

Eagle Project Contract No. 18FH012

**Gold Line Segment 1A (GL1A)
IFC DESIGN SUBMITTAL**

Rev. 0

Date of Submittal: 6/3/2013

Submitting Organization:

Concessionaire: Denver Transit Partners (DTP)
Subcontractors: Denver Transit Constructors (DTC) & Fluor/HDR

**Clay Street Outfall Bridge Load Rating Calculations
(Submitted as part of CDRL 7B-05.07A)**

Status: Submitted for Information Only
Category: Final

Rev. No.	Design Package No. or Description	Date
0	Issued for Construction, CDRL #7B-05.07A	6/3/2013

Signature



Scott Wharton, FHDR Design Manager

Signature:



Jon Updike, DTP Engineering Manager

Having checked this item of Contract Data, I hereby certify that it conforms to the requirements of the Concession Agreement in all respects, except as specifically indicated.

DENVER TRANSIT PARTNERS LOAD RATING SUMMARY

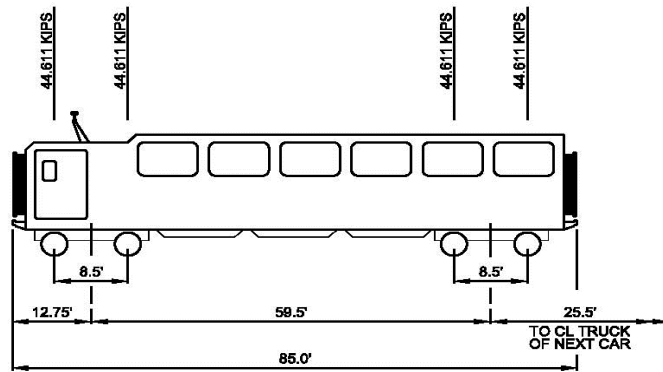
Structure Name : Clay St. Bridge	Structure # :
Corridor : GL1	Structure Type : 42" Prestressed Box Girder
Ballasted / Direct Fixation	

SUMMARY

VEHICLE	NORMAL	MAXIMUM
DTP EMU (178.44 K)	255	407
Alternative Live Load (290 K)	N/A	N/A
Alternative Live Load (290 K)	N/A	N/A
AREMA Cooper E80	N/A	N/A

BREAKDOWN OF BRIDGE RATING

BRIDGE COMPONENT	NORMAL			MAXIMUM		
	DTP EMU (178.44 K)	ALT. LL (290 K)	AREMA Cooper E80	DTP EMU (178.44 K)	ALT. LL (290 K)	AREMA Cooper E80
SPAN 1	255	N/A	N/A	407	N/A	N/A



LIVE LOADING DIAGRAM - DTP ELECTRICAL MULTIPLE UNIT (EMU)
(ONE CAR SHOWN - 8 CARS OPERATING MAXIMUM)

Comments

Rated by Josh Heigert	Date 2/6/2013	Checked by Lorena Piedrahita	Date 2/6/2013
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Project: RTD ~ EAGLE P3	Computed: JPH	Date: 2/6/2013
Subject: GL1 ~ Clay Street	Checked: LLP	Date: 2/6/2013
Task: Bridge Rating Summary - EMU Load	Page: 2/B	of: 3
Job #: 178637	No:	

P:\HDR Denver\RTD P3 Design Build\Clay Street Bridge\6.08_Structures\Ratings\Rating Calcs - Clay St EMU.xlsx

Summary of Rating Calculations

EMU Live Load Vehicle 178.44 kip

		Normal		Maximum	
		Rating		Rating	
		Factor	Load	Factor	Load
SPAN 1, Typical	Shear	2.05	365.69 K	Shear	609.48 K
	Moment	1.43	255.33 K	Moment	425.54 K
	Conc. Ten	2.09	372.19 K	Conc. Ten	407.14 K
	Conc. Comp.	4.07	726.16 K	Conc. Comp.	908.41 K

Project: **SPAN 1, Typical**

Computed by: **JPH** Date: **2/6/2013**

Checked by: **LLP** Date: **2/6/2013**

Shear

$$\Phi V_n = \Phi(V_c + V_s)$$

$$V_s = \text{Min}(A_v f_y d / s, 8(f'_c)^{0.5} bd)$$

Where:

$$\Phi = \underline{\mathbf{0.9}}$$

$$A_v = \underline{\mathbf{0.62}} \text{ (in}^2\text{)}$$

$$f_y = \underline{\mathbf{60000}} \text{ (psi)}$$

$$f'_c = \underline{\mathbf{8500}} \text{ (psi)}$$

$$d = \underline{\mathbf{39.75}} \text{ (in)}$$

$$b = \underline{\mathbf{12}} \text{ (in)}$$

$$s = \underline{\mathbf{6}} \text{ (in)}$$

$$V_c = \underline{\mathbf{257.4}} \text{ (kips - Conspan Results)}$$

$$V_s = \underline{\mathbf{246.5}} \text{ (kips)}$$

$$\Phi V_n = \underline{\mathbf{453.5}} \text{ (kips)}$$

$$V_{DL} = \underline{\mathbf{98.6}} \text{ (kips - Conspan Results)}$$

$$V_{LL+1} = \underline{\mathbf{77.7}} \text{ (kips - Conspan Results)}$$

Normal Rating (Arema - Eq 19-7)

