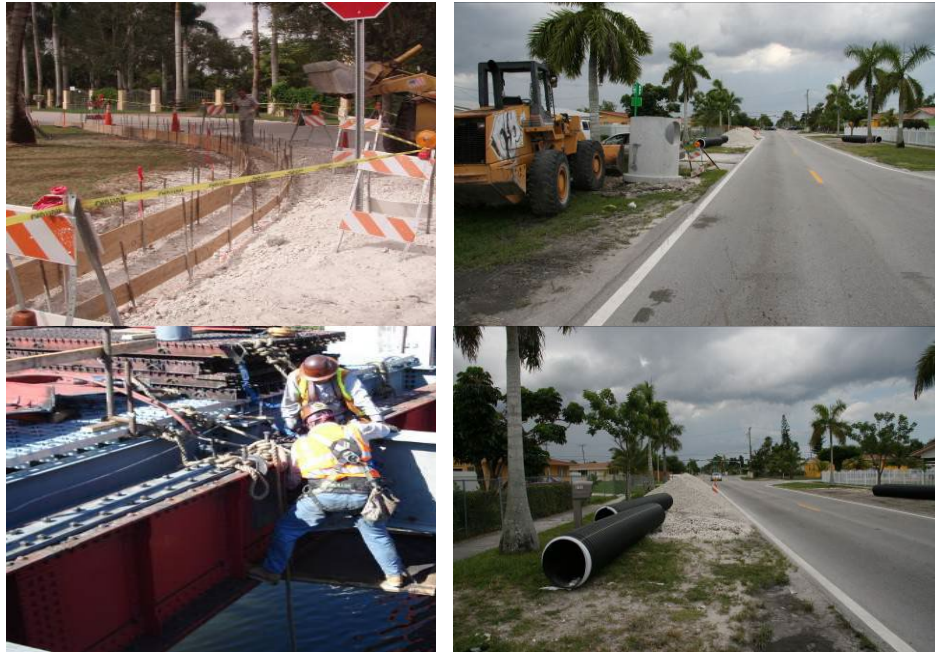




VOLUME II OF III

CALCULATIONS AND REPORTS

Structure Design Report

**Improvements to SW 87 Avenue
Bridge Over Canal C-100**

Miami-Dade County

Small Business Enterprise-Construction Program (SBE-CONST.):
SBE-Con 22.01%

Small Business Enterprise-Services Program (SBE-S):
SBE-S 0.26%

Community Workforce Program:
N/A

DTPW Capital Improvements Engineer:
Katherine Fernandez

RPQ Issue Date:
May 26, 2022

Miscellaneous Construction Contracts (MCC) Program:
MCC 7360 Plan -CICC 7360-0/08, Request for Price Quotation (RPQ) No. 20220010

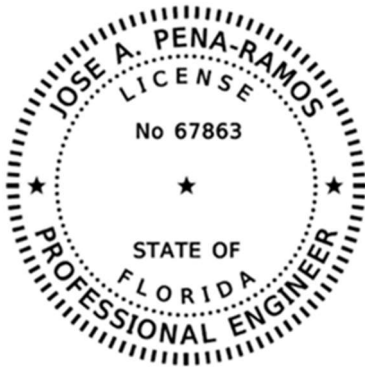
STRUCTURE DESIGN REPORT

**SW 87th Avenue Over the C-100 Canal
From SW 164th St. to SW 163rd Terr.**

Miami-Dade County Project No 20200098

Prepared For:

MIAMI-DADE COUNTY
Department of Transportation and Public Works



This item has been digitally signed and sealed by
Jose A. Pena Ramos on the dated adjacent to the seal

Printed copies of this document are not considered signed and
sealed and signatures must be verified on any electronic copies

May 2022

Prepared By:



R.J.Behar & Company, Inc.
Engineers • Planners

**6861 SW 196th Avenue, Suite 302
Pembroke Pines, FL 33332**

RJB Project No. 21030

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SW 87th Avenue
From SW 164th St to SW 163rd Terr

1. DESIGN CRITERIA



DESIGN CRITERIA

Design Specifications..... AASHTO LRFD Bridge Design Specifications
Ninth Edition with Interims.
FDOT Structures Manual , January 2021.

