	47.9	55.0	57.4	58.9

		0.60L	0.70L	0.80L	0.90L	H/2	Trans	Bearing
Prec. :	M	194.0	168.9	127.0	68.4	25.6	10.3	0.0
DL+ADL	V	1.7	3.4	5.1	6.8	7.8	8.1	8.3
Deck :	M	1760.1	1532.2	1152.3	620.4	232.4	93.0	0.0
+ Haunch	V	15.3	30.7	46.0	61.3	70.5	73.5	75.4
Diaphragm :	M	23.8	20.9	15.8	7.6	2.7	1.0	-0.0
	V	0.3	0.3	0.8	0.8	0.8	0.8	0.8
Comp. :	M	385.8	255.1	13.2	-339.8	-600.5	-695.9	-760.0
DL+ADL	V	7.6	18.8	30.0	41.2	47.9	50.1	51.5
LL + I :	M+	2548.8	2135.5	1377.0	792.7	675.8	666.7	667.7
	V	99.3	122.0	145.3	62.8	43.8	37.3	33.0
LL + I :	M-	-1003.3	-1013.0	-1246.9	-1685.3	-2331.3	-2591.9	-2772.7
	V	4.7	4.6	22.1	95.1	133.4	146.6	155.0
LL + I :	Vmx	111.9	134.8	159.0	186.6	202.7	208.3	211.7
	M	2481.9	2109.7	1406.2	463.9	-147.3	-352.2	-485.4
Total :	M+	6287.7	5309.6	3585.5	1634.0	517.6	147.8	0.0
	V	136.2	199.1	263.2	220.9	225.8	227.2	0.0
Total :	M-	0.0	0.0	0.0	-843.9	-2489.5	-3110.8	-3532.7
	V	0.0	0.0	0.0	253.2	315.4	336.4	349.9
Total :	Vmx	148.8	212.0	276.9	344.7	384.7	398.1	406.6
	M	6220.7	5283.8	3614.7	1305.2	293.4	-176.3	-485.9

REACTIONS (kips), FACTORED 1

Load Type		Left Support	Right Support
Self Wt.		58.9	58.9
Deck+Haunch		75.4	75.4
Diaphragm		0.8	0.8
Prec.DL+ADL		8.3	8.3
Comp. DL+ADL		646.6	525.3
Live	(Max)	283.0	269.0
Live	(Min)	-24.1	-49.0
Pedestrian	(Max)	-0.0	-0.0
Pedestrian	(Min)	-0.0	-0.0

Upward reactions are positive.
Live Load reactions are per lane with no distribution factor and no impact.
Non-composite load types are per beam.
Composite and Pedestrian load types are per total bridge width.

BENTLEY

Program:
CONSPAN® Rating
Version: 8.0.2

By: DMP - check revision
Date: Apr/30/2008
CKD:
Date:

File Name: 100-100-100-100 Type IV66 continuous_REV 1... .csl

POSITIVE ENVELOPE STRESSES

Span : 2, Beam : 3, SERVICE 1

RELEASE STRESSES, (psi) (LOSS = 8.33 %)

	Trans	0.10L /0.90L	0.20L /0.80L	0.30L /0.70L	0.40L /0.60L	Midspan
Location, ft	2.08	9.91	19.82	29.72	39.63	49.54
Self Wt.						
Precast-top	82.0	358.4	637.2	836.4	955.8	995.7
Bottom	-73.1	-319.4	-567.8	-745.3	-851.8	-887.2
Prestress						
Precast-top	-329.3	-456.4	-617.5	-778.5	-939.5	-939.5
Bottom	2819.5	2932.8	3076.3	3219.7	3363.2	3363.2
Total						
Precast-top	-247.3	-98.0	19.8	57.9	16.4	56.2
Bottom	2746.4	2613.4	2508.4	2474.4	2511.5	2476.0
As_top (in2)	0.991	0.000	0.000	0.000	0.000	0.000

Span : 2, Beam : 3, SERVICE 1

POSITIVE ENVELOPE STRESSES, (psi) (LOSS = 21.01%)

	Bearing	Trans	H/2	0.10L /0.90L	0.20L /0.80L	0.30L /0.70L	0.40L /0.60L	Midspan
Location, ft	0.00	1.25	3.19	9.07	18.98	28.89	38.80	48.71
Prestress								
Precast-top	-106.5	-283.8	-310.9	-393.3	-532.1	-670.8	-809.6	-809.6
Bottom	965.6	2429.7	2453.9	2527.3	2651.0	2774.6	2898.3	2898.3
Self wt.								
Precast-top	0.0	48.8	121.8	325.2	604.0	803.1	922.6	962.4
Bottom	-0.0	-43.5	-108.6	-289.8	-538.2	-715.7	-822.2	-857.7
Prec. DL+ADL								
Precast-top	0.0	6.9	17.2	45.9	85.2	113.3	130.2	135.8
Bottom	-0.0	-6.1	-15.3	-40.9	-75.9	-101.0	-116.0	-121.0
Diaphragm								
Precast-top	-0.0	0.7	1.8	5.1	10.6	14.0	15.9	17.6
Bottom	-0.0	-0.6	-1.6	-4.5	-9.4	-12.5	-14.2	-15.6
Deck + Haunch								

		Bearing	Trans	H/2	0.10L /0.90L	0.20L /0.80L	0.30L /0.70L	0.40L /0.60L	Midspan
Precast-top		0.0	62.4	156.0	416.3	773.1	1028.0	1180.9	1231.9
Bottom		-0.0	-55.6	-139.0	-370.9	-688.9	-916.1	-1052.3	-1097.8
Comp. DL+ADL									
Topping-top		-112.1	-102.7	-88.6	-50.1	1.9	37.6	56.9	59.8
Precast-top		-80.5	-73.7	-63.6	-36.0	1.4	27.0	40.8	42.9
Bottom		292.8	268.1	231.4	130.9	-5.1	-98.3	-148.7	-156.2
LL+I(+)									
Topping-top		59.0	58.9	59.7	70.0	121.6	188.6	225.2	236.5
Precast-top		42.3	42.3	42.8	50.2	87.3	135.4	161.6	169.7
Bottom		-154.0	-153.8	-155.9	-182.9	-317.7	-492.7	-588.0	-617.6
Final 1 (P/S + DL	+ LL)								
Topping-top		-53.1	-43.8	-28.9	19.9	123.6	226.3	282.1	296.3
Precast-top		-144.6	-196.4	-34.9	413.4	1029.5	1450.0	1642.5	1750.7
Bottom		1104.4	2438.2	2264.8	1769.2	1015.7	438.4	156.9	32.4
Final 2 (P/S + DL)									
Topping-top		-112.1	-102.7	-88.6	-50.1	1.9	37.6	56.9	59.8
Precast-top		-187.0	-238.7	-77.7	363.1	942.2	1314.6	1480.9	1581.0
Bottom		1258.4	2592.0	2420.8	1952.1	1333.3	931.1	744.9	649.9
Final 3 (50% P/S	+ 50%	DL + LL)							
Topping-top		2.9	7.6	15.4	45.0	122.6	207.5	253.6	266.4
Precast-top		-51.2	-77.1	4.0	231.8	558.4	792.7	902.0	960.2
Bottom		475.2	1142.2	1054.5	793.2	349.0	-27.1	-215.6	-292.6

VERTICAL/HORIZONTAL SHEAR

VERTICAL SHEAR (Art. 9.20) - Span : 2, Beam : 3, FACTORED 1

Location (ft)		Vd(kips)	Md(k.ft)	Ml(k.ft)	Vu(kips)	Mu(k.ft)	Vmu(kips)	Mmax(k.ft)	Vi(kips)
fpe (psi)	fd (psi)	Mcr (k.ft)	d (in)	Vci-com (kips)	Vci-min (kips)	Vci (kips)	fpc (psi)	Vp (kips)	Vcw (kips)
Vc (kips)	Vs-rqrd (kips)	Vs-max (kips)	Av-com (in2/ft)	Av-min (in2/ft)	Av (in2/ft)	Av-prvd (in2/ft)	pVn/Vu	MaxSpc (in)	Vs-crit (kips)
Bearing :	0.83	155.5	-856.1	-1309.7	384.9	-3956.4	358.2	-3100.3	202.7
0.0	-164.2	-1242.6	75.00	266.8	85.3	266.8	124.6	6.4	204.5
204.5	223.1	401.6	0.60	0.08	0.60	0.80	1.180	12.0	200.8
Transfer :	2.08	151.6	-664.2	-1224.5	384.9	-3521.9	344.4	-2857.7	192.8
0.0	-153.5	-1298.4	75.00	269.3	85.3	269.3	371.4	16.0	258.5
258.5	169.1	401.6	0.45	0.08	0.45	0.80	1.306	24.0	200.8
H/2 :	4.02	145.5	-376.3	-1102.8	384.9	-2883.4	322.9	-2507.1	177.4
0.0	-137.4	-1382.2	75.00	273.4	85.3	273.4	460.8	16.0	274.6
273.4	154.2	401.6	0.41	0.08	0.41	0.80	1.341	24.0	200.8
0.1L :	9.91	127.2	426.4	-807.9	343.3	-1199.5	259.6	-1625.9	132.4
0.0	-92.4	-1616.7	75.00	288.9	85.3	288.9	705.5	16.0	318.7
288.9	92.5	401.6	0.25	0.08	0.25	0.40	1.151	24.0	200.8
0.2L :	19.82	96.2	1533.1	700.8	278.8	3514.3	186.8	1981.3	90.6
2651.0	-1234.5	3830.4	67.93	298.6	77.3	298.6	1026.3	16.0	342.4
298.6	11.2	363.7	0.03	0.08	0.08	0.40	1.402	24.0	181.9
0.3L :	29.72	64.9	2331.4	1004.8	216.3	5212.3	109.4	2880.9	44.6
2774.6	-1788.3	2971.5	69.79	138.9	79.4	138.9	1232.0	16.0	385.8
138.9	101.5	373.7	0.29	0.08	0.29	0.40	1.159	24.0	186.8
0.4L :	39.63	33.9	2820.8	1193.0	154.8	6257.0	44.3	3436.2	10.3
2898.3	-2125.6	2544.9	71.64	70.3	81.5	81.5	1322.2	0.0	395.2
81.5	90.5	383.6	0.25	0.08	0.25	0.40	1.307	24.0	191.8
0.5L :	49.54	3.0	3003.6	1233.0	97.6	6581.5	31.1	3577.9	28.2
2898.3	-2248.3	2299.9	71.64	49.8	81.5	81.5	1380.3	0.0	405.2
81.5	26.9	383.6	0.08	0.08	0.08	0.20	1.413	24.0	191.8
0.6L :	59.45	28.4	2876.1	1174.0	148.8	6287.7	136.2	3411.6	107.8
2898.3	-2153.4	2489.5	71.64	135.8	81.5	135.8	1322.3	0.0	395.2
135.8	29.5	383.6	0.08	0.08	0.08	0.40	1.688	24.0	191.8
0.7L :	69.36	59.3	2441.6	983.6	212.0	5309.6	199.1	2868.0	139.8
2774.6	-1843.5	2861.3	69.79	226.8	79.4	226.8	1232.0	16.0	385.8
226.8	8.7	373.7	0.02	0.08	0.08	0.40	1.556	24.0	186.8
0.8L :	79.27	90.7	1698.9	634.3	276.9	3585.5	263.2	1886.6	172.5
2651.0	-1317.6	3664.4	67.93	453.1	77.3	453.1	1026.5	16.0	342.4
342.4	0.0	363.7	0.00	0.08	0.08	0.40	1.555	24.0	181.9

Location (ft)		Vd(kips)	Md(k.ft)	Ml(k.ft)	Vu(kips)	Mu(k.ft)	Vmu(kips)	Mmax(k.ft)	Vi(kips)
fpe (psi)	fd (psi)	Mcr (k.ft)	d (in)	Vci-com (kips)	Vci-min (kips)	Vci (kips)	fpc (psi)	Vp (kips)	Vcw (kips)
Vc (kips)	Vs-rqrd (kips)	Vs-max (kips)	Av-com (in2/ft)	Av-min (in2/ft)	Av (in2/ft)	Av-prvd (in2/ft)	pVn/Vu	MaxSpc (in)	Vs-crit (kips)
0.9L :	89.17	121.6	647.2	365.1	344.7	1634.0	220.9	986.9	99.3
2527.3	-575.3	4899.7	66.07	641.0	75.2	641.0	705.6	16.0	282.6
282.6	100.4	353.8	0.30	0.08	0.30	0.40	1.083	24.0	176.9
H/2 :	95.06	140.0	-121.7	-1073.9	384.7	-2489.5	315.4	-2367.8	175.4
0.0	-88.6	-1636.7	75.00	291.4	85.3	291.4	460.8	16.0	274.6
274.6	152.8	401.6	0.41	0.08	0.41	0.80	1.344	24.0	200.8
Transfer :	97.00	146.0	-399.2	-1193.9	384.7	-3110.8	336.4	-2711.7	190.4
0.0	-102.7	-1563.4	75.00	285.9	85.3	285.9	371.5	16.0	258.5
258.5	168.9	401.6	0.45	0.08	0.45	0.80	1.307	24.0	200.8
Bearing :	98.25	149.9	-584.6	-1277.2	384.7	-3532.7	349.9	-2948.1	200.0
0.0	-112.1	-1514.1	75.00	282.8	85.3	282.8	124.6	6.4	204.5
204.5	222.9	401.6	0.59	0.08	0.59	0.80	1.180	12.0	200.8

ANCHORAGE ZONE REINFORCEMENT (Art. 9.22.1)
Span : 2, Beam : 3

Fpi (kips)	fs (ksi)	d/4 (in)	Abrst_rqrd (in2)
1301.26	20.00	13.43	2.60

HORIZONTAL SHEAR (Art. 9.20.4) - Span : 2, Beam : 3

(Beam and Slab effects are INCLUDED in Vu).

Location (ft)									
bv (in)	fsy (ksi)	Vu (kips)	Vnh-req (psi)	d (in)	Surf (in2/ft)	s_max (in)	Avh-min (in2/ft)	Avh-sm (in2/ft)	Avh-rg (in2/ft)
Bearing :	0.00								
36.00	60.00	407.7	167.78	75.00	432.00	24.00	0.360	1.940	0.360
Transfer :	1.25								
36.00	60.00	398.9	164.15	75.00	432.00	24.00	0.360	1.875	0.360
H/2 :	3.19								
36.00	60.00	384.9	158.39	75.00	432.00	24.00	0.360	1.771	0.360
0.1L :	9.07								
36.00	60.00	343.3	141.26	75.00	432.00	24.00	0.360	1.463	0.360
0.2L :	18.98								

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Program:
CONSPAN® Rating
Version: 8.0.2

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Date:

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Location (ft)									
bv (in)	**fsy (ksi)**	**Vu (kips)**	**Vnh-req (psi)**	**d (in)**	**Surf (in2/ft)**	**s_max (in)**	**Avh-min (in2/ft)**	**Avh-sm (in2/ft)**	**Avh-rg (in2/ft)**
36.00	60.00	278.8	126.69	67.93	432.00	24.00	0.360	1.200	0.360
0.3L :	28.89								
36.00	60.00	216.3	95.66	69.79	432.00	24.00	0.360	0.642	0.360
0.4L :	38.80								
36.00	60.00	154.8	66.68	71.64	432.00	24.00	0.360	0.360	0.000
0.5L :	48.71								
36.00	60.00	97.6	42.04	71.64	432.00	24.00	0.360	0.360	0.000
0.6L :	58.62								
36.00	60.00	148.8	64.11	71.64	432.00	24.00	0.360	0.360	0.000
0.7L :	68.52								
36.00	60.00	212.0	93.74	69.79	432.00	24.00	0.360	0.607	0.360
0.8L :	78.43								
36.00	60.00	276.9	125.80	67.93	432.00	24.00	0.360	1.184	0.360
0.9L :	88.34								
36.00	60.00	344.7	141.86	75.00	432.00	24.00	0.360	1.473	0.360
H/2 :	94.23								
36.00	60.00	384.7	158.31	75.00	432.00	24.00	0.360	1.770	0.360
Transfer :	96.17								
36.00	60.00	398.1	163.84	75.00	432.00	24.00	0.360	1.869	0.360
Bearing :	97.42								
36.00	60.00	406.6	167.32	75.00	432.00	24.00	0.360	1.932	0.360

CAMBER/DEFLECTION

CAMBER AND DEFLECTIONS: SERVICE 1
(Span : 2, Beam : 3; Units: in)

	Release	Mult	Erection	Mult	Final
At 0.1 x L =	9.07 ft				
Prestress	0.871	1.80	1.569	2.45	2.135
Self Wt.	-0.308	1.85	-0.569	2.40	-0.738
Deck + Haunch			-0.290	1.00	-0.290
Prec. DL+ADL			-0.032	1.00	-0.032
Diaphragm			-0.004	1.00	-0.004
Comp. DL+ADL			0.003	1.00	0.003
Live Load(+I)					-0.069
Total	0.564		0.676		1.004

	Release	Mult	Erection	Mult	Final
At 0.2 x L =	18.98 ft				
Prestress	1.575	1.80	2.835	2.45	3.859
Self Wt.	-0.582	1.85	-1.077	2.40	-1.397
Deck + Haunch			-0.575	1.00	-0.575
Prec. DL+ADL			-0.063	1.00	-0.063
Diaphragm			-0.008	1.00	-0.008
Comp. DL+ADL			-0.008	1.00	-0.008
Live Load(+I)					-0.136
Total	0.993		1.104		1.671

	Release	Mult	Erection	Mult	Final
At 0.3 x L =	28.89 ft				
Prestress	2.095	1.80	3.771	2.45	5.132
Self Wt.	-0.797	1.85	-1.474	2.40	-1.913
Deck + Haunch			-0.799	1.00	-0.799
Prec. DL+ADL			-0.088	1.00	-0.088
Diaphragm			-0.011	1.00	-0.011
Comp. DL+ADL			-0.024	1.00	-0.024
Live Load(+I)					-0.193
Total	1.298		1.374		2.104

	Release	Mult	Erection	Mult	Final
At 0.4 x L =	38.80 ft				
Prestress	2.415	1.80	4.346	2.45	5.916
Self Wt.	-0.933	1.85	-1.727	2.40	-2.240
Deck + Haunch			-0.942	1.00	-0.942
Prec. DL+ADL			-0.104	1.00	-0.104
Diaphragm			-0.013	1.00	-0.013
Comp. DL+ADL			-0.038	1.00	-0.038
Live Load(+I)					-0.231
Total	1.481		1.523		2.349

	Release	Mult	Erection	Mult	Final
At 0.5 x L =	48.71 ft				
Prestress	2.522	1.80	4.540	2.45	6.179
Self Wt.	-0.980	1.85	-1.813	2.40	-2.352
Deck + Haunch			-0.991	1.00	-0.991

BENTLEY

Program:
CONSPAN® Rating
Version: 8.0.2

By: DMP - check revision
Date: Apr/30/2008
CKD:
Date:

File Name: 100-100-100-100 Type IV66 continuous_REV 1... .csl

	Release	Mult	Erection	Mult	Final
Prec. DL+ADL			-0.109	1.00	-0.109
Diaphragm			-0.014	1.00	-0.014
Comp. DL+ADL			-0.046	1.00	-0.046
Live Load(+I)					-0.243
Total	1.542		1.568		2.426

	Release	Mult	Erection	Mult	Final
At 0.6 x L =	58.62 ft				
Prestress	2.415	1.80	4.346	2.45	5.916
Self Wt.	-0.933	1.85	-1.727	2.40	-2.240
Deck + Haunch			-0.942	1.00	-0.942
Prec. DL+ADL			-0.104	1.00	-0.104
Diaphragm			-0.013	1.00	-0.013
Comp. DL+ADL			-0.045	1.00	-0.045
Live Load(+I)					-0.227
Total	1.481		1.517		2.346

	Release	Mult	Erection	Mult	Final
At 0.7 x L =	68.52 ft				
Prestress	2.095	1.80	3.771	2.45	5.132
Self Wt.	-0.797	1.85	-1.474	2.40	-1.913
Deck + Haunch			-0.799	1.00	-0.799
Prec. DL+ADL			-0.088	1.00	-0.088
Diaphragm			-0.011	1.00	-0.011
Comp. DL+ADL			-0.036	1.00	-0.036
Live Load(+I)					-0.187
Total	1.298		1.362		2.099

	Release	Mult	Erection	Mult	Final
At 0.8 x L =	78.43 ft				
Prestress	1.575	1.80	2.835	2.45	3.859
Self Wt.	-0.582	1.85	-1.077	2.40	-1.397
Deck + Haunch			-0.575	1.00	-0.575
Prec. DL+ADL			-0.063	1.00	-0.063
Diaphragm			-0.008	1.00	-0.008
Comp. DL+ADL			-0.021	1.00	-0.021
Live Load(+I)					-0.129
Total	0.993		1.091		1.666

	Release	Mult	Erection	Mult	Final
At 0.9 x L =	88.34 ft				
Prestress	0.871	1.80	1.569	2.45	2.135
Self Wt.	-0.308	1.85	-0.569	2.40	-0.738
Deck + Haunch			-0.290	1.00	-0.290
Prec. DL+ADL			-0.032	1.00	-0.032
Diaphragm			-0.004	1.00	-0.004
Comp. DL+ADL			-0.007	1.00	-0.007
Live Load(+I)					-0.062
Total	0.564		0.666		1.001

Positive values indicate upward deflection.

ULTIMATE MOMENT

ULTIMATE - Span : 2, Beam : 3, FACTORED 1
(Mu-prvd computed by AASHTO equations, Art. 9.17/9.18)

(f'c_eff, ksi = 4.50; beta1 = 0.825)

Location (ft)	A*s in2	Ycg in	p*(A*s/bd)	f*su ksi	a in	Mu-prvd k.ft	Mu-rqrd k.ft	Mcr k.ft	Crkg Ratio	Mu-p/r Ratio
Transfer	1.25									
	1.259	11.90	0.00015	269.1	0.7	1814.2	-525.0	6028.7	0.301	3.46
H/2	3.19									
	2.430	11.53	0.00030	268.4	1.4	3493.0	-138.0	5964.4	0.586	25.30
0.1L	9.07									
	5.988	10.43	0.00072	266.0	3.3	8547.4	1119.0	5797.6	1.474	-
0.2L	18.98									
	6.426	8.57	0.00075	265.9	3.5	9413.9	3514.3	5614.0	1.677	-
0.3L	28.89									
	6.426	6.71	0.00073	266.0	3.5	9682.2	5212.3	5553.4	1.743	-
0.4L	38.80									
	6.426	4.86	0.00071	266.1	3.5	9950.5	6257.0	5616.2	1.772	-
0.5L	48.71									
	6.426	4.86	0.00071	266.1	3.5	9950.5	6581.5	5554.1	1.792	-
0.6L	58.62									
	6.426	4.86	0.00071	266.1	3.5	9950.5	6287.7	5616.1	1.772	-
0.7L	68.52									
	6.426	6.71	0.00073	266.0	3.5	9682.2	5309.6	5553.5	1.743	-
0.8L	78.43									
	6.426	8.57	0.00075	265.9	3.5	9413.9	3585.5	5613.8	1.677	-
0.9L	88.34									
	5.988	10.43	0.00072	266.0	3.3	8547.4	1634.0	5797.5	1.474	-
H/2	94.23									
	2.430	11.53	0.00030	268.4	1.4	3493.0	517.6	5964.4	0.586	6.75
Transfer	96.17									
	1.259	11.90	0.00015	269.1	0.7	1814.2	147.8	6028.7	0.301	12.27

DETENSIONING

Span : 2, Beam : 3; Groups 1-23; Units: psi

Grp	Str		Ys,in		2.08ft
1	2	E	2.00	Ft	25.547
		M	2.00	Fb	97.522
2	2	E	64.00	Ft	212.827
		M	8.00	Fb	50.920
3	1	E	64.00	Ft	306.468
		M	8.00	Fb	27.619
4	2	E	54.00	Ft	454.200
		M	6.00	Fb	16.260
5	1	E	54.00	Ft	528.066
		M	6.00	Fb	10.580
6	2	E	8.00	Ft	496.304
		M	8.00	Fb	159.171
7	2	E	8.00	Ft	464.542
		M	8.00	Fb	307.761
8	2	E	8.00	Ft	432.781
		M	8.00	Fb	456.351
9	2	E	6.00	Ft	392.762
		M	6.00	Fb	612.300
10	2	E	6.00	Ft	352.744
		M	6.00	Fb	768.248
11	2	E	6.00	Ft	312.725
		M	6.00	Fb	924.197
12	2	E	6.00	Ft	272.706
		M	6.00	Fb	1080.145
13	2	E	4.00	Ft	224.431
		M	4.00	Fb	1243.451
14	2	E	4.00	Ft	176.155
		M	4.00	Fb	1406.758
15	2	E	4.00	Ft	127.880
		M	4.00	Fb	1570.064
16	2	E	4.00	Ft	79.604
		M	4.00	Fb	1733.370
17	2	E	4.00	Ft	31.329
		M	4.00	Fb	1896.677
18	1	E	4.00	Ft	7.191
		M	4.00	Fb	1978.330
19	2	E	2.00	Ft	-49.342
		M	2.00	Fb	2148.994
20	2	E	2.00	Ft	-105.874
		M	2.00	Fb	2319.658
21	2	E	2.00	Ft	-162.407
		M	2.00	Fb	2490.322
22	2	E	2.00	Ft	-218.939
		M	2.00	Fb	2660.986
23	1	E	2.00	Ft	-247.205
		M	2.00	Fb	2746.318

NEGATIVE ENVELOPE STRESSES

Span : 2, Beam : 3, SERVICE 1
NEGATIVE ENVELOPE STRESSES, (psi) (LOSS = 21.01%)

		Bearing	Trans	H/2	0.10L /0.90L	0.20L /0.80L	0.30L /0.70L	0.40L /0.60L	Midspan
Location, ft		0.00	1.25	3.19	9.07	18.98	28.89	38.80	48.71
Prestress									
Precast-top		-106.5	-283.8	-310.9	-393.3	-532.1	-670.8	-809.6	-809.6
Bottom		965.6	2429.7	2453.9	2527.3	2651.0	2774.6	2898.3	2898.3
Self wt.									
Precast-top		0.0	48.8	121.8	325.2	604.0	803.1	922.6	962.4
Bottom		-0.0	-43.5	-108.6	-289.8	-538.2	-715.7	-822.2	-857.7
Prec. DL+ADL									
Precast-top		0.0	6.9	17.2	45.9	85.2	113.3	130.2	135.8
Bottom		-0.0	-6.1	-15.3	-40.9	-75.9	-101.0	-116.0	-121.0
Diaphragm									
Precast-top		0.0	0.7	1.7	4.9	10.3	14.1	15.8	17.6
Bottom		-0.0	-0.6	-1.5	-4.4	-9.1	-12.6	-14.1	-15.6
Deck + Haunch									
Precast-top		0.0	62.4	156.0	416.3	773.1	1028.0	1180.9	1231.9
Bottom		-0.0	-55.6	-139.0	-370.9	-688.9	-916.1	-1052.3	-1097.8
Comp. DL+ADL									
Topping-top		-164.2	-153.5	-137.4	-92.4	-29.8	16.5	46.3	59.8
Precast-top		-117.8	-110.1	-98.6	-66.3	-21.4	11.8	33.3	42.9
Bottom		428.8	400.8	358.9	241.4	77.8	-43.0	-121.0	-156.2
LL+I(-)									
Topping-top		-251.2	-234.8	-211.5	-154.9	-120.7	-96.7	-89.0	-87.5
Precast-top		-180.2	-168.5	-151.8	-111.2	-86.6	-69.4	-63.9	-62.8
Bottom		656.0	613.3	552.3	404.6	315.2	252.5	232.4	228.4
Final 1 (P/S + DL	+ LL)								
Topping-top		-415.4	-388.3	-348.9	-247.4	-150.5	-80.2	-42.6	-27.6
Precast-top		-404.6	-443.7	-264.6	221.4	832.5	1230.1	1409.3	1518.3
Bottom		2050.4	3338.0	3100.7	2467.3	1731.6	1238.8	1005.0	878.3
Final 2 (P/S + DL)									
Topping-top		-164.2	-153.5	-137.4	-92.4	-29.8	16.5	46.3	59.8
Precast-top		-224.3	-275.2	-112.8	332.6	919.1	1299.5	1473.2	1581.0
Bottom		1394.4	2724.7	2548.3	2062.7	1416.5	986.3	772.6	649.9
Final 3 (50% P/S	+ 50%	DL + LL)							
Topping-top		-333.3	-311.6	-280.2	-201.1	-135.6	-88.4	-65.8	-57.5
Precast-top		-292.4	-306.1	-208.2	55.1	373.0	580.4	672.7	727.8
Bottom		1353.2	1975.7	1826.5	1436.0	1023.4	745.6	618.7	553.4

REINFORCED DESIGN

REINFORCED DESIGN - Span : 2, Beam : 3, FACTORED 1 (fy = 60.00 ksi, phi = 0.9)

(a) NEGATIVE MOMENTS ALONG SPAN (Non-composite Moment effects are INCLUDED in Mu)

Negative Moment Continuity Steel:

#bars	Size	Dist. from Top (in)	Area (in2)	Start (ft)	End (ft)
4	US#10[M32]	1.50	5.08	85.0000	100.0000
7	US#10[M32]	1.50	8.89	95.0000	100.0000
4	US#10[M32]	1.50	5.08	0.0000	15.0000
7	US#10[M32]	1.50	8.89	0.0000	5.0000

f'c (ksi)	b (in)	bw (in)
7000.00 (Art. 9.7.2.3.2)	26.00;	8.00

Sec	Dist (ft)	Mu-reqd (k.ft)	hf (in)	d (in)	d' (in)	1.2*Mcr (k.ft)	Asb (in2)	Ast-r (in2)	Ast-p (in2)	M-prvd (k.ft)
1	0.00	-4320.1	8.00	75.00	2.00	-3148.0	0.000	13.255	13.970	-4544.6
2	10.74	-1199.5	8.00	75.00	2.00	-3148.0	0.000	4.786	5.080	-1692.0
3	20.65	0.0	12.50	74.50	4.25	-0.0	0.000	0.000	0.000	-0.0
4	30.56	0.0	12.50	74.50	4.25	-0.0	0.000	0.000	0.000	-0.0
5	40.47	0.0	12.50	74.50	4.25	-0.0	0.000	0.000	0.000	-0.0
6	50.37	0.0	12.50	74.50	4.25	-0.0	0.000	0.000	0.000	-0.0
7	60.28	0.0	12.50	74.50	4.25	-0.0	0.000	0.000	0.000	-0.0
8	70.19	0.0	12.50	74.50	4.25	-0.0	0.000	0.000	0.000	-0.0
9	80.10	0.0	12.50	74.50	4.25	-0.0	0.000	0.000	0.000	-0.0
10	90.01	-843.9	8.00	75.00	2.00	-3148.0	0.000	3.355	5.080	-1692.0
11	100.00	-3719.9	8.00	75.00	2.00	-3148.0	0.000	11.355	13.970	-4544.6

(b) POSITIVE MOMENTS AT PIERS

NONE

DESIGN SUMMARY

Span: 2, Beam: 3, Interior beam

Beam type:		
	I-Girder,	ODOT AASHTO Type 4 66 MOD
Precast Length,	ft	99.08
Release Length,	ft	99.08
Strand Pattern:	Straight/Draped	Depr. Point: 0.40 L
Strand:	1/2-270K-LL	
Strand Type:	Low Relaxation	
Strand Es,	ksi:	28500.0
No. of strands:	42	
	Draped:	6
	Straight:	36
Concrete Strength:		
	f'ci:	5000.0 psi
	f'c:	7000.0 psi
	f'ct:	4500.0 psi
Initial losses:	8.33 %	
Final losses:	21.01 %	

Specification	Allowable	Computed	Status
Release Stresses (psi) (Art. 9.15.2.1)			
Precast Top w/ no reinf.	-200.00		
Precast Top w/ reinf.	-530.33	-247.31	OK
Precast Bot (compression)	3000.00	2746.41	OK
Factored 1	Provided	Required	
Ult. Moment (k.ft)	9950.51	6581.51	OK
Debonding Limits	Allowable	Computed	
Max. Debond per Row	40.00 %	0.00 %	OK
Max. Debond Total	25.00 %	0.00 %	OK

Positive Moment Envelope Stresses (psi)

Specification	Final 1 Allow	Comp	Final 2 Allow	Comp	Final 3 Allow	Comp
Service 1						
Topping Top	2700.0/-503.1	296.3 / -53.1	1800.0	59.8	1800.0	266.4

BENTLEY

Program:
CONSPAN® Rating
Version: 8.0.2

By: DMP - check revision
Date: Apr/30/2008
CKD:
Date:

File Name: 100-100-100-100 Type IV66 continuous_REV 1... .csl

Specification	Final 1 Allow	Comp	Final 2 Allow	Comp	Final 3 Allow	Comp
Precast Top	4200.0/-502.0	1750.7 /-196.4	2800.0	1581.0	2800.0	960.2
Precast Bot	4200.0/-502.0	2438.2 / 32.4	2800.0	2592.0	2800.0	1142.2

Negative Moment Envelope Stresses (psi)

Specification	Final 1 Allow	Comp	Final 2 Allow	Comp	Final 3 Allow	Comp
Service 1						
Topping Top	2700.0/-503.1	-27.6 /-415.4	1800.0	59.8	1800.0	-57.5
Precast Top	4200.0/-502.0	1518.3 /-443.7	2800.0	1581.0	2800.0	727.8
Precast Bot	4200.0/-502.0	3338.0 / 878.3	2800.0	2724.7	2800.0	1975.7

CAMBER / DEFLECTION: (PCI Design Handbook - 4th Ed.- Table 4.6.2)
0.5 x L = 48.71 ft

	Release	Mult	Erection	Mult	Final
Prestress	2.522	1.80	4.540	2.45	6.179
Self Wt.	-0.980	1.85	-1.813	2.40	-2.352
Deck + Haunch			-0.991	1.00	-0.991
Prec. DL+ADL			-0.109	1.00	-0.109
Diaphragm			-0.014	1.00	-0.014
Comp. DL+ADL			-0.046	1.00	-0.046
Live Load					-0.243
Total	1.542		1.568		2.426

Positive values indicate upward deflection.

Program:
CONSPAN® Rating
Version: 8.0.2

By: DMP - check revision
Date: Apr/30/2008
CKD:
Date:

File Name: 100-100-100-100 Type IV66 simple_REV 1.csl

PROJECT DATA

Project:	
Designer:	DMP - check revision
Date:	Apr/30/2008
User job number:	
State:	Ohio, State Job #:
State Specification:	None
Design Mode:	AASHTO Standard (LFD)- US Units [17th Edition, 2003]
Flared Girder:	No
File Name:	C:\PWWORKING\PITT\d0112578\100-100-100-100 Type IV66 simple_REV 1.csl

BENTLEY

Program:
CONSPAN® Rating
Version: 8.0.2

By: DMP - check revision
Date: Apr/30/2008
CKD:
Date:

File Name: 100-100-100-100 Type IV66 simple_REV 1.csl

GEOMETRY DATA

BRIDGE LAYOUT

Overall Width (ft)	48.458
Left curb (ft)	1.500
Right curb (ft)	1.458
curb-to-curb width (ft)	45.500
Number of spans	1
Number of lanes	3
Lane width (ft)	12.000
Topping thickness (in)	8.500
Haunch thickness (in)	4.000
Haunch width (in)	36.000
Bridge c/s,MI(Ixx) (in4)	6483654.50

SPAN DATA

Precast length,	ft =	99.083
Bearing-to-bearing,	ft =	97.417
Release span,	ft =	99.083

BEAM DATA

No	ID	Loc-prev ft	Area in2	MI(Ixx) in4	Height in	Yb in	B-topg in	B-trib ft
1	ODOT AASHTO Type 4 6	3.500	893.0	480161.0	66.00	31.10	36.00	8.750
2	ODOT AASHTO Type 4 6	10.500	893.0	480161.0	66.00	31.10	36.00	10.500
3	ODOT AASHTO Type 4 6	10.500	893.0	480161.0	66.00	31.10	36.00	10.500
4	ODOT AASHTO Type 4 6	10.500	893.0	480161.0	66.00	31.10	36.00	10.500
5	ODOT AASHTO Type 4 6	10.500	893.0	480161.0	66.00	31.10	36.00	8.208

MATERIAL DATA

CONCRETE PROPERTIES

	Precast	C.I.P
f'c (ksi)	7000.000	4500.000
Wc (pcf)	150.000	150.000
Ec (ksi)	5072.240	4066.840
f'ci (psi)	5000.000	
Eci (ksi)	4286.830	

STRAND AND REBAR PROPERTIES

PRESTRESSED STEEL:

1/2-270K-LL, Low relaxation strands
Depressed at 0.40L (39.63 ft from member end)

Strand Diameter = 0.500
Ult. Strength(f's) = 270.0 ksi
Strand Area = 0.153 in2
Use transformed strand and rebar: No

REINFORCING STEEL:

Tension steel: fy = 60.0 ksi Es = 29000 ksi fs = 24.0 ksi

LOADS DATA

LOADS ON PRECAST

UNITS: (Point: kips, Location: ft, Line: klf)

Span	Beam	DL/ADL	Type	Mag.	Loc.	Description
1	1	DL	Line	0.109	-	
1	2	DL	Line	0.131	-	
1	3	DL	Line	0.131	-	
1	4	DL	Line	0.131	-	
1	5	DL	Line	0.103	-	

DIAPHRAGM LOADS

(kips, ft)

Span	Beam	Mag.	Loc.
1	1	0.210	24.750
1	1	0.210	49.500
1	1	0.210	74.750
1	2	0.420	24.750
1	2	0.420	49.500
1	2	0.420	74.250
1	3	0.420	24.750
1	3	0.420	49.500
1	3	0.420	74.250
1	4	0.420	24.750
1	4	0.420	49.500
1	4	0.420	74.250
1	5	0.210	24.750
1	5	0.210	49.500
1	5	0.210	74.250

LOADS ON COMPOSITE

UNITS: (Point: kips, Location: ft, Line: klf, Area: ksf, Width: ft)

Span	DL/ADL	Type	Mag.	Loc.	Description
1	DL	Line	0.716	-	Left Barrier
1	DL	Line	0.864	-	Right Barrier and Noise Wall
1	DL	Line	0.042	-	Noise Wall wind effects

LIVE LOADS

Live load deflection: not included.

ID: H/HS25 Lane	(Type: Lane Load)
ID: HS25 Truck	(Type: Truck Load)
ID: Military Truck	(Type: Truck Load)

Program:
CONSPAN® Rating
Version: 8.0.2

By: DMP - check revision
Date: Apr/30/2008
CKD:
Date:

File Name: 100-100-100-100 Type IV66 simple_REV 1.csl

LIVE LOADS USED

LIVE LOAD LIBRARY: default.cs4

1 ID: H/HS25 Lane

Description:	H25/HS25 as in AASHTO-STANDARD
Type:	Lane Load

Lane Load:	Intensity = 0.80 klf,	Width = 10.00 ft
Conc. Loads:	Moment = 22.50 k,	Shear = 32.50 k

2 ID: HS25 Truck

Description:	HS25 Truck as in AASHTO-STANDARD
Type:	Truck Load

Uniform Load	Intensity, klf	Location, ft	Length, ft
Preceding Load	0.00	0.00	0.00
Trailing Load	0.00	0.00	0.00

First Axle Magnitude = 10.00 k,	Wheel Spacing = 6.00 ft,	Truck Width = 10.00 ft

#	Magnitude, k	Max Spacing, ft	Min Spacing, ft	Increment, ft
1	40.00	14.00	14.00	0.00
2	40.00	30.00	14.00	2.00

3 ID: Military Truck

Description:	Military Truck as in AASHTO-STANDARD
Type:	Truck Load

Uniform Load	Intensity, klf	Location, ft	Length, ft
Preceding Load	0.00	0.00	0.00
Trailing Load	0.00	0.00	0.00

First Axle Magnitude = 24.00 k,	Wheel Spacing = 6.00 ft,	Truck Width = 10.00 ft

#	Magnitude, k	Max Spacing, ft	Min Spacing, ft	Increment, ft
1	24.00	4.00	4.00	0.00

ANALYSIS DATA

ANALYSIS PARAMETERS DATA

Beam#	Moment impact	Shear impact
1	1.225	Calculated (AASHTO 3.8.2.2)
2	1.225	Calculated (AASHTO 3.8.2.2)
3	1.225	Calculated (AASHTO 3.8.2.2)
4	1.225	Calculated (AASHTO 3.8.2.2)
5	1.225	Calculated (AASHTO 3.8.2.2)

NOTE: Beam specific dead and live load DFs are printed in beam level reports.

GAMMA/BETA FACTORS: (Table 3.22.1A)

	Service		Factored	
Gamma:	1.00		1.30	
Beta-D:	1.00		1.00	
Beta-L:	1.00	(Group 1)	1.67	(Group 1)

PROJECT PARAMETERS

MULTIPLIERS:

Trans len mult:	Bonded	=	1.00
	Debonded	=	1.00
Dev len mult:	Bonded	=	1.60
	Debonded	=	2.00

Camber & Deflection Multiplier (PCI ref.)

	Erection	Final
Prestress:	1.80	2.45
Self. Wt:	1.85	2.40
Deck + Haunch:		1.00
Diaphragm:		1.00
Prec.DL+ADL:		1.00
Comp.DL+ADL:		1.00

MOMENT AND SHEAR PROVISIONS:

Ultimate Moment Capacity, Mu-prvd computed:	AASHTO equations
Horizontal Shear, Beam and Slab effects in Vu:	INCLUDED
Negative Moment Design, Non-composite Moment effects in Mu:	INCLUDED

STRESS LIMITS (Art. 9.15.2):

STRESS LIMITS AT FINAL 1 (P/S + DL + LL) (Art. 9.15.2.2 a):

	PRECAST		DECK	
Strength	7000.00	psi	4500.00	psi
Max Comp, Top	4200.00	psi	2700.00	psi
Pos Mom, Bot	4200.00	psi		
Neg Mom, Bot	4200.00	psi		
Max Tens, Top	-502.00	psi	-503.12	psi
Max Tens, Bot	-502.00	psi		
Crk Tens, Bot	-627.50	psi		
Elasticity	5072.2	ksi	4066.8	ksi

STRESS LIMITS AT FINAL 2 (P/S + DL) (Art. 9.15.2.2 b):

	PRECAST		DECK	
Max Comp, Top	2800.00	psi	1800.00	psi

	PRECAST		DECK	
Pos Mom, Bot	2800.00	psi		
Neg Mom, Bot	2800.00	psi		

STRESS LIMITS AT FINAL 3 (50% P/S + 50% DL + LL) (Art. 9.15.2.2 c):

	PRECAST		DECK	
Max Comp, Top	2800.00	psi	1800.00	psi
Pos Mom, Bot	2800.00	psi		
Neg Mom, Bot	2800.00	psi		

AT RELEASE (Art. 9.15.2.1):

	PRECAST	
Strength	5000.00	psi
Max Comp, Top	5000.00	psi
Max Comp, Bot	3000.00	psi
Max Tens, Top	-200.00	psi
w/reinf	-530.33	psi
Max Tens, Bot	-0.00	psi
Elasticity	4286.8	ksi

RESISTANCE FACTORS (Art. 9.14):

Flexure Reinforced	0.90
Flexure Prestressed	1.00
Shear	0.90

PRESTRESS LOSSES:

Time Dependent Losses, Approximate Method (Art.5.9.5.3)
Hours to release = 18.00
Rel. Humid.(RH) = 75.0 %

PROPERTIES

Span: 1, Beam: 3

PRECAST DATA:

Section Id	ODOT AASHTO Type 4 66 MOD						
Type	I-Girder						
Flng width		Top	36.000	in	Bot	26.000	in
thick		Top	4.000	in	Bot	8.000	in
Stems		No	1				
		Top	8.000	in			
		Bot	8.000	in			
Shear width			8.000	in			
Wide top Flange		NO					

GENERAL BRIDGE DATA:

Bridge Width	48.46	ft
Curb-to-curb	45.50	ft
Beam Spac. Lt./Rt	10.50/ 10.50	ft
Lane width	12.00	ft
Number of lanes	3	
Interior/Exterior	Interior	

TOPPING DATA:

Deck	Thickness	8.500	in	
Haunch:				
	Thickness	4.000	in	
	Width	36.000	in	
Effective	width	126.000	in	(Art. 8.10.1)

GENERAL LOAD DATA:

Dead loads on precast:
UNITS: (Point: kips, Location: ft)
(Line: klf)

Type	Mag.	Loc.
Line	0.131	-

Diaphragm loads:
(kips, ft)

Mag.	Loc.
0.42	24.75
0.42	49.50
0.42	74.25

Dead loads on composite: See Project info for composite loads

GENERAL SPAN DATA:

Overall length	99.083	ft
Release length	99.083	ft
Design length	97.417	ft

KERN POINTS:

Upper	48.39	in
Lower	15.69	in

DISTRIBUTION FACTORS (Art. 3.23):

Live Moment (Group 1)	0.955	(Calculated)
Live Shear (Group 1)	0.955	(Calculated)

Dead Loads and Pedestrian Load distributed equally to all beams (Art. 3.23.2.3.1.1)

Pedestrian	0.200	(Calculated)
Comp. DL	0.200	(Calculated)
Comp. ADL	0.200	(Calculated)

RESISTANCE FACTORS (Art. 9.14):

Flexure Reinforced	0.90
Flexure Prestressed	1.00
Shear	0.90

Span: 1, Beam: 3

SECTION PROPERTIES:

	PRECAST		COMPOSITE		
Area	893.0	in2	1867.2	in2	#
Total Height	66.00	in	78.50	in	
Mom. of Inertia (Ixx)	480161	in4	1327420	in4	#
Ht. of c.g.	31.10	in	53.23	in	#
Density	150.00	pcf	150.00	pcf	
Self-weight	930.2	plf	2195.8	plf	
Mom. of Inertia (Iyy)	36314.0	in4			
Poisson's Ratio	0.2				

(#) Of Total Section using Ect/Ec = 0.8018

Use transformed strand and rebar: No

Span: 1, Beam: 3
STRESS LIMITS (Art. 9.15.2):

STRESS LIMITS AT FINAL 1 (P/S + DL + LL) (Art. 9.15.2.2 a):

	PRECAST		DECK	
Strength	7000.00	psi	4500.00	psi
Max Comp, Top	4200.00	psi	2700.00	psi
Pos Mom, Bot	4200.00	psi		
Neg Mom, Bot	4200.00	psi		
Max Tens, Top	-502.00	psi	-503.12	psi
Max Tens, Bot	-502.00	psi		
Crk Tens, Bot	-627.50	psi		
Elasticity	5072.2	ksi	4066.8	ksi

STRESS LIMITS AT FINAL 2 (P/S + DL) (Art. 9.15.2.2 b):

	PRECAST		DECK	
Max Comp, Top	2800.00	psi	1800.00	psi
Pos Mom, Bot	2800.00	psi		
Neg Mom, Bot	2800.00	psi		

STRESS LIMITS AT FINAL 3 (50% P/S + 50% DL + LL) (Art. 9.15.2.2 c):

	PRECAST		DECK	
Max Comp, Top	2800.00	psi	1800.00	psi
Pos Mom, Bot	2800.00	psi		
Neg Mom, Bot	2800.00	psi		

AT RELEASE (Art. 9.15.2.1):

	PRECAST	
Strength	5000.00	psi
Max Comp, Top	5000.00	psi
Max Comp, Bot	3000.00	psi
Max Tens, Top	-200.00	psi
w/reinf	-530.33	psi
Max Tens, Bot	-0.00	psi
Elasticity	4286.8	ksi

Span: 1, Beam: 3

PRESTRESSED STEEL:

42 strands, 1/2-270K-LL, Low relaxation strands
Depressed at 0.40L (39.63 ft from member end)

END PATTERN (Ycg = 12.29 in):

11 @ 2.000 in	11 @ 4.000 in	8 @ 6.000 in	6 @ 8.000 in
3 @ 54.000 in	3 @ 64.000 in		

MID PATTERN (Ycg = 4.86 in):
(A) Draped:

3 @ 6.000 in	3 @ 8.000 in	

(B) Straight:

11 @ 2.000 in	11 @ 4.000 in	8 @ 6.000 in	6 @ 8.000 in

Strand Diameter	0.500	in
Strand Area	0.153	in2
Total Strand Area	6.426	in2

Trans. Len,bonded	2.083	ft
Trans. Len,debonded	2.083	ft
Dev. Len, bonded	10.615	ft
Dev. Len, debonded	13.269	ft
Holddown Force	20.202	kips
Holddown Force	270.0	ksi
Initial Prestress = 0.75f's	202.5	ksi
Initial Pull	1301.3	kips
Beam Shrtng (PL/AE)	0.370	in

REINFORCING STEEL:

Tension	steel:	
fy	60.0	ksi
Es	29000	ksi
fs	24.0	ksi

Stirrups:

# legs	Size	fy (ksi)	Area (in2)	Spacing (in)	Start (ft)	End (ft)
2	US#4[M13]	60.0	0.40	6.00	0.0000	7.9711
2	US#4[M13]	60.0	0.40	12.00	7.9711	46.4446
2	US#4[M13]	60.0	0.40	24.00	46.4460	52.6387
2	US#4[M13]	60.0	0.40	12.00	52.6387	91.1122
2	US#4[M13]	60.0	0.40	6.00	91.1122	99.0833

LOSSES

Note: Values are calculated at Midspan

Str. area	6.4260	in2
Ycg	4.86	in
P_init	1301.3	kips
Ecc	26.24	in
Hours to release	18.00	
Rel. Humid.(RH)	75.0	%
Es	28500.0	ksi
Eci	4287	ksi

AASHTO LOSSES

		Release			Final		(Art. 9.16.2)
Steel relaxation	*	1600.47	psi	CRs (Eq 9-10A)	2249.95	psi	

	Release			Final		(Art. 9.16.2)
Elastic Shortening	15276.95	psi	ES (Eq 9-6)	15276.95	psi	(Fcir=2297.88 psi)
Concrete shrinkage	0.00	psi	SH (Eq 9-4)	5750.00	psi	
Concrete creep	0.00	psi	CRc (Eq 9-9)	18697.20	psi	(Fcds=-1268.20 psi)
Total	16877.42	psi	(8.33 %)	41974.09	psi	(20.73 %)

* Steel relax. before release - Ref: PCI Journal Vol. 20, No. 4, Jul-Aug 1975

SHEAR/MOMENT ENVELOPE (&REACTIONS)

SHEAR AND MOMENT ENVELOPE : Span : 1, Beam : 3, SERVICE 1
Shears: kips, Moments: kft

		Bearing	Trans	H/2	0.10L	0.20L	0.30L	0.40L	Midspan
Location,	ft	0.00	1.25	3.27	9.07	18.98	28.89	38.80	48.71
Self wt. :	M	0.0	55.9	143.2	372.9	692.5	920.8	1057.8	1103.5
	V	45.3	44.1	42.3	36.9	27.7	18.4	9.2	0.0
Prec. :	M	0.0	7.9	20.2	52.6	97.7	129.9	149.2	155.6
DL+ADL	V	6.4	6.2	6.0	5.2	3.9	2.6	1.3	0.0
Deck :	M	0.0	76.1	194.9	507.3	942.2	1252.8	1439.2	1501.3
+ Haunch	V	61.6	60.1	57.5	50.2	37.6	25.1	12.5	0.0
Diaphragm :	M	0.0	0.8	2.0	5.6	11.8	16.2	18.1	20.1
	V	0.6	0.6	0.6	0.6	0.6	0.2	0.2	0.2
Comp. :	M	0.0	19.5	49.9	130.0	241.5	321.1	368.9	384.8
DL+ADL	V	15.8	15.4	14.7	12.9	9.6	6.4	3.2	0.0
LL + I :	M+	0.0	116.2	296.9	767.9	1406.6	1836.8	2092.3	2153.4
	V	95.1	93.9	91.6	85.3	75.4	65.3	48.2	37.7
LL + I :	M-	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	V	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LL + I :	Vmx	95.1	93.9	91.6	85.3	75.4	65.3	55.1	44.7
	M	0.0	116.2	296.9	767.9	1406.6	1836.8	2058.4	2071.6
Total :	M+	0.0	276.3	707.2	1836.4	3392.2	4477.6	5125.5	5318.8
	V	224.9	220.3	212.7	191.0	154.8	118.1	74.7	37.9
Total :	M-	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	V	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total :	Vmx	224.9	220.3	212.7	191.0	154.8	118.1	81.6	44.9
	M	0.0	276.3	707.2	1836.4	3392.2	4477.6	5091.7	5236.9

		0.60L	0.70L	0.80L	0.90L	H/2	Trans	Bearing
Location,	ft	58.62	68.52	78.43	88.34	94.15	96.17	97.42
Self wt. :	M	1057.8	920.8	692.5	372.9	143.2	55.9	0.0
	V	9.2	18.4	27.7	36.9	42.3	44.1	45.3
Prec. :	M	149.2	129.9	97.7	52.6	20.2	7.9	0.0
DL+ADL	V	1.3	2.6	3.9	5.2	6.0	6.2	6.4
Deck :	M	1439.2	1252.8	942.2	507.3	194.9	76.1	0.0
+ Haunch	V	12.5	25.1	37.6	50.2	57.5	60.1	61.6
Diaphragm :	M	18.3	16.1	12.2	5.8	2.1	0.8	0.0
	V	0.2	0.2	0.6	0.6	0.6	0.6	0.6
Comp. :	M	368.9	321.1	241.5	130.0	49.9	19.5	-0.0
DL+ADL	V	3.2	6.4	9.6	12.9	14.7	15.4	15.8
LL + I :	M+	2092.3	1836.8	1406.6	767.9	296.9	116.2	0.0
	V	48.2	65.3	75.4	85.3	91.6	93.9	95.1
LL + I :	M-	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	V	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LL + I :	Vmx	55.1	65.3	75.4	85.3	91.6	93.9	95.1
	M	2058.4	1836.8	1406.6	767.9	296.9	116.2	0.0
Total :	M+	5125.6	4477.5	3392.6	1836.5	707.3	276.3	0.0
	V	74.7	118.1	154.8	191.0	212.7	220.3	224.9
Total :	M-	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	V	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total :	Vmx	81.6	118.1	154.8	191.0	212.7	220.3	224.9
	M	5091.8	4477.5	3392.6	1836.5	707.3	276.3	-0.0

REACTIONS (kips), SERVICE 1

Load Type	Left Support	Right Support
Self Wt.	45.3	45.3
Deck+Haunch	61.6	61.6
Diaphragm	0.6	0.6
Prec.DL+ADL	6.4	6.4
Comp. DL+ADL	79.0	79.0
Live	81.4	81.4
Pedestrian	0.0	0.0

Upward reactions are positive.
Live Load reactions are per lane with no distribution factor and no impact.
Non-composite load types are per beam.
Composite and Pedestrian load types are per total bridge width.

SHEAR AND MOMENT ENVELOPE : Span : 1, Beam : 3, FACTORED 1
Shears: kips, Moments: kft

		Bearing	Trans	H/2	0.10L	0.20L	0.30L	0.40L	Midspan
Location,	ft	0.00	1.25	3.27	9.07	18.98	28.89	38.80	48.71
Self wt. :	M	0.0	72.7	186.2	484.7	900.3	1197.1	1375.1	1434.5
	V	58.9	57.4	54.9	47.9	35.9	24.0	12.0	0.0
Prec. :	M	0.0	10.3	26.3	68.4	127.0	168.8	194.0	202.3
DL+ADL	V	8.3	8.1	7.7	6.8	5.1	3.4	1.7	0.0
Deck :	M	0.0	98.9	253.3	659.5	1224.9	1628.7	1871.0	1951.8
+ Haunch	V	80.1	78.1	74.8	65.2	48.9	32.6	16.3	0.0
Diaphragm :	M	0.0	1.0	2.6	7.3	15.3	21.0	23.6	26.2
	V	0.8	0.8	0.8	0.8	0.8	0.3	0.3	0.3
Comp. :	M	0.0	25.3	64.9	169.0	314.0	417.5	479.6	500.3
DL+ADL	V	20.5	20.0	19.2	16.7	12.5	8.4	4.2	0.0
LL + I :	M+	0.0	252.2	644.6	1667.1	3053.7	3987.6	4542.3	4675.0
	V	206.5	203.8	198.9	185.1	163.6	141.8	104.6	81.9
LL + I :	M-	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	V	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LL + I :	Vmx	206.5	203.8	198.9	185.1	163.6	141.8	119.6	97.1
	M	0.0	252.2	644.6	1667.1	3053.7	3987.6	4468.8	4497.3
Total :	M+	0.0	460.4	1178.0	3056.1	5635.1	7420.7	8485.5	8790.0
	V	375.2	368.1	356.3	322.6	266.9	210.4	139.1	82.2
Total :	M-	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	V	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total :	Vmx	375.2	368.1	356.3	322.6	266.9	210.4	154.1	97.3
	M	0.0	460.4	1178.0	3056.1	5635.1	7420.7	8412.0	8612.3

		0.60L	0.70L	0.80L	0.90L	H/2	Trans	Bearing
Location,	ft	58.62	68.52	78.43	88.34	94.15	96.17	97.42
Self wt. :	M	1375.1	1197.1	900.3	484.7	186.2	72.7	0.0
	V	12.0	24.0	35.9	47.9	54.9	57.4	58.9
Prec. :	M	194.0	168.8	127.0	68.4	26.3	10.3	0.0
DL+ADL	V	1.7	3.4	5.1	6.8	7.7	8.1	8.3

		0.60L	0.70L	0.80L	0.90L	H/2	Trans	Bearing
Deck :	M	1871.0	1628.7	1224.9	659.5	253.3	98.9	0.0
+ Haunch	V	16.3	32.6	48.9	65.2	74.8	78.1	80.1
Diaphragm :	M	23.8	20.9	15.8	7.6	2.7	1.0	0.0
	V	0.3	0.3	0.8	0.8	0.8	0.8	0.8
Comp. :	M	479.6	417.5	314.0	169.0	64.9	25.3	-0.0
DL+ADL	V	4.2	8.4	12.5	16.7	19.2	20.0	20.5
LL + I :	M+	4542.3	3987.6	3053.7	1667.1	644.6	252.2	0.0
	V	104.6	141.8	163.6	185.1	198.9	203.8	206.5
LL + I :	M-	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	V	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LL + I :	Vmx	119.6	141.8	163.6	185.1	198.9	203.8	206.5
	M	4468.8	3987.6	3053.7	1667.1	644.6	252.2	0.0
Total :	M+	8485.7	7420.6	5635.6	3056.4	1178.1	460.4	0.0
	V	139.1	210.4	266.9	322.6	356.3	368.2	375.3
Total :	M-	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	V	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total :	Vmx	154.1	210.4	266.9	322.6	356.3	368.2	375.3
	M	8412.2	7420.6	5635.6	3056.4	1178.1	460.4	-0.0

REACTIONS (kips), FACTORED 1

Load Type	Left Support	Right Support
Self Wt.	58.9	58.9
Deck+Haunch	80.1	80.1
Diaphragm	0.8	0.8
Prec.DL+ADL	8.3	8.3
Comp. DL+ADL	102.7	102.7
Live	176.7	176.7
Pedestrian	0.0	0.0

Upward reactions are positive.
Live Load reactions are per lane with no distribution factor and no impact.
Non-composite load types are per beam.
Composite and Pedestrian load types are per total bridge width.

POSITIVE ENVELOPE STRESSES

Span : 1, Beam : 3, SERVICE 1

RELEASE STRESSES, (psi) (LOSS = 8.33 %)

	Trans	0.10L /0.90L	0.20L /0.80L	0.30L /0.70L	0.40L /0.60L	Midspan
Location, ft	2.08	9.91	19.82	29.72	39.63	49.54
Self Wt.						
Precast-top	82.0	358.4	637.2	836.4	955.8	995.7
Bottom	-73.1	-319.4	-567.8	-745.3	-851.8	-887.2
Prestress						
Precast-top	-329.3	-456.4	-617.5	-778.5	-939.5	-939.5
Bottom	2819.5	2932.8	3076.3	3219.7	3363.2	3363.2
Total						
Precast-top	-247.3	-98.0	19.8	57.9	16.4	56.2
Bottom	2746.4	2613.4	2508.4	2474.4	2511.5	2476.0
As_top (in2)	0.991	0.000	0.000	0.000	0.000	0.000

Span : 1, Beam : 3, SERVICE 1

POSITIVE ENVELOPE STRESSES, (psi) (LOSS = 20.73%)

	Bearing	Trans	H/2	0.10L /0.90L	0.20L /0.80L	0.30L /0.70L	0.40L /0.60L	Midspan
Location, ft	0.00	1.25	3.27	9.07	18.98	28.89	38.80	48.71
Prestress								
Precast-top	-106.9	-284.8	-313.2	-394.7	-534.0	-673.2	-812.5	-812.5
Bottom	969.1	2438.3	2463.6	2536.3	2660.3	2784.4	2908.5	2908.5
Self wt.								
Precast-top	-0.0	48.8	124.9	325.2	604.0	803.1	922.6	962.4
Bottom	-0.0	-43.5	-111.3	-289.8	-538.2	-715.7	-822.2	-857.7
Prec. DL+ADL								
Precast-top	0.0	6.9	17.6	45.9	85.2	113.3	130.1	135.7
Bottom	-0.0	-6.1	-15.7	-40.9	-75.9	-100.9	-116.0	-121.0
Diaphragm								
Precast-top	0.0	0.7	1.8	5.1	10.6	14.1	15.9	17.6
Bottom	-0.0	-0.6	-1.6	-4.5	-9.4	-12.6	-14.2	-15.6
Deck + Haunch								

	Bearing	Trans	H/2	0.10L /0.90L	0.20L /0.80L	0.30L /0.70L	0.40L /0.60L	Midspan
Precast-top	0.0	66.3	170.0	442.5	821.8	1092.7	1255.3	1309.5
Bottom	-0.0	-59.1	-151.5	-394.3	-732.3	-973.8	-1118.6	-1166.9
Comp. DL+ADL								
Topping-top	0.0	3.6	9.1	23.8	44.2	58.8	67.6	70.5
Precast-top	0.0	2.3	5.8	15.0	27.9	37.1	42.6	44.4
Bottom	-0.0	-9.4	-24.0	-62.6	-116.2	-154.5	-177.5	-185.2
LL+I(+)								
Topping-top	0.0	21.3	54.4	140.7	257.7	336.5	383.3	394.5
Precast-top	0.0	13.4	34.3	88.7	162.4	212.1	241.6	248.7
Bottom	-0.0	-55.9	-142.9	-369.5	-676.8	-883.8	-1006.7	-1036.1
Final 1 (P/S + DL + LL)								
Topping-top	0.0	24.9	63.5	164.5	301.9	395.3	450.9	465.0
Precast-top	-106.9	-146.4	41.2	527.6	1177.9	1599.2	1795.7	1905.9
Bottom	969.1	2263.7	2016.6	1374.7	511.4	-56.9	-346.7	-474.0
Final 2 (P/S + DL)								
Topping-top	0.0	3.6	9.1	23.8	44.2	58.8	67.6	70.5
Precast-top	-106.9	-159.8	6.9	438.9	1015.5	1387.1	1554.1	1657.2
Bottom	969.1	2319.6	2159.4	1744.2	1188.2	826.9	660.0	562.2
Final 3 (50% P/S + 50% DL + LL)								
Topping-top	0.0	23.1	59.0	152.6	279.8	365.9	417.1	429.7
Precast-top	-53.4	-66.5	37.8	308.1	670.2	905.7	1018.7	1077.3
Bottom	484.5	1103.9	936.8	502.6	-82.7	-470.3	-676.7	-755.1

VERTICAL/HORIZONTAL SHEAR

VERTICAL SHEAR (Art. 9.20) - Span : 1, Beam : 3, FACTORED 1

Location (ft)		Vd(kips)	Md(k.ft)	Ml(k.ft)	Vu(kips)	Mu(k.ft)	Vmu(kips)	Mmax(k.ft)	Vi(kips)
fpe (psi)	fd (psi)	Mcr (k.ft)	d (in)	Vci-com (kips)	Vci-min (kips)	Vci (kips)	fpc (psi)	Vp (kips)	Vcw (kips)
Vc (kips)	Vs-rqrd (kips)	Vs-max (kips)	Av-com (in2/ft)	Av-min (in2/ft)	Av (in2/ft)	Av-prvd (in2/ft)	pVn/Vu	MaxSpc (in)	Vs-crit (kips)
Bearing :	0.83	129.8	0.0	0.0	356.3	0.0	375.2	0.0	245.5
969.1	-0.0	3057.2	66.37	10000.0	75.5	10000.0	101.4	6.4	178.0
178.0	217.8	355.4	0.66	0.08	0.66	0.80	1.120	12.0	177.7
Transfer :	2.08	126.5	160.1	116.2	356.3	460.4	368.1	300.2	241.7
2438.3	-118.7	5864.0	66.60	4873.9	75.8	4873.9	320.0	16.0	223.2
223.2	172.7	356.6	0.52	0.08	0.52	0.80	1.237	24.0	178.3
H/2 :	4.10	121.1	410.3	296.9	356.3	1178.0	356.3	767.7	235.2
2463.6	-304.1	5531.3	66.98	1842.5	76.2	1842.5	423.5	16.0	241.0
241.0	154.9	358.7	0.46	0.08	0.46	0.80	1.286	24.0	179.3
0.1L :	9.91	105.7	1068.4	767.9	322.6	3056.1	322.6	1987.7	216.9
2536.3	-791.9	4668.4	68.07	642.4	77.5	642.4	691.5	16.0	288.4
288.4	70.0	364.5	0.21	0.08	0.21	0.40	1.185	24.0	182.2
0.2L :	19.82	79.4	1985.7	1406.6	266.9	5635.1	266.9	3649.4	187.4
2660.3	-1471.8	3513.3	69.93	288.0	79.6	288.0	1048.7	16.0	355.8
288.0	8.6	374.4	0.02	0.08	0.08	0.40	1.443	24.0	187.2
0.3L :	29.72	52.7	2640.8	1836.8	210.4	7420.7	210.4	4779.9	157.6
2784.4	-1957.5	2761.9	71.79	172.6	81.7	172.6	1278.7	16.0	404.5
172.6	61.1	384.4	0.17	0.08	0.17	0.40	1.353	24.0	192.2
0.4L :	39.63	26.5	3033.3	2092.3	154.1	8485.5	139.1	5452.3	112.6
2908.5	-2248.3	2415.2	73.64	105.9	83.8	105.9	1381.0	0.0	416.6
105.9	65.3	394.3	0.18	0.08	0.18	0.40	1.479	24.0	197.2
0.5L :	49.54	0.2	3165.4	2153.4	97.3	8790.0	82.2	5624.6	82.0
2908.5	-2346.3	2211.6	73.64	62.0	83.8	83.8	1445.3	0.0	428.0
83.8	24.4	394.3	0.07	0.08	0.08	0.20	1.456	24.0	197.2
0.6L :	59.45	26.5	3033.4	2092.3	154.1	8485.7	139.1	5452.3	112.6
2908.5	-2248.4	2415.0	73.64	105.9	83.8	105.9	1381.1	0.0	416.6
105.9	65.3	394.3	0.18	0.08	0.18	0.40	1.479	24.0	197.2
0.7L :	69.36	52.8	2640.7	1836.8	210.4	7420.6	210.4	4779.8	157.6
2784.4	-1957.4	2762.0	71.79	172.7	81.7	172.7	1278.7	16.0	404.5
172.7	61.1	384.4	0.17	0.08	0.17	0.40	1.353	24.0	192.2
0.8L :	79.27	79.5	1986.0	1406.6	266.9	5635.6	266.9	3649.5	187.5
2660.3	-1472.1	3512.7	69.93	288.0	79.6	288.0	1048.9	16.0	355.9
288.0	8.6	374.4	0.02	0.08	0.08	0.40	1.443	24.0	187.2

Location (ft)		Vd(kips)	Md(k.ft)	Ml(k.ft)	Vu(kips)	Mu(k.ft)	Vmu(kips)	Mmax(k.ft)	Vi(kips)
fpe (psi)	fd (psi)	Mcr (k.ft)	d (in)	Vci-com (kips)	Vci-min (kips)	Vci (kips)	fpc (psi)	Vp (kips)	Vcw (kips)
Vc (kips)	Vs-rqrd (kips)	Vs-max (kips)	Av-com (in2/ft)	Av-min (in2/ft)	Av (in2/ft)	Av-prvd (in2/ft)	pVn/Vu	MaxSpc (in)	Vs-crit (kips)
0.9L :	89.17	105.7	1068.6	767.9	322.6	3056.4	322.6	1987.7	216.9
2536.3	-792.1	4668.1	68.07	642.3	77.5	642.3	691.6	16.0	288.5
288.5	70.0	364.5	0.21	0.08	0.21	0.40	1.185	24.0	182.2
H/2 :	94.98	121.1	410.3	296.9	356.3	1178.1	356.3	767.7	235.2
2463.6	-304.1	5531.1	66.98	1842.5	76.2	1842.5	423.5	16.0	241.0
241.0	154.9	358.7	0.46	0.08	0.46	0.80	1.286	24.0	179.3
Transfer :	97.00	126.5	160.2	116.2	356.3	460.4	368.2	300.2	241.7
2438.3	-118.7	5863.9	66.60	4873.9	75.8	4873.9	320.0	16.0	223.2
223.2	172.7	356.6	0.52	0.08	0.52	0.80	1.237	24.0	178.3
Bearing :	98.25	129.8	0.0	0.0	356.3	0.0	375.3	0.0	245.5
969.1	-0.0	3057.2	66.37	10000.0	75.5	10000.0	101.4	6.4	178.0
178.0	217.9	355.4	0.66	0.08	0.66	0.80	1.120	12.0	177.7

ANCHORAGE ZONE REINFORCEMENT (Art. 9.22.1)
Span : 1, Beam : 3

Fpi (kips)	fs (ksi)	d/4 (in)	Abrst_rqrd (in2)
1301.26	20.00	13.43	2.60

HORIZONTAL SHEAR (Art. 9.20.4) - Span : 1, Beam : 3
(Beam and Slab effects are INCLUDED in Vu).