$$\text{LFN} = [(\Phi V_n - 1.1(V_{DL}))] / [1.3 * (5/3) * (V_{LL+1})]$$

$$\text{LFN} = \underline{\mathbf{2.05}}$$

Maximum Rating (Arema - Eq 19-10)

$$\text{LFN} = [(\Phi V_n - 1.1(V_{DL}))] / [1.3 * (V_{LL+1})]$$

$$\text{LFM} = \underline{\mathbf{3.42}}$$

Moment

$$\Phi M_n = \underline{\mathbf{4588.7}} \text{ (k-ft - Conspan Results)}$$

$$M_{DL} = \underline{\mathbf{1525.7}} \text{ (k-ft - Conspan Results)}$$

$$M_{LL+1} = \underline{\mathbf{938.8}} \text{ (k-ft - Conspan Results)}$$

Normal Rating

(Arema - Eq 19-7)

$$\text{LFN} = [(\Phi M_n - 1.1(M_{DL}))] / [1.3 * (5/3) * (M_{LL+1})]$$

$$\text{LFN} = \underline{\mathbf{1.43}}$$

Maximum Rating

(Arema - Eq 19-10)

$$\text{LFN} = [(\Phi M_n - 1.1(M_{DL}))] / [1.3 * (M_{LL+1})]$$

$$\text{LFM} = \underline{\mathbf{2.38}}$$

Prestressed Concrete Tension (Final)

$$S_f = 1.2 * (7.5 * (f'_c)^{0.5})$$

$$S_f = \underline{\mathbf{829.8}} \text{ (psi)}$$

$$f_{DL} = \underline{\mathbf{1147.7}} \text{ (psi - Conspan Results)}$$

$$f_{PS} = \underline{\mathbf{1929.2}} \text{ (psi - Conspan Results)}$$

$$f_{LL+1} = \underline{\mathbf{706.2}} \text{ (psi - Conspan Results)}$$

Normal Rating (Arema - Eq 19-1)

$$\text{SLN} = [(S_f / 1.2) - (f_{DL} - f_{PS})] / f_{LL+1}$$

$$\text{SLN} = \underline{\mathbf{2.09}}$$

Maximum Rating (Arema - Eq 19-4)

$$\text{SLM} = [S_f - (f_{DL} - f_{PS})] / f_{LL+1}$$

$$\text{SLM} = \underline{\mathbf{2.28}}$$

Prestressed Concrete Compression (Final)

$$S_f = 1.2 * (0.4 * f'_c)$$

$$S_f = \underline{\mathbf{4080.0}} \text{ (psi)}$$

$$f_{DL} = \underline{\mathbf{1082.0}} \text{ (psi - Conspan Results)}$$

$$f_{PS} = \underline{\mathbf{391.4}} \text{ (psi - Conspan Results)}$$

$$f_{LL+1} = \underline{\mathbf{665.8}} \text{ (psi - Conspan Results)}$$

Normal Rating (Arema - Eq 19-1)

$$\text{SLN} = [(S_f / 1.2) - (f_{DL} - f_{PS})] / f_{LL+1}$$

$$\text{SLN} = \underline{\mathbf{4.07}}$$

Maximum Rating (Arema - Eq 19-4)

$$\text{SLM} = [S_f - (f_{DL} - f_{PS})] / f_{LL+1}$$

$$\text{SLM} = \underline{\mathbf{5.09}}$$

Normal Rating

1.43 Moment @ 0.5L

Maximum Rating

2.28 Prestressed Concrete Tension @ 0.5L



HDR - USA

Sheet #	DS-1
Job #	
By	JPH
Date	Nov/13/2012
Checked	TMS
Date	Nov/15/2012

Program: LEAP® CONSPAN® V8i (SELECTseries 1)

Version: Version: 09.00.03.01

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Phone: 1-800-778-4277

File Name: ClayStreet - Typical.csl

PROJECT DATA

Project:	RTD EAGLE P3 - Clay Street Bridge
Designer:	JPH
Date:	Nov/13/2012
Checked By:	TMS
Date Checked:	Nov/15/2012
User job number:	
State:	CO, State Job #:
State Specification:	None
Design Mode:	AASHTO Standard (LFD)- US Units [17th Edition, 2003]
Flared Girder:	No
Comments:	Typical condition case
File Name:	P:\HDR Denver\RTD P3 Design Build\Clay Street Bridge\6.08_Structures\Superstructure\Girder Design\ClayStreet - Typical.csl