Design Method..... Load and Resistance Factor Design Method (LRFD).

Environment..... The superstructure is classified as slightly aggressive.
The substructure is classified as moderately aggressive.

Concrete.....	Class	Minimum 28-day Compressive Strength (psi)	Location
	II	$f'c = 3400$	Traffic Barriers
	II (Bridge Deck)	$f'c = 4500$	CIP Deck Topping
	IV	$f'c = 5500$	CIP Substructure

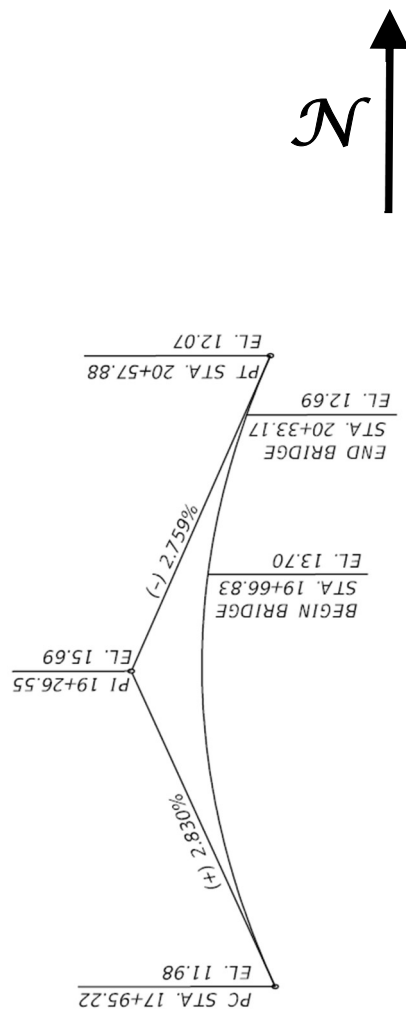
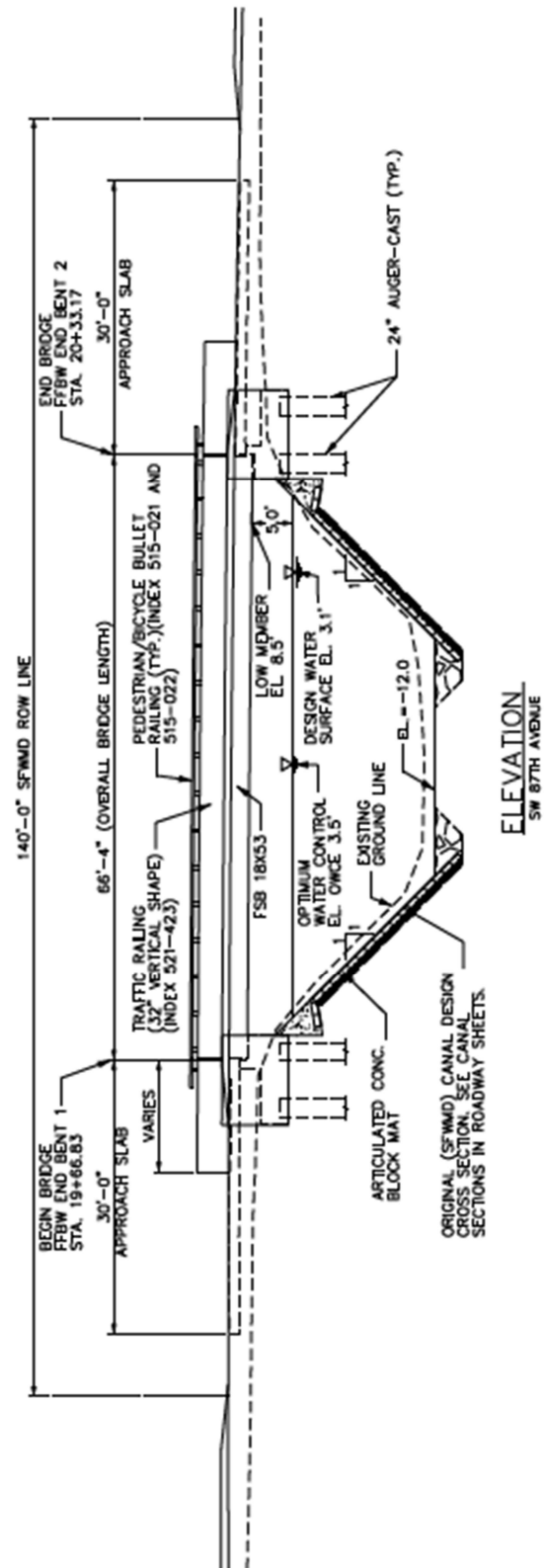
Reinforcing Steel..... ASTM A615, Grade 60