Location (ft)									
bv (in)	fsy (ksi)	Vu (kips)	Vnh-req (psi)	d (in)	Surf (in2/ft)	s_max (in)	Avh-min (in2/ft)	Avh-sm (in2/ft)	Avh-rg (in2/ft)
Bearing :	0.00								
36.00	60.00	375.2	174.50	66.37	432.00	24.00	0.360	2.061	0.360
Transfer :	1.25								
36.00	60.00	368.1	170.60	66.60	432.00	24.00	0.360	1.991	0.360
H/2 :	3.27								
36.00	60.00	356.3	164.16	66.98	432.00	24.00	0.360	1.875	0.360
0.1L :	9.07								
36.00	60.00	322.6	146.25	68.07	432.00	24.00	0.360	1.553	0.360
0.2L :	18.98								

BENTLEY

Program:
CONSPAN® Rating
Version: 8.0.2

By: DMP - check revision
Date: Apr/30/2008
CKD:
Date:

File Name: 100-100-100-100 Type IV66 simple_REV 1.csl

Location (ft) bv (in)	fsy (ksi)	Vu (kips)	Vnh-req (psi)	d (in)	Surf (in2/ft)	s_max (in)	Avh-min (in2/ft)	Avh-sm (in2/ft)	Avh-rg (in2/ft)
36.00	60.00	266.9	117.79	69.93	432.00	24.00	0.360	1.040	0.360
0.3L :	28.89								
36.00	60.00	210.4	90.45	71.79	432.00	24.00	0.360	0.548	0.360
0.4L :	38.80								
36.00	60.00	154.1	64.57	73.64	432.00	24.00	0.360	0.360	0.000
0.5L :	48.71								
36.00	60.00	97.3	40.80	73.64	432.00	24.00	0.360	0.360	0.000
0.6L :	58.62								
36.00	60.00	154.1	64.58	73.64	432.00	24.00	0.360	0.360	0.000
0.7L :	68.52								
36.00	60.00	210.4	90.46	71.79	432.00	24.00	0.360	0.548	0.360
0.8L :	78.43								
36.00	60.00	266.9	117.80	69.93	432.00	24.00	0.360	1.040	0.360
0.9L :	88.34								
36.00	60.00	322.6	146.26	68.07	432.00	24.00	0.360	1.553	0.360
H/2 :	94.15								
36.00	60.00	356.3	164.18	66.98	432.00	24.00	0.360	1.875	0.360
Transfer :	96.17								
36.00	60.00	368.2	170.61	66.60	432.00	24.00	0.360	1.991	0.360
Bearing :	97.42								
36.00	60.00	375.3	174.51	66.37	432.00	24.00	0.360	2.061	0.360

BENTLEY®

Program:
CONSPAN® Rating
Version: 8.0.2

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Date: Apr/30/2008
CKD:
Date:

File Name: 100-100-100-100 Type IV66 simple_REV 1.csl

CAMBER/DEFLECTION

CAMBER AND DEFLECTIONS: SERVICE 1
(Span : 1, Beam : 3; Units: in)

	Release	Mult	Erection	Mult	Final
At 0.1 x L =	9.07 ft				
Prestress	0.871	1.80	1.569	2.45	2.135
Self Wt.	-0.308	1.85	-0.569	2.40	-0.738
Deck + Haunch			-0.309	1.00	-0.309
Prec. DL+ADL			-0.032	1.00	-0.032
Diaphragm			-0.004	1.00	-0.004
Comp. DL+ADL			-0.029	1.00	-0.029
Live Load(+I)					-0.141
Total	0.564		0.626		0.882

	Release	Mult	Erection	Mult	Final
At 0.2 x L =	18.98 ft				
Prestress	1.575	1.80	2.835	2.45	3.859
Self Wt.	-0.582	1.85	-1.077	2.40	-1.397
Deck + Haunch			-0.612	1.00	-0.612
Prec. DL+ADL			-0.063	1.00	-0.063
Diaphragm			-0.008	1.00	-0.008
Comp. DL+ADL			-0.058	1.00	-0.058
Live Load(+I)					-0.282
Total	0.993		1.018		1.439

	Release	Mult	Erection	Mult	Final
At 0.3 x L =	28.89 ft				
Prestress	2.095	1.80	3.771	2.45	5.132
Self Wt.	-0.797	1.85	-1.474	2.40	-1.913
Deck + Haunch			-0.850	1.00	-0.850
Prec. DL+ADL			-0.088	1.00	-0.088
Diaphragm			-0.011	1.00	-0.011
Comp. DL+ADL			-0.081	1.00	-0.081
Live Load(+I)					-0.396
Total	1.298		1.267		1.795

	Release	Mult	Erection	Mult	Final
At 0.4 x L =	38.80 ft				
Prestress	2.415	1.80	4.346	2.45	5.916
Self Wt.	-0.933	1.85	-1.727	2.40	-2.240
Deck + Haunch			-1.001	1.00	-1.001
Prec. DL+ADL			-0.104	1.00	-0.104
Diaphragm			-0.013	1.00	-0.013
Comp. DL+ADL			-0.095	1.00	-0.095
Live Load(+I)					-0.468
Total	1.481		1.407		1.995

	Release	Mult	Erection	Mult	Final
At 0.5 x L =	48.71 ft				
Prestress	2.522	1.80	4.540	2.45	6.179
Self Wt.	-0.980	1.85	-1.813	2.40	-2.352
Deck + Haunch			-1.053	1.00	-1.053

	Release	Mult	Erection	Mult	Final
Prec. DL+ADL			-0.109	1.00	-0.109
Diaphragm			-0.014	1.00	-0.014
Comp. DL+ADL			-0.100	1.00	-0.100
Live Load(+I)					-0.494
Total	1.542		1.451		2.058

	Release	Mult	Erection	Mult	Final
At 0.6 x L =	58.62 ft				
Prestress	2.415	1.80	4.346	2.45	5.916
Self Wt.	-0.933	1.85	-1.727	2.40	-2.240
Deck + Haunch			-1.001	1.00	-1.001
Prec. DL+ADL			-0.104	1.00	-0.104
Diaphragm			-0.013	1.00	-0.013
Comp. DL+ADL			-0.095	1.00	-0.095
Live Load(+I)					-0.468
Total	1.481		1.407		1.995

	Release	Mult	Erection	Mult	Final
At 0.7 x L =	68.52 ft				
Prestress	2.095	1.80	3.771	2.45	5.132
Self Wt.	-0.797	1.85	-1.474	2.40	-1.913
Deck + Haunch			-0.850	1.00	-0.850
Prec. DL+ADL			-0.088	1.00	-0.088
Diaphragm			-0.011	1.00	-0.011
Comp. DL+ADL			-0.081	1.00	-0.081
Live Load(+I)					-0.396
Total	1.298		1.267		1.795

	Release	Mult	Erection	Mult	Final
At 0.8 x L =	78.43 ft				
Prestress	1.575	1.80	2.835	2.45	3.859
Self Wt.	-0.582	1.85	-1.077	2.40	-1.397
Deck + Haunch			-0.612	1.00	-0.612
Prec. DL+ADL			-0.063	1.00	-0.063
Diaphragm			-0.008	1.00	-0.008
Comp. DL+ADL			-0.058	1.00	-0.058
Live Load(+I)					-0.282
Total	0.993		1.018		1.439

	Release	Mult	Erection	Mult	Final
At 0.9 x L =	88.34 ft				
Prestress	0.871	1.80	1.569	2.45	2.135
Self Wt.	-0.308	1.85	-0.569	2.40	-0.738
Deck + Haunch			-0.309	1.00	-0.309
Prec. DL+ADL			-0.032	1.00	-0.032
Diaphragm			-0.004	1.00	-0.004
Comp. DL+ADL			-0.029	1.00	-0.029
Live Load(+I)					-0.141
Total	0.564		0.626		0.882

Positive values indicate upward deflection.

ULTIMATE MOMENT

ULTIMATE - Span : 1, Beam : 3, FACTORED 1
(Mu-prvd computed by AASHTO equations, Art. 9.17/9.18)

(f'c_eff, ksi = 4.50; beta1 = 0.825)

Location (ft)	A*s in2	Ycg in	p*(A*s/bd)	f*su ksi	a in	Mu-prvd k.ft	Mu-rqrd k.ft	Mcr k.ft	Crkg Ratio	Mu-p/r Ratio
Transfer	1.25									
	1.261	11.90	0.00015	269.2	0.7	1874.1	460.4	6284.9	0.298	4.07
H/2	3.27									
	2.485	11.52	0.00029	268.4	1.4	3682.8	1178.0	6202.3	0.594	3.13
0.1L	9.07									
	5.998	10.43	0.00070	266.2	3.3	8831.2	3056.1	5997.7	1.472	-
0.2L	18.98									
	6.426	8.57	0.00073	266.0	3.5	9702.8	5635.1	5759.8	1.685	-
0.3L	28.89									
	6.426	6.71	0.00071	266.1	3.5	9971.2	7420.7	5663.5	1.761	-
0.4L	38.80									
	6.426	4.86	0.00069	266.2	3.5	10239.5	8485.5	5709.3	1.793	-
0.5L	48.71									
	6.426	4.86	0.00069	266.2	3.5	10239.5	8790.0	5637.8	1.816	-
0.6L	58.62									
	6.426	4.86	0.00069	266.2	3.5	10239.5	8485.7	5709.2	1.793	-
0.7L	68.52									
	6.426	6.71	0.00071	266.1	3.5	9971.2	7420.6	5663.6	1.761	-
0.8L	78.43									
	6.426	8.57	0.00073	266.0	3.5	9702.8	5635.6	5759.5	1.685	-
0.9L	88.34									
	5.998	10.43	0.00070	266.2	3.3	8831.2	3056.4	5997.6	1.472	-
H/2	94.15									
	2.485	11.52	0.00029	268.4	1.4	3682.8	1178.1	6202.3	0.594	3.13
Transfer	96.17									
	1.261	11.90	0.00015	269.2	0.7	1874.1	460.4	6284.9	0.298	4.07

DETENSIONING

Span : 1, Beam : 3; Groups 1-23; Units: psi

Grp	Str		Ys,in		2.08ft
1	2	E	2.00	Ft	25.547
		M	2.00	Fb	97.522
2	2	E	64.00	Ft	212.827
		M	8.00	Fb	50.920
3	1	E	64.00	Ft	306.468
		M	8.00	Fb	27.619
4	2	E	54.00	Ft	454.200
		M	6.00	Fb	16.260
5	1	E	54.00	Ft	528.066
		M	6.00	Fb	10.580
6	2	E	8.00	Ft	496.304
		M	8.00	Fb	159.171
7	2	E	8.00	Ft	464.542
		M	8.00	Fb	307.761
8	2	E	8.00	Ft	432.781
		M	8.00	Fb	456.351
9	2	E	6.00	Ft	392.762
		M	6.00	Fb	612.300
10	2	E	6.00	Ft	352.744
		M	6.00	Fb	768.248
11	2	E	6.00	Ft	312.725
		M	6.00	Fb	924.197
12	2	E	6.00	Ft	272.706
		M	6.00	Fb	1080.145
13	2	E	4.00	Ft	224.431
		M	4.00	Fb	1243.451
14	2	E	4.00	Ft	176.155
		M	4.00	Fb	1406.758
15	2	E	4.00	Ft	127.880
		M	4.00	Fb	1570.064
16	2	E	4.00	Ft	79.604
		M	4.00	Fb	1733.370
17	2	E	4.00	Ft	31.329
		M	4.00	Fb	1896.677
18	1	E	4.00	Ft	7.191
		M	4.00	Fb	1978.330
19	2	E	2.00	Ft	-49.342
		M	2.00	Fb	2148.994
20	2	E	2.00	Ft	-105.874
		M	2.00	Fb	2319.658
21	2	E	2.00	Ft	-162.407
		M	2.00	Fb	2490.322
22	2	E	2.00	Ft	-218.939
		M	2.00	Fb	2660.986
23	1	E	2.00	Ft	-247.205
		M	2.00	Fb	2746.318

DESIGN SUMMARY

Span: 1, Beam: 3, Interior beam

Beam type:		
	I-Girder,	ODOT AASHTO Type 4 66 MOD
Precast Length,	ft	99.08
Release Length,	ft	99.08
Strand Pattern:	Straight/Draped	Depr. Point: 0.40 L
Strand:	1/2-270K-LL	
Strand Type:	Low Relaxation	
Strand Es,	ksi:	28500.0
No. of strands:	42	
	Draped:	6
	Straight:	36
Concrete Strength:		
	f'ci:	5000.0 psi
	f'c:	7000.0 psi
	f'ct:	4500.0 psi
Initial losses:	8.33 %	
Final losses:	20.73 %	

Specification	Allowable	Computed	Status
Release Stresses (psi) (Art. 9.15.2.1)			
Precast Top w/ no reinf.	-200.00		
Precast Top w/ reinf.	-530.33	-247.31	OK
Precast Bot (compression)	3000.00	2746.41	OK
Factored 1	Provided	Required	
Ult. Moment (k.ft)	10239.47	8790.01	OK
Debonding Limits	Allowable	Computed	
Max. Debond per Row	40.00 %	0.00 %	OK
Max. Debond Total	25.00 %	0.00 %	OK

Positive Moment Envelope Stresses (psi)

Specification	Final 1 Allow	Comp	Final 2 Allow	Comp	Final 3 Allow	Comp
Service 1						
Topping Top	2700.0/-503.1	465.0 / 0.0	1800.0	70.5	1800.0	429.7

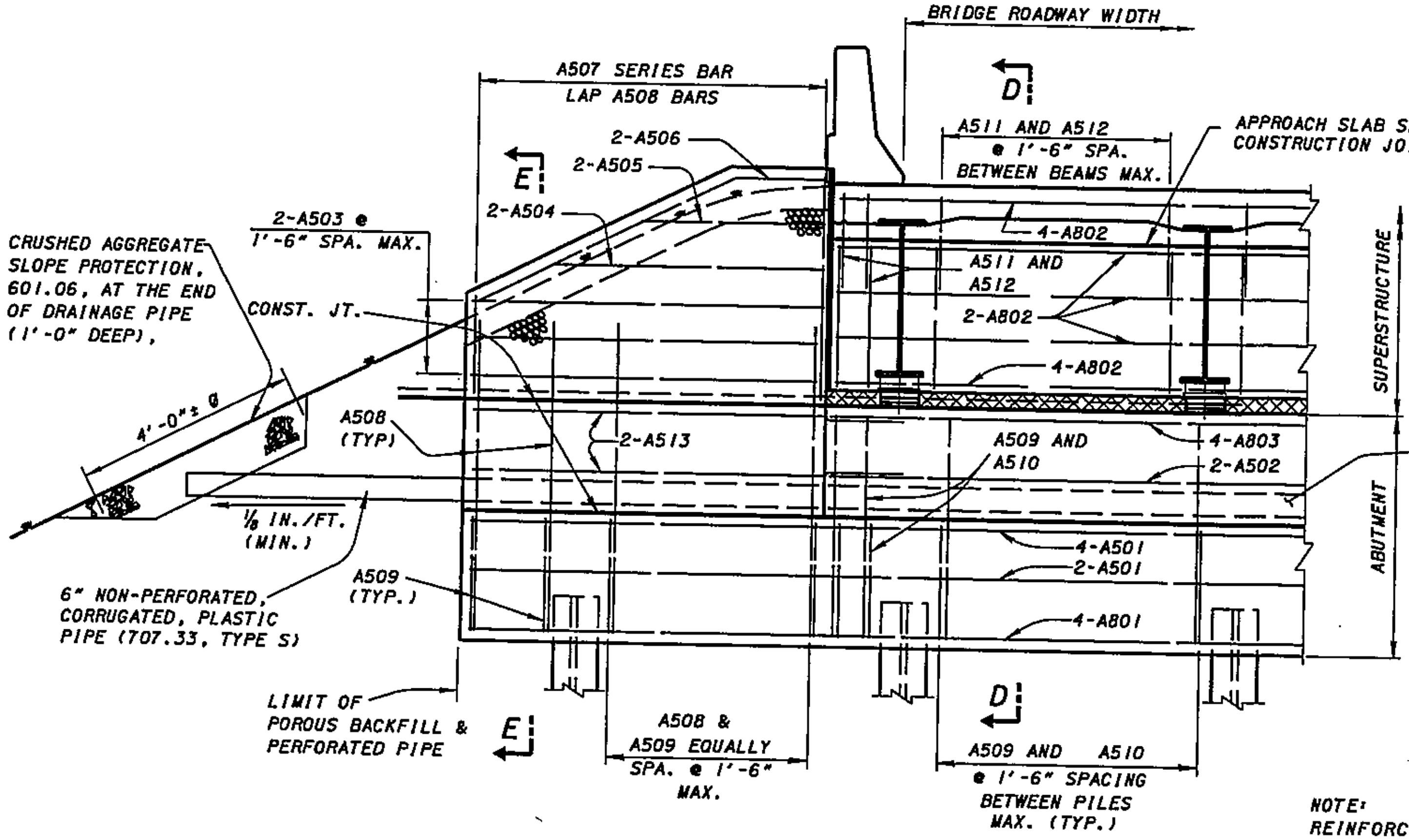
Specification	Final 1 Allow	Comp	Final 2 Allow	Comp	Final 3 Allow	Comp
Precast Top	4200.0/-502.0	1905.9 /-146.4	2800.0	1657.2	2800.0	1077.3
Precast Bot	4200.0/-502.0	2263.7 /-474.0	2800.0	2319.6	2800.0	1103.9

CAMBER / DEFLECTION: (PCI Design Handbook - 4th Ed.- Table 4.6.2)
0.5 x L = 48.71 ft

	Release	Mult	Erection	Mult	Final
Prestress	2.522	1.80	4.540	2.45	6.179
Self Wt.	-0.980	1.85	-1.813	2.40	-2.352
Deck + Haunch			-1.053	1.00	-1.053
Prec. DL+ADL			-0.109	1.00	-0.109
Diaphragm			-0.014	1.00	-0.014
Comp. DL+ADL			-0.100	1.00	-0.100
Live Load					-0.494
Total	1.542		1.451		2.058

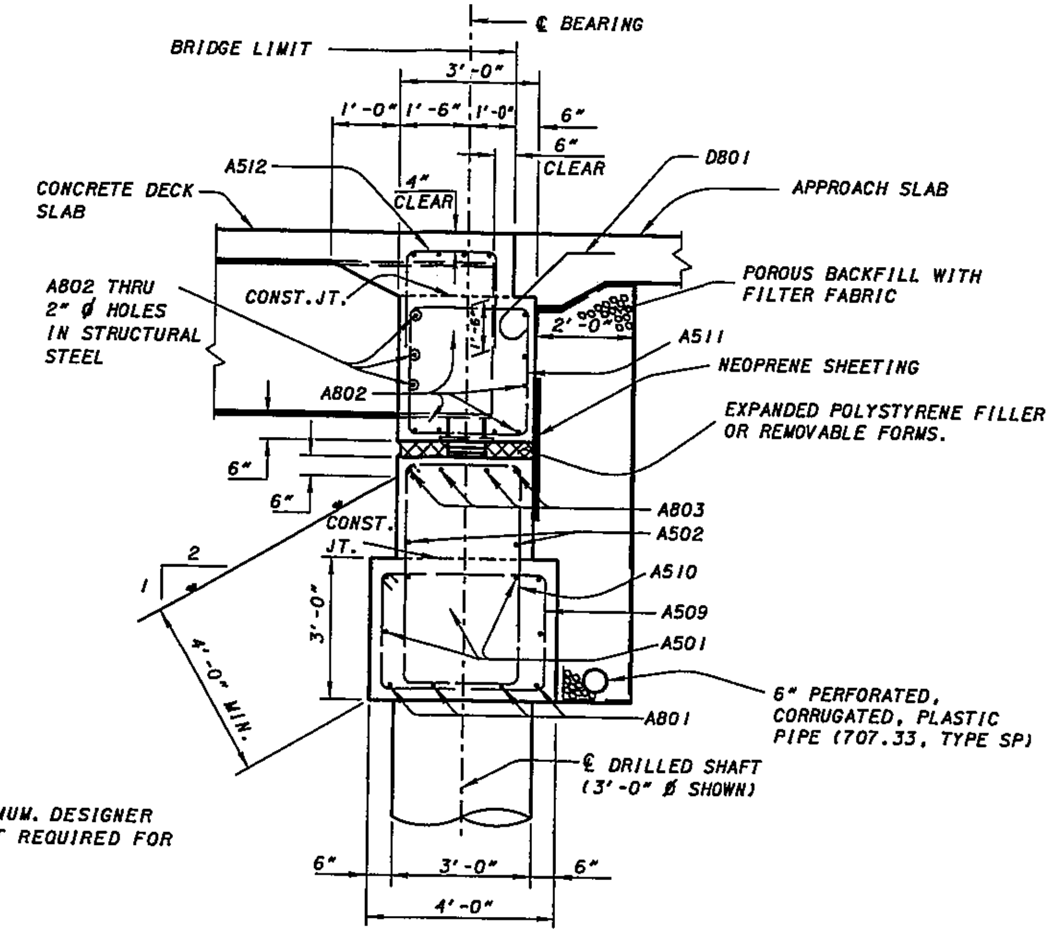
Positive values indicate upward deflection.

Abutment Design

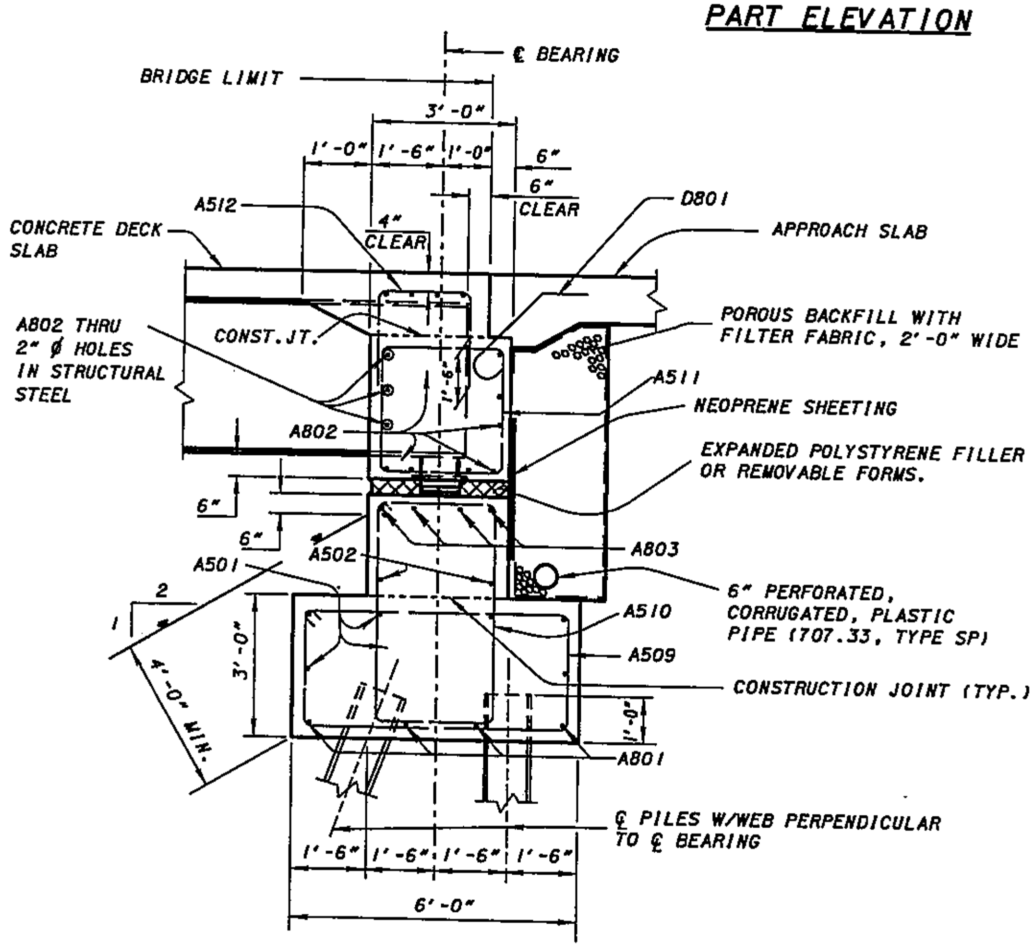


PART ELEVATION

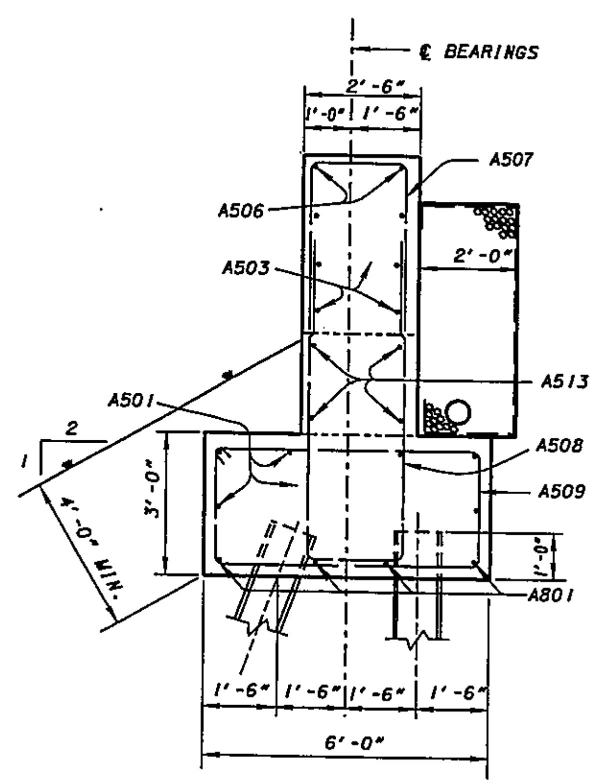
NOTE:
REINFORCING STEEL SHOWN IS MINIMUM. DESIGNER SHALL PROVIDE THE REINFORCEMENT REQUIRED FOR THE INDIVIDUAL STRUCTURE.



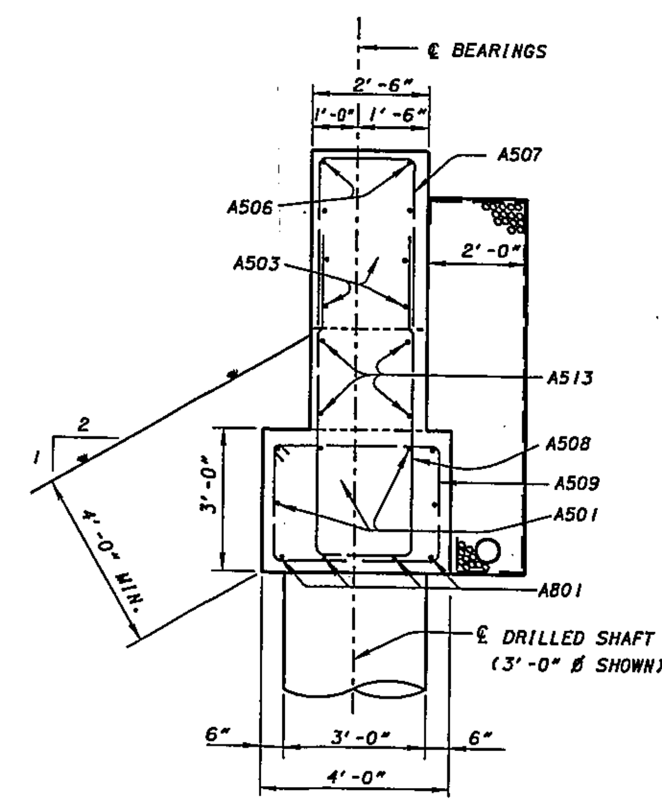
SECTION D-D
(ON DRILLED SHAFT)



SECTION D-D
(ON PILES)



SECTION E-E
(ON PILES)



SECTION E-E
(ON DRILLED SHAFT)

DESIGN AGENCY
OFFICE OF STRUCTURAL ENGINEERING

STATE OF OHIO DEPARTMENT OF TRANSPORTATION
Brad Fagall
ADMINISTRATOR
2-12-97
DATE

REVIEWED LMW
CHECKED MRG/JS
DESIGNED WLF
DRAWN WLF
REVISIONS 04-20-01 07-19-02
SICD-1-96

STANDARD
SEMI-INTEGRAL CONSTRUCTION DETAILS FOR STEEL BEAM AND GIRDER BRIDGES ON RIGID ABUTMENTS

act as form work for the placement of the upper semi-integral abutment concrete.

Both the horizontal and vertical joints shall be sealed at the back face of the backwall by use of a 3 foot [900 mm] wide sheet of nylon reinforced neoprene sheeting. The sheeting should only be attached on one side of the joint to allow for the anticipated movement of the integral section.

A standard bridge drawing detailing semi-integral abutment is available.

See Figure 303.2.2.7-1.

For phased construction projects, do not design an abutment phase to be supported on less than three (3) piles or two (2) drilled shafts.

Phased construction semi-integral backwall details shall have a closure section detailed between sections of staged construction to allow for dead load rotation of the main beams or girders.

303.2.3 ABUTMENT DRAINAGE

303.2.3.1 BACKWALL DRAINAGE

The porous backfill immediately behind abutments and retaining walls should be provided according to CMS 518. The porous backfill shall be effectively drained by the use of a corrosion resistant pipe system into which water can percolate. See Section 303.2.3.3 for possible exceptions.

Porous backfill shall be wrapped with filter fabric, CMS 712.09, Type A. The fabric shall cover the vertical face between the porous backfill and the excavation, the bottom of the porous backfill and the excavation and include a 6 inch [150 mm] vertical up turn between the porous backfill and the abutment backwall. The porous backfill excavation should extend up to the horizontal plane of the subgrade or 1'-0" [300 mm] below the embankment surface. The bottom of the porous backfill should extend to the bottom of the abutment footing except when the vertical backface of the abutment footing extends more than 1'-0" [300 mm] out from the vertical backface of the abutment backwall. Then the Porous backfill shall extend down only to the top of the abutment footing. Porous backfill should be 2'-0" [600 mm] thick for its full height behind the abutment and wingwalls except where the vertical backface of the abutment footing extends out 1'-0" [300 mm] or less. A pipe drainage system shall be placed at the bottom of the porous backfill and sloped to allow drainage.

While a single outlet for the pipe drainage systems in the porous backfill can be adequate, the designer should evaluate whether the length of the drainage run requires multiple outlets to supply the porous backfill with a positive drainage system.

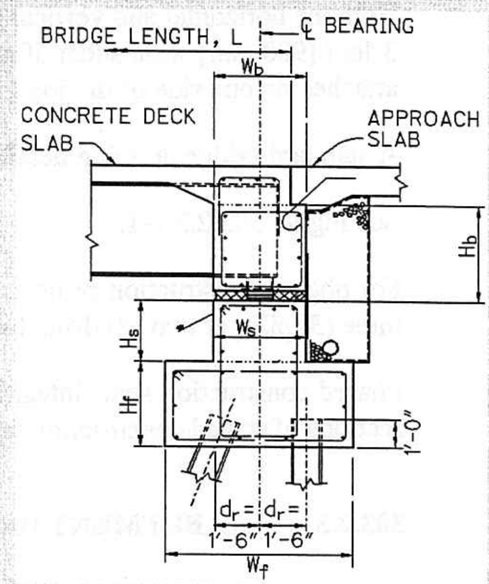
The pipe drainage system designs shall make use of standard corrugated plastic pipe segments, tees and elbows (either 90° or adjustable). Overlapping bands should connect pipe segments. Ends of runs, unless intended to function as outlets, should have end caps. While galvanized

SEMI-INTREGRAL ABUTMENT PILE DESIGN

AASHTO LFD, 17TH ED., 2002

I. ABUTMENT GEOMETRY

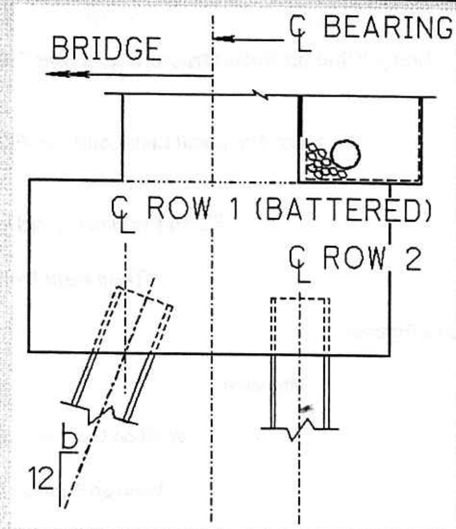
Expansion Length = L =	100	ft
Length of the Abutment = L_a =	63.75	ft
Skew = θ =	19	°
Height of Backwall including End Diaphragms= H_b =	7.5	ft
Width of Backwall including End Diaphragms = W_b =	3.75	ft
Width of Abutment Seat = W_s =	3.75	ft
Height of Seat = H_s =	3	ft
Exposed Height of Backwall =H_{bexp} =	7.5	ft
Height of Footing = H_f =	3	ft
Width of Footing = W_f =	6	ft
Length of Wingwall = L_W =	12.5	ft
Height of Wingwall = H_W =	11	ft
Wingwall Width = W_W =	2.5	ft
Depth of the Superstructure = D_{ss} =	6.29	ft
Approach Slab Length = L_{appr} =	30	ft
Approach Slab Thickness = H_{appr} =	1.42	ft
Degree of Curve =	0	degree
Design Speed =	NA	mph
Number of Lanes =	3	lanes
Number of Pile Rows =	2	
Bearing Type	Expansion	
Unit Weight of Soil = γ =	0.12	k/ft^3
ϕ =	32	°
K_o = 1 - sinϕ	0.470080736	
Unit Weight of Concrete =	0.15	k/ft^3



II. ABUTMENT LOADS

Total Beam Dead Load = P_D =	162	kips	(Total For All Beams From Conspan Output)	
Total Beam Live Load = P_{LL} =	243	kips	(Total For All Beams From Conspan Output)	
Abutment Self Weight = P_{self} =	770.84	kips		
Transverse Wind on Live Load = W_{LLT} =	5	kips	Applied 6ft above the deck	(3.15.2.1.3)
Longitudinal Wind on Live Load = W_{LLL} =	2.41	Kips	Applied 6ft above the deck	(3.15.2.1.3)
Transverse Wind on Superstructure = W_{SUPERT} =	15.725	kips	Applied at centroid of Super.	(3.15.2.1.3)
Longitudinal Wind on Superstructure = W_{SUPERL} =	0.72	kips	Applied at centroid of Super.	(3.15.2.1.3)
Longitudinal Force = P_{long} =	12.15	kips	Applied 6ft above floor slab	(3.9)
Centrifugal Force = $P_{cent.}$ =	0	kips	Bridge not on a Curve	
Wind on Substructure = W_{sub} =	1.125	kips	Applied at centroid of Exposed Sub.	(3.15.2.2)
Temperature Force = P_{temp} =	8.1	kips	5% of Beam Dead Load	(3.16)
External Load Approach Slab =$P_{appr. Slab}$ =	203.68	kips	Approach Slab Dead Load	
Vertical Backwall Live Load = P_{backv} =	120.00	kips	$= 40k * 6lanes$	
Horizontal Backwall Live Load = P_{backh} =	6.00	kips	5% of Vert. Load	(3.9)
Earth Pressure = E_{earth} =	-3.11	k/ft	$= (\gamma * .5(H_b + H_s)^2) * K_o$	Applied at 1/3 H_{back} (5.5.2)

II. AXIAL LOADS ON PILES



Numberof Piles in Row 1 =	9	
Numberof Piles in Row 2 =	9	
Numberof Piles =	18	
Number of Pile Rows =	2	
Distance from Pile Rows to Center of Footing = d_r =	1.5	ft
Pile Spacing Row 1= S_{pile1} =	7	ft
Pile Spacing Row 2 = S_{pile2} =	14	ft
CL End Pile to End of Footing = S_{edge} =	3	ft

Direct Axial Loads:

Dead Load Per Pile = DL_{pile} =	63.14	kips/pile	
Live Load Per Pile = LL_{pile} =	20.17	kips/pile	

Longitudinal Forces:

Longitudinal Force = P_{long} =	12.15	kips	
Moment = M_{long} =	72.90	k*ft	$= P_{long}(H_s + H_f)$
Temperature Force = P_{temp} =	8.1	kips	
Temperature Moment = M_{temp} =	48.6	k*ft	$= P_{temp}(H_s + H_f)$
Longitudinal Wind on Live Load = W_{LLL} =	2.41	kips	
Longitudinal Wind on Live Load Moment= M_{LLL} =	14.47	k*ft	$= W_{LLL}(H_s + H_f)$
Longitudinal Wind on Superstructure = W_{SUPERL} =	0.72	kips	
Longitudinal Wind on Superstructure Moment = M_{SUPERL} =	4.34	k*ft	$= W_{SUPERL}(H_s + H_f)$
Horizontal Backwall Live Load = P_{backh} =	6.00	kips	
Horizontal Backwall Live Load Moment = M_{backh} =	36.00	k*ft	$= P_{backh}(H_s + H_f)$
Earth Pressure = P_{earth} =	-99.12	kips	
Earth Pressure Moment = M_{earth} =	-343.44	k*ft	$= P_{earth} * \frac{1}{3}(H_s + H_f)$
Moment of Pile Group = I_{xpile} =	40.5	ft^2	

Resolved Axial Load:

Longitudinal Force per Pile = LF_{pile} =	5.40	kips/pile	$= \frac{M_{long}(d_r * 2)}{I_{xpile}}$
Temperature Force per Pile = $TEMP_{pile}$ =	3.60	kips/pile	$= \frac{M_{temp}(d_r * 2)}{I_{xpile}}$

Long. Wind on Live Load per Pile = $W_{LLLpile}$ = 1.07 kips/pile $= \frac{M_{LLL}(d_r * 2)}{I_{xpile}}$

Long. Wind on Superstructure Load per Pile = $W_{SUPERpile}$ = 0.32 kips/pile $= \frac{M_{SUPERL}(d_r * 2)}{I_{xpile}}$

Horz. Backwall Live Load per Pile = $LL_{backhpile}$ = 2.67 kips/pile $= \frac{M_{backh}(d_r * 2)}{I_{xpile}}$

Earth Pressure Load per Pile= E_{pile} = 25.44 kips/pile $= \frac{M_{earth}(d_r * 2)}{I_{xpile}}$

Total Resolved Axial Load = 38.50 kips/pile

Transverse Forces:

Moments:

Wind on Live Load Moment = M_{WLL} = 52.50 k*ft

Wind on Superstructure = M_{wsup} = 165.11 k*ft

Wind on Substructure = M_{wsub} = 7.59 k*ft

Front Row Piles:

	d (ft)	I (ft^2)	P_{WLL} (kips)	P_{wsup} (kips)	P_{wsub} (kips)
d_1	2	8	0.002	0.007	0.000
d_2	8	128	0.008	0.026	0.001
d_3	14	392	0.015	0.046	0.002
d_4	20	800	0.021	0.065	0.003
d_5	26	1,352	0.027	0.085	0.004
d_6	32	2,048	0.033	0.104	0.005
d_7	38	2,888	0.039	0.124	0.006
d_8	44	3,872	0.046	0.143	0.007
d_9	50	5,000	0.052	0.163	0.007
d_{10}	56	6,272	0.058	0.183	0.008
d_{11}	62	7,688	0.064	0.202	0.009
d_{12}	68	9,248	0.070	0.222	0.010
d_{13}	74	10,952	0.077	0.241	0.011
d_{14}	0				
d_{15}	0				
d_{16}	0				
d_{17}	0				
d_{18}	0				
d_{19}					
d_{20}					
	Total I(ft^2) =	50,648			

ck Row Piles:

	d (ft)	I (ft^2)	P_{WLL} (kips)	P_{wsup} (kips)	P_{wsub} (kips)
d_1	2	8	0.004	0.012	0.001
d_2	14	392	0.026	0.082	0.004
d_3	26	1,352	0.048	0.152	0.007
d_4	38	2,888	0.071	0.222	0.010
d_5	50	5,000	0.093	0.292	0.013
d_6	62	7,688	0.115	0.362	0.017
d_7	74	10,952	0.137	0.432	0.020
d_8					
d_9					
d_{10}					
d_{11}					
d_{12}					
d_{13}					
d_{14}					
d_{15}					
d_{16}					
d_{17}					
d_{18}					
d_{19}					
d_{20}					
	Total I(ft^2) =	28280			

Wind on Live Load = P_{WLL} = 0.137 kips/pile

Wind on Superstructure = P_{wsup} = 0.432 kips/pile

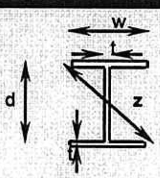
Wind on Substructure = P_{wsub} = 0.020 kips/pile

Total Axial Load Per Pile:

Total Axial Pile Load = T_{pile} = 102.23 kips

$\boxed{51.11 \text{ tons}}$

III. ALLOWABLE PILE CAPACITY



HP12X53

w = 12 inches

d = 11.75 inches

z = 16.79 inches

t = 0.44 inches

$A_p = A_s =$ 15.5 inches^2

$A_p =$ 141.00 inches^2

0.06 inch (for corrosion reduction) (4.5.7.4)

11.88 inches

11.63 inches

0.32 inches

$A_s' = A_{s\_corr} =$ 11.044 inches^2 $= A_p'$

(assuming soil "plug" acts as a unit)

AASHTO 4.5.6.1.4 states that for piles driven to competent rock, the structural capacity of the pile will generally goven the design axial capacity. Since the piles

Structural Capacity, $P_R = \phi_c P_n$

Factored Axial Resistance = $\boxed{P_R = 69.0 \text{ tons}}$

<u>Where:</u>

$\phi_c \equiv$ 0.25 using pile tip [AASHTO 4.5.7.3]

$P_n \equiv F_y A_s' =$ 276.1 tons

$F_y =$ 50 ksi

$A_s =$ 15.5 in^2 HP12X53

$A_s' =$ $A_s - {}^1/_{16}" =$ 11.044 in2 potentially corrosive environment

Corrosive Environment? YES

Therefore $\boxed{Q_{all} = 69.0 \text{ tons}}$

$T_{pile} \leq Q_{all}$ Therefore **Piles are Satisfactory**

IV. LATERAL PILE LOADS & RESISTANCE

Total Lateral Load (Trans.) = T_{trans} =	21.85	kips
Total Lateral Load (Long.) = T_{long} =	69.73	kips
Long. Load > Trans. Load use:	69.73	kips
Lateral Load Per Front Row of Piles = T_{pileL} =	7.75	kips
=	3.87	tons
Pile Batter =	1	:4
Battered Pile Angle = θ_B =	14.04	°
Horizontal Component of Battered Pile Capacity = Q_{horiz} =	16.74	tons

TpileL ≤ Qhoriz   Therefore   **Piles are Satisfactory**

Pier Design

ALL SHEETS CHECKED

PIER GEOMETRY

Pier Info:

Pier View: Downstation.
Pier Type: Hammer Head

Column Shape: Rectangular Non Tapered

Bottom width(X) = 16.00 ft Top width(X) = 16.00 ft Depth (Z) = 4.50 ft Height (Y) = 53.22 ft

Column Bottom has Diagonal Spring Matrix Defined

Diagonal Spring Matrix: (Units: kip, ft, radians) Kx 0.00 0.00 0.00 0.00 0.00 0.00 Ky 0.00 0.00 0.00 0.00 0.00 0.00 Kz 0.00 0.00 0.00 0.00 0.00 0.00 Rx 0.00 0.00 0.00 0.00 0.00 0.00 Ry 0.00 0

Column Shape: Rectangular Non Tapered

Bottom width(X) = 16.00 ft Top width(X) = 16.00 ft Depth (Z) = 4.50 ft Height (Y) = 53.22 ft

Column Bottom has Diagonal Spring Matrix Defined

Diagonal Spring Matrix: (Units: Kx 0.00 0.00 0.00 0.00 0.00 0.00 Ky 0.00 0.00 0.00 0.00 0.00 0.00 Kz 0.00 0.00 0.00 0.00 0.00 0.00 Rx 0.00 0.00 0.00 0.00 0.00 0.00 Ry 0.00 0 kip, ft, radians)

Diagonal Spring Matrix

	Kx	Ky	Kz	Rx	Ry	Rz
Diagonal Spring Matrix: (Units: kip, ft, radians)	Kx 0.00 0.00 0.00 0.00 0.00 0.00 Ky 0.00 0.00 0.00 0.00 0.00 0.00 Kz 0.00 0.00 0.00 0.00 0.00 0.00 Rx 0.00 0.00 0.00 0.00 0.00 0.00 Ry 0.00					
Diagonal Spring Matrix: (Units: kip, ft, radians)	Kx 0.00 0.00 0.00 0.00 0.00 0.00 Ky 0.00 0.00 0.00 0.00 0.00 0.00 Kz 0.00 0.00 0.00 0.00 0.00 0.00 Rx 0.00 0.00 0.00 0.00 0.00 0.00 Ry 0.00					
Diagonal Spring Matrix: (Units: kip, ft, radians)	Kx 0.00 0.00 0.00 0.00 0.00 0.00 Ky 0.00 0.00 0.00 0.00 0.00 0.00 Kz 0.00 0.00 0.00 0.00 0.00 0.00 Rx 0.00 0.00 0.00 0.00 0.00 0.00 Ry 0.00					
Diagonal Spring Matrix: (Units: kip, ft, radians)	Kx 0.00 0.00 0.00 0.00 0.00 0.00 Ky 0.00 0.00 0.00 0.00 0.00 0.00 Kz 0.00 0.00 0.00 0.00 0.00 0.00 Rx 0.00 0.00 0.00 0.00 0.00 0.00 Ry					
Diagonal Spring Matrix: (Units: kip, ft, radians)	Kx 0.00 0.00 0.00 0.00 0.00 0.00 Ky 0.00 0.00 0.00 0.00 0.00 0.00 Kz 0.00 0.00 0.00 0.00 0.00 0.00 Rx 0.00 0.00 0.00 0.00 0.00 0.00 Ry 0.00					
Diagonal Spring Matrix: (Units: kip, ft, radians)	Kx 0.00 0.00 0.00 0.00 0.00 0.00 Ky 0.00 0.00 0.00 0.00 0.00 0.00 Kz 0.00 0.00 0.00 0.00 0.00 0.00 Rx 0.00 0.00 0.00 0.00 0.00 0.00 Ry 0.00					

SUPERSTRUCTURE INFO

Superstructure info:

Total number of spans:	4
Span number rear to current pier:	1
Number of traffic lanes:	3
Barrier height :	48.00 in
Depth of slab :	8.50 in
Curb to curb distance: 0.000	45.500 ft

Beam info:

Height in	Section area in^2	Inertia (Ixx) in^4	Inertia (Iyy) in^4	Beam CG in
54.00	893.00	480161.00	36314.00	31.10

Span #	Span length ft	Bridge Width ft
1	100.000	51.250
2	100.000	51.250
3	100.000	51.250
4	100.000	51.250
		51.250

BEARING POINTS

Number of bearing lines: 2

First bearing line **Eccentricity = 1.22 ft**

Point	Distance ft
1	3.17
2	14.18
3	25.19
4	36.20
5	47.21

Second bearing line **Eccentricity = -1.22 ft**

Point	Distance ft
1	2.10
2	13.17
3	24.24
4	35.31
5	46.38

MATERIAL PROPERTIES

MATERIAL PROPERTIES

	Cap	Column	Footing
Concrete Type	normal	normal	normal
Concrete Strength (psi)	4000.00	4000.00	4000.00
Concrete Density (lb/ft3)	150.00	150.00	150.00
Concrete Modulus Ec (ksi)	3834.30	3834.30	3834.30
Steel Strength Fy (ksi)	60.00	60.00	60.00

DESIGN PARAMETERS

DESIGN PARAMETERS

AASHTO STANDARD Code

Strength Reduction factors for reinf. concrete

Flexure and tension	0.90
Shear and torsion (normal)	0.85
Shear and torsion (lightweight)	0.85
Axial compression (ties)	0.70
Axial compression (spiral)	0.75

Multi presence factors for live load

1 Lane	1.00
2 Lanes	1.00
3 Lanes	0.90
more than 3 Lanes	0.75

	Crack control factor kip/ft	Clear cover in	Clear side cover in	Impact factors (auto calculation)
Cap	170.00	2.00	3.00	1.22
Column	170.00	2.00		1.22
Footing	130.00	3.00	3.00	1.00

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

SEISMIC DESIGN PARAMETERS

Strength Reduction factors for reinf. Concrete Seismic Design

Flexure and tension	0.90
Shear and torsion (normal)	0.85
Shear and torsion (lightweight)	0.85
Axial compression (ties)	0.70
Axial compression (spiral)	0.75

Seismic Overstrength

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

Response Modification Factor 3.00

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.

LOADS

Pier Info:

Pier View: Downstation.

Load Cases: 54

Loadcase ID: D1 Name:

Multiplier = 1.000

Bearing loads

Line #	Bearing #	Dir	Load kips
1	1	Y	-141.62
1	2	Y	-154.87
1	3	Y	-154.87
1	4	Y	-154.87
1	5	Y	-144.75
2	1	Y	-148.49
2	2	Y	-161.74
2	3	Y	-161.74
2	4	Y	-161.74
2	5	Y	-151.62

Auto generation details:

Generated Dead Load

Imported dead load reaction from Conspan for Pier: 1

Loadcase ID: (L+In)1 Name:

Multiplier = 1.000

Bearing loads

Line #	Bearing #	Dir	Load kips
1	1	Y	-7.74
1	2	Y	-47.80
1	3	Y	-53.61
1	4	Y	-56.04
1	5	Y	-10.79
2	1	Y	-5.16
2	2	Y	-46.13
2	3	Y	-52.78
2	4	Y	-58.08
2	5	Y	-13.83

Auto generation details:

Generated Live Load

gitudinal Reaction: User Input Reaction

	Max Vert. Reaction kips
Truck:	89.25
Lane:	130.36

Reaction distribution among lines

	Bearing Line 1	Bearing Line 2
Truck Case A:	0.50	0.50
Lane Case A:	0.50	0.50
Truck Case B:	1.00	0.00
Lane Case B:	0.50	0.00

Transverse Positioning

Number of loaded lanes = all combinations
Live Load Positions = Variable Spacing
Minimum Spacing Between Positions = 1.00 ft

Generate Braking/Longitudinal Force = Selected
Generate Centrifugal Force = Selected

Total number of Considered Truck Positions = 80
Total number of Possible Combination = 57222

Loadcase ID: (L+In)2 Name:

Multiplier = 1.000

Bearing loads

Line #	Bearing #	Dir	Load kips
1	1	Y	0.00
1	2	Y	0.00
1	3	Y	0.00
1	4	Y	0.00
1	5	Y	0.00
2	1	Y	-54.19
2	2	Y	-85.54
2	3	Y	-80.16
2	4	Y	-21.07
2	5	Y	0.00

Auto generation details:

Generated Live Load

Longitudinal Reaction: User Input Reaction

	Max Vert. Reaction kips
Truck:	89.25
Lane:	130.36

Reaction distribution among lines

	Bearing Line 1	Bearing Line 2
Truck Case A:	0.50	0.50
Lane Case A:	0.50	0.50
Truck Case B:	1.00	0.00
Lane Case B:	0.50	0.00

Transverse Positioning

Number of loaded lanes = all combinations
Live Load Positions = Variable Spacing
Minimum Spacing Between Positions = 1.00 ft

Generate Braking/Longitudinal Force = Selected
Generate Centrifugal Force = Selected

Total number of Considered Truck Positions = 80
Total number of Possible Combination = 57222

Loadcase ID: (L+ln)3 Name:

Multiplier = 1.000

Bearing loads

Line #	Bearing #	Dir	Load kips
1	1	Y	0.00
1	2	Y	0.00
1	3	Y	-21.63
1	4	Y	-65.96
1	5	Y	-42.76
2	1	Y	0.00
2	2	Y	0.00
2	3	Y	-17.40
2	4	Y	-64.12
2	5	Y	-48.85

Auto generation details:

Generated Live Load

Longitudinal Reaction: User Input Reaction

	Max Vert. Reaction kips
Truck:	89.25
Lane:	130.36

Reaction distribution among lines

	Bearing Line 1	Bearing Line 2
Truck Case A:	0.50	0.50
Lane Case A:	0.50	0.50
Truck Case B:	1.00	0.00
Lane Case B:	0.50	0.00

Transverse Positioning

Number of loaded lanes = all combinations
Live Load Positions = Variable Spacing
Minimum Spacing Between Positions = 1.00 ft

Generate Braking/Longitudinal Force = Selected
Generate Centrifugal Force = Selected

Total number of Considered Truck Positions = 80
Total number of Possible Combination = 57222

Loadcase ID: (L+In)4 Name:

Multiplier = 1.000

Bearing loads

Line #	Bearing #	Dir	Load kips
1	1	Y	-61.67
1	2	Y	-32.75
1	3	Y	-70.33
1	4	Y	-66.23
1	5	Y	-9.99
2	1	Y	0.00
2	2	Y	0.00
2	3	Y	0.00
2	4	Y	0.00
2	5	Y	0.00

Auto generation details:

Generated Live Load

Longitudinal Reaction: User Input Reaction

	Max Vert. Reaction kips
Truck:	89.25
Lane:	130.36

Reaction distribution among lines

	Bearing Line 1	Bearing Line 2
Truck Case A:	0.50	0.50
Lane Case A:	0.50	0.50
Truck Case B:	1.00	0.00
Lane Case B:	0.50	0.00

Transverse Positioning

Number of loaded lanes = all combinations
Live Load Positions = Variable Spacing
Minimum Spacing Between Positions = 1.00 ft

Generate Braking/Longitudinal Force = Selected
Generate Centrifugal Force = Selected

Total number of Considered Truck Positions = 80
Total number of Possible Combination = 57222

Loadcase ID: (L+In)5 Name:

Multiplier = 1.000

Bearing loads

Line #	Bearing #	Dir	Load kips
1	1	Y	-52.84
1	2	Y	-62.14
1	3	Y	-15.37
1	4	Y	0.00
1	5	Y	0.00
2	1	Y	-45.14
2	2	Y	-65.49
2	3	Y	-19.72
2	4	Y	0.00
2	5	Y	0.00

Auto generation details:

Generated Live Load

Longitudinal Reaction: User Input Reaction

	Max Vert. Reaction kips
Truck:	89.25
Lane:	130.36

Reaction distribution among lines

	Bearing Line 1	Bearing Line 2
ck Case A:	0.50	0.50
Lane Case A:	0.50	0.50
Truck Case B:	1.00	0.00
Lane Case B:	0.50	0.00

Transverse Positioning

Number of loaded lanes = all combinations
Live Load Positions = Variable Spacing
Minimum Spacing Between Positions = 1.00 ft

Generate Braking/Longitudinal Force = Selected
Generate Centrifugal Force = Selected

Total number of Considered Truck Positions = 80
Total number of Possible Combination = 57222

Loadcase ID: (L+In)6 Name:

Multiplier = 1.000

Bearing loads

Line #	Bearing #	Dir	Load kips
1	1	Y	-65.49
1	2	Y	-81.24
1	3	Y	-76.49
1	4	Y	-17.74
1	5	Y	0.00
2	1	Y	0.00
2	2	Y	0.00
2	3	Y	0.00
2	4	Y	0.00
2	5	Y	0.00

Auto generation details:

Generated Live Load

Longitudinal Reaction: User Input Reaction

	Max Vert. Reaction kips
Truck:	89.25
Lane:	130.36

Reaction distribution among lines

	Bearing Line 1	Bearing Line 2
Truck Case A:	0.50	0.50
Lane Case A:	0.50	0.50
Truck Case B:	1.00	0.00
Lane Case B:	0.50	0.00

Transverse Positioning

Number of loaded lanes = all combinations
Live Load Positions = Variable Spacing
Minimum Spacing Between Positions = 1.00 ft

Generate Braking/Longitudinal Force = Selected
Generate Centrifugal Force = Selected

Total number of Considered Truck Positions = 80
Total number of Possible Combination = 57222

adcase ID: (L+In)7 Name:

iplier = 1.000

Bearing loads

Line #	Bearing #	Dir	Load kips
1	1	Y	0.00
1	2	Y	0.00
1	3	Y	0.00
1	4	Y	0.00
1	5	Y	0.00
2	1	Y	-60.21
2	2	Y	-92.88
2	3	Y	-25.40
2	4	Y	0.00
2	5	Y	0.00

Auto generation details:

nerated Live Load

Longitudinal Reaction: User Input Reaction

	Max Vert. Reaction kips
Truck:	89.25
Lane:	130.36

Reaction distribution among lines

	Bearing Line 1	Bearing Line 2
Truck Case A:	0.50	0.50
Lane Case A:	0.50	0.50
Truck Case B:	1.00	0.00
Lane Case B:	0.50	0.00

Transverse Positioning

Number of loaded lanes = all combinations
Live Load Positions = Variable Spacing
Minimum Spacing Between Positions = 1.00 ft

Generate Braking/Longitudinal Force = Selected
Generate Centrifugal Force = Selected

Total number of Considered Truck Positions = 80
Total number of Possible Combination = 57222

Loadcase ID: (L+In)8 Name:

Multiplier = 1.000

Bearing loads

Line #	Bearing #	Dir	Load kips
1	1	Y	-72.77
1	2	Y	-84.26
1	3	Y	-21.47
1	4	Y	0.00
1	5	Y	0.00
2	1	Y	0.00
2	2	Y	0.00
2	3	Y	0.00
2	4	Y	0.00
2	5	Y	0.00

Auto generation details:

Generated Live Load

Longitudinal Reaction: User Input Reaction

	Max Vert. Reaction kips
Truck:	89.25
Lane:	130.36

Reaction distribution among lines

	Bearing Line 1	Bearing Line 2
Truck Case A:	0.50	0.50
Lane Case A:	0.50	0.50
Truck Case B:	1.00	0.00
Lane Case B:	0.50	0.00

Transverse Positioning

Number of loaded lanes = all combinations
Live Load Positions = Variable Spacing
Minimum Spacing Between Positions = 1.00 ft

Generate Braking/Longitudinal Force = Selected
Generate Centrifugal Force = Selected

Total number of Considered Truck Positions = 80
Total number of Possible Combination = 57222

Loadcase ID: (L+In)9 Name:

Multiplier = 1.000

Bearing loads

Line #	Bearing #	Dir	Load kips
1	1	Y	0.00
1	2	Y	0.00
1	3	Y	0.00
1	4	Y	-23.31
1	5	Y	-41.87
2	1	Y	0.00
2	2	Y	0.00
2	3	Y	0.00
2	4	Y	-18.32

Line #	Bearing #	Dir	Load kips
2	5	Y	-46.86

Auto generation details:

Generated Live Load

Longitudinal Reaction: User Input Reaction

	Max Vert. Reaction kips
Truck:	89.25
Lane:	130.36

Reaction distribution among lines

	Bearing Line 1	Bearing Line 2
Truck Case A:	0.50	0.50
Lane Case A:	0.50	0.50
Truck Case B:	1.00	0.00
Lane Case B:	0.50	0.00

Transverse Positioning

Number of loaded lanes = all combinations
Live Load Positions = Variable Spacing
Minimum Spacing Between Positions = 1.00 ft

Generate Braking/Longitudinal Force = Selected
Generate Centrifugal Force = Selected

Total number of Considered Truck Positions = 80
Total number of Possible Combination = 57222

Loadcase ID: (L+In)10 Name:

Multiplier = 1.000

Bearing loads

Line #	Bearing #	Dir	Load kips

Line #	Bearing #	Dir	Load kips
1	1	Y	0.00
1	2	Y	0.00
1	3	Y	0.00
1	4	Y	0.00
1	5	Y	0.00
2	1	Y	0.00
2	2	Y	0.00
2	3	Y	0.00
2	4	Y	-37.52
2	5	Y	-51.72

Auto generation details:

Generated Live Load

Longitudinal Reaction: User Input Reaction

	Max Vert. Reaction kips
Truck:	89.25
Lane:	130.36

Reaction distribution among lines

	Bearing Line 1	Bearing Line 2
Truck Case A:	0.50	0.50
Lane Case A:	0.50	0.50
Truck Case B:	1.00	0.00
Lane Case B:	0.50	0.00

Transverse Positioning

Number of loaded lanes = all combinations
Live Load Positions = Variable Spacing
Minimum Spacing Between Positions = 1.00 ft

Generate Braking/Longitudinal Force = Selected
Generate Centrifugal Force = Selected

Total number of Considered Truck Positions = 80
Total number of Possible Combination = 57222

Loadcase ID: (L+ln)11 Name:

Multiplier = 1.000

Bearing loads

Line #	Bearing #	Dir	Load kips
1	1	Y	-47.56
1	2	Y	-59.19
1	3	Y	-56.97
1	4	Y	-12.26
1	5	Y	0.00
2	1	Y	-40.63
2	2	Y	-60.71
2	3	Y	-58.92
2	4	Y	-15.73
2	5	Y	0.00

Auto generation details:

Generated Live Load

Longitudinal Reaction: User Input Reaction

	Max Vert. Reaction kips
Truck:	89.25
Lane:	130.36

Reaction distribution among lines

	Bearing Line 1	Bearing Line 2
Truck Case A:	0.50	0.50
Lane Case A:	0.50	0.50
Truck Case B:	1.00	0.00
Lane Case B:	0.50	0.00

Transverse Positioning

Number of loaded lanes = all combinations
Live Load Positions = Variable Spacing
Minimum Spacing Between Positions = 1.00 ft

Generate Braking/Longitudinal Force = Selected
Generate Centrifugal Force = Selected

Total number of Considered Truck Positions = 80
Total number of Possible Combination = 57222

Loadcase ID: (L+ln)12 Name:

Multiplier = 1.000

Bearing loads

Line #	Bearing #	Dir	Load kips
1	1	Y	0.00
1	2	Y	0.00
1	3	Y	-31.31
1	4	Y	-57.18
1	5	Y	-41.87
2	1	Y	0.00
2	2	Y	0.00
2	3	Y	-26.14
2	4	Y	-57.14
2	5	Y	-47.08

Auto generation details:

Generated Live Load

Longitudinal Reaction: User Input Reaction

	Max Vert. Reaction kips
Truck:	89.25
Lane:	130.36

Reaction distribution among lines

	Bearing Line 1	Bearing Line 2
Truck Case A:	0.50	0.50
Lane Case A:	0.50	0.50
Truck Case B:	1.00	0.00
Lane Case B:	0.50	0.00

Transverse Positioning

Number of loaded lanes = all combinations
Live Load Positions = Variable Spacing
Minimum Spacing Between Positions = 1.00 ft

Generate Braking/Longitudinal Force = Selected
Generate Centrifugal Force = Selected

Total number of Considered Truck Positions = 80

Total number of Possible Combination = 57222

Loadcase ID: (L+ln)13 Name:

Multiplier = 1.000

Bearing loads

Line #	Bearing #	Dir	Load kips
1	1	Y	0.00
1	2	Y	-17.59
1	3	Y	-59.29
1	4	Y	-60.61
1	5	Y	-38.49
2	1	Y	0.00
2	2	Y	-13.76
2	3	Y	-58.05
2	4	Y	-60.21
2	5	Y	-43.96

Auto generation details:

Generated Live Load

Longitudinal Reaction: User Input Reaction

	Max Vert. Reaction kips
Truck:	89.25
Lane:	130.36

Reaction distribution among lines

	Bearing Line 1	Bearing Line 2
Truck Case A:	0.50	0.50
Lane Case A:	0.50	0.50
Truck Case B:	1.00	0.00
Lane Case B:	0.50	0.00

Transverse Positioning

Number of loaded lanes = all combinations
Live Load Positions = Variable Spacing
Minimum Spacing Between Positions = 1.00 ft

Generate Braking/Longitudinal Force = Selected
Generate Centrifugal Force = Selected

Total number of Considered Truck Positions = 80
Total number of Possible Combination = 57222

Loadcase ID: (L+ln)14 Name:

Multiplier = 1.000

Bearing loads

Line #	Bearing #	Dir	Load kips
1	1	Y	0.00
1	2	Y	-22.77
1	3	Y	-82.73
1	4	Y	-83.86
1	5	Y	-51.60
2	1	Y	0.00
2	2	Y	0.00
2	3	Y	0.00
2	4	Y	0.00
2	5	Y	0.00

Auto generation details:

Generated Live Load

Longitudinal Reaction: User Input Reaction

	Max Vert. Reaction kips
Truck:	89.25
Lane:	130.36

Reaction distribution among lines

	Bearing Line 1	Bearing Line 2
Truck Case A:	0.50	0.50
Lane Case A:	0.50	0.50
Truck Case B:	1.00	0.00
Lane Case B:	0.50	0.00

Transverse Positioning

Number of loaded lanes = all combinations
Live Load Positions = Variable Spacing
Minimum Spacing Between Positions = 1.00 ft

Generate Braking/Longitudinal Force = Selected
Generate Centrifugal Force = Selected

Total number of Considered Truck Positions = 80
Total number of Possible Combination = 57222

Loadcase ID: (L+In)15 Name:

Multiplier = 1.000

Bearing loads

Line #	Bearing #	Dir	Load kips
1	1	Y	0.00
1	2	Y	0.00
1	3	Y	0.00
1	4	Y	0.00
1	5	Y	0.00
2	1	Y	0.00
2	2	Y	0.00
2	3	Y	-23.34
2	4	Y	-88.75
2	5	Y	-66.40

Auto generation details:

Generated Live Load

Longitudinal Reaction: User Input Reaction

	Max Vert. Reaction kips
Truck:	89.25
Lane:	130.36

Reaction distribution among lines

	Bearing Line 1	Bearing Line 2
Truck Case A:	0.50	0.50
Lane Case A:	0.50	0.50
Truck Case B:	1.00	0.00
Lane Case B:	0.50	0.00

Transverse Positioning

Number of loaded lanes = all combinations
Live Load Positions = Variable Spacing
Minimum Spacing Between Positions = 1.00 ft

Generate Braking/Longitudinal Force = Selected
Generate Centrifugal Force = Selected

Total number of Considered Truck Positions = 80
Total number of Possible Combination = 57222

adcase ID: (L+In)16 Name:

itiplier = 1.000

Bearing loads

Line #	Bearing #	Dir	Load kips
1	1	Y	0.00
1	2	Y	0.00
1	3	Y	-28.40
1	4	Y	-92.76
1	5	Y	-57.33
2	1	Y	0.00
2	2	Y	0.00
2	3	Y	0.00
2	4	Y	0.00
2	5	Y	0.00

Auto generation details:

enerated Live Load

Longitudinal Reaction: User Input Reaction

	Max Vert. Reaction kips
Truck:	89.25
Lane:	130.36

Reaction distribution among lines

	Bearing Line 1	Bearing Line 2
Truck Case A:	0.50	0.50
Lane Case A:	0.50	0.50
Truck Case B:	1.00	0.00
Lane Case B:	0.50	0.00

Transverse Positioning

Number of loaded lanes = all combinations
Live Load Positions = Variable Spacing
Minimum Spacing Between Positions = 1.00 ft

Generate Braking/Longitudinal Force = Selected
Generate Centrifugal Force = Selected

Total number of Considered Truck Positions = 80
Total number of Possible Combination = 57222

Loadcase ID: (L+In)17 Name:

Multiplier = 1.000

Bearing loads

Line #	Bearing #	Dir	Load kips
1	1	Y	0.00
1	2	Y	0.00
1	3	Y	0.00
1	4	Y	-31.91
1	5	Y	-57.33
2	1	Y	0.00
2	2	Y	0.00
2	3	Y	0.00
2	4	Y	0.00
2	5	Y	0.00

Auto generation details:

Generated Live Load

Longitudinal Reaction: User Input Reaction

	Max Vert. Reaction kips
Truck:	89.25
Lane:	130.36

Reaction distribution among lines

	Bearing Line 1	Bearing Line 2
Truck Case A:	0.50	0.50
Lane Case A:	0.50	0.50
Truck Case B:	1.00	0.00
Lane Case B:	0.50	0.00

Transverse Positioning

Number of loaded lanes = all combinations
Live Load Positions = Variable Spacing
Minimum Spacing Between Positions = 1.00 ft

Generate Braking/Longitudinal Force = Selected
Generate Centrifugal Force = Selected

Total number of Considered Truck Positions = 80
Total number of Possible Combination = 57222

Loadcase ID: LF1 Name:

Multiplier = 1.000

Cap loads

Type	Dir	Arm ft	Mag1	x1/L	Mag2	x2/L
Moment	X		50.43 k-ft	0.50		

Bearing loads

[illegible]e #	Bearing #	Dir	Load kips
1	1	X	-0.15
1	1	Z	0.45
1	1	Y	-0.20

Line #	Bearing #	Dir	Load kips
1	2	X	-0.15
1	2	Z	0.45
1	3	X	-0.15
1	3	Z	0.45
1	4	X	-0.15
1	4	Z	0.45
1	5	X	-0.15
1	5	Z	0.45
1	5	Y	0.20
2	1	X	-0.15
2	1	Z	0.45
2	1	Y	-0.20
2	2	X	-0.15
2	2	Z	0.45
2	3	X	-0.15
2	3	Z	0.45
2	4	X	-0.15
2	4	Z	0.45
2	5	X	-0.15
2	5	Z	0.45
2	5	Y	0.20

Auto generation details:

Manual input
Maximum truck load = 0.00 kips
Maximum lane load = 35.25 kips
Number of loaded lanes = 3

Loadcase ID: LF2 Name:

Multiplier = 1.000

Cap loads

Type	Dir	Arm ft	Mag1	x1/L	Mag2	x2/L
Moment	X		50.43 k-ft	0.50		

Bearing loads

Line #	Bearing #	Dir	Load kips
1	1	X	-0.15

Line #	Bearing #	Dir	Load kips
1	1	Z	0.45
1	1	Y	-0.20
1	2	X	-0.15
1	2	Z	0.45
1	3	X	-0.15
1	3	Z	0.45
1	4	X	-0.15
1	4	Z	0.45
1	5	X	-0.15
1	5	Z	0.45
1	5	Y	0.20
2	1	X	-0.15
2	1	Z	0.45
2	1	Y	-0.20
2	2	X	-0.15
2	2	Z	0.45
2	3	X	-0.15
2	3	Z	0.45
2	4	X	-0.15
2	4	Z	0.45
2	5	X	-0.15
2	5	Z	0.45
2	5	Y	0.20

Auto generation details:

Manual input
Maximum truck load = 0.00 kips
Maximum lane load = 35.25 kips
Number of loaded lanes = 3

Loadcase ID: LF3 Name:

Multiplier = 1.000

Cap loads

Type	Dir	Arm ft	Mag1	x1/L	Mag2	x2/L
Moment	X		37.36 k-ft	0.50		

Bearing loads

Line #	Bearing #	Dir	Load kips
1	1	X	-0.11
1	1	Z	0.33
1	1	Y	-0.15
1	2	X	-0.11
1	2	Z	0.33
1	3	X	-0.11
1	3	Z	0.33
1	4	X	-0.11
1	4	Z	0.33
1	5	X	-0.11
1	5	Z	0.33
1	5	Y	0.15
2	1	X	-0.11
2	1	Z	0.33
2	1	Y	-0.15
2	2	X	-0.11
2	2	Z	0.33
2	3	X	-0.11
2	3	Z	0.33
2	4	X	-0.11
2	4	Z	0.33
2	5	X	-0.11
2	5	Z	0.33
2	5	Y	0.15

Auto generation details:

Manual input
Maximum truck load = 0.00 kips
Maximum lane load = 35.25 kips
Number of loaded lanes = 2

Loadcase ID: LF4 Name:

Multiplier = 1.000

Cap loads

Type	Dir	Arm ft	Mag1	x1/L	Mag2	x2/L
Moment	X		50.43 k-ft	0.50		

Bearing loads

Line #	Bearing #	Dir	Load kips
1	1	X	-0.15
1	1	Z	0.45
1	1	Y	-0.20
1	2	X	-0.15
1	2	Z	0.45
1	3	X	-0.15
1	3	Z	0.45
1	4	X	-0.15
1	4	Z	0.45
1	5	X	-0.15
1	5	Z	0.45
1	5	Y	0.20
2	1	X	-0.15
2	1	Z	0.45
2	1	Y	-0.20
2	2	X	-0.15
2	2	Z	0.45
2	3	X	-0.15
2	3	Z	0.45
2	4	X	-0.15
2	4	Z	0.45
2	5	X	-0.15
2	5	Z	0.45
2	5	Y	0.20

Auto generation details:

Manual input
Maximum truck load = 0.00 kips
Maximum lane load = 35.25 kips
Number of loaded lanes = 3

Loadcase ID: LF5 Name:

Multiplier = 1.000

Cap loads

Type	Dir	Arm ft	Mag1	x1/L	Mag2	x2/L
Moment	X		37.36 k-ft	0.50		

Bearing loads

Line #	Bearing #	Dir	Load kips
1	1	X	-0.11
1	1	Z	0.33
1	1	Y	-0.15
1	2	X	-0.11
1	2	Z	0.33
1	3	X	-0.11
1	3	Z	0.33
1	4	X	-0.11
1	4	Z	0.33
1	5	X	-0.11
1	5	Z	0.33
1	5	Y	0.15
2	1	X	-0.11
2	1	Z	0.33
2	1	Y	-0.15
2	2	X	-0.11
2	2	Z	0.33
2	3	X	-0.11
2	3	Z	0.33
2	4	X	-0.11
2	4	Z	0.33
2	5	X	-0.11
2	5	Z	0.33
2	5	Y	0.15

Auto generation details:

Manual input
Maximum truck load = 0.00 kips
Maximum lane load = 35.25 kips
Number of loaded lanes = 2

Loadcase ID: LF6 Name:

Multiplier = 1.000

Cap loads

Type	Dir	Arm ft	Mag1	x1/L	Mag2	x2/L
Moment	X		50.43 k-ft	0.50		

Bearing loads

Line #	Bearing #	Dir	Load kips
1	1	X	-0.15
1	1	Z	0.45
1	1	Y	-0.20
1	2	X	-0.15
1	2	Z	0.45
1	3	X	-0.15
1	3	Z	0.45
1	4	X	-0.15
1	4	Z	0.45
1	5	X	-0.15
1	5	Z	0.45
1	5	Y	0.20
2	1	X	-0.15
2	1	Z	0.45
2	1	Y	-0.20
2	2	X	-0.15
2	2	Z	0.45
2	3	X	-0.15
2	3	Z	0.45
2	4	X	-0.15
2	4	Z	0.45
2	5	X	-0.15
2	5	Z	0.45
2	5	Y	0.20

Auto generation details:

Manual input
Maximum truck load = 0.00 kips
Maximum lane load = 35.25 kips
Number of loaded lanes = 3

Loadcase ID: LF7 Name:

Multiplier = 1.000

Cap loads

Type	Dir	Arm ft	Mag1	x1/L	Mag2	x2/L
Moment	X		37.36 k-ft	0.50		

Bearing loads

Line #	Bearing #	Dir	Load kips
1	1	X	-0.11
1	1	Z	0.33
1	1	Y	-0.15
1	2	X	-0.11
1	2	Z	0.33
1	3	X	-0.11
1	3	Z	0.33
1	4	X	-0.11
1	4	Z	0.33
1	5	X	-0.11
1	5	Z	0.33
1	5	Y	0.15
2	1	X	-0.11
2	1	Z	0.33
2	1	Y	-0.15
2	2	X	-0.11
2	2	Z	0.33
2	3	X	-0.11
2	3	Z	0.33
2	4	X	-0.11
2	4	Z	0.33
2	5	X	-0.11
2	5	Z	0.33
2	5	Y	0.15

Auto generation details:

Manual input
Maximum truck load = 0.00 kips
Maximum lane load = 35.25 kips
Number of loaded lanes = 2

Loadcase ID: LF8 Name:

Multiplier = 1.000

Cap loads

Type	Dir	Arm ft	Mag1	x1/L	Mag2	x2/L
Moment	X		37.36 k-ft	0.50		

Bearing loads

Line #	Bearing #	Dir	Load kips
1	1	X	-0.11
1	1	Z	0.33
1	1	Y	-0.15
1	2	X	-0.11
1	2	Z	0.33
1	3	X	-0.11
1	3	Z	0.33
1	4	X	-0.11
1	4	Z	0.33
1	5	X	-0.11
1	5	Z	0.33
1	5	Y	0.15
2	1	X	-0.11
2	1	Z	0.33
2	1	Y	-0.15
2	2	X	-0.11
2	2	Z	0.33
2	3	X	-0.11
2	3	Z	0.33
2	4	X	-0.11
2	4	Z	0.33
2	5	X	-0.11
2	5	Z	0.33
2	5	Y	0.15

Auto generation details:

Manual input
Maximum truck load = 0.00 kips
Maximum lane load = 35.25 kips
Number of loaded lanes = 2

Loadcase ID: LF9 Name:

Multiplier = 1.000

Cap loads

Type	Dir	Arm ft	Mag1	x1/L	Mag2	x2/L
Moment	X		18.68 k-ft	0.50		

Bearing loads

Line #	Bearing #	Dir	Load kips
1	1	X	-0.06
1	1	Z	0.17
1	1	Y	-0.07
1	2	X	-0.06
1	2	Z	0.17
1	3	X	-0.06
1	3	Z	0.17
1	4	X	-0.06
1	4	Z	0.17
1	5	X	-0.06
1	5	Z	0.17
1	5	Y	0.07
2	1	X	-0.06
2	1	Z	0.17
2	1	Y	-0.07
2	2	X	-0.06
2	2	Z	0.17
2	3	X	-0.06
2	3	Z	0.17
2	4	X	-0.06
2	4	Z	0.17
2	5	X	-0.06
2	5	Z	0.17
2	5	Y	0.07

Auto generation details:

Manual input
Maximum truck load = 0.00 kips
Maximum lane load = 35.25 kips
Number of loaded lanes = 1

Loadcase ID: LF10 Name:

Multiplier = 1.000

Cap loads

Type	Dir	Arm ft	Mag1	x1/L	Mag2	x2/L
Moment	X		18.68 k-ft	0.50		

Bearing loads

Line #	Bearing #	Dir	Load kips
1	1	X	-0.06
1	1	Z	0.17
1	1	Y	-0.07
1	2	X	-0.06
1	2	Z	0.17
1	3	X	-0.06
1	3	Z	0.17
1	4	X	-0.06
1	4	Z	0.17
1	5	X	-0.06
1	5	Z	0.17
1	5	Y	0.07
2	1	X	-0.06
2	1	Z	0.17
2	1	Y	-0.07
2	2	X	-0.06
2	2	Z	0.17
2	3	X	-0.06
2	3	Z	0.17
2	4	X	-0.06
2	4	Z	0.17
2	5	X	-0.06
2	5	Z	0.17
2	5	Y	0.07

Auto generation details:

Manual input
Maximum truck load = 0.00 kips
Maximum lane load = 35.25 kips
Number of loaded lanes = 1

Loadcase ID: LF11 Name:

Multiplier = 1.000

Cap loads

Type	Dir	Arm ft	Mag1	x1/L	Mag2	x2/L
Moment	X		50.43 k-ft	0.50		

Bearing loads

Line #	Bearing #	Dir	Load kips
1	1	X	-0.15
1	1	Z	0.45
1	1	Y	-0.20
1	2	X	-0.15
1	2	Z	0.45
1	3	X	-0.15
1	3	Z	0.45
1	4	X	-0.15
1	4	Z	0.45
1	5	X	-0.15
1	5	Z	0.45
1	5	Y	0.20
2	1	X	-0.15
2	1	Z	0.45
2	1	Y	-0.20
2	2	X	-0.15
2	2	Z	0.45
2	3	X	-0.15
2	3	Z	0.45
2	4	X	-0.15
2	4	Z	0.45
2	5	X	-0.15
2	5	Z	0.45
2	5	Y	0.20

Auto generation details:

Manual input
Maximum truck load = 0.00 kips
Maximum lane load = 35.25 kips
Number of loaded lanes = 3

Loadcase ID: LF12 Name:

Multiplier = 1.000

Cap loads

Type	Dir	Arm ft	Mag1	x1/L	Mag2	x2/L
Moment	X		37.36 k-ft	0.50		

Bearing loads

Line #	Bearing #	Dir	Load kips
1	1	X	-0.11
1	1	Z	0.33
1	1	Y	-0.15
1	2	X	-0.11
1	2	Z	0.33
1	3	X	-0.11
1	3	Z	0.33
1	4	X	-0.11
1	4	Z	0.33
1	5	X	-0.11
1	5	Z	0.33
1	5	Y	0.15
2	1	X	-0.11
2	1	Z	0.33
2	1	Y	-0.15
2	2	X	-0.11
2	2	Z	0.33
2	3	X	-0.11
2	3	Z	0.33
2	4	X	-0.11
2	4	Z	0.33
2	5	X	-0.11
2	5	Z	0.33
2	5	Y	0.15

Auto generation details:

Manual input
Maximum truck load = 0.00 kips
Maximum lane load = 35.25 kips
Number of loaded lanes = 2

Loadcase ID: LF13 Name:

Multiplier = 1.000

Cap loads

Type	Dir	Arm ft	Mag1	x1/L	Mag2	x2/L
Moment	X		50.43 k-ft	0.50		

Bearing loads

Line #	Bearing #	Dir	Load kips
1	1	X	-0.15
1	1	Z	0.45
1	1	Y	-0.20
1	2	X	-0.15
1	2	Z	0.45
1	3	X	-0.15
1	3	Z	0.45
1	4	X	-0.15
1	4	Z	0.45
1	5	X	-0.15
1	5	Z	0.45
1	5	Y	0.20
2	1	X	-0.15
2	1	Z	0.45
2	1	Y	-0.20
2	2	X	-0.15
2	2	Z	0.45
2	3	X	-0.15
2	3	Z	0.45
2	4	X	-0.15
2	4	Z	0.45
2	5	X	-0.15
2	5	Z	0.45
2	5	Y	0.20

Auto generation details:

Manual input
Maximum truck load = 0.00 kips
Maximum lane load = 35.25 kips
Number of loaded lanes = 3

Loadcase ID: LF14 Name:

Multiplier = 1.000

Cap loads

Type	Dir	Arm ft	Mag1	x1/L	Mag2	x2/L
Moment	X		50.43 k-ft	0.50		

Bearing loads

Line #	Bearing #	Dir	Load kips
1	1	X	-0.15
1	1	Z	0.45
1	1	Y	-0.20
1	2	X	-0.15
1	2	Z	0.45
1	3	X	-0.15
1	3	Z	0.45
1	4	X	-0.15
1	4	Z	0.45
1	5	X	-0.15
1	5	Z	0.45
1	5	Y	0.20
2	1	X	-0.15
2	1	Z	0.45
2	1	Y	-0.20
2	2	X	-0.15
2	2	Z	0.45
2	3	X	-0.15
2	3	Z	0.45
2	4	X	-0.15
2	4	Z	0.45
2	5	X	-0.15
2	5	Z	0.45
2	5	Y	0.20

Auto generation details:

Manual input
Maximum truck load = 0.00 kips
Maximum lane load = 35.25 kips
Number of loaded lanes = 3

Loadcase ID: LF15 Name:

Multiplier = 1.000

Cap loads

Type	Dir	Arm ft	Mag1	x1/L	Mag2	x2/L
Moment	X		37.36 k-ft	0.50		

Bearing loads

Line #	Bearing #	Dir	Load kips
1	1	X	-0.11
1	1	Z	0.33
1	1	Y	-0.15
1	2	X	-0.11
1	2	Z	0.33
1	3	X	-0.11
1	3	Z	0.33
1	4	X	-0.11
1	4	Z	0.33
1	5	X	-0.11
1	5	Z	0.33
1	5	Y	0.15
2	1	X	-0.11
2	1	Z	0.33
2	1	Y	-0.15
2	2	X	-0.11
2	2	Z	0.33
2	3	X	-0.11
2	3	Z	0.33
2	4	X	-0.11
2	4	Z	0.33
2	5	X	-0.11
2	5	Z	0.33
2	5	Y	0.15

Auto generation details:

Manual input
Maximum truck load = 0.00 kips
Maximum lane load = 35.25 kips
Number of loaded lanes = 2

Loadcase ID: LF16 Name:

Multiplier = 1.000

Cap loads

Type	Dir	Arm ft	Mag1	x1/L	Mag2	x2/L
Moment	X		37.36 k-ft	0.50		

Bearing loads

Line #	Bearing #	Dir	Load kips
1	1	X	-0.11
1	1	Z	0.33
1	1	Y	-0.15
1	2	X	-0.11
1	2	Z	0.33
1	3	X	-0.11
1	3	Z	0.33
1	4	X	-0.11
1	4	Z	0.33
1	5	X	-0.11
1	5	Z	0.33
1	5	Y	0.15
2	1	X	-0.11
2	1	Z	0.33
2	1	Y	-0.15
2	2	X	-0.11
2	2	Z	0.33
2	3	X	-0.11
2	3	Z	0.33
2	4	X	-0.11
2	4	Z	0.33
2	5	X	-0.11
2	5	Z	0.33
2	5	Y	0.15

Auto generation details:

Manual input
Maximum truck load = 0.00 kips
Maximum lane load = 35.25 kips
Number of loaded lanes = 2

Loadcase ID: LF17 Name:

Multiplier = 1.000

Cap loads

Type	Dir	Arm ft	Mag1	x1/L	Mag2	x2/L
Moment	X		18.68 k-ft	0.50		

Bearing loads

Line #	Bearing #	Dir	Load kips
1	1	X	-0.06
1	1	Z	0.17
1	1	Y	-0.07
1	2	X	-0.06
1	2	Z	0.17
1	3	X	-0.06
1	3	Z	0.17
1	4	X	-0.06
1	4	Z	0.17
1	5	X	-0.06
1	5	Z	0.17
1	5	Y	0.07
2	1	X	-0.06
2	1	Z	0.17
2	1	Y	-0.07
2	2	X	-0.06
2	2	Z	0.17
2	3	X	-0.06
2	3	Z	0.17
2	4	X	-0.06
2	4	Z	0.17
2	5	X	-0.06
2	5	Z	0.17
2	5	Y	0.07

Auto generation details:

Manual input
Maximum truck load = 0.00 kips
Maximum lane load = 35.25 kips
Number of loaded lanes = 1

Loadcase ID: CF1 Name:

Multiplier = 1.000

Cap loads

Type	Dir	Arm ft	Mag1	x1/L	Mag2	x2/L
Moment	X		50.23 k-ft	0.50		

Bearing loads

Line #	Bearing #	Dir	Load kips
1	1	X	1.30
1	1	Z	0.45
1	1	Y	1.66
1	2	X	1.30
1	2	Z	0.45
1	3	X	1.30
1	3	Z	0.45
1	4	X	1.30
1	4	Z	0.45
1	5	X	1.30
1	5	Z	0.45
1	5	Y	-1.66
2	1	X	1.30
2	1	Z	0.45
2	1	Y	1.65
2	2	X	1.30
2	2	Z	0.45
2	3	X	1.30
2	3	Z	0.45
2	4	X	1.30
2	4	Z	0.45
2	5	X	1.30
2	5	Z	0.45
2	5	Y	-1.65

Auto generation details:

Manual input
Maximum truck load = 89.25 kips
Maximum lane load = 0.00 kips
Number of loaded lanes = 3
Radius of curve = 5729.57 ft
Design speed = 70.00 mph

Loadcase ID: CF2 Name:

Multiplier = 1.000

Cap loads

Type	Dir	Arm ft	Mag1	x1/L	Mag2	x2/L
Moment	X		50.23 k-ft	0.50		

Bearing loads

Line #	Bearing #	Dir	Load kips
1	1	X	1.30
1	1	Z	0.45
1	1	Y	1.66
1	2	X	1.30
1	2	Z	0.45
1	3	X	1.30
1	3	Z	0.45
1	4	X	1.30
1	4	Z	0.45
1	5	X	1.30
1	5	Z	0.45
1	5	Y	-1.66
2	1	X	1.30
2	1	Z	0.45
2	1	Y	1.65
2	2	X	1.30
2	2	Z	0.45
2	3	X	1.30
2	3	Z	0.45
2	4	X	1.30
2	4	Z	0.45
2	5	X	1.30
2	5	Z	0.45
2	5	Y	-1.65

Auto generation details:

Manual input
Maximum truck load = 89.25 kips
Maximum lane load = 0.00 kips
Number of loaded lanes = 3
Radius of curve = 5729.57 ft
Design speed = 70.00 mph

Loadcase ID: CF3 Name:

Multiplier = 1.000

Cap loads

Type	Dir	Arm ft	Mag1	x1/L	Mag2	x2/L
Moment	X		37.21 k-ft	0.50		

Bearing loads

Line #	Bearing #	Dir	Load kips
1	1	X	0.96
1	1	Z	0.33
1	1	Y	1.23
1	2	X	0.96
1	2	Z	0.33
1	3	X	0.96
1	3	Z	0.33
1	4	X	0.96
1	4	Z	0.33
1	5	X	0.96
1	5	Z	0.33
1	5	Y	-1.23
2	1	X	0.96
2	1	Z	0.33
2	1	Y	1.22
2	2	X	0.96
2	2	Z	0.33
2	3	X	0.96
2	3	Z	0.33
2	4	X	0.96
2	4	Z	0.33
2	5	X	0.96
2	5	Z	0.33
2	5	Y	-1.22

Auto generation details:

Manual input
Maximum truck load = 89.25 kips
Maximum lane load = 0.00 kips
Number of loaded lanes = 2
Radius of curve = 5729.57 ft
Design speed = 70.00 mph

Loadcase ID: CF4 Name:

Multiplier = 1.000

Cap loads

Type	Dir	Arm ft	Mag1	x1/L	Mag2	x2/L
Moment	X		50.23 k-ft	0.50		

Bearing loads

Line #	Bearing #	Dir	Load kips
1	1	X	1.30
1	1	Z	0.45
1	1	Y	1.66
1	2	X	1.30
1	2	Z	0.45
1	3	X	1.30
1	3	Z	0.45
1	4	X	1.30
1	4	Z	0.45
1	5	X	1.30
1	5	Z	0.45
1	5	Y	-1.66
2	1	X	1.30
2	1	Z	0.45
2	1	Y	1.65
2	2	X	1.30
2	2	Z	0.45
2	3	X	1.30
2	3	Z	0.45
2	4	X	1.30
2	4	Z	0.45
2	5	X	1.30
2	5	Z	0.45
2	5	Y	-1.65

Auto generation details:

Manual input
Maximum truck load = 89.25 kips
Maximum lane load = 0.00 kips
Number of loaded lanes = 3
Radius of curve = 5729.57 ft
Design speed = 70.00 mph

Loadcase ID: CF5 Name:

Multiplier = 1.000

Cap loads

Type	Dir	Arm ft	Mag1	x1/L	Mag2	x2/L
Moment	X		37.21 k-ft	0.50		

Bearing loads

Line #	Bearing #	Dir	Load kips
1	1	X	0.96
1	1	Z	0.33
1	1	Y	1.23
1	2	X	0.96
1	2	Z	0.33
1	3	X	0.96
1	3	Z	0.33
1	4	X	0.96
1	4	Z	0.33
1	5	X	0.96
1	5	Z	0.33
1	5	Y	-1.23
2	1	X	0.96
2	1	Z	0.33
2	1	Y	1.22
2	2	X	0.96
2	2	Z	0.33
2	3	X	0.96
2	3	Z	0.33
2	4	X	0.96
2	4	Z	0.33
2	5	X	0.96
2	5	Z	0.33
2	5	Y	-1.22

Auto generation details:

Manual input
Maximum truck load = 89.25 kips
Maximum lane load = 0.00 kips
Number of loaded lanes = 2
Radius of curve = 5729.57 ft
Design speed = 70.00 mph

Loadcase ID: CF6 Name:

Multiplier = 1.000

Cap loads

Type	Dir	Arm ft	Mag1	x1/L	Mag2	x2/L

Type	Dir	Arm ft	Mag1	x1/L	Mag2	x2/L
Moment	X		50.23 k-ft	0.50		

Bearing loads

Line #	Bearing #	Dir	Load kips
1	1	X	1.30
1	1	Z	0.45
1	1	Y	1.66
1	2	X	1.30
1	2	Z	0.45
1	3	X	1.30
1	3	Z	0.45
1	4	X	1.30
1	4	Z	0.45
1	5	X	1.30
1	5	Z	0.45
1	5	Y	-1.66
2	1	X	1.30
2	1	Z	0.45
2	1	Y	1.65
2	2	X	1.30
2	2	Z	0.45
2	3	X	1.30
2	3	Z	0.45
2	4	X	1.30
2	4	Z	0.45
2	5	X	1.30
2	5	Z	0.45
2	5	Y	-1.65

Auto generation details:

Manual input
Maximum truck load = 89.25 kips
Maximum lane load = 0.00 kips
Number of loaded lanes = 3
Radius of curve = 5729.57 ft
Design speed = 70.00 mph

Loadcase ID: CF7 Name:

Multiplier = 1.000

Cap loads

Type	Dir	Arm ft	Mag1	x1/L	Mag2	x2/L
Moment	X		37.21 k-ft	0.50		

Bearing loads

Line #	Bearing #	Dir	Load kips
1	1	X	0.96
1	1	Z	0.33
1	1	Y	1.23
1	2	X	0.96
1	2	Z	0.33
1	3	X	0.96
1	3	Z	0.33
1	4	X	0.96
1	4	Z	0.33
1	5	X	0.96
1	5	Z	0.33
1	5	Y	-1.23
2	1	X	0.96
2	1	Z	0.33
2	1	Y	1.22
2	2	X	0.96
2	2	Z	0.33
2	3	X	0.96
2	3	Z	0.33
2	4	X	0.96
2	4	Z	0.33
2	5	X	0.96
2	5	Z	0.33
2	5	Y	-1.22

Auto generation details:

Manual input
Maximum truck load = 89.25 kips
Maximum lane load = 0.00 kips
Number of loaded lanes = 2
Radius of curve = 5729.57 ft
Design speed = 70.00 mph

Loadcase ID: CF8 Name:

Multiplier = 1.000

Cap loads

Type	Dir	Arm ft	Mag1	x1/L	Mag2	x2/L
Moment	X		37.21 k-ft	0.50		

Bearing loads

Line #	Bearing #	Dir	Load kips
1	1	X	0.96
1	1	Z	0.33
1	1	Y	1.23
1	2	X	0.96
1	2	Z	0.33
1	3	X	0.96
1	3	Z	0.33
1	4	X	0.96
1	4	Z	0.33
1	5	X	0.96
1	5	Z	0.33
1	5	Y	-1.23
2	1	X	0.96
2	1	Z	0.33
2	1	Y	1.22
2	2	X	0.96
2	2	Z	0.33
2	3	X	0.96
2	3	Z	0.33
2	4	X	0.96
2	4	Z	0.33
2	5	X	0.96
2	5	Z	0.33
2	5	Y	-1.22

Auto generation details:

Manual input
Maximum truck load = 89.25 kips
Maximum lane load = 0.00 kips
Number of loaded lanes = 2
Radius of curve = 5729.57 ft
Design speed = 70.00 mph

Loadcase ID: CF9 Name:

Multiplier = 1.000

Cap loads

Type	Dir	Arm ft	Mag1	x1/L	Mag2	x2/L
Moment	X		18.60 k-ft	0.50		

Bearing loads

Line #	Bearing #	Dir	Load kips
1	1	X	0.48
1	1	Z	0.17
1	1	Y	0.61
1	2	X	0.48
1	2	Z	0.17
1	3	X	0.48
1	3	Z	0.17
1	4	X	0.48
1	4	Z	0.17
1	5	X	0.48
1	5	Z	0.17
1	5	Y	-0.61
2	1	X	0.48
2	1	Z	0.17
2	1	Y	0.61
2	2	X	0.48
2	2	Z	0.17
2	3	X	0.48
2	3	Z	0.17
2	4	X	0.48
2	4	Z	0.17
2	5	X	0.48
2	5	Z	0.17
2	5	Y	-0.61

Auto generation details:

Manual input
Maximum truck load = 89.25 kips
Maximum lane load = 0.00 kips
Number of loaded lanes = 1
  ius of curve = 5729.57 ft
  ign speed = 70.00 mph

Loadcase ID: CF10 Name:

Multiplier = 1.000

Cap loads

Type	Dir	Arm ft	Mag1	x1/L	Mag2	x2/L
Moment	X		18.60 k-ft	0.50		

Bearing loads

Line #	Bearing #	Dir	Load kips
1	1	X	0.48
1	1	Z	0.17
1	1	Y	0.61
1	2	X	0.48
1	2	Z	0.17
1	3	X	0.48
1	3	Z	0.17
1	4	X	0.48
1	4	Z	0.17
1	5	X	0.48
1	5	Z	0.17
1	5	Y	-0.61
2	1	X	0.48
2	1	Z	0.17
2	1	Y	0.61
2	2	X	0.48
2	2	Z	0.17
2	3	X	0.48
2	3	Z	0.17
2	4	X	0.48
2	4	Z	0.17
2	5	X	0.48
2	5	Z	0.17
2	5	Y	-0.61

Auto generation details:

Manual input
Maximum truck load = 89.25 kips
Maximum lane load = 0.00 kips
Number of loaded lanes = 1
Radius of curve = 5729.57 ft
Design speed = 70.00 mph

Loadcase ID: CF11 Name:

Multiplier = 1.000

Cap loads

Type	Dir	Arm ft	Mag1	x1/L	Mag2	x2/L
Moment	X		50.23 k-ft	0.50		

Bearing loads

Line #	Bearing #	Dir	Load kips
1	1	X	1.30
1	1	Z	0.45
1	1	Y	1.66
1	2	X	1.30
1	2	Z	0.45
1	3	X	1.30
1	3	Z	0.45
1	4	X	1.30
1	4	Z	0.45
1	5	X	1.30
1	5	Z	0.45
1	5	Y	-1.66
2	1	X	1.30
2	1	Z	0.45
2	1	Y	1.65
2	2	X	1.30
2	2	Z	0.45
2	3	X	1.30
2	3	Z	0.45
2	4	X	1.30
2	4	Z	0.45
2	5	X	1.30
2	5	Z	0.45
2	5	Y	-1.65

Auto generation details:

Manual input
Maximum truck load = 89.25 kips
Maximum lane load = 0.00 kips
Number of loaded lanes = 3
Radius of curve = 5729.57 ft

Design speed = 70.00 mph

Loadcase ID: CF12 Name:

Multiplier = 1.000

Cap loads

Type	Dir	Arm ft	Mag1	x1/L	Mag2	x2/L
Moment	X		37.21 k-ft	0.50		

Bearing loads

Line #	Bearing #	Dir	Load kips
1	1	X	0.96
1	1	Z	0.33
1	1	Y	1.23
1	2	X	0.96
1	2	Z	0.33
1	3	X	0.96
1	3	Z	0.33
1	4	X	0.96
1	4	Z	0.33
1	5	X	0.96
1	5	Z	0.33
1	5	Y	-1.23
2	1	X	0.96
2	1	Z	0.33
2	1	Y	1.22
2	2	X	0.96
2	2	Z	0.33
2	3	X	0.96
2	3	Z	0.33
2	4	X	0.96
2	4	Z	0.33
2	5	X	0.96
2	5	Z	0.33
2	5	Y	-1.22

Auto generation details:

Manual input
Maximum truck load = 89.25 kips
Maximum lane load = 0.00 kips

Number of loaded lanes = 2
Radius of curve = 5729.57 ft
Design speed = 70.00 mph

Loadcase ID: CF13 Name:

Multiplier = 1.000

Cap loads

Type	Dir	Arm ft	Mag1	x1/L	Mag2	x2/L
Moment	X		50.23 k-ft	0.50		

Bearing loads

Line #	Bearing #	Dir	Load kips
1	1	X	1.30
1	1	Z	0.45
1	1	Y	1.66
1	2	X	1.30
1	2	Z	0.45
1	3	X	1.30
1	3	Z	0.45
1	4	X	1.30
1	4	Z	0.45
1	5	X	1.30
1	5	Z	0.45
1	5	Y	-1.66
2	1	X	1.30
2	1	Z	0.45
2	1	Y	1.65
2	2	X	1.30
2	2	Z	0.45
2	3	X	1.30
2	3	Z	0.45
2	4	X	1.30
2	4	Z	0.45
2	5	X	1.30
2	5	Z	0.45
2	5	Y	-1.65

Auto generation details:

Manual input

Maximum truck load = 89.25 kips
Maximum lane load = 0.00 kips
Number of loaded lanes = 3
Radius of curve = 5729.57 ft
Design speed = 70.00 mph

Loadcase ID: CF14 Name:

Multiplier = 1.000

Cap loads

Type	Dir	Arm ft	Mag1	x1/L	Mag2	x2/L
Moment	X		50.23 k-ft	0.50		

Bearing loads

Line #	Bearing #	Dir	Load kips
1	1	X	1.30
1	1	Z	0.45
1	1	Y	1.66
1	2	X	1.30
1	2	Z	0.45
1	3	X	1.30
1	3	Z	0.45
1	4	X	1.30
1	4	Z	0.45
1	5	X	1.30
1	5	Z	0.45
1	5	Y	-1.66
2	1	X	1.30
2	1	Z	0.45
2	1	Y	1.65
2	2	X	1.30
2	2	Z	0.45
2	3	X	1.30
2	3	Z	0.45
2	4	X	1.30
2	4	Z	0.45
2	5	X	1.30
2	5	Z	0.45
2	5	Y	-1.65

Auto generation details:

Manual input
Maximum truck load = 89.25 kips
Maximum lane load = 0.00 kips
Number of loaded lanes = 3
Radius of curve = 5729.57 ft
Design speed = 70.00 mph

Loadcase ID: CF15 Name:

Multiplier = 1.000

Cap loads

Type	Dir	Arm ft	Mag1	x1/L	Mag2	x2/L
Moment	X		37.21 k-ft	0.50		

Bearing loads

Line #	Bearing #	Dir	Load kips
1	1	X	0.96
1	1	Z	0.33
1	1	Y	1.23
1	2	X	0.96
1	2	Z	0.33
1	3	X	0.96
1	3	Z	0.33
1	4	X	0.96
1	4	Z	0.33
1	5	X	0.96
1	5	Z	0.33
1	5	Y	-1.23
2	1	X	0.96
2	1	Z	0.33
2	1	Y	1.22
2	2	X	0.96
2	2	Z	0.33
2	3	X	0.96
2	3	Z	0.33
2	4	X	0.96
2	4	Z	0.33
2	5	X	0.96
2	5	Z	0.33
2	5	Y	-1.22

Auto generation details:

Manual input
Maximum truck load = 89.25 kips
Maximum lane load = 0.00 kips
Number of loaded lanes = 2
Radius of curve = 5729.57 ft
Design speed = 70.00 mph

Loadcase ID: CF16 Name:

Multiplier = 1.000

Cap loads

Type	Dir	Arm ft	Mag1	x1/L	Mag2	x2/L
Moment	X		37.21 k-ft	0.50		

Bearing loads

Line #	Bearing #	Dir	Load kips
1	1	X	0.96
1	1	Z	0.33
1	1	Y	1.23
1	2	X	0.96
1	2	Z	0.33
1	3	X	0.96
1	3	Z	0.33
1	4	X	0.96
1	4	Z	0.33
1	5	X	0.96
1	5	Z	0.33
1	5	Y	-1.23
2	1	X	0.96
2	1	Z	0.33
2	1	Y	1.22
2	2	X	0.96
2	2	Z	0.33
2	3	X	0.96
2	3	Z	0.33
2	4	X	0.96
2	4	Z	0.33
2	5	X	0.96
2	5	Z	0.33
2	5	Y	-1.22

Auto generation details:

Manual input
Maximum truck load = 89.25 kips
Maximum lane load = 0.00 kips
Number of loaded lanes = 2
Radius of curve = 5729.57 ft
Design speed = 70.00 mph

Loadcase ID: CF17 Name:

Multiplier = 1.000

Cap loads

Type	Dir	Arm ft	Mag1	x1/L	Mag2	x2/L
Moment	X		18.60 k-ft	0.50		

Bearing loads

Line #	Bearing #	Dir	Load kips
1	1	X	0.48
1	1	Z	0.17
1	1	Y	0.61
1	2	X	0.48
1	2	Z	0.17
1	3	X	0.48
1	3	Z	0.17
1	4	X	0.48
1	4	Z	0.17
1	5	X	0.48
1	5	Z	0.17
1	5	Y	-0.61
2	1	X	0.48
2	1	Z	0.17
2	1	Y	0.61
2	2	X	0.48
2	2	Z	0.17
2	3	X	0.48
2	3	Z	0.17
2	4	X	0.48
2	4	Z	0.17
2	5	X	0.48
2	5	Z	0.17
2	5	Y	-0.61

Auto generation details:

Manual input
Maximum truck load = 89.25 kips
Maximum lane load = 0.00 kips
Number of loaded lanes = 1
Radius of curve = 5729.57 ft
Design speed = 70.00 mph

Loadcase ID: W1 Name: Angle: 0

Multiplier = 1.000

Cap loads

Type	Dir	Arm ft	Mag1	x1/L	Mag2	x2/L
Force	X	0.00	6.14 kips	0.50		
UDL	Z		0.04 klf	0.00		1.00

Column loads

Col #	Type	Dir	Mag1	y1/L	Mag2	y2/L
1	UDL	X	0.358 klf	0.00		0.88
1	UDL	Z	0.123 klf	0.00		0.88

Bearing loads

Line #	Bearing #	Dir	Load kips
1	1	X	4.50
1	1	Y	27.46
1	1	Z	1.08
1	2	X	4.50
1	2	Y	10.25
1	2	Z	1.08
1	3	X	4.50
1	3	Y	10.25
1	3	Z	1.08
1	4	X	4.50
1	4	Y	10.25
1	4	Z	1.08
1	5	X	4.50
1	5	Y	-6.96
1	5	Z	1.08

Line #	Bearing #	Dir	Load kips
2	1	X	4.50
2	1	Y	27.46
2	1	Z	1.08
2	2	X	4.50
2	2	Y	10.25
2	2	Z	1.08
2	3	X	4.50
2	3	Y	10.25
2	3	Z	1.08
2	4	X	4.50
2	4	Y	10.25
2	4	Z	1.08
2	5	X	4.50
2	5	Y	-6.96
2	5	Z	1.08

Auto generation details:

Generated Wind Load on Structure

...le of wind = 0.00 deg Elevation above which wind load acts = 0.00 ft
... defined wind pressure:

Wind pressure for superstructure: Wind pressure for substructure:
Transverse 50.000 psf Cap 40.000 psf
Longitudinal 4.800 psf Column 40.000 psf
Overturning 20.000 psf

Loadcase ID: WL1 Name: Angle: 0

Multiplier = 1.000

Bearing loads

Line #	Bearing #	Dir	Load kips
1	1	X	0.38
1	1	Y	0.48
1	1	Z	0.13
1	2	X	0.38
1	2	Y	-0.00
1	2	Z	0.13
1	3	X	0.38
1	3	Y	-0.00
1	3	Z	0.13
1	4	X	0.38

Line #	Bearing #	Dir	Load kips
1	4	Y	-0.00
1	4	Z	0.13
1	5	X	0.38
1	5	Y	-0.48
1	5	Z	0.13
2	1	X	0.38
2	1	Y	0.48
2	1	Z	0.13
2	2	X	0.38
2	2	Y	-0.00
2	2	Z	0.13
2	3	X	0.38
2	3	Y	-0.00
2	3	Z	0.13
2	4	X	0.38
2	4	Y	-0.00
2	4	Z	0.13
2	5	X	0.38
2	5	Y	-0.48
2	5	Z	0.13

Auto generation details:

Generated Wind Load on Live Load

Angle of wind = 0.00 deg Live load length = 40.00 ft

Selected load groups

SERVICE GROUP I
SERVICE GROUP III
LOAD FACTOR GROUP I
LOAD FACTOR GROUP III
SERVICE GROUP IA
LOAD FACTOR GROUP IA

HDR ONE COMPANY *Many Solutions*	Project: ODOT-SCI-823-PHASE 1	Computed: JSW	Date: 6-24-09
	Subject: BRIDGE 0917	Checked: DMP	Date: 7/27/09
	Task: BENT DESIGN - LIVE LOAD	Page: 1	of:
	Job #:	No:	

LIVE LOAD

RC PIER AUTO-GENERATED LOADS:

- RC-PIER UTILIZES THE MAX SERVICE LANE AND TRUCK LIVE LOAD REACTIONS TO COMPUTE MULTIPLE LIVE LOAD CASES.

- CONSPAN PROVIDES SERVICE LOAD REACTIONS FOR ONE LANE, WITH NO IMPACT AND NO MULTILANE REDUCTION FACTOR.

MAX LANE LOAD = 130.357^{k}
MAX TRUCK LOAD = 89.2452^{k}

AUTO-GENERATED LIVE LOAD CHECK:

- CONSPAN LIVE LOAD LANE REACTION ON PIER 1

MAX => 130.4^{k}
MIN => -11.1^{k}

IMPACT (AASHTO 3.8.2.1)

$$I = \frac{50}{L+125} = \frac{50}{100+125} = .22$$

$$I_{MAX} = 130.4^{k} \cdot .22 = 28.69^{k}$$

$$I_{MIN} = -11.1^{k} \cdot .22 = -2.44^{k}$$

LIVE LOAD + IMPACT

$LL+I =$ MAX $= 159.1^{k}$
MIN $= 13.5^{k}$

THESE REACTIONS OCCUR OVER A 10' WIDE LANE ON A 19° SKEW
THE SKEWED LANE WIDTH IS:

Project: ODOT-SCI-823-PHASE 1	Computed: JSW	Date: 6-24-09
Subject: BRIDGE 0917	Checked: DMP	Date: 7/27/09
Task: BENT DESIGN - LIVE LOAD	Page: 2	of:
Job #:	No:	

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LIVE LOAD CONT

$$\frac{10}{\cos 19} = 10.58' \qquad \frac{1}{\cos 19} = 1.058'$$

LIVE LOAD FOR APPLICATION TO THE DECK FOR SIMPLE SPAN DIST. N TO THE BEAM IS;

$$MAX \Rightarrow \frac{159.1^k}{10.58'} = 15.04^k/FT \qquad MIN \Rightarrow \frac{-13.5^k}{10.58'} = -1.28^k/FT$$

- IN RC-PIER: LIVE LOADS WERE AUTO-GENERATED BY IMPORT THE MAX TRUCK AND LANE LOAD FROM THE CONSPAN PRESTRESSED I-BEAM DESIGN. RC-PIER CREATES DIFFERENT LIVE LOAD CASES BY APPLYING THE IMPORT LIVE LOADS AT DIFFERENT LOCATION ACROSS THE STRUCTURE.

- THE FOLLOWING CALCULATED LIVE LOAD CASES WERE USED AS A CHECK.

Project: ODOT-SCI-823-PHASE I	Computed: JSW	Date: 6-24-09	
Subject: BRIDGE 0917	Checked: DMP	Date: 7/27/09	
Task: BENT DESIGN - LIVE LOAD	Page: 3	of:	
Job #:	No:		

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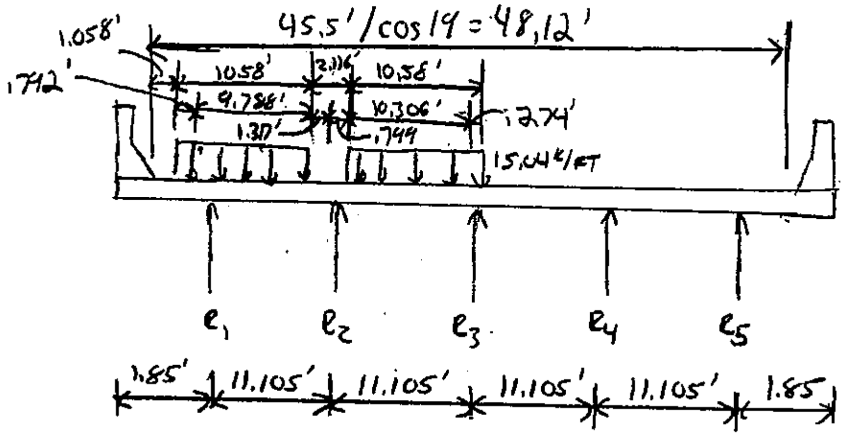
LIVE LOAD 1



$$R_1 = (.792')(15.04\ ^k/_{FT}) + \frac{(9.788')(15.04\ ^k/_{FT})(1.317 + \frac{9.788'}{2})}{11.105'}$$

$$= 11.9^k + 82.3^k = 94.2^k$$

$$R_2 = [(9.788')(15.04\ ^k/_{FT}) - 82.3^k] + \frac{(10.306')(15.04\ ^k/_{FT})(\frac{10.306'}{2})}{11.105'}$$

$$= 64.9^k + 72.1^k = 137.0^k$$

$$R_3 = [(10.306')(15.04\ ^k/_{FT}) - 31.9^k] + \frac{(.274')(15.04\ ^k/_{FT})(10.831' + \frac{.274}{2})}{11.105'}$$

$$= 83.1^k + 4.1^k = 87.2^k$$

$$R_4 = (.274')(15.04\ ^k/_{FT}) - 4.1^k = .02^k$$

$$R_5 = 0$$

$$2(159.1^k) = 318.2^k \approx 318.22^k = .02^k + 87.2^k + 136.8^k + 94.2^k$$

Project: ODOT-SCI-823-PHASE I	Computed: JSW	Date: 6-24-09
Subject: BRIDGE 0917	Checked: DMP	Date: 7/22/09
Task: BENT DESIGN - LIVE LOAD	Page: 4	of:
Job #:	No:	

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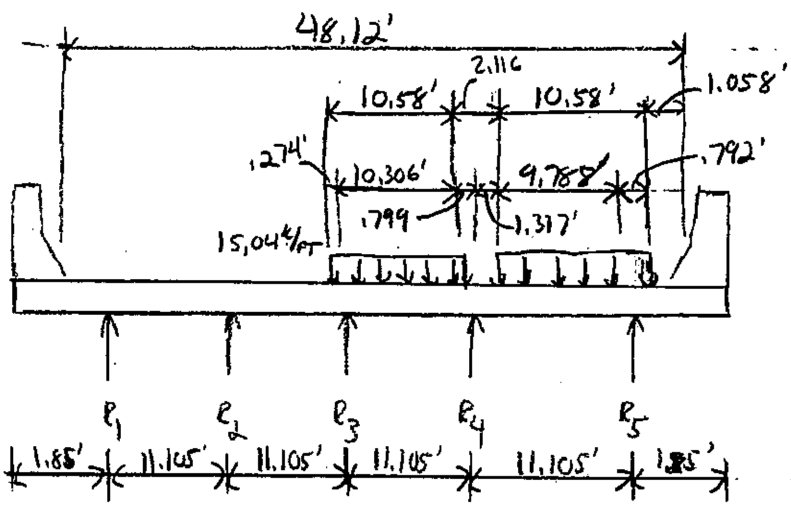
LIVE LOAD 2



$R_1 = 0$

$R_2 = .02^k$

$R_3 = 87.2^k$

$R_4 = 137^k$

$R_5 = 94.2^k$

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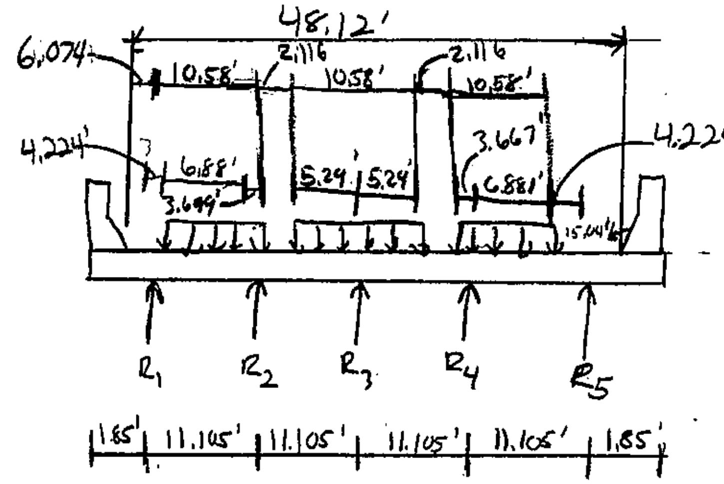
Project: ODOT-SCI-823-PHASE I	Computed: JSW	Date: 6-24-09	
Subject: BRIDGE 0917	Checked: DMP	Date: 7/22/09	
Task: BENT DESIGN - LIVE LOAD	Page: 5	of:	
Job #:	No:		

LIVE LOAD 3



$$R_1 = \frac{(6.881')(15.04^k/_{FT})\left(\frac{6.881'}{2}\right)}{11.105'} = 32.1^k$$

$$R_2 = \left[(6.881')(15.04^k/_{FT}) - 32.1^k\right] + \frac{(3.669)(15.04^k/_{FT})\left(5.29' + 2.116' + \frac{3.669}{2}\right)}{11.105'}$$

$$+ \frac{(5.29')(15.04^k/_{FT})\left(\frac{5.29}{2}\right)}{11.105'} = 71.4^k + 45.9^k + 19.0^k = 136.3^k$$

$$R_3 = \left[(3.699 + 5.29)(15.04^k/_{FT}) - 46.4^k - 19.0^k\right] + \frac{(5.29)(15.04^k/_{FT})\left(3.669 + 2.116 + \frac{5.29}{2}\right)}{11.105'}$$

$$+ \frac{(3.669')(15.04^k/_{FT})\left(\frac{3.669}{2}\right)}{11.105} = 69.8^k + 60.6^k + 9.3^k = 139.7^k$$

$$R_4 = (3.669' + 5.29')(15.04^k/_{FT}) - 60.6^k - 9.3^k + \frac{(6.881')(15.04^k/_{FT})\left(3.667 + \frac{6.881}{2}\right)}{11.105'}$$

$$= 65.3^k + 71.4^k = 136.7^k$$

$$R_5 = (6.881)(15.04^k/_{FT}) - 71.4^k = 32.1^k$$

WIND ON SUPERSTRUCTURE

- MAX SPAN LENGTH IS 100' FOLLOW THE PROVISIONS OF AASHTO HB-17 3.17.2.1.3

50 PSF TRANSVERSE
12 PSF LONGITUDINAL } APPLIED SIMULTANEOUSLY

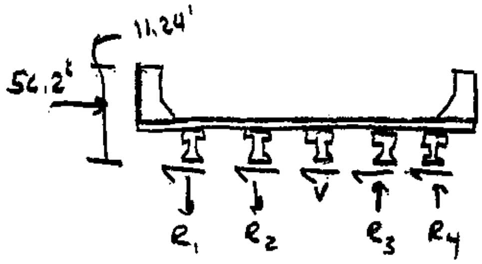
- FOR SUPERSTRUCTURE TRANSVERSE WIND LOAD RC-PIER TAKES THE 50 PSF UNIFORM LOAD AND GENERATES POINT LOAD LOADS IN THE X, Y, Z DIRECTIONS AT EACH BEARING LOCATION ALONG THE PIER.

HEIGHT OF THE SUPERSTRUCTURE

CROSS-SLOPE: (3.6%)(48.458'-13.845) = 1.25
RAIL: (3.5')
DECK: 8.5" = .7083
HAUNCH: 2" = .17"
BEAM: 5.5"
TOTAL = 11.24'

WINDWARD AREA: (TRANSVERSE)
(11.24')(100') = 1124 ft²

TOTAL TRANSVERSE WIND FORCE
(1124 ft²)(50 PSF) = 56.2ᵏ



$V = \frac{56.2}{5} = 11.24^k$

$V \cdot \cos 19 = 10.63^k$ IN "X" DIRECTION

$V \cdot \sin 19 = 3.66^k$ IN "Z" DIRECTION

Project: ODOT-SCI-823-PHASE1		Computed: JSW	Date: 6-24-09
Subject: BRIDGE 0917		Checked: DMP	Date: 9/21/09
Task: PIER DESIGN		Page: 7	of:
Job #:		No:	

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WIND ON SUPERSTRUCTURE (CONT)

$m = 56.2^k(7.62') = 428^k$

$\Sigma r^2 = 2[(10.5')^2 + ((2)(10.5))^2] = 2(107+427) = 1102.5 ft^2$

$R_1 = \dfrac{(428^{k \cdot ft})(2)(-10.5)}{1102.5 ft^2} = -8.2^k$

$R_2 = \dfrac{(428^{k \cdot ft})(-10.5')}{1102.5'} = -4.1^k$

$R_3 = 0$

$R_4 = 4.1^k$

$R_5 = 8.2^k$

LONGITUDINAL DIRECTION:

- PRELIM. ANALYSIS ASSUMING NORMAL EXP. BRG AT ABUTS. & PIERS 1 AND 3 AND FIXED BRG AT PIER 2 SHOWED DISTRIBUTION OF APPROX: 15% TO ABUTS,
  15% TO EXP. PIERS
  40% TO FIXED PIERS

- TAKING INTO ACCOUNT THAT ABUTMENTS ARE SEMI-INTERGAL AND HAVE A LARGE PASSIVE PRESSURE RESTRAINT ASSUME THAT THE ABUTMENTS WILL ACT IN MORE OF A FIXED MANNER (ABUT. DESIGN COMPENSATES FOR THIS) AND ASSUME LONGITUDINAL FORCE DISTRIBUTIONS OF:
  10% EXP PIERS
  40% FIXED PIERS
  WHICH IS CONSERVATIVE FOR ALL PIERS RELATIVE TO ABUTMENT RIGIDITY.

Project: ODOT-SCI-823-PHASE I		Computed: JSW	Date: 6-24-09
Subject: BRIDGE 0917		Checked: DMP	Date: 7/27/09
Task: BENT DESIGN		Page: 8	of:
Job #:		No:	

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WIND ON SUPERSTRUCTURE CONT

FORCE

$(12\ PSF)(11.24')(400') = 54.0^k$

PIER 1: $.1 \cdot 54^k = 5.4^k$

PIER 2: $.4 \cdot 54^k = 21.6^k$

PIER 3: $.1 \cdot 54^k = 5.4^k$

FOR IMPUT INTO RCPIER ENTER LONGITUDINAL WIND SEPERATLY, SINCE IT IS ENTERED AS A PSF BACK CALCULATE:

PIER 1 AND 3: $\dfrac{5.4^k}{100ft \cdot 11.24ft} = 4.8\ PSF$

PIER 2: $\dfrac{21.6^k}{100ft \cdot 11.24ft} = 19.2\ PSF$

WIND ON SUBSTRUCTURE

AASHTO HB-17 3.15.2.2 REQUIRES 40 PSF APPLIED IN THE TRANSVERSE AND LONGITUDINAL DIRECTIONS RELATIVE TO SUPERSTRUCTURE. (SUB IS SKEWED 19°)

RC-PIER AUTO GENERATES SUBSTRUCTURE WIND LOADS BASED ON AN TRIPLTE CAP AN COLUMN UNIFORM LOAD (40 PSF)

- ON COLUMNS

  TRANSVERSE: (40 PSF)(4.76') = .19 K/FT

  LONGITUDINAL: (40 PSF)(20.09') = .80 K/FT

- ON CAP

  TRANSVERSE: (40 PSF)(4.76)(15.98) + (4.76)(4.0') = 3.8 K

  LONG.: (40 psf)(9.5) = .38 K/ft

WIND ON LIVE LOAD

- RC-PIER AUTO-GENERATES WIND ON LIVE LOAD BY MULTIPLYING THE WIND PRESSURES IN THE TRASVERSE AND LONGITUDINAL DIRECTIONS WITH THE LIVE LOAD LENGTHS, THEN IT IS RESOLVED INTO THE PIER CAP X AND Z DIRECTIONS IF THE BRIDGE IS ON A SKEW.

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Project: ODT-SCI-823-Phase I — Computed: JSW — Date: 6-24-09
Subject: BRIDGE 0917 — Checked: DMP — Date: 7/27/09
Task: PIER DESIGN — Page: 10 of:
Job #: — No:

WIND ON LIVE LOAD (CONT)

- PER AASHTO HB-17 3.15.2.1.3 APPLY:

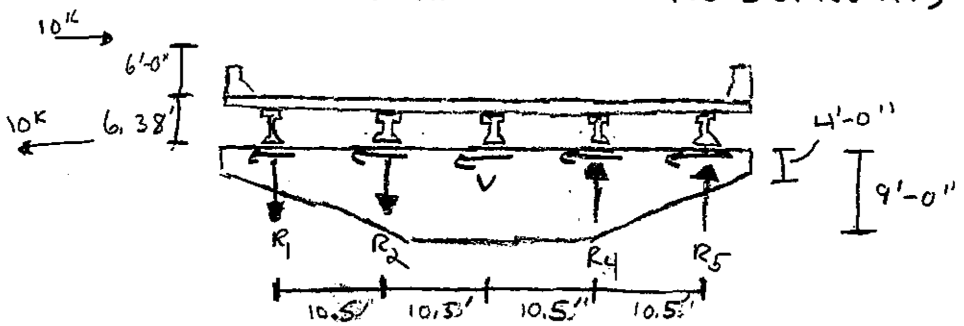
100 lb/ft TRANSVERSE, 40 lb/ft. LONGITUDINAL } APPLIED SIMULTANEOUSLY

PER AASHTO HB-17 3.15.2.1.2, THE LOADS ARE APPLIED 6' ABOVE THE DECK

- TRANSVERSE

TRIBUTARY SPAN LENGTH = 100'

⇒ TRANSVERSE WIND FORCE = (100')(.100 k/ft) = 10 k



$$R_i = \frac{M r_i}{\Sigma r^2} \qquad M = (10^k)(6.0' + 6.38' + 2') = 143.8^{k \cdot ft}$$

$$\Sigma r^2 = 1102.5 \ ft^2$$

$$R_1 = \frac{(143.8^{k \cdot ft})(2)(10.5')}{1102.5 \ ft^2} = 2.74^k \qquad V = \frac{10^k}{5} = 2^k$$

$$R_2 = \frac{(143.8^{k \cdot ft})(10.5')}{1102.5 \ ft^2} = 1.37^k \qquad V \cos 19 = 2 \cos 19 = 1.89^k$$

"X" DIRECTION

$R_4 = 1.37^k$ $\qquad V \sin 19 = 2 \sin 19 = .65$

"Z" DIRECTION

$R_5 = 2.74^k$

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Project: ODOT-SCI-823-PHASE 1		Computed: JSW	Date: 6-24-09
Subject: BRIDGE 0917		Checked: DMP	Date: 7/27/09
Task: BENT DESIGN		Page: 11	of:
Job #:		No:	

WIND ON LIVE LOAD (CONT)

- LONGITUDINAL DIRECTION

- USE SAME C/C AS WIND ON SUPER.

TOTAL FORCES

$(.040 \text{ K/FT})(400') = 16^K$

PIER 1 AND 3: $.1 \cdot 16^K = 1.6^K$

PIER 2: $.4 \cdot 16^K = 6.4^K$

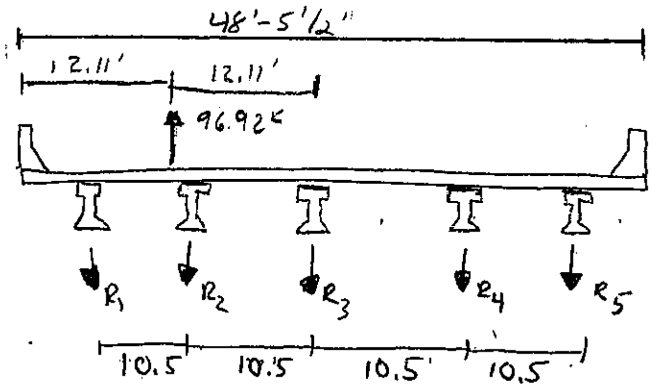
FOR INPUT INTO RC-PIER SCALE LIVE LOAD LENGTH TO CREATE APPROPRIATE LOAD

PIER 1 $\dfrac{1.6^K}{.040 \text{ K/FT}} = 40'$

PIER 2 $\dfrac{6.4^K}{.040 \text{ K/FT}} = 160'$

WIND OVERTURNING

PER AASHTO HB-17 3.15.3 APPLY 20 psf UPLIFT OVER ENTIRE DECK, WITH THE RESULTANT FORCE LOCATED AT THE WINDWARD QUARTER POINT OF THE DECK WIDTH.



LENGTH = 100'

DECK WIDTH = 48.46'

UPLIFT = (.020 ksf)(100')(48.46') = 96.92k

$m = (12.11')(96.92^k) = 1173.7^{k\cdot ft}$

$R_i = \dfrac{M r_i}{\Sigma r^2} + \dfrac{P}{5\ \text{Bms}}$ $\qquad \Sigma r^2 = 1102.5\ ft^2$

$R_1 = \dfrac{(1173.7^{k\,ft})(2)(10.5')}{1102.5\ ft^2} + \dfrac{96.92}{5} = 41.7^k \downarrow$

$R_2 = \dfrac{(1173.7^{k\,ft})(10.5')}{1102.5\ ft^2} + \dfrac{96.92}{5} = 30.6^k \downarrow$

$R_3 = \dfrac{96.92}{5} = 19.4^k \downarrow$

$R_4 = -\dfrac{(1173.7^{k\,ft})(10.5')}{1102.5\ ft^2} + \dfrac{96.92}{5} = 8.2^k \downarrow$

$R_5 = -\dfrac{(1173.7^{k\,ft})(2)(10.5')}{1102.5\ ft^2} + \dfrac{96.92}{5} = -3.0^k \uparrow$

Project: ODOT-SCI-823-PHASE I	Computed: JSW	Date: 6-24-09
Subject: BRIDGE 0917	Checked: DMP	Date: 7/22/09
Task: BENT DESIGN	Page:	of:
Job #:	No:	

HDR | ONE COMPANY *Many Solutions*

LONGITUDINAL FORCES FROM LIVE LOAD

PER AASHTO 17TH-17 3.9 APPLY 5% OF THE LIVE LOAD VERTICAL REACTION IN THE LONGITUDINAL DIRECTION 6' ABOVE THE DECK

- USE SAME %. AS WIND ON SUPERSTRUCTURE

- CALCULATE TOTAL LIVE LOAD VERTICAL FORCE ON EACH UNIT FOR SPANS, LANE LOAD CONTROLS

$[(.80^k/ft)(400') + 32.5^k](3 \text{ LANES})(.90) = 951.75^k$

PIER 1 & 3: 4.8^k

PIER 2: 19.0^k

FOR RC-PIER:

AUTO-GENERATED LOAD INPUT LONG. FORCE AS A % OF THE LIVE LANE LOAD AS FOLLOWS

PIER 1&3: $.1[(.80^k/ft)(400') + 32.5^k] = 35.25^k$

PIER 2: $.4[(.80^k/ft)(400') + 32.5^k] = 141^k$

ANALYSIS RESULTS - PIER 1
============================

Global Coordinate System, Units: kip kft

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

Combination No. 3

Group Id: SER GP I Name: SERVICE GROUP I

Memb	Node	Fx kip	Fy kip	Fz kip	Mx kft	My kft	Mz kft
1	1	-9.64	2682.71	-3.32	-203.52	0.72	5466.29
1	2	9.64	-2107.93	3.32	1.95	-0.72	-4880.87
2	3	0.00	0.00	0.00	0.00	0.00	0.00
2	4	0.00	6.18	0.00	0.00	0.00	-6.50
3	4	0.96	-153.45	0.33	-179.00	0.00	4.57
3	5	-0.96	156.96	-0.33	179.00	-0.35	-170.02
4	5	1.93	-297.35	0.66	-7.06	0.35	168.09
4	6	-1.93	342.75	-0.66	7.06	-7.00	-3369.87
5	6	2.89	-504.50	1.00	-203.72	7.00	3367.94
5	7	-2.89	510.31	-1.00	203.72	-8.00	-3878.39
6	7	3.86	-665.18	1.33	-14.11	8.00	3876.46
6	8	-3.86	679.45	-1.33	14.11	-11.08	-5436.24
7	8	3.86	-679.45	1.33	-14.11	11.08	5436.24
7	9	-3.86	729.11	-1.33	14.11	-21.36	-10890.19
8	9	4.82	-912.12	1.66	-236.72	21.36	10888.26
8	2	-4.82	913.76	-1.66	236.72	-21.79	-11121.98
9	2	-4.82	1194.17	-1.66	-201.45	22.51	16002.85
9	10	4.82	-1189.75	1.66	201.45	-21.36	-15180.39
10	10	-3.86	1008.44	-1.33	20.41	21.36	15178.46
10	11	3.86	-961.56	1.33	-20.41	-11.66	-7978.11
11	11	-3.86	961.56	-1.33	20.41	11.66	7978.11
11	12	3.86	-944.41	1.33	-20.41	-7.92	-5296.41
12	12	-2.89	704.30	-1.00	-271.85	7.92	5294.48
12	13	2.89	-699.27	1.00	271.85	-7.04	-4672.70
13	13	-1.93	463.78	-0.66	16.12	7.04	4670.77
13	14	1.93	-418.62	0.66	-16.12	-0.27	-177.63
14	14	-0.96	206.08	-0.33	-242.52	0.27	175.71
14	15	0.96	-203.44	0.33	242.52	0.00	-6.58
15	15	0.00	5.19	0.00	0.00	0.00	4.65
15	16	0.00	0.00	0.00	0.00	0.00	0.00

Combination No. 5

Group Id: SER GP I Name: SERVICE GROUP I

Memb	Node	Fx kip	Fy kip	Fz kip	Mx kft	My kft	Mz kft
1	1	-9.64	2682.71	-3.32	-203.52	0.72	-3127.50
1	2	9.64	-2107.93	3.32	1.95	-0.72	3712.92
2	3	0.00	0.00	0.00	0.00	0.00	0.00
2	4	0.00	6.18	0.00	0.00	0.00	-6.50
3	4	0.96	-208.62	0.33	-246.31	0.00	4.57
3	5	-0.96	212.13	-0.33	246.31	-0.35	-228.83
4	5	1.93	-417.11	0.66	4.42	0.35	226.90
4	6	-1.93	462.51	-0.66	-4.42	-7.00	-4626.77
5	6	2.89	-704.30	1.00	-289.90	7.00	4624.84
5	7	-2.89	710.11	-1.00	289.90	-8.00	-5336.29
6	7	3.86	-940.94	1.33	-7.63	8.00	5334.36
6	8	-3.86	955.21	-1.33	7.63	-11.08	-7533.89
7	8	3.86	-955.21	1.33	-7.63	11.08	7533.89
7	9	-3.86	1004.87	-1.33	7.63	-21.36	-15123.29
8	9	4.82	-1190.71	1.66	-233.70	21.36	15121.36
8	2	-4.82	1192.36	-1.66	233.70	-21.79	-15426.39
9	2	-4.82	915.58	-1.66	-198.44	22.51	11713.47
9	10	4.82	-911.15	1.66	198.44	-21.36	-11083.25
10	10	-3.86	737.49	-1.33	14.10	21.36	11081.32
10	11	3.86	-690.61	1.33	-14.10	-11.66	-5861.61
11	11	-3.86	690.61	-1.33	14.10	11.66	5861.61
11	12	3.86	-673.46	1.33	-14.10	-7.92	-3942.36
12	12	-2.89	511.72	-1.00	-182.56	7.92	3940.43
12	13	2.89	-506.68	1.00	182.56	-7.04	-3489.28

13	13	-1.93	351.81	-0.66	7.04	7.04	3487.35
13	14	1.93	-306.65	0.66	-7.04	-0.27	-134.46
14	14	-0.96	153.81	-0.33	-178.76	0.27	132.53
14	15	0.96	-151.17	0.33	178.76	0.00	-6.58
15	15	0.00	5.19	0.00	0.00	0.00	4.65
15	16	0.00	0.00	0.00	0.00	0.00	0.00

Combination No. 13
Group Id: SER GP I Name: SERVICE GROUP I

Memb	Node	Fx kip	Fy kip	Fz kip	Mx kft	My kft	Mz kft
1	1	-13.02	2794.24	-4.48	-289.42	0.97	4944.84
1	2	13.02	-2219.46	4.48	17.29	-0.97	-4154.53
2	3	0.00	0.00	0.00	0.00	0.00	0.00
2	4	0.00	6.18	0.00	0.00	0.00	-6.50
3	4	1.30	-153.02	0.45	-178.25	0.00	3.90
3	5	-1.30	156.53	-0.45	178.25	-0.48	-168.89
4	5	2.60	-296.49	0.90	-6.60	0.48	166.28
4	6	-2.60	341.90	-0.90	6.60	-9.44	-3359.50
5	6	3.90	-520.46	1.34	-223.55	9.44	3356.90
5	7	-3.90	526.27	-1.34	223.55	-10.80	-3883.40
6	7	5.21	-702.65	1.79	-7.47	10.80	3880.80
6	8	-5.21	716.92	-1.79	7.47	-14.96	-5527.50
7	8	5.21	-716.92	1.79	-7.47	14.96	5527.50
7	9	-5.21	766.58	-1.79	7.47	-28.84	-11271.61
8	9	6.51	-999.27	2.24	-290.46	28.84	11269.00
8	2	-6.51	1000.91	-2.24	290.46	-29.41	-11525.03
9	2	-6.51	1218.55	-2.24	-257.52	30.38	15679.55
9	10	6.51	-1214.13	2.24	257.52	-28.84	-14840.28
10	10	-5.21	986.78	-1.79	20.74	28.84	14837.68
10	11	5.21	-939.91	1.79	-20.74	-15.73	-7795.64
11	11	-5.21	939.91	-1.79	20.74	15.73	7795.64
11	12	5.21	-922.75	1.79	-20.74	-10.69	-5174.88
12	12	-3.90	687.42	-1.34	-265.47	10.69	5172.28
12	13	3.90	-682.38	1.34	265.47	-9.50	-4565.46
13	13	-2.60	453.44	-0.90	14.74	9.50	4562.85
13	14	2.60	-408.28	0.90	-14.74	-0.37	-175.02
14	14	-1.30	201.28	-0.45	-236.90	0.37	172.42
14	15	1.30	-198.64	0.45	236.90	0.00	-7.25
15	15	0.00	5.19	0.00	0.00	0.00	4.65
15	16	0.00	0.00	0.00	0.00	0.00	0.00

Combination No. 20
Group Id: SER GP III Name: SERVICE GROUP III

Memb	Node	Fx kip	Fy kip	Fz kip	Mx kft	My kft	Mz kft
1	1	-33.33	2651.96	-13.77	-824.03	2.43	7220.65
1	2	27.61	-2077.18	11.80	55.06	-2.43	-5392.08
2	3	0.00	0.00	0.00	0.00	0.00	0.00
2	4	0.00	6.18	-0.03	0.00	-0.03	-6.50
3	4	2.58	-144.87	1.15	-166.97	0.03	1.35
3	5	-2.58	148.38	-1.16	166.97	-1.26	-157.65
4	5	5.15	-280.20	2.28	-3.91	1.26	152.50
4	6	-5.15	325.61	-2.40	3.91	-24.67	-3182.74
5	6	7.73	-484.27	3.52	-195.25	24.67	3177.59
5	7	-7.73	490.09	-3.53	195.25	-28.22	-3667.69
6	7	10.31	-641.88	4.65	-7.81	28.22	3662.54
6	8	-10.31	656.16	-4.68	7.81	-39.05	-5168.27
7	8	10.31	-656.16	4.68	-7.81	39.05	5168.27
7	9	-10.31	705.81	-4.78	7.81	-75.68	-10441.81
8	9	12.88	-885.74	5.90	-225.09	75.68	10436.66
8	2	-12.88	887.39	-5.90	225.09	-77.19	-10663.62
9	2	-12.88	1189.80	-5.90	-205.58	79.62	16055.69
9	10	12.88	-1185.37	5.89	205.58	-75.55	-15236.26
10	10	-10.31	1007.14	-4.77	14.11	75.55	15231.11
10	11	10.31	-960.26	4.68	-14.11	-40.99	-8040.28
11	11	-10.31	960.26	-4.68	14.11	40.99	8040.28

11	12	10.31	-943.11	4.65	-14.11	-27.86	-5362.24
12	12	-7.73	706.08	-3.53	-272.83	27.86	5357.09
12	13	7.73	-701.04	3.52	272.83	-24.74	-4733.74
13	13	-5.15	468.62	-2.40	12.96	24.74	4728.58
13	14	5.15	-423.46	2.27	-12.96	-0.97	-186.09
14	14	-2.58	208.50	-1.15	-247.05	0.97	180.93
14	15	2.58	-205.86	1.14	247.05	-0.02	-9.80
15	15	0.00	5.19	-0.02	0.00	0.02	4.65
15	16	0.00	0.00	0.00	0.00	0.00	0.00

Combination No. 43
Group Id: SER GP III Name: SERVICE GROUP III

Memb	Node	Fx kip	Fy kip	Fz kip	Mx kft	My kft	Mz kft
1	1	20.58	2554.13	3.79	170.10	-0.26	1922.36
1	2	-14.87	-1979.36	-1.82	-7.06	0.26	-2977.33
2	3	0.00	0.00	0.00	0.00	0.00	0.00
2	4	0.00	6.18	0.03	0.00	0.03	-6.50
3	4	-1.30	-162.85	-0.15	-191.38	-0.03	9.11
3	5	1.30	166.36	0.16	191.38	0.19	-184.57
4	5	-2.61	-316.16	-0.28	-8.87	-0.19	187.18
4	6	2.61	361.56	0.41	8.87	3.64	-3577.11
5	6	-3.91	-526.38	-0.53	-210.19	-3.64	3579.72
5	7	3.91	532.19	0.54	210.19	4.18	-4112.18
6	7	-5.21	-690.14	-0.66	-17.74	-4.18	4114.78
6	8	5.21	704.41	0.69	17.74	5.75	-5732.46
7	8	-5.21	-704.41	-0.69	-17.74	-5.75	5732.46
7	9	5.21	754.07	0.79	17.74	11.47	-11379.68
8	9	-6.51	-918.89	-0.91	-219.06	-11.47	11382.29
8	2	6.51	920.53	0.91	219.06	11.70	-11617.74
9	2	6.51	1058.83	0.91	-174.72	-11.96	14595.07
9	10	-6.51	-1054.40	-0.90	174.72	11.34	-13866.00
10	10	5.21	896.46	0.78	17.74	-11.34	13868.61
10	11	-5.21	-849.58	-0.69	-17.74	5.96	-7486.84
11	11	5.21	849.58	0.69	17.74	-5.96	7486.84
11	12	-5.21	-832.43	-0.66	-17.74	4.06	-5120.26
12	12	3.91	645.22	0.53	-210.90	-4.06	5122.86
12	13	-3.91	-640.19	-0.52	210.90	3.59	-4553.43
13	13	2.61	453.75	0.40	16.31	-3.59	4556.03
13	14	-2.61	-408.59	-0.28	-16.31	0.14	-164.98
14	14	1.30	201.73	0.15	-236.31	-0.14	167.58
14	15	-1.30	-199.09	-0.14	236.31	0.02	-2.04
15	15	0.00	5.19	0.02	0.00	-0.02	4.65
15	16	0.00	0.00	0.00	0.00	0.00	0.00

Combination No. 52
Group Id: SER GP III Name: SERVICE GROUP III

Memb	Node	Fx kip	Fy kip	Fz kip	Mx kft	My kft	Mz kft
1	1	-39.40	2763.49	-7.10	-330.89	0.98	4055.05
1	2	33.68	-2188.71	5.13	-33.05	-0.98	-1857.82
2	3	0.00	0.00	0.00	0.00	0.00	0.00
2	4	0.00	6.18	-0.03	0.00	-0.03	-6.50
3	4	3.18	-150.41	0.48	-175.06	0.03	0.13
3	5	-3.18	153.92	-0.49	175.06	-0.54	-162.34
4	5	6.37	-294.43	0.94	-2.73	0.54	155.97
4	6	-6.37	339.83	-1.07	2.73	-10.61	-3328.56
5	6	9.55	-554.88	1.52	-264.19	10.61	3322.19
5	7	-9.55	560.70	-1.53	264.19	-12.15	-3883.33
6	7	12.74	-770.92	1.99	-6.81	12.15	3876.96
6	8	-12.74	785.19	-2.01	6.81	-16.79	-5682.05
7	8	12.74	-785.19	2.01	-6.81	16.79	5682.05
7	9	-12.74	834.85	-2.11	6.81	-32.76	-11954.84
8	9	15.92	-1058.03	2.56	-278.18	32.76	11948.47
8	2	-15.92	1059.67	-2.57	278.18	-33.41	-12219.54
9	2	-15.92	1129.04	-2.57	-245.34	34.39	14077.36
9	10	15.92	-1124.62	2.56	245.34	-32.63	-13299.85

10	10	-12.74	907.30	-2.10	20.70	32.63	13293.49
10	11	12.74	-860.42	2.01	-20.70	-17.57	-6832.48
11	11	-12.74	860.42	-2.01	20.70	17.57	6832.48
11	12	12.74	-843.27	1.98	-20.70	-11.95	-4435.39
12	12	-9.55	613.61	-1.53	-258.57	11.95	4429.02
12	13	9.55	-608.58	1.52	258.57	-10.61	-3887.59
13	13	-6.37	388.29	-1.06	11.09	10.61	3881.22
13	14	6.37	-343.13	0.94	-11.09	-0.42	-156.87
14	14	-3.18	170.19	-0.48	-198.98	0.42	150.50
14	15	3.18	-167.55	0.47	198.98	-0.02	-11.02
15	15	0.00	5.19	-0.02	0.00	0.02	4.65
15	16	0.00	0.00	0.00	0.00	0.00	0.00