HDR - USA

Sheet #	DS-2
Job #	
By	JPH
Date	Nov/13/2012
Checked	TMS
Date	Nov/15/2012

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GEOMETRY DATA

BRIDGE LAYOUT

Overall Width (ft)	14.000
Left curb (ft)	0.000
Right curb (ft)	0.000
curb-to-curb width (ft)	14.000
Number of spans	1
Number of lanes	1
Lane width (ft)	12.000
Eff Deck thick (in)	0.000
Sacrificial thick (in)	0.000
Haunch thickness (in)	0.000
Haunch width (in)	0.000
Bridge c/s,MI(lxx) (in4)	670661.50

SPAN DATA

Precast length, ft =	59.330
Bearing-to-bearing, ft =	58.000
Release span, ft =	59.330

BEAM DATA

No	ID	Loc-prev ft	Area in2	MI(lxx) in4	Height in	Yb in	B-topg in	B-trib ft
1	BX 42	3.500	1314.0	335330.8	42.00	21.99	72.00	7.000
2	BX 42	7.000	1314.0	335330.8	42.00	21.99	72.00	7.000

MATERIAL DATA - Project Level

As defined in Material Tab. For beam level properties look at Beam Specific output.

CONCRETE PROPERTIES

	Precast	C.I.P
f'c (psi)	8500.000	4500.000
Wc (pcf)	150.000	150.000
Ec (ksi)	5255.000	3824.000
f'ci (psi)	6500.000	
Eci (ksi)	4595.000	

STRAND AND REBAR PROPERTIES



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Sheet # DS-3

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PRESTRESSED STEEL:

6/10-270K-LL, Low relaxation strands

Straight Pattern

Strand Diameter = 0.600 in

Ult. Strength(f_s) = 270.0 ksi

Strand Area = 0.217 in²

Use transformed strand and rebar: Strand Only

REINFORCING STEEL:

Tension/Shear steel: f_y = 60.0 ksi E_s = 29000 ksi f_s = 24.0 ksi



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Date Nov/15/2012

LOADS DATA

Loads generated using Permanent Load Wizard: NO

LOADS ON PRECAST - NONE

DIAPHRAGM LOADS - NONE

LOADS ON COMPOSITE

UNITS: (Point: kips, Location: ft, Line: klf, Trapez: klf, Area: ksf, Width: ft)

Span	DL/ADL	Type	Mag.1	Loc.1/Width	Mag.2	Loc.2	Description
1	DL	Line	0.799	0.000	0.799	58.000	Walkway, Ped Load & Fence
1	ADL	Line	3.720	0.000	3.720	58.000	Ballast, Track & Utilities

LIVE LOADS

Live load deflection: not included.

ID: DTP Selected EMU (1 Car) (Type: Truck Load)

ID: DTP Selected EMU (2 Cars) (Type: Truck Load)

ID: DTP Selected EMU (3 Cars) (Type: Truck Load)

Pedestrian Load: 0.21 plf



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Sheet # DS-5

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LIVE LOADS USED

LIVE LOAD LIBRARY: default.cs4

1 ID: DTP Selected EMU (1 Car)
Description: DTP Selected EMU (1 Car)
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 = 44.61 k, Wheel Spacing = 4.71 ft, Truck Width = 10.00 ft

#	Magnitude, k	Max Spacing, ft	Min Spacing, ft	Increment, ft
1	44.61	8.50	8.50	0.00
2	44.61	51.00	51.00	0.00
3	44.61	8.50	8.50	0.00

2 ID: DTP Selected EMU (2 Cars)
Description: DTP Selected EMU (2 Cars)
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 = 44.61 k, Wheel Spacing = 4.71 ft, Truck Width = 10.00 ft

#	Magnitude, k	Max Spacing, ft	Min Spacing, ft	Increment, ft
1	44.61	8.50	8.50	0.00
2	44.61	51.00	51.00	0.00
3	44.61	8.50	8.50	0.00
4	44.61	17.00	17.00	0.00
5	44.61	8.50	8.50	0.00
6	44.61	51.00	51.00	0.00
7	44.61	8.50	8.50	0.00



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Sheet #	DS-6
Job #	
By	JPH
Date	Nov/13/2012
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File Name: ClayStreet - Typical.csl

3 ID: DTP Selected EMU (3 Cars)

Description: DTP Selected EMU (3 Cars)

Type: Truck Load

Uniform Load	Intensity, Location, Length,		
	klf	ft	ft
Preceding Load	0.00	0.00	0.00
Trailing Load	0.00	0.00	0.00

First Axle Magnitude = 44.61 k, Wheel Spacing = 4.71 ft, Truck Width = 10.00 ft

#	Magnitude,	Max Spacing,	Min Spacing,	Increment,
	k	ft	ft	ft
1	44.61	8.50	8.50	0.00
2	44.61	51.00	51.00	0.00
3	44.61	8.50	8.50	0.00
4	44.61	17.00	17.00	0.00
5	44.61	8.50	8.50	0.00
6	44.61	51.00	51.00	0.00
7	44.61	8.50	8.50	0.00
8	44.61	17.00	17.00	0.00
9	44.61	8.50	8.50	0.00
10	44.61	51.00	51.00	0.00
11	44.61	8.50	8.50	0.00