Concrete Cover.....	Superstructure	
	Top deck surfaces	2.5"
	All other surfaces	2"
	Substructure	
	External surfaces Formed	4"
	External surfaces cast against earth	4.5"
	Auger Piling	3"

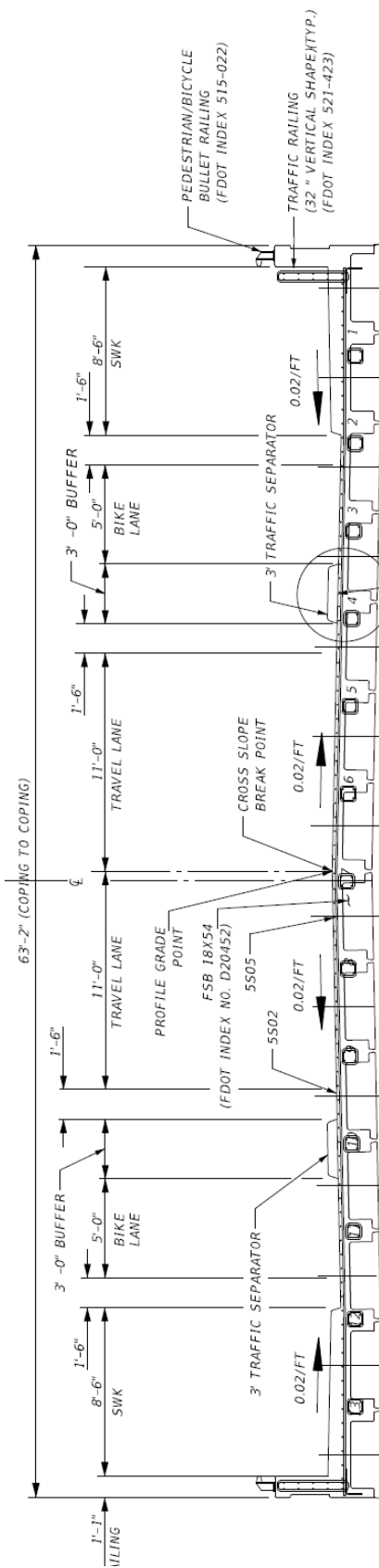
Assumed Loads.....	Item	Load
	Live Load	HL-93
	Traffic Railing-32" Vertical shape (plf)	385
	Wearing Surface (psf)	0
	Wind Loads are in accordance with AASHTO Bridge Design Specifications and FDOT Structures Design Guidelines.	

Dimensions..... All dimensions are in feet or inches, except as noted.