Combination No. 86
Group Id: LFR GP I Name: LOAD FACTOR GROUP I

Memb	Node	Fx kip	Fy kip	Fz kip	Mx kft	My kft	Mz kft
1	1	-16.92	4007.19	-5.83	-376.25	1.26	3326.11
1	2	16.92	-3259.98	5.83	22.48	-1.26	-2298.70
2	3	0.00	0.00	0.00	0.00	0.00	0.00
2	4	0.00	8.03	0.00	0.00	0.00	-8.45
3	4	1.69	-212.62	0.58	-248.43	0.00	5.07
3	5	-1.69	217.18	-0.58	248.43	-0.62	-234.15
4	5	3.38	-419.67	1.17	-0.22	0.62	230.76
4	6	-3.38	478.70	-1.17	0.22	-12.28	-4724.44
5	6	5.08	-811.37	1.75	-404.91	12.28	4721.06
5	7	-5.08	818.93	-1.75	404.91	-14.04	-5541.10
6	7	6.77	-1147.10	2.33	-3.37	14.04	5537.71
6	8	-6.77	1165.66	-2.33	3.37	-19.44	-8220.51
7	8	6.77	-1165.66	2.33	-3.37	19.44	8220.51
7	9	-6.77	1230.21	-2.33	3.37	-37.49	-17497.30
8	9	8.46	-1580.53	2.91	-429.59	37.49	17493.92
8	2	-8.46	1582.66	-2.91	429.59	-38.24	-17898.81
9	2	-8.46	1677.32	-2.91	-386.77	39.50	20197.51
9	10	8.46	-1671.57	2.91	386.77	-37.49	-19042.15
10	10	-6.77	1327.98	-2.33	33.56	37.49	19038.76
10	11	6.77	-1267.05	2.33	-33.56	-20.45	-9553.92
11	11	-6.77	1267.05	-2.33	33.56	20.45	9553.92
11	12	6.77	-1244.75	2.33	-33.56	-13.90	-6019.83
12	12	-5.08	880.37	-1.75	-409.81	13.90	6016.44
12	13	5.08	-873.83	1.75	409.81	-12.35	-5239.33
13	13	-3.38	523.79	-1.17	18.40	12.35	5235.95
13	14	3.38	-465.08	1.17	-18.40	-0.48	-200.66
14	14	-1.69	229.13	-0.58	-268.29	0.48	197.28
14	15	1.69	-225.70	0.58	268.29	0.00	-9.43
15	15	0.00	6.75	0.00	0.00	0.00	6.04
15	16	0.00	0.00	0.00	0.00	0.00	0.00

Combination No. 105
Group Id: LFR GP III Name: LOAD FACTOR GROUP III

Memb	Node	Fx kip	Fy kip	Fz kip	Mx kft	My kft	Mz kft
1	1	-43.32	3447.55	-17.90	-1071.25	3.16	9386.84
1	2	35.89	-2700.34	15.34	71.58	-3.16	-7009.70
2	3	0.00	0.00	0.00	0.00	0.00	0.00
2	4	0.00	8.03	-0.03	0.00	-0.04	-8.45
3	4	3.35	-188.34	1.49	-217.06	0.04	1.75
3	5	-3.35	192.90	-1.51	217.06	-1.63	-204.95
4	5	6.70	-364.26	2.96	-5.09	1.63	198.25
4	6	-6.70	423.29	-3.12	5.09	-32.07	-4137.57
5	6	10.05	-629.56	4.58	-253.82	32.07	4130.87
5	7	-10.05	637.11	-4.59	253.82	-36.68	-4768.00
6	7	13.40	-834.45	6.05	-10.16	36.68	4761.30
6	8	-13.40	853.00	-6.09	10.16	-50.76	-6718.75
7	8	13.40	-853.00	6.09	-10.16	50.76	6718.75
7	9	-13.40	917.56	-6.21	10.16	-98.38	-13574.35
8	9	16.75	-1151.47	7.67	-292.61	98.38	13567.65

8	2	-16.75	1153.60	-7.67	292.61	-100.35	-13862.70
9	2	-16.75	1546.74	-7.67	-267.26	103.51	20872.40
9	10	16.75	-1540.98	7.66	267.26	-98.22	-19807.14
10	10	-13.40	1309.28	-6.20	18.34	98.22	19800.44
10	11	13.40	-1248.34	6.09	-18.34	-53.29	-10452.37
11	11	-13.40	1248.34	-6.09	18.34	53.29	10452.37
11	12	13.40	-1226.04	6.04	-18.34	-36.22	-6970.92
12	12	-10.05	917.90	-4.59	-354.68	36.22	6964.22
12	13	10.05	-911.36	4.57	354.68	-32.17	-6153.86
13	13	-6.70	609.21	-3.12	16.85	32.17	6147.16
13	14	6.70	-550.50	2.95	-16.85	-1.26	-241.91
14	14	-3.35	271.05	-1.50	-321.17	1.26	235.21
14	15	3.35	-267.62	1.48	321.17	-0.03	-12.74
15	15	0.00	6.75	-0.03	0.00	0.03	6.04
15	16	0.00	0.00	0.00	0.00	0.00	0.00

Combination No. 128
Group Id: LFR GP III Name: LOAD FACTOR GROUP III

Memb	Node	Fx kip	Fy kip	Fz kip	Mx kft	My kft	Mz kft
1	1	26.76	3320.37	4.93	221.13	-0.34	2499.07
1	2	-19.33	-2573.16	-2.37	-9.18	0.34	-3870.53
2	3	0.00	0.00	0.00	0.00	0.00	0.00
2	4	0.00	8.03	0.03	0.00	0.04	-8.45
3	4	-1.69	-211.70	-0.19	-248.79	-0.04	11.84
3	5	1.69	216.26	0.21	248.79	0.25	-239.94
4	5	-3.39	-411.00	-0.37	-11.53	-0.25	243.33
4	6	3.39	470.03	0.53	11.53	4.73	-4650.24
5	6	-5.08	-684.29	-0.69	-273.25	-4.73	4653.63
5	7	5.08	691.85	0.70	273.25	5.43	-5345.83
6	7	-6.77	-897.18	-0.86	-23.06	-5.43	5349.22
6	8	6.77	915.73	0.90	23.06	7.47	-7452.19
7	8	-6.77	-915.73	-0.90	-23.06	-7.47	7452.19
7	9	6.77	980.29	1.02	23.06	14.91	-14793.59
8	9	-8.47	-1194.55	-1.18	-284.78	-14.91	14796.97
8	2	8.47	1196.69	1.18	284.78	15.21	-15103.06
9	2	8.47	1376.48	1.18	-227.13	-15.55	18973.59
9	10	-8.47	-1370.73	-1.17	227.13	14.74	-18025.80
10	10	6.77	1165.39	1.02	23.06	-14.74	18029.19
10	11	-6.77	-1104.46	-0.90	-23.06	7.74	-9732.89
11	11	6.77	1104.46	0.90	23.06	-7.74	9732.89
11	12	-6.77	-1082.15	-0.85	-23.06	5.28	-6656.33
12	12	5.08	838.79	0.69	-274.17	-5.28	6659.72
12	13	-5.08	-832.24	-0.68	274.17	4.67	-5919.45
13	13	3.39	589.88	0.52	21.20	-4.67	5922.84
13	14	-3.39	-531.17	-0.36	-21.20	0.19	-214.47
14	14	1.69	262.25	0.20	-307.20	-0.19	217.86
14	15	-1.69	-258.82	-0.19	307.20	0.03	-2.66
15	15	0.00	6.75	0.03	0.00	-0.03	6.04
15	16	0.00	0.00	0.00	0.00	0.00	0.00

Combination No. 137
Group Id: LFR GP III Name: LOAD FACTOR GROUP III

Memb	Node	Fx kip	Fy kip	Fz kip	Mx kft	My kft	Mz kft
1	1	-51.22	3592.53	-9.23	-430.16	1.28	5271.56
1	2	43.79	-2845.32	6.67	-42.96	-1.28	-2415.17
2	3	0.00	0.00	0.00	0.00	0.00	0.00
2	4	0.00	8.03	-0.03	0.00	-0.04	-8.45
3	4	4.14	-195.53	0.62	-227.58	0.04	0.17
3	5	-4.14	200.10	-0.64	227.58	-0.71	-211.04
4	5	8.28	-382.76	1.23	-3.55	0.71	202.77
4	6	-8.28	441.78	-1.39	3.55	-13.79	-4327.13
5	6	12.42	-721.35	1.98	-343.44	13.79	4318.85
5	7	-12.42	728.90	-1.99	343.44	-15.79	-5048.33
6	7	16.56	-1002.19	2.58	-8.85	15.79	5040.05
6	8	-16.56	1020.75	-2.62	8.85	-21.82	-7386.67

7	8	16.56	-1020.75	2.62	-8.85	21.82	7386.67
7	9	-16.56	1085.30	-2.74	8.85	-42.58	-15541.29
8	9	20.70	-1375.44	3.33	-361.64	42.58	15533.01
8	2	-20.70	1377.57	-3.34	361.64	-43.44	-15885.40
9	2	-20.70	1467.75	-3.34	-318.94	44.71	18300.57
9	10	20.70	-1462.00	3.32	318.94	-42.42	-17289.81
10	10	-16.56	1179.49	-2.74	26.91	42.42	17281.53
10	11	16.56	-1118.55	2.62	-26.91	-22.84	-8882.22
11	11	-16.56	1118.55	-2.62	26.91	22.84	8882.22
11	12	16.56	-1096.25	2.57	-26.91	-15.54	-5766.00
12	12	-12.42	797.70	-1.99	-336.15	15.54	5757.73
12	13	12.42	-791.15	1.97	336.15	-13.79	-5053.86
13	13	-8.28	504.77	-1.38	14.42	13.79	5045.58
13	14	8.28	-446.06	1.22	-14.42	-0.54	-203.93
14	14	-4.14	221.25	-0.63	-258.68	0.54	195.66
14	15	4.14	-217.82	0.62	258.68	-0.03	-14.32
15	15	0.00	6.75	-0.03	0.00	0.03	6.04
15	16	0.00	0.00	0.00	0.00	0.00	0.00

Combination No. 173
Group Id: SER GP IA Name: SERVICE GROUP IA

Memb	Node	Fx kip	Fy kip	Fz kip	Mx kft	My kft	Mz kft
1	1	-0.00	3001.36	0.00	41.90	0.00	9050.42
1	2	-0.00	-2426.58	0.00	-41.90	0.00	-9050.42
2	3	0.00	0.00	0.00	0.00	0.00	0.00
2	4	0.00	6.18	0.00	0.00	0.00	-6.50
3	4	0.00	-154.67	0.00	-181.15	0.00	6.50
3	5	0.00	158.18	0.00	181.15	0.00	-173.25
4	5	0.00	-299.79	0.00	-8.38	0.00	173.25
4	6	0.00	345.20	0.00	8.38	0.00	-3399.51
5	6	0.00	-506.94	0.00	-205.71	0.00	3399.51
5	7	0.00	512.75	0.00	205.71	0.00	-3912.42
6	7	0.00	-667.63	0.00	-16.76	0.00	3912.42
6	8	0.00	681.90	0.00	16.76	0.00	-5477.87
7	8	0.00	-681.90	0.00	-16.76	0.00	5477.87
7	9	0.00	731.56	0.00	16.76	0.00	-10950.78
8	9	0.00	-935.83	0.00	-265.97	0.00	10950.78
8	2	0.00	937.47	0.00	265.97	0.00	-11190.56
9	2	0.00	1489.12	0.00	-224.06	0.00	20240.98
9	10	0.00	-1484.69	0.00	224.06	0.00	-19215.02
10	10	0.00	1276.94	0.00	29.39	0.00	19215.02
10	11	0.00	-1230.07	0.00	-29.39	0.00	-10051.91
11	11	0.00	1230.07	0.00	29.39	0.00	10051.91
11	12	0.00	-1212.91	0.00	-29.39	0.00	-6614.64
12	12	0.00	894.44	0.00	-359.14	0.00	6614.64
12	13	0.00	-889.41	0.00	359.14	0.00	-5824.39
13	13	0.00	573.29	0.00	26.52	0.00	5824.39
13	14	0.00	-528.13	0.00	-26.52	0.00	-215.93
14	14	0.00	257.11	0.00	-304.12	0.00	215.93
14	15	0.00	-254.47	0.00	304.12	0.00	-4.65
15	15	0.00	5.19	0.00	0.00	0.00	4.65
15	16	0.00	0.00	0.00	0.00	0.00	0.00

Combination No. 175
Group Id: SER GP IA Name: SERVICE GROUP IA

Memb	Node	Fx kip	Fy kip	Fz kip	Mx kft	My kft	Mz kft
1	1	-0.00	3001.36	0.00	41.90	0.00	-8137.16
1	2	-0.00	-2426.58	0.00	-41.90	0.00	8137.16
2	3	0.00	0.00	0.00	0.00	0.00	0.00
2	4	0.00	6.18	0.00	0.00	0.00	-6.50
3	4	0.00	-265.01	0.00	-315.78	0.00	6.50
3	5	0.00	268.53	0.00	315.78	0.00	-290.88
4	5	0.00	-539.31	0.00	14.58	0.00	290.88
4	6	0.00	584.72	0.00	-14.58	0.00	-5913.30
5	6	0.00	-906.55	0.00	-378.05	0.00	5913.30

5	7	0.00	912.37	0.00	378.05	0.00	-6828.21
6	7	0.00	-1219.14	0.00	-3.79	0.00	6828.21
6	8	0.00	1233.41	0.00	3.79	0.00	-9673.17
7	8	0.00	-1233.41	0.00	-3.79	0.00	9673.17
7	9	0.00	1283.07	0.00	3.79	0.00	-19416.96
8	9	0.00	-1493.02	0.00	-259.93	0.00	19416.96
8	2	0.00	1494.66	0.00	259.93	0.00	-19799.39
9	2	0.00	931.92	0.00	-218.03	0.00	11662.23
9	10	0.00	-927.49	0.00	218.03	0.00	-11020.73
10	10	0.00	735.04	0.00	16.76	0.00	11020.73
10	11	0.00	-688.17	0.00	-16.76	0.00	-5818.91
11	11	0.00	688.17	0.00	16.76	0.00	5818.91
11	12	0.00	-671.01	0.00	-16.76	0.00	-3906.55
12	12	0.00	509.27	0.00	-180.57	0.00	3906.55
12	13	0.00	-504.24	0.00	180.57	0.00	-3457.56
13	13	0.00	349.36	0.00	8.38	0.00	3457.56
13	14	0.00	-304.20	0.00	-8.38	0.00	-129.59
14	14	0.00	152.58	0.00	-176.60	0.00	129.59
14	15	0.00	-149.94	0.00	176.60	0.00	-4.65
15	15	0.00	5.19	0.00	0.00	0.00	4.65
15	16	0.00	0.00	0.00	0.00	0.00	0.00

Combination No. 177
Group Id: SER GP IA Name: SERVICE GROUP IA

Memb	Node	Fx kip	Fy kip	Fz kip	Mx kft	My kft	Mz kft
1	1	-0.00	2800.37	0.00	574.20	0.00	-5426.86
1	2	-0.00	-2225.59	0.00	-574.20	0.00	5426.86
2	3	0.00	0.00	0.00	0.00	0.00	0.00
2	4	0.00	6.18	0.00	0.00	0.00	-6.50
3	4	0.00	-301.85	0.00	-360.71	0.00	6.50
3	5	0.00	305.36	0.00	360.71	0.00	-330.14
4	5	0.00	-446.98	0.00	-187.94	0.00	330.14
4	6	0.00	492.38	0.00	187.94	0.00	-5028.80
5	6	0.00	-881.15	0.00	-662.24	0.00	5028.80
5	7	0.00	886.97	0.00	662.24	0.00	-5918.16
6	7	0.00	-1041.84	0.00	-473.30	0.00	5918.16
6	8	0.00	1056.11	0.00	473.30	0.00	-8351.78
7	8	0.00	-1056.11	0.00	-473.30	0.00	8351.78
7	9	0.00	1105.77	0.00	473.30	0.00	-16722.57
8	9	0.00	-1329.61	0.00	-746.39	0.00	16722.57
8	2	0.00	1331.25	0.00	746.39	0.00	-17063.17
9	2	0.00	894.34	0.00	-172.18	0.00	11636.30
9	10	0.00	-889.91	0.00	172.18	0.00	-11020.73
10	10	0.00	735.04	0.00	16.76	0.00	11020.73
10	11	0.00	-688.17	0.00	-16.76	0.00	-5818.91
11	11	0.00	688.17	0.00	16.76	0.00	5818.91
11	12	0.00	-671.01	0.00	-16.76	0.00	-3906.55
12	12	0.00	509.27	0.00	-180.57	0.00	3906.55
12	13	0.00	-504.24	0.00	180.57	0.00	-3457.56
13	13	0.00	349.36	0.00	8.38	0.00	3457.56
13	14	0.00	-304.20	0.00	-8.38	0.00	-129.59
14	14	0.00	152.58	0.00	-176.60	0.00	129.59
14	15	0.00	-149.94	0.00	176.60	0.00	-4.65
15	15	0.00	5.19	0.00	0.00	0.00	4.65
15	16	0.00	0.00	0.00	0.00	0.00	0.00

Combination No. 186
Group Id: SER GP IA Name: SERVICE GROUP IA

Memb	Node	Fx kip	Fy kip	Fz kip	Mx kft	My kft	Mz kft
1	1	-0.00	2800.37	0.00	-490.40	0.00	6340.12
1	2	-0.00	-2225.59	0.00	490.40	0.00	-6340.12
2	3	0.00	0.00	0.00	0.00	0.00	0.00
2	4	0.00	6.18	0.00	0.00	0.00	-6.50
3	4	0.00	-154.67	0.00	-181.15	0.00	6.50
3	5	0.00	158.18	0.00	181.15	0.00	-173.25

4	5	0.00	-299.79	0.00	-8.38	0.00	173.25
4	6	0.00	345.20	0.00	8.38	0.00	-3399.51
5	6	0.00	-506.94	0.00	-205.71	0.00	3399.51
5	7	0.00	512.75	0.00	205.71	0.00	-3912.42
6	7	0.00	-667.63	0.00	-16.76	0.00	3912.42
6	8	0.00	681.90	0.00	16.76	0.00	-5477.87
7	8	0.00	-681.90	0.00	-16.76	0.00	5477.87
7	9	0.00	731.56	0.00	16.76	0.00	-10950.78
8	9	0.00	-893.30	0.00	-214.09	0.00	10950.78
8	2	0.00	894.94	0.00	214.09	0.00	-11179.67
9	2	0.00	1330.65	0.00	-704.48	0.00	17519.79
9	10	0.00	-1326.22	0.00	704.48	0.00	-16603.17
10	10	0.00	1101.93	0.00	-430.85	0.00	16603.17
10	11	0.00	-1055.06	0.00	430.85	0.00	-8719.37
11	11	0.00	1055.06	0.00	-430.85	0.00	8719.37
11	12	0.00	-1037.90	0.00	430.85	0.00	-5774.57
12	12	0.00	876.16	0.00	-628.17	0.00	5774.57
12	13	0.00	-871.13	0.00	628.17	0.00	-5000.52
13	13	0.00	489.51	0.00	-162.59	0.00	5000.52
13	14	0.00	-444.35	0.00	162.59	0.00	-245.35
14	14	0.00	292.73	0.00	-347.57	0.00	245.35
14	15	0.00	-290.09	0.00	347.57	0.00	-4.65
15	15	0.00	5.19	0.00	0.00	0.00	4.65
15	16	0.00	0.00	0.00	0.00	0.00	0.00

Combination No. 190
Group Id: LFR GP IA Name: LOAD FACTOR GROUP IA

Memb	Node	Fx kip	Fy kip	Fz kip	Mx kft	My kft	Mz kft
1	1	-0.00	3984.62	0.00	54.47	0.00	12882.74
1	2	-0.00	-3237.41	0.00	-54.47	0.00	-12882.74
2	3	0.00	0.00	0.00	0.00	0.00	0.00
2	4	0.00	8.03	0.00	0.00	0.00	-8.45
3	4	0.00	-201.07	0.00	-235.50	0.00	8.45
3	5	0.00	205.63	0.00	235.50	0.00	-225.22
4	5	0.00	-389.73	0.00	-10.89	0.00	225.22
4	6	0.00	448.76	0.00	10.89	0.00	-4419.36
5	6	0.00	-659.03	0.00	-267.42	0.00	4419.36
5	7	0.00	666.58	0.00	267.42	0.00	-5086.14
6	7	0.00	-867.92	0.00	-21.79	0.00	5086.14
6	8	0.00	886.47	0.00	21.79	0.00	-7121.23
7	8	0.00	-886.47	0.00	-21.79	0.00	7121.23
7	9	0.00	951.03	0.00	21.79	0.00	-14236.01
8	9	0.00	-1222.10	0.00	-352.50	0.00	14236.01
8	2	0.00	1224.24	0.00	352.50	0.00	-14549.14
9	2	0.00	2013.17	0.00	-298.03	0.00	27431.88
9	10	0.00	-2007.42	0.00	298.03	0.00	-26044.78
10	10	0.00	1730.47	0.00	39.85	0.00	26044.78
10	11	0.00	-1669.53	0.00	-39.85	0.00	-13617.77
11	11	0.00	1669.53	0.00	39.85	0.00	13617.77
11	12	0.00	-1647.23	0.00	-39.85	0.00	-8951.08
12	12	0.00	1212.85	0.00	-490.10	0.00	8951.08
12	13	0.00	-1206.31	0.00	490.10	0.00	-7879.40
13	13	0.00	774.39	0.00	36.84	0.00	7879.40
13	14	0.00	-715.68	0.00	-36.84	0.00	-291.94
14	14	0.00	347.84	0.00	-411.94	0.00	291.94
14	15	0.00	-344.40	0.00	411.94	0.00	-6.04
15	15	0.00	6.75	0.00	0.00	0.00	6.04
15	16	0.00	0.00	0.00	0.00	0.00	0.00

Combination No. 192
Group Id: LFR GP IA Name: LOAD FACTOR GROUP IA

Memb	Node	Fx kip	Fy kip	Fz kip	Mx kft	My kft	Mz kft
1	1	-0.00	3984.62	0.00	54.47	0.00	-11695.50
1	2	-0.00	-3237.41	0.00	-54.47	0.00	11695.50
2	3	0.00	0.00	0.00	0.00	0.00	0.00

2	4	0.00	8.03	0.00	0.00	0.00	-8.45
3	4	0.00	-358.86	0.00	-428.01	0.00	8.45
3	5	0.00	363.43	0.00	428.01	0.00	-393.43
4	5	0.00	-732.25	0.00	21.94	0.00	393.43
4	6	0.00	791.27	0.00	-21.94	0.00	-8014.08
5	6	0.00	-1230.47	0.00	-513.87	0.00	8014.08
5	7	0.00	1238.02	0.00	513.87	0.00	-9255.73
6	7	0.00	-1656.58	0.00	-3.24	0.00	9255.73
6	8	0.00	1675.13	0.00	3.24	0.00	-13120.50
7	8	0.00	-1675.13	0.00	-3.24	0.00	13120.50
7	9	0.00	1739.68	0.00	3.24	0.00	-26342.66
8	9	0.00	-2018.89	0.00	-343.88	0.00	26342.66
8	2	0.00	2021.03	0.00	343.88	0.00	-26859.77
9	2	0.00	1216.38	0.00	-289.40	0.00	15164.27
9	10	0.00	-1210.63	0.00	289.40	0.00	-14326.95
10	10	0.00	955.55	0.00	21.79	0.00	14326.95
10	11	0.00	-894.62	0.00	-21.79	0.00	-7564.58
11	11	0.00	894.62	0.00	21.79	0.00	7564.58
11	12	0.00	-872.32	0.00	-21.79	0.00	-5078.51
12	12	0.00	662.05	0.00	-234.73	0.00	5078.51
12	13	0.00	-655.51	0.00	234.73	0.00	-4494.83
13	13	0.00	454.17	0.00	10.89	0.00	4494.83
13	14	0.00	-395.47	0.00	-10.89	0.00	-168.47
14	14	0.00	198.36	0.00	-229.58	0.00	168.47
14	15	0.00	-194.93	0.00	229.58	0.00	-6.04
15	15	0.00	6.75	0.00	0.00	0.00	6.04
15	16	0.00	0.00	0.00	0.00	0.00	0.00

Combination No. 194
Group Id: LFR GP IA Name: LOAD FACTOR GROUP IA

Memb	Node	Fx kip	Fy kip	Fz kip	Mx kft	My kft	Mz kft
1	1	-0.00	3697.20	0.00	815.66	0.00	-7819.78
1	2	-0.00	-2949.99	0.00	-815.66	0.00	7819.78
2	3	0.00	0.00	0.00	0.00	0.00	0.00
2	4	0.00	8.03	0.00	0.00	0.00	-8.45
3	4	0.00	-411.53	0.00	-492.27	0.00	8.45
3	5	0.00	416.10	0.00	492.27	0.00	-449.58
4	5	0.00	-600.20	0.00	-267.67	0.00	449.58
4	6	0.00	659.23	0.00	267.67	0.00	-6749.24
5	6	0.00	-1194.15	0.00	-920.27	0.00	6749.24
5	7	0.00	1201.70	0.00	920.27	0.00	-7954.35
6	7	0.00	-1403.04	0.00	-674.64	0.00	7954.35
6	8	0.00	1421.59	0.00	674.64	0.00	-11230.92
7	8	0.00	-1421.59	0.00	-674.64	0.00	11230.92
7	9	0.00	1486.15	0.00	674.64	0.00	-22489.68
8	9	0.00	-1785.21	0.00	-1039.50	0.00	22489.68
8	2	0.00	1787.35	0.00	1039.50	0.00	-22946.97
9	2	0.00	1162.64	0.00	-223.84	0.00	15127.19
9	10	0.00	-1156.89	0.00	223.84	0.00	-14326.95
10	10	0.00	955.55	0.00	21.79	0.00	14326.95
10	11	0.00	-894.62	0.00	-21.79	0.00	-7564.58
11	11	0.00	894.62	0.00	21.79	0.00	7564.58
11	12	0.00	-872.32	0.00	-21.79	0.00	-5078.51
12	12	0.00	662.05	0.00	-234.73	0.00	5078.51
12	13	0.00	-655.51	0.00	234.73	0.00	-4494.83
13	13	0.00	454.17	0.00	10.89	0.00	4494.83
13	14	0.00	-395.47	0.00	-10.89	0.00	-168.47
14	14	0.00	198.36	0.00	-229.58	0.00	168.47
14	15	0.00	-194.93	0.00	229.58	0.00	-6.04
15	15	0.00	6.75	0.00	0.00	0.00	6.04
15	16	0.00	0.00	0.00	0.00	0.00	0.00

Combination No. 195
Group Id: LFR GP IA Name: LOAD FACTOR GROUP IA

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

1	1	-0.00	3697.20	0.00	-706.71	0.00	-7819.78
1	2	-0.00	-2949.99	0.00	706.71	0.00	7819.78
2	3	0.00	0.00	0.00	0.00	0.00	0.00
2	4	0.00	8.03	0.00	0.00	0.00	-8.45
3	4	0.00	-201.07	0.00	-235.50	0.00	8.45
3	5	0.00	205.63	0.00	235.50	0.00	-225.22
4	5	0.00	-644.10	0.00	299.44	0.00	225.22
4	6	0.00	703.13	0.00	-299.44	0.00	-6964.09
5	6	0.00	-913.40	0.00	42.91	0.00	6964.09
5	7	0.00	920.95	0.00	-42.91	0.00	-7886.77
6	7	0.00	-1416.81	0.00	647.86	0.00	7886.77
6	8	0.00	1435.36	0.00	-647.86	0.00	-11195.28
7	8	0.00	-1435.36	0.00	647.86	0.00	11195.28
7	9	0.00	1499.91	0.00	-647.86	0.00	-22560.66
8	9	0.00	-1710.18	0.00	391.33	0.00	22560.66
8	2	0.00	1712.31	0.00	-391.33	0.00	-22998.74
9	2	0.00	1237.67	0.00	-315.38	0.00	15178.96
9	10	0.00	-1231.92	0.00	315.38	0.00	-14326.95
10	10	0.00	955.55	0.00	21.79	0.00	14326.95
10	11	0.00	-894.62	0.00	-21.79	0.00	-7564.58
11	11	0.00	894.62	0.00	21.79	0.00	7564.58
11	12	0.00	-872.32	0.00	-21.79	0.00	-5078.51
12	12	0.00	662.05	0.00	-234.73	0.00	5078.51
12	13	0.00	-655.51	0.00	234.73	0.00	-4494.83
13	13	0.00	454.17	0.00	10.89	0.00	4494.83
13	14	0.00	-395.47	0.00	-10.89	0.00	-168.47
14	14	0.00	198.36	0.00	-229.58	0.00	168.47
14	15	0.00	-194.93	0.00	229.58	0.00	-6.04
15	15	0.00	6.75	0.00	0.00	0.00	6.04
15	16	0.00	0.00	0.00	0.00	0.00	0.00

Combination No. 202
Group Id: LFR GP IA Name: LOAD FACTOR GROUP IA

Memb	Node	Fx kip	Fy kip	Fz kip	Mx kft	My kft	Mz kft
1	1	-0.00	3697.20	0.00	815.66	0.00	9007.01
1	2	-0.00	-2949.99	0.00	-815.66	0.00	-9007.01
2	3	0.00	0.00	0.00	0.00	0.00	0.00
2	4	0.00	8.03	0.00	0.00	0.00	-8.45
3	4	0.00	-201.07	0.00	-235.50	0.00	8.45
3	5	0.00	205.63	0.00	235.50	0.00	-225.22
4	5	0.00	-389.73	0.00	-10.89	0.00	225.22
4	6	0.00	448.76	0.00	10.89	0.00	-4419.36
5	6	0.00	-659.03	0.00	-267.42	0.00	4419.36
5	7	0.00	666.58	0.00	267.42	0.00	-5086.14
6	7	0.00	-867.92	0.00	-21.79	0.00	5086.14
6	8	0.00	886.47	0.00	21.79	0.00	-7121.23
7	8	0.00	-886.47	0.00	-21.79	0.00	7121.23
7	9	0.00	951.03	0.00	21.79	0.00	-14236.01
8	9	0.00	-1242.88	0.00	-377.85	0.00	14236.01
8	2	0.00	1245.01	0.00	377.85	0.00	-14554.46
9	2	0.00	1704.98	0.00	437.81	0.00	23561.47
9	10	0.00	-1699.22	0.00	-437.81	0.00	-22387.02
10	10	0.00	1497.89	0.00	683.44	0.00	22387.02
10	11	0.00	-1436.95	0.00	-683.44	0.00	-11660.18
11	11	0.00	1436.95	0.00	683.44	0.00	11660.18
11	12	0.00	-1414.65	0.00	-683.44	0.00	-7647.98
12	12	0.00	894.16	0.00	48.44	0.00	7647.98
12	13	0.00	-887.62	0.00	-48.44	0.00	-6858.65
13	13	0.00	686.28	0.00	294.07	0.00	6858.65
13	14	0.00	-627.58	0.00	-294.07	0.00	-168.47
14	14	0.00	198.36	0.00	-229.58	0.00	168.47
14	15	0.00	-194.93	0.00	229.58	0.00	-6.04
15	15	0.00	6.75	0.00	0.00	0.00	6.04
15	16	0.00	0.00	0.00	0.00	0.00	0.00

Combination No. 203
Group Id: LFR GP IA Name: LOAD FACTOR GROUP IA

Memb	Node	Fx kip	Fy kip	Fz kip	Mx kft	My kft	Mz kft
1	1	-0.00	3697.20	0.00	-706.71	0.00	9007.01
1	2	-0.00	-2949.99	0.00	706.71	0.00	-9007.01
2	3	0.00	0.00	0.00	0.00	0.00	0.00
2	4	0.00	8.03	0.00	0.00	0.00	-8.45
3	4	0.00	-201.07	0.00	-235.50	0.00	8.45
3	5	0.00	205.63	0.00	235.50	0.00	-225.22
4	5	0.00	-389.73	0.00	-10.89	0.00	225.22
4	6	0.00	448.76	0.00	10.89	0.00	-4419.36
5	6	0.00	-659.03	0.00	-267.42	0.00	4419.36
5	7	0.00	666.58	0.00	267.42	0.00	-5086.14
6	7	0.00	-867.92	0.00	-21.79	0.00	5086.14
6	8	0.00	886.47	0.00	21.79	0.00	-7121.23
7	8	0.00	-886.47	0.00	-21.79	0.00	7121.23
7	9	0.00	951.03	0.00	21.79	0.00	-14236.01
8	9	0.00	-1161.29	0.00	-278.31	0.00	14236.01
8	2	0.00	1163.42	0.00	278.31	0.00	-14533.57
9	2	0.00	1786.56	0.00	-985.03	0.00	23540.59
9	10	0.00	-1780.81	0.00	985.03	0.00	-22309.84
10	10	0.00	1480.21	0.00	-618.29	0.00	22309.84
10	11	0.00	-1419.27	0.00	618.29	0.00	-11712.24
11	11	0.00	1419.27	0.00	-618.29	0.00	11712.24
11	12	0.00	-1396.97	0.00	618.29	0.00	-7749.79
12	12	0.00	1186.71	0.00	-874.81	0.00	7749.79
12	13	0.00	-1180.16	0.00	874.81	0.00	-6701.26
13	13	0.00	654.58	0.00	-233.60	0.00	6701.26
13	14	0.00	-595.87	0.00	233.60	0.00	-334.00
14	14	0.00	398.76	0.00	-474.07	0.00	334.00
14	15	0.00	-395.33	0.00	474.07	0.00	-6.04
15	15	0.00	6.75	0.00	0.00	0.00	6.04
15	16	0.00	0.00	0.00	0.00	0.00	0.00

Combination No. 176 C
Group Id: LFR GP IA Name: LOAD FACTOR GROUP IA

Memb	Node	Fx kip	Fy kip	Fz kip	Mx kft	My kft	Mz kft
1	1	-0.00	3216.30	0.00	40.86	0.00	12734.33
1	2	-0.00	-2655.89	0.00	-40.86	0.00	-12734.33
2	3	0.00	0.00	0.00	0.00	0.00	0.00
2	4	0.00	6.02	0.00	0.00	0.00	-6.34
3	4	0.00	-150.80	0.00	-176.63	0.00	6.34
3	5	0.00	154.22	0.00	176.63	0.00	-168.91
4	5	0.00	-292.30	0.00	-8.17	0.00	168.91
4	6	0.00	336.57	0.00	8.17	0.00	-3314.52
5	6	0.00	-494.27	0.00	-200.56	0.00	3314.52
5	7	0.00	499.94	0.00	200.56	0.00	-3814.61
6	7	0.00	-650.94	0.00	-16.34	0.00	3814.61
6	8	0.00	664.85	0.00	16.34	0.00	-5340.92
7	8	0.00	-664.85	0.00	-16.34	0.00	5340.92
7	9	0.00	713.27	0.00	16.34	0.00	-10677.01
8	9	0.00	-931.78	0.00	-282.92	0.00	10677.01
8	2	0.00	933.38	0.00	282.92	0.00	-10915.75
9	2	0.00	1722.51	0.00	-242.07	0.00	23650.08
9	10	0.00	-1718.20	0.00	242.07	0.00	-22463.04
10	10	0.00	1491.58	0.00	34.40	0.00	22463.04
10	11	0.00	-1445.88	0.00	-34.40	0.00	-11726.62
11	11	0.00	1445.88	0.00	34.40	0.00	11726.62
11	12	0.00	-1429.15	0.00	-34.40	0.00	-7681.45
12	12	0.00	1047.34	0.00	-431.41	0.00	7681.45
12	13	0.00	-1042.43	0.00	431.41	0.00	-6755.69
13	13	0.00	660.85	0.00	34.12	0.00	6755.69
13	14	0.00	-616.82	0.00	-34.12	0.00	-249.82
14	14	0.00	298.25	0.00	-354.54	0.00	249.82
14	15	0.00	-295.67	0.00	354.54	0.00	-4.53
15	15	0.00	5.06	0.00	0.00	0.00	4.53
15	16	0.00	0.00	0.00	0.00	0.00	0.00

CAP DESIGN
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Code: AASHTO STANDARD (17th Edition 2002) - Ultimate Strength Design
Units: US
Pier View : Downstation.

DESIGN PARAMETERS:
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f'c = 4000.0 psi
Fy flex = 60000.0 psi Fy shear = 60000.0 psi
phi flex = 0.90 phi shear = 0.85
Ec = 3834.3 ksi Es = 29000.0 ksi
crack control factor z = 170.00 kips / in
Concrete Type : Normal Weight.
Design : face of column.

CAP GEOMETRY:
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Hammer Head Cap : Length(X) = 49.00 ft Depth(Z) = 54.00 in

MAIN REINFORCEMENT:
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	Bar size	Quantity	Bar dist. in	As total in^2	From ft	To ft	Hook
TOP							
	# 10	13	3.00	16.510	0.00	49.00	Both
	# 10	13	6.00	16.510	0.00	49.00	None
BOTTOM							
	# 10	2	3.00	2.540	0.00	20.38	None
	# 10	2	3.00	2.540	16.37	32.63	None
	# 10	2	3.00	2.540	28.62	49.00	None

STIRRUPS:
=========

From ft	To ft	Stirrup Size	n legs	Spacing in	Aprv/s in^2 / ft
0.50	2.50	# 6	4	12.00	1.76
2.50	17.50	# 6	4	6.00	3.52
17.50	31.50	# 6	4	12.00	1.76
31.50	46.50	# 6	4	6.00	3.52
46.50	48.50	# 6	4	12.00	1.76

Clear Cover on Sides = 2.00 in

FLEXURE DESIGN:
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Span 1: From 0.00 ft To 24.50 ft

Loc ft	AbsLoc ft	H in	Mmax Mmin kips-ft	pMn pMn kips-ft	Comb Comb	Asb-req Asb-req in^2	Asb-prv Asb-prv in^2	Asb-eff Asb-eff in^2	Ast-req Ast-req in^2	Ast-prv Ast-prv in^2	Ast-eff Ast-eff in^2
2.1	2.1	56	0.0	423.0	0	0.00	2.54	1.33	0.00	33.02	33.02
			-11.8	-5030.9	128	0.00	2.54	2.54	0.07	33.02	22.69
3.2	3.2	61	0.0	610.4	0	0.00	2.54	2.00	0.00	33.02	33.02
			-449.6	-6138.3	194	0.00	2.54	2.54	2.36	33.02	25.82
13.2	13.2	101	0.0	1196.3	0	0.00	2.54	2.54	0.00	33.02	33.02
			-8014.1	-13571.8	192	0.00	2.54	2.54	19.14	33.02	33.02
14.2	14.2	105	0.0	1242.3	0	0.00	2.54	2.54	0.00	33.02	33.02
			-9255.7	-14169.8	192	0.00	2.54	2.54	21.26	33.02	33.02
16.5	16.5	114	0.0	1348.4	0	0.00	5.08	2.54	0.00	33.02	33.02

			-13120.5	-15553.7	192	0.00	5.08	2.71	27.78	33.02	33.02

Span 2: From 24.50 ft To 49.00 ft

Loc ft	AbsLoc ft	H in	Mmax Mmin kips-ft	pMn pMn kips-ft	Comb Comb	Asb-req Asb-req in^2	Asb-prv Asb-prv in^2	Asb-eff Asb-eff in^2	Ast-req Ast-req in^2	Ast-prv Ast-prv in^2	Ast-eff Ast-eff in^2
8.0	32.5	114	0.0	1348.4	0	0.00	5.08	2.54	0.00	33.02	33.02
			-13617.8	-15553.7	190	0.00	5.08	2.71	28.88	33.02	33.02
10.8	35.3	103	0.0	1219.7	0	0.00	2.54	2.54	0.00	33.02	33.02
			-8951.1	-13876.2	190	0.00	2.54	2.54	20.98	33.02	33.02
11.7	36.2	99	0.0	1179.2	0	0.00	2.54	2.54	0.00	33.02	33.02
			-7879.4	-13349.5	190	0.00	2.54	2.54	19.12	33.02	33.02
21.9	46.4	58	0.0	509.8	0	0.00	2.54	1.65	0.00	33.02	33.02
			-334.0	-5549.5	203	0.00	2.54	2.54	1.82	33.02	24.19
22.7	47.2	55	0.0	371.8	0	0.00	2.54	1.13	0.00	33.02	29.43
			-14.3	-4349.4	137	0.00	2.54	2.26	0.08	33.02	19.97

SHEAR AND TORSION DESIGN:
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Span 1: From 0.00 ft To 24.50 ft

Loc ft	AbsLoc ft	Pos	Vu kips	Comb	Tu kips-ft	Comb	phi*Vc kips	T-lim kips-ft	Avs/s <---------	2Ats/s in^2/ft	Av/s	Aprv/s -------->	Alt in^2
2.10	2.10	L	8.0	86	0.0	0	301.4	188.3	0.00	0.00	0.00	1.76	0.00
		R	411.5	194	492.3	194	301.4	188.3	0.50	0.63	1.13	1.76	10.86
3.17	3.17	L	416.1	194	492.3	194	326.2	209.7	0.38	0.59	0.96	3.52	12.26
		R	732.2	192	299.4	195	326.2	209.7	1.70	0.36	2.06	3.52	12.65
13.17	13.17	L	791.3	192	299.4	195	558.5	428.1	0.57	0.00	0.57	3.52	0.00
		R	1230.5	192	920.3	194	558.5	428.1	1.64	0.64	2.29	3.52	21.03
14.18	14.18	L	1238.0	192	920.3	194	581.9	451.3	1.54	0.62	2.16	3.52	22.27
		R	1656.6	192	674.6	194	581.9	451.3	2.52	0.45	2.97	3.52	23.20
16.50	16.50	L	1675.1	192	674.6	194	635.8	505.3	2.23	0.41	2.65	3.52	25.42

Span 2: From 24.50 ft To 49.00 ft

Loc ft	AbsLoc ft	Pos	Vu kips	Comb	Tu kips-ft	Comb	phi*Vc kips	T-lim kips-ft	Avs/s <---------	2Ats/s in^2/ft	Av/s	Aprv/s -------->	Alt in^2
8.00	32.50	R	1669.5	190	683.4	202	635.8	505.3	2.22	0.42	2.64	3.52	25.42
10.81	35.31	L	1647.2	190	683.4	202	570.4	439.9	2.58	0.47	3.05	3.52	22.73
		R	1212.8	190	874.8	203	570.4	439.9	1.54	0.60	2.14	3.52	22.04
11.70	36.20	L	1206.3	190	874.8	203	549.8	419.6	1.63	0.62	2.25	3.52	20.94
		R	774.4	190	294.1	202	549.8	419.6	0.56	0.00	0.56	3.52	0.00
21.88	46.38	L	715.7	190	294.1	202	313.3	198.5	1.75	0.36	2.12	3.52	12.12
		R	398.8	203	474.1	203	313.3	198.5	0.37	0.59	0.96	3.52	11.73
22.71	47.21	L	395.3	203	474.1	203	294.1	182.1	0.47	0.62	1.09	1.76	10.64
		R	6.8	86	0.0	0	294.1	182.1	0.00	0.00	0.00	1.76	0.00

Note:

- 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.
- 2Ats/s is the required area of steel per unit length for two legs 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 steel per unit length due to shear (stirrups).
- Alt is the total longitudinal steel required due to torsion in addition to the REQUIRED flexural steel.

CRACKING/FATIGUE CHECK:
======================

Span 1: From 0.00 ft To 24.50 ft

Loc ft	AbsLoc ft.	H in	Cracking fs-t fs-b ksi	Cracking ratio fs-t ratio fs-b	Cracking Comb Comb	Fatigue fs-t fs-b ksi	Fatigue ratio fs-t ratio fs-b
2.10	2.1	56.4	0.1	0.00	43	0.0	0.00
			0.0	0.00	0	0.0	0.00
3.17	3.2	60.7	3.0	0.08	177	0.6	0.02
			0.0	0.00	0	0.0	0.00
13.17	13.2	100.7	24.4	0.68	175	5.2	0.27
			0.0	0.00	0	3.2	0.12
14.18	14.2	104.7	27.0	0.75	175	5.8	0.31
			0.0	0.00	0	3.5	0.14
16.50	16.5	114.0	34.9	0.97	175	7.6	0.43
			0.0	0.00	0	4.4	0.17

Span 2: From 24.50 ft To 49.00 ft

Loc ft	AbsLoc ft	H in	Cracking fs-t fs-b ksi	Cracking ratio fs-t ratio fs-b	Cracking Comb Comb	Fatigue fs-t fs-b ksi	Fatigue ratio fs-t ratio fs-b
8.00	32.5	114.0	36.3	1.01*	173	7.6	0.45
			0.0	0.00	0	0.0	0.00
10.81	35.3	102.7	26.7	0.74	173	5.5	0.29
			0.0	0.00	0	0.0	0.00
11.70	36.2	99.2	24.4	0.68	173	5.0	0.26
			0.0	0.00	0	0.0	0.00
21.88	46.4	58.5	2.5	0.07	186	0.4	0.02
			0.0	0.00	0	0.0	0.00
22.71	47.2	55.2	0.1	0.00	52	0.0	0.00
			0.0	0.00	0	0.0	0.00

Note:
* Cracking / fatigue checking failed.

COLUMN DESIGN
============

COLUMN DESIGN - Column: 1

Column Type: Rectangular 192.00 x 54.00 in

Code: AASHTO STANDARD (17th Edition 2002) - Factored Load Design
Units: US
Pier View : Downstation.
Design/Analysis Method: P - Delta.

DESIGN PARAMETERS:
=================

f'c = 4000.0 psi fy = 60000.0 psi
phi flex = 0.90 phi axial = 0.70
Ec = 3834.3 ksi Es = 29000 ksi
Concrete Type : Normal Weight.

Reinforcement:
==============

Rebar Pattern: Rectangular
Rebar Orientation: Face Parallel

Layer	Dir	Size	No. bars	Bar Dist. in
1	X	10	33	3.13
1	Z	10	10	3.13

Main bars summary: Ties size: # 4
82 # 10 bars

Total number of bars in the column: 82

Design values used after P-Delta Analysis (e-min effect included).
==

(global coordinates)

Loc ft	Comb	Fx kips	Fy kips	Fz kips	Mx kips-ft	My kips-ft	Mz kips-ft
0.00	176C	-0.0	3295.2	0.0	609.6	0.0	12818.5
60.72	176C	-0.0	2655.9	-0.0	-491.3	0.0	-12734.3

Column Design
============

Loc ft	Comb	Pu kips	Mux kips-ft	Muz kips-ft	pMn kips-ft	Incl deg	pPn/Pu	pMn/Mu
0.00	176C	3295.2	609.6	12818.5	48184.9	87.28	1.00	3.75
60.72	176C	2655.9	491.3	12734.3	47340.7	87.79	1.00	3.71

ISOLATED FOOTING DESIGN

Code: AASHTO STANDARD (17th Edition 2002) - Ultimate Strength Design
Units: US
Pier View : Downstation.

Geometry:
=========

Name : footing
Shape : Rectangular, Type : Spread

Bf(X) = 24.00 ft, Hf(Z) = 15.00 ft, Thickness(Y) = 48.00 in

Footing concentric.
Columns located on the footing:
Column No. 1 at x = 0.00 ft, Rectangular 192.00 in x 54.00 in

Ag = 360.00 ft^2, Ix = 6750.00 ft^4, Iz = 17280.00 ft^4

Surcharge = 0.00 ksf

Design Parameters:
==================

f'c = 4000.00 psi fy = 60000.00 psi
phi flex = 0.90 phi shear = 0.85
Ec = 3834.3 ksi Es = 29000.0 ksi
Crack control factor z = 130.00 kips/in
Concrete Type : Normal Weight.

Max Soil Pressures, Service (Without the reduction of overstress allowance):
============================

Corner	X ft	Z ft	comb	Ovs	P, kips	Mxx, kft	Mzz, kft	Soil press. ksf
1	12.00	-7.50	173	1.500	-2885.49	-41.90	-7487.91	13.86
			175	1.500	-2885.49	-41.90	6574.65	4.10
2	-12.00	-7.50	175	1.500	-2885.49	-41.90	6574.65	13.23
			20	1.250	-2594.02	824.03	-6439.40	2.42
3	-12.00	7.50	175	1.500	-2885.49	-41.90	6574.65	13.13
			173	1.500	-2885.49	-41.90	-7487.91	3.37
4	12.00	7.50	173	1.500	-2885.49	-41.90	-7487.91	13.77
			175	1.500	-2885.49	-41.90	6574.65	4.00

Max Soil Pressures, Factored:
============================

Corner	X ft	Z ft	comb	Ovs	P, kips	Mxx, kft	Mzz, kft	Soil press. ksf
1	12.00	-7.50	190	---	-3818.92	-54.47	-10648.35	18.84
			192	---	-3818.92	-54.47	9461.12	4.88
2	-12.00	-7.50	192	---	-3818.92	-54.47	9461.12	18.02
			105	---	-3372.23	1071.25	-8371.21	3.14
3	-12.00	7.50	192	---	-3818.92	-54.47	9461.12	17.90
			190	---	-3818.92	-54.47	-10648.35	3.93
4	12.00	7.50	190	---	-3818.92	-54.47	-10648.35	18.72
			192	---	-3818.92	-54.47	9461.12	4.76

Max Soil Pressures, Service (After the reduction of overstress allowance):
============================

Corner	X ft	Z ft	comb	Ovs	P, kips	Mxx, kft	Mzz, kft	Soil press. ksf
1	12.00	-7.50	3	1.000	-2624.77	203.52	-4685.03	10.92

			175	1.500	-2885.49	-41.90	6574.65	2.73
2	-12.00	-7.50	5	1.000	-2624.77	203.52	2346.25	9.29
			20	1.250	-2594.02	824.03	-6439.40	1.93
3	-12.00	7.50	5	1.000	-2624.77	203.52	2346.25	9.75
			173	1.500	-2885.49	-41.90	-7487.91	2.25
4	12.00	7.50	13	1.000	-2716.02	289.42	-4303.75	11.45
			175	1.500	-2885.49	-41.90	6574.65	2.67

Note:
Only max. positive pressure is considered for design.

Max. Soil Pressure Used in Design: (without selfweight and surcharge)
=================================

Factored soil pressure = 18.06 ksf

Service soil pressure = 13.46 ksf

Fatigue soil pressure = 3.17 ksf

Reinforcement Schedule:
======================:

Dir	Quantity	Size	Bar dist. in	As total in^2	Spacing in	Hook
X	17	# 10	3.63	21.59	10.80	Both
Z	43	# 10	5.14	54.61	6.68	None

Flexure:
========

Dir	Loc ft	d in	Mmax kft	Comb	Asb_req in^2	Asb_prv in^2	Asb_eff in^2	Ast_req in^2	Ast_prv in^2	Ast_eff in^2
X	-8.00	44.37	2167.6	190	14.68	21.59	21.59	0.00	0.00	0.00
X	8.00	44.37	2167.6	190	14.68	21.59	21.59	0.00	0.00	0.00
Z	-2.25	42.86	5974.4	190	31.69	54.61	54.61	0.00	0.00	0.00
Z	2.25	42.86	5974.4	190	31.69	54.61	54.61	0.00	0.00	0.00

Cracking/Fatigue
================

			<-------- Cracking			---------->	<---------- Fatigue			--------->
Dir	Loc ft	d in	Mmax kft	Comb	fs ksi	ratio fs	Mmax kft	Comb	fs ksi	ratio fs
X	-8.00	44.37	1615.4	173	21.55	0.87	379.9	3	5.07	0.25
X	8.00	44.37	1615.4	173	21.55	0.87	379.9	3	5.07	0.25
Z	-2.25	42.86	4452.5	173	24.70	0.86	1047.0	3	5.81	0.29
Z	2.25	42.86	4452.5	173	24.70	0.86	1047.0	3	5.81	0.29

One Way Shear :
=============

Col	Dir	Dist ft	Comb	d in	Vu kips	phi*Vc kips
1	X	-11.70	190	44.37	82.1	858.6
	X	11.70	190	44.37	82.1	858.6
	Z	-5.82	190	42.86	727.4	1327.3
	Z	5.82	190	42.86	727.4	1327.3

Two Way Shear:
==============

#	Bo ft	Ao ft^2	Comb	Avg. d in	Vu kips	phi*Vc kips
Columns:						
1	55.54	159.72	190	43.61	3617.7	4883.2

Note:
TWO WAY SHEAR IN FOOTING IS NOT DESIGNED AND STIRRUPS ARE NOT CONSIDERED.

CHECK 5/29/09 DMP

```
                            OOOOO
                           OO   OO
                           OO   OO
OOOOOOO   OOOOO   OOOOO    OO        OOOOO   OO    OO   OO  OOOOOOOO   OOOO
OO    OO  OO      OO   OO  OO       OO   OO  OO    OO   OO  OO  OO  OO  OO  OO
OO    OO  OO      OOOOOOO  OO   OO  OO   OO  OO    OO   OO  OO  OO  OO  OO  OO
OOOOOOO   OO      OO   OO  OO   OO  OO   OO  OO    OO   OO  OO  OO  OO  OO  OO
OO        OOOOO   OO   OO   OOOOO    OOOOO   OOOOO  OOOOO   OO  OO  OO  OO  OO (TM)
```

==

pcaColumn v4.10 (TM)
Computer program for the Strength Design of Reinforced Concrete Sections

==

General Information:
===================

File Name: untitled.col
Project: ODT-SCI-823-0917
Column: Pier 1 & 3
Code: ACI 318-02

Engineer: JSW
Units: English

Run Option: Investigation
Run Axis: Biaxial

Slenderness: Not considered
Column Type: Structural

Material Properties:
====================

f'c = 4 ksi
Ec = 3605 ksi
Ultimate strain = 0.003 in/in
Beta1 = 0.85

fy = 60 ksi
Es = 29000 ksi

Section:
========

Exterior Points

No.	X (in)	Y (in)	No.	X (in)	Y (in)	No.	X (in)	Y (in)
1	-87.0	27.0	2	87.0	27.0	3	91.7	26.6
4	96.2	25.4	5	100.5	23.4	6	104.4	20.7
7	107.7	17.4	8	110.4	13.5	9	112.4	9.2
10	113.6	4.7	11	114.0	0.0	12	113.6	-4.7
13	112.4	-9.2	14	110.4	-13.5	15	107.7	-17.4
16	104.4	-20.7	17	100.5	-23.4	18	96.2	-25.4
19	91.7	-26.6	20	87.0	-27.0	21	-87.0	-27.0
22	-91.7	-26.6	23	-96.2	-25.4	24	-100.5	-23.4
25	-104.4	-20.7	26	-107.7	-17.4	27	-110.4	-13.5
28	-112.4	-9.2	29	-113.6	-4.7	30	-114.0	0.0
31	-113.6	4.7	32	-112.4	9.2	33	-110.4	13.5
34	-107.7	17.4	35	-104.4	20.7	36	-100.5	23.4
37	-96.2	25.4	38	-91.7	26.6			

Gross section area, Ag = 11674.6 in^2
Ix = 2.6964e+006 in^4
Xo = -9.81049e-007 in

Iy = 4.58979e+007 in^4
Yo = -6.26587e-009 in

Reinforcement:
==============

Bar Set: ASTM A615

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

Confinement: Tied; #3 ties with #10 bars, #4 with larger bars.
phi(a) = 0.8, phi(b) = 0.9, phi(c) = 0.65

Pattern: Irregular

Total steel area, As = 119.38 in^2 at 1.02%

Area in^2	X (in)	Y (in)	Area in^2	X (in)	Y (in)	Area in^2	X (in)	Y (in)
1.27	-87.0	24.0	1.27	-81.6	24.0	1.27	-76.1	24.0
1.27	-70.7	24.0	1.27	-65.3	24.0	1.27	-59.8	24.0
1.27	-54.4	24.0	1.27	-48.9	24.0	1.27	-43.5	24.0
1.27	-38.1	24.0	1.27	-32.6	24.0	1.27	-27.2	24.0
1.27	-21.8	24.0	1.27	-16.3	24.0	1.27	-10.9	24.0

Should be (27" - 3" clear - 0.5" Ties - $\frac{1.270"}{2}$ for #10s)
= 22.865". SAT OK since $\phi M_n/M_u$ >>1.0

SIMILAR

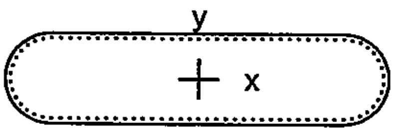
1.27	-5.4	24.0	1.27	0.0	24.0	1.27	5.4	24.0
1.27	10.9	24.0	1.27	16.3	24.0	1.27	21.8	24.0
1.27	27.2	24.0	1.27	32.6	24.0	1.27	38.1	24.0
1.27	43.5	24.0	1.27	48.9	24.0	1.27	54.4	24.0
1.27	59.8	24.0	1.27	65.3	24.0	1.27	70.7	24.0
1.27	76.1	24.0	1.27	81.6	24.0	1.27	87.0	24.0
1.27	92.0	23.5	1.27	96.8	21.9	1.27	101.1	19.4
1.27	104.8	16.1	1.27	107.8	12.0	1.27	109.8	7.4
1.27	110.9	2.5	1.27	110.9	-2.5	1.27	109.8	-7.4
1.27	107.8	-12.0	1.27	104.8	-16.1	1.27	101.1	-19.4
1.27	96.8	-21.9	1.27	92.0	-23.5	1.27	87.0	-24.0
1.27	81.6	-24.0	1.27	76.1	-24.0	1.27	70.7	-24.0
1.27	65.3	-24.0	1.27	59.8	-24.0	1.27	54.4	-24.0
1.27	48.9	-24.0	1.27	43.5	-24.0	1.27	38.1	-24.0
1.27	32.6	-24.0	1.27	27.2	-24.0	1.27	21.8	-24.0
1.27	16.3	-24.0	1.27	10.9	-24.0	1.27	5.4	-24.0
1.27	0.0	-24.0	1.27	-5.4	-24.0	1.27	-10.9	-24.0
1.27	-16.3	-24.0	1.27	-21.8	-24.0	1.27	-27.2	-24.0
1.27	-32.6	-24.0	1.27	-38.1	-24.0	1.27	-43.5	-24.0
1.27	-48.9	-24.0	1.27	-54.4	-24.0	1.27	-59.8	-24.0
1.27	-65.3	-24.0	1.27	-70.7	-24.0	1.27	-76.1	-24.0
1.27	-81.6	-24.0	1.27	-87.0	-24.0	1.27	-92.0	-23.5
1.27	-96.8	-21.9	1.27	-101.1	-19.4	1.27	-104.8	-16.1
1.27	-107.8	-12.0	1.27	-109.8	-7.4	1.27	-110.9	-2.5
1.27	-110.9	2.5	1.27	-109.8	7.4	1.27	-107.8	12.0
1.27	-104.8	16.1	1.27	-101.1	19.4	1.27	-96.8	21.9
1.27	-92.0	23.5						

Factored Loads and Moments with Corresponding Capacities:
==

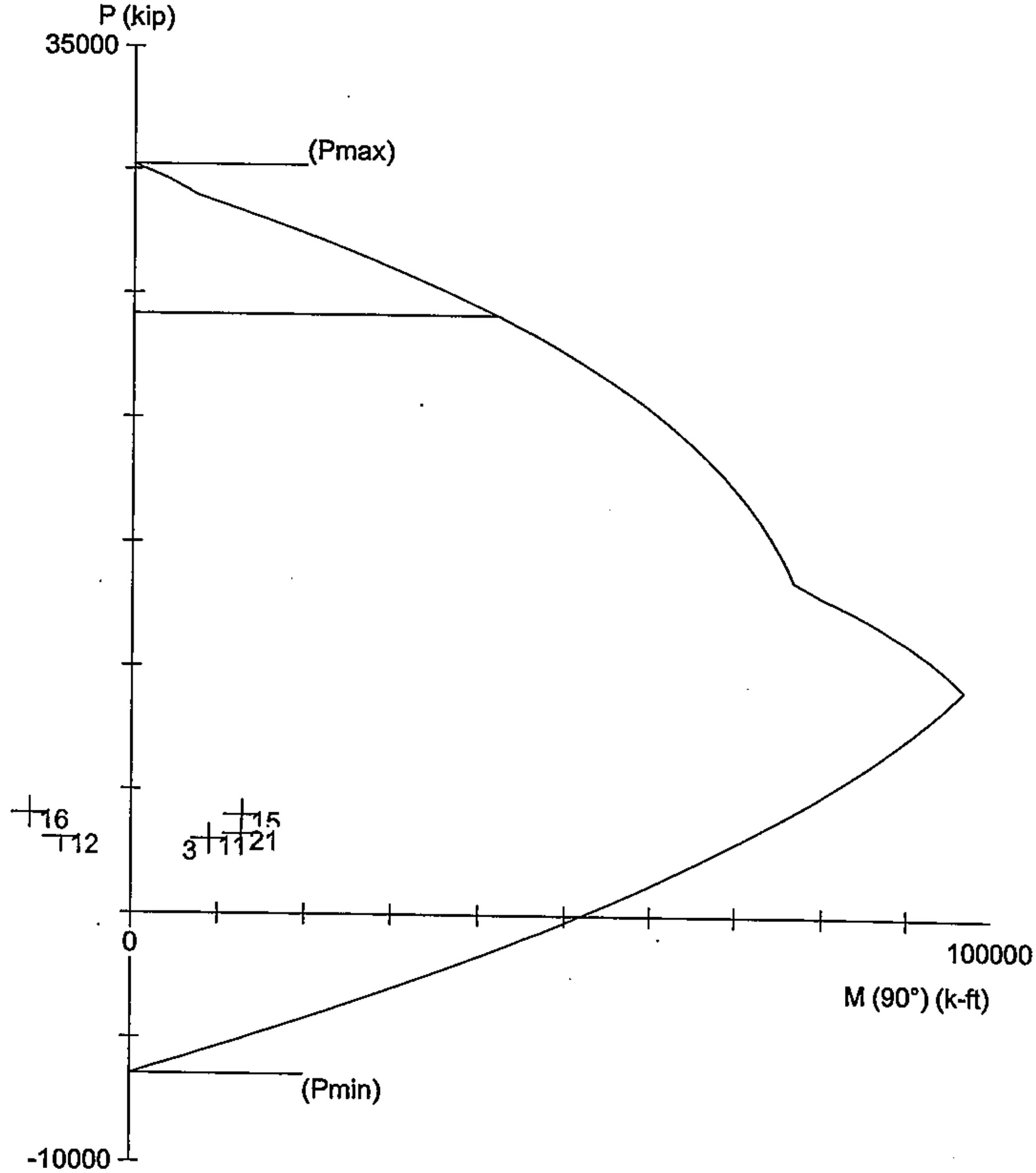
No.	Pu kip	Mux k-ft	Muy k-ft	fMnx k-ft	fMny k-ft	fMn/Mu	Phi
1	3295.20	609.60	12818.50	3363.83	70733.59	5.518	0.900
2	2655.90	491.30	12734.30	2610.23	67656.01	5.313	0.900

*** End of output ***

Dmp ✓



228 x 54 in



Code: ACI 318-02

Units: English

Run axis: Biaxial

Run option: Investigation

Slenderness: Not considered

Column type: Structural

Bars: ASTM A615

Date: 07/30/09

Time: 09:20:12

pcaColumn v4.10. Licensed to: HDR, Inc.. License ID: 54840-1015243-2-1E375-275CC

File: X:\Cincinnati\ODT-SCI-823-0917 PIER 1 & 3.col

Project: ODT-SCI-823-0917

Column: Pier 1

Engineer: JSW

f'c = 4 ksi	fy = 60 ksi	Ag = 11674.6 in^2	94 #10 bars
Ec = 3605 ksi	Es = 29000 ksi	As = 119.38 in^2	rho = 1.02%
fc = 3.4 ksi		Xo = -0.00 in	Ix = 2.6964e+006 in^4
e_u = 0.003 in/in		Yo = -0.00 in	Iy = 4.58979e+007 in^4
Beta1 = 0.85		Min clear spacing = 3.75 in	Clear cover = N/A
Confinement: Tied	phi(a) = 0.8, phi(b) = 0.9, phi(c) = 0.65		

DMP 6/25/09
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PROJECT DATA
===========

Project : ODT_SCI_823_Phase 1
User Job No.:
State : OH State Job No. :
Pier View : Downstation.
Code : AASHTO STANDARD (17th Edition 2002)
Comments : Pier 2

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

Pier Type: Hammer Head

Pier View : Downstation.
Length(X) = 49.00 ft Height max(Y) = 9.50 ft Height min(Y) = 4.00 ft
Bottom length(X) = 16.00 ft Depth(Z) = 4.50 ft Skew angle = 19.00 Reduction of I = 1.000

Column Shape: Rectangular Non Tapered
Bottom width(X) = 16.00 ft Top width(X) = 16.00 ft Depth(Z) = 4.50 ft Height(Y) = 51.05 ft
Column Bottom has Diagonal Spring Matrix Defined

Diagonal Spring Matrix: (Units: kip, ft, radians)

	Kx	Ky	Kz	Rx	Ry	Rz
Kx	0.00	0.00	0.00	0.00	0.00	0.00
Ky	0.00	0.00	0.00	0.00	0.00	0.00
Kz	0.00	0.00	0.00	0.00	0.00	0.00
Rx	0.00	0.00	0.00	0.00	0.00	0.00
Ry	0.00	0.00	0.00	0.00	0.00	0.00
Rz	0.00	0.00	0.00	0.00	0.00	0.00

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

Total number of spans: 4 Span number rear to current pier: 1 2
Number of traffic lanes: 3

Beam: height : 54.00 in section area : 893.00 in^2
Beam Inertia (Ixx): 480161.00 in^4 Beam inertia (Iyy): 36314.00 in^4
Beam CG:31.10 in Barrier height : 48.00 in Depth of slab : 8.50 in
Curb to curb distance: 45.500 ft

Span #	Span length	Bridge Width
1	100.000 ft	51.250 ft
2	100.000 ft	51.250 ft
3	100.000 ft	51.250 ft
4	100.000 ft	51.250 ft
		51.250 ft

BEARING POINTS
==============

Number of bearing lines: 2

First bearing line Eccentricity = 1.22 ft

Point	Distance ft
1	3.17
2	14.18
3	25.19
4	36.20
5	47.21

Second bearing line Eccentricity = -1.22 ft

Point	Distance ft

1	2.10
2	13.17
3	24.24
4	35.31
5	46.38

MATERIAL PROPERTIES

	Cap	Column	Footing
Concrete Type	normal	normal	normal
Concrete Strength (psi)	4000.00	4000.00	4000.00
Concrete Density (lb/ft3)	150.00	150.00	150.00
Concrete Modulus Ec (ksi)	3834.30	3834.30	3834.30
Steel Strength Fy (ksi)	60.00	60.00	60.00

DESIGN PARAMETERS

AASHTO STANDARD Code

Strength Reduction factors for reinf. concrete:

Flexure and tension	0.90
Shear and torsion (normal)	0.85
(lightweight)	0.85
Axial compression (ties)	0.70
Axial compression (spiral)	0.75

Multi presence factors for live load:

1	Lane	1.00
2	Lanes	1.00
3	Lanes	0.90
more than 3	Lanes	0.75

	Crack control factor kip/ft	Clear cover in	Clear side cover in	Impact factors (auto calculation)
Cap	170.00	2.00	2.00	1.22
Column	170.00	2.00 [3.00]		1.22
Footing	130.00	3.00	3.00	1.00

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

SEISMIC DESIGN PARAMETERS

Strength Reduction factors for reinf. Concrete Seismic Design:

Flexure and tension :	0.90
Shear and torsion (normal) :	0.85
(lightweight) :	0.85
Axial compression (ties):	0.70
Axial compression (spiral):	0.75

Seismic Overstrength

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

Response Modification Factor : 3.00

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.