HDR - USA

Sheet #	DS-7
Job #	
By	JPH
Date	Nov/13/2012
Checked	TMS
Date	Nov/15/2012

Program: LEAP® CONSPAN® V8i (SELECTseries 1)

Version: Version: 09.00.03.01

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File Name: ClayStreet - Typical.csl

ANALYSIS DATA

ANALYSIS PARAMETERS DATA

Beam#	Moment impact	Shear impact
1	1.295	Same as moment
2	1.295	Same as moment

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	1.40
Beta-D:	1.00	1.00
Beta-L:	1.00 (Group 1)	1.67 (Group 1)



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Sheet #	DS-8
Job #	
By	JPH
Date	Nov/13/2012
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Date	Nov/15/2012

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File Name: ClayStreet - Typical.csl

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	2.70
Deck + Haunch:	2.30	
Diaphragm:	3.00	
Prec.DL+ADL:	3.00	
Comp.DL+ADL:	3.00	

MOMENT AND SHEAR PROVISIONS:

Ultimate Moment Capacity, Mu-prvd computed:	Strain Compatibility method.
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	8500.00 psi	4500.00 psi
Max Comp, Top	3400.00 psi	2700.00 psi
Pos Mom, Bot	3400.00 psi	
Neg Mom, Bot	3400.00 psi	
Max Tens, Top	-691.47 psi	-503.12 psi
Max Tens, Bot	-691.47 psi	
Crk Tens, Bot	-691.47 psi	
Elasticity	5255.0 ksi	3824.0 ksi

STRESS LIMITS AT FINAL 2 (P/S + DL) (Art. 9.15.2.2 b):



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Sheet #	DS-9
Job #	
By	JPH
Date	Nov/13/2012
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Date	Nov/15/2012

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File Name: ClayStreet - Typical.csl

	PRECAST	DECK
Max Comp, Top	3400.00 psi	1800.00 psi
Pos Mom, Bot	3400.00 psi	
Neg Mom, Bot	3400.00 psi	

STRESS LIMITS AT FINAL 3 (50% P/S + 50% DL + LL) (Art. 9.15.2.2 c):

	PRECAST	DECK
Max Comp, Top	3400.00 psi	1800.00 psi
Pos Mom, Bot	3400.00 psi	
Neg Mom, Bot	3400.00 psi	

AT RELEASE (Art. 9.15.2.1):

	PRECAST
Strength	6500.00 psi
Max Comp, Top	3900.00 psi
Max Comp, Bot	3900.00 psi
Max Tens, Top	-200.00 psi
w/reinf	-604.67 psi
Max Tens, Bot	-0.00 psi
Elasticity	4595.0 ksi

RESISTANCE FACTORS (Art. 9.14):

Flexure Reinforced	0.90
Flexure Prestressed	0.95
Shear	0.90

PRESTRESS LOSSES:

Time Dependent Losses, Approximate Method (Art.5.9.5.3)	
Hours to release =	18.00
Rel. Humid.(RH) =	55.0 %



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Sheet #	DS-1
Job #	
By	JPH
Date	Nov/13/2012
Checked	LLP
Date	Nov/13/2012

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File Name:	ClayStreet - Typical.csl	

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	1.83	1.75	5.27	11.20	17.13	23.07	29.00
Self wt. :	M	0.0	70.5	67.4	190.1	358.7	479.2	551.5	575.6
	V	39.7	37.2	37.3	32.5	24.4	16.2	8.1	0.0
Prec. :	M	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
DL+ADL	V	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Deck :	M	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
+ Haunch	V	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Diaphragm :	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
Comp. :	M	-0.0	116.4	111.2	313.8	592.2	791.0	910.4	950.1
DL+ADL	V	65.5	61.4	61.6	53.6	40.2	26.8	13.4	0.0
LL + I :	M+	0.0	140.9	134.7	369.4	656.0	857.8	966.9	938.8
	V	81.7	77.7	77.8	70.1	58.6	35.1	23.5	16.9
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	81.7	77.7	77.8	70.1	58.6	47.0	35.5	26.4
	M	0.0	140.9	134.7	369.4	656.0	805.5	817.9	765.5
Pedestrian:	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
Pedestrian:	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
Pedestrian:	Vmx	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	M	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total :	M+	0.0	327.9	313.3	873.4	1607.0	2128.1	2428.7	2464.5
	V	186.9	176.2	176.7	156.2	123.1	78.1	45.0	16.9
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	186.9	176.2	176.7	156.2	123.1	90.1	57.0	26.4
	M	-0.0	327.9	313.3	873.4	1607.0	2075.8	2279.8	2291.2