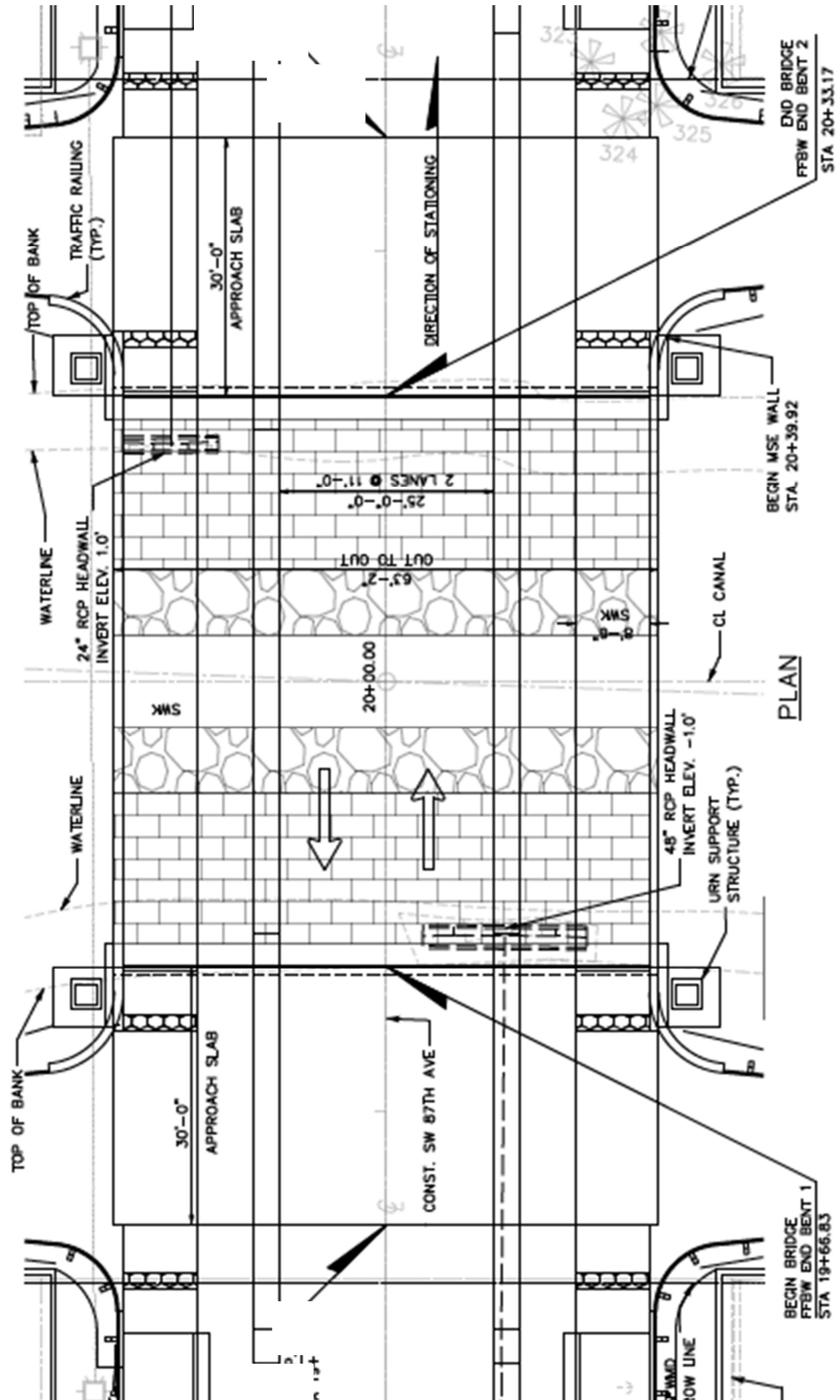
ELEVATION

VERTICAL CURVE DATA

SECTION



PLAN



2. SUPERSTRUTURE DESIGN

2.1. PRESTRESSED SLAB BEAMS ANALYSIS & DESIGN (LEAP CONCRETE)

2.2. GENERAL INPUT

2.3. GENERAL OUTPUT & BEAM DESIGN SUMMARY

Precast/Prestressed Girder

QIPRC/PT Girder

Design Spec: AASHTO

☐ Three-point bearing system
Bearing: 12.00 in

☐ Show Wing Walls

☐ Single Beam

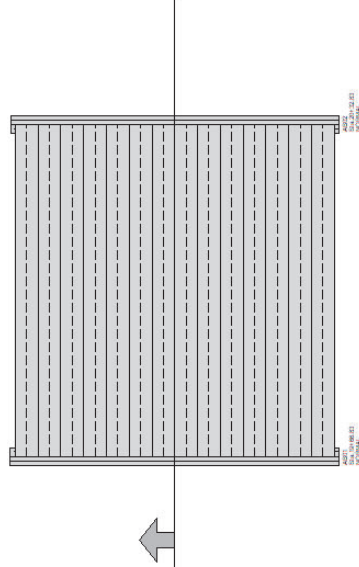
Span: 1

Beam: GR01

Section Offset

37+67.050 ft

Apply



BB-EB CL: 66 ft

Span:

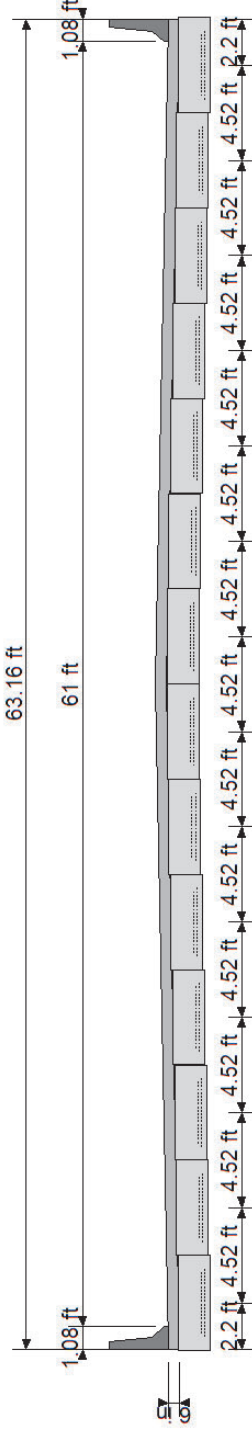
Precast:

66 ft

66 ft

63.16 ft

61 ft



Superstructure Cross Section Sta 19+72

				Sheet #	1
				Job #	RJB 21030
Program:	LEAP® Bridge Concrete CONNECT Edition	RJ Behar		Designed	JAPR
Module:	Precast/Prestressed Girder	Copyright © Bentley Systems, Inc. 2021		Date	Oct/19/2021
Version:	21.00.00.24	www.bentley.com	Phone: 1-800-778-4277	Checked	AW
File Name:	SW 87 Ave Bridge Superstructure.lbcx			Date	Oct/20/2021

PROJECT DATA

Project:	SW 87 Ave Bridge
Designer:	JAPR
Date:	Oct/19/2021
Checked By:	AW
Date Checked:	Oct/20/2021
User job number:	RJB 21030
State:	Florida, State Job #:
State Specification:	Florida
Design Code:	AASHTO LRFD - 9th Edition
Units:	US
Span Type:	Simple Span
Flared Girder:	No
File Name:	C:\Users\jpena\AppData\Local\Temp\OBD20211123082626722\Standalone\SW 87 Bridge over C-100\SW 87 Ave Bridge Superstructure.lbcx



				Sheet #	2
				Job #	RJB 21030
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GEOMETRY DATA

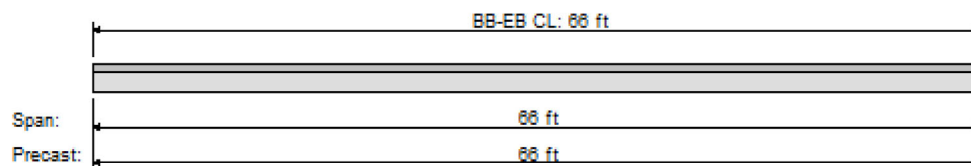
BRIDGE LAYOUT

Overall Width (ft)	63.160
Left curb (ft)	1.080
Right curb (ft)	1.080
Curb-to-curb width (ft)	61.000
Number of spans	1
Number of lanes	2
Lane width (ft)	12.000
Eff Deck thick (in)	6.000
Sacrificial thick (in)	0.000
Haunch thickness (in)	0.000
Haunch width (in)	54.150
Bridge c/s, MI(lxx) (in4)	797188.00

Note: Haunch is ignored for composite section properties. Haunch self weight is included.

SPAN DATA

Precast length,	ft =	66.000
Bearing-to-bearing,	ft =	63.916
Release span,	ft =	66.000



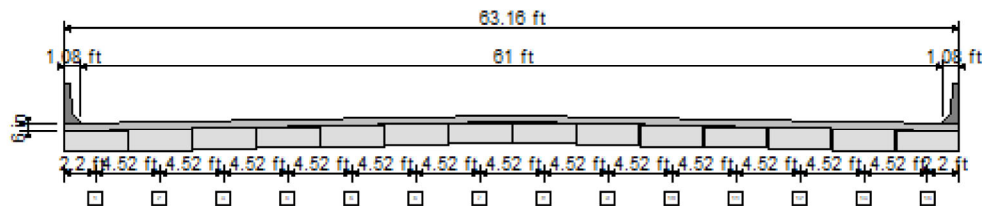
BR01 - Bridge elevation

BEAM DATA



				Sheet #	3
				Job #	RJB 21030
Program:	LEAP® Bridge Concrete CONNECT Edition	RJ Behar		Designed	JAPR
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File Name:	SW 87 Ave Bridge Superstructure.lbcx			Date	Oct/20/2021