LOADS
=====

Pier View : Downstation.
Load Cases: 48

Loadcase ID: D1 Name:
Multiplier = 1.000

Bearing loads:

Line #	Bearing #	Dir.	Load, kips
1	1	Y	-135.40
1	2	Y	-148.66
1	3	Y	-148.66
1	4	Y	-148.66
1	5	Y	-138.53
2	1	Y	-136.05
2	2	Y	-149.31
2	3	Y	-149.31
2	4	Y	-149.31
2	5	Y	-139.19

Auto generation details

Generated Dead Load
Imported dead load reaction from Conspan for Pier: 2

Loadcase ID: W1 Name: 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	6.14	0.50	----	----
UDL	Z	----	0.04	0.00	----	1.00

Column loads:

Col #	Type	Dir	Mag1		y1/L	Mag2	y2/L
1	UDL	X	0.358	klf	0.00	----	0.87
1	UDL	Z	0.123	klf	0.00	----	0.87

Bearing loads:

Line #	Bearing #	Dir.	Load, kips
1	1	X	4.93
1	1	Y	27.69
1	1	Z	-0.17
1	2	X	4.93
1	2	Y	10.25
1	2	Z	-0.17
1	3	X	4.93
1	3	Y	10.25
1	3	Z	-0.17
1	4	X	4.93
1	4	Y	10.25
1	4	Z	-0.17
1	5	X	4.93
1	5	Y	-7.19
1	5	Z	-0.17
2	1	X	4.93
2	1	Y	27.69
2	1	Z	-0.17
2	2	X	4.93
2	2	Y	10.25

2	2	Z	-0.17
2	3	X	4.93
2	3	Y	10.25
2	3	Z	-0.17
2	4	X	4.93
2	4	Y	10.25
2	4	Z	-0.17
2	5	X	4.93
2	5	Y	-7.19
2	5	Z	-0.17

Auto generation details
Generated Wind Load on Structure
Angle of wind = 0.00 deg Elevation above which wind load acts = 0.00 ft
User defined wind pressure

Wind pressure for superstructure:		Wind pressure for substructure:	
Transverse	50.000 psf	Cap	40.000 psf
Longitudinal	19.220 psf	Column	40.000 psf
Overturning	20.000 psf		

Loadcase ID: WL1 Name: Angle: 0
Multiplier = 1.000

Bearing loads:

Line #	Bearing #	Dir.	Load, kips
1	1	X	1.51
1	1	Y	1.93
1	1	Z	0.52
1	2	X	1.51
1	2	Y	-0.00
1	2	Z	0.52
1	3	X	1.51
1	3	Y	-0.00
1	3	Z	0.52
1	4	X	1.51
1	4	Y	-0.00
1	4	Z	0.52
1	5	X	1.51
1	5	Y	-1.93
1	5	Z	0.52
2	1	X	1.51
2	1	Y	1.91
2	1	Z	0.52
2	2	X	1.51
2	2	Y	-0.00
2	2	Z	0.52
2	3	X	1.51
2	3	Y	-0.00
2	3	Z	0.52
2	4	X	1.51
2	4	Y	-0.00
2	4	Z	0.52
2	5	X	1.51
2	5	Y	-1.91
2	5	Z	0.52

Auto generation details
Generated Wind Load on Live Load
Angle of wind = 0.00 deg Live load length = 160.00 ft

Loadcase ID: (L+In)1 Name:
Multiplier = 1.000

Bearing loads:

Line #	Bearing #	Dir.	Load, kips
1	1	Y	-7.74
1	2	Y	-47.80

1	3	Y	-53.61
1	4	Y	-56.04
1	5	Y	-10.79
2	1	Y	-5.16
2	2	Y	-46.13
2	3	Y	-52.78
2	4	Y	-58.08
2	5	Y	-13.83

Auto generation details

Generated Live Load

Longitudinal Reaction: User Input Reaction

	Max Vert. Reaction kips
Truck:	89.25 [88.43]
Lane:	130.36 [123.93]

LARGER LOADS USED → SAY OK

Reaction distribution among lines

	Bearing Line 1	Bearing Line 2
Truck Case A:	0.50	0.50
Lane Case A:	0.50	0.50
Truck Case B:	1.00	0.00
Lane Case B:	0.50	0.00

Transverse Positioning
Number of loaded lanes = all combinations

Live Load Positions = Variable Spacing
Minimum Spacing Between Positions = 1.00 ft

Generate Braking/Longitudinal Force = Selected
Generate Centrifugal Force = Selected
Total number of Considered Truck Positions = 80
Total number of Possible Combination = 57222

Loadcase ID: (L+In)2 Name:
Multiplier = 1.000

Bearing loads:

Line #	Bearing #	Dir.	Load, kips
1	1	Y	0.00
1	2	Y	0.00
1	3	Y	0.00
1	4	Y	0.00
1	5	Y	0.00
2	1	Y	-54.19
2	2	Y	-85.54
2	3	Y	-80.16
2	4	Y	-21.07
2	5	Y	0.00

Auto generation details

Generated Live Load

Longitudinal Reaction: User Input Reaction

	Max Vert. Reaction kips
Truck:	89.25
Lane:	130.36

Reaction distribution among lines

	Bearing Line 1	Bearing Line 2
Truck Case A:	0.50	0.50
Lane Case A:	0.50	0.50
Truck Case B:	1.00	0.00
Lane Case B:	0.50	0.00

Transverse Positioning
Number of loaded lanes = all combinations

Live Load Positions = Variable Spacing
Minimum Spacing Between Positions = 1.00 ft

Generate Braking/Longitudinal Force = Selected
Generate Centrifugal Force = Selected
Total number of Considered Truck Positions = 80
Total number of Possible Combination = 57222

Loadcase ID: (L+In)3 Name:
Multiplier = 1.000

Bearing loads:

Line #	Bearing #	Dir.	Load, kips
1	1	Y	0.00
1	2	Y	0.00
1	3	Y	-21.63
1	4	Y	-65.96
1	5	Y	-42.76
2	1	Y	0.00
2	2	Y	0.00
2	3	Y	-17.40
2	4	Y	-64.12
2	5	Y	-48.85

Auto generation details

Generated Live Load

Longitudinal Reaction: User Input Reaction

	Max Vert. Reaction kips
Truck:	89.25
Lane:	130.36

Reaction distribution among lines

	Bearing Line 1	Bearing Line 2
Truck Case A:	0.50	0.50
Lane Case A:	0.50	0.50
Truck Case B:	1.00	0.00
Lane Case B:	0.50	0.00

Transverse Positioning
Number of loaded lanes = all combinations

Live Load Positions = Variable Spacing
Minimum Spacing Between Positions = 1.00 ft

Generate Braking/Longitudinal Force = Selected
Generate Centrifugal Force = Selected
Total number of Considered Truck Positions = 80
Total number of Possible Combination = 57222

Loadcase ID: (L+In)4 Name:
Multiplier = 1.000

Bearing loads:

Line #	Bearing #	Dir.	Load, kips
1	1	Y	-65.49
1	2	Y	-81.24
1	3	Y	-76.49
1	4	Y	-17.74
1	5	Y	0.00
2	1	Y	0.00

2	2	Y	0.00
2	3	Y	0.00
2	4	Y	0.00
2	5	Y	0.00

Auto generation details

Generated Live Load

Longitudinal Reaction: User Input Reaction

	Max Vert. Reaction kips
Truck:	89.25
Lane:	130.36

Reaction distribution among lines

	Bearing Line 1	Bearing Line 2
Truck Case A:	0.50	0.50
Lane Case A:	0.50	0.50
Truck Case B:	1.00	0.00
Lane Case B:	0.50	0.00

Transverse Positioning
Number of loaded lanes = all combinations

Live Load Positions = Variable Spacing
Minimum Spacing Between Positions = 1.00 ft

Generate Braking/Longitudinal Force = Selected
Generate Centrifugal Force = Selected
Total number of Considered Truck Positions = 80
Total number of Possible Combination = 57222

Loadcase ID: (L+In)5 Name:
Multiplier = 1.000

Bearing loads:

Line #	Bearing #	Dir.	Load, kips
1	1	Y	-52.84
1	2	Y	-62.14
1	3	Y	-15.37
1	4	Y	0.00
1	5	Y	0.00
2	1	Y	-45.14
2	2	Y	-65.49
2	3	Y	-19.72
2	4	Y	0.00
2	5	Y	0.00

Auto generation details

Generated Live Load

Longitudinal Reaction: User Input Reaction

	Max Vert. Reaction kips
Truck:	89.25
Lane:	130.36

Reaction distribution among lines

	Bearing Line 1	Bearing Line 2
Truck Case A:	0.50	0.50
Lane Case A:	0.50	0.50
Truck Case B:	1.00	0.00
Lane Case B:	0.50	0.00

Transverse Positioning
Number of loaded lanes = all combinations

Live Load Positions = Variable Spacing
Minimum Spacing Between Positions = 1.00 ft

Generate Braking/Longitudinal Force = Selected
Generate Centrifugal Force = Selected
Total number of Considered Truck Positions = 80
Total number of Possible Combination = 57222

Loadcase ID: (L+In)6 Name:
Multiplier = 1.000

Bearing loads:

Line #	Bearing #	Dir.	Load, kips
1	1	Y	0.00
1	2	Y	0.00
1	3	Y	0.00
1	4	Y	0.00
1	5	Y	0.00
2	1	Y	-60.21
2	2	Y	-92.88
2	3	Y	-25.40
2	4	Y	0.00
2	5	Y	0.00

Auto generation details

Generated Live Load

Longitudinal Reaction: User Input Reaction

	Max Vert. Reaction kips
Truck:	89.25
Lane:	130.36

Reaction distribution among lines

	Bearing Line 1	Bearing Line 2
Truck Case A:	0.50	0.50
Lane Case A:	0.50	0.50
Truck Case B:	1.00	0.00
Lane Case B:	0.50	0.00

Transverse Positioning
Number of loaded lanes = all combinations

Live Load Positions = Variable Spacing
Minimum Spacing Between Positions = 1.00 ft

Generate Braking/Longitudinal Force = Selected
Generate Centrifugal Force = Selected
Total number of Considered Truck Positions = 80
Total number of Possible Combination = 57222

Loadcase ID: (L+In)7 Name:
Multiplier = 1.000

Bearing loads:

Line #	Bearing #	Dir.	Load, kips
1	1	Y	-72.77
1	2	Y	-84.26
1	3	Y	-21.47
1	4	Y	0.00
1	5	Y	0.00
2	1	Y	0.00
2	2	Y	0.00
2	3	Y	0.00
2	4	Y	0.00
2	5	Y	0.00

Auto generation details

Generated Live Load

Longitudinal Reaction: User Input Reaction

	Max Vert. Reaction kips
Truck:	89.25
Lane:	130.36

Reaction distribution among lines

	Bearing Line 1	Bearing Line 2
Truck Case A:	0.50	0.50
Lane Case A:	0.50	0.50
Truck Case B:	1.00	0.00
Lane Case B:	0.50	0.00

Transverse Positioning
Number of loaded lanes = all combinations

Live Load Positions = Variable Spacing
Minimum Spacing Between Positions = 1.00 ft

Generate Braking/Longitudinal Force = Selected
Generate Centrifugal Force = Selected
Total number of Considered Truck Positions = 80
Total number of Possible Combination = 57222

Loadcase ID: (L+In)8 Name:
Multiplier = 1.000

Bearing loads:

Line #	Bearing #	Dir.	Load, kips
1	1	Y	0.00
1	2	Y	0.00
1	3	Y	-0.04
1	4	Y	-36.11
1	5	Y	-29.03
2	1	Y	0.00
2	2	Y	0.00
2	3	Y	0.00
2	4	Y	-31.14
2	5	Y	-34.04

Auto generation details

Generated Live Load

Longitudinal Reaction: User Input Reaction

	Max Vert. Reaction kips
Truck:	89.25
Lane:	130.36

Reaction distribution among lines

	Bearing Line 1	Bearing Line 2
Truck Case A:	0.50	0.50
Lane Case A:	0.50	0.50
Truck Case B:	1.00	0.00
Lane Case B:	0.50	0.00

Transverse Positioning
Number of loaded lanes = all combinations

Live Load Positions = Variable Spacing
Minimum Spacing Between Positions = 1.00 ft

Generate Braking/Longitudinal Force = Selected

Generate Centrifugal Force = Selected
Total number of Considered Truck Positions = 80
Total number of Possible Combination = 57222

Loadcase ID: (L+In)9   Name:
Multiplier = 1.000

Bearing loads:

Line #	Bearing #	Dir.	Load, kips
1	1	Y	-47.56
1	2	Y	-59.19
1	3	Y	-56.97
1	4	Y	-12.26
1	5	Y	0.00
2	1	Y	-40.63
2	2	Y	-60.71
2	3	Y	-58.92
2	4	Y	-15.73
2	5	Y	0.00

Auto generation details

Generated Live Load

Longitudinal Reaction: User Input Reaction

	Max Vert. Reaction kips
Truck:	89.25
Lane:	130.36

Reaction distribution among lines

	Bearing Line 1	Bearing Line 2
Truck Case A:	0.50	0.50
Lane Case A:	0.50	0.50
Truck Case B:	1.00	0.00
Lane Case B:	0.50	0.00

Transverse Positioning
Number of loaded lanes = all combinations

Live Load Positions = Variable Spacing
Minimum Spacing Between Positions = 1.00 ft

Generate Braking/Longitudinal Force = Selected
Generate Centrifugal Force = Selected
Total number of Considered Truck Positions = 80
Total number of Possible Combination = 57222

Loadcase ID: (L+In)10   Name:
Multiplier = 1.000

Bearing loads:

Line #	Bearing #	Dir.	Load, kips
1	1	Y	0.00
1	2	Y	-17.59
1	3	Y	-59.29
1	4	Y	-60.61
1	5	Y	-38.49
2	1	Y	0.00
2	2	Y	-13.76
2	3	Y	-58.05
2	4	Y	-60.21
2	5	Y	-43.96

Auto generation details

Generated Live Load

Longitudinal Reaction: User Input Reaction

	Max Vert. Reaction kips
Truck:	89.25
Lane:	130.36

Reaction distribution among lines

	Bearing Line 1	Bearing Line 2
Truck Case A:	0.50	0.50
Lane Case A:	0.50	0.50
Truck Case B:	1.00	0.00
Lane Case B:	0.50	0.00

Transverse Positioning
Number of loaded lanes = all combinations

Live Load Positions = Variable Spacing
Minimum Spacing Between Positions = 1.00 ft

Generate Braking/Longitudinal Force = Selected
Generate Centrifugal Force = Selected
Total number of Considered Truck Positions = 80
Total number of Possible Combination = 57222

Loadcase ID: (L+In)11 Name:
Multiplier = 1.000

Bearing loads:

Line #	Bearing #	Dir.	Load, kips
1	1	Y	0.00
1	2	Y	-22.77
1	3	Y	-82.73
1	4	Y	-83.86
1	5	Y	-51.60
2	1	Y	0.00
2	2	Y	0.00
2	3	Y	0.00
2	4	Y	0.00
2	5	Y	0.00

Auto generation details

Generated Live Load

Longitudinal Reaction: User Input Reaction

	Max Vert. Reaction kips
Truck:	89.25
Lane:	130.36

Reaction distribution among lines

	Bearing Line 1	Bearing Line 2
Truck Case A:	0.50	0.50
Lane Case A:	0.50	0.50
Truck Case B:	1.00	0.00
Lane Case B:	0.50	0.00

Transverse Positioning
Number of loaded lanes = all combinations

Live Load Positions = Variable Spacing
Minimum Spacing Between Positions = 1.00 ft

Generate Braking/Longitudinal Force = Selected
Generate Centrifugal Force = Selected
Total number of Considered Truck Positions = 80
Total number of Possible Combination = 57222

Loadcase ID: (L+In)12 Name:
Multiplier = 1.000

Bearing loads:

Line #	Bearing #	Dir.	Load, kips
1	1	Y	0.00
1	2	Y	0.00
1	3	Y	0.00
1	4	Y	0.00
1	5	Y	0.00
2	1	Y	0.00
2	2	Y	0.00
2	3	Y	-23.34
2	4	Y	-88.75
2	5	Y	-66.40

Auto generation details

Generated Live Load

Longitudinal Reaction: User Input Reaction

	Max Vert. Reaction kips
Truck:	89.25
Lane:	130.36

Reaction distribution among lines

	Bearing Line 1	Bearing Line 2
Truck Case A:	0.50	0.50
Lane Case A:	0.50	0.50
Truck Case B:	1.00	0.00
Lane Case B:	0.50	0.00

Transverse Positioning
Number of loaded lanes = all combinations

Live Load Positions = Variable Spacing
Minimum Spacing Between Positions = 1.00 ft

Generate Braking/Longitudinal Force = Selected
Generate Centrifugal Force = Selected
Total number of Considered Truck Positions = 80
Total number of Possible Combination = 57222

Loadcase ID: (L+In)13 Name:
Multiplier = 1.000

Bearing loads:

Line #	Bearing #	Dir.	Load, kips
1	1	Y	-50.04
1	2	Y	-15.14
1	3	Y	0.00
1	4	Y	0.00
1	5	Y	0.00
2	1	Y	-43.85
2	2	Y	-21.33
2	3	Y	0.00
2	4	Y	0.00
2	5	Y	0.00

Auto generation details

Generated Live Load

Longitudinal Reaction: User Input Reaction
Max Vert. Reaction
kips

	Max Vert. Reaction kips
Truck:	89.25
Lane:	130.36

Reaction distribution among lines

	Bearing Line 1	Bearing Line 2
Truck Case A:	0.50	0.50
Lane Case A:	0.50	0.50
Truck Case B:	1.00	0.00
Lane Case B:	0.50	0.00

Transverse Positioning
Number of loaded lanes = all combinations

Live Load Positions = Variable Spacing
Minimum Spacing Between Positions = 1.00 ft

Generate Braking/Longitudinal Force = Selected
Generate Centrifugal Force = Selected
Total number of Considered Truck Positions = 80
Total number of Possible Combination = 57222

Loadcase ID: (L+In)14 Name:
Multiplier = 1.000

Bearing loads:

Line #	Bearing #	Dir.	Load, kips
1	1	Y	0.00
1	2	Y	0.00
1	3	Y	-28.40
1	4	Y	-92.76
1	5	Y	-57.33
2	1	Y	0.00
2	2	Y	0.00
2	3	Y	0.00
2	4	Y	0.00
2	5	Y	0.00

Auto generation details

Generated Live Load

Longitudinal Reaction: User Input Reaction

	Max Vert. Reaction kips
Truck:	89.25
Lane:	130.36

Reaction distribution among lines

	Bearing Line 1	Bearing Line 2
Truck Case A:	0.50	0.50
Lane Case A:	0.50	0.50
Truck Case B:	1.00	0.00
Lane Case B:	0.50	0.00

Transverse Positioning
Number of loaded lanes = all combinations

Live Load Positions = Variable Spacing
Minimum Spacing Between Positions = 1.00 ft

Generate Braking/Longitudinal Force = Selected
Generate Centrifugal Force = Selected
Total number of Considered Truck Positions = 80
Total number of Possible Combination = 57222

Loadcase ID: (L+In)15 Name:
Multiplier = 1.000

Bearing loads:

Line #	Bearing #	Dir.	Load, kips
1	1	Y	0.00
1	2	Y	0.00
1	3	Y	0.00
1	4	Y	-31.91
1	5	Y	-57.33
2	1	Y	0.00
2	2	Y	0.00
2	3	Y	0.00
2	4	Y	0.00
2	5	Y	0.00

Auto generation details

Generated Live Load

Longitudinal Reaction: User Input Reaction

	Max Vert. Reaction kips
Truck:	89.25
Lane:	130.36

Reaction distribution among lines

	Bearing Line 1	Bearing Line 2
Truck Case A:	0.50	0.50
Lane Case A:	0.50	0.50
Truck Case B:	1.00	0.00
Lane Case B:	0.50	0.00

Transverse Positioning
Number of loaded lanes = all combinations

Live Load Positions = Variable Spacing
Minimum Spacing Between Positions = 1.00 ft

Generate Braking/Longitudinal Force = Selected
Generate Centrifugal Force = Selected
Total number of Considered Truck Positions = 80
Total number of Possible Combination = 57222

Loadcase ID: LF1 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	----	201.73	0.50	----	----

Bearing loads:

Line #	Bearing #	Dir.	Load, kips
1	1	X	-0.62
1	1	Z	1.80
1	1	Y	-0.79
1	2	X	-0.62
1	2	Z	1.80
1	3	X	-0.62
1	3	Z	1.80
1	4	X	-0.62
1	4	Z	1.80
1	5	X	-0.62
1	5	Z	1.80
1	5	Y	0.79
2	1	X	-0.62
2	1	Z	1.80
2	1	Y	-0.78
2	2	X	-0.62

2	2	Z	1.80
2	3	X	-0.62
2	3	Z	1.80
2	4	X	-0.62
2	4	Z	1.80
2	5	X	-0.62
2	5	Z	1.80
2	5	Y	0.78

Auto generation details

Manual input
Maximum truck load = 0.00 kips
Maximum lane load = 141.00 kips
Number of loaded lanes = 3

Loadcase ID: LF2 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	----	201.73	0.50	----	----

Bearing loads:

Line #	Bearing #	Dir.	Load, kips
1	1	X	-0.62
1	1	Z	1.80
1	1	Y	-0.79
1	2	X	-0.62
1	2	Z	1.80
1	3	X	-0.62
1	3	Z	1.80
1	4	X	-0.62
1	4	Z	1.80
1	5	X	-0.62
1	5	Z	1.80
1	5	Y	0.79
2	1	X	-0.62
2	1	Z	1.80
2	1	Y	-0.78
2	2	X	-0.62
2	2	Z	1.80
2	3	X	-0.62
2	3	Z	1.80
2	4	X	-0.62
2	4	Z	1.80
2	5	X	-0.62
2	5	Z	1.80
2	5	Y	0.78

Auto generation details

Manual input
Maximum truck load = 0.00 kips
Maximum lane load = 141.00 kips
Number of loaded lanes = 3

Loadcase ID: LF3 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	----	149.43	0.50	----	----

Bearing loads:

Line #	Bearing #	Dir.	Load, kips

1	1	X	-0.46
1	1	Z	1.33
1	1	Y	-0.58
1	2	X	-0.46
1	2	Z	1.33
1	3	X	-0.46
1	3	Z	1.33
1	4	X	-0.46
1	4	Z	1.33
1	5	X	-0.46
1	5	Z	1.33
1	5	Y	0.58
2	1	X	-0.46
2	1	Z	1.33
2	1	Y	-0.58
2	2	X	-0.46
2	2	Z	1.33
2	3	X	-0.46
2	3	Z	1.33
2	4	X	-0.46
2	4	Z	1.33
2	5	X	-0.46
2	5	Z	1.33
2	5	Y	0.58

Auto generation details

Manual input
Maximum truck load = 0.00 kips
Maximum lane load = 141.00 kips
Number of loaded lanes = 2

Loadcase ID: LF4 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	----	201.73	0.50	----	----

Bearing loads:

Line #	Bearing #	Dir.	Load, kips
1	1	X	-0.62
1	1	Z	1.80
1	1	Y	-0.79
1	2	X	-0.62
1	2	Z	1.80
1	3	X	-0.62
1	3	Z	1.80
1	4	X	-0.62
1	4	Z	1.80
1	5	X	-0.62
1	5	Z	1.80
1	5	Y	0.79
2	1	X	-0.62
2	1	Z	1.80
2	1	Y	-0.78
2	2	X	-0.62
2	2	Z	1.80
2	3	X	-0.62
2	3	Z	1.80
2	4	X	-0.62
2	4	Z	1.80
2	5	X	-0.62
2	5	Z	1.80
2	5	Y	0.78

Auto generation details

Manual input
Maximum truck load = 0.00 kips
Maximum lane load = 141.00 kips
Number of loaded lanes = 3

Loadcase ID: LF5 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	----	149.43	0.50	----	----

Bearing loads:

Line #	Bearing #	Dir.	Load, kips
1	1	X	-0.46
1	1	Z	1.33
1	1	Y	-0.58
1	2	X	-0.46
1	2	Z	1.33
1	3	X	-0.46
1	3	Z	1.33
1	4	X	-0.46
1	4	Z	1.33
1	5	X	-0.46
1	5	Z	1.33
1	5	Y	0.58
2	1	X	-0.46
2	1	Z	1.33
2	1	Y	-0.58
2	2	X	-0.46
2	2	Z	1.33
2	3	X	-0.46
2	3	Z	1.33
2	4	X	-0.46
2	4	Z	1.33
2	5	X	-0.46
2	5	Z	1.33
2	5	Y	0.58

Auto generation details

Manual input
Maximum truck load = 0.00 kips
Maximum lane load = 141.00 kips
Number of loaded lanes = 2

Loadcase ID: LF6 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	----	149.43	0.50	----	----

Bearing loads:

Line #	Bearing #	Dir.	Load, kips
1	1	X	-0.46
1	1	Z	1.33
1	1	Y	-0.58
1	2	X	-0.46
1	2	Z	1.33
1	3	X	-0.46
1	3	Z	1.33
1	4	X	-0.46
1	4	Z	1.33

1	5	X	-0.46
1	5	Z	1.33
1	5	Y	0.58
2	1	X	-0.46
2	1	Z	1.33
2	1	Y	-0.58
2	2	X	-0.46
2	2	Z	1.33
2	3	X	-0.46
2	3	Z	1.33
2	4	X	-0.46
2	4	Z	1.33
2	5	X	-0.46
2	5	Z	1.33
2	5	Y	0.58

Auto generation details

Manual input
Maximum truck load = 0.00 kips
Maximum lane load = 141.00 kips
Number of loaded lanes = 2

Loadcase ID: LF7 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	----	149.43	0.50	----	----

Bearing loads:

Line #	Bearing #	Dir.	Load, kips
1	1	X	-0.46
1	1	Z	1.33
1	1	Y	-0.58
1	2	X	-0.46
1	2	Z	1.33
1	3	X	-0.46
1	3	Z	1.33
1	4	X	-0.46
1	4	Z	1.33
1	5	X	-0.46
1	5	Z	1.33
1	5	Y	0.58
2	1	X	-0.46
2	1	Z	1.33
2	1	Y	-0.58
2	2	X	-0.46
2	2	Z	1.33
2	3	X	-0.46
2	3	Z	1.33
2	4	X	-0.46
2	4	Z	1.33
2	5	X	-0.46
2	5	Z	1.33
2	5	Y	0.58

Auto generation details

Manual input
Maximum truck load = 0.00 kips
Maximum lane load = 141.00 kips
Number of loaded lanes = 2

Loadcase ID: LF8 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	----	74.71	0.50	----	----

Bearing loads:

Line #	Bearing #	Dir.	Load, kips
1	1	X	-0.23
1	1	Z	0.67
1	1	Y	-0.29
1	2	X	-0.23
1	2	Z	0.67
1	3	X	-0.23
1	3	Z	0.67
1	4	X	-0.23
1	4	Z	0.67
1	5	X	-0.23
1	5	Z	0.67
1	5	Y	0.29
2	1	X	-0.23
2	1	Z	0.67
2	1	Y	-0.29
2	2	X	-0.23
2	2	Z	0.67
2	3	X	-0.23
2	3	Z	0.67
2	4	X	-0.23
2	4	Z	0.67
2	5	X	-0.23
2	5	Z	0.67
2	5	Y	0.29

Auto generation details

Manual input
Maximum truck load = 0.00 kips
Maximum lane load = 141.00 kips
Number of loaded lanes = 1

Loadcase ID: LF9 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	----	201.73	0.50	----	----

Bearing loads:

Line #	Bearing #	Dir.	Load, kips
1	1	X	-0.62
1	1	Z	1.80
1	1	Y	-0.79
1	2	X	-0.62
1	2	Z	1.80
1	3	X	-0.62
1	3	Z	1.80
1	4	X	-0.62
1	4	Z	1.80
1	5	X	-0.62
1	5	Z	1.80
1	5	Y	0.79
2	1	X	-0.62
2	1	Z	1.80
2	1	Y	-0.78
2	2	X	-0.62
2	2	Z	1.80
2	3	X	-0.62
2	3	Z	1.80

2	4	X	-0.62
2	4	Z	1.80
2	5	X	-0.62
2	5	Z	1.80
2	5	Y	0.78

Auto generation details

Manual input
Maximum truck load = 0.00 kips
Maximum lane load = 141.00 kips
Number of loaded lanes = 3

Loadcase ID: LF10 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	----	201.73	0.50	----	----

Bearing loads:

Line #	Bearing #	Dir.	Load, kips
1	1	X	-0.62
1	1	Z	1.80
1	1	Y	-0.79
1	2	X	-0.62
1	2	Z	1.80
1	3	X	-0.62
1	3	Z	1.80
1	4	X	-0.62
1	4	Z	1.80
1	5	X	-0.62
1	5	Z	1.80
1	5	Y	0.79
2	1	X	-0.62
2	1	Z	1.80
2	1	Y	-0.78
2	2	X	-0.62
2	2	Z	1.80
2	3	X	-0.62
2	3	Z	1.80
2	4	X	-0.62
2	4	Z	1.80
2	5	X	-0.62
2	5	Z	1.80
2	5	Y	0.78

Auto generation details

Manual input
Maximum truck load = 0.00 kips
Maximum lane load = 141.00 kips
Number of loaded lanes = 3

Loadcase ID: LF11 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	----	201.73	0.50	----	----

Bearing loads:

Line #	Bearing #	Dir.	Load, kips
1	1	X	-0.62
1	1	Z	1.80

1	1	Y	-0.79
1	2	X	-0.62
1	2	Z	1.80
1	3	X	-0.62
1	3	Z	1.80
1	4	X	-0.62
1	4	Z	1.80
1	5	X	-0.62
1	5	Z	1.80
1	5	Y	0.79
2	1	X	-0.62
2	1	Z	1.80
2	1	Y	-0.78
2	2	X	-0.62
2	2	Z	1.80
2	3	X	-0.62
2	3	Z	1.80
2	4	X	-0.62
2	4	Z	1.80
2	5	X	-0.62
2	5	Z	1.80
2	5	Y	0.78

Auto generation details

Manual input
Maximum truck load = 0.00 kips
Maximum lane load = 141.00 kips
Number of loaded lanes = 3

Loadcase ID: LF12 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	----	149.43	0.50	----	----

Bearing loads:

Line #	Bearing #	Dir.	Load, kips
1	1	X	-0.46
1	1	Z	1.33
1	1	Y	-0.58
1	2	X	-0.46
1	2	Z	1.33
1	3	X	-0.46
1	3	Z	1.33
1	4	X	-0.46
1	4	Z	1.33
1	5	X	-0.46
1	5	Z	1.33
1	5	Y	0.58
2	1	X	-0.46
2	1	Z	1.33
2	1	Y	-0.58
2	2	X	-0.46
2	2	Z	1.33
2	3	X	-0.46
2	3	Z	1.33
2	4	X	-0.46
2	4	Z	1.33
2	5	X	-0.46
2	5	Z	1.33
2	5	Y	0.58

Auto generation details

Manual input
Maximum truck load = 0.00 kips

Maximum lane load = 141.00 kips
Number of loaded lanes = 2

Loadcase ID: LF13 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	----	74.71	0.50	----	----

Bearing loads:

Line #	Bearing #	Dir.	Load, kips
1	1	X	-0.23
1	1	Z	0.67
1	1	Y	-0.29
1	2	X	-0.23
1	2	Z	0.67
1	3	X	-0.23
1	3	Z	0.67
1	4	X	-0.23
1	4	Z	0.67
1	5	X	-0.23
1	5	Z	0.67
1	5	Y	0.29
2	1	X	-0.23
2	1	Z	0.67
2	1	Y	-0.29
2	2	X	-0.23
2	2	Z	0.67
2	3	X	-0.23
2	3	Z	0.67
2	4	X	-0.23
2	4	Z	0.67
2	5	X	-0.23
2	5	Z	0.67
2	5	Y	0.29

Auto generation details

Manual input
Maximum truck load = 0.00 kips
Maximum lane load = 141.00 kips
Number of loaded lanes = 1

Loadcase ID: LF14 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	----	149.43	0.50	----	----

Bearing loads:

Line #	Bearing #	Dir.	Load, kips
1	1	X	-0.46
1	1	Z	1.33
1	1	Y	-0.58
1	2	X	-0.46
1	2	Z	1.33
1	3	X	-0.46
1	3	Z	1.33
1	4	X	-0.46
1	4	Z	1.33
1	5	X	-0.46
1	5	Z	1.33
1	5	Y	0.58

2	1	X	-0.46
2	1	Z	1.33
2	1	Y	-0.58
2	2	X	-0.46
2	2	Z	1.33
2	3	X	-0.46
2	3	Z	1.33
2	4	X	-0.46
2	4	Z	1.33
2	5	X	-0.46
2	5	Z	1.33
2	5	Y	0.58

Auto generation details

Manual input
Maximum truck load = 0.00 kips
Maximum lane load = 141.00 kips
Number of loaded lanes = 2

Loadcase ID: LF15 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	----	74.71	0.50	----	----

Bearing loads:

Line #	Bearing #	Dir.	Load, kips
1	1	X	-0.23
1	1	Z	0.67
1	1	Y	-0.29
1	2	X	-0.23
1	2	Z	0.67
1	3	X	-0.23
1	3	Z	0.67
1	4	X	-0.23
1	4	Z	0.67
1	5	X	-0.23
1	5	Z	0.67
1	5	Y	0.29
2	1	X	-0.23
2	1	Z	0.67
2	1	Y	-0.29
2	2	X	-0.23
2	2	Z	0.67
2	3	X	-0.23
2	3	Z	0.67
2	4	X	-0.23
2	4	Z	0.67
2	5	X	-0.23
2	5	Z	0.67
2	5	Y	0.29

Auto generation details

Manual input
Maximum truck load = 0.00 kips
Maximum lane load = 141.00 kips
Number of loaded lanes = 1

Loadcase ID: CF1 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	----	50.23	0.50	----	----

Bearing loads:

Line #	Bearing #	Dir.	Load, kips
1	1	X	1.30
1	1	Z	0.45
1	1	Y	1.66
1	2	X	1.30
1	2	Z	0.45
1	3	X	1.30
1	3	Z	0.45
1	4	X	1.30
1	4	Z	0.45
1	5	X	1.30
1	5	Z	0.45
1	5	Y	-1.66
2	1	X	1.30
2	1	Z	0.45
2	1	Y	1.65
2	2	X	1.30
2	2	Z	0.45
2	3	X	1.30
2	3	Z	0.45
2	4	X	1.30
2	4	Z	0.45
2	5	X	1.30
2	5	Z	0.45
2	5	Y	-1.65

Auto generation details

Manual input
Maximum truck load = 89.25 kips
Maximum lane load = 0.00 kips
Number of loaded lanes = 3
Radius of curve = 5729.57 ft
Design speed = 70.00 mph

Loadcase ID: CF2 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	----	50.23	0.50	----	----

Bearing loads:

Line #	Bearing #	Dir.	Load, kips
1	1	X	1.30
1	1	Z	0.45
1	1	Y	1.66
1	2	X	1.30
1	2	Z	0.45
1	3	X	1.30
1	3	Z	0.45
1	4	X	1.30
1	4	Z	0.45
1	5	X	1.30
1	5	Z	0.45
1	5	Y	-1.66
2	1	X	1.30
2	1	Z	0.45
2	1	Y	1.65
2	2	X	1.30
2	2	Z	0.45
2	3	X	1.30
2	3	Z	0.45
2	4	X	1.30

2	4	Z	0.45
2	5	X	1.30
2	5	Z	0.45
2	5	Y	-1.65

Auto generation details

Manual input
Maximum truck load = 89.25 kips
Maximum lane load = 0.00 kips
Number of loaded lanes = 3
Radius of curve = 5729.57 ft
Design speed = 70.00 mph

Loadcase ID: CF3 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	----	37.21	0.50	----	----

Bearing loads:

Line #	Bearing #	Dir.	Load, kips
1	1	X	0.96
1	1	Z	0.33
1	1	Y	1.23
1	2	X	0.96
1	2	Z	0.33
1	3	X	0.96
1	3	Z	0.33
1	4	X	0.96
1	4	Z	0.33
1	5	X	0.96
1	5	Z	0.33
1	5	Y	-1.23
2	1	X	0.96
2	1	Z	0.33
2	1	Y	1.22
2	2	X	0.96
2	2	Z	0.33
2	3	X	0.96
2	3	Z	0.33
2	4	X	0.96
2	4	Z	0.33
2	5	X	0.96
2	5	Z	0.33
2	5	Y	-1.22

Auto generation details

Manual input
Maximum truck load = 89.25 kips
Maximum lane load = 0.00 kips
Number of loaded lanes = 2
Radius of curve = 5729.57 ft
Design speed = 70.00 mph

Loadcase ID: CF4 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	----	50.23	0.50	----	----

Bearing loads:

Line # Bearing # Dir. Load, kips

1	1	X	1.30
1	1	Z	0.45
1	1	Y	1.66
1	2	X	1.30
1	2	Z	0.45
1	3	X	1.30
1	3	Z	0.45
1	4	X	1.30
1	4	Z	0.45
1	5	X	1.30
1	5	Z	0.45
1	5	Y	-1.66
2	1	X	1.30
2	1	Z	0.45
2	1	Y	1.65
2	2	X	1.30
2	2	Z	0.45
2	3	X	1.30
2	3	Z	0.45
2	4	X	1.30
2	4	Z	0.45
2	5	X	1.30
2	5	Z	0.45
2	5	Y	-1.65

Auto generation details

Manual input
Maximum truck load = 89.25 kips
Maximum lane load = 0.00 kips
Number of loaded lanes = 3
Radius of curve = 5729.57 ft
Design speed = 70.00 mph

Loadcase ID: CF5 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	----	37.21	0.50	----	----

Bearing loads:

Line #	Bearing #	Dir.	Load, kips
1	1	X	0.96
1	1	Z	0.33
1	1	Y	1.23
1	2	X	0.96
1	2	Z	0.33
1	3	X	0.96
1	3	Z	0.33
1	4	X	0.96
1	4	Z	0.33
1	5	X	0.96
1	5	Z	0.33
1	5	Y	-1.23
2	1	X	0.96
2	1	Z	0.33
2	1	Y	1.22
2	2	X	0.96
2	2	Z	0.33
2	3	X	0.96
2	3	Z	0.33
2	4	X	0.96
2	4	Z	0.33
2	5	X	0.96
2	5	Z	0.33
2	5	Y	-1.22

Auto generation details

Manual input
Maximum truck load = 89.25 kips
Maximum lane load = 0.00 kips
Number of loaded lanes = 2
Radius of curve = 5729.57 ft
Design speed = 70.00 mph

Loadcase ID: CF6 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	----	37.21	0.50	----	----

Bearing loads:

Line #	Bearing #	Dir.	Load, kips
1	1	X	0.96
1	1	Z	0.33
1	1	Y	1.23
1	2	X	0.96
1	2	Z	0.33
1	3	X	0.96
1	3	Z	0.33
1	4	X	0.96
1	4	Z	0.33
1	5	X	0.96
1	5	Z	0.33
1	5	Y	-1.23
2	1	X	0.96
2	1	Z	0.33
2	1	Y	1.22
2	2	X	0.96
2	2	Z	0.33
2	3	X	0.96
2	3	Z	0.33
2	4	X	0.96
2	4	Z	0.33
2	5	X	0.96
2	5	Z	0.33
2	5	Y	-1.22

Auto generation details

Manual input
Maximum truck load = 89.25 kips
Maximum lane load = 0.00 kips
Number of loaded lanes = 2
Radius of curve = 5729.57 ft
Design speed = 70.00 mph

Loadcase ID: CF7 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	----	37.21	0.50	----	----

Bearing loads:

Line #	Bearing #	Dir.	Load, kips
1	1	X	0.96
1	1	Z	0.33
1	1	Y	1.23

1	2	X	0.96
1	2	Z	0.33
1	3	X	0.96
1	3	Z	0.33
1	4	X	0.96
1	4	Z	0.33
1	5	X	0.96
1	5	Z	0.33
1	5	Y	-1.23
2	1	X	0.96
2	1	Z	0.33
2	1	Y	1.22
2	2	X	0.96
2	2	Z	0.33
2	3	X	0.96
2	3	Z	0.33
2	4	X	0.96
2	4	Z	0.33
2	5	X	0.96
2	5	Z	0.33
2	5	Y	-1.22

Auto generation details

Manual input
Maximum truck load = 89.25 kips
Maximum lane load = 0.00 kips
Number of loaded lanes = 2
Radius of curve = 5729.57 ft
Design speed = 70.00 mph

Loadcase ID: CF8 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	----	18.60	0.50	----	----

Bearing loads:

Line #	Bearing #	Dir.	Load, kips
1	1	X	0.48
1	1	Z	0.17
1	1	Y	0.61
1	2	X	0.48
1	2	Z	0.17
1	3	X	0.48
1	3	Z	0.17
1	4	X	0.48
1	4	Z	0.17
1	5	X	0.48
1	5	Z	0.17
1	5	Y	-0.61
2	1	X	0.48
2	1	Z	0.17
2	1	Y	0.61
2	2	X	0.48
2	2	Z	0.17
2	3	X	0.48
2	3	Z	0.17
2	4	X	0.48
2	4	Z	0.17
2	5	X	0.48
2	5	Z	0.17
2	5	Y	-0.61

Auto generation details

Manual input

Maximum truck load = 89.25 kips
Maximum lane load = 0.00 kips
Number of loaded lanes = 1
Radius of curve = 5729.57 ft
Design speed = 70.00 mph

Loadcase ID: CF9 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	----	50.23	0.50	----	----

Bearing loads:

Line #	Bearing #	Dir.	Load, kips
1	1	X	1.30
1	1	Z	0.45
1	1	Y	1.66
1	2	X	1.30
1	2	Z	0.45
1	3	X	1.30
1	3	Z	0.45
1	4	X	1.30
1	4	Z	0.45
1	5	X	1.30
1	5	Z	0.45
1	5	Y	-1.66
2	1	X	1.30
2	1	Z	0.45
2	1	Y	1.65
2	2	X	1.30
2	2	Z	0.45
2	3	X	1.30
2	3	Z	0.45
2	4	X	1.30
2	4	Z	0.45
2	5	X	1.30
2	5	Z	0.45
2	5	Y	-1.65

Auto generation details

Manual input
Maximum truck load = 89.25 kips
Maximum lane load = 0.00 kips
Number of loaded lanes = 3
Radius of curve = 5729.57 ft
Design speed = 70.00 mph

Loadcase ID: CF10 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	----	50.23	0.50	----	----

Bearing loads:

Line #	Bearing #	Dir.	Load, kips
1	1	X	1.30
1	1	Z	0.45
1	1	Y	1.66
1	2	X	1.30
1	2	Z	0.45
1	3	X	1.30
1	3	Z	0.45

1	4	X	1.30
1	4	Z	0.45
1	5	X	1.30
1	5	Z	0.45
1	5	Y	-1.66
2	1	X	1.30
2	1	Z	0.45
2	1	Y	1.65
2	2	X	1.30
2	2	Z	0.45
2	3	X	1.30
2	3	Z	0.45
2	4	X	1.30
2	4	Z	0.45
2	5	X	1.30
2	5	Z	0.45
2	5	Y	-1.65

Auto generation details

Manual input
Maximum truck load = 89.25 kips
Maximum lane load = 0.00 kips
Number of loaded lanes = 3
Radius of curve = 5729.57 ft
Design speed = 70.00 mph

Loadcase ID: CF11 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	----	50.23	0.50	----	----

Bearing loads:

Line #	Bearing #	Dir.	Load, kips
1	1	X	1.30
1	1	Z	0.45
1	1	Y	1.66
1	2	X	1.30
1	2	Z	0.45
1	3	X	1.30
1	3	Z	0.45
1	4	X	1.30
1	4	Z	0.45
1	5	X	1.30
1	5	Z	0.45
1	5	Y	-1.66
2	1	X	1.30
2	1	Z	0.45
2	1	Y	1.65
2	2	X	1.30
2	2	Z	0.45
2	3	X	1.30
2	3	Z	0.45
2	4	X	1.30
2	4	Z	0.45
2	5	X	1.30
2	5	Z	0.45
2	5	Y	-1.65

Auto generation details

Manual input
Maximum truck load = 89.25 kips
Maximum lane load = 0.00 kips
Number of loaded lanes = 3
Radius of curve = 5729.57 ft

Design speed = 70.00 mph

Loadcase ID: CF12 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	----	37.21	0.50	----	----

Bearing loads:

Line #	Bearing #	Dir.	Load, kips
1	1	X	0.96
1	1	Z	0.33
1	1	Y	1.23
1	2	X	0.96
1	2	Z	0.33
1	3	X	0.96
1	3	Z	0.33
1	4	X	0.96
1	4	Z	0.33
1	5	X	0.96
1	5	Z	0.33
1	5	Y	-1.23
2	1	X	0.96
2	1	Z	0.33
2	1	Y	1.22
2	2	X	0.96
2	2	Z	0.33
2	3	X	0.96
2	3	Z	0.33
2	4	X	0.96
2	4	Z	0.33
2	5	X	0.96
2	5	Z	0.33
2	5	Y	-1.22

Auto generation details

Manual input
Maximum truck load = 89.25 kips
Maximum lane load = 0.00 kips
Number of loaded lanes = 2
Radius of curve = 5729.57 ft
Design speed = 70.00 mph

Loadcase ID: CF13 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	----	18.60	0.50	----	----

Bearing loads:

Line #	Bearing #	Dir.	Load, kips
1	1	X	0.48
1	1	Z	0.17
1	1	Y	0.61
1	2	X	0.48
1	2	Z	0.17
1	3	X	0.48
1	3	Z	0.17
1	4	X	0.48
1	4	Z	0.17
1	5	X	0.48
1	5	Z	0.17

1	5	Y	-0.61
2	1	X	0.48
2	1	Z	0.17
2	1	Y	0.61
2	2	X	0.48
2	2	Z	0.17
2	3	X	0.48
2	3	Z	0.17
2	4	X	0.48
2	4	Z	0.17
2	5	X	0.48
2	5	Z	0.17
2	5	Y	-0.61

Auto generation details

Manual input
Maximum truck load = 89.25 kips
Maximum lane load = 0.00 kips
Number of loaded lanes = 1
Radius of curve = 5729.57 ft
Design speed = 70.00 mph

Loadcase ID: CF14 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	----	37.21	0.50	----	----

Bearing loads:

Line #	Bearing #	Dir.	Load, kips
1	1	X	0.96
1	1	Z	0.33
1	1	Y	1.23
1	2	X	0.96
1	2	Z	0.33
1	3	X	0.96
1	3	Z	0.33
1	4	X	0.96
1	4	Z	0.33
1	5	X	0.96
1	5	Z	0.33
1	5	Y	-1.23
2	1	X	0.96
2	1	Z	0.33
2	1	Y	1.22
2	2	X	0.96
2	2	Z	0.33
2	3	X	0.96
2	3	Z	0.33
2	4	X	0.96
2	4	Z	0.33
2	5	X	0.96
2	5	Z	0.33
2	5	Y	-1.22

Auto generation details

Manual input
Maximum truck load = 89.25 kips
Maximum lane load = 0.00 kips
Number of loaded lanes = 2
Radius of curve = 5729.57 ft
Design speed = 70.00 mph

Loadcase ID: CF15 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	----	18.60	0.50	----	----

Bearing loads:

Line #	Bearing #	Dir.	Load, kips
1	1	X	0.48
1	1	Z	0.17
1	1	Y	0.61
1	2	X	0.48
1	2	Z	0.17
1	3	X	0.48
1	3	Z	0.17
1	4	X	0.48
1	4	Z	0.17
1	5	X	0.48
1	5	Z	0.17
1	5	Y	-0.61
2	1	X	0.48
2	1	Z	0.17
2	1	Y	0.61
2	2	X	0.48
2	2	Z	0.17
2	3	X	0.48
2	3	Z	0.17
2	4	X	0.48
2	4	Z	0.17
2	5	X	0.48
2	5	Z	0.17
2	5	Y	-0.61

Auto generation details

Manual input
Maximum truck load = 89.25 kips
Maximum lane load = 0.00 kips
Number of loaded lanes = 1
Radius of curve = 5729.57 ft
Design speed = 70.00 mph

Selected load groups:

- SERVICE GROUP I
- SERVICE GROUP III
- LOAD FACTOR GROUP I
- LOAD FACTOR GROUP III
- SERVICE GROUP IA
- LOAD FACTOR GROUP IA

ANALYSIS RESULTS - PIER 2
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Global Coordinate System, Units: kip kft

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

Combination No. 3
Group Id: SER GP I Name: SERVICE GROUP I

Memb	Node	Fx kip	Fy kip	Fz kip	Mx kft	My kft	Mz kft
1	1	-9.64	2566.01	-3.32	-234.24	0.72	5439.83
1	2	9.64	-2014.67	3.32	39.87	-0.72	-4875.34
2	3	0.00	0.00	0.00	0.00	0.00	0.00
2	4	0.00	6.18	0.00	0.00	0.00	-6.50
3	4	0.96	-141.01	0.33	-163.83	0.00	4.57
3	5	-0.96	144.52	-0.33	163.83	-0.35	-156.76
4	5	1.93	-278.70	0.66	0.52	0.35	154.83
4	6	-1.93	324.10	-0.66	-0.52	-7.00	-3170.03
5	6	2.89	-473.41	1.00	-180.97	7.00	3168.10
5	7	-2.89	479.22	-1.00	180.97	-8.00	-3647.27
6	7	3.86	-627.88	1.33	1.06	8.00	3645.34
6	8	-3.86	642.15	-1.33	-1.06	-11.08	-5118.58
7	8	3.86	-642.15	1.33	1.06	11.08	5118.58
7	9	-3.86	691.81	-1.33	-1.06	-21.36	-10283.66
8	9	4.82	-862.38	1.66	-206.38	21.36	10281.73
8	2	-4.82	864.02	-1.66	206.38	-21.79	-10502.71
9	2	-4.82	1150.65	-1.66	-209.04	22.51	15378.04
9	10	4.82	-1146.23	1.66	209.04	-21.36	-14585.62
10	10	-3.86	971.14	-1.33	5.24	21.36	14583.69
10	11	3.86	-924.26	1.33	-5.24	-11.66	-7656.02
11	11	-3.86	924.26	-1.33	5.24	11.66	7656.02
11	12	3.86	-907.11	1.33	-5.24	-7.92	-5079.29
12	12	-2.89	679.43	-1.00	-271.85	7.92	5077.36
12	13	2.89	-674.40	1.00	271.85	-7.04	-4477.61
13	13	-1.93	445.12	-0.66	8.53	7.04	4475.69
13	14	1.93	-399.96	0.66	-8.53	-0.27	-172.50
14	14	-0.96	199.86	-0.33	-234.93	0.27	170.57
14	15	0.96	-197.22	0.33	234.93	0.00	-6.58
15	15	0.00	5.19	0.00	0.00	0.00	4.65
15	16	0.00	0.00	0.00	0.00	0.00	0.00

Combination No. 18
Group Id: SER GP III Name: SERVICE GROUP III

Memb	Node	Fx kip	Fy kip	Fz kip	Mx kft	My kft	Mz kft
1	1	-42.29	2535.26	-23.83	-1558.16	4.63	7794.68
1	2	36.81	-1983.92	21.94	225.33	-4.63	-5499.50
2	3	0.00	0.00	0.00	0.00	0.00	0.00
2	4	0.00	6.18	-0.03	0.00	-0.03	-6.50
3	4	3.50	-131.37	2.16	-148.47	0.03	-0.49
3	5	-3.50	134.88	-2.17	148.47	-2.34	-141.42
4	5	6.99	-259.41	4.31	7.72	2.34	134.43
4	6	-6.99	304.81	-4.43	-7.72	-46.04	-2956.66
5	6	10.49	-451.05	6.56	-166.42	46.04	2949.67
5	7	-10.49	456.86	-6.58	166.42	-52.64	-3406.34
6	7	13.99	-602.44	8.71	15.46	52.64	3399.35
6	8	-13.99	616.71	-8.74	-15.46	-72.88	-4813.56
7	8	13.99	-616.71	8.74	15.46	72.88	4813.56
7	9	-13.99	666.37	-8.83	-15.46	-140.92	-9781.65
8	9	17.48	-833.87	10.97	-184.62	140.92	9774.66
8	2	-17.48	835.51	-10.97	184.62	-143.73	-9988.34
9	2	-17.48	1148.42	-10.97	-223.31	148.36	15487.84
9	10	17.48	-1143.99	10.96	223.31	-140.79	-14696.96
10	10	-13.99	971.97	-8.83	-9.18	140.79	14689.96
10	11	13.99	-925.10	8.74	9.18	-76.59	-7756.17
11	11	-13.99	925.10	-8.74	-9.18	76.59	7756.17

11	12	13.99	-907.94	8.70	9.18	-52.05	-5177.08
12	12	-10.49	683.35	-6.57	-278.92	52.05	5170.08
12	13	10.49	-678.32	6.56	278.92	-46.23	-4566.87
13	13	-6.99	452.11	-4.43	1.32	46.23	4559.87
13	14	6.99	-406.95	4.30	-1.32	-1.80	-185.52
14	14	-3.50	203.36	-2.17	-242.81	1.80	178.52
14	15	3.50	-200.72	2.16	242.81	-0.02	-11.64
15	15	0.00	5.19	-0.02	0.00	0.02	4.65
15	16	0.00	0.00	0.00	0.00	0.00	0.00

Combination No. 25
Group Id: SER GP III Name: SERVICE GROUP III

Memb	Node	Fx kip	Fy kip	Fz kip	Mx kft	My kft	Mz kft
1	1	-44.06	2646.79	-29.66	-1976.37	5.89	7150.62
1	2	38.58	-2095.45	27.77	302.31	-5.89	-4751.94
2	3	0.00	0.00	0.00	0.00	0.00	0.00
2	4	0.00	6.18	-0.03	0.00	-0.03	-6.50
3	4	3.67	-131.15	2.74	-147.03	0.03	-0.85
3	5	-3.67	134.66	-2.76	147.03	-2.96	-140.83
4	5	7.35	-258.96	5.47	10.05	2.96	133.48
4	6	-7.35	304.36	-5.60	-10.05	-58.32	-2951.23
5	6	11.02	-467.42	8.31	-183.44	58.32	2943.88
5	7	-11.02	473.23	-8.32	183.44	-66.69	-3417.02
6	7	14.69	-640.32	11.04	25.84	66.69	3409.68
6	8	-14.69	654.59	-11.07	-25.84	-92.33	-4911.77
7	8	14.69	-654.59	11.07	25.84	92.33	4911.77
7	9	-14.69	704.25	-11.16	-25.84	-178.43	-10173.17
8	9	18.37	-921.43	13.88	-233.69	178.43	10165.82
8	2	-18.37	923.07	-13.88	233.69	-181.98	-10401.91
9	2	-18.37	1172.39	-13.88	-284.04	187.87	15153.85
9	10	18.37	-1167.96	13.88	284.04	-178.30	-14346.43
10	10	-14.69	949.91	-11.16	-12.58	178.30	14339.08
10	11	14.69	-903.03	11.07	12.58	-97.05	-7566.58
11	11	-14.69	903.03	-11.07	-12.58	97.05	7566.58
11	12	14.69	-885.88	11.03	12.58	-65.95	-5049.58
12	12	-11.02	666.05	-8.32	-275.34	65.95	5042.24
12	13	11.02	-661.02	8.31	275.34	-58.58	-4454.34
13	13	-7.35	441.36	-5.59	-1.92	58.58	4446.99
13	14	7.35	-396.21	5.47	1.92	-2.29	-182.09
14	14	-3.67	198.35	-2.75	-237.87	2.29	174.75
14	15	3.67	-195.71	2.74	237.87	-0.02	-12.00
15	15	0.00	5.19	-0.02	0.00	0.02	4.65
15	16	0.00	0.00	0.00	0.00	0.00	0.00

Combination No. 35
Group Id: SER GP III Name: SERVICE GROUP III

Memb	Node	Fx kip	Fy kip	Fz kip	Mx kft	My kft	Mz kft
1	1	32.19	2596.76	-9.47	-823.66	2.60	-6167.62
1	2	-26.71	-2045.42	11.36	206.59	-2.60	4463.88
2	3	0.00	0.00	0.00	0.00	0.00	0.00
2	4	0.00	6.18	0.03	0.00	0.03	-6.50
3	4	-2.49	-206.99	1.17	-242.59	-0.03	11.47
3	5	2.49	210.50	-1.16	242.59	-1.21	-233.99
4	5	-4.97	-420.07	2.35	15.48	1.21	238.97
4	6	4.97	465.48	-2.23	-15.48	-24.15	-4668.51
5	6	-7.46	-697.91	3.43	-265.69	24.15	4673.48
5	7	7.46	703.72	-3.42	265.69	-27.59	-5378.50
6	7	-9.95	-931.40	4.61	14.47	27.59	5383.48
6	8	9.95	945.67	-4.58	-14.47	-38.26	-7560.88
7	8	-9.95	-945.67	4.58	14.47	38.26	7560.88
7	9	9.95	995.33	-4.49	-14.47	-73.38	-15076.45
8	9	-12.43	-1171.82	5.68	-198.45	73.38	15081.42
8	2	12.43	1173.46	-5.68	198.45	-74.83	-15381.62
9	2	12.43	871.96	-5.68	-218.40	77.43	10917.74
9	10	-12.43	-867.54	5.69	218.40	-73.50	-10317.61

10	10	9.95	697.02	-4.49	-7.97	73.50	10322.58
10	11	-9.95	-650.14	4.58	7.97	-40.33	-5398.72
11	11	9.95	650.14	-4.58	-7.97	40.33	5398.72
11	12	-9.95	-632.99	4.62	7.97	-27.39	-3593.35
12	12	7.46	480.60	-3.42	-191.49	27.39	3598.33
12	13	-7.46	-475.57	3.43	191.49	-24.35	-3174.74
13	13	4.97	323.84	-2.24	-3.98	24.35	3179.71
13	14	-4.97	-278.68	2.36	3.98	-0.95	-111.67
14	14	2.49	142.93	-1.16	-167.21	0.95	116.64
14	15	-2.49	-140.29	1.17	167.21	0.02	0.33
15	15	0.00	5.19	0.02	0.00	-0.02	4.65
15	16	0.00	0.00	0.00	0.00	0.00	0.00

Combination No. 38
Group Id: SER GP III Name: SERVICE GROUP III

Memb	Node	Fx kip	Fy kip	Fz kip	Mx kft	My kft	Mz kft
1	1	34.72	2437.44	-1.15	-226.21	0.79	592.20
1	2	-29.23	-1886.10	3.04	96.62	-0.79	-2443.80
2	3	0.00	0.00	0.00	0.00	0.00	0.00
2	4	0.00	6.18	0.03	0.00	0.03	-6.50
3	4	-2.74	-152.13	0.34	-177.34	-0.03	11.98
3	5	2.74	155.64	-0.32	177.34	-0.33	-176.02
4	5	-5.48	-300.96	0.69	0.67	0.33	181.50
4	6	5.48	346.36	-0.57	-0.67	-6.60	-3419.38
5	6	-8.22	-498.74	0.93	-184.51	6.60	3424.86
5	7	8.22	504.56	-0.92	184.51	-7.53	-3929.52
6	7	-10.96	-656.29	1.28	1.33	7.53	3935.00
6	8	10.96	670.56	-1.25	-1.33	-10.47	-5474.14
7	8	-10.96	-670.56	1.25	1.33	10.47	5474.14
7	9	10.96	720.22	-1.16	-1.33	-19.80	-10859.22
8	9	-13.70	-872.60	1.52	-183.85	19.80	10864.70
8	2	13.70	874.24	-1.52	183.85	-20.19	-11088.30
9	2	13.70	1011.86	-1.52	-187.15	20.98	13532.10
9	10	-13.70	-1007.43	1.53	187.15	-19.93	-12835.44
10	10	10.96	855.65	-1.16	-1.25	19.93	12840.92
10	11	-10.96	-808.77	1.25	1.25	-11.10	-6757.46
11	11	10.96	808.77	-1.25	-1.25	11.10	6757.46
11	12	-10.96	-791.62	1.29	1.25	-7.53	-4505.71
12	12	8.22	601.18	-0.92	-232.85	7.53	4511.19
12	13	-8.22	-596.15	0.93	232.85	-6.71	-3980.77
13	13	5.48	400.28	-0.57	6.83	6.71	3986.25
13	14	-5.48	-355.13	0.70	-6.83	-0.26	-139.70
14	14	2.74	178.08	-0.33	-208.43	0.26	145.18
14	15	-2.74	-175.44	0.34	208.43	0.02	0.83
15	15	0.00	5.19	0.02	0.00	-0.02	4.65
15	16	0.00	0.00	0.00	0.00	0.00	0.00

Combination No. 39
Group Id: SER GP III Name: SERVICE GROUP III

Memb	Node	Fx kip	Fy kip	Fz kip	Mx kft	My kft	Mz kft
1	1	30.42	2708.29	-15.30	-1241.87	3.86	-5269.85
1	2	-24.94	-2156.95	17.19	283.57	-3.86	3669.62
2	3	0.00	0.00	0.00	0.00	0.00	0.00
2	4	0.00	6.18	0.03	0.00	0.03	-6.50
3	4	-2.31	-201.25	1.75	-234.42	-0.03	11.12
3	5	2.31	204.76	-1.74	234.42	-1.83	-227.52
4	5	-4.62	-407.65	3.52	16.66	1.83	232.14
4	6	4.62	453.06	-3.40	-16.66	-36.43	-4537.39
5	6	-6.93	-679.63	5.18	-256.20	36.43	4542.01
5	7	6.93	685.45	-5.16	256.20	-41.63	-5228.64
6	7	-9.24	-909.52	6.94	20.72	41.63	5233.26
6	8	9.24	923.79	-6.91	-20.72	-57.70	-7359.90
7	8	-9.24	-923.79	6.91	20.72	57.70	7359.90
7	9	9.24	973.45	-6.82	-20.72	-110.88	-14706.00
8	9	-11.55	-1197.84	8.60	-249.48	110.88	14710.62

8	2	11.55	1199.49	-8.59	249.48	-113.08	-15017.48
9	2	11.55	957.47	-8.60	-281.09	116.94	11347.86
9	10	-11.55	-953.04	8.60	281.09	-111.01	-10688.73
10	10	9.24	731.68	-6.82	-7.47	111.01	10693.35
10	11	-9.24	-684.80	6.91	7.47	-60.79	-5516.11
11	11	9.24	684.80	-6.91	-7.47	60.79	5516.11
11	12	-9.24	-667.65	6.95	7.47	-41.29	-3613.20
12	12	6.93	496.04	-5.17	-213.27	41.29	3617.82
12	13	-6.93	-491.01	5.18	213.27	-36.70	-3180.56
13	13	4.62	324.29	-3.40	-6.31	36.70	3185.18
13	14	-4.62	-279.13	3.53	6.31	-1.43	-112.56
14	14	2.31	143.15	-1.75	-168.65	1.43	117.18
14	15	-2.31	-140.51	1.76	168.65	0.02	-0.03
15	15	0.00	5.19	0.02	0.00	-0.02	4.65
15	16	0.00	0.00	0.00	0.00	0.00	0.00

Combination No. 46
Group Id: SER GP III Name: SERVICE GROUP III

Memb	Node	Fx kip	Fy kip	Fz kip	Mx kft	My kft	Mz kft
1	1	-56.45	2646.79	6.34	606.63	-1.92	5196.49
1	2	50.97	-2095.45	-8.23	-173.13	1.92	-2072.11
2	3	0.00	0.00	0.00	0.00	0.00	0.00
2	4	0.00	6.18	-0.03	0.00	-0.03	-6.50
3	4	4.91	-135.89	-0.86	-160.01	0.03	-3.33
3	5	-4.91	139.40	0.84	160.01	0.88	-143.40
4	5	9.83	-271.58	-1.73	-0.51	-0.88	133.57
4	6	-9.83	316.99	1.60	0.51	17.54	-3077.61
5	6	14.74	-519.60	-2.49	-249.46	-17.54	3067.78
5	7	-14.74	525.42	2.47	249.46	20.04	-3593.43
6	7	19.65	-729.42	-3.36	-2.34	-20.04	3583.60
6	8	-19.65	743.69	3.33	2.34	27.79	-5292.41
7	8	19.65	-743.69	-3.33	-2.34	-27.79	5292.41
7	9	-19.65	793.35	3.23	2.34	53.20	-11243.84
8	9	24.56	-1004.10	-4.12	-261.22	-53.20	11234.02
8	2	-24.56	1005.74	4.11	261.22	54.25	-11491.28
9	2	-24.56	1089.72	4.11	-239.58	-56.17	13563.39
9	10	24.56	-1085.29	-4.12	239.58	53.33	-12813.01
10	10	-19.65	874.19	3.24	16.20	-53.33	12803.19
10	11	19.65	-827.31	-3.33	-16.20	29.32	-6584.20
11	11	-19.65	827.31	3.33	16.20	-29.32	6584.20
11	12	19.65	-810.16	-3.36	-16.20	19.91	-4280.28
12	12	-14.74	592.94	2.48	-250.57	-19.91	4270.45
12	13	14.74	-587.91	-2.49	250.57	17.71	-3747.34
13	13	-9.83	373.83	1.61	8.84	-17.71	3737.51
13	14	9.83	-328.67	-1.73	-8.84	0.69	-160.39
14	14	-4.91	166.08	0.85	-191.29	-0.69	150.56
14	15	4.91	-163.44	-0.86	191.29	-0.02	-14.47
15	15	0.00	5.19	-0.02	0.00	0.02	4.65
15	16	0.00	0.00	0.00	0.00	0.00	0.00

Combination No. 48
Group Id: SER GP III Name: SERVICE GROUP III

Memb	Node	Fx kip	Fy kip	Fz kip	Mx kft	My kft	Mz kft
1	1	-51.47	2535.26	2.83	355.17	-1.16	8453.50
1	2	45.99	-1983.92	-4.72	-126.85	1.16	-5620.77
2	3	0.00	0.00	0.00	0.00	0.00	0.00
2	4	0.00	6.18	-0.03	0.00	-0.03	-6.50
3	4	4.41	-130.21	-0.51	-152.38	0.03	-2.33
3	5	-4.41	133.72	0.49	152.38	0.51	-138.34
4	5	8.83	-257.08	-1.03	-2.95	-0.51	129.51
4	6	-8.83	302.48	0.90	2.95	10.16	-2928.44
5	6	13.24	-448.72	-1.44	-182.42	-10.16	2919.61
5	7	-13.24	454.53	1.42	182.42	11.59	-3373.94
6	7	17.66	-600.11	-1.96	-5.88	-11.59	3365.11
6	8	-17.66	614.38	1.93	5.88	16.10	-4773.92

7	8	17.66	-614.38	-1.93	-5.88	-16.10	4773.92
7	9	-17.66	664.04	1.83	5.88	30.65	-9723.96
8	9	22.07	-831.54	-2.36	-211.29	-30.65	9715.13
8	2	-22.07	833.18	2.36	211.29	31.26	-9928.22
9	2	-22.07	1150.75	2.36	-196.66	-32.41	15548.98
9	10	22.07	-1146.32	-2.37	196.66	30.78	-14756.49
10	10	-17.66	974.30	1.84	12.14	-30.78	14747.66
10	11	17.66	-927.43	-1.93	-12.14	17.02	-7796.83
11	11	-17.66	927.43	1.93	12.14	-17.02	7796.83
11	12	17.66	-910.27	-1.96	-12.14	11.55	-5211.18
12	12	-13.24	685.68	1.43	-262.93	-11.55	5202.35
12	13	13.24	-680.65	-1.44	262.93	10.28	-4597.07
13	13	-8.83	454.44	0.91	11.97	-10.28	4588.24
13	14	8.83	-409.28	-1.03	-11.97	0.40	-190.16
14	14	-4.41	204.52	0.50	-238.90	-0.40	181.33
14	15	4.41	-201.88	-0.51	238.90	-0.02	-13.48
15	15	0.00	5.19	-0.02	0.00	0.02	4.65
15	16	0.00	0.00	0.00	0.00	0.00	0.00

Combination No. 55
Group Id: SER GP III Name: SERVICE GROUP III

Memb	Node	Fx kip	Fy kip	Fz kip	Mx kft	My kft	Mz kft
1	1	-56.45	2646.79	6.34	606.63	-1.92	8040.02
1	2	50.97	-2095.45	-8.23	-173.13	1.92	-4915.65
2	3	0.00	0.00	0.00	0.00	0.00	0.00
2	4	0.00	6.18	-0.03	0.00	-0.03	-6.50
3	4	4.91	-129.58	-0.86	-152.31	0.03	-3.33
3	5	-4.91	133.09	0.84	152.31	0.88	-136.68
4	5	9.83	-255.81	-1.73	-4.36	-0.88	126.85
4	6	-9.83	301.22	1.60	4.36	17.54	-2913.12
5	6	14.74	-464.27	-2.49	-205.05	-17.54	2903.30
5	7	-14.74	470.08	2.47	205.05	20.04	-3373.28
6	7	19.65	-637.17	-3.36	-2.97	-20.04	3363.45
6	8	-19.65	651.44	3.33	2.97	27.79	-4858.24
7	8	19.65	-651.44	-3.33	-2.97	-27.79	4858.24
7	9	-19.65	701.10	3.23	2.97	53.20	-10095.28
8	9	24.56	-918.28	-4.12	-269.70	-53.20	10085.46
8	2	-24.56	919.92	4.11	269.70	54.25	-10320.75
9	2	-24.56	1175.53	4.11	-248.06	-56.17	15236.39
9	10	24.56	-1171.11	-4.12	248.06	53.33	-14426.80
10	10	-19.65	953.05	3.24	16.20	-53.33	14416.97
10	11	19.65	-906.18	-3.33	-16.20	29.32	-7621.48
11	11	-19.65	906.18	3.33	16.20	-29.32	7621.48
11	12	19.65	-889.02	-3.36	-16.20	19.91	-5095.63
12	12	-14.74	669.20	2.48	-253.75	-19.91	5085.80
12	13	14.74	-664.17	-2.49	253.75	17.71	-4495.12
13	13	-9.83	444.51	1.61	12.46	-17.71	4485.29
13	14	9.83	-399.35	-1.73	-12.46	0.69	-188.35
14	14	-4.91	199.93	0.85	-232.59	-0.69	178.53
14	15	4.91	-197.29	-0.86	232.59	-0.02	-14.47
15	15	0.00	5.19	-0.02	0.00	0.02	4.65
15	16	0.00	0.00	0.00	0.00	0.00	0.00

Combination No. 65
Group Id: SER GP III Name: SERVICE GROUP III

Memb	Node	Fx kip	Fy kip	Fz kip	Mx kft	My kft	Mz kft
1	1	23.01	2596.76	17.19	1089.68	-3.19	-5508.81
1	2	-17.53	-2045.42	-15.30	-145.59	3.19	4342.62
2	3	0.00	0.00	0.00	0.00	0.00	0.00
2	4	0.00	6.18	0.03	0.00	0.03	-6.50
3	4	-1.57	-205.83	-1.50	-246.51	-0.03	9.64
3	5	1.57	209.34	1.51	246.51	1.63	-230.92
4	5	-3.14	-417.74	-2.98	4.81	-1.63	234.06
4	6	3.14	463.15	3.10	-4.81	32.04	-4640.29
5	6	-4.71	-695.58	-4.57	-281.69	-32.04	4643.42

5	7	4.71	701.39	4.58	281.69	36.65	-5346.10
6	7	-6.27	-929.07	-6.05	-6.86	-36.65	5349.24
6	8	6.27	943.34	6.08	6.86	50.73	-7521.24
7	8	-6.27	-943.34	-6.08	-6.86	-50.73	7521.24
7	9	6.27	993.00	6.18	6.86	98.20	-15018.76
8	9	-7.84	-1169.49	-7.65	-225.12	-98.20	15021.89
8	2	7.84	1171.13	7.65	225.12	100.16	-15321.50
9	2	7.84	874.29	7.65	-191.75	-103.35	10978.88
9	10	-7.84	-869.87	-7.64	191.75	98.07	-10377.14
10	10	6.27	699.35	6.17	13.35	-98.07	10380.28
10	11	-6.27	-652.47	-6.08	-13.35	53.28	-5439.38
11	11	6.27	652.47	6.08	13.35	-53.28	5439.38
11	12	-6.27	-635.32	-6.05	-13.35	36.21	-3627.46
12	12	4.71	482.93	4.58	-175.50	-36.21	3630.60
12	13	-4.71	-477.90	-4.57	175.50	32.16	-3204.95
13	13	3.14	326.17	3.10	6.68	-32.16	3208.08
13	14	-3.14	-281.01	-2.97	-6.68	1.26	-116.31
14	14	1.57	144.10	1.50	-163.30	-1.26	119.45
14	15	-1.57	-141.46	-1.49	163.30	0.02	-1.51
15	15	0.00	5.19	0.02	0.00	-0.02	4.65
15	16	0.00	0.00	0.00	0.00	0.00	0.00

Combination No. 76
Group Id: LFR GP I Name: LOAD FACTOR GROUP I

Memb	Node	Fx kip	Fy kip	Fz kip	Mx kft	My kft	Mz kft
1	1	-16.92	3855.49	-5.83	-412.91	1.26	3282.20
1	2	16.92	-3138.75	5.83	71.78	-1.26	-2291.51
2	3	0.00	0.00	0.00	0.00	0.00	0.00
2	4	0.00	8.03	0.00	0.00	0.00	-8.45
3	4	1.69	-196.45	0.58	-228.71	0.00	5.07
3	5	-1.69	201.01	-0.58	228.71	-0.62	-216.91
4	5	3.38	-395.43	1.17	9.64	0.62	213.53
4	6	-3.38	454.45	-1.17	-9.64	-12.28	-4464.64
5	6	5.08	-770.96	1.75	-375.33	12.28	4461.26
5	7	-5.08	778.52	-1.75	375.33	-14.04	-5240.64
6	7	6.77	-1098.61	2.33	16.35	14.04	5237.26
6	8	-6.77	1117.16	-2.33	-16.35	-19.44	-7807.55
7	8	6.77	-1117.16	2.33	16.35	19.44	7807.55
7	9	-6.77	1181.72	-2.33	-16.35	-37.49	-16708.81
8	9	8.46	-1515.87	2.91	-390.15	37.49	16705.42
8	2	-8.46	1518.01	-2.91	390.15	-38.24	-17093.76
9	2	-8.46	1620.74	-2.91	-396.63	39.50	19385.27
9	10	8.46	-1614.99	2.91	396.63	-37.49	-18268.94
10	10	-6.77	1279.49	-2.33	13.84	37.49	18265.56
10	11	6.77	-1218.55	2.33	-13.84	-20.45	-9135.21
11	11	-6.77	1218.55	-2.33	13.84	20.45	9135.21
11	12	6.77	-1196.25	2.33	-13.84	-13.90	-5737.58
12	12	-5.08	848.04	-1.75	-409.81	13.90	5734.19
12	13	5.08	-841.50	1.75	409.81	-12.35	-4985.73
13	13	-3.38	499.54	-1.17	8.54	12.35	4982.34
13	14	3.38	-440.83	1.17	-8.54	-0.48	-193.98
14	14	-1.69	221.05	-0.58	-258.43	0.48	190.60
14	15	1.69	-217.62	0.58	258.43	0.00	-9.43
15	15	0.00	6.75	0.00	0.00	0.00	6.04
15	16	0.00	0.00	0.00	0.00	0.00	0.00

Combination No. 93
Group Id: LFR GP III Name: LOAD FACTOR GROUP III

Memb	Node	Fx kip	Fy kip	Fz kip	Mx kft	My kft	Mz kft
1	1	-54.98	3295.84	-30.98	-2025.61	6.02	10133.09
1	2	47.85	-2579.10	28.52	292.93	-6.02	-7149.35
2	3	0.00	0.00	0.00	0.00	0.00	0.00
2	4	0.00	8.03	-0.03	0.00	-0.04	-8.45
3	4	4.55	-170.78	2.81	-193.01	0.04	-0.64
3	5	-4.55	175.35	-2.82	193.01	-3.04	-183.84