		0.60L	0.70L	0.80L	0.90L	H/2	Trans	Bearing
Location, ft		34.93	40.87	46.80	52.73	56.25	56.17	58.00
Self wt. :	M	551.5	479.2	358.7	190.1	67.4	70.5	0.0
	V	8.1	16.2	24.4	32.5	37.3	37.2	39.7
Prec. :	M	0.0	0.0	0.0	0.0	0.0	0.0	0.0
DL+ADL	V	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Deck :	M	0.0	0.0	0.0	0.0	0.0	0.0	0.0
+ Haunch	V	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Diaphragm :	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
Comp. :	M	910.4	791.0	592.2	313.8	111.2	116.4	-0.0



HDR - USA

Sheet #	DS-2
Job #	
By	JPH
Date	Nov/13/2012
Checked	LLP
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File Name:	ClayStreet - Typical.csl	

		0.60L	0.70L	0.80L	0.90L	H/2	Trans	Bearing
DL+ADL	V	13.4	26.8	40.2	53.6	61.6	61.4	65.5
LL + I :	M+	966.9	857.8	656.0	369.4	134.7	140.9	0.0
	V	23.5	35.1	58.6	70.1	77.8	77.7	81.7
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	35.5	47.0	58.6	70.1	77.8	77.7	81.7
	M	817.9	805.5	656.0	369.4	134.7	140.9	0.0
Pedestrian:	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
Pedestrian:	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
Pedestrian:	Vmx	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	M	0.0	0.0	0.0	0.0	0.0	0.0	-0.0
Total :	M+	2428.7	2128.1	1607.0	873.4	313.3	327.9	0.0
	V	45.0	78.1	123.1	156.2	176.7	176.2	186.9
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	57.0	90.1	123.1	156.2	176.7	176.2	186.9
	M	2279.8	2075.8	1607.0	873.4	313.3	327.9	0.0

REACTIONS (kips), SERVICE 1

Load Type	Left Support	Right Support
Self Wt.	39.7	39.7
Deck+Haunch	0.0	0.0
Diaphragm	0.0	0.0
Prec.DL+ADL	0.0	0.0
Comp. DL+ADL	131.1	131.1
Live	126.1	126.1
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 : 1, FACTORED 1
Shears: kips, Moments: kft

		Bearing	Trans	H/2	0.10L	0.20L	0.30L	0.40L	Midspan
Location, ft		0.00	1.83	1.75	5.27	11.20	17.13	23.07	29.00
Self wt. :	M	0.0	98.7	94.3	266.2	502.2	670.9	772.1	805.8
	V	55.6	52.1	52.2	45.5	34.1	22.7	11.4	0.0



HDR - USA

Sheet #	DS-3
Job #	
By	JPH
Date	Nov/13/2012
Checked	LLP
Date	Nov/13/2012

Program:	LEAP® CONSPAN® V8i (SELECTseries 1)	Copyright © Bentley Systems, Inc. 1984 - 2010
Version:	Version: 09.00.03.01	www.bentley.com Phone: 1-800-778-4277
File Name:	ClayStreet - Typical.csl	

		Bearing	Trans	H/2	0.10L	0.20L	0.30L	0.40L	Midspan
Prec. :	M	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
DL+ADL	V	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Deck :	M	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
+ Haunch	V	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Diaphragm :	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
Comp. :	M	-0.0	163.0	155.7	439.4	829.1	1107.5	1274.5	1330.2
DL+ADL	V	91.7	85.9	86.2	75.1	56.3	37.5	18.8	0.0
LL + I :	M+	0.0	329.5	314.9	863.7	1533.8	2005.6	2260.5	2194.9
	V	191.0	181.5	182.0	163.9	136.9	82.0	55.0	39.6
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	191.0	181.5	182.0	163.9	136.9	109.9	82.9	61.7
	M	0.0	329.5	314.9	863.7	1533.8	1883.3	1912.4	1789.7
Pedestrian:	M+	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1
	V	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Pedestrian:	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
Pedestrian:	Vmx	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	M	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1
Total :	M+	0.0	591.3	565.0	1569.2	2865.2	3784.0	4307.2	4330.9
	V	338.3	319.5	320.4	284.5	227.3	142.2	85.1	39.6
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	338.3	319.5	320.4	284.5	227.3	170.2	113.0	61.7
	M	-0.0	591.3	565.0	1569.2	2865.2	3661.7	3959.0	3925.7