No	ID	Loc-prev ft	Area in2	MI(Ixx) in4	Height in	Yb in	B-topg in	B-trib ft
1	18" FSB	2.200	974.1	26302.0	18.00	9.00	54.12	4.460
2	18" FSB	4.520	974.1	26302.0	18.00	9.00	54.12	4.520
3	18" FSB	4.520	974.1	26302.0	18.00	9.00	54.12	4.520
4	18" FSB	4.520	974.1	26302.0	18.00	9.00	54.12	4.520
5	18" FSB	4.520	974.1	26302.0	18.00	9.00	54.12	4.520
6	18" FSB	4.520	974.1	26302.0	18.00	9.00	54.12	4.520
7	18" FSB	4.520	974.1	26302.0	18.00	9.00	54.12	4.520
8	18" FSB	4.520	974.1	26302.0	18.00	9.00	54.12	4.520
9	18" FSB	4.520	974.1	26302.0	18.00	9.00	54.12	4.520
10	18" FSB	4.520	974.1	26302.0	18.00	9.00	54.12	4.520
11	18" FSB	4.520	974.1	26302.0	18.00	9.00	54.12	4.520
12	18" FSB	4.520	974.1	26302.0	18.00	9.00	54.12	4.520
13	18" FSB	4.520	974.1	26302.0	18.00	9.00	54.12	4.520
14	18" FSB	4.520	974.1	26302.0	18.00	9.00	54.12	4.460



BR01 - Bridge cross section

MATERIAL DATA - Project Level

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

CONCRETE PROPERTIES

	Precast Release	Precast Final	C.I.P
f'c (ksi)	6.000	8.500	4.500
Wc (pcf)	150.000	150.000	150.000
Concrete Type	Normal	Normal	Normal
Lambda	1.000	1.000	1.000
Ec (ksi)	4389.310	4923.960	3991.780
K1	0.900	0.900	0.900
Thermal coeff.(1/°F)	0.00000600		

				Sheet #	4
				Job #	RJB 21030
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File Name:	SW 87 Ave Bridge Superstructure.lbcx			Date	Oct/20/2021

STRAND AND REBAR PROPERTIES

PRESTRESSED STEEL:

9/16-270K-LL, Low relaxation strands

Straight Pattern

Strand Diameter = 0.563 in

Tensile Strength(fpu) = 270.0 ksi

Use transformed strand and rebar: Strand Only

REINFORCING STEEL:

Tension/Shear steel: $f_y = 60.0$ ksi $E_s = 29000$ ksi

				Sheet #	5
				Job #	RJB 21030
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File Name:	SW 87 Ave Bridge Superstructure.lbcx			Date	Oct/20/2021

LOADS DATA

Loads generated using Permanent Load Wizard: YES

Left Barrier Weight, klf	0.380
Right Barrier Weight, klf	0.380
Left Curb Weight, klf	0.000
Right Curb Weight, klf	0.000
Left Sidewalk, klf	0.860
Right Sidewalk, klf	0.860
Future Wearing Surface, ksf	0.015
Sacrificial Wearing Surface, in	0.000
Stay in Place Deck Forms, klf	0.000

DEAD LOADS ON PRECAST - NONE

DIAPHRAGM LOADS - NONE

DEAD LOADS ON COMPOSITE

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

Span	DC/DW	Type	Mag.1	Loc.1/Width	Mag.2	Loc.2	Description
1	DC	Line	0.380	0.000	0.380	63.916	Left Barrier Weight
1	DC	Line	0.380	0.000	0.380	63.916	Right Barrier Weight
1	DC	Line	0.860	0.000	0.860	63.916	Left Sidewalk
1	DC	Line	0.860	0.000	0.860	63.916	Right Sidewalk
1	DW	Area	0.015	61.000	-	-	Future Wearing Surface

TEMPERATURE LOADS - NONE

LIVE LOADS

Live load deflection: included.