4	5	9.09	-337.23	5.60	10.04	3.04	174.75
4	6	-9.09	396.26	-5.76	-10.04	-59.85	-3843.66
5	6	13.64	-586.36	8.53	-216.34	59.85	3834.57
5	7	-13.64	593.92	-8.55	216.34	-68.44	-4428.25
6	7	18.18	-783.17	11.32	20.10	68.44	4419.15
6	8	-18.18	801.72	-11.36	-20.10	-94.75	-6257.63
7	8	18.18	-801.72	11.36	20.10	94.75	6257.63
7	9	-18.18	866.28	-11.48	-20.10	-183.20	-12716.15
8	9	22.73	-1084.02	14.26	-240.00	183.20	12707.06
8	2	-22.73	1086.16	-14.26	240.00	-186.85	-12984.84
9	2	-22.73	1492.94	-14.26	-290.31	192.87	20134.19
9	10	22.73	-1487.19	14.25	290.31	-183.03	-19106.04
10	10	-18.18	1263.57	-11.48	-11.93	183.03	19096.95
10	11	18.18	-1202.63	11.36	11.93	-99.56	-10083.02
11	11	-18.18	1202.63	-11.36	-11.93	99.56	10083.02
11	12	18.18	-1180.33	11.31	11.93	-67.66	-6730.20
12	12	-13.64	888.35	-8.54	-362.60	67.66	6721.11
12	13	13.64	-881.81	8.53	362.60	-60.10	-5936.93
13	13	-9.09	587.75	-5.75	1.71	60.10	5927.83
13	14	9.09	-529.04	5.59	-1.71	-2.35	-241.17
14	14	-4.55	264.36	-2.82	-315.65	2.35	232.08
14	15	4.55	-260.93	2.80	315.65	-0.03	-15.13
15	15	0.00	6.75	-0.03	0.00	0.03	6.04
15	16	0.00	0.00	0.00	0.00	0.00	0.00

Combination No. 100
Group Id: LFR GP III Name: LOAD FACTOR GROUP III

Memb	Node	Fx kip	Fy kip	Fz kip	Mx kft	My kft	Mz kft
1	1	-57.28	3440.83	-38.55	-2569.29	7.66	9295.81
1	2	50.15	-2724.09	36.10	393.01	-7.66	-6177.52
2	3	0.00	0.00	0.00	0.00	0.00	0.00
2	4	0.00	8.03	-0.03	0.00	-0.04	-8.45
3	4	4.78	-170.49	3.57	-191.14	0.04	-1.10
3	5	-4.78	175.06	-3.58	191.14	-3.85	-183.08
4	5	9.55	-336.65	7.11	13.07	3.85	173.52
4	6	-9.55	395.67	-7.27	-13.07	-75.81	-3836.59
5	6	14.33	-607.64	10.81	-238.47	75.81	3827.04
5	7	-14.33	615.20	-10.82	238.47	-86.69	-4442.13
6	7	19.10	-832.41	14.35	33.59	86.69	4432.58
6	8	-19.10	850.96	-14.39	-33.59	-120.03	-6385.29
7	8	19.10	-850.96	14.39	33.59	120.03	6385.29
7	9	-19.10	915.52	-14.51	-33.59	-231.95	-13225.11
8	9	23.88	-1197.85	18.05	-303.80	231.95	13215.56
8	2	-23.88	1199.99	-18.05	303.80	-236.57	-13522.49
9	2	-23.88	1524.10	-18.05	-369.25	244.24	19700.00
9	10	23.88	-1518.35	18.04	369.25	-231.79	-18650.36
10	10	-19.10	1234.88	-14.51	-16.36	231.79	18640.81
10	11	19.10	-1173.94	14.39	16.36	-126.16	-9836.56
11	11	-19.10	1173.94	-14.39	-16.36	126.16	9836.56
11	12	19.10	-1151.64	14.35	16.36	-85.73	-6564.46
12	12	-14.33	865.87	-10.81	-357.94	85.73	6554.91
12	13	14.33	-859.33	10.80	357.94	-76.16	-5790.64
13	13	-9.55	573.77	-7.27	-2.50	76.16	5781.09
13	14	9.55	-515.07	7.10	2.50	-2.97	-236.72
14	14	-4.78	257.86	-3.57	-309.23	2.97	227.17
14	15	4.78	-254.43	3.56	309.23	-0.03	-15.59
15	15	0.00	6.75	-0.03	0.00	0.03	6.04
15	16	0.00	0.00	0.00	0.00	0.00	0.00

Combination No. 110
Group Id: LFR GP III Name: LOAD FACTOR GROUP III

Memb	Node	Fx kip	Fy kip	Fz kip	Mx kft	My kft	Mz kft
1	1	41.85	3375.79	-12.32	-1070.76	3.38	-8017.91
1	2	-34.72	-2659.05	14.77	268.57	-3.38	5803.05
2	3	0.00	0.00	0.00	0.00	0.00	0.00

2	4	0.00	8.03	0.03	0.00	0.04	-8.45
3	4	-3.23	-269.08	1.52	-315.37	-0.04	14.92
3	5	3.23	273.65	-1.50	315.37	-1.58	-304.19
4	5	-6.47	-546.10	3.06	20.13	1.58	310.66
4	6	6.47	605.12	-2.90	-20.13	-31.39	-6069.06
5	6	-9.70	-907.28	4.46	-345.40	31.39	6075.53
5	7	9.70	914.84	-4.44	345.40	-35.87	-6992.05
6	7	-12.93	-1210.82	6.00	18.82	35.87	6998.52
6	8	12.93	1229.37	-5.96	-18.82	-49.73	-9829.15
7	8	-12.93	-1229.37	5.96	18.82	49.73	9829.15
7	9	12.93	1293.93	-5.83	-18.82	-95.39	-19599.38
8	9	-16.16	-1523.37	7.39	-257.98	95.39	19605.85
8	2	16.16	1525.50	-7.39	257.98	-97.28	-19996.11
9	2	16.16	1133.55	-7.39	-283.92	100.66	14193.06
9	10	-16.16	-1127.80	7.40	283.92	-95.56	-13412.89
10	10	12.93	906.12	-5.84	-10.36	95.56	13419.36
10	11	-12.93	-845.18	5.96	10.36	-52.43	-7018.33
11	11	12.93	845.18	-5.96	-10.36	52.43	7018.33
11	12	-12.93	-822.88	6.00	10.36	-35.60	-4671.36
12	12	9.70	624.79	-4.45	-248.93	35.60	4677.83
12	13	-9.70	-618.24	4.46	248.93	-31.66	-4127.16
13	13	6.47	420.99	-2.91	-5.18	31.66	4133.63
13	14	-6.47	-362.29	3.07	5.18	-1.23	-145.17
14	14	3.23	185.81	-1.51	-217.37	1.23	151.64
14	15	-3.23	-182.37	1.53	217.37	0.03	0.42
15	15	0.00	6.75	0.03	0.00	-0.03	6.04
15	16	0.00	0.00	0.00	0.00	0.00	0.00

Combination No. 113
Group Id: LFR GP III Name: LOAD FACTOR GROUP III

Memb	Node	Fx kip	Fy kip	Fz kip	Mx kft	My kft	Mz kft
1	1	45.13	3168.67	-1.49	-294.08	1.03	769.86
1	2	-38.00	-2451.93	3.95	125.61	-1.03	-3176.94
2	3	0.00	0.00	0.00	0.00	0.00	0.00
2	4	0.00	8.03	0.03	0.00	0.04	-8.45
3	4	-3.56	-197.77	0.44	-230.54	-0.04	15.57
3	5	3.56	202.34	-0.42	230.54	-0.42	-228.83
4	5	-7.12	-391.24	0.90	0.87	0.42	235.95
4	6	7.12	450.27	-0.74	-0.87	-8.58	-4445.19
5	6	-10.68	-648.37	1.21	-239.86	8.58	4452.32
5	7	10.68	655.92	-1.19	239.86	-9.79	-5108.37
6	7	-14.24	-853.17	1.67	1.73	9.79	5115.50
6	8	14.24	871.73	-1.63	-1.73	-13.61	-7116.38
7	8	-14.24	-871.73	1.63	1.73	13.61	7116.38
7	9	14.24	936.28	-1.50	-1.73	-25.74	-14116.99
8	9	-17.80	-1134.38	1.98	-239.00	25.74	14124.11
8	2	17.80	1136.52	-1.97	239.00	-26.25	-14414.79
9	2	17.80	1315.41	-1.97	-243.30	27.27	17591.73
9	10	-17.80	-1309.66	1.98	243.30	-25.91	-16686.08
10	10	14.24	1112.34	-1.51	-1.62	25.91	16693.20
10	11	-14.24	-1051.41	1.63	1.62	-14.43	-8784.70
11	11	14.24	1051.41	-1.63	-1.62	14.43	8784.70
11	12	-14.24	-1029.11	1.67	1.62	-9.79	-5857.42
12	12	10.68	781.54	-1.20	-302.71	9.79	5864.54
12	13	-10.68	-774.99	1.21	302.71	-8.72	-5175.00
13	13	7.12	520.37	-0.74	8.88	8.72	5182.12
13	14	-7.12	-461.66	0.90	-8.88	-0.34	-181.61
14	14	3.56	231.51	-0.43	-270.96	0.34	188.73
14	15	-3.56	-228.08	0.44	270.96	0.03	1.08
15	15	0.00	6.75	0.03	0.00	-0.03	6.04
15	16	0.00	0.00	0.00	0.00	0.00	0.00

Combination No. 121
Group Id: LFR GP III Name: LOAD FACTOR GROUP III

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

1	1	-73.39	3440.83	8.24	788.62	-2.49	6755.43
1	2	66.26	-2724.09	-10.69	-225.07	2.49	-2693.75
2	3	0.00	0.00	0.00	0.00	0.00	0.00
2	4	0.00	8.03	-0.03	0.00	-0.04	-8.45
3	4	6.39	-176.65	-1.11	-208.01	0.04	-4.32
3	5	-6.39	181.21	1.10	208.01	1.14	-186.42
4	5	12.77	-353.06	-2.25	-0.66	-1.14	173.64
4	6	-12.77	412.08	2.08	0.66	22.80	-4000.89
5	6	19.16	-675.48	-3.23	-324.30	-22.80	3988.12
5	7	-19.16	683.04	3.22	324.30	26.05	-4671.45
6	7	25.55	-948.25	-4.36	-3.04	-26.05	4658.68
6	8	-25.55	966.80	4.33	3.04	36.13	-6880.14
7	8	25.55	-966.80	-4.33	-3.04	-36.13	6880.14
7	9	-25.55	1031.36	4.20	3.04	69.16	-14617.00
8	9	31.93	-1305.32	-5.35	-339.58	-69.16	14604.22
8	2	-31.93	1307.46	5.35	339.58	70.53	-14938.66
9	2	-31.93	1416.63	5.35	-311.45	-73.02	17632.41
9	10	31.93	-1410.88	-5.36	311.45	69.33	-16656.92
10	10	-25.55	1136.44	4.21	21.06	-69.33	16644.14
10	11	25.55	-1075.51	-4.33	-21.06	38.12	-8559.46
11	11	-25.55	1075.51	4.33	21.06	-38.12	8559.46
11	12	25.55	-1053.21	-4.37	-21.06	25.88	-5564.36
12	12	-19.16	770.82	3.22	-325.74	-25.88	5551.59
12	13	19.16	-764.28	-3.24	325.74	23.02	-4871.54
13	13	-12.77	485.98	2.09	11.49	-23.02	4858.76
13	14	12.77	-427.27	-2.25	-11.49	0.89	-208.51
14	14	-6.39	215.90	1.11	-248.68	-0.89	195.73
14	15	6.39	-212.47	-1.12	248.68	-0.03	-18.82
15	15	0.00	6.75	-0.03	0.00	0.03	6.04
15	16	0.00	0.00	0.00	0.00	0.00	0.00

Combination No. 123
Group Id: LFR GP III Name: LOAD FACTOR GROUP III

Memb	Node	Fx kip	Fy kip	Fz kip	Mx kft	My kft	Mz kft
1	1	-66.92	3295.84	3.69	461.73	-1.50	10989.55
1	2	59.79	-2579.10	-6.14	-164.90	1.50	-7307.00
2	3	0.00	0.00	0.00	0.00	0.00	0.00
2	4	0.00	8.03	-0.03	0.00	-0.04	-8.45
3	4	5.74	-169.27	-0.66	-198.10	0.04	-3.03
3	5	-5.74	173.84	0.64	198.10	0.66	-179.85
4	5	11.48	-334.20	-1.33	-3.84	-0.66	168.37
4	6	-11.48	393.23	1.17	3.84	13.20	-3806.97
5	6	17.22	-583.33	-1.87	-237.15	-13.20	3795.49
5	7	-17.22	590.89	1.85	237.15	15.07	-4386.12
6	7	22.96	-780.14	-2.54	-7.64	-15.07	4374.64
6	8	-22.96	798.70	2.51	7.64	20.93	-6206.09
7	8	22.96	-798.70	-2.51	-7.64	-20.93	6206.09
7	9	-22.96	863.25	2.38	7.64	39.85	-12641.15
8	9	28.70	-1081.00	-3.07	-274.67	-39.85	12629.67
8	2	-28.70	1083.13	3.07	274.67	40.63	-12906.68
9	2	-28.70	1495.97	3.07	-255.65	-42.14	20213.68
9	10	28.70	-1490.22	-3.08	255.65	40.02	-19183.44
10	10	-22.96	1266.59	2.39	15.79	-40.02	19171.96
10	11	22.96	-1205.66	-2.51	-15.79	22.13	-10135.88
11	11	-22.96	1205.66	2.51	15.79	-22.13	10135.88
11	12	22.96	-1183.36	-2.55	-15.79	15.02	-6774.54
12	12	-17.22	891.38	1.86	-341.81	-15.02	6763.06
12	13	17.22	-884.84	-1.87	341.81	13.36	-5976.19
13	13	-11.48	590.77	1.18	15.56	-13.36	5964.72
13	14	11.48	-532.07	-1.34	-15.56	0.52	-247.20
14	14	-5.74	265.88	0.65	-310.57	-0.52	235.72
14	15	5.74	-262.45	-0.66	310.57	-0.03	-17.52
15	15	0.00	6.75	-0.03	0.00	0.03	6.04
15	16	0.00	0.00	0.00	0.00	0.00	0.00

Combination No. 140
Group Id: LFR GP III Name: LOAD FACTOR GROUP III

Memb	Node	Fx kip	Fy kip	Fz kip	Mx kft	My kft	Mz kft
1	1	29.91	3375.79	22.35	1416.58	-4.15	-7161.45
1	2	-22.79	-2659.05	-19.89	-189.27	4.15	5645.40
2	3	0.00	0.00	0.00	0.00	0.00	0.00
2	4	0.00	8.03	0.03	0.00	0.04	-8.45
3	4	-2.04	-267.57	-1.94	-320.46	-0.04	12.53
3	5	2.04	272.14	1.96	320.46	2.12	-300.19
4	5	-4.08	-543.07	-3.87	6.25	-2.12	304.27
4	6	4.08	602.09	4.03	-6.25	41.66	-6032.37
5	6	-6.12	-904.25	-5.94	-366.20	-41.66	6036.45
5	7	6.12	911.81	5.96	366.20	47.64	-6949.93
6	7	-8.16	-1207.79	-7.87	-8.92	-47.64	6954.01
6	8	8.16	1226.35	7.91	8.92	65.94	-9777.61
7	8	-8.16	-1226.35	-7.91	-8.92	-65.94	9777.61
7	9	8.16	1290.90	8.03	8.92	127.66	-19524.38
8	9	-10.20	-1520.34	-9.94	-292.66	-127.66	19528.46
8	2	10.20	1522.47	9.95	292.66	130.20	-19917.94
9	2	10.20	1136.58	9.95	-249.27	-134.35	14272.54
9	10	-10.20	-1130.83	-9.93	249.27	127.49	-13490.29
10	10	8.16	909.15	8.02	17.36	-127.49	13494.36
10	11	-8.16	-848.21	-7.91	-17.36	69.26	-7071.20
11	11	8.16	848.21	7.91	17.36	-69.26	7071.20
11	12	-8.16	-825.91	-7.86	-17.36	47.07	-4715.70
12	12	6.12	627.81	5.95	-228.15	-47.07	4719.78
12	13	-6.12	-621.27	-5.94	228.15	41.81	-4166.43
13	13	4.08	424.02	4.03	8.68	-41.81	4170.51
13	14	-4.08	-365.32	-3.86	-8.68	1.63	-151.20
14	14	2.04	187.33	1.95	-212.29	-1.63	155.28
14	15	-2.04	-183.89	-1.94	212.29	0.03	-1.96
15	15	0.00	6.75	0.03	0.00	-0.03	6.04
15	16	0.00	0.00	0.00	0.00	0.00	0.00

Combination No. 151
Group Id: SER GP IA Name: SERVICE GROUP IA

Memb	Node	Fx kip	Fy kip	Fz kip	Mx kft	My kft	Mz kft
1	1	-0.00	3107.72	0.00	3.98	0.00	1815.99
1	2	-0.00	-2556.38	0.00	-3.98	0.00	-1815.99
2	3	0.00	0.00	0.00	0.00	0.00	0.00
2	4	0.00	6.18	0.00	0.00	0.00	-6.50
3	4	0.00	-154.84	0.00	-181.37	0.00	6.50
3	5	0.00	158.36	0.00	181.37	0.00	-173.44
4	5	0.00	-312.68	0.00	6.91	0.00	173.44
4	6	0.00	358.09	0.00	-6.91	0.00	-3528.63
5	6	0.00	-620.16	0.00	-312.82	0.00	3528.63
5	7	0.00	625.97	0.00	312.82	0.00	-4155.44
6	7	0.00	-891.48	0.00	11.10	0.00	4155.44
6	8	0.00	905.75	0.00	-11.10	0.00	-6240.22
7	8	0.00	-905.75	0.00	11.10	0.00	6240.22
7	9	0.00	955.41	0.00	-11.10	0.00	-13446.61
8	9	0.00	-1233.74	-0.00	-328.47	0.00	13446.61
8	2	0.00	1235.38	0.00	328.47	0.00	-13762.66
9	2	0.00	1321.00	0.00	-324.49	0.00	15578.65
9	10	0.00	-1316.58	0.00	324.49	0.00	-14668.68
10	10	0.00	1036.88	0.00	16.74	0.00	14668.68
10	11	0.00	-990.00	0.00	-16.74	0.00	-7260.43
11	11	0.00	990.00	0.00	16.74	0.00	7260.43
11	12	0.00	-972.85	0.00	-16.74	0.00	-4498.70
12	12	0.00	681.57	0.00	-338.62	0.00	4498.70
12	13	0.00	-676.53	0.00	338.62	0.00	-3897.06
13	13	0.00	390.89	0.00	9.87	0.00	3897.06
13	14	0.00	-345.73	0.00	-9.87	0.00	-146.24
14	14	0.00	172.73	0.00	-201.18	0.00	146.24
14	15	0.00	-170.09	0.00	201.18	0.00	-4.65
15	15	0.00	5.19	0.00	0.00	0.00	4.65
15	16	0.00	0.00	0.00	0.00	0.00	0.00

Combination No. 153
Group Id: SER GP IA Name: SERVICE GROUP IA

Memb	Node	Fx kip	Fy kip	Fz kip	Mx kft	My kft	Mz kft
1	1	-0.00	2884.67	0.00	3.98	0.00	9044.89
1	2	-0.00	-2333.33	0.00	-3.98	0.00	-9044.89
2	3	0.00	0.00	0.00	0.00	0.00	0.00
2	4	0.00	6.18	0.00	0.00	0.00	-6.50
3	4	0.00	-142.23	0.00	-165.98	0.00	6.50
3	5	0.00	145.74	0.00	165.98	0.00	-159.99
4	5	0.00	-281.14	0.00	-0.80	0.00	159.99
4	6	0.00	326.55	0.00	0.80	0.00	-3199.67
5	6	0.00	-475.86	0.00	-182.95	0.00	3199.67
5	7	0.00	481.67	0.00	182.95	0.00	-3681.30
6	7	0.00	-630.33	0.00	-1.59	0.00	3681.30
6	8	0.00	644.60	0.00	1.59	0.00	-5160.21
7	8	0.00	-644.60	0.00	-1.59	0.00	5160.21
7	9	0.00	694.25	0.00	1.59	0.00	-10344.24
8	9	0.00	-886.09	-0.00	-235.63	0.00	10344.24
8	2	0.00	887.73	0.00	235.63	0.00	-10571.29
9	2	0.00	1445.60	0.00	-231.65	0.00	19616.18
9	10	0.00	-1441.17	0.00	231.65	0.00	-18620.24
10	10	0.00	1239.64	0.00	14.22	0.00	18620.24
10	11	0.00	-1192.76	0.00	-14.22	0.00	-9729.82
11	11	0.00	1192.76	0.00	14.22	0.00	9729.82
11	12	0.00	-1175.61	0.00	-14.22	0.00	-6397.52
12	12	0.00	869.57	0.00	-359.14	0.00	6397.52
12	13	0.00	-864.54	0.00	359.14	0.00	-5629.31
13	13	0.00	554.64	0.00	18.94	0.00	5629.31
13	14	0.00	-509.48	0.00	-18.94	0.00	-210.80
14	14	0.00	250.90	0.00	-296.54	0.00	210.80
14	15	0.00	-248.26	0.00	296.54	0.00	-4.65
15	15	0.00	5.19	0.00	0.00	0.00	4.65
15	16	0.00	0.00	0.00	0.00	0.00	0.00

Combination No. 155
Group Id: SER GP IA Name: SERVICE GROUP IA

Memb	Node	Fx kip	Fy kip	Fz kip	Mx kft	My kft	Mz kft
1	1	-0.00	2884.66	0.00	3.98	0.00	-8142.69
1	2	-0.00	-2333.32	0.00	-3.98	0.00	8142.69
2	3	0.00	0.00	0.00	0.00	0.00	0.00
2	4	0.00	6.18	0.00	0.00	0.00	-6.50
3	4	0.00	-252.58	0.00	-300.61	0.00	6.50
3	5	0.00	256.09	0.00	300.61	0.00	-277.62
4	5	0.00	-520.66	0.00	22.17	0.00	277.62
4	6	0.00	566.07	0.00	-22.17	0.00	-5713.45
5	6	0.00	-875.47	0.00	-355.30	0.00	5713.45
5	7	0.00	881.28	0.00	355.30	0.00	-6597.10
6	7	0.00	-1181.83	0.00	11.38	0.00	6597.10
6	8	0.00	1196.11	0.00	-11.38	0.00	-9355.51
7	8	0.00	-1196.11	0.00	11.38	0.00	9355.51
7	9	0.00	1245.76	0.00	-11.38	0.00	-18810.43
8	9	0.00	-1443.28	-0.00	-229.60	0.00	18810.43
8	2	0.00	1444.93	0.00	229.60	0.00	-19180.12
9	2	0.00	888.40	0.00	-225.62	0.00	11037.43
9	10	0.00	-883.97	0.00	225.62	0.00	-10425.96
10	10	0.00	697.74	0.00	1.59	0.00	10425.96
10	11	0.00	-650.86	0.00	-1.59	0.00	-5496.82
11	11	0.00	650.86	0.00	1.59	0.00	5496.82
11	12	0.00	-633.71	0.00	-1.59	0.00	-3689.43
12	12	0.00	484.40	0.00	-180.56	0.00	3689.43
12	13	0.00	-479.37	0.00	180.56	0.00	-3262.48
13	13	0.00	330.71	0.00	0.80	0.00	3262.48
13	14	0.00	-285.55	0.00	-0.80	0.00	-124.46
14	14	0.00	146.37	0.00	-169.01	0.00	124.46
14	15	0.00	-143.73	0.00	169.01	0.00	-4.65

15	15	0.00	5.19	0.00	0.00	0.00	4.65
15	16	0.00	0.00	0.00	0.00	0.00	0.00

Combination No. 156
Group Id: SER GP IA Name: SERVICE GROUP IA

Memb	Node	Fx kip	Fy kip	Fz kip	Mx kft	My kft	Mz kft
1	1	-0.00	2683.67	0.00	536.28	0.00	-5432.40
1	2	-0.00	-2132.33	0.00	-536.28	0.00	5432.40
2	3	0.00	0.00	0.00	0.00	0.00	0.00
2	4	0.00	6.18	0.00	0.00	0.00	-6.50
3	4	0.00	-289.41	0.00	-345.54	0.00	6.50
3	5	0.00	292.92	0.00	345.54	0.00	-316.88
4	5	0.00	-428.32	0.00	-180.36	0.00	316.88
4	6	0.00	473.73	0.00	180.36	0.00	-4828.95
5	6	0.00	-850.07	0.00	-639.49	0.00	4828.95
5	7	0.00	855.88	0.00	639.49	0.00	-5687.04
6	7	0.00	-1004.54	0.00	-458.13	0.00	5687.04
6	8	0.00	1018.81	0.00	458.13	0.00	-8034.12
7	8	0.00	-1018.81	0.00	-458.13	0.00	8034.12
7	9	0.00	1068.47	0.00	458.13	0.00	-16116.04
8	9	0.00	-1279.87	-0.00	-716.05	0.00	16116.04
8	2	0.00	1281.51	0.00	716.05	0.00	-16443.90
9	2	0.00	850.82	0.00	-179.77	0.00	11011.50
9	10	0.00	-846.39	0.00	179.77	0.00	-10425.96
10	10	0.00	697.74	0.00	1.59	0.00	10425.96
10	11	0.00	-650.86	0.00	-1.59	0.00	-5496.82
11	11	0.00	650.86	0.00	1.59	0.00	5496.82
11	12	0.00	-633.71	0.00	-1.59	0.00	-3689.43
12	12	0.00	484.40	0.00	-180.56	0.00	3689.43
12	13	0.00	-479.37	0.00	180.56	0.00	-3262.48
13	13	0.00	330.71	0.00	0.80	0.00	3262.48
13	14	0.00	-285.55	0.00	-0.80	0.00	-124.46
14	14	0.00	146.37	0.00	-169.01	0.00	124.46
14	15	0.00	-143.73	0.00	169.01	0.00	-4.65
15	15	0.00	5.19	0.00	0.00	0.00	4.65
15	16	0.00	0.00	0.00	0.00	0.00	0.00

Combination No. 164
Group Id: SER GP IA Name: SERVICE GROUP IA

Memb	Node	Fx kip	Fy kip	Fz kip	Mx kft	My kft	Mz kft
1	1	-0.00	2683.67	0.00	-528.32	0.00	6334.59
1	2	-0.00	-2132.33	0.00	528.32	0.00	-6334.59
2	3	0.00	0.00	0.00	0.00	0.00	0.00
2	4	0.00	6.18	0.00	0.00	0.00	-6.50
3	4	0.00	-142.23	0.00	-165.98	0.00	6.50
3	5	0.00	145.74	0.00	165.98	0.00	-159.99
4	5	0.00	-281.14	0.00	-0.80	0.00	159.99
4	6	0.00	326.55	0.00	0.80	0.00	-3199.67
5	6	0.00	-475.86	0.00	-182.95	0.00	3199.67
5	7	0.00	481.67	0.00	182.95	0.00	-3681.30
6	7	0.00	-630.33	0.00	-1.59	0.00	3681.30
6	8	0.00	644.60	0.00	1.59	0.00	-5160.21
7	8	0.00	-644.60	0.00	-1.59	0.00	5160.21
7	9	0.00	694.25	0.00	1.59	0.00	-10344.24
8	9	0.00	-843.56	-0.00	-183.75	0.00	10344.24
8	2	0.00	845.20	0.00	183.75	0.00	-10560.41
9	2	0.00	1287.13	0.00	-712.07	0.00	16894.99
9	10	0.00	-1282.70	0.00	712.07	0.00	-16008.40
10	10	0.00	1064.63	0.00	-446.02	0.00	16008.40
10	11	0.00	-1017.75	0.00	446.02	0.00	-8397.28
11	11	0.00	1017.75	0.00	-446.02	0.00	8397.28
11	12	0.00	-1000.60	0.00	446.02	0.00	-5557.46
12	12	0.00	851.29	0.00	-628.17	0.00	5557.46
12	13	0.00	-846.26	0.00	628.17	0.00	-4805.44
13	13	0.00	470.85	0.00	-170.18	0.00	4805.44

13	14	0.00	-425.69	0.00	170.18	0.00	-240.22
14	14	0.00	286.51	0.00	-339.98	0.00	240.22
14	15	0.00	-283.87	0.00	339.98	0.00	-4.65
15	15	0.00	5.19	0.00	0.00	0.00	4.65
15	16	0.00	0.00	0.00	0.00	0.00	0.00

Combination No. 168
Group Id: LFR GP IA Name: LOAD FACTOR GROUP IA

Memb	Node	Fx kip	Fy kip	Fz kip	Mx kft	My kft	Mz kft
1	1	-0.00	3832.91	0.00	5.17	0.00	12875.54
1	2	-0.00	-3116.17	0.00	-5.17	0.00	-12875.54
2	3	0.00	0.00	0.00	0.00	0.00	0.00
2	4	0.00	8.03	0.00	0.00	0.00	-8.45
3	4	0.00	-184.90	0.00	-215.78	0.00	8.45
3	5	0.00	189.47	0.00	215.78	0.00	-207.99
4	5	0.00	-365.49	0.00	-1.03	0.00	207.99
4	6	0.00	424.51	0.00	1.03	0.00	-4159.56
5	6	0.00	-618.61	0.00	-237.84	0.00	4159.56
5	7	0.00	626.17	0.00	237.84	0.00	-4785.69
6	7	0.00	-819.42	0.00	-2.07	0.00	4785.69
6	8	0.00	837.98	0.00	2.07	0.00	-6708.27
7	8	0.00	-837.98	0.00	-2.07	0.00	6708.27
7	9	0.00	902.53	0.00	2.07	0.00	-13447.51
8	9	0.00	-1157.44	-0.00	-313.06	0.00	13447.51
8	2	0.00	1159.58	0.00	313.06	0.00	-13744.09
9	2	0.00	1956.60	0.00	-307.89	0.00	26619.64
9	10	0.00	-1950.84	0.00	307.89	0.00	-25271.57
10	10	0.00	1681.98	0.00	20.13	0.00	25271.57
10	11	0.00	-1621.04	0.00	-20.13	0.00	-13199.06
11	11	0.00	1621.04	0.00	20.13	0.00	13199.06
11	12	0.00	-1598.74	0.00	-20.13	0.00	-8668.83
12	12	0.00	1180.52	0.00	-490.10	0.00	8668.83
12	13	0.00	-1173.98	0.00	490.10	0.00	-7625.79
13	13	0.00	750.14	0.00	26.98	0.00	7625.79
13	14	0.00	-691.44	0.00	-26.98	0.00	-285.26
14	14	0.00	339.75	0.00	-402.08	0.00	285.26
14	15	0.00	-336.32	0.00	402.08	0.00	-6.04
15	15	0.00	6.75	0.00	0.00	0.00	6.04
15	16	0.00	0.00	0.00	0.00	0.00	0.00

Combination No. 170
Group Id: LFR GP IA Name: LOAD FACTOR GROUP IA

Memb	Node	Fx kip	Fy kip	Fz kip	Mx kft	My kft	Mz kft
1	1	-0.00	3832.91	0.00	5.17	0.00	-11702.69
1	2	-0.00	-3116.17	0.00	-5.17	0.00	11702.69
2	3	0.00	0.00	0.00	0.00	0.00	0.00
2	4	0.00	8.03	0.00	0.00	0.00	-8.45
3	4	0.00	-342.70	0.00	-408.29	0.00	8.45
3	5	0.00	347.26	0.00	408.29	0.00	-376.20
4	5	0.00	-708.00	0.00	31.80	0.00	376.20
4	6	0.00	767.03	0.00	-31.80	0.00	-7754.28
5	6	0.00	-1190.06	0.00	-484.29	0.00	7754.28
5	7	0.00	1197.61	0.00	484.29	0.00	-8955.28
6	7	0.00	-1608.08	0.00	16.48	0.00	8955.28
6	8	0.00	1626.63	0.00	-16.48	0.00	-12707.55
7	8	0.00	-1626.63	0.00	16.48	0.00	12707.55
7	9	0.00	1691.19	0.00	-16.48	0.00	-25554.16
8	9	0.00	-1954.23	-0.00	-304.43	0.00	25554.16
8	2	0.00	1956.37	0.00	304.43	0.00	-26054.72
9	2	0.00	1159.80	0.00	-299.26	0.00	14352.03
9	10	0.00	-1154.05	0.00	299.26	0.00	-13553.75
10	10	0.00	907.06	0.00	2.07	0.00	13553.75
10	11	0.00	-846.12	0.00	-2.07	0.00	-7145.87
11	11	0.00	846.12	0.00	2.07	0.00	7145.87
11	12	0.00	-823.82	0.00	-2.07	0.00	-4796.26

12	12	0.00	629.72	0.00	-234.73	0.00	4796.26
12	13	0.00	-623.18	0.00	234.73	0.00	-4241.22
13	13	0.00	429.93	0.00	1.03	0.00	4241.22
13	14	0.00	-371.22	0.00	-1.03	0.00	-161.80
14	14	0.00	190.28	0.00	-219.71	0.00	161.80
14	15	0.00	-186.85	0.00	219.71	0.00	-6.04
15	15	0.00	6.75	0.00	0.00	0.00	6.04
15	16	0.00	0.00	0.00	0.00	0.00	0.00

Combination No. 171
Group Id: LFR GP IA Name: LOAD FACTOR GROUP IA

Memb	Node	Fx kip	Fy kip	Fz kip	Mx kft	My kft	Mz kft
1	1	-0.00	3545.50	0.00	766.36	0.00	-7826.97
1	2	-0.00	-2828.75	0.00	-766.36	0.00	7826.97
2	3	0.00	0.00	0.00	0.00	0.00	0.00
2	4	0.00	8.03	0.00	0.00	0.00	-8.45
3	4	0.00	-395.37	0.00	-472.55	0.00	8.45
3	5	0.00	399.93	0.00	472.55	0.00	-432.35
4	5	0.00	-575.95	0.00	-257.81	0.00	432.35
4	6	0.00	634.98	0.00	257.81	0.00	-6489.44
5	6	0.00	-1153.74	0.00	-890.69	0.00	6489.44
5	7	0.00	1161.29	0.00	890.69	0.00	-7653.90
6	7	0.00	-1354.54	0.00	-654.92	0.00	7653.90
6	8	0.00	1373.10	0.00	654.92	0.00	-10817.96
7	8	0.00	-1373.10	0.00	-654.92	0.00	10817.96
7	9	0.00	1437.65	0.00	654.92	0.00	-21701.18
8	9	0.00	-1720.56	-0.00	-1000.06	0.00	21701.18
8	2	0.00	1722.69	0.00	1000.06	0.00	-22141.92
9	2	0.00	1106.06	0.00	-233.70	0.00	14314.95
9	10	0.00	-1100.31	0.00	233.70	0.00	-13553.75
10	10	0.00	907.06	0.00	2.07	0.00	13553.75
10	11	0.00	-846.12	0.00	-2.07	0.00	-7145.87
11	11	0.00	846.12	0.00	2.07	0.00	7145.87
11	12	0.00	-823.82	0.00	-2.07	0.00	-4796.26
12	12	0.00	629.72	0.00	-234.73	0.00	4796.26
12	13	0.00	-623.18	0.00	234.73	0.00	-4241.22
13	13	0.00	429.93	0.00	1.03	0.00	4241.22
13	14	0.00	-371.22	0.00	-1.03	0.00	-161.80
14	14	0.00	190.28	0.00	-219.71	0.00	161.80
14	15	0.00	-186.85	0.00	219.71	0.00	-6.04
15	15	0.00	6.75	0.00	0.00	0.00	6.04
15	16	0.00	0.00	0.00	0.00	0.00	0.00

Combination No. 172
Group Id: LFR GP IA Name: LOAD FACTOR GROUP IA

Memb	Node	Fx kip	Fy kip	Fz kip	Mx kft	My kft	Mz kft
1	1	-0.00	3545.50	0.00	-756.01	0.00	-7826.97
1	2	-0.00	-2828.75	0.00	756.01	0.00	7826.97
2	3	0.00	0.00	0.00	0.00	0.00	0.00
2	4	0.00	8.03	0.00	0.00	0.00	-8.45
3	4	0.00	-184.90	0.00	-215.78	0.00	8.45
3	5	0.00	189.47	0.00	215.78	0.00	-207.99
4	5	0.00	-619.86	0.00	309.30	0.00	207.99
4	6	0.00	678.88	0.00	-309.30	0.00	-6704.30
5	6	0.00	-872.99	0.00	72.50	0.00	6704.30
5	7	0.00	880.54	0.00	-72.50	0.00	-7586.32
6	7	0.00	-1368.31	0.00	667.58	0.00	7586.32
6	8	0.00	1386.86	0.00	-667.58	0.00	-10782.32
7	8	0.00	-1386.86	0.00	667.58	0.00	10782.32
7	9	0.00	1451.42	0.00	-667.58	0.00	-21772.17
8	9	0.00	-1645.52	-0.00	430.77	0.00	21772.17
8	2	0.00	1647.66	0.00	-430.77	0.00	-22193.69
9	2	0.00	1181.10	0.00	-325.24	0.00	14366.72
9	10	0.00	-1175.35	0.00	325.24	0.00	-13553.75
10	10	0.00	907.06	0.00	2.07	0.00	13553.75

10	11	0.00	-846.12	0.00	-2.07	0.00	-7145.87
11	11	0.00	846.12	0.00	2.07	0.00	7145.87
11	12	0.00	-823.82	0.00	-2.07	0.00	-4796.26
12	12	0.00	629.72	0.00	-234.73	0.00	4796.26
12	13	0.00	-623.18	0.00	234.73	0.00	-4241.22
13	13	0.00	429.93	0.00	1.03	0.00	4241.22
13	14	0.00	-371.22	0.00	-1.03	0.00	-161.80
14	14	0.00	190.28	0.00	-219.71	0.00	161.80
14	15	0.00	-186.85	0.00	219.71	0.00	-6.04
15	15	0.00	6.75	0.00	0.00	0.00	6.04
15	16	0.00	0.00	0.00	0.00	0.00	0.00

Combination No. 177
Group Id: LFR GP IA Name: LOAD FACTOR GROUP IA

Memb	Node	Fx kip	Fy kip	Fz kip	Mx kft	My kft	Mz kft
1	1	-0.00	3545.50	0.00	766.36	0.00	8999.82
1	2	-0.00	-2828.75	0.00	-766.36	0.00	-8999.82
2	3	0.00	0.00	0.00	0.00	0.00	0.00
2	4	0.00	8.03	0.00	0.00	0.00	-8.45
3	4	0.00	-184.90	0.00	-215.78	0.00	8.45
3	5	0.00	189.47	0.00	215.78	0.00	-207.99
4	5	0.00	-365.49	0.00	-1.03	0.00	207.99
4	6	0.00	424.51	0.00	1.03	0.00	-4159.56
5	6	0.00	-618.61	0.00	-237.84	0.00	4159.56
5	7	0.00	626.17	0.00	237.84	0.00	-4785.69
6	7	0.00	-819.42	0.00	-2.07	0.00	4785.69
6	8	0.00	837.98	0.00	2.07	0.00	-6708.27
7	8	0.00	-837.98	0.00	-2.07	0.00	6708.27
7	9	0.00	902.53	0.00	2.07	0.00	-13447.51
8	9	0.00	-1178.22	-0.00	-338.41	0.00	13447.51
8	2	0.00	1180.35	0.00	338.41	0.00	-13749.41
9	2	0.00	1648.40	0.00	427.95	0.00	22749.23
9	10	0.00	-1642.65	0.00	-427.95	0.00	-21613.82
10	10	0.00	1449.40	0.00	663.72	0.00	21613.82
10	11	0.00	-1388.46	0.00	-663.72	0.00	-11241.47
11	11	0.00	1388.46	0.00	663.72	0.00	11241.47
11	12	0.00	-1366.16	0.00	-663.72	0.00	-7365.73
12	12	0.00	861.83	0.00	48.44	0.00	7365.73
12	13	0.00	-855.29	0.00	-48.44	0.00	-6605.04
13	13	0.00	662.04	0.00	284.21	0.00	6605.04
13	14	0.00	-603.33	0.00	-284.21	0.00	-161.80
14	14	0.00	190.28	0.00	-219.71	0.00	161.80
14	15	0.00	-186.85	0.00	219.71	0.00	-6.04
15	15	0.00	6.75	0.00	0.00	0.00	6.04
15	16	0.00	0.00	0.00	0.00	0.00	0.00

Combination No. 179
Group Id: LFR GP IA Name: LOAD FACTOR GROUP IA

Memb	Node	Fx kip	Fy kip	Fz kip	Mx kft	My kft	Mz kft
1	1	-0.00	3545.50	0.00	-756.01	0.00	8999.82
1	2	-0.00	-2828.75	0.00	756.01	0.00	-8999.82
2	3	0.00	0.00	0.00	0.00	0.00	0.00
2	4	0.00	8.03	0.00	0.00	0.00	-8.45
3	4	0.00	-184.90	0.00	-215.78	0.00	8.45
3	5	0.00	189.47	0.00	215.78	0.00	-207.99
4	5	0.00	-365.49	0.00	-1.03	0.00	207.99
4	6	0.00	424.51	0.00	1.03	0.00	-4159.56
5	6	0.00	-618.61	0.00	-237.84	0.00	4159.56
5	7	0.00	626.17	0.00	237.84	0.00	-4785.69
6	7	0.00	-819.42	0.00	-2.07	0.00	4785.69
6	8	0.00	837.98	0.00	2.07	0.00	-6708.27
7	8	0.00	-837.98	0.00	-2.07	0.00	6708.27
7	9	0.00	902.53	0.00	2.07	0.00	-13447.51
8	9	0.00	-1096.63	-0.00	-238.87	0.00	13447.51
8	2	0.00	1098.77	0.00	238.87	0.00	-13728.53

9	2	0.00	1729.99	0.00	-994.89	0.00	22728.35
9	10	0.00	-1724.24	0.00	994.89	0.00	-21536.64
10	10	0.00	1431.72	0.00	-638.01	0.00	21536.64
10	11	0.00	-1370.78	0.00	638.01	0.00	-11293.53
11	11	0.00	1370.78	0.00	-638.01	0.00	11293.53
11	12	0.00	-1348.48	0.00	638.01	0.00	-7467.54
12	12	0.00	1154.38	0.00	-874.81	0.00	7467.54
12	13	0.00	-1147.83	0.00	874.81	0.00	-6447.66
13	13	0.00	630.33	0.00	-243.46	0.00	6447.66
13	14	0.00	-571.62	0.00	243.46	0.00	-327.33
14	14	0.00	390.68	0.00	-464.21	0.00	327.33
14	15	0.00	-387.25	0.00	464.21	0.00	-6.04
15	15	0.00	6.75	0.00	0.00	0.00	6.04
15	16	0.00	0.00	0.00	0.00	0.00	0.00

Combination No. 51 C
Group Id: LFR GP III Name: LOAD FACTOR GROUP III

Memb	Node	Fx kip	Fy kip	Fz kip	Mx kft	My kft	Mz kft
1	1	-57.28	3264.46	-38.55	-3036.38	7.66	7850.18
1	2	50.15	-2547.72	36.10	860.10	-7.66	-4731.89
2	3	0.00	0.00	0.00	0.00	0.00	0.00
2	4	0.00	8.03	-0.03	0.00	-0.04	-8.45
3	4	4.78	-170.49	3.57	-191.14	0.04	-1.10
3	5	-4.78	175.06	-3.58	191.14	-3.85	-183.08
4	5	9.55	-336.65	7.11	13.07	3.85	173.52
4	6	-9.55	395.67	-7.27	-13.07	-75.81	-3836.59
5	6	14.33	-585.78	10.81	-211.80	75.81	3827.04
5	7	-14.33	593.33	-10.82	211.80	-86.69	-4420.13
6	7	19.10	-818.77	14.35	70.30	86.69	4410.58
6	8	-19.10	837.32	-14.39	-70.30	-120.03	-6331.65
7	8	19.10	-837.32	14.39	70.30	120.03	6331.65
7	9	-19.10	901.88	-14.51	-70.30	-231.95	-13065.82
8	9	23.88	-1091.98	18.05	-154.56	231.95	13056.27
8	2	-23.88	1094.11	-18.05	154.56	-236.57	-13336.09
9	2	-23.88	1453.60	-18.05	-687.11	244.24	18067.98
9	10	23.88	-1447.85	18.04	687.11	-231.79	-17066.98
10	10	-19.10	1127.14	-14.51	-288.79	231.79	17057.43
10	11	19.10	-1066.21	14.39	288.79	-126.16	-9040.73
11	11	-19.10	1066.21	-14.39	-288.79	126.16	9040.73
11	12	19.10	-1043.91	14.35	288.79	-85.73	-6071.80
12	12	-14.33	853.80	-10.81	-513.65	85.73	6062.25
12	13	14.33	-847.26	10.80	513.65	-76.16	-5308.68
13	13	-9.55	524.76	-7.27	-113.13	76.16	5299.13
13	14	9.55	-466.05	7.10	113.13	-2.97	-253.93
14	14	-4.78	278.69	-3.57	-334.65	2.97	244.38
14	15	4.78	-275.26	3.56	334.65	-0.03	-15.59
15	15	0.00	6.75	-0.03	0.00	0.03	6.04
15	16	0.00	0.00	0.00	0.00	0.00	0.00

Combination No. 156 C
Group Id: LFR GP IA Name: LOAD FACTOR GROUP IA

Memb	Node	Fx kip	Fy kip	Fz kip	Mx kft	My kft	Mz kft
1	1	-0.00	3102.52	0.00	3.88	0.00	12728.94
1	2	-0.00	-2564.96	0.00	-3.88	0.00	-12728.94
2	3	0.00	0.00	0.00	0.00	0.00	0.00
2	4	0.00	6.02	0.00	0.00	0.00	-6.34
3	4	0.00	-138.68	0.00	-161.84	0.00	6.34
3	5	0.00	142.10	0.00	161.84	0.00	-155.99
4	5	0.00	-274.11	0.00	-0.78	0.00	155.99
4	6	0.00	318.38	0.00	0.78	0.00	-3119.67
5	6	0.00	-463.96	0.00	-178.38	0.00	3119.67
5	7	0.00	469.63	0.00	178.38	0.00	-3589.27
6	7	0.00	-614.57	0.00	-1.55	0.00	3589.27

6	8	0.00	628.48	0.00	1.55	0.00	-5031.20
7	8	0.00	-628.48	0.00	-1.55	0.00	5031.20
7	9	0.00	676.90	0.00	1.55	0.00	-10085.64
8	9	0.00	-883.28	-0.00	-253.34	0.00	10085.64
8	2	0.00	884.89	0.00	253.34	0.00	-10311.96
9	2	0.00	1680.08	0.00	-249.46	0.00	23040.90
9	10	0.00	-1675.77	0.00	249.46	0.00	-21883.13
10	10	0.00	1455.21	0.00	19.61	0.00	21883.13
10	11	0.00	-1409.51	0.00	-19.61	0.00	-11412.59
11	11	0.00	1409.51	0.00	19.61	0.00	11412.59
11	12	0.00	-1392.78	0.00	-19.61	0.00	-7469.77
12	12	0.00	1023.09	0.00	-431.41	0.00	7469.77
12	13	0.00	-1018.18	0.00	431.41	0.00	-6565.48
13	13	0.00	642.66	0.00	26.72	0.00	6565.48
13	14	0.00	-598.63	0.00	-26.72	0.00	-244.81
14	14	0.00	292.18	0.00	-347.15	0.00	244.81
14	15	0.00	-289.61	0.00	347.15	0.00	-4.53
15	15	0.00	5.06	0.00	0.00	0.00	4.53
15	16	0.00	0.00	0.00	0.00	0.00	0.00

CAP DESIGN
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Code: AASHTO STANDARD (17th Edition 2002) - Ultimate Strength Design
Units: US
Pier View : Downstation.

DESIGN PARAMETERS:
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f'c = 4000.0 psi
Fy flex = 60000.0 psi Fy shear = 60000.0 psi
phi flex = 0.90 phi shear = 0.85
Ec = 3834.3 ksi Es = 29000.0 ksi
crack control factor z = 170.00 kips / in
Concrete Type : Normal Weight.
Design : face of column.

CAP GEOMETRY:
=============

Hammer Head Cap : Length(X) = 49.00 ft Depth(Z) = 54.00 in

MAIN REINFORCEMENT:
===================

	Bar size	Quantity	Bar dist. in	As total in^2	From ft	To ft	Hook
TOP							
	# 10	13	3.00	16.510	0.00	49.00	Both
	# 10	13	6.00	16.510	0.00	49.00	None
BOTTOM							
	# 10	2	3.00	2.540	0.00	20.38	None
	# 10	2	3.00	2.540	16.37	32.63	None
	# 10	2	3.00	2.540	28.62	49.00	None

STIRRUPS:
=========

From ft	To ft	Stirrup Size	n legs	Spacing in	Aprv/s in^2 / ft
0.50	2.50	# 6	4	12.00	1.76
2.50	17.50	# 6	4	6.00	3.52
17.50	31.50	# 6	4	12.00	1.76
31.50	46.50	# 6	4	6.00	3.52
46.50	48.50	# 6	4	12.00	1.76

Clear Cover on Sides = 2.00 in

FLEXURE DESIGN:
===============

Span 1: From 0.00 ft To 24.50 ft

Loc ft	AbsLoc ft	H in	Mmax Mmin kips-ft	pMn pMn kips-ft	Comb Comb	Asb-req Asb-req in^2	Asb-prv Asb-prv in^2	Asb-eff Asb-eff in^2	Ast-req Ast-req in^2	Ast-prv Ast-prv in^2	Ast-eff Ast-eff in^2
2.1	2.1	56	4.3	423.0	121	0.02	2.54	1.33	0.00	33.02	33.02
			-15.6	-5030.9	113	0.00	2.54	2.54	0.09	33.02	22.69
3.2	3.2	61	0.0	610.4	0	0.00	2.54	2.00	0.00	33.02	33.02
			-432.3	-6138.3	171	0.00	2.54	2.54	2.27	33.02	25.82
13.2	13.2	101	0.0	1196.3	0	0.00	2.54	2.54	0.00	33.02	33.02
			-7754.3	-13571.8	170	0.00	2.54	2.54	18.49	33.02	33.02
14.2	14.2	105	0.0	1242.3	0	0.00	2.54	2.54	0.00	33.02	33.02
			-8955.3	-14169.8	170	0.00	2.54	2.54	20.55	33.02	33.02

16.5	16.5	114	0.0	1348.4	0	0.00	5.08	2.54	0.00	33.02	33.02
			-12707.5	-15553.7	170	0.00	5.08	2.71	26.87	33.02	33.02

Span 2: From 24.50 ft To 49.00 ft

Loc ft	AbsLoc ft	H in	Mmax Mmin kips-ft	pMn pMn kips-ft	Comb Comb	Asb-req Asb-req in^2	Asb-prv Asb-prv in^2	Asb-eff Asb-eff in^2	Ast-req Ast-req in^2	Ast-prv Ast-prv in^2	Ast-eff Ast-eff in^2
8.0	32.5	114	0.0	1348.4	0	0.00	5.08	2.54	0.00	33.02	33.02
			-13199.1	-15553.7	168	0.00	5.08	2.71	27.95	33.02	33.02
10.8	35.3	103	0.0	1219.7	0	0.00	2.54	2.54	0.00	33.02	33.02
			-8668.8	-13876.2	168	0.00	2.54	2.54	20.29	33.02	33.02
11.7	36.2	99	0.0	1179.2	0	0.00	2.54	2.54	0.00	33.02	33.02
			-7625.8	-13349.5	168	0.00	2.54	2.54	18.48	33.02	33.02
21.9	46.4	58	0.0	509.8	0	0.00	2.54	1.65	0.00	33.02	33.02
			-327.3	-5549.5	179	0.00	2.54	2.54	1.78	33.02	24.19
22.7	47.2	55	1.1	371.8	113	0.01	2.54	1.13	0.00	33.02	29.43
			-18.8	-4349.4	121	0.00	2.54	2.26	0.11	33.02	19.97

SHEAR AND TORSION DESIGN:
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Span 1: From 0.00 ft To 24.50 ft

Loc ft	AbsLoc ft	Pos	Vu kips	Comb	Tu kips-ft	Comb	phi*Vc kips	T-lim kips-ft	Avs/s	2Ats/s	Av/s	Aprv/s	Alt in^2
									<---------	in^2/ft		-------->	
2.10	2.10	L	8.0	76	0.0	0	301.4	188.3	0.00	0.00	0.00	1.76	0.00
		R	395.4	171	472.6	171	301.4	188.3	0.43	0.61	1.03	1.76	11.07
3.17	3.17	L	399.9	171	472.6	171	326.2	209.7	0.31	0.56	0.87	3.52	12.46
		R	708.0	170	309.3	172	326.2	209.7	1.60	0.37	1.97	3.52	12.65
13.17	13.17	L	767.0	170	309.3	172	558.5	428.1	0.54	0.00	0.54	3.52	0.00
		R	1190.1	170	890.7	171	558.5	428.1	1.54	0.62	2.17	3.52	21.27
14.18	14.18	L	1197.6	170	890.7	171	581.9	451.3	1.45	0.60	2.04	3.52	22.51
		R	1608.1	170	667.6	172	581.9	451.3	2.41	0.45	2.86	3.52	23.20
16.50	16.50	L	1626.6	170	667.6	172	635.8	505.3	2.13	0.41	2.54	3.52	25.42

Span 2: From 24.50 ft To 49.00 ft

Loc ft	AbsLoc ft	Pos	Vu kips	Comb	Tu kips-ft	Comb	phi*Vc kips	T-lim kips-ft	Avs/s	2Ats/s	Av/s	Aprv/s	Alt in^2
									<---------	in^2/ft		-------->	
8.00	32.50	R	1621.0	168	663.7	177	635.8	505.3	2.12	0.41	2.52	3.52	25.42
10.81	35.31	L	1598.7	168	663.7	177	570.4	439.9	2.46	0.45	2.92	3.52	22.73
		R	1180.5	168	874.8	179	570.4	439.9	1.46	0.60	2.06	3.52	22.04
11.70	36.20	L	1174.0	168	874.8	179	549.8	419.6	1.55	0.62	2.17	3.52	20.94
		R	750.1	168	284.2	177	549.8	419.6	0.54	0.00	0.54	3.52	0.00
21.88	46.38	L	691.4	168	284.2	177	313.3	198.5	1.65	0.35	2.00	3.52	12.12
		R	390.7	179	464.2	179	313.3	198.5	0.34	0.57	0.91	3.52	11.83
22.71	47.21	L	387.2	179	464.2	179	294.1	182.1	0.43	0.61	1.04	1.76	10.75
		R	6.8	76	0.0	0	294.1	182.1	0.00	0.00	0.00	1.76	0.00

Note:

- 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.
- 2Ats/s is the required area of steel per unit length for two legs 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 steel per unit length due to shear (stirrups).
- Alt is the total longitudinal steel required due to torsion in addition to the REQUIRED

flexural steel.

CRACKING/FATIGUE CHECK:
=====================

Span 1: From 0.00 ft To 24.50 ft

Loc (ft)	AbsLoc (ft)	H (in)	Cracking: fs-t / fs-b (ksi)	Cracking: ratio fs-t / ratio fs-b	Cracking: Comb / Comb	Fatigue: fs-t / fs-b (ksi)	Fatigue: ratio fs-t / ratio fs-b
2.10	2.1	56.4	0.1	0.00	38	0.0	0.00
			0.6	0.02	46	0.0	0.00
3.17	3.2	60.7	2.9	0.08	156	0.6	0.02
			0.0	0.00	0	0.0	0.00
13.17	13.2	100.7	23.6	0.65	155	5.2	0.26
			0.0	0.00	0	0.0	0.00
14.18	14.2	104.7	26.1	0.72	155	5.8	0.30
			0.0	0.00	0	0.0	0.00
16.50	16.5	114.0	33.7	0.94	155	7.6	0.42
			0.0	0.00	0	0.0	0.00

Span 2: From 24.50 ft To 49.00 ft

Loc (ft)	AbsLoc (ft)	H (in)	Cracking: fs-t / fs-b (ksi)	Cracking: ratio fs-t / ratio fs-b	Cracking: Comb / Comb	Fatigue: fs-t / fs-b (ksi)	Fatigue: ratio fs-t / ratio fs-b
8.00	32.5	114.0	35.1	0.97	153	7.6	0.44
			0.0	0.00	0	0.0	0.00
10.81	35.3	102.7	25.8	0.72	153	5.5	0.29
			0.0	0.00	0	0.0	0.00
11.70	36.2	99.2	23.6	0.66	153	5.0	0.25
			0.0	0.00	0	0.0	0.00
21.88	46.4	58.5	2.4	0.07	164	0.4	0.02
			0.0	0.00	0	0.0	0.00
22.71	47.2	55.2	0.2	0.01	46	0.0	0.00
			0.2	0.01	38	0.0	0.00

* Cracking / fatigue checking failed.

COLUMN DESIGN
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COLUMN DESIGN - Column: 1

Column Type: Rectangular 192.00 x 54.00 in

Code: AASHTO STANDARD (17th Edition 2002) - Factored Load Design
Units: US
Pier View : Downstation.
Design/Analysis Method: P - Delta.

DESIGN PARAMETERS:
==================

f'c = 4000.0 psi fy = 60000.0 psi
phi flex = 0.90 phi axial = 0.70
Ec = 3834.3 ksi Es = 29000 ksi
Concrete Type : Normal Weight.

Reinforcement:
==============
Rebar Pattern: Rectangular
Rebar Orientation: Face Parallel

Layer	Dir	Size	No. bars	Bar Dist. in
1	X	10	33	3.13
1	Z	10	10	3.13

Main bars summary: Ties size: # 4
82 # 10 bars

Total number of bars in the column: 82

Design values used after P-Delta Analysis (e-min effect included).
==
(global coordinates)

Loc ft	Comb	Fx kips	Fy kips	Fz kips	Mx kips-ft	My kips-ft	Mz kips-ft
0.00	51C	-57.3	3369.7	-38.6	-3235.6	7.7	7953.5
58.55	51C	50.2	2547.7	36.1	860.1	7.7	-4731.9
0.00	156C	-0.0	3181.5	0.0	588.6	0.0	12728.9
58.55	156C	-0.0	2565.0	.0.0	-474.5	-0.0	-12728.9

Column Design
=============

Loc ft	Comb	Pu kips	Mux kips-ft	Muz kips-ft	pMn kips-ft	Incl deg	pPn/Pu	pMn/Mu
0.00	51C	3369.7	3235.6	7953.5	30221.7	67.86	1.00	3.52
58.55	156C	2565.0	474.5	12728.9	47194.8	87.87	1.00	3.71

ISOLATED FOOTING DESIGN

Code: AASHTO STANDARD (17th Edition 2002) - Ultimate Strength Design
Units: US
Pier View : Downstation.

Geometry:

Name : footing
Shape : Rectangular, Type : Spread

Bf(X) = 24.00 ft, Hf(Z) = 15.00 ft, Thickness(Y) = 48.00 in

Footing concentric.
Columns located on the footing:
Column No. 1 at x = 0.00 ft, Rectangular 192.00 in x 54.00 in

Ag = 360.00 ft^2, Ix = 6750.00 ft^4, Iz = 17280.00 ft^4

Surcharge = 0.00 ksf

Design Parameters:

f'c = 4000.00 psi fy = 60000.00 psi
phi flex = 0.90 phi shear = 0.85
Ec = 3834.3 ksi Es = 29000.0 ksi
Crack control factor z = 130.00 kips/in
Concrete Type : Normal Weight.

Max Soil Pressures, Service (Without the reduction of overstress allowance):

Corner	X ft	Z ft	comb	Ovs	P, kips	Mxx, kft	Mzz, kft	Soil press. ksf
1	12.00	-7.50	55	1.250	-2568.58	-606.63	-7398.93	13.55
			35	1.250	-2538.83	823.66	5386.37	3.00
2	-12.00	-7.50	155	1.500	-2768.79	-3.98	6580.19	12.87
			18	1.250	-2477.33	1558.16	-7013.43	0.88
3	-12.00	7.50	155	1.500	-2768.79	-3.98	6580.19	12.86
			48	1.250	-2477.33	-355.17	-7672.24	1.76
4	12.00	7.50	25	1.250	-2568.58	1976.37	-6509.53	14.45
			65	1.250	-2538.83	-1089.68	4727.55	3.16

Max Soil Pressures, Factored:

Corner	X ft	Z ft	comb	Ovs	P, kips	Mxx, kft	Mzz, kft	Soil press. ksf
1	12.00	-7.50	168	---	-3667.22	-5.17	-10641.16	18.36
			110	---	-3300.48	1070.76	7002.28	3.90
2	-12.00	-7.50	170	---	-3667.22	-5.17	9468.31	17.55
			93	---	-3220.53	2025.61	-9117.46	1.14
3	-12.00	7.50	170	---	-3667.22	-5.17	9468.31	17.54
			123	---	-3220.53	-461.73	-9973.92	2.29
4	12.00	7.50	100	---	-3339.15	2569.29	-8462.39	18.79
			140	---	-3300.48	-1416.58	6145.82	4.11

Max Soil Pressures, Service (After the reduction of overstress allowance):

Corner	X ft	Z ft	comb	Ovs	P, kips	Mxx, kft	Mzz, kft	Soil press. ksf
1	12.00	-7.50	55	1.250	-2568.58	-606.63	-7398.93	10.84
			35	1.250	-2538.83	823.66	5386.37	2.40
2	-12.00	-7.50	65	1.250	-2538.83	-1089.68	4727.55	9.72
			18	1.250	-2477.33	1558.16	-7013.43	0.70

3	-12.00	7.50	39	1.250	-2630.08	1241.87	4628.77	10.00
			48	1.250	-2477.33	-355.17	-7672.24	1.41
4	12.00	7.50	25	1.250	-2568.58	1976.37	-6509.53	11.56
			155	1.500	-2768.79	-3.98	6580.19	2.48

Note:
Only max. positive pressure is considered for design.

Max. Soil Pressure Used in Design: (without selfweight and surcharge)
=================================

Factored soil pressure = 18.01 ksf
Service soil pressure = 14.05 ksf
Fatigue soil pressure = 3.17 ksf

Reinforcement Schedule:
=======================:

Dir	Quantity	Size	Bar dist. in	As total in^2	Spacing in	Hook
X	17	# 10	3.63	21.59	10.80	Both
Z	43	# 10	5.14	54.61	6.68	None

Flexure:
========

Dir	Loc ft	d in	Mmax kft	Comb	Asb_req in^2	Asb_prv in^2	Asb_eff in^2	Ast_req in^2	Ast_prv in^2	Ast_eff in^2
X	-8.00	44.37	2160.8	100	14.63	21.59	21.59	0.00	0.00	0.00
X	8.00	44.37	2160.8	100	14.63	21.59	21.59	0.00	0.00	0.00
Z	-2.25	42.86	5955.8	100	31.59	54.61	54.61	0.00	0.00	0.00
Z	2.25	42.86	5955.8	100	31.59	54.61	54.61	0.00	0.00	0.00

Cracking/Fatigue
================

			<-------- Cracking	---------->			<----------- Fatigue	--------->		
Dir	Loc ft	d in	Mmax kft	Comb	fs ksi	ratio fs	Mmax kft	Comb	fs ksi	ratio fs
X	-8.00	44.37	1686.2	151	22.50	0.91	379.9	3	5.07	0.25
X	8.00	44.37	1686.2	151	22.50	0.91	379.9	3	5.07	0.25
Z	-2.25	42.86	4647.5	151	25.78	0.90	1047.0	3	5.81	0.29
Z	2.25	42.86	4647.5	151	25.78	0.90	1047.0	3	5.81	0.29

One Way Shear :
==============

Col	Dir	Dist ft	Comb	d in	Vu kips	phi*Vc kips
1	X	-11.70	100	44.37	81.8	858.6
	X	11.70	100	44.37	81.8	858.6
	Z	-5.82	100	42.86	725.1	1327.3
	Z	5.82	100	42.86	725.1	1327.3

Two Way Shear:
==============

#	Bo ft	Ao ft^2	Comb	Avg. d in	Vu kips	phi*Vc kips
Columns:						
1	55.54	159.72	100	43.61	3606.4	4883.2

Note:
TWO WAY SHEAR IN FOOTING IS NOT DESIGNED AND STIRRUPS ARE NOT CONSIDERED.

CHECK 5/29/09 DMP

```
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                                 00    00
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 0000000    00000   00000   00          00000   00      00    00   00000000   0000
 00     00  00      00   00 00         00    00 00      00    00  00  00  00  00  00
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 00          00000  00   00  00000      00000   00000   00000     00  00  00  00  00 (TM)
```

===

pcaColumn v4.10 (TM)
Computer program for the Strength Design of Reinforced Concrete Sections

===

General Information:

File Name: \\Omae-saeprd01\sae\Cincinnati\ODT-SCI-823-0917 PIER 2.col
Project: ODT-SCI-823-0917
Column: Pier 2
Code: ACI 318-02

Engineer: JSW
Units: English

Run Option: Investigation
Run Axis: Biaxial

Slenderness: Not considered
Column Type: Structural

Material Properties:

f'c = 4 ksi
Ec = 3605 ksi
Ultimate strain = 0.003 in/in
Beta1 = 0.85

fy = 60 ksi
Es = 29000 ksi

Section:

SAME AS PIER 1 ✓

Exterior Points

No.	X (in)	Y (in)	No.	X (in)	Y (in)	No.	X (in)	Y (in)
1	-87.0	27.0	2	87.0	27.0	3	91.7	26.6
4	96.2	25.4	5	100.5	23.4	6	104.4	20.7
7	107.7	17.4	8	110.4	13.5	9	112.4	9.2
10	113.6	4.7	11	114.0	0.0	12	113.6	-4.7
13	112.4	-9.2	14	110.4	-13.5	15	107.7	-17.4
16	104.4	-20.7	17	100.5	-23.4	18	96.2	-25.4
19	91.7	-26.6	20	87.0	-27.0	21	-87.0	-27.0
22	-91.7	-26.6	23	-96.2	-25.4	24	-100.5	-23.4
25	-104.4	-20.7	26	-107.7	-17.4	27	-110.4	-13.5
28	-112.4	-9.2	29	-113.6	-4.7	30	-114.0	0.0
31	-113.6	4.7	32	-112.4	9.2	33	-110.4	13.5
34	-107.7	17.4	35	-104.4	20.7	36	-100.5	23.4
37	-96.2	25.4	38	-91.7	26.6			

Gross section area, Ag = 11674.6 in^2
Ix = 2.6964e+006 in^4
Xo = -9.81049e-007 in

Iy = 4.58979e+007 in^4
Yo = -6.26587e-009 in

Reinforcement:

Bar Set: ASTM A615

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

Confinement: Tied; #3 ties with #10 bars, #4 with larger bars.
phi(a) = 0.8, phi(b) = 0.9, phi(c) = 0.65

Pattern: Irregular

Total steel area, As = 119.38 in^2 at 1.02% ✓

Area in^2	X (in)	Y (in)	Area in^2	X (in)	Y (in)	Area in^2	X (in)	Y (in)
1.27	-87.0	24.0	1.27	-81.6	24.0	1.27	-76.1	24.0
1.27	-70.7	24.0	1.27	-65.3	24.0	1.27	-59.8	24.0
1.27	-54.4	24.0	1.27	-48.9	24.0	1.27	-43.5	24.0
1.27	-38.1	24.0	1.27	-32.6	24.0	1.27	-27.2	24.0
1.27	-21.8	24.0	1.27	-16.3	24.0	1.27	-10.9	24.0

SAME AS PIER 1 w/ COMMENTS ✓

1.27	-5.4	24.0	1.27	0.0	24.0	1.27	5.4	24.0
1.27	10.9	24.0	1.27	16.3	24.0	1.27	21.8	24.0
1.27	27.2	24.0	1.27	32.6	24.0	1.27	38.1	24.0
1.27	43.5	24.0	1.27	48.9	24.0	1.27	54.4	24.0
1.27	59.8	24.0	1.27	65.3	24.0	1.27	70.7	24.0
1.27	76.1	24.0	1.27	81.6	24.0	1.27	87.0	24.0
1.27	92.0	23.5	1.27	96.8	21.9	1.27	101.1	19.4
1.27	104.8	16.1	1.27	107.8	12.0	1.27	109.8	7.4
1.27	110.9	2.5	1.27	110.9	-2.5	1.27	109.8	-7.4
1.27	107.8	-12.0	1.27	104.8	-16.1	1.27	101.1	-19.4
1.27	96.8	-21.9	1.27	92.0	-23.5	1.27	87.0	-24.0
1.27	81.6	-24.0	1.27	76.1	-24.0	1.27	70.7	-24.0
1.27	65.3	-24.0	1.27	59.8	-24.0	1.27	54.4	-24.0
1.27	48.9	-24.0	1.27	43.5	-24.0	1.27	38.1	-24.0
1.27	32.6	-24.0	1.27	27.2	-24.0	1.27	21.8	-24.0
1.27	16.3	-24.0	1.27	10.9	-24.0	1.27	5.4	-24.0
1.27	0.0	-24.0	1.27	-5.4	-24.0	1.27	-10.9	-24.0
1.27	-16.3	-24.0	1.27	-21.8	-24.0	1.27	-27.2	-24.0
1.27	-32.6	-24.0	1.27	-38.1	-24.0	1.27	-43.5	-24.0
1.27	-48.9	-24.0	1.27	-54.4	-24.0	1.27	-59.8	-24.0
1.27	-65.3	-24.0	1.27	-70.7	-24.0	1.27	-76.1	-24.0
1.27	-81.6	-24.0	1.27	-87.0	-24.0	1.27	-92.0	-23.5
1.27	-96.8	-21.9	1.27	-101.1	-19.4	1.27	-104.8	-16.1
1.27	-107.8	-12.0	1.27	-109.8	-7.4	1.27	-110.9	-2.5
1.27	-110.9	2.5	1.27	-109.8	7.4	1.27	-107.8	12.0
1.27	-104.8	16.1	1.27	-101.1	19.4	1.27	-96.8	21.9
1.27	-92.0	23.5						

Factored Loads and Moments with Corresponding Capacities:
==

No.	Pu kip	Mux k-ft	Muy k-ft	fMnx k-ft	fMny k-ft	fMn/Mu	Phi
1	3369.70	3235.60	7953.50	15859.64	38984.94	4.902	0.900
2	2565.00	474.50	12728.90	2505.07	67200.90	5.279	0.900
3	3181.50	588.60	12728.90	3246.63	70210.77	5.516	0.900
4	2547.70	860.10	4731.90	10207.64	56158.04	11.868	0.900

*** End of output ***

DMP 6/25/09
CHECK COPY

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

Project : ODT_SCI_823_Phase 1
User Job No.:
State : OH State Job No. :
Pier View : Downstation.
Code : AASHTO STANDARD (17th Edition 2002)
Comments : Pier 3 •

PIER 3 INPUT IS IDENTICAL TO PIER 1 SAVE HEIGHT ∴ COMPLETE CHECK NOT DONE

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

Pier Type: Hammer Head

Pier View : Downstation.
Length(X) = 49.00 ft Height max(Y) = 9.50 ft Height min(Y) = 4.00 ft
Bottom length(X) = 16.00 ft Depth(Z) = 4.50 ft Skew angle = 19.00 Reduction of I = 1.000

Column Shape: Rectangular Non Tapered
Bottom width(X) = 16.00 ft Top width(X) = 16.00 ft Depth(Z) = 4.50 ft Height(Y) = 49.43 ft
Column Bottom has Diagonal Spring Matrix Defined

Diagonal Spring Matrix: (Units: kip, ft, radians)

	Kx	Ky	Kz	Rx	Ry	Rz
Kx	0.00	0.00	0.00	0.00	0.00	0.00
Ky	0.00	0.00	0.00	0.00	0.00	0.00
Kz	0.00	0.00	0.00	0.00	0.00	0.00
Rx	0.00	0.00	0.00	0.00	0.00	0.00
Ry	0.00	0.00	0.00	0.00	0.00	0.00
Rz	0.00	0.00	0.00	0.00	0.00	0.00

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

Total number of spans: 4 Span number rear to current pier: ~~1~~ 3
Number of traffic lanes: 3

Beam: height : 54.00 in section area : 893.00 in^2
Beam Inertia (Ixx): 480161.00 in^4 Beam inertia (Iyy): 36314.00 in^4
Beam CG:31.10 in Barrier height : 48.00 in Depth of slab : 8.50 in
Curb to curb distance: 45.500 ft

Span #	Span length	Bridge Width
1	100.000 ft	51.250 ft
2	100.000 ft	51.250 ft
3	100.000 ft	51.250 ft
4	100.000 ft	51.250 ft
		51.250 ft

BEARING POINTS
==============

Number of bearing lines: 2
First bearing line Eccentricity = 1.22 ft

Point	Distance ft
1	3.17
2	14.18
3	25.19
4	36.20
5	47.21

Second bearing line Eccentricity = -1.22 ft

Point	Distance ft

Bearing Pad Design

Live Load Reactions

CONSPAN Output - Abutments (Reactions are symetric about mid-span of bridge)

$LL := 79.4kip$ Service Load, per 12ft Lane

$$LL_{12} := \frac{LL}{12ft} = 6.617\frac{kip}{ft}$$

Position 1, 1 Lane Loaded:

G1 Reaction: $$G1_1 := LL_{12}\cdot\left[1.7292ft + 10.2708ft\cdot\left(\frac{0.2292ft + 0.5\cdot 10.2708ft}{10.5ft}\right)\right] = 46.162\,kip$$

G2 Reaction: $$G2_1 := LL_{12}\cdot\left[10.2708ft\cdot\left[\frac{10.2708ft}{(2)\cdot 10.5ft}\right]\right] = 33.238\,kip$$

Position 2, 3 Lane Loaded:

G1 Reaction: $$G1_2 := LL_{12}\cdot\left[7.5ft\cdot\left[\frac{(0.5)\cdot 7.5ft}{10.5ft}\right]\right] = 17.723\,kip$$

G2 Reaction: $$G2_2 := LL_{12}\cdot\left[7.5ft\cdot\left(\frac{3ft + 0.5\cdot 7.5ft}{10.5ft}\right) + \frac{10.5ft}{2}\right] = 66.639\,kip$$

G3 Reaction: $$G3_2 := LL_{12}\cdot 10.5ft = 69.475\,kip$$

G4 Reaction: $$G4_2 := G2_2 = 66.639\,kip$$

G5 Reaction: $$G5_2 := G1_2 = 17.723\,kip$$

Check: $$G1_2 + G2_2 + G3_2 + G4_2 + G5_2 = 238.2\,kip$$
$$3\cdot LL = 238.2\,kip$$

Position 3, 2 Lane Loaded:

Position 3 wioll not control for any girder (by inspection)

HDR | ONE COMPANY Many Solutions[SM]	Project: SCI-823	Computed:	DMP	Date:	6/3/2009
	Subject: LL Pier Reactions	Checked:		Date:	
	Task: Live Load Distribution to Girders	Page:		of:	
	Job #:	No:			

CONSPAN Output - Pier 2, Pier 4

$LL := 130.4kip$ Service Load, per 12ft Lane

$LL_{12} := \frac{LL}{12ft} = 10.867 \frac{kip}{ft}$

Position 1, 1 Lane Loaded:

G1 Reaction: $G1_1 := LL_{12} \cdot \left[1.7292ft + 10.2708ft \cdot \left(\frac{0.2292ft + 0.5 \cdot 10.2708ft}{10.5ft}\right)\right] = 75.813\,kip$

G2 Reaction: $G2_1 := LL_{12} \cdot \left[10.2708ft \cdot \left[\frac{10.2708ft}{(2) \cdot 10.5ft}\right]\right] = 54.587\,kip$

Position 2, 3 Lane Loaded:

G1 Reaction: $G1_2 := LL_{12} \cdot \left[7.5ft \cdot \left[\frac{(0.5) \cdot 7.5ft}{10.5ft}\right]\right] = 29.107\,kip$

G2 Reaction: $G2_2 := LL_{12} \cdot \left[7.5ft \cdot \left(\frac{3ft + 0.5 \cdot 7.5ft}{10.5ft}\right) + \frac{10.5ft}{2}\right] = 109.443\,kip$

G3 Reaction: $G3_2 := LL_{12} \cdot 10.5ft = 114.1\,kip$

G4 Reaction: $G4_2 := G2_2 = 109.443\,kip$

G5 Reaction: $G5_2 := G1_2 = 29.107\,kip$

Check: $G1_2 + G2_2 + G3_2 + G4_2 + G5_2 = 391.2\,kip$

$3 \cdot LL = 391.2\,kip$

Position 3, 2 Lane Loaded:

Position 3 wioll not control for any girder (by inspection)

CONSPAN Output - Pier 3

$LL := 123.9\text{kip}$ Service Load, per 12ft Lane

$$LL_{12} := \frac{LL}{12\text{ft}} = 10.325\frac{\text{kip}}{\text{ft}}$$

Position 1, 1 Lane Loaded:

G1 Reaction: $$G1_1 := LL_{12}\cdot\left[1.7292\text{ft} + 10.2708\text{ft}\cdot\left(\frac{0.2292\text{ft} + 0.5\cdot 10.2708\text{ft}}{10.5\text{ft}}\right)\right] = 72.034\,\text{kip}$$

G2 Reaction: $$G2_1 := LL_{12}\cdot\left[10.2708\text{ft}\cdot\left[\frac{10.2708\text{ft}}{(2)\cdot 10.5\text{ft}}\right]\right] = 51.866\,\text{kip}$$

Position 2, 3 Lane Loaded:

G1 Reaction: $$G1_2 := LL_{12}\cdot\left[7.5\text{ft}\cdot\left[\frac{(0.5)\cdot 7.5\text{ft}}{10.5\text{ft}}\right]\right] = 27.656\,\text{kip}$$

G2 Reaction: $$G2_2 := LL_{12}\cdot\left[7.5\text{ft}\cdot\left(\frac{3\text{ft} + 0.5\cdot 7.5\text{ft}}{10.5\text{ft}}\right) + \frac{10.5\text{ft}}{2}\right] = 103.987\,\text{kip}$$

G3 Reaction: $$G3_2 := LL_{12}\cdot 10.5\text{ft} = 108.412\,\text{kip}$$

G4 Reaction: $$G4_2 := G2_2 = 103.987\,\text{kip}$$

G5 Reaction: $$G5_2 := G1_2 = 27.656\,\text{kip}$$

Check: $$G1_2 + G2_2 + G3_2 + G4_2 + G5_2 = 371.7\,\text{kip}$$
$$3\cdot LL = 371.7\,\text{kip}$$

Position 3, 2 Lane Loaded:

Position 3 wioll not control for any girder (by inspection)

HDR Computation - QA/QC Cover Sheet

HDR

Department 000, Bridge/Rail Section

Project	SCI 823 - Minford Road	Project No.	
Subject	Elastomeric Bearings		
Task	Enter Task	Sheet	Of

C:\PWworking\PITT\d0187425\Portsmouth - Minford Rd - Elastomeric Bearing Design_LFD Method B.xls

☐ Preliminary Calculation ☐ Final Calculation

For Calculation Sheets ______ Through ______ Of ______

Description: The purpose of this calculation is to ....