		0.60L	0.70L	0.80L	0.90L	H/2	Trans	Bearing
Location, ft		34.93	40.87	46.80	52.73	56.25	56.17	58.00
Self wt. :	M	772.1	670.9	502.2	266.2	94.3	98.7	0.0
	V	11.4	22.7	34.1	45.5	52.2	52.1	55.6
Prec. :	M	0.0	0.0	0.0	0.0	0.0	0.0	0.0
DL+ADL	V	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Deck :	M	0.0	0.0	0.0	0.0	0.0	0.0	0.0
+ Haunch	V	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Diaphragm :	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
Comp. :	M	1274.5	1107.5	829.1	439.4	155.7	163.0	-0.0
DL+ADL	V	18.8	37.5	56.3	75.1	86.2	85.9	91.7
LL + I :	M+	2260.5	2005.6	1533.8	863.7	314.9	329.5	0.0
	V	55.0	82.0	136.9	163.9	182.0	181.5	191.0
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	82.9	109.9	136.9	163.9	182.0	181.5	191.0
	M	1912.4	1883.3	1533.8	863.7	314.9	329.5	0.0
Pedestrian:	M+	0.1	0.1	0.1	0.0	0.0	0.0	-0.0
	V	0.0	0.0	0.0	0.0	0.0	0.0	0.0



HDR - USA

Sheet #	DS-4
Job #	
By	JPH
Date	Nov/13/2012
Checked	LLP
Date	Nov/13/2012

Program:	LEAP® CONSPAN® V8i (SELECTseries 1)	Copyright © Bentley Systems, Inc. 1984 - 2010
Version:	Version: 09.00.03.01	www.bentley.com Phone: 1-800-778-4277
File Name:	ClayStreet - Typical.csl	

		0.60L	0.70L	0.80L	0.90L	H/2	Trans	Bearing
Pedestrian: 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
Pedestrian: Vmx		0.0	0.0	0.0	0.0	0.0	0.0	0.0
	M	0.1	0.1	0.1	0.0	0.0	0.0	-0.0
Total :	M+	4307.2	3784.0	2865.2	1569.2	565.0	591.3	0.0
	V	85.1	142.2	227.3	284.5	320.4	319.5	338.3
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	113.0	170.2	227.3	284.5	320.4	319.5	338.3
	M	3959.0	3661.8	2865.2	1569.2	565.0	591.3	0.0

REACTIONS (kips), FACTORED 1

Load Type	Left Support	Right Support
Self Wt.	55.6	55.6
Deck+Haunch	0.0	0.0
Diaphragm	0.0	0.0
Prec.DL+ADL	0.0	0.0
Comp. DL+ADL	183.5	183.5
Live	294.9	294.9
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.



HDR - USA

Sheet #	DS-5
Job #	
By	JPH
Date	Nov/13/2012
Checked	LLP
Date	Nov/13/2012

Program: LEAP® CONSPAN® V8i (SELECTseries 1)

Version: Version: 09.00.03.01

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www.bentley.com

Phone: 1-800-778-4277

File Name: ClayStreet - Typical.csl

POSITIVE ENVELOPE STRESSES

Span : 1, Beam : 1, SERVICE 1

RELEASE STRESSES, (psi) (LOSS = 0.79 %)

	Trans	0.10L /0.90L	0.20L /0.80L	0.30L /0.70L	0.40L /0.60L	Midspan
Location, ft	2.50	5.93	11.87	17.80	23.73	29.67
Self Wt.						
Precast-top	68.8	153.5	272.9	358.2	409.4	426.4
Bottom	-72.6	-161.8	-287.7	-377.6	-431.6	-449.6
Prestress						
Precast-top	-447.3	-447.3	-447.3	-447.3	-447.3	-447.3
Bottom	2204.9	2204.9	2204.9	2204.9	2204.9	2204.9
Total						
Precast-top	-378.5	-293.8	-174.4	-89.1	-37.9	-20.9
Bottom	2132.4	2043.1	1917.2	1827.3	1773.4	1755.4
As_top (in2)	3.586	2.327	0.000	0.000	0.000	0.000

Span : 1, Beam : 1, SERVICE 1

POSITIVE ENVELOPE STRESSES, (psi) (LOSS = 13.89%)

	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	1.83	1.75	5.27	11.20	17.13	23.07
Prestress								
Precast-top		-107.7	-391.4	-378.6	-391.4	-391.4	-391.4	-391.4
Bottom		531.0	1929.2	1866.5	1929.2	1929.2	1929.2	1929.2
Self wt.								
Precast-top		0.0	50.0	47.8	134.8	254.4	339.8	391.1
Bottom		-0.0	-53.1	-50.8	-143.0	-269.9	-360.5	-414.8
Prec. DL+ADL								
Precast-top		-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0
Bottom		-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0



HDR - USA

Sheet #	DS-6
Job #	
By	JPH
Date	Nov/13/2012
Checked	LLP
Date	Nov/13/2012

Program:	LEAP® CONSPAN® V8i (SELECTseries 1)	Copyright © Bentley Systems, Inc. 1984 - 2010
Version:	Version: 09.00.03.01	www.bentley.com Phone: 1-800-778-4277
File Name:	ClayStreet - Typical.csl	