ID	Type
Design Lane	Design Lane
Design Tandem	Design Tandem
Design Truck	Design Truck

Pedestrian Load

600.00 plf

				Sheet #	6
				Job #	RJB 21030
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				Sheet #	7
				Job #	RJB 21030
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File Name:	SW 87 Ave Bridge Superstructure.lbcx			Date	Oct/20/2021

LIVE LOADS USED

LIVE LOAD LIBRARY: USLRFDTruckLib.shlib

1 ID: Design Lane

Description:	Design Lane as in AASHTO-LRFD
Type:	Design Lane

Lane Load: Intensity = 0.64 klf, Width = 10.00 ft

2 ID: Design Tandem

Description:	Design Tandem as in AASHTO-LRFD
Type:	Design Tandem

First Axle Magnitude = 25.00 k, Wheel Spacing = 6.00 ft, Truck Width = 10.00 ft

#	Magnitude, k	Max Spacing, ft	Min Spacing, ft	Increment, ft
1	25.00	4.00	4.00	0.00

3 ID: Design Truck

Description:	Design Truck as in AASHTO-LRFD
Type:	Design Truck

First Axle Magnitude = 8.00 k, Wheel Spacing = 6.00 ft, Truck Width = 10.00 ft

#	Magnitude, k	Max Spacing, ft	Min Spacing, ft	Increment, ft
1	32.00	14.00	14.00	0.00
2	32.00	30.00	14.00	2.00

4 ID: Fatigue Truck

Description:	Fatigue Truck as in AASHTO-LRFD
Type:	Fatigue Truck

First Axle Magnitude = 8.00 k, Wheel Spacing = 6.00 ft, Truck Width = 10.00 ft

#	Magnitude, k	Max Spacing, ft	Min Spacing, ft	Increment, ft
1	32.00	14.00	14.00	0.00
2	32.00	30.00	30.00	0.00

RATING LOADS

Design Live Load Type,	Weight (tons),	Wheel Spacing(ft)
HL93 Design Load	-	-



		Sheet #	8
		Job #	RJB 21030
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Legal Live Load Type,	Weight (tons),	Wheel Spacing(ft)
C5 Truck	40.00	6.00
ST5 Truck	40.00	6.00
SU4 Truck	35.00	6.00

Permit Live Load Type,	Weight (tons),	Wheel Spacing(ft)
FL120	60.00	6.00

RATING LOADS DETAILS

Design Rating Loads:

1 ID: HL93 Design Load

Description:	HL93 Design Load - Internal
Type:	Design Lane + Design Truck + Design Tandem

* HL93 Internal loads:

HL93 Load ID: Design Lane *

Description:	Design Lane - Internal
Type:	Design Lane

Lane Load: Intensity = 0.64 klf, Width = 10.00 ft

HL93 Load ID: Design Tandem *

Description:	Design Tandem - Internal
Type:	Design Tandem

First Axle Magnitude = 25.00 k, Wheel Spacing = 6.00 ft, Truck Width = 10.00 ft

#	Magnitude, k	Max Spacing, ft	Min Spacing, ft	Increment, ft
1	25.00	4.00	4.00	0.00

HL93 Load ID: Design Truck *

Description:	Design Truck - Internal
Type:	Design Truck

First Axle Magnitude = 8.00 k, Wheel Spacing = 6.00 ft, Truck Width = 10.00 ft

#	Magnitude, k	Max Spacing, ft	Min Spacing, ft	Increment, ft
1	32.00	14.00	14.00	0.00
2	32.00	30.00	14.00	2.00

Legal Rating Loads:



		Sheet #	9
		Job #	RJB 21030
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File Name:	SW 87 Ave Bridge Superstructure.lbcx	Date	Oct/20/2021

1 ID: C5 Truck

Description:	C5 Truck Florida Specific Vehicles
Type:	Legal Truck

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	20.00	10.00	10.00	0.00
2	20.00	4.17	4.17	0.00
3	15.00	17.67	17.67	0.00
4	15.00	4.17	4.17	0.00