Fill in Department number, project title, subject and job number above.

Design Methodology:

☐ Allowable Stress Design ☐ Load Factor Design ☐ Load & Resistance Factor Design ☐ Not Applicable

☐ Combination of Methodologies (describe) ______

Codes/References:

AASHTO

Edition: ______

Interims Through: ______

Applicable Sections: ______

AREMA

Chapter: ______

Last Update: ______

Applicable Sections: ______

Other

Title: ______

Year/Edition: ______

Applicable Sections: ______

Original Designer:

Name: ______ Initials: DMP Date: 6/3/09

Checker: (May not be applicable for preliminary calculation.)

Name: ______ Initials: ______ Date: ______

Check Method:

For Hand Calculations: ☐ Backchecked original calculations ☐ Independent calculations

For Computer Calculations: ☐ Checked input & output ☐ Reran same software ☐ Ran different software

Does this calculation supersede a previous calculation? ☐ Yes ☐ No

If yes, provide the following information for the superseded calculation:

Sheets ______ Through ______ Of ______ First Date: ______ By: ______

Checker's Comments:

☐ No Changes ☐ Minor corrections: original design satisfactory

☐ Revise design as shown on Sheet(s) ______ Of ______

☐ Other comments/conclusions: ______

CONSPAN Output:

Abut 1 Beam 3 (Span 1)

Self Weight		**45.3**	kip
Deck + Haunch		**63.5**	kip
Diaphragm		**0.6**	kip
Non-Comp DL		**6.4**	kip
Comp. DL		**32.48**	kip
Live	(max)	**79.4**	kip (per lane)
Live	(min)	**-6.8**	kip

Semi-Itegral Pier Weight
247.2 kip total (estimate)
49.44 kip per beam

Total DL =	197.72 kip
Total LL =	69.475 kip

<-- See attachedLive Load Distribution for Girder 3

Horizontal movement

ε (shrinkage) =	0.0002	(AASHTO 8.5.4)
ε (Thermal) =	0.000006 /°F	(AASHTO 8.5.3)
Δ_T (Zone C) =	**100** °F	(AASHTO Table 14.6.5.2-2)
L =	**200** ft	
Δ =	0.16 ft	
Δ =	**1.92 in**	

End Rotation

LL Deflection at pier =	**0**	(from CONAPAN Output)
LL Deflection at 0.1L =	**0.114** ft	(from CONAPAN Output)
a =	**10** ft	(= 0.1 L)
b =	0.114 ft	
θ =	0.653144 °	
θ =	**0.0114 rad**	

NSBA ELASTOMERIC BEARING DESIGN (ENGLISH UNITS)
AASHTO LFD, HB-17 ED., 2002
METHOD B - STEEL-REINFORCED ELASTOMERIC BEARINGS - SECTION 14.6.5

The following design program was developed based upon the AASHTO LRFD code and has been adapted for LFD. The program is applicable to the design of steel-reinforced elastomeric bearings, both rectangular and circular in shape. The program is not applicable to design of rectangular bearings subject to combined rotation about the transverse and longitudinal axes. The program assumes that interior elastomeric layers are of equal thickness, as are the two exterior elastomeric layers.

I. INITIAL DESIGN INPUTS

Dead Load = P_D =	198	kips		
Live Load = P_{LL} =	69	kips		
Horizontal Movement of Bridge Superstructure = Δ_0 =	1.9	in.		
Axis of Pad Rotation:	Transverse			
Calculated Rotation =	0.011	Radians		
Rotation Construction Tolerance =	0.005	Radians		(14.4.1)
Design Rotation = θ_s =	0.016	Radians		
Bearing Shape:	Rectangular			
Bearing Subject to Shear Deformation?	yes			
Bridge Deck Fixed Against Horizontal Translation?	yes			

II. BEARING GEOMETRY

Flange Width =	26	in.		
Bearing Width = W =	22	in.		
Flange Width $\geq$ W				
26 $\geq$ 22		in.	OK	
Total Unfactored Compressive Load = P_{TL} =	267	kips		
Minimum Required Area of Bearing = A_{min} =	167.0	in.^{2}	Based on service limit (14.6.5.3.2)	
Minimum Bearing Length = L_{min} =	7.59	in.		
Bearing Length = L =	11	in.		
L $\geq$ L_{min}				
11.0 $\geq$ 7.59		in.	OK	
N/A $\geq$ N/A				
N/A $\geq$ N/A		N/A	N/A	
Bearing Area = A =	242.0	in.^{2}		

III. SHEAR DEFORMATION (AASHTO LRFD 14.6.5.3.4)

Maximum Total Shear Deformation of Elastomer at Service Limit = $\Delta_s = \Delta_0$ =	1.920	in.		
$2\Delta_s$ =	3.840	in.		
Elastomeric Layer Thickness = h_{ri} =	0.5	in.		
Thickness of top and Bottom Cover Layers (each) = h_{cover} =	0.3125	in.		
$h_{cover} \leq 0.7h_{ri}$				(14.6.5.1)
0.313 $\leq$ 0.350		in.	OK	
Number of Interior Elastomeric Layers (Excluding Exterior Layer Allowance) = n_{int} =	7			
Total Elastomer Thickness = $h_{rt} = 2h_{cover} + n_{int}h_{ri}$ =	4.125	in.		
$h_{rt} \geq 2\Delta_s$				(14.6.5.3.4-1)
4.125 $\geq$ 3.840		in.	OK	

IV. COMPRESSIVE STRESS (AASHTO LRFD 14.6.5.3.2)

Service Average Compressive Stress (Total Load) = $\sigma_{TL} = \dfrac{P_{TL}}{A}$ =	1.10	ksi		
Service Average Compressive Stress (Live Load) = $\sigma_L = \dfrac{P_L}{A}$ =	0.29	ksi		
Rectangular Shape Factor = $S_i = \dfrac{LW}{2h_{ri}(L+W)}$ =	7.33			(14.6.3)
Circular Shape Factor = $S_i = \dfrac{D}{4\,h_{ri}}$ =	N/A			(14.6.3)

Shear Modulus of Elastomer = G =	0.100	ksi		
0.080 $\leq$ G $\leq$ 0.175		ksi		(14.6.5.2)
0.080 $\leq$ 0.100 $\leq$ 0.175		ksi	OK	

For Bearings Subject to Shear Deformation (14.6.5.3.2-1):

$\sigma_{TL} \leq 1.66GS$		
1.10 $\leq$ 1.22	ksi	OK
$\sigma_{TL} \leq$ 1.6 ksi		
1.10 $\leq$ 1.6	ksi	OK
$\sigma_L \leq 0.66GS$		
0.29 $\leq$ 0.48	ksi	OK

For Bearings Fixed Against Shear Deformation (14.6.5.3.2-2):

$\sigma_{TL} \leq 2.00GS$	
N/A $\leq$ N/A	N/A
$\sigma_{TL} \leq$ 1.75 ksi	
N/A $\leq$ N/A	N/A
$\sigma_L \leq 1.00GS$	
N/A $\leq$ N/A	N/A

NSBA ELASTOMERIC BEARING DESIGN (ENGLISH UNITS)

AASHTO LFD, HB-17 ED., 2002

V. COMBINED COMPRESSION AND ROTATION (AASHTO LRFD 14.6.5.3.5)

RECTANGULAR BEARINGS:

B = Length of Pad = 11.00 in.

Exterior Layer Allowance = n_{ext} = 1.0 *(14.6.5.3.5)*

Equivalent Number of Interior Elastomeric Layers = $n = n_{int} + n_{ext}$ = 8

$$\sigma_{TL} > 1.0GS\left(\frac{\theta_s}{n}\right)\left(\frac{B}{h_{ri}}\right)^2$$ *(14.6.5.3.5-1)*

1.10 > 0.73 ksi OK

Subject to shear deformation:

$$\sigma_{TL} < 1.875GS\left[1-0.200\left(\frac{\theta_s}{n}\right)\left(\frac{B}{h_{ri}}\right)^2\right]$$ *(14.6.5.3.5-2)*

1.10 < 1.10 ksi NG

Fixed against shear deformation:

$$\sigma_{TL} < 2.25GS\left[1-0.167\left(\frac{\theta_s}{n}\right)\left(\frac{B}{h_{ri}}\right)^2\right]$$ *(14.6.5.3.5-3)*

1.10 < N/A N/A

CIRCULAR BEARINGS:

$$\sigma_{TL} > 0.75GS\left(\frac{\theta_s}{n}\right)\left(\frac{D}{h_{ri}}\right)^2$$ *(14.6.5.3.5-4)*

1.10 > N/A N/A

Subject to Shear Deformation:

$$\sigma_{TL} < 2.5GS\left[1-0.15\left(\frac{\theta_s}{n}\right)\left(\frac{D}{h_{ri}}\right)^2\right]$$ *(14.6.5.3.5-5)*

1.10 < N/A N/A

Fixed Against Shear Deformation:

$$\sigma_{TL} < 3.0GS\left[1-0.125\left(\frac{\theta_s}{n}\right)\left(\frac{D}{h_{ri}}\right)^2\right]$$ *(14.6.5.3.5-6)*

1.10 < N/A N/A

VI. STABILITY (AASHTO LRFD 14.6.5.3.6)

For free horizontal translation*:

$2A \le B$ *(14.6.5.3.6-1)*

$$A = \frac{1.92\frac{h_{rt}}{L}}{\sqrt{1+\frac{2L}{W}}} = 0.509$$ *(14.6.5.3.6-2)*

2A = 1.018

$$B = \frac{2.67}{(S+2.0)\left(1+\frac{L}{4.0W}\right)} = 0.254$$ *(14.6.5.3.6-3)*

$2A \le B$

$1.02 \le 0.25$ NG - SEE EQ. 5

**Notes - For rectangular bearings where L > W, L and W are interchanged.* *(14.6.5.3.6)*

- For circular bearings, W = L = 0.8D. *(14.6.5.3.6)*

Bridge Deck Free to Translate Horizontally:

$$\sigma_{TL} \le \frac{GS}{2A-B}$$ *(14.6.5.3.6-4)*

$1.10 \le$ N/A N/A

Bridge Deck Fixed Against Horizontal Translation:

$$\sigma_{TL} \le \frac{GS}{A-B}$$ *(14.6.5.3.6-5)*

$1.10 \le 2.88$ ksi OK

NSBA ELASTOMERIC BEARING DESIGN (ENGLISH UNITS)

AASHTO LFD, HB-17 ED., 2002

VII. REINFORCEMENT (AASHTO LRFD 14.6.5.3.7)

Service Limit State:

Min. Yield Strength of Steel Reinforcement = F_y =	36	ksi		
Thickness of Steel Reinforcement = h_s				
$h_{s\,min} = \dfrac{3.0 h_{max} \sigma_{TL}}{F_y}$ =	0.046	in.	*Controls*	*(14.6.5.3.7-1)*

Fatigue Limit State:

Constant Amplitude Fatigue Threshold = ΔF_{TH} =	24.0	ksi		*(Table 10.3.1A)*
$h_{s\,min} = \dfrac{2.0 h_{max} \sigma_{L}}{\Delta F_{TH}}$ =	0.012	in.		*(14.6.5.3.7-2)*

Required Minimum Reinforcement Thickness =	0.046	in.	
Reinforcement Thickness = h_s =	0.1250	in.	
$h_s \geq h_{s\,min}$			
$0.125 \geq 0.046$		in.	OK

VIII. FINAL DESIGN SUMMARY

Bearing Width = W =	22	in.
Bearing Length = L =	11	in.
Elastomeric Layer Thickness = h_{ri} =	0.5	in.
Thickness of top and Bottom Cover Layers (each) = h_{cover} =	0.313	in.
Number of Interior Elastomeric Layers (Excluding Exterior Layer Allowance) = n_{int} =	7	
Total Elastomer Thickness = h_{rt} =	4.125	in.
Reinforcement Thickness = h_s =	0.1250	in.
Total Bearing Thickness = $h_{rt} + h_s(n_{int}+1)$ =	5.1250	in.

CONSPAN Output:

Pier 2 Beam 3 (Span 1)		
Self Weight	**45.3**	kip
Deck + Haunch	**63.5**	kip
Diaphragm	**0.6**	kip
Non-Comp DL	**6.4**	kip
Comp. DL	**101.18**	kip
Live (max)	**130.4**	kip
Live (min)	**-11.1**	kip

Pier 2 Beam 3 (Span 2)		
Self Weight	**45.3**	kip
Deck + Haunch	**63.5**	kip
Diaphragm	**0.6**	kip
Non-Comp DL	**6.4**	kip
Comp. DL	**101.18**	kip
Live (max)	**130.4**	kip
Live (min)	**-11.1**	kip

Span 1: Total DL = 216.98 kip; Total LL = 114.1 kip

Span 2: Total DL = 216.98 kip; Total LL = 114.1 kip

(See attached Live Load Distribution for Girder 3)

Horizontal movement

ε (shrinkage) = 0.0002 (AASHTO 8.5.4)

ε (Thermal) = 0.000006 /°F (AASHTO 8.5.3)

Δ_T (Zone C) = **100** °F (AASHTO Table 14.6.5.2-2)

L = **100** ft

Δ = 0.08 ft

Δ = **0.96 in**

End Rotation

LL Deflection at pier = **0** (from CONAPAN Output)

LL Deflection at 0.1L = **0.08** ft (from CONAPAN Output)

a = **10** ft (= 0.1 L)

b = 0.08 ft

θ = 0.458356 °

θ = **0.008 rad**

NSBA ELASTOMERIC BEARING DESIGN (ENGLISH UNITS)

AASHTO LFD, HB-17 ED., 2002

METHOD B - STEEL-REINFORCED ELASTOMERIC BEARINGS - SECTION 14.6.5

The following design program was developed based upon the AASHTO LRFD code and has been adapted for LFD. The program is applicable to the design of steel-reinforced elastomeric bearings, both rectangular and circular in shape. The program is not applicable to design of rectangular bearings subject to combined rotation about the transverse and longitudinal axes. The program assumes that interior elastomeric layers are of equal thickness, as are the two exterior elastomeric layers.

I. INITIAL DESIGN INPUTS

Dead Load = P_D =	217	kips	
Live Load = P_{LL} =	114	kips	
Horizontal Movement of Bridge Superstructure = Δ_0 =	1.0	in.	
Axis of Pad Rotation:	Transverse		
Calculated Rotation =	0.008	Radians	
Rotation Construction Tolerance =	0.005	Radians	*(14.4.1)*
Design Rotation = θ_s =	0.013	Radians	
Bearing Shape:	Rectangular		
Bearing Subject to Shear Deformation?	yes		
Bridge Deck Fixed Against Horizontal Translation?	yes		

II. BEARING GEOMETRY

Flange Width =	26	in.	
Bearing Width = W =	22	in.	
Flange Width $\geq$ W			
26 $\geq$ 22		in.	OK
Total Unfactored Compressive Load = P_{TL} =	331	kips	
Minimum Required Area of Bearing = A_{min} =	206.9	in.^{2}	Based on service limit (14.6.5.3.2)
Minimum Bearing Length = L_{min} =	9.41	in.	
Bearing Length = L =	11	in.	
L $\geq$ L_{min}			
11.0 $\geq$ 9.41		in.	OK
N/A $\geq$ N/A			
N/A $\geq$ N/A		N/A	N/A
Bearing Area = A =	242.0	in.^{2}	

III. SHEAR DEFORMATION (AASHTO LRFD 14.6.5.3.4)

Maximum Total Shear Deformation of Elastomer at Service Limit = $\Delta_s = \Delta_0$ =	0.960	in.		
$2\Delta_s$ =	1.920	in.		
Elastomeric Layer Thickness = h_{rl} =	0.375	in.		
Thickness of top and Bottom Cover Layers (each) = h_{cover} =	0.2500	in.		
$h_{cover} \leq 0.7h_{rl}$				*(14.6.5.1)*
0.250 $\leq$ 0.263		in.	OK	
Number of Interior Elastomeric Layers (Excluding Exterior Layer Allowance) = n_{int} =	8			
Total Elastomer Thickness = $h_{rt} = 2h_{cover} + n_{int}h_{rl}$ =	3.500	in.		
$h_{rt} \geq 2\Delta_s$				*(14.6.5.3.4-1)*
3.500 $\geq$ 1.920		in.	OK	

IV. COMPRESSIVE STRESS (AASHTO LRFD 14.6.5.3.2)

Service Average Compressive Stress (Total Load) = $\sigma_{TL} = \dfrac{P_{TL}}{A} =$	1.37	ksi	
Service Average Compressive Stress (Live Load) = $\sigma_L = \dfrac{P_L}{A} =$	0.47	ksi	
Rectangular Shape Factor = $S_i = \dfrac{LW}{2h_{rl}(L+W)} =$	9.78		*(14.6.3)*
Circular Shape Factor = $S_i = \dfrac{D}{4h_{rl}} =$	N/A		*(14.6.3)*

Shear Modulus of Elastomer = G =	0.100	ksi		
0.080 $\leq$ G $\leq$ 0.175		ksi		*(14.6.5.2)*
0.080 $\leq$ 0.100 $\leq$ 0.175		ksi	OK	

For Bearings Subject to Shear Deformation (14.6.5.3.2-1):

$\sigma_{TL} \leq 1.66GS$		
1.37 $\leq$ 1.62	ksi	OK
$\sigma_{TL} \leq$ 1.6 ksi		
1.37 $\leq$ 1.6	ksi	OK
$\sigma_L \leq 0.66GS$		
0.47 $\leq$ 0.65	ksi	OK

For Bearings Fixed Against Shear Deformation (14.6.5.3.2-2):

$\sigma_{TL} \leq 2.00GS$	
N/A $\leq$ N/A	N/A
$\sigma_{TL} \leq$ 1.75 ksi	
N/A $\leq$ N/A	N/A
$\sigma_L \leq 1.00GS$	
N/A $\leq$ N/A	N/A

NSBA ELASTOMERIC BEARING DESIGN (ENGLISH UNITS)

AASHTO LFD, HB-17 ED., 2002

V. COMBINED COMPRESSION AND ROTATION (AASHTO LRFD 14.6.5.3.5)

RECTANGULAR BEARINGS:

B = Length of Pad = 11.00 in.

Exterior Layer Allowance = n_{ext} = 1.0 *(14.6.5.3.5)*

Equivalent Number of Interior Elastomeric Layers = $n = n_{int} + n_{ext}$ = 9

$$\sigma_{TL} > 1.0GS\left(\frac{\theta_s}{n}\right)\left(\frac{B}{h_{ri}}\right)^2$$ *(14.6.5.3.5-1)*

1.37 > 1.22 ksi OK

Subject to shear deformation:

$$\sigma_{TL} < 1.875GS\left[1-0.200\left(\frac{\theta_s}{n}\right)\left(\frac{B}{h_{ri}}\right)^2\right]$$ *(14.6.5.3.5-2)*

1.37 < 1.38 ksi OK

Fixed against shear deformation:

$$\sigma_{TL} < 2.25GS\left[1-0.167\left(\frac{\theta_s}{n}\right)\left(\frac{B}{h_{ri}}\right)^2\right]$$ *(14.6.5.3.5-3)*

1.37 < N/A N/A

CIRCULAR BEARINGS:

$$\sigma_{TL} > 0.75GS\left(\frac{\theta_s}{n}\right)\left(\frac{D}{h_{ri}}\right)^2$$ *(14.6.5.3.5-4)*

1.37 > N/A N/A

Subject to Shear Deformation:

$$\sigma_{TL} < 2.5GS\left[1-0.15\left(\frac{\theta_s}{n}\right)\left(\frac{D}{h_{ri}}\right)^2\right]$$ *(14.6.5.3.5-5)*

1.37 < N/A N/A

Fixed Against Shear Deformation:

$$\sigma_{TL} < 3.0GS\left[1-0.125\left(\frac{\theta_s}{n}\right)\left(\frac{D}{h_{ri}}\right)^2\right]$$ *(14.6.5.3.5-6)*

1.37 < N/A N/A

VI. STABILITY (AASHTO LRFD 14.6.5.3.6)

For free horizontal translation*:

2A ≤ B *(14.6.5.3.6-1)*

$$A = \frac{1.92\frac{h_{rt}}{L}}{\sqrt{1+\frac{2L}{W}}} = \quad 0.432$$ *(14.6.5.3.6-2)*

2A = 0.864

$$B = \frac{2.67}{(S+2.0)\left(1+\frac{L}{4.0W}\right)} = \quad 0.202$$ *(14.6.5.3.6-3)*

2A ≤ B

0.86 ≤ 0.20 NG - SEE EQ. 5

**Notes - For rectangular bearings where L > W, L and W are interchanged.* *(14.6.5.3.6)*

- For circular bearings, W = L = 0.8D. *(14.6.5.3.6)*

Bridge Deck Free to Translate Horizontally:

$$\sigma_{TL} \leq \frac{GS}{2A-B}$$ *(14.6.5.3.6-4)*

1.37 ≤ N/A N/A

Bridge Deck Fixed Against Horizontal Translation:

$$\sigma_{TL} \leq \frac{GS}{A-B}$$ *(14.6.5.3.6-5)*

1.37 ≤ 4.24 ksi OK

NSBA ELASTOMERIC BEARING DESIGN (ENGLISH UNITS)

AASHTO LFD, HB-17 ED., 2002

VII. REINFORCEMENT (AASHTO LRFD 14.6.5.3.7)

Service Limit State:

Min. Yield Strength of Steel Reinforcement = F_y =	36	ksi		
Thickness of Steel Reinforcement = h_s				
$h_{s\min} = \dfrac{3.0 h_{\max} \sigma_{TL}}{F_y} =$	0.043	in.	Controls	(14.6.5.3.7-1)

Fatigue Limit State:

Constant Amplitude Fatigue Threshold = ΔF_{TH} =	24.0	ksi		(Table 10.3.1A)
$h_{s\min} = \dfrac{2.0 h_{\max} \sigma_L}{\Delta F_{TH}} =$	0.015	in.		(14.6.5.3.7-2)

Required Minimum Reinforcement Thickness =	0.043	in.	
Reinforcement Thickness = h_s =	0.1250	in.	
$h_s \geq h_{s\min}$			
0.125 $\geq$ 0.043		in.	OK

VIII. FINAL DESIGN SUMMARY

Bearing Width = W =	22	in.
Bearing Length = L =	11	in.
Elastomeric Layer Thickness = h_{ri} =	0.375	in.
Thickness of top and Bottom Cover Layers (each) = h_{cover} =	0.250	in.
Number of Interior Elastomeric Layers (Excluding Exterior Layer Allowance) = n_{int} =	8	
Total Elastomer Thickness = h_{rt} =	3.500	in.
Reinforcement Thickness = h_s =	0.1250	in.
Total Bearing Thickness = $h_{rt} + h_s(n_{int}+1)$ =	4.6250	in.

CONSPAN Output:

Pier 3	Beam 3 (Span 2)		Pier 3	Beam 3 (Span 3)	
Self Weight	**45.3**	kip	Self Weight	**45.3**	kip
Deck + Haunch	**63.5**	kip	Deck + Haunch	**63.5**	kip
Diaphragm	**0.6**	kip	Diaphragm	**0.6**	kip
Non-Comp DL	**6.4**	kip	Non-Comp DL	**6.4**	kip
Comp. DL	**89.18**	kip	Comp. DL	**89.18**	kip
Live (max)	**123.9**	kip	Live (max)	**123.9**	kip
Live (min)	**-22.6**	kip	Live (min)	**-22.6**	kip

Span 2			Span 3		
Total DL =	204.98	kip	Total DL =	204.98	kip
Total LL =	108.4	kip	Total LL =	108.4	kip

(See attached Live Load Distribution for Girder 3)

Horizontal movement

ε (shrinkage) = 0.0002 (AASHTO 8.5.4)

ε (Thermal) = 0.000006 /°F (AASHTO 8.5.3)

Δ_T (Zone C) = **100** °F (AASHTO Table 14.6.5.2-2)

L = **0** ft

Δ = 0 ft

Δ = 0 in

End Rotation

LL Deflection at pier = **0** (from CONSPAN Output)

LL Deflection at 0.1L = **0.058** ft (from CONSPAN Output)

a = **10** ft (= 0.1 L)

b = 0.058 ft

θ = 0.332312 °

θ = 0.0058 rad

NSBA ELASTOMERIC BEARING DESIGN (ENGLISH UNITS)

AASHTO LFD, HB-17 ED., 2002

METHOD B - STEEL-REINFORCED ELASTOMERIC BEARINGS - SECTION 14.6.5

The following design program was developed based upon the AASHTO LRFD code and has been adapted for LFD. The program is applicable to the design of steel-reinforced elastomeric bearings, both rectangular and circular in shape. The program is not applicable to design of rectangular bearings subject to combined rotation about the transverse and longitudinal axes. The program assumes that interior elastomeric layers are of equal thickness, as are the two exterior elastomeric layers.

I. INITIAL DESIGN INPUTS

Dead Load = P_D =	205	kips		
Live Load = P_{LL} =	108	kips		
Horizontal Movement of Bridge Superstructure = Δ_0 =	0.0	in.		
Axis of Pad Rotation:	Transverse			
Calculated Rotation =	0.006	Radians		
Rotation Construction Tolerance =	0.005	Radians		(14.4.1)
Design Rotation = θ_s =	0.011	Radians		
Bearing Shape:	Rectangular			
Bearing Subject to Shear Deformation?	yes			
Bridge Deck Fixed Against Horizontal Translation?	yes			

II. BEARING GEOMETRY

Flange Width =	26	in.		
Bearing Width = W =	22	in.		
Flange Width $\geq$ W				
26 $\geq$ 22		in.	OK	
Total Unfactored Compressive Load = P_{TL} =	313	kips		
Minimum Required Area of Bearing = A_{min} =	195.9	$in.^2$	Based on service limit (14.6.5.3.2)	
Minimum Bearing Length = L_{min} =	8.90	in.		
Bearing Length = L =	11	in.		
L $\geq$ L_{min}				
11.0 $\geq$ 8.90		in.	OK	
N/A $\geq$ N/A				
N/A $\geq$ N/A		N/A	N/A	
Bearing Area = A =	242.0	$in.^2$		

III. SHEAR DEFORMATION (AASHTO LRFD 14.6.5.3.4)

Maximum Total Shear Deformation of Elastomer at Service Limit = $\Delta_s = \Delta_0$ =	0.000	in.		
$2\Delta_s$ =	0.000	in.		
Elastomeric Layer Thickness = h_{ri} =	0.375	in.		
Thickness of top and Bottom Cover Layers (each) = h_{cover} =	0.2500	in.		
h_{cover} $\leq$ $0.7h_{ri}$				(14.6.5.1)
0.250 $\leq$ 0.263		in.	OK	
Number of Interior Elastomeric Layers (Excluding Exterior Layer Allowance) = n_{int} =	7			
Total Elastomer Thickness = $h_{rt} = 2h_{cover} + n_{int}h_{ri}$ =	3.125	in.		
$h_{rt} \geq 2\Delta_s$				(14.6.5.3.4-1)
3.125 $\geq$ 0.000		in.	OK	

IV. COMPRESSIVE STRESS (AASHTO LRFD 14.6.5.3.2)

Service Average Compressive Stress (Total Load) = $\sigma_{TL} = \frac{P_{TL}}{A}$ =	1.29	ksi		
Service Average Compressive Stress (Live Load) = $\sigma_L = \frac{P_L}{A}$ =	0.45	ksi		
Rectangular Shape Factor = $S_i = \frac{LW}{2h_{ri}(L+W)}$ =	9.78			(14.6.3)
Circular Shape Factor = $S_i = \frac{D}{4h_{ri}}$ =	N/A			(14.6.3)
Shear Modulus of Elastomer = G =	0.100	ksi		
0.080 $\leq$ G $\leq$ 0.175		ksi		(14.6.5.2)
0.080 $\leq$ 0.100 $\leq$ 0.175		ksi	OK	

For Bearings Subject to Shear Deformation (14.6.5.3.2-1):

$\sigma_{TL} \leq 1.66GS$		
1.29 $\leq$ 1.62	ksi	OK
$\sigma_{TL} \leq$ 1.6 ksi		
1.29 $\leq$ 1.6	ksi	OK
$\sigma_L \leq 0.66GS$		
0.45 $\leq$ 0.65	ksi	OK

For Bearings Fixed Against Shear Deformation (14.6.5.3.2-2):

$\sigma_{TL} \leq 2.00GS$	
N/A $\leq$ N/A	N/A
$\sigma_{TL} \leq$ 1.75 ksi	
N/A $\leq$ N/A	N/A
$\sigma_L \leq 1.00GS$	
N/A $\leq$ N/A	N/A

V. COMBINED COMPRESSION AND ROTATION (AASHTO LRFD 14.6.5.3.5)

RECTANGULAR BEARINGS:

B = Length of Pad = 11.00 in.

Exterior Layer Allowance = n_{ext} = 1.0 *(14.6.5.3.5)*

Equivalent Number of Interior Elastomeric Layers = $n = n_{int} + n_{ext}$ = 8

$$\sigma_{TL} > 1.0GS\left(\frac{\theta_s}{n}\right)\left(\frac{B}{h_{ri}}\right)^2$$ *(14.6.5.3.5-1)*

1.29 > 1.14 ksi OK

Subject to shear deformation:

$$\sigma_{TL} < 1.875GS\left[1-0.200\left(\frac{\theta_s}{n}\right)\left(\frac{B}{h_{ri}}\right)^2\right]$$ *(14.6.5.3.5-2)*

1.29 < 1.41 ksi OK

Fixed against shear deformation:

$$\sigma_{TL} < 2.25GS\left[1-0.167\left(\frac{\theta_s}{n}\right)\left(\frac{B}{h_{ri}}\right)^2\right]$$ (14.6.5.3.5-3)

1.29 < N/A N/A

CIRCULAR BEARINGS:

$$\sigma_{TL} > 0.75GS\left(\frac{\theta_s}{n}\right)\left(\frac{D}{h_{ri}}\right)^2$$ *(14.6.5.3.5-4)*

1.29 > N/A N/A

Subject to Shear Deformation:

$$\sigma_{TL} < 2.5GS\left[1-0.15\left(\frac{\theta_s}{n}\right)\left(\frac{D}{h_{ri}}\right)^2\right]$$ *(14.6.5.3.5-5)*

1.29 < N/A N/A

Fixed Against Shear Deformation:

$$\sigma_{TL} < 3.0GS\left[1-0.125\left(\frac{\theta_s}{n}\right)\left(\frac{D}{h_{ri}}\right)^2\right]$$ *(14.6.5.3.5-6)*

1.29 < N/A N/A

VI. STABILITY (AASHTO LRFD 14.6.5.3.6)

For free horizontal translation*:

$2A \leq B$ *(14.6.5.3.6-1)*

$$A = \frac{1.92\frac{h_{rt}}{L}}{\sqrt{1+\frac{2L}{W}}} = 0.386$$ *(14.6.5.3.6-2)*

2A = 0.771

$$B = \frac{2.67}{(S+2.0)\left(1+\frac{L}{4.0W}\right)} = 0.202$$ *(14.6.5.3.6-3)*

$2A \leq B$

$0.77 \leq 0.20$ NG - SEE EQ. 5

**Notes - For rectangular bearings where L > W, L and W are interchanged.* *(14.6.5.3.6)*

- For circular bearings, W = L = 0.8D. *(14.6.5.3.6)*

Bridge Deck Free to Translate Horizontally:

$$\sigma_{TL} \leq \frac{GS}{2A-B}$$ *(14.6.5.3.6-4)*

1.29 ≤ N/A N/A

Bridge Deck Fixed Against Horizontal Translation:

$$\sigma_{TL} \leq \frac{GS}{A-B}$$ *(14.6.5.3.6-5)*

1.29 ≤ 5.31 ksi OK

NSBA ELASTOMERIC BEARING DESIGN (ENGLISH UNITS)

AASHTO LFD, HB-17 ED., 2002

VII. REINFORCEMENT (AASHTO LRFD 14.6.5.3.7)

Service Limit State:

Min. Yield Strength of Steel Reinforcement = F_y =	36	ksi		
Thickness of Steel Reinforcement = h_s				
$h_{s\,min} = \dfrac{3.0 h_{max} \sigma_{TL}}{F_y} =$	0.040	in.	Controls	(14.6.5.3.7-1)

Fatigue Limit State:

Constant Amplitude Fatigue Threshold = ΔF_{TH} =	24.0	ksi	(Table 10.3.1A)
$h_{s\,min} = \dfrac{2.0 h_{max} \sigma_{L}}{\Delta F_{TH}} =$	0.014	in.	(14.6.5.3.7-2)

Required Minimum Reinforcement Thickness =	0.040	in.	
Reinforcement Thickness = h_s =	0.1250	in.	
$h_s \geq h_{s\,min}$			
$0.125 \geq 0.040$		in.	OK

VIII. FINAL DESIGN SUMMARY

Bearing Width = W =	22	in.
Bearing Length = L =	11	in.
Elastomeric Layer Thickness = h_{ri} =	0.375	in.
Thickness of top and Bottom Cover Layers (each) = h_{cover} =	0.250	in.
Number of Interior Elastomeric Layers (Excluding Exterior Layer Allowance) = n_{int} =	7	
Total Elastomer Thickness = h_{rt} =	3.125	in.
Reinforcement Thickness = h_s =	0.1250	in.
Total Bearing Thickness = $h_{rt} + h_s(n_{int}+1)$ =	4.1250	in.

Subsurface Exploration

TABLE OF CONTENTS

1.0 INTRODUCTION 1
2.0 PROJECT SETTING 1
2.1 Proposed Structure 1
2.2 Soils 2
2.3 Site Geology 2
3.0 SUBSURFACE EXPLORATION 3
4.0 LABORATORY TESTING PROGRAM 3
5.0 ENCOUNTERED SUBSURFACE CONDITIONS AT THE STRUCTURE 3
5.1 Previous Exploration Programs 4
5.2 Recent Exploration Program (Rear Abutment) 4
5.3 Summary of Subsurface Conditions 4
6.0 ANALYSES AND DISCUSSIONS 6
6.1 Rear Abutment 6
6.1 Forward Abutment 7
6.3 Bridge Piers 7
6.3.1 Pier 1 7
6.3.2 Pier 2 8
6.3.3 Pier 3 9
6.4 Approach Embankments 10
6.4.1 Slope Stability 10
6.4.2 Embankment Settlement 11
6.4.3 Settlement Monitoring 12
7.0 RECOMMENDATIONS 13
7.1 Foundation Design 13
7.1.1 Rear Abutment 13
7.1.2 Forward Abutment 15
7.1.3 Pier 1 15
7.1.4 Pier 2 16
7.1.5 Pier 3 16
7.1.6 Temporary Construction Issues for Excavations 17
7.1.7 Groundwater Considerations 17
7.2 Approach Embankments 17
8.0 LIMITATIONS 18
9.0 REFERENCES 19

APPENDICES

Appendix A – Figures

Appendix B – "Report of Subsurface Exploration, Bridge and MSE Retaining Walls, SR 823 over Portsmouth-Minford Road (SR 139), SCI-823-0.00 Portsmouth Bypass, Scioto County, Ohio" (DLZ 2006)

Appendix C – Laboratory Test Results

Appendix D – Supplemental Boring Logs and Core Photos

Appendix E – Analyses

1.0 INTRODUCTION

This report presents the results of HDR Engineering, Inc.'s geotechnical study for Bridge No. SCI-823-0917 L, SR 823 over Portsmouth-Minford Road, a component of Phase I of the Ohio Department of Transportation's Portsmouth Bypass project located in Scioto County. This study was undertaken in response to the Office of Structural Engineering's directive to modify the original two-span bridge design to four spans in order to eliminate the approximate 50-foot high MSE walls required to retain the approach embankments. This geotechnical report is intended to supplement the existing subsurface information at the site, and to amend, as necessary, the previous geotechnical recommendations provided by DLZ Ohio, Inc., (DLZ) in their "*Report of Subsurface Exploration, Bridge and MSE Retaining Walls, SR 823 Over Portsmouth-Minford Road (SR 139), SCI-823-0.00 Portsmouth Bypass, Scioto County, Ohio*" dated September 26, 2006.

The scope of work for this geotechnical study included

- a review of available soil, geologic and existing subsurface information at the site,
- site reconnaissance,
- the development and performance of a limited subsurface exploration program,
- laboratory testing on selected soil and rock samples in accordance with the requirements of the ODOT *Specifications for Geotechnical Exploration*,
- geotechnical engineering evaluations and analysis, and
- preparation of this report.

The purpose of this report is to present descriptions and interpretations of the subsurface conditions in the area of the proposed structure as they affect design, and to provide recommendations for geotechnical treatments and designs for the foundations of the substructure units.

2.0 PROJECT SETTING

The Portsmouth Bypass will be a four-lane limited access highway connecting U.S. Route 52 near Wheelersburg, Ohio to U.S. Route 23 north of Lucasville. The proposed bypass is intended to improve both regional mobility and economic development within the region, and will be constructed in three phases. Phase I of the project extends approximately 3.5 miles from Shumway Hollow Road to Lucasville-Minford Road (CR 28), passing through rough, hilly terrain. The steep hillsides and slopes located along the proposed alignment are typically wooded and undeveloped, while the more gradual slopes and valleys have for the most part been cleared for use as pasture land or have been developed as residential properties.

2.1 Proposed Structure

Figure 1 shows the planned location for Bridge No. SCI-823-0917 L. The proposed bridge is a 397-foot long, 4-span structure designed to carry traffic over Long Run Creek and Portsmouth-Minford Road (SR 139). The structure will be composed of 72-inch Modified AASHTO Type 4 prestressed concrete I-beams with a composite reinforced concrete deck supported on semi-integral abutments and T-type piers. As shown in Figure 2, the rear and forward abutments will be located at approximate Station 483+18 and Station 487+15, respectively, and are anticipated to be reinforced concrete semi-integral abutments supported on steel H-piles. Pier 1 will be located at Station 484+17 and Pier 2 at Station 485+17, on the opposite bank of Long Run Creek. Pier 3 will be located to the west of Portsmouth-Minford Road, at Station 486+17. Based on previous subsurface information gathered at the site, shallow spread footings bearing on rock appear to be viable options to support the bridge piers.

2.2 Soils

Review of the Natural Resources Conservation Service's "*Web Soil Survey*" (NRCS website, 2008) indicates several soil types within the project area, with the predominant soil associations consisting of the Shelocta-Brownsville and Omulga groups (see Figure 3). Specifically, soil types encountered within the immediate vicinity of Bridge No. SCI-823-0917 are listed below.

> **Skidmore Silt Loam, 0 to 3 percent slopes (Sk)** – The Skidmore Silt Loam is typically found on flood plains, and as such, is occasionally flooded. These soils are well drained with high permeabilities and typically have a shallow water table. The depth to bedrock is also generally shallow in those areas overlain by the Skidmore Silt Loam. With a typical pH value ranging from 5.6 to 7.8, this unit represents a low risk of corrosion to uncoated steel and a moderate risk in regards to concrete.
>
> **Shelocta-Brownsville Association, 40 to 70 percent slopes (ScF)** – The soils associated with the Shelocta-Brownsville Association are typically found along steep hillsides. They are well drained with moderately high to high permeabilities and available water capacities are moderate to high. The parent material for these soils is colluvium over residuum and the depth to water table is typically in excess of 80 inches. With a typical pH value ranging from 3.6 to 6.0, this unit represents a low risk of corrosion to uncoated steel and a high risk in regards to concrete. Additionally, this unit represents a very severe risk of erodibility due to the steepness of the slopes, particularly in regards to the Brownsville component.
>
> **Omulga Silt Loam, 1 to 8 percent slopes (OmB)** – These soils are typically found along terraces and are moderately well drained. Permeabilities are moderately low to moderately high and available water capacities are considered moderate. The parent material is loess over alluvium over lacustrine deposits and the depth to water table is relatively shallow. With a typical pH value ranging from 3.6 to 7.3, this unit represents a moderate risk of corrosion to uncoated steel and a high risk in regards to concrete.

2.3 Site Geology

An overview of the site geology is found in the "*Report of Subsurface Exploration, Bridge and MSE Retaining Walls, SR 823 Over Portsmouth-Minford Road (SR 139), SCI-823-0.00 Portsmouth Bypass, Scioto County, Ohio*" (DLZ, 2006) located in Appendix B. Please note that the potentially problematic Minford Silts do not appear to be present at the bridge site based upon our review of the previous test borings performed by DLZ at the site.

It should also be noted that slope instability was indicated by DLZ from Station 482+00 to Station 484+25 in their "*Report for Geology and Field Reconnaissance, Portsmouth Bypass Project, SCI-823-6.81, Phase I – Stage I, Scioto County, Ohio*" dated November 29, 2006. This instability was described by DLZ as relatively shallow soil creep contained within the overburden as a result of the toe of the nearly 1H:1V slope being eroded by Long Run Creek. The area was noted to exhibit signs of a massive landslide in the past at this location, but based on our meeting with DLZ and the Office of Geotechnical Engineering on December 20, 2007, it is our understanding that there is no evidence of a deep active slide in the area, and that the past slide at the site has removed the majority of the overburden on the slope. Evidence of the past slide and the more recent shallow soil creep were confirmed by HDR geotechnical personnel during their site reconnaissance on January 22, 2008.

3.0 SUBSURFACE EXPLORATION

A subsurface exploration program was developed using the site plans for the four span bridge option and the existing subsurface information available at the site. Eight test borings were previously drilled at the bridge site as part of DLZ's original geotechnical study for Bridge No. SCI-823-0837 L. As several of the previously drilled test borings are located at or near the proposed substructure units (see Figure 2), a single new test boring, designated as B-003-0-08 was located at the rear abutment of the structure. This boring was located and staked in the field by TesTech, Inc. with stations and offsets developed by HDR from the coordinates and elevation provided.

Drilling and sampling was performed on February 11, 2008. An ATV mounted CME 550 drill rig equipped with a 3¼" inside diameter hollow stem auger was used to advance the borings. The boring was drilled in general accordance with the "*Specifications for Geotechnical Explorations*" (ODOT, 2007) with sampling of the overburden soils accomplished in accordance with "*Standard Test Method for Penetration Test and Split-Barrel Sampling of Soils*", ASTM D 1586. In the spilt-barrel sampling procedure, a standard 2-inch outside diameter split-barrel sampling spoon is driven into the ground with a 140-pound hammer falling a distance of 30 inches. The number of blows required to advance the sampling spoon the last 12 inches of an 18-inch penetration is recorded as the standard penetration test (SPT) resistance or N-value. The soils were sampled at 2.5-foot intervals until spoon refusal, defined as a minimum of 50 blows per 2 inches of penetration, was obtained on the underlying bedrock. It should be noted that as the soil/bedrock interface was generally transitional from residual soil to weathered rock, samples of this softer bedrock was achieved by overdriving the sampling spoon. Additional sampling of the bedrock at Boring B-003-0-08 was accomplished in accordance with the *"Standard Practice for Rock Core Drilling and Sampling of Rock for Site Investigation"*, ASTM D 2113, using an NX-size double tube-swivel core barrel.

Water levels within Boring B-003-0-08 were measured when encountered during drilling, immediately upon completion of the boring, and again approximately 24 hours after completion. After obtaining the final water level reading, the boring was grouted in accordance with ODOT's "*Policy for Sealing of Geotechnical Exploratory Boreholes*".

4.0 LABORATORY TESTING PROGRAM

The recovered soil and rock samples were visually classified by an HDR geotechnical engineer and representative samples selected for laboratory testing to confirm the field classifications and to assess the various engineering properties of the encountered materials. The tests performed on representative soil samples included 7 natural moisture contents (ASTM D 2216), 2 Atterberg limit determinations (ASTM D 4318), 2 grain size analyses (ASTM D 422), and 2 unconfined compressive strength tests (ASTM D 2166). The results of the laboratory tests are presented on the laboratory summary sheets located in Appendix C, with individual copies of the laboratory test data sheets also provided in Appendix C.

5.0 ENCOUNTERED SUBSURFACE CONDITIONS AT THE STRUCTURE

This section summarizes the subsurface conditions encountered during the field exploration program. For a more detailed description of the subsurface conditions encountered during the previous subsurface exploration programs at the site, please refer to the "*Report of Subsurface Exploration, Bridge and MSE Retaining Walls, SR 823 Over Portsmouth-Minford Road (SR 139), SCI-823-0.00 Portsmouth Bypass, Scioto County, Ohio*" (DLZ, 2006) located in Appendix B.

5.1 Previous Exploration Programs

Eight test borings were previously drilled at the bridge site as part of DLZ's original geotechnical study for the structure. Based upon review of their geotechnical report, five preliminary structural borings designated as TR-15 through TR-19 were performed by DLZ between July 9, 2004 and February 23, 2005, and three final structural borings, designated as B-10 through B-12, were performed between June 20 and 28, 2006. The locations of these eight borings as related to the current bridge plan are presented in Figure 2.

In general, the previous test borings at the site encountered 2 to 12 inches of topsoil overlying a relatively thin layer of primarily granular soils. The overburden typically extended from approximately 4.0 to 9.2 feet below the existing ground surface, and was described as gravel with sand (A-2-4), sandy silt (A-4a), and silt (A-4b) with a minor cohesive component. SPT N-values ranged from 2 to 18 blows/foot within the overburden material, with the granular soils noted to be loose to medium dense while the soils with a more appreciable cohesive component were typically described as medium stiff to very stiff.

The underlying bedrock was described as very fine to fine grained, argillaceous sandstone. Typically, the sandstone was described as medium hard to hard, moderately to slightly weathered, moderately to slightly fractured, and laminated to massively bedded. The amount of core recovery varied from 78 to 100 percent, with an average recovery of 95 percent. The rock quality designation (RQD) for the sandstone ranged between 57 and 97 percent, with an average RQD of 80 percent. Unconfined compressive strength tests performed on four intact core samples from the final structural borings indicated unconfined compressive strengths ranging from 9,709 to 11,829 psi, with an average unconfined compressive strength of 10,617 psi.

5.2 Recent Exploration Program (Rear Abutment)

This section summarizes the subsurface conditions encountered during HDR's field exploration program. The typed test boring log and photographs of the recovered rock core for boring B-003-0-08 is included in Appendix D.

Boring B-003-0-08 encountered a 12.5-foot thick layer of residual soil overlying sedimentary bedrock. The residuum was classified as silt (CL, A-4b) and silt and clay (CL, A-6a). SPT N-values within the overburden ranged from 9 blows/foot to over 50 blows/foot with depth.

The underlying sedimentary rock consisted of argillaceous silty shale and interbedded siltstone and sandy shale, with the top of rock (silty shale) encountered at approximate El. 663.0. The overlying argillaceous silty shale was described as completely to moderately weathered, with the degree of weathering decreasing with depth. The underlying interbedded siltstone and sandy shale was described as slightly weathered to unweathered. RQD values ranged from 82 to 94 percent, signifying very good quality rock. The core recoveries were generally good and ranged from 97 to 100 percent, with the lower recovery rates encountered within the upper rock stratum. The results of two unconfined compressive tests on intact core samples indicated unconfined compressive strengths (q_u) of 6,169 psi for the overlying argillaceous silty shale and 15,441 psi for the interbedded siltstone and sandy shale.

5.3 Summary of Subsurface Conditions

As noted previously, Bridge No. SCI-823-0917 L was modified from two spans to four spans in order to eliminate the approximate 50-foot high MSE walls required to retain the approach embankments. Under the new bridge design, several of the substructure units were repositioned and four new T-type piers added; however, the subsurface exploration program as performed by

DLZ had been completed under the original two-span bridge design. As shown in Table 1, these previously drilled test borings are located approximately 10 to 45 feet from the currently proposed substructure locations. As such, some variations in the estimated top of bedrock at the proposed substructure locations should be anticipated.

Table 1: Substructure and Boring Locations

Substructure		Associated Borings			
Description	**Station**	**Boring Number**	**Station**	**Top of Boring Elevation**	**Top of Rock Elevation**
Rear Abutment	483+16.0, CL	B-003-0-08	483+12.0, 11.4 ft. LT	675.5	659.4
Pier 1	484+14.7, CL	TR-18	484+38.6, 39.0 ft. LT	631.3	624.0
		TR-19	483+69.8, 46.5 ft. RT	633.0	624.3
Pier 2	485+14.7, CL	B-11	485+19.1, 48.6 ft. LT	632.7	624.2
		B-12	485+04.7, 9.0 ft. RT	632.5	624.0
		TR-17	485+26.9, 24.3 ft. RT	631.7	624.7
Pier 3	486+14.7, CL	B-10	486+01.5, 43.8 ft. RT	632.6	623.1
		TR-16	486+12.4, 32.3 ft. LT	631.9	623.4
Forward Abutment	487+13.4, CL	TR-15	486+83.3, 32.9 ft. RT	631.3	623.3

Table 2 presents the proposed design elevations for the individual substructure units and the top of rock as encountered in the nearby boring locations. Based on the encountered subsurface conditions at the site, the depth to bedrock varies from approximately 7 to 16 feet below the existing ground surface at the bridge site. The top of rock was encountered between elevations 623.1 and 624.7 along the valley floor at the locations of the bridge piers and the forward abutment. At the rear abutment as currently located on the valley wall, rock was encountered significantly higher at El. 659.4.

Table 2: Summary of Design Elevations for Individual Substructure Units

Substructure Unit	**Existing Grade at Centerline (Estimated)**	**Proposed Ground Surface At Centerline**	**Top of Rock[1] (El.)**	**Approximate Depth to Bedrock[2] (ft)**	**Proposed Bottom of Footing/ Concrete Cap**
Rear Abutment	665.0	699.8	659.4	40.5	685.9
Pier 1	634.0	643.0	624.0 - 624.3	18.5 to 19.0	622.5
Pier 2	631.6	631.6	624.0 - 624.7	7.0 to 8.0	622.7
Pier 3	631.9	635.4	623.1 - 623.4	12.0 to 12.5	622.8
Forward Abutment	633.2	691.1	623.3	68.0	676.8

Notes: 1. As encountered in the nearest test borings
2. Below proposed grade

6.0 ANALYSES AND DISCUSSIONS

Spread footings, drilled shafts and driven piles are all viable options for support of Bridge No. SCI-823-0917-L based upon the encountered subsurface conditions at the site as well as the economics of construction. As such, analyses were performed to determine the bearing capacity of shallow spread footings and the axial capacity of steel H-piles. Analyses for the drilled shafts were not performed as the recommendations provided by DLZ in their "*Report of Subsurface Exploration, Bridge and MSE Retaining Walls, SR 823 Over Portsmouth-Minford Road (SR 139), SCI-823-0.00 Portsmouth Bypass, Scioto County, Ohio*" (2006) appear to be adequate. The results of these and other related analyses are presented in the appendices.

6.1 Rear Abutment

As shown in Table 2, the proposed bottom of footing/pile cap for the rear abutment is El. 685.87, approximately 21 feet above the existing ground surface (at the centerline) and roughly 27 feet above the top of rock based on boring B-003-0-08. Approximately 30 to 35 feet of fill will be required to attain the proposed profile grade (El. 699.8) at the abutment location based on the bridge plan provided in Figure 2. The overall depth of the embankment fill would preclude the use of spread footings bearing on rock, and excess differential settlement would be a concern if the spread footings were to be located within the fill. As such, steel H-piles driven to absolute refusal on bedrock appear to be the most feasible and cost effective foundation to support the rear abutment. For steel piles driven to bedrock, refusal is obtained when a minimum driving resistance of 20 blows per inch is achieved per Section 606.1 of the ODOT Bridge Design Manual.

Top of rock was encountered at El. 659.4 in boring B-003-0-08, with the bedrock consisting of decomposed to moderately weathered silty shale overlying interbedded siltstone and sandy shale. Refusal of the driven piles is expected to be obtained relatively quickly once the top of rock is encountered, with less than 12 inches of penetration into the overlying weathered rock expected. Hardened steel pile driving tips should be utilized per Section 202.2.2.2.a of the ODOT *Bridge Design Manual* to protect the H-piles from damage and to minimize slippage on the sloping bedrock surface.

For piles driven to refusal on competent rock, the structural capacity of the piles will control the design. Based on Section 4.5.7.3 of the *Standard Specifications for Highway Bridges* (AASHTO, 2002), an allowable axial stress of 12.5 ksi ($0.25f_y$) is recommended for a Grade 50 H-pile bearing on bedrock. Foundation settlement at the rear abutment as a result of elastic compression of the piles is anticipated to be negligible. It should be noted that lateral loads will be resisted by battered piles without relying on lateral resistance of the vertical piles.

Special construction measures will be required to allow for the installation of the driven piles through the approach embankments as the embankment material is expected to contain appreciable quantities of durable rock. It is recommended that the steel H-piles be installed through a pile window constructed during placement of the approach embankment fill. The pile window should extend 3 feet laterally beyond the outer limits of the piles in all directions, and extend from the bottom of the abutment pile cap to the existing ground surface. The pile window should be constructed of Granular Material Type C (Item 703.16 of the *Construction and Material Specifications*) as the maximum 3-inch particle size should not impede pile penetration and the requirement for prebored holes through the embankment material per Section 202.2.3.2.g of the ODOT *Bridge Design Manual* could be eliminated. It is anticipated that the Type C Granular Material can be processed on site using the hard, durable sandstone and siltstone from the nearby rock cuts.

6.1 Forward Abutment

As shown in Table 2, the proposed elevation for the bottom of footing/pile cap at the forward abutment is 676.78 feet, roughly 44 feet above the existing ground surface (at the centerline) and approximately 54 feet above the top of rock based on boring TR-15. The proposed profile grade at the abutment is El. 691.1, indicating that approximately 58 feet of embankment fill will be required at the abutment location based on the bridge plan provided in Figure 2. As such, steel H-piles driven to refusal on bedrock appear to be the most feasible and cost effective foundation to support the forward abutment as the overall depth of the embankment fill would preclude the use of spread footings bearing upon rock and excess differential settlement would be a concern if the spread footings would be located within the fill.

The top of rock was encountered at El. 623.3 in boring TR-15. The bedrock consists of medium hard to hard, very fine to fine grained sandstone. Refusal is expected to be obtained relatively quickly once the top of rock is encountered, with less than 12 inches of penetration into the sandstone expected. Hardened steel pile driving tips should be utilized per Section 202.2.2.2.a of the ODOT *Bridge Design Manual* to help protect the H-piles from damage during driving.

For piles driven to refusal on competent rock, the structural capacity of the piles will generally control the design. Based on Section 4.5.7.3 of the *Standard Specifications for Highway Bridges* (AASHTO, 2002), an allowable axial stress of 12.5 ksi ($0.25f_y$) is recommended for a Grade 50 H-pile bearing on bedrock. Foundation settlement at the forward abutment as a result of elastic compression of the piles is anticipated to be negligible. It should be noted that lateral loads will be resisted by battered piles without relying on lateral resistance of the vertical piles.

Special construction measures will be required to allow for the installation of the driven piles through the approach embankments as the embankment material is expected to contain appreciable quantities of durable rock. It is recommended that the steel H-piles be installed through a pile window constructed during placement of the approach embankment fill. The pile window should extend 3 feet laterally beyond the outer limits of the piles in all directions, and extend from the bottom of the abutment pile cap to the existing ground surface. The pile window should be constructed of Granular Material Type C (Item 703.16 of the *Construction and Material Specifications*) as the maximum 3-inch particle size should not impede pile penetration and the requirement for prebored holes through the embankment material per Section 202.2.3.2.g of the ODOT *Bridge Design Manual* could be eliminated. It is anticipated that the Type C Granular Material can be processed on site using the hard, durable sandstone and siltstone from nearby rock cuts.

6.3 Bridge Piers

Based on the subsurface conditions encountered at the pier locations, bedrock is expected to be encountered within approximately 7 to 19 feet below final grade at Piers 1, 2 and 3 (See Table 2). As such, both drilled shafts and spread footings bearing upon competent rock appear to be viable options to support the bridge piers. Recommendations are provided for both foundation types, with constructability and cost effectiveness expected to be the main factors in determining the most feasible foundation alternative.

6.3.1 Pier 1

Spread Footings

Based on Borings TR-18 and TR-19, the top of rock was encountered from El. 624.0 to El. 624.3 across Pier 1. The bedrock was described as medium hard to hard, very fine to fine grained, argillaceous, micaceous sandstone. The sandstone is moderately to slightly weathered, with fractures and broken zones noted from El. 624.0 to El. 623.3 in boring TR-18, and decomposed rock from El. 624.3 to El. 623.6 in boring TR-19. As such, it is recommended that the proposed bottom of footing be located at El. 623.3 or lower.

Analyses were performed to verify the allowable bearing capacity of 40 tsf for spread footings bearing upon competent bedrock as recommended by DLZ in their previous geotechnical report for the site (DLZ, 2006). These analyses were based upon the Geomechanics Classification System of Rock Mass Rating, and using the rock descriptions, RQD, and unconfined compression test data as provided in DLZ's final boring logs. As shown in the analyses presented in Appendix E, a reduced allowable bearing capacity of 35 tsf is recommended.

Due to the potential for variations in the top of bedrock beneath the footing from that encountered at Borings TR-18 and TR-19, provisions should be included in the construction plans for overexcavation and backfill with Class C concrete. If unacceptable bearing material is encountered at or below the proposed bottom of footing, the unacceptable materials should be removed to bedrock, and the minimum bottom of footing reestablished using Class C concrete. Any overexcavation should be stepped and have a level bottom.

Drilled Shafts
The use of drilled shafts should be explored as an alternative to a spread footing foundation at Pier 1 due to the size and depth of the excavation that will be required to construct the spread footing. It is currently understood that the approach embankment will be constructed under separate contract in advance of the bridge contract. As such, an approximate 21-foot deep excavation would be required to construct the footing at the proposed bearing elevation of 622.5. Temporary shoring, particularly on the upslope side of the excavation would likely be required, and/or the excavation sloped in accordance with applicable federal (OSHA) and state standards. A smaller footprint with less excavation is anticipated for the drilled shaft alternative as the cap for the drilled shafts is expected to be considerably smaller than the dimensions for a spread footing, and the bottom of the cap would likely be set higher, within the overburden material, rather than at the top of rock.

The drilled shafts should be designed following the recommendations provided in the "*Report of Subsurface Exploration, Bridge and MSE Retaining Walls, SR 823 Over Portsmouth-Minford Road (SR 139), SCI-823-0.00 Portsmouth Bypass, Scioto County, Ohio*" (DLZ, 2006). Per DLZ's geotechnical report, the drilled shafts should be socketed a minimum of 5 feet into competent bedrock, and the shafts designed for tip resistance only, using an allowable bearing pressure of 40 tsf. Any side resistance provided by the overlying soils and from the shallow rock socket should be neglected. Per DLZ's report, deeper rock sockets (> 5 ft) can be utilized if adequate capacity cannot be developed through end bearing; however, it is recommended that the drilled shafts be designed such that the loads are carried entirely by the socket resistance and any end bearing ignored. DLZ recommends an allowable sidewall resistance of 7500 psf for the rock socket, and that any side resistance within the upper two feet of the rock socket be neglected.

<u>6.3.2 Pier 2</u>

Spread Footings
The top of rock varies from El. 624.0 to El. 624.7 across Pier 2, with the bedrock described as medium hard to hard, very fine to fine grained, argillaceous sandstone based on borings B-11, B-12 and TR-17. A highly fractured to broken zone was noted from El. 624.2 to El. 622.7 in Boring B-11 and a very soft, highly weathered zone to El. 624.3 in Boring TR-17. As such, it is recommended that the proposed bottom of footing be set at El. 622.7 or lower.

Analyses were performed to verify the allowable bearing capacity of 40 tsf for spread footings bearing upon competent bedrock as recommended by DLZ in their previous geotechnical report for the site (DLZ, 2006). These analyses were based upon the Geomechanics Classification System of Rock Mass Rating, and using the rock descriptions, RQD, and unconfined compression test data of the bedrock as provided in DLZ's final boring logs. As shown in the analyses presented in Appendix E, a reduced allowable bearing capacity of 35 tsf is recommended.

Due to the potential for variations in the top of bedrock beneath the footing from that encountered at Borings B-11, B-12 and TR-17 , provisions should be included in the construction plans for overexcavation and backfill with Class C concrete. If unacceptable bearing material is encountered at or below the proposed bottom of footing, the unacceptable materials should be removed to bedrock, and the minimum bottom of footing reestablished using Class C concrete. Any overexcavation should be stepped and have a level bottom.

Drilled Shafts

The use of drilled shafts should be explored as an alternative to a spread footing foundation at Pier 2 due to the close proximity of the bridge pier to Long Run Creek. A smaller footprint with less excavation is anticipated for the drilled shaft alternative, and could eliminate the need for construction of a temporary cofferdam within the creek and associated dewatering.

The drilled shafts should be designed following the recommendations provided in the "*Report of Subsurface Exploration, Bridge and MSE Retaining Walls, SR 823 Over Portsmouth-Minford Road (SR 139), SCI-823-0.00 Portsmouth Bypass, Scioto County, Ohio*" (DLZ, 2006). Per DLZ's geotechnical report, the drilled shafts should be socketed a minimum of 5 feet into competent bedrock, and the shafts designed for tip resistance only, using an allowable bearing pressure of 40 tsf. Any side resistance provided by the overlying soils and from the shallow rock socket should be neglected. Per DLZ's report, deeper rock sockets (> 5 ft) can be utilized if adequate capacity cannot be developed through end bearing; however, it is recommended that the drilled shafts be designed such that the loads are carried entirely by the socket resistance and any end bearing ignored. DLZ recommends an allowable sidewall resistance of 7500 psf for the rock socket, and that any side resistance within the upper two feet of the rock socket be neglected.

6.3.3 Pier 3

Spread Footings

Based on Borings B-10 and TR-16, the top of rock was encountered from approximate El. 623.1 to El. 623.4 across Pier 3. The bedrock was described as medium hard to hard, very fine to fine grained, argillaceous, micaceous sandstone. With recovery rates ranging from 96 to 98 percent, it is recommended that the proposed bottom of footing for Pier 3 be located at El. 623.0 or lower.

Analyses were performed to verify the allowable bearing capacity of 40 tsf for spread footings bearing upon competent bedrock as recommended by DLZ in their previous geotechnical report for the site (DLZ, 2006). These analyses were based upon the Geomechanics Classification System of Rock Mass Rating (RMR), and using the rock descriptions, RQD, and unconfined compression test data of the bedrock as provided in DLZ's final boring logs. As shown in the analyses presented in Appendix E, a reduced allowable bearing capacity of 35 tsf is recommended.

Due to the potential for variations in the top of bedrock beneath the footing from that encountered at Borings B-10 and TR-16, provisions should be included in the construction plans for overexcavation and backfill with Class C concrete. If unacceptable bearing material is encountered at or below the proposed bottom of footing, the unacceptable materials should be removed to competent rock, and the minimum bottom of footing reestablished using Class C concrete. Any overexcavation should be stepped and have a level bottom.

Drilled Shafts
The use of drilled shafts should be explored as an alternative to a spread footing foundation at Pier 3 due to the size and depth of the excavation that will be required to construct the spread footing. It is currently understood that the approach embankment will be constructed under separate contract in advance of the bridge contract. As such, an approximate 13-foot deep excavation would be required to construct the footing at the proposed bearing elevation of 622.8. Temporary shoring, particularly on the upslope side of the excavation would likely be required, and/or the excavation sloped in accordance with applicable federal (OSHA) and state standards. A smaller footprint with less excavation is anticipated for the drilled shaft alternative as the cap for the drilled shafts is expected to be considerably smaller than the dimensions for a spread footing, and the bottom of the cap would likely be set higher, within the overburden material, rather than at the top of rock.

The drilled shafts should be designed following the recommendations provided in the "*Report of Subsurface Exploration, Bridge and MSE Retaining Walls, SR 823 Over Portsmouth-Minford Road (SR 139), SCI-823-0.00 Portsmouth Bypass, Scioto County, Ohio*" (DLZ, 2006). Per DLZ's geotechnical report, the drilled shafts should be socketed a minimum of 5 feet into competent bedrock, and the shafts designed for tip resistance only, using an allowable bearing pressure of 40 tsf. Any side resistance provided by the overlying soils and from the shallow rock socket should be neglected. Per DLZ's report, deeper rock sockets (> 5 ft) can be utilized if adequate capacity cannot be developed through end bearing; however, it is recommended that the drilled shafts be designed such that the loads are carried entirely by the socket resistance and any end bearing ignored. DLZ recommends an allowable sidewall resistance of 7500 psf for the rock socket, and that any side resistance within the upper two feet of the rock socket be neglected.