	Bearing	Trans	H/2	0.10L /0.90L	0.20L /0.80L	0.30L /0.70L	0.40L /0.60L	Midspan
Diaphragm								
Precast-top	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0
Bottom	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0
Deck + Haunch								
Precast-top	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0
Bottom	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0
Comp. DL+ADL								
Precast-top	-0.0	82.6	78.9	222.6	420.0	561.0	645.6	673.8
Bottom	0.0	-87.6	-83.8	-236.1	-445.5	-595.0	-684.8	-714.7
LL+(+)								
Precast-top	-0.0	100.0	95.6	262.0	465.2	608.4	685.7	665.8
Bottom	-0.0	-106.0	-101.5	-277.9	-493.5	-645.3	-727.3	-706.2
Pedestrian(+)								
Precast-top	-0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bottom	0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0
Final 1 (P/S + DL + LL)								
Precast-top	-107.7	-158.8	-156.4	228.0	748.3	1117.9	1331.1	1356.4
Bottom	531.0	1682.5	1630.5	1272.2	720.3	328.3	102.2	75.3
Final 2 (P/S + DL)								
Precast-top	-107.7	-258.8	-252.0	-34.0	283.1	509.5	645.4	690.6
Bottom	531.0	1788.5	1731.9	1550.1	1213.8	973.6	829.5	781.5
Final 3 (50%% P/S + 50%% DL + LL)								
Precast-top	-53.9	-29.4	-30.4	245.0	606.8	863.1	1008.4	1011.1
Bottom	265.5	788.2	764.5	497.1	113.4	-158.5	-312.6	-315.5



HDR - USA

Sheet #	DS-7
Job #	
By	JPH
Date	Nov/13/2012
Checked	LLP
Date	Nov/13/2012

Program: LEAP® CONSPAN® V8i (SELECTseries 1)

Version: Version: 09.00.03.01

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www.bentley.com

Phone: 1-800-778-4277

File Name: ClayStreet - Typical.csl

VERTICAL/HORIZONTAL SHEAR

VERTICAL SHEAR (Art. 9.20) - Span : 1, Beam : 1, FACTORED 1

Location (ft)	Vd(kips)	Md(k.ft)	MI(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 :	0.67	105.2	0.0	0.0	320.4	0.0	338.3	0.0	233.1
537.8	0.0	1386.6	39.75	10000.0	74.8	10000.0	199.2	0.0	182.4
182.4	173.6	351.8	0.873	0.120	0.873	1.240	1.205	24.0	175.9
Transfer :	2.50	98.6	187.0	140.9	319.5	591.3	319.5	404.3	221.0
2021.7	-147.1	3085.7	39.75	1811.4	74.8	1811.4	748.7	0.0	261.1
261.1	94.0	351.8	0.473	0.120	0.473	1.240	1.429	24.0	175.9
H/2 :	2.42	98.9	178.6	134.7	320.4	565.0	320.4	386.4	221.5
1953.0	-140.5	3006.7	39.75	1849.2	74.8	1849.2	723.2	0.0	257.4
257.4	98.6	351.8	0.496	0.120	0.496	1.240	1.415	24.0	175.9
0.1L :	5.93	86.1	503.9	369.4	284.5	1569.2	284.5	1065.3	198.4
2021.7	-396.5	2768.7	39.75	628.1	74.8	628.1	748.7	0.0	261.1
261.1	55.1	351.8	0.277	0.120	0.277	1.240	1.605	24.0	175.9
0.2L :	11.87	64.6	951.0	656.0	227.3	2865.2	227.3	1914.2	162.8
2021.7	-748.2	2321.7	39.75	288.4	74.8	288.4	748.7	0.0	261.1
261.1	0.0	351.8	0.000	0.120	0.120	0.413	1.359	24.0	175.9
0.3L :	17.80	43.1	1270.2	857.9	170.2	3784.0	142.2	2513.8	99.2
2021.7	-999.4	2002.4	39.75	148.5	74.8	148.5	748.7	0.0	261.1
148.5	40.6	351.8	0.205	0.120	0.205	0.310	1.111	24.0	175.9
0.4L :	23.73	21.5	1461.8	966.9	113.0	4307.2	85.1	2845.3	63.6
2021.7	-1150.1	1810.8	39.75	88.4	74.8	88.4	748.7	0.0	261.1
88.4	37.2	351.8	0.187	0.120	0.187	0.310	1.194	24.0	175.9
0.5L :	29.67	0.0	1525.7	938.8	61.7	4330.9	39.6	2805.3	39.6
2021.7	-1200.4	1747.0	39.75	51.0	74.8	74.8	748.7	0.0	261.1
74.8	0.0	351.8	0.000	0.120	0.120	0.310	1.989	24.0	175.9
0.6L :	35.60	21.5	1461.8	966.9	113.0	4307.2	85.1	2845.3	63.6
2021.7	-1150.1	1810.8	39.75	88.4	74.8	88.4	748.7	0.0	261.1
88.4	37.2	351.8	0.187	0.120	0.187	0.310	1.194	24.0	175.9