2 ID: ST5 Truck

Description:	ST5 Truck Florida Specific Vehicles
Type:	Legal Truck

First Axle Magnitude = 8.00 k, Wheel Spacing = 6.00 ft, Truck Width = 10.00 ft

#	Magnitude, k	Max Spacing, ft	Min Spacing, ft	Increment, ft
1	18.00	27.00	27.00	0.00
2	18.00	4.00	4.00	0.00
3	18.00	12.00	12.00	0.00
4	18.00	24.00	24.00	0.00

3 ID: SU4 Truck

Description:	SU4 Truck Florida Specific Vehicles
Type:	Legal Truck

First Axle Magnitude = 13.90 k, Wheel Spacing = 6.00 ft, Truck Width = 10.00 ft

#	Magnitude, k	Max Spacing, ft	Min Spacing, ft	Increment, ft
1	18.70	9.17	9.17	0.00
2	18.70	4.17	4.17	0.00
3	18.70	4.17	4.17	0.00

Permit Rating Loads:

1 ID: FL120

Description:	FL120 Permit Vehicle
Type:	Permit Vehicle

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

				Sheet #	10
				Job #	RJB 21030
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First Axle Magnitude = 13.33 k, Wheel Spacing = 6.00 ft, Truck Width = 10.00 ft

#	Magnitude, k	Max Spacing, ft	Min Spacing, ft	Increment, ft
1	53.33	14.00	14.00	0.00
2	53.33	14.00	14.00	0.00

				Sheet #	11
				Job #	RJB 21030
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File Name:	SW 87 Ave Bridge Superstructure.lbcx			Date	Oct/20/2021

ANALYSIS DATA

ANALYSIS PARAMETERS DATA

Truck impact:	1.330
Lane impact:	1.000
Strength II impact:	1.330
Fatigue impact:	1.150

DISTRIBUTION FACTORS (Art. 4.6.2.2):

Include sacrificial deck thick in ts:	NO
Is Span Post-tensioned:	NO
ADTT (Average Daily Truck Traffic) :	5000
Percent of the specified force effect :	1.00
Apply reduction of Moment for skew:	YES

NOTE: Beam specific dead and live load DFs are printed in beam level reports.

LOAD FACTORS: (Table 3.4.1-1 & 3.4.1-2)

	Live	DC(max)	DC(min)	DW(max)	DW(min)
Service I:	1.00	1.00	1.00	1.00	1.00
Service III:	0.80	1.00	1.00	1.00	1.00
Strength I:	1.75	1.25	0.90	1.50	0.65
Fatigue I:	1.50	-	-	-	-

Ductility Factor:	1.00
Redundancy Factor:	1.00
Importance Factor:	1.00



				Sheet #	12
				Job #	RJB 21030
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File Name:	SW 87 Ave Bridge Superstructure.lbcx			Date	Oct/20/2021

PROJECT DESIGN PARAMETERS

MULTIPLIERS:

Trans len mult:	Bonded	1.00
	Debonded	1.00
Dev len mult:	Bonded	1.00
	Debonded	2.00

Camber & Deflection Multiplier (PCI ref.)

	Erection	Final
Prestress:	1.80	2.20
Self. Wt:	1.85	2.40
Deck + Haunch:		2.30
Diaphragm:		3.00
DL-Prec.:		3.00
DL-Comp.:		3.00

MOMENT AND SHEAR PROVISIONS:

Ultimate Moment Capacity, Mu-prvd computed:	equations
Horizontal Shear, Beam and Slab effects in Vu:	INCLUDED

STRESS LIMITS (Art. 5.9.2):

STRESS LIMITS AT RELEASE BEFORE LOSSES (Using Advanced Settings):

		PRECAST	
Strength		6.00	ksi
Elasticity		4389.3	ksi
Max comp		3.60	ksi
Outer	15.00 %		
Max tens		-0.23	ksi
Max tens, w/reinf		-0.93	ksi
Center	70.00 %		
Max tens		-0.23	ksi
Max tens, w/reinf		-0.59	ksi

STRESS LIMITS AT FINAL AFTER LOSSES:

	PRECAST		DECK	
Strength	8.50	ksi	4.50	ksi
Elasticity	4923.96	ksi	