6.4 Approach Embankments

As over 3 million cubic yards of waste material is currently estimated for Phase I of the Portsmouth Bypass project, consideration should be given to using durable rock fill to construct the bridge approach embankments. The use of durable rock rather than random fill materials will help to limit settlement at the bridge approaches (thus avoiding the bump that commonly occurs at the ends of the structure), as well as reduce the quarantine period for the embankments as settlement of the rock fill itself should occur relatively quickly. In addition, the stability of the embankment slopes will be improved as the rock fill provides a substantial increase in shear strength over that of random fill. The durable rock fill should be located within six times the height of the fill at the abutment location, and placed in accordance with Item 203 of the *Construction and Materials Specifications.*

6.4.1 Slope Stability

Based upon recommendations provided in the "*Report of Subsurface Investigation, Embankments (Station 416+00 to 509+50), Project SCI-823-6.81, Phase 1 – Stage 1, Scioto County, Ohio*" (DLZ, 2006), the embankment slope ratios beyond the ends of the bridge were set at 2H:1V. Stability analyses for the planned slopes were conducted in accordance with the guidelines and criteria established by the Ohio Department of Transportation using a minimum target factor of safety of 1.3 for both long and short term conditions as the abutments will be supported on pile foundations.

The soil and rock properties used in the stability analyses for the various strata encountered at the site are presented in Table 3. These parameters are based on previous values reported by DLZ in their "*Report of Subsurface Exploration, Bridge and MSE Retaining Walls, SR 823 Over Portsmouth-Minford Road (SR 139), SCI-823-0.00 Portsmouth Bypass, Scioto County, Ohio*" and their "*Response to Stage I Geotechnical Review Comments, Phase I*" dated March 7, 2008, as well as standard geotechnical correlations and engineering judgment.

Table 3: Soil Parameters Used in Stability Analyses

Zone	Soil Type	Unit Weight (pcf)	Strength Parameters			
			Undrained		Drained	
			c (psf)	Φ	c' (psf)	φ'
Fill	Compacted Embankment Fill	125	0	35	0	35[a]
Rock Toe	Select Rock Fill	130	0	38	0	38
Foundation Soil (Rear Abutment)	Medium Dense Sandy Silt	120	0	29	0	29
Foundation Soil (Forward Abutment)	Very Soft to Stiff Sandy Silt	120	1000	0	0	29
Bedrock	Sandstone and Siltstone	130	3500	45	3500	45

Note: a. Embankment fill consisting primarily of excavated rock (per DLZ).

The stability analyses were performed using the software package GSTABL7 with STEDwin. This program is a Windows version of the computer program STABL as developed by Purdue University through the support of the Indiana State Highway Commission. The program's capacity to analyze circular failure surfaces using the Modified Bishop's Method of Slices was used in these analyses. The results of the stability analyses are presented in Appendix E.

The planned 2H:1V embankment slopes at the forward abutment meet the minimum required factor of safety of 1.3 under both short and long-term conditions. As shown in the stability runs presented in Appendix E, factors of safety of 1.36 and 1.35 were calculated, respectively. However, at the rear abutment, the existing foundation soils encountered along Long Run Creek do not have sufficient strength for the planned embankment slopes to meet the targeted ODOT standard. As shown in Appendix E, a factor of safety of 1.24 was calculated for the rear approach embankment under both short and long term conditions. As such, an embankment toe key was modeled to lock the embankment into the relatively flat, existing ground and increase the shear strength of the foundation soils. Based on the stability analyses, the shear key will need to be constructed of durable rock fill and should extend to the top of bedrock. The base of the shear key should be a minimum of 8 feet in width, with front and back slopes of 1H:1V extending from the existing ground surface to the top of rock. As shown in the stability runs presented in Appendix E, the use of an embankment toe key is sufficient to increase the calculated factor of safety at the rear abutment to 1.31, exceeding the targeted ODOT standard of 1.3.

6.4.2 Embankment Settlement

Due to roadway design and grading requirements, the bridge abutments will be constructed on relatively large approach embankments. Based on the provided bridge plan (Figure 2), up to 35 feet of compacted fill is expected at the rear abutment, and over 58 feet of fill at the forward abutment. The magnitude of the embankment settlement will be a function of the consolidation of the existing foundation soils under the influence of the overlying fill and consolidation of the embankment fill itself under the influence of successive lifts. It is difficult to analyze settlement of the compacted embankment fill as the amount of settlement experienced will be dependent upon the materials, placement, and construction controls used to place the embankments. As such, a quarantine period and settlement monitoring is often recommended for critical embankment areas near project structures as inherent impacts such as downdrag and bending of piles, and rotation/differential stresses on the substructure units can occur if settlement is not allowed to progress to completion, or near completion, prior to substructure construction. Based upon research performed by the United States Bureau of Reclamation (Sherard et. al., 1963), consolidation within compacted embankment fill generally ranges between approximately one to four percent of the embankment height. Using proper placement and compaction of the embankment materials, and assuming one percent consolidation as the embankments will be constructed primarily of excavated rock, approximately 4 to 5 inches of settlement at the rear abutment and about 7 inches of settlement at the forward abutment can be expected. However, it is anticipated that most of this settlement will occur during construction of the embankment.

Settlement analyses were performed at Station 483+17 and Station 486+98 to assess the magnitude and duration of the expected settlement for the encountered foundation soils at the site as a result of the new embankment loading. As shown in Appendix E, settlement as a result of primary consolidation is estimated to be approximately 2 inches at Station 483+17 and approximately 1 inch at Station 486+98. The time needed to reach 90% consolidation is estimated at 107 days and 221 days respectively.

Due to the estimated 1 to 2 inches of consolidation settlement expected at the approach embankments, additional loading due to downdrag on the pile supported abutments is a concern. It is estimated that consolidation will take approximately two months from completion of the embankments to progress to the point where less than ½ inch of settlement has yet to occur (the point at which loading due to downdrag on the abutment piles is no longer a concern). As such, the embankments should be quarantined and monitored for a minimum of 60 days to allow the settlement to take place prior to the start of substructure construction. Provisions should be included in the contract to allow for an extension of the monitoring period without penalty if the settlement has not slowed to an acceptable rate over the 60 days.

6.4.3 Settlement Monitoring

Settlement monitoring should consist of the placement and monitoring of surface monuments to establish the time-settlement characteristics of the embankment fill and the underlying foundation soils once the embankments are complete. Surface monuments typically consist of a 6-inch diameter augured hole that is backfilled with concrete. A section of steel rebar (minimum length of 36 inches) is centered in the concrete, with the top of the reinforcing bar approximately ½ inch above the ground surface. (See Figure 4.) Recommended locations for the surface monuments are provided in Table 4.

Table 4 Recommended Locations for Surface Monuments

Approach Embankment	Station	Location
Rear	482+90, 40 feet LT	Roadway Shoulder
	482+70, 40 feet RT	Roadway Shoulder
Forward	487+70, 40 feet LT	Roadway Shoulder
	487+50, 40 feet RT	Roadway Shoulder

Weekly settlement monitoring should be performed, and the survey data collected over the quarantine period reviewed by the District to establish the time-settlement characteristics of each approach embankment. The quarantine period could be refined and possibly shortened at the direction of the District should the data collected during the quarantine period show negligible settlement at a time less than the recommended 60 days. Conversely, if the data shows that settlement is continuing at a magnitude or rate deemed unacceptable by the District at the end of the 60 day period, the quarantine period should be extended as required.

7.0 RECOMMENDATIONS

General and specific recommendations are provided in this section and include foundation details as well as locations for geotechnical treatments for the approach embankments based on the proposed bridge design.

7.1 Foundation Design

Table 5 provides a summary of the foundation design parameters for Bridge No. SCI-823-0917 L, based on review of the previous geotechnical exploration programs at the site, the encountered subsurface conditions, laboratory tests performed on representative soil and rock samples, and our engineering analyses. Driven H-piles are recommended to support the rear and forward abutments, and recommendations for both spread footings and drilled shafts are provided for the bridge piers.

7.1.1 Rear Abutment

- It is recommended that the rear abutment be founded upon steel H piles driven to absolute refusal on the underlying bedrock. An allowable axial stress of 12.5 ksi is recommended for a Grade 50 H-pile bearing on bedrock.
- The allowable pile capacities provided in Section 202.2.3.2a of the *Bridge Design Manual* do not include section loss due to corrosion. As corrosivity testing was not performed on the potential embankment material, a corrosive environment should be assumed, and the pile dimensions should be reduced by 1/16 inch when computing the area of the pile.
- Standard pile tip reinforcement is recommended per Section 202.2.3.2.a of the ODOT *Bridge Design Manual.*
- An average pile length of 29 feet is anticipated based on the encountered subsurface conditions at Borings B-003-0-08 and the design elevations presented in Table 5.
- It is recommended that the steel H-piles be installed through pile windows constructed during placement of the approach abutment fill. The pile window should extend 3 feet laterally beyond the outer edges of the piles in all directions, with the vertical extent of the window from the bottom of the abutment pile cap to the existing ground surface. The pile window should be constructed of Type C Granular Material (Item 703.16 of the *Construction and Material Specifications*).
- The abutment should be designed based on an active earth pressure condition using a unit weight of 125 pcf and an angle of internal friction of 35 degrees plus any surface surcharge. To account for traffic loading, a surcharge equivalent to 2 feet of soil ($\gamma = 120$ pcf) should be applied. Please note that no hydrostatic pressure has been included in the recommended design earth pressure. As such, drainage provisions for the abutment should be provided.

Table 5: Summary of Foundation Design Parameters

Substructure Unit	Rear Abutment	Forward Abutment	Pier 1	Pier 2	Pier 3	Pier 1	Pier 2	Pier 3
Foundation Type	Driven Piles	Driven Piles	Spread Footing	Spread Footing	Spread Footing	Drilled Shafts	Drilled Shafts	Drilled Shafts
Proposed Bottom of Footing/Pile Cap (El.)	685.87	676.78	623.3	622.7	623.0	TBD	TBD	TBD
Top of Bedrock (El.)	659.0	623.0	624.0 to 624.5	624.0 to 625.0	623.0 to 623.5	624.0 to 624.5	624.0 to 625.0	623.0 to 623.5
Estimated Tip Elevation (El.)	658.5	622.0	NA	NA	NA	618.3 (1)	617.7 (1)	618.0 (1)
Estimated Pile Length 2,3	29 ft	56 ft	NA	NA	NA	NA	NA	NA
Allowable Axial Stress 4,5	12.5 ksi	12.5 ksi	NA	NA	NA	NA	NA	NA
Minimum Length of Rock Socket 1,6	NA	NA	NA	NA	NA	5 ft	5 ft	5 ft
Allowable Side Resistance of Rock Socket 6,7,8	NA	NA	NA	NA	NA	7500 psf	7500 psf	7500 psf
Allowable Bearing Capacity	NA	NA	35 tsf	35 tsf	35 tsf	40 tsf (6)	40 tsf (6)	40 tsf (6)

Notes:
1. The design lengths for the rock sockets and corresponding tip elevations to be determined using the axial and lateral loads
2. Average Length based on encountered bedrock elevation at the test boring locations
3. Includes 1-foot embedment into cap
4. Allowable horizontal or lateral load to be developed in battered piles
5. Allowable Axial Stress does not include section loss due to corrosivity
6. Per "*Report of Subsurface Exploration, Bridge and MSE Retaining Walls, SR 823 Over Portsmouth-Minford Road (SR 139), SCI-823-0.00 Portsmouth Bypass, Scioto County, Ohio*" (DLZ, 2006)
7. Neglect the upper two feet of the rock socket. (per DLZ recommendations)
8. If side resistance of the rock socket is utilized (length of socket >5 feet), the design load should be carried entirely by the side resistance, ignoring any end bearing. (per DLZ recommendations)
9. TBD = to be determined
10. NA = not applicable

7.1.2 Forward Abutment

- It is recommended that the forward abutment be founded upon steel H piles driven to absolute refusal on the underlying bedrock. As allowable axial stress of 12.5 ksi is recommended for a Grade 50 H-pile bearing on bedrock.
- The allowable pile capacities provided in Section 202.2.3.2a of the *Bridge Design Manual* do not include section loss due to corrosion. As corrosivity testing was not performed on the potential embankment material, a corrosive environment should be assumed, and the pile dimensions should be reduced by 1/16 inch when computing the area of the pile.
- Standard pile tip reinforcement is recommended per Section 202.2.3.2.a of the ODOT *Bridge Design Manual.*
- An average pile length of 56 feet is anticipated based on the encountered subsurface conditions at Borings TR-15, and the design elevations presented in Table 5.
- It is recommended that the steel H-piles be installed through pile windows constructed during placement of the approach abutment fill. The pile window should extend 3 feet laterally beyond the outer edges of the piles in all directions, with the vertical extent of the window from the bottom of the abutment pile cap to the existing ground surface. The pile window should be constructed of Type C Granular Material (Item 703.16 of the *Construction and Material Specifications*).
- The abutment should be designed based on an active earth pressure condition using a unit weight of 125 pcf and an angle of internal friction of 35 degrees plus any surface surcharge. To account for traffic loading, a surcharge equivalent to 2 feet of soil ($\gamma = 120$ pcf) should be applied. Please note that no hydrostatic pressure has been included in the recommended design earth pressure. As such, drainage provisions for the abutment should be provided.

7.1.3 Pier 1

It is recommended that drilled shafts be used to support Pier 1 as a drilled shaft foundation may be more cost effective than a spread footing given that the approach embankments will be in-place prior to the construction of the substructure units. For a drilled shaft foundation , a smaller footprint with less excavation is anticipated as the pier cap is expected to be smaller than a spread footing and the bottom of the cap would likely be located within the overburden, rather than at the top of rock. Please note that as a cost analysis of the foundation alternatives were not performed as part of this geotechnical study, recommendations for both drilled shafts and spread footings are provided should spread footings prove to be more economical.

Drilled Shafts

- Design recommendations for drilled shafts are located in Table 5 and in the "*Report of Subsurface Exploration, Bridge and MSE Retaining Walls, SR 823 Over Portsmouth-Minford Road (SR 139), SCI-823-0.00, Portsmouth Bypass, Scioto County, Ohio*" (DLZ, 2006). It should be noted that deeper rock sockets (> 5 ft) can be utilized if adequate capacity cannot be developed through end bearing; however, the drilled shafts should be designed such that the loads are carried entirely by side resistance of the rock socket and any end bearing ignored.

Spread Footings Bearing on Rock

- A bottom of footing elevation of 623.3 is recommended based on the subsurface conditions encountered at Borings TR-18 and TR-19.

- The footings should be designed using an allowable bearing capacity of 35 tsf and a friction factor of 0.7 for cast-in-place footings on bedrock.
- Due to the potential for variations in the top of bedrock beneath the footing from that encountered at Borings TR-18 and TR-19, provisions should be included in the construction plans for overexcavation and backfill with Class C concrete. If unacceptable bearing material is encountered at or below the proposed bottom of footing, the unacceptable materials should be removed to the top of rock, and the minimum bottom of footing reestablished using Class C concrete. Any overexcavation should be stepped and have a level bottom.
- As the approach embankment will be placed prior to construction of the substructure units, an excavation of approximately 21 feet will be required to construct the footing. As such, the footing excavation for Pier 1 will require temporary shoring, particularly on the upslope side of the excavation.

7.1.4 Pier 2

The use of drilled shafts is recommended for Pier 2 due to the close proximity of the bridge piers to Long Run Creek. A smaller footprint with less excavation is anticipated for a drilled shaft foundation as compared to a spread footing, possibly eliminating the need for construction of a temporary cofferdam within the creek. However, a cost analysis of the foundation alternatives was not performed as part of this geotechnical study, and recommendations for both drilled shafts and spread footings are provided should spread footings prove to be more economical.

Drilled Shafts

- Design recommendations for drilled shafts are located in Table 5 and in the "*Report of Subsurface Exploration, Bridge and MSE Retaining Walls, SR 823 Over Portsmouth-Minford Road (SR 139), SCI-823-0.00, Portsmouth Bypass, Scioto County, Ohio*" (DLZ, 2006). It should be noted that deeper rock sockets (> 5 ft) can be utilized if adequate capacity cannot be developed through end bearing; however, the drilled shafts should be designed such that the loads are carried entirely by the socket resistance and any end bearing ignored.

Spread Footings Bearing on Rock

- A bottom of footing elevation of 622.7 is recommended based on the subsurface conditions encountered at Borings B-11, B-12 and TR-17.
- The footings should be designed using an allowable bearing capacity of 35 tsf and a friction factor of 0.7 for cast-in-place footings on bedrock.
- Due to the potential for variations in the top of bedrock beneath the footing from that encountered at Borings B-11, B-12 and TR-17 , provisions should be included in the construction plans for overexcavation and backfill with Class C concrete. If unacceptable bearing material is encountered at or below the proposed bottom of footing, the unacceptable materials should be removed to the top of rock, and the minimum bottom of footing reestablished using Class C concrete. Any overexcavation should be stepped and have a level bottom.

7.1.5 Pier 3

Since the approach embankments will be in-place prior to the construction of the substructure units, it is recommended that drilled shafts be used to support Pier 3 as a drilled shaft foundation may be more cost effective due to the additional shoring and excavation costs associated with a spread footing. Recommendations for both drilled shafts and spread footing are provided should spread footings prove to be more economical.

Drilled Shafts

- Design recommendations for drilled shafts are located in Table 5 and in the "*Report of Subsurface Exploration, Bridge and MSE Retaining Walls, SR 823 Over Portsmouth-Minford Road (SR 139), SCI-823-0.00, Portsmouth Bypass, Scioto County, Ohio*" (DLZ, 2006). It should be noted that deeper rock sockets (> 5 ft) can be utilized if adequate capacity cannot be developed through end bearing; however, the drilled shafts should be designed such that the loads are carried entirely by the socket resistance and any end bearing ignored.

Spread Footings Bearing on Rock

- A bottom of footing elevation of 623.0 is recommended based on the subsurface conditions encountered at Borings B-10 and TR-16.
- The footings should be designed using an allowable bearing capacity of 35 tsf and a friction factor of 0.7 for cast-in-place footings on bedrock.
- Due to the potential for variations in the top of bedrock beneath the footing from that encountered at Borings B-10 and TR-16, provisions should be included in the construction plans for overexcavation and backfill with Class C concrete. If unacceptable bearing material is encountered at or below the proposed bottom of footing, the unacceptable materials should be removed to the top of rock, and the minimum bottom of footing reestablished using Class C concrete. Any overexcavation should be stepped and have a level bottom.
- As the approach embankment will be placed prior to construction of the substructure units, an excavation of approximately 13 feet will be required to place the bottom of footing at a consistent elevation. As such, the footing excavation for Pier 1 may require temporary shoring, particularly on the upslope side of the excavation.

7.1.6 Temporary Construction Issues for Excavations

All temporary excavations at the site should comply with the requirements of OSHA 29 CFR, part 1926, Subpart P, "Excavations and Trenches" and other applicable codes. The excavations are anticipated to encounter natural silts and sands, as well as newly placed embankment fill. Temporary slopes should be observed daily for signs of distress as exposure to the environment may weaken the soils should the excavations remain open for extended periods of time.

7.1.7 Groundwater Considerations

Based on review of the geotechnical recommendations provided in the "*Report of Subsurface Exploration, Bridge and MSE Retaining Walls, SR 823 Over Portsmouth-Minford Road (SR 139), SCI-823-0.00 Portsmouth Bypass, Scioto County, Ohio*" (DLZ, 2006), seepage was noted between approximate El. 624.5 and El. 626 at borings TR-15, TR-16 and TR-17, with no measurable water levels in the borings prior to rock coring. Based on experience, groundwater is likely to be encountered near the top of rock with some variation expected due to seasonal variations in the amount of rainfall, runoff and other factors not evident at the time the borings were completed. In addition, groundwater is expected to vary with the water level within nearby Long Run Creek. As such, the Contractor should anticipate that the pier foundation excavations will likely require dewatering. Any excavations near Long Run Creek should also be protected from stream and storm water flow.

7.2 Approach Embankments

The approach embankments at both the Forward and Rear Abutments should be constructed in accordance with the recommendations provided in the "*Report of Subsurface Investigation,* *Embankments (Station 416+00 to 509+50), Project SCI-823-6.81, Phase 1-Stage 1, Scioto County, Ohio*" (DLZ, 2006) with the following exceptions.

- It is recommended that the approach embankments be constructed of durable rock fill in order to limit settlement at the bridge approaches and potentially reduce the quarantine period for the embankments. The durable rock fill should extend a distance of six times the height of the fill (at the abutment) from the abutment location. The rock fill should be placed in accordance with Item 203 of the *Construction and Materials Specifications*.
- It is recommended that the rear approach embankment incorporate an embankment toe key and special benching in accordance with ODOT's Office of Geotechnical Engineering "*Geotechnical Bulletin GB2 - Special Benching and Sidehill Embankment Fills*".
    - The recommended shear key should be constructed of durable rock fill and extend completely through the foundation soils to the top of bedrock. The base of the shear key should be a minimum of 8 feet in width, with the front and back slopes of the key constructed at 1H:1V.
    - Special benching of the rear approach embankment will be required as the existing hillside is steeper than 4H:1V. Per GB2, the special benching is shown on the cross-sections in the project plans, and is performed in addition to, and in place of, standard specification benching (Item 203.05). In addition, Plan Note G110 from the ODOT *Location and Design Manual, Volume 3* needs to be included in the General Notes.
- It is currently anticipated that the approach embankments will be in-place prior to the start of construction of the proposed bridge structure. However, to ensure that settlement of the embankment fill and underlying soils has progressed sufficiently to avoid the effects of downdrag on the pile supported abutments, it is recommended that the embankments be quarantined and monitored for approximately 60 days after construction of the embankment fill is complete or prior to the start of pile driving for the abutments. A settlement monitoring program is recommended to establish the time-settlement characteristics of the embankment fill and underlying foundation soils. The recommended locations of the surface monuments are given in Table 4. If the data collected during the quarantine period shows negligible settlement at a time less than the recommended 60 days, than the quarantine period may be shortened at the direction of the District. Conversely, if the data shows settlement to be continuing at a magnitude or rate deemed unacceptable by the District at the end of the 60 day period, the quarantine period should be extended as appropriate.

8.0 LIMITATIONS

This report documents the findings and conclusions of HDR Engineering, Inc., for the geotechnical aspects related to the design of the proposed Bridge No. SCI-823-0917L SR 823 over Portsmouth-Minford Road (S.R. 139), in Scioto County, Ohio. The report has been prepared for the use of the Ohio Department of Transportation for specific application to the project, in accordance with generally accepted engineering practice and the parameters established by others from previous project geotechnical studies. No warranty, expressed or implied, is made. Any analyses or recommendations submitted are based on field explorations performed at the locations indicated, on specific laboratory tests on individual samples taken during the investigation, and information obtained from outside sources. The report and analyses do not reflect variations that could occur between borings or at other points in time. Variations in conditions, if any, may become evident during the construction period, at which time, a re-evaluation of the recommendations may become necessary. In the event of such changes, the recommendations and changes should be reviewed by HDR's geotechnical staff.

9.0 REFERENCES

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Estimated Construction Cost & Est. Quantities

Estimate SCI-823-0917L

Estimated Cost: $2,282,722.45

Contingency: 0.00%

Estimated Total: $2,282,722.45

SCI-823-6.81 (PID 19415) - Structure SCI-823-0917L - SFN 7306474L

Base Date: 03/09/11

Spec Year: 08

Unit System: E

Work Type: BRIDGE REPLACEMENT

Highway Type: SUPERPAVE ASPHALT CONCRETE

Urban/Rural Type: RURAL CLASS

Season: SPRING

County: SCIOTO

Midpoint of Latitude: 385130

Midpoint of Longitude: 825200

District: 9

Federal/State Project Number:

Estimate Type: Bridge Construction

Prepared by HDR Engineering, Inc. on 07/29/09

Line #	Item Number	Description / *Supplemental Description*	Quantity	Units	Unit Price	Extension

Group 0001: Structures over 20' Span

Line #	Item Number	Description	Quantity	Units	Unit Price	Extension
0001	203E20001	EMBANKMENT, AS PER PLAN	225.000	CY	$24.80000	$5,580.00
0002	503E21301	UNCLASSIFIED EXCAVATION, AS PER PLAN	1.000	LS	$7,500.00000	$7,500.00
0003	505E11100	PILE DRIVING EQUIPMENT MOBILIZATION	1.000	LS	$15,000.00000	$15,000.00
0004	507E00200	STEEL PILES HP12X53, FURNISHED	1,710.000	FT	$27.56078	$47,128.93
0005	507E00250	STEEL PILES HP12X53, DRIVEN	1,530.000	FT	$12.73640	$19,486.69
0006	507E93300	STEEL POINTS OR SHOES	36.000	EACH	$109.59909	$3,945.57
0007	509E10000	EPOXY COATED REINFORCING STEEL	324,437.000	LB	$0.90735	$294,377.91
0008	512E10100	SEALING OF CONCRETE SURFACES (EPOXY-URETHANE)	2,325.000	SY	$11.63178	$27,043.89
0009	515E15040	DRAPED STRAND PRESTRESSED CONCRETE BRIDGE I-BEAM MEMBERS, LEVEL 3, TYPE 4 MOD. (66")	20.000	EACH	$25,381.00000	$507,620.00
0010	515E20000	INTERMEDIATE DIAPHRAMS	48.000	EACH	$917.78605	$44,053.73
0011	516E13600	1" PREFORMED EXPANSION JOINT FILLER	88.000	SF	$5.77846	$508.50
0012	516E14021	SEMI-INTEGRAL ABUTMENT EXPANSION JOINT SEAL, AS PER PLAN	103.000	FT	$30.64075	$3,156.00
0013	516E44200	ELASTOMERIC BEARING WITH INTERNAL LAMINATES AND LOAD PLATE (NEOPRENE)	30.000	EACH	$887.53658	$26,626.10
0014	516E44300	ELASTOMERIC BEARING WITH INTERNAL LAMINATES AND LOAD PLATE (NEOPRENE)	10.000	EACH	$1,315.37239	$13,153.72
0015	518E21200	POROUS BACKFILL WITH FILTER FABRIC	117.000	CY	$57.33745	$6,708.48
0016	518E40000	6" PERFORATED CORRUGATED PLASTIC PIPE	127.000	FT	$9.11257	$1,157.30
0017	518E40012	6" NON-PERFORATED CORRUGATED PLASTIC PIPE	14.000	FT	$12.47791	$174.69
0018	601E32104	ROCK CHANNEL PROTECTION, TYPE B WITH FABRIC FILTER	297.000	CY	$50.04441	$14,863.19
0019	898E10200	QC/QA CONCRETE, CLASS QSC2, SUPERSTRUCTURE (DECK)	581.000	CY	$653.47533	$379,669.17
0020	898E10708	QC/QA CONCRETE, CLASS QSC2, SUPERSTRUCTURE (APPROACH SLAB), (T=17")	323.000	SY	$230.25000	$74,370.75
0021	898E11000	QC/QA CONCRETE, CLASS QSC2, SUPERSTRUCTURE (PARAPET)	72.000	CY	$576.71396	$41,523.41
0022	898E11001	QC/QA CONCRETE, CLASS QSC2, SUPERSTRUCTURE (PARAPET), AS PER PLAN	81.000	CY	$543.79260	$44,047.20
0023	898E20100	QC/QA CONCRETE, CLASS QSC1, SUBSTRUCTURE (PIER ABOVE FOOTING)	666.000	CY	$774.96399	$516,126.02
0024	898E20150	QC/QA CONCRETE, CLASS QSC1, SUBSTRUCTURE (ABUTMENT)	195.000	CY	$486.01978	$94,773.86
0025	898E20300	QC/QA CONCRETE, CLASS QSC1, SUBSTRUCTURE (FOOTING)	239.000	CY	$393.83824	$94,127.34

Total for Group 0001: $2,282,722.45

Estimate SCI-823-0917R

Estimated Cost: $2,368,089.93

Contingency: 0.00%

Estimated Total: $2,368,089.93

SCI-823-6.81 (PID 19415) - Structure SCI-823-0917R - SFN 7306474R

Base Date: 03/09/11

Spec Year: 08

Unit System: E

Work Type: BRIDGE REPLACEMENT

Highway Type: SUPERPAVE ASPHALT CONCRETE

Urban/Rural Type: RURAL CLASS

Season: SPRING

County: SCIOTO

Midpoint of Latitude: 385130

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Federal/State Project Number:

Estimate Type: Bridge Construction

Prepared by HDR Engineering, Inc. on 07/29/09

Line #	Item Number Description *Supplemental Description*	Quantity	Units	Unit Price	Extension

Group 0001: Structures over 20' Span

Line #	Item Number / Description	Quantity	Units	Unit Price	Extension
0001	203E20001 EMBANKMENT, AS PER PLAN	255.000	CY	$24.80000	$6,324.00
0002	503E21301 UNCLASSIFIED EXCAVATION, AS PER PLAN	1.000	LS	$7,500.00000	$7,500.00
0003	505E11100 PILE DRIVING EQUIPMENT MOBILIZATION	1.000	LS	$15,000.00000	$15,000.00
0004	507E00200 STEEL PILES HP12X53, FURNISHED	1,710.000	FT	$27.56078	$47,128.93
0005	507E00250 STEEL PILES HP12X53, DRIVEN	1,530.000	FT	$12.73640	$19,486.69
0006	507E93300 STEEL POINTS OR SHOES	36.000	EACH	$109.59909	$3,945.57
0007	509E10000 EPOXY COATED REINFORCING STEEL	323,466.000	LB	$0.90757	$293,568.04
0008	512E10100 SEALING OF CONCRETE SURFACES (EPOXY-URETHANE)	2,453.000	SY	$11.59370	$28,439.35
0009	515E15040 DRAPED STRAND PRESTRESSED CONCRETE BRIDGE I-BEAM MEMBERS, LEVEL 3, TYPE 4 MOD. (66")	20.000	EACH	$25,381.00000	$507,620.00
0010	515E20000 INTERMEDIATE DIAPHRAMS	48.000	EACH	$917.78605	$44,053.73
0011	516E13600 1" PREFORMED EXPANSION JOINT FILLER	184.000	SF	$5.14342	$946.39
0012	516E14021 SEMI-INTEGRAL ABUTMENT EXPANSION JOINT SEAL, AS PER PLAN	103.000	FT	$30.64075	$3,156.00
0013	516E44200 ELASTOMERIC BEARING WITH INTERNAL LAMINATES AND LOAD PLATE (NEOPRENE)	30.000	EACH	$887.53658	$26,62[illegible]10
0014	516E44300 ELASTOMERIC BEARING WITH INTERNAL LAMINATES AND LOAD PLATE (NEOPRENE)	10.000	EACH	$1,315.37239	$13,153.72
0015	518E21200 POROUS BACKFILL WITH FILTER FABRIC	117.000	CY	$57.33745	$6,708.48
0016	518E40000 6" PERFORATED CORRUGATED PLASTIC PIPE	127.000	FT	$9.11257	$1,157.30
0017	518E40012 6" NON-PERFORATED CORRUGATED PLASTIC PIPE	14.000	FT	$12.47791	$174.69
0018	601E32104 ROCK CHANNEL PROTECTION, TYPE B WITH FABRIC FILTER	297.000	CY	$50.04441	$14,863.19
0019	606E10210 SPECIAL - NOISE BARRIER (REFLECTIVE), OVER 10' TO 14' HEIGHT	4,180.000	SF	$20.00000	$83,600.00
0020	898E10200 QC/QA CONCRETE, CLASS QSC2, SUPERSTRUCTURE (DECK)	581.000	CY	$653.47533	$379,669.17
0021	898E10708 QC/QA CONCRETE, CLASS QSC2, SUPERSTRUCTURE (APPROACH SLAB), (T=17")	323.000	SY	$230.25000	$74,370.75
0022	898E11000 QC/QA CONCRETE, CLASS QSC2, SUPERSTRUCTURE (PARAPET)	72.000	CY	$576.71396	$41,523.41
0023	898E11001 QC/QA CONCRETE, CLASS QSC2, SUPERSTRUCTURE (PARAPET), AS PER PLAN	81.000	CY	$543.79260	$44,047.20
0024	898E20100 QC/QA CONCRETE, CLASS QSC1, SUBSTRUCTURE (PIER ABOVE FOOTING)	666.000	CY	$774.96399	$516,126.02
0025	898E20150 QC/QA CONCRETE, CLASS QSC1, SUBSTRUCTURE (ABUTMENT)	195.000	CY	$486.01978	$94,773.86
0026	898E20300 QC/QA CONCRETE, CLASS QSC1, SUBSTRUCTURE (FOOTING)	239.000	CY	$393.83824	$94,127.34

Total for Group 0001: $2,368,089.9[illegible]

SCI-823-0917 Bridge Estimated Quantities Right Bridge

Units Definition: $k \equiv 1000 \cdot lbf$ $\quad ksi \equiv \frac{k}{in^2}$ $\quad psi \equiv \frac{lbf}{in^2}$ $\quad psf \equiv \frac{lbf}{ft^2}$ $\quad plf \equiv \frac{lbf}{ft}$

Item 507 Bearing Piles:

Steel Piles HP12x53, Furnished:

Rear abutment:

Number of Piles: $N_{rabut} := 18$

Furnished Length: $L_{pilefr} := 35ft$

Rear Abut Furnished Length: $L_{trf} := N_{rabut} \cdot L_{pilefr}$ $\quad L_{trf} = 630.00\ ft$

Foward abutment:

Number of Piles: $N_{fabut} := 18$

Furnished Length: $L_{pileff} := 60ft$

Foward Abut Furnished Length: $L_{tff} := N_{fabut} \cdot L_{pileff}$ $\quad L_{tff} = 1080.00\ ft$

Right Bridge Total Furnished Pile Length:

$L_{tfurnished} := L_{tff} + L_{trf}$ $\quad L_{tfurnished} = 1710.00\ ft$

Steel Piles HP12x53, Driven:

Rear abutment:

Rear Abutment Driven Length: $L_{piledr} := 30ft$

Rear Abut Driven Length: $L_{trd} := N_{rabut} \cdot L_{piledr}$ $\quad L_{trd} = 540.00\ ft$

Foward Abutment Driven Length: $L_{piledf} := 55ft$

Foward Abut Driven Length: $L_{tfd} := N_{fabut} \cdot L_{piledf}$ $\quad L_{tfd} = 990.00\ ft$

Right Bridge Total Driven Pile Length:

$L_{tdriven} := L_{tfd} + L_{trd}$ $\quad L_{tdriven} = 1530.00\ ft$

Item 515 Draped Strand Prestressed Concrete Bridge I-Beam Members, Type 4 Mod. 66":

Number of Spans: $N_{span} := 4$

Number of Beams per Span: $N_{beams} := 5$

Total number of Beams: $Total_{beams} := N_{beams} \cdot N_{span}$ $\quad Total_{beams} = 20.00$

Item 515 Concrete Intermediate Diaphragms:

Number of Diaphragms per Span: $N_{dia} := 12$

Total Number of Diaphragms: $N_{diatotal} := N_{dia} \cdot N_{span}$ $\quad N_{diatotal} = 48.00$

Item 516 Elastomeric Bearing with Internal Laminates and Load Plate:

Piers:

Number of 22"x11"x3.5" Elastomeric Bearing: $Pier_{bearing} := 30$

Number of 26"x12"x2" Load Plate: $Pier_{loadpl} := 30$

Abutments:

Number of 22"x11"x4 1/8" Elastomeric Bearing: $Abut_{bearing} := 10$

Number of 23"x12"x2" Load Plate: $Abut_{loadpl1} := 10$

Number of 26"x16"x1.5" Load Plate: $Abut_{loadpl2} := 10$

Item 518 Porous Backfill with Filter Fabric:

Rear Abutment:

Height of Backfill $H_{rback} := 12.5ft$

Width of Backfill: $W_{rback} := 2.0ft$

Area of Porous Backfill: $A_{rback} := H_{rback} \cdot W_{rback}$ $A_{rback} = 25.00 \cdot ft^2$

Length of PorousBackfill: $L_{rback} := 63.29ft$

Rear Abutment Porous Backfill: $V_{rback} := A_{rback} \cdot L_{rback}$ $V_{rback} = 58.60 \cdot yd^3$

Foward Abutment:

Same as Rear Abutment

Total Porous Backfill: $V_{totalback} := 2 \cdot V_{rback}$ $V_{totalback} = 117.20 \cdot yd^3$

Item 518 Corrugated Plastic Pipe:

6" Perforated Corrugated Platic Pipe: $L_{pcpp} := L_{rback} \cdot 2$ $L_{pcpp} = 126.58\,ft$

6" Non-Perforated Corrugated Plastic Pipe: $L_{npcpp} := 14ft$

Item 601 Rock Channel Protection:

Channel Protection:

Rear Abutment: $L_{ripr} := 167ft$ (From Microstation)

$W_{ripr} := 14.5ft$ (From Microstation)

$H_{ripr} := 2.5ft$

Total Rear Abutment: $V_{ripr} := L_{ripr} \cdot W_{ripr} \cdot H_{ripr}$ $V_{ripr} = 224.21 \cdot yd^3$

Total Abutments: $V_{totalabutrip} := V_{ripr}$ $V_{totalabutrip} = 224.21 \cdot yd^3$

Piers: $L_{ripp} := 54.5ft$

Total Piers: $V_{ripp} := L_{ripp} \cdot W_{ripr} \cdot H_{ripr}$ $V_{ripp} = 73.17 \cdot yd^3$

Item 898 QA/QC Concrete QCS1:

Substructure (Pier Above Footing):

Pier 1:

Cap:

Cap Dimensions: $H_{c1} := 9.5ft$ $W_c := 4.75ft$ $L_{c3} := 15.0ft$

$H_{c2} := 4.0ft$ $L_{c1} := 49.0ft$

$H_{c3} := 5.5ft$ $L_{c2} := 19.0ft$

Cap Area: $A_c := (H_{c2} \cdot L_{c1}) + 2(.5 \cdot L_{c3} \cdot H_{c3}) + (L_{c2} \cdot H_{c3})$

$A_c = 383.00 \cdot ft^2$

Additional Cap Haunch for Bearings:

Bearing 1: $H_{b1} := .7ft$

$L_{b1} := 4.0625ft$

$A_{b1} := H_{b1} \cdot L_{b1}$ $A_{b1} = 2.84 \cdot ft^2$

Bearing 2: $H_{b2} := .85ft$

$L_{b2} := 15.23ft$

$A_{b2} := H_{b2} \cdot L_{b2}$ $A_{b2} = 12.95 \cdot ft^2$

Bearing 3: $H_{b3} := .57ft$

$L_{b3} := 11.01ft$

$A_{b3} := H_{b3} \cdot L_{b3}$ $A_{b3} = 6.28 \cdot ft^2$

Bearing 4: $H_{b4} := .29ft$

$L_{b4} := 14.95ft$

$A_{b4} := H_{b4} \cdot L_{b4}$ $A_{b4} = 4.34 \cdot ft^2$

Seismic Pedestal:

$H_{sp} := .34ft$

$L_{sp} := 2ft$

$A_{sp} := H_{sp} \cdot L_{sp}$ $A_{sp} = 0.68 \cdot ft^2$

Total Area of the Pier Cap:

$A_{tc} := A_c + A_{b1} + A_{b2} + A_{b3} + A_{b4} + 2 \cdot A_{sp}$ $A_{tc} = 410.76 \cdot ft^2$

Volume of Pier Cap:

$V_c := A_{tc} \cdot W_c$ $V_c = 72.26 \cdot yd^3$

Pier 1 Column:

$H_{col1} := 51.42ft$ $R_{col} := 2.25ft$

$L_{col1} := 19.0ft$ $W_{col} := 4.5ft$

$L_{col2} := 14.5ft$

Pier Column Cross Sectional Area: $A_{col} := \pi R_{col}^2 + (W_{col} \cdot L_{col2}) \quad A_{col} = 81.15 \cdot ft^2$

Pier 1 Column Volume:

$V_{col1} := A_{col} \cdot H_{col1} \quad V_{col1} = 154.55 \cdot yd^3$

Pier 2 Column:

$H_{col2} := 50.17ft$

Pier 1 Column Volume:

$V_{col2} := A_{col} \cdot H_{col2} \quad V_{col2} = 150.80 \cdot yd^3$

Pier 3 Column:

$H_{col3} := 48.0ft$

Pier 1 Column Volume:

$V_{col3} := A_{col} \cdot H_{col3} \quad V_{col3} = 144.27 \cdot yd^3$

Total Concrete Pier Above Footing:

$V_{piertotal} := 3V_c + V_{col1} + V_{col2} + V_{col3} \quad V_{piertotal} = 666.42 \cdot yd^3$

Substructure (Abutments):

Rear Abutment:

Footing: $L_{af} := 64.45ft \quad H_{af} := 3.0ft$

$W_{af} := 6.0ft$

Volume of Footing: $V_{af} := L_{af} \cdot W_{af} \cdot H_{af} \quad V_{af} = 42.97 \cdot yd^3$

Seat: $L_{as} := 51.95ft \quad H_{as} := 3.0ft$

$W_{as} := 3.9ft$

Volume of Seat: $V_{as} := L_{as} \cdot W_{as} \cdot H_{as} \quad V_{as} = 22.51 \cdot yd^3$

Backwall: $L_{ab} := 51.95ft \quad H_{ab} := 8.5ft$ Approx. since H varies

$W_{ab} := 3.9ft$

Volume of Backwall: $V_{ab} := L_{ab} \cdot W_{ab} \cdot H_{ab} \quad V_{ab} = 63.78 \cdot yd^3$

Wingwall: $L_{aw} := 12.5ft \quad H_{aw1} := 6.5ft$

$W_{aw} := 2.5ft \quad H_{aw2} := 5.0ft$

Volume of Wingwall: $V_{aw} := (L_{aw} \cdot W_{aw} \cdot H_{aw1}) + (L_{aw} \cdot W_{aw} \cdot H_{aw2}) - [(.5 \cdot 10ft \cdot 5ft) \cdot W_{aw}]$

$V_{aw} = 11.00 \cdot yd^3$

Volume Rear Abutment: $V_{rt} := V_{af} + V_{as} + V_{ab} + V_{aw} \quad V_{rt} = 140.26 \cdot yd^3$

Foward Abutment: Same as the Rear Abutment.

$V_{ft} := V_{rt}$ $\quad V_{ft} = 140.26 \cdot yd^3$

Total Concrete Abutments: $V_{abut} := V_{rt} + V_{ft}$ $\quad V_{abut} = 280.51 \cdot yd^3$

***Substructure (Footing)*:**

Pier Footings: $L_f := 23.0ft$ $\quad W_f := 15.0ft$

$H_f := 4.0ft$

Volume of Footing: $V_f := L_f \cdot H_f \cdot W_f$ $\quad V_f = 51.11 \cdot yd^3$

Number of Pier Footings: $N_f := 3$

Total Concrete Footings: $V_{tfooting} := N_f \cdot V_f$ $\quad V_{tfooting} = 153.33 \cdot yd^3$

Item 898 QA/QC Concrete QCS2:

Deck: $L_d := 400.77ft$ $\quad H_d := 8.5in$

$W_d := 48.46ft$

Volume of Deck: $V_d := L_d \cdot W_d \cdot H_d$ $\quad V_d = 509.51 \cdot yd^3$

Hauch: $W_h := 3.0ft$ $\quad H_h := 3.3125in$ (AVG)

Hauch Volume: $V_h := 5 \cdot (L_d \cdot W_h \cdot H_h)$ $\quad V_h = 61.46 \cdot yd^3$

Additional Concrete at Deck Overhang: $W_{ad} := 2.06ft$ $\quad H_{ad} := 2in$

Additional Concrete Volume: $V_{ad} := 2 \cdot (L_d \cdot W_{ad} \cdot H_{ad})$ $\quad V_{ad} = 10.19 \cdot yd^3$

Total Deck Concrete: $V_{decktotal} := V_d + V_h + V_{ad}$ $\quad V_{decktotal} = 581.16 \cdot yd^3$

42" Parapet (Per STD DWG SBR-1-99):

Parapet Area: $A_p := 4.222ft^2$

Parapet Length: $L_p := 461.25ft$

Total 42" Parapet: $V_p := A_p \cdot L_p$ $\quad V_p = 72.13 \cdot yd^3$

Parapet, As Per Plan:

Parapet Area: $A_{p2} := 4.7747ft^2$

Parapet Length: $L_{p2} := 460.58ft$

Total 57" Parapet: $V_{p2} := A_{p2} \cdot L_{p2}$ $\quad V_{p2} = 81.45 \cdot yd^3$

Approach Span:

Approach Span: $L_{app} := 30ft$ $\quad H_{app} := 18in$

$W_{app} := 48.46ft$

Total Approach Spans: $V_{app} := 2 \cdot (L_{app} \cdot W_{app} \cdot H_{app})$ $V_{app} = 161.53 \cdot yd^3$

Item 509 Epoxy Coated Reinforcing Steel:

Superstructure:

Deck: For this stage Deck Reinforcing is taken as 300 lb per CY

Deck Reinforcing: $D_R := V_{decktotal} \cdot 300 \frac{lb}{yd^3}$ $D_R = 174348.87 \cdot lb$

Total Superstructure Reinforcing $R_{super} := D_R$ $R_{super} = 174348.87 \cdot lb$

Pier:

Piers: For this stage Pier Reinforcing is taken as 160 lb per CY

Pier Reinforcing: $P_R := V_{piertotal} \cdot 160 \frac{lb}{yd^3}$ $P_R = 106626.43\,lb$

Pier Footings: For this stage Footing Reinforcing is taken as 80 lb per CY

Footing Reinforcing: $P_F := V_{tfooting} \cdot 80 \frac{lb}{yd^3}$ $P_F = 12266.67\,lb$

Pier Total Reinforcing: $R_{pier} := P_R + P_F$ $R_{pier} = 118893.10\,lb$

Abutments:

Abutments: For this stage Abutments Reinforcing is taken as 120 lb per CY

Abutment Reinforcing: $P_A := \left[(V_{abut} - 2 \cdot V_{af}) \cdot 120 \frac{lb}{yd^3} \right]$ $P_A = 23349.62\,lb$

Abtment Footings: For this stage Footing Reinforcing is taken as 80 lb per CY

Abutment Footing Reinforcing: $P_{FA} := (2 \cdot V_{af}) \cdot 80 \frac{lb}{yd^3}$ $P_{FA} = 6874.67\,lb$

Abutment Total Reinforcing: $R_A := P_A + P_{FA}$ $R_A = 30224.29\,lb$

Item 512 Sealing of Concrete Surfaces (Epoxy-Urethene):

Surface Areas:

Piers:

Top: $A_{pt} := W_c \cdot L_{c1}$ $A_{pt} = 232.75 \cdot ft^2$

Cap Face: $A_{tc} = 410.76 \cdot ft^2$

Cap Side: $A_{cs} := (W_c \cdot H_{c2}) + \left(\frac{H_{c3}}{\sin(20.14)} \cdot W_c\right)$ $A_{cs} = 46.19 \cdot ft^2$

Column Face:
Length of Buried Portion of Piers: $H_{nb1} := 18ft$ $H_{nb3} := 6.5ft$

$H_{nb2} := 5ft$

Pier 1: $A_{fp1} := L_{col2} \cdot (H_{col1} - H_{nb1})$ $A_{fp1} = 484.59 \cdot ft^2$

Pier 2: $A_{fp2} := L_{col2} \cdot (H_{col2} - H_{nb2})$ $A_{fp2} = 654.96 \cdot ft^2$

Pier 3: $A_{fp3} := L_{col2} \cdot (H_{col3} - H_{nb3})$ $A_{fp3} = 601.75 \cdot ft^2$

Column Side:
Pier 1: $A_{sp1} := 2\pi R_{col} \cdot (H_{col1} - H_{nb1})$ $A_{sp1} = 472.46 \cdot ft^2$

Pier 2: $A_{sp2} := 2\pi R_{col} \cdot (H_{col2} - H_{nb2})$ $A_{sp2} = 638.58 \cdot ft^2$

Pier 3: $A_{sp3} := 2\pi R_{col} \cdot (H_{col3} - H_{nb3})$ $A_{sp3} = 586.69 \cdot ft^2$

Total Surface Area of Exposed Pier:

$$A_{totalpier} := 3A_{pt} + 6A_{tc} + 6A_{cs} + 2A_{fp1} + 2A_{fp2} + 2A_{fp3} + A_{sp1} + A_{sp2} + A_{sp3}$$

$A_{totalpier} = 957.81 \cdot yd^2$

Abutments:
Length of Exposed Face of Abutment: $L_{exfa} := 8ft$

Length of Buried Portion of Face of Abutment: $L_{buraf} := 2.17ft$

Wingwalls:

Top: $A_{awt} := W_{aw} \cdot \frac{5ft}{\sin(26.57)} + 2.5ft \cdot W_{aw}$ $A_{awt} = 18.86 \cdot ft^2$

Face: $A_{awf} := (L_{aw} \cdot H_{aw1}) + (L_{aw} \cdot H_{aw2}) - (.5 \cdot 10ft \cdot 5ft) - (L_{buraf} \cdot L_{aw})$

$A_{awf} = 91.63 \cdot ft^2$

Number of Wingwalls: $N_{wing} := 2$

Wingwall Total Surface Area: $A_{wingtotal} := N_{wing} \cdot (A_{awf} + A_{awt})$ $A_{wingtotal} = 220.97 \cdot ft^2$

Abutment Face:

Face: $A_{aface} := L_{af} \cdot L_{exfa}$ $A_{aface} = 515.60 \cdot ft^2$

Total Exposed Surface Area Abutments: $A_{totalabut} := 2 \cdot A_{aface} + A_{wingtotal}$

$A_{totalabut} = 139.13 \cdot yd^2$

Superstructure:

Parapet 1 Height: $H_{p1} := 42in$

Parapet 2 Height: $H_{p2} := 57in$

Parapet 1 Width: $W_{p1} := 10in$

Parapet 2 Width: $W_{p2} := 6.75in$

Deck Length: $L_{ovd} := 30in$

Deck Height: $H_d = 0.71\,ft$

Hauch Height: $H_h = 0.28\,ft$

Beam Height: $H_{beam} := 66in$

Total Height Interior: $H_{int} := 9in + H_{p2} + W_{p2}$ $H_{int} = 6.06\,ft$

Total Height Exterior: $H_{ex} := 9in + 2H_{p1} + H_d + H_h + H_{beam} + W_{p1} + L_{ovd} + 26in + 8i$ $H_{ex} = 20.40\,ft$

Interior Area: $A_{int} := H_{int} \cdot L_{p2}$ $A_{int} = 2792.27 \cdot ft^2$

Interior Area: $A_{ex} := H_{ex} \cdot L_p$ $A_{ex} = 9409.98 \cdot f$

Total Superstructure Surface Area: $A_{super} := A_{int} + A_{ex}$ $A_{super} = 1355.81 \cdot yd^2$

Item 606 Noise Barrier :

Height of Barrier on Bridge: $H_{bar} := 9.5ft$

Length of Barrier along Bridge: $L_{bar1} := 420.0ft$

Height of Barrier Approaching Bridge: $H_{bar2} := 12ft$

Length of Barrier Approaching Bridge: $L_{bar2} := 15.82ft$

Area of Barrier: $A_{bar} := (H_{bar} \cdot L_{bar1}) + (H_{bar2} \cdot L_{bar2})$ $A_{bar} = 4179.84 \cdot ft^2$

Item 503 Unclassified Excavation, As Per Plan:

Insert as a Lump Sum Quantity.

Item 507 Steel Pile Points:

Number of Pile Points: $N_{pilepoints} := 36$

Item 203 Embankment, As Per Plan:

Pier Footing Area: $A_f := L_f \cdot W_f$ $A_f = 345.00\,ft^2$

Height of Soil Above Pier: (Taken From Microstation)

Pier 1: $H_{sp1} := 8ft$

Pier 2: $H_{sp2} := 5ft$

Pier 3: $H_{sp3} := 7ft$

Embankment Above Pier Footing: $V_{embank} := (A_f \cdot H_{sp1}) + (A_f \cdot H_{sp2}) + (A_f \cdot H_{sp3})$

$V_{embank} = 255.56\,yd^3$

Item 516 Semi-Integral Exp. Jt. Material:

Length of the Abutment Seat: $L_{ab} = 51.95\,ft$

Length of Exp. Jt. Material: $L_{aexjt} := L_{ab} \cdot 2$ $L_{aexjt} = 103.90\,ft$

Item 516 1" Exp. Jt. Material:

1" Exp. Jt. Material: $A_{expjt} := 184ft^2$

SCI-823-0917 Bridge Estimated Quantities Left Bridge

Units Definition: $k \equiv 1000 \cdot lbf$ $ksi \equiv \frac{k}{in^2}$ $psi \equiv \frac{lbf}{in^2}$ $psf \equiv \frac{lbf}{ft^2}$ $plf \equiv \frac{lbf}{ft}$

Item 507 Bearing Piles:

Steel Piles HP12x53, Furnished:

Rear abutment:

Number of Piles: $N_{rabut} := 18$

Furnished Length: $L_{pilefr} := 35ft$

Rear Abut Furnished Length: $L_{trf} := N_{rabut} \cdot L_{pilefr}$ $L_{trf} = 630.00\ ft$

Foward abutment:

Number of Piles: $N_{fabut} := 18$

Furnished Length: $L_{pileff} := 60ft$

Foward Abut Furnished Length: $L_{tff} := N_{fabut} \cdot L_{pileff}$ $L_{tff} = 1080.00\ ft$

Right Bridge Total Furnished Pile Length:

$L_{tfurnished} := L_{tff} + L_{trf}$ $L_{tfurnished} = 1710.00\ ft$

Steel Piles HP12x53, Driven:

Rear abutment:

Rear Abutment Driven Length: $L_{piledr} := 30ft$

Rear Abut Driven Length: $L_{trd} := N_{rabut} \cdot L_{piledr}$ $L_{trd} = 540.00\ ft$

Foward Abutment Driven Length: $L_{piledf} := 55ft$

Foward Abut Driven Length: $L_{tfd} := N_{fabut} \cdot L_{piledf}$ $L_{tfd} = 990.00\ ft$

Right Bridge Total Driven Pile Length:

$L_{tdriven} := L_{tfd} + L_{trd}$ $L_{tdriven} = 1530.00\ ft$

Item 515 Draped Strand Prestressed Concrete Bridge I-Beam Members, Type 4 Mod. 66":

Number of Spans: $N_{span} := 4$

Number of Beams per Span: $N_{beams} := 5$

Total number of Beams: $Total_{beams} := N_{beams} \cdot N_{span}$ $Total_{beams} = 20.00$

Item 515 Concrete Intermediate Diaphragms:

Number of Diaphragms per Span: $N_{dia} := 12$

Total Number of Diaphragms: $N_{diatotal} := N_{dia} \cdot N_{span}$ $N_{diatotal} = 48.00$

Item 516 Elastomeric Bearing with Internal Laminates and Load Plate:

Piers:

Number of 22"x11"x3.5" Elastomeric Bearing: $Pier_{bearing} := 30$

Number of 26"x12"x2" Load Plate: $Pier_{loadpl} := 30$

Abutments:

Number of 22"x11"x4 1/8" Elastomeric Bearing: $Abut_{bearing} := 10$

Number of 23"x12"x2" Load Plate: $Abut_{loadpl1} := 10$

Number of 26"x16"x1.5" Load Plate: $Abut_{loadpl2} := 10$

Item 518 Porous Backfill with Filter Fabric:

Rear Abutment:

Height of Backfill $H_{rback} := 12.5ft$

Width of Backfill: $W_{rback} := 2.0ft$

Area of Porous Backfill: $A_{rback} := H_{rback} \cdot W_{rback}$ $A_{rback} = 25.00 \cdot ft^2$

Length of PorousBackfill: $L_{rback} := 63.29ft$

Rear Abutment Porous Backfill: $V_{rback} := A_{rback} \cdot L_{rback}$ $V_{rback} = 58.60 \cdot yd^3$

Foward Abutment:

Same as Rear Abutment

Total Porous Backfill: $V_{totalback} := 2 \cdot V_{rback}$ $V_{totalback} = 117.20 \cdot yd^3$

Item 518 Corrugated Plastic Pipe:

6" Perforated Corrugated Platic Pipe: $L_{pcpp} := L_{rback} \cdot 2$ $L_{pcpp} = 126.58\,ft$

6" Non-Perforated Corrugated Plastic Pipe: $L_{npcpp} := 14ft$

Item 601 Rock Channel Protection:

Channel Protection:

Rear Abutment: $L_{ripr} := 167ft$ (From Microstation)

$W_{ripr} := 14.5ft$ (From Microstation)

$H_{ripr} := 2.5ft$

Total Rear Abutment: $V_{ripr} := L_{ripr} \cdot W_{ripr} \cdot H_{ripr}$ $V_{ripr} = 224.21 \cdot yd^3$

Total Abutments: $V_{totalabutrip} := V_{ripr}$ $V_{totalabutrip} = 224.21 \cdot yd^3$

Piers: $L_{ripp} := 54.5ft$

Total Piers: $V_{ripp} := L_{ripp} \cdot W_{ripr} \cdot H_{ripr}$ $V_{ripp} = 73.17 \cdot yd^3$

Item 898 QA/QC Concrete QCS1:

Substructure (Pier Above Footing):

Pier 1:
Cap:

Cap Dimensions: $H_{c1} := 9.5\text{ft}$ $\quad W_c := 4.75\text{ft}$ $\quad L_{c3} := 15.0\text{ft}$

$H_{c2} := 4.0\text{ft}$ $\quad L_{c1} := 49.0\text{ft}$

$H_{c3} := 5.5\text{ft}$ $\quad L_{c2} := 19.0\text{ft}$

Cap Area: $A_c := (H_{c2} \cdot L_{c1}) + 2(.5 \cdot L_{c3} \cdot H_{c3}) + (L_{c2} \cdot H_{c3})$

$A_c = 383.00 \cdot \text{ft}^2$

Additional Cap Haunch for Bearings:

Bearing 1: $H_{b1} := .39\text{ft}$

$L_{b1} := 4.0625\text{ft}$

$A_{b1} := H_{b1} \cdot L_{b1}$ $\quad A_{b1} = 1.58 \cdot \text{ft}^2$

Bearing 2: $H_{b2} := .87\text{ft}$

$L_{b2} := 15.23\text{ft}$

$A_{b2} := H_{b2} \cdot L_{b2}$ $\quad A_{b2} = 13.25 \cdot \text{ft}^2$

Bearing 3: $H_{b3} := .55\text{ft}$

$L_{b3} := 11.01\text{ft}$

$A_{b3} := H_{b3} \cdot L_{b3}$ $\quad A_{b3} = 6.06 \cdot \text{ft}^2$

Bearing 4: $H_{b4} := .3\text{ft}$

$L_{b4} := 14.95\text{ft}$

$A_{b4} := H_{b4} \cdot L_{b4}$ $\quad A_{b4} = 4.48 \cdot \text{ft}^2$

Seismic Pedestal:

$H_{sp} := .34\text{ft}$

$L_{sp} := 2\text{ft}$

$A_{sp} := H_{sp} \cdot L_{sp}$ $\quad A_{sp} = 0.68 \cdot \text{ft}^2$

Total Area of the Pier Cap:

$A_{tc} := A_c + A_{b1} + A_{b2} + A_{b3} + A_{b4} + 2 \cdot A_{sp}$ $\quad A_{tc} = 409.73 \cdot \text{ft}^2$

Volume of Pier Cap:

$V_c := A_{tc} \cdot W_c$ $\quad V_c = 72.08 \cdot \text{yd}^3$

Pier 1 Column:

$H_{col1} := 52.35\text{ft}$ $\quad R_{col} := 2.25\text{ft}$

$L_{col1} := 19.0\text{ft}$ $\quad W_{col} := 4.5\text{ft}$

$L_{col2} := 14.5\text{ft}$

Pier Column Cross Sectional Area: $A_{col} := \pi R_{col}^2 + (W_{col} \cdot L_{col2})$ $A_{col} = 81.15 \cdot ft^2$

Pier 1 Column Volume: $V_{col1} := A_{col} \cdot H_{col1}$ $V_{col1} = 157.35 \cdot yd^3$

Pier 2 Column: $H_{col2} := 50.71ft$

Pier 1 Column Volume: $V_{col2} := A_{col} \cdot H_{col2}$ $V_{col2} = 152.42 \cdot yd^3$

Pier 3 Column: $H_{col3} := 48.73ft$

Pier 1 Column Volume: $V_{col3} := A_{col} \cdot H_{col3}$ $V_{col3} = 146.47 \cdot yd^3$

Total Concrete Pier Above Footing:

$V_{piertotal} := 3V_c + V_{col1} + V_{col2} + V_{col3}$ $V_{piertotal} = 672.49 \cdot yd^3$

Substructure (Abutments):

Rear Abutment:

Footing: $L_{af} := 64.45ft$ $H_{af} := 3.0ft$
$W_{af} := 6.0ft$

Volume of Footing: $V_{af} := L_{af} \cdot W_{af} \cdot H_{af}$ $V_{af} = 42.97 \cdot yd^3$

Seat: $L_{as} := 51.95ft$ $H_{as} := 3.0ft$
$W_{as} := 3.9ft$

Volume of Seat: $V_{as} := L_{as} \cdot W_{as} \cdot H_{as}$ $V_{as} = 22.51 \cdot yd^3$

Backwall: $L_{ab} := 51.95ft$ $H_{ab} := 8.5ft$ Approx. since H varies
$W_{ab} := 3.9ft$

Volume of Backwall: $V_{ab} := L_{ab} \cdot W_{ab} \cdot H_{ab}$ $V_{ab} = 63.78 \cdot yd^3$

Wingwall: $L_{aw} := 12.5ft$ $H_{aw1} := 6.5ft$
$W_{aw} := 2.5ft$ $H_{aw2} := 5.0ft$

Volume of Wingwall: $V_{aw} := (L_{aw} \cdot W_{aw} \cdot H_{aw1}) + (L_{aw} \cdot W_{aw} \cdot H_{aw2}) - [(.5 \cdot 10ft \cdot 5ft) \cdot W_{aw}]$

$V_{aw} = 11.00 \cdot yd^3$

Volume Rear Abutment: $V_{rt} := V_{af} + V_{as} + V_{ab} + V_{aw}$ $V_{rt} = 140.26 \cdot yd^3$

Foward Abutment: Same as the Rear Abutment.

$V_{ft} := V_{rt}$ $\quad V_{ft} = 140.26 \cdot yd^3$

Total Concrete Abutments: $V_{abut} := V_{rt} + V_{ft}$ $\quad V_{abut} = 280.51 \cdot yd^3$

Substructure (Footing):

Pier Footings: $L_f := 23.0ft$ $\quad W_f := 15.0ft$

$H_f := 4.0ft$

Volume of Footing: $V_f := L_f \cdot H_f \cdot W_f$ $\quad V_f = 51.11 \cdot yd^3$

Number of Pier Footings: $N_f := 3$

Total Concrete Footings: $V_{tfooting} := N_f \cdot V_f$ $\quad V_{tfooting} = 153.33 \cdot yd^3$

Item 898 QA/QC Concrete QCS2:

Deck: $L_d := 400.77ft$ $\quad H_d := 8.5in$

$W_d := 48.46ft$

Volume of Deck: $V_d := L_d \cdot W_d \cdot H_d$ $\quad V_d = 509.51 \cdot yd^3$

Hauch: $W_h := 3.0ft$ $\quad H_h := 3.3125in$ (AVG)

Hauch Volume: $V_h := 5 \cdot (L_d \cdot W_h \cdot H_h)$ $\quad V_h = 61.46 \cdot yd^3$

Additional Concrete at Deck Overhang: $W_{ad} := 2.06ft$ $\quad H_{ad} := 2in$

Additional Concrete Volume: $V_{ad} := 2 \cdot (L_d \cdot W_{ad} \cdot H_{ad})$ $\quad V_{ad} = 10.19 \cdot yd^3$

Total Deck Concrete: $V_{decktotal} := V_d + V_h + V_{ad}$ $\quad V_{decktotal} = 581.16 \cdot yd^3$

42" Parapet (Per STD DWG SBR-1-99):

Parapet Area: $A_p := 4.222ft^2$

Parapet Length: $L_p := 400.58ft$

Total 42" Parapet: $V_p := A_p \cdot L_p$ $\quad V_p = 62.64 \cdot yd^3$

Parapet, As Per Plan:

Parapet Area: $A_{p2} := 4.7747ft^2$

Parapet Length: $L_{p2} := 460.58ft$

Total 57" Parapet: $V_{p2} := A_{p2} \cdot L_{p2}$ $\quad V_{p2} = 81.45 \cdot yd^3$

Approach Span:

Approach Span: $L_{app} := 30ft$ $\quad H_{app} := 18in$

$W_{app} := 48.46ft$

Total Approach Spans: $V_{app} := 2\cdot(L_{app}\cdot W_{app}\cdot H_{app})$ $\quad V_{app} = 161.53\cdot yd^3$

Item 509 Epoxy Coated Reinforcing Steel:

Superstructure:

Deck: For this stage Deck Reinforcing is taken as 300 lb per CY

Deck Reinforcing: $D_R := V_{decktotal}\cdot 300\frac{lb}{yd^3}$ $\quad D_R = 174348.87\cdot lb$

Total Superstructure Reinforcing: $R_{super} := D_R$ $\quad R_{super} = 174348.87\cdot lb$

Pier:

Piers: For this stage Pier Reinforcing is taken as 160 lb per CY

Pier Reinforcing: $P_R := V_{piertotal}\cdot 160\frac{lb}{yd^3}$ $\quad P_R = 107597.85\,lb$

Pier Footings: For this stage Footing Reinforcing is taken as 80 lb per CY

Footing Reinforcing: $P_F := V_{tfooting}\cdot 80\frac{lb}{yd^3}$ $\quad P_F = 12266.67\,lb$

Pier Total Reinforcing: $R_{pier} := P_R + P_F$ $\quad R_{pier} = 119864.51\,lb$

Abutments:

Abutments: For this stage Abutments Reinforcing is taken as 120 lb per CY

Abutment Reinforcing: $P_A := \left[\left(V_{abut} - 2\cdot V_{af}\right)\cdot 120\frac{lb}{yd^3}\right]$ $\quad P_A = 23349.62\,lb$

Abutment Footings: For this stage Footing Reinforcing is taken as 80 lb per CY

Abutment Footing Reinforcing: $P_{FA} := \left(2\cdot V_{af}\right)\cdot 80\frac{lb}{yd^3}$ $\quad P_{FA} = 6874.67\,lb$

Abutment Total Reinforcing: $R_A := P_A + P_{FA}$ $\quad R_A = 30224.29\,lb$

Item 512 Sealing of Concrete Surfaces (Epoxy-Urethene):

Surface Areas:

Piers:

Top: $A_{pt} := W_c\cdot L_{c1}$ $\quad A_{pt} = 232.75\cdot ft^2$

Cap Face: $A_{tc} = 409.73\cdot ft^2$

Cap Side: $A_{cs} := (W_c \cdot H_{c2}) + \left(\frac{H_{c3}}{\sin(20.14)} \cdot W_c\right)$ $\quad A_{cs} = 46.19 \cdot ft^2$

Column Face:
Length of Buried Portion of Piers: $H_{nb1} := 18ft$ $\quad H_{nb3} := 6.5ft$

$H_{nb2} := 5ft$

Pier 1: $A_{fp1} := L_{col2} \cdot (H_{col1} - H_{nb1})$ $\quad A_{fp1} = 498.07 \cdot ft^2$

Pier 2: $A_{fp2} := L_{col2} \cdot (H_{col2} - H_{nb2})$ $\quad A_{fp2} = 662.80 \cdot ft^2$

Pier 3: $A_{fp3} := L_{col2} \cdot (H_{col3} - H_{nb3})$ $\quad A_{fp3} = 612.34 \cdot ft^2$

Column Side:
Pier 1: $A_{sp1} := 2\pi R_{col} \cdot (H_{col1} - H_{nb1})$ $\quad A_{sp1} = 485.61 \cdot ft^2$

Pier 2: $A_{sp2} := 2\pi R_{col} \cdot (H_{col2} - H_{nb2})$ $\quad A_{sp2} = 646.21 \cdot ft^2$

Pier 3: $A_{sp3} := 2\pi R_{col} \cdot (H_{col3} - H_{nb3})$ $\quad A_{sp3} = 597.01 \cdot ft^2$

Total Surface Area of Exposed Pier:

$$A_{totalpier} := 3A_{pt} + 6A_{tc} + 6A_{cs} + 2A_{fp1} + 2A_{fp2} + 2A_{fp3} + A_{sp1} + A_{sp2} + A_{sp3}$$

$A_{totalpier} = 967.67 \cdot yd^2$

Abutments:
Length of Exposed Face of Abutment: $L_{exfa} := 8ft$

Length of Buried Portion of Face of Abutment: $L_{buraf} := 2.17ft$

Wingwalls:

Top: $A_{awt} := W_{aw} \cdot \frac{5ft}{\sin(26.57)} + 2.5ft \cdot W_{aw}$ $\quad A_{awt} = 18.86 \cdot ft^2$

Face: $A_{awf} := (L_{aw} \cdot H_{aw1}) + (L_{aw} \cdot H_{aw2}) - (.5 \cdot 10ft \cdot 5ft) - (L_{buraf} \cdot L_{aw})$

$A_{awf} = 91.63 \cdot ft^2$

Number of Wingwalls: $N_{wing} := 2$

Wingwall Total Surface Area: $A_{wingtotal} := N_{wing} \cdot (A_{awf} + A_{awt})$ $\quad A_{wingtotal} = 220.97 \cdot ft^2$

Abutment Face:

Face: $A_{aface} := L_{af} \cdot L_{exfa}$ $\quad A_{aface} = 515.60 \cdot ft^2$

Total Exposed Surface Area Abutments: $A_{totalabut} := 2 \cdot A_{aface} + A_{wingtotal}$

$A_{totalabut} = 139.13 \cdot yd^2$

Superstructure:

Parapet 1 Height: $H_{p1} := 42\text{in}$

Parapet 2 Height: $H_{p2} := 57\text{in}$

Parapet 1 Width: $W_{p1} := 10\text{in}$

Parapet 2 Width: $W_{p2} := 6.75\text{in}$

Deck Length: $L_{ovd} := 30\text{in}$

Deck Height: $H_d = 0.71\,\text{ft}$

Hauch Height: $H_h = 0.28\,\text{ft}$

Beam Height: $H_{beam} := 66\text{in}$

Total Height Interior: $H_{int} := 9\text{in} + H_{p2} + W_{p2}$ $H_{int} = 6.06\,\text{ft}$

Total Height Exterior: $H_{ex} := 9\text{in} + 2H_{p1} + H_d + H_h + H_{beam} + W_{p1} + L_{ovd} + 26\text{in} + 8\text{i}$ $H_{ex} = 20.40\,\text{ft}$

Interior Area: $A_{int} := H_{int} \cdot L_{p2}$ $A_{int} = 2792.27 \cdot \text{ft}^2$

Interior Area: $A_{ex} := H_{ex} \cdot L_p$ $A_{ex} = 8172.25 \cdot \text{ft}^2$

Total Superstructure Surface Area: $A_{super} := A_{int} + A_{ex}$ $A_{super} = 1218.28 \cdot \text{yd}^2$

Item 503 Unclassified Excavation, As Per Plan:

Insert as a Lump Sum Quantity.

Item 507 Steel Pile Points:

Number of Pile Points: $N_{pilepoints} := 36$

Item 203 Embankment, As Per Plan:

Pier Footing Area: $A_f := L_f \cdot W_f$ $A_f = 345.00\,\text{ft}^2$

Height of Soil Above Pier: (Taken From Microstation)

Pier 1: $H_{sp1} := 8\text{ft}$

Pier 2: $H_{sp2} := 5\text{ft}$

Pier 3: $H_{sp3} := 7\text{ft}$

Embankment Above Pier Footing: $V_{embank} := (A_f \cdot H_{sp1}) + (A_f \cdot H_{sp2}) + (A_f \cdot H_{sp3})$

$V_{embank} = 255.56\,\text{yd}^3$

Item 516 Semi-Integral Exp. Jt. Material:

Length of the Abutment Seat: $L_{ab} = 51.95\,ft$

Length of Exp. Jt. Material: $L_{aexjt} := L_{ab} \cdot 2$ $L_{aexjt} = 103.90\,ft$

Item 516 1" Exp. Jt. Material:

1" Exp. Jt. Material: $A_{expjt} := 88ft^2$