HDR - USA

Sheet #	DS-8
Job #	
By	JPH
Date	Nov/13/2012
Checked	LLP
Date	Nov/13/2012

Program:	LEAP® CONSPAN® V8i (SELECTseries 1)	Copyright © Bentley Systems, Inc. 1984 - 2010
Version:	Version: 09.00.03.01	www.bentley.com Phone: 1-800-778-4277
File Name:	ClayStreet - Typical.csl	

Location (ft)	Vd(kips)	Md(k.ft)	MI(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)	
0.7L :	41.53	43.1	1270.2	857.9	170.2	3784.0	142.2	2513.8	99.2	
	2021.7	-999.4	2002.4	39.75	148.5	74.8	148.5	748.7	0.0	261.1
	148.5	40.6	351.8	0.205	0.120	0.205	0.310	1.111	24.0	175.9
0.8L :	47.46	64.6	951.0	656.0	227.3	2865.2	227.3	1914.2	162.8	
	2021.7	-748.2	2321.7	39.75	288.4	74.8	288.4	748.7	0.0	261.1
	261.1	0.0	351.8	0.000	0.120	0.120	0.413	1.359	24.0	175.9
0.9L :	53.40	86.1	504.0	369.4	284.5	1569.2	284.5	1065.3	198.4	
	2021.7	-396.5	2768.7	39.75	628.1	74.8	628.1	748.7	0.0	261.1
	261.1	55.1	351.8	0.277	0.120	0.277	1.240	1.605	24.0	175.9
H/2 :	56.92	98.9	178.6	134.7	320.4	565.0	320.4	386.4	221.5	
	1953.0	-140.5	3006.7	39.75	1849.2	74.8	1849.2	723.2	0.0	257.4
	257.4	98.6	351.8	0.496	0.120	0.496	1.240	1.415	24.0	175.9
Transfer :	56.83	98.6	187.0	140.9	319.5	591.3	319.5	404.3	221.0	
	2021.7	-147.1	3085.7	39.75	1811.4	74.8	1811.4	748.7	0.0	261.1
	261.1	94.0	351.8	0.473	0.120	0.473	1.240	1.429	24.0	175.9
Bearing :	58.67	105.2	0.0	0.0	320.4	0.0	338.3	0.0	233.1	
	537.8	0.0	1386.6	39.75	10000.0	74.8	10000.0	199.2	0.0	182.4
	182.4	173.6	351.8	0.873	0.120	0.873	1.240	1.205	24.0	175.9

ANCHORAGE ZONE REINFORCEMENT (Art. 9.22.1)

Span : 1, Beam : 1

Fpi (kips)	fs (ksi)	d/4 (in)	Abrst_rqrd (in2)
1142.50	20.00	9.94	2.29



HDR - USA

Sheet #	DS-9
Job #	
By	JPH
Date	Nov/13/2012
Checked	LLP
Date	Nov/13/2012

Program: LEAP® CONSPAN® V8i (SELECTseries 1)

Version: Version: 09.00.03.01

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File Name: ClayStreet - Typical.csl

ULTIMATE MOMENT

ULTIMATE - Span : 1, Beam : 1, FACTORED 1
 (Mu-prvd computed by Strain Compatibility method. Ult. Conc. Strain = 0.00300)
 (f_{c_eff}, ksi = 8.50; beta1 = 0.650)

Location (ft)	A*s in ²	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	1.83									
	1.160	2.25	0.00041	269.7	0.6	976.8	591.3	3483.8	0.280	1.65
H/2	1.75									
	1.120	2.25	0.00039	269.7	0.6	943.9	565.0	3395.4	0.278	1.67
0.1L	5.27									
	2.752	2.25	0.00096	269.2	1.4	2289.9	1569.2	3483.8	0.657	1.46
0.2L	11.20									
	5.505	2.25	0.00192	268.3	2.8	4481.9	2865.2	3483.8	1.286	-
0.3L	17.13									
	5.642	2.25	0.00197	268.3	2.9	4588.7	3784.0	3483.8	1.317	-
0.4L	23.07									
	5.642	2.25	0.00197	268.3	2.9	4588.7	4307.2	3483.8	1.317	-
0.5L	29.00									
	5.642	2.25	0.00197	268.3	2.9	4588.7	4330.9	3483.8	1.317	-
0.6L	34.93									
	5.642	2.25	0.00197	268.3	2.9	4588.7	4307.2	3483.8	1.317	-
0.7L	40.87									
	5.642	2.25	0.00197	268.3	2.9	4588.7	3784.0	3483.8	1.317	-
0.8L	46.80									
	5.505	2.25	0.00192	268.3	2.8	4481.9	2865.2	3483.8	1.286	-
0.9L	52.73									
	2.752	2.25	0.00096	269.2	1.4	2289.9	1569.2	3483.8	0.657	1.46
H/2	56.25									
	1.120	2.25	0.00039	269.7	0.6	943.9	565.0	3395.4	0.278	1.67
Transfer	56.17									
	1.160	2.25	0.00041	269.7	0.6	976.8	591.3	3483.8	0.280	1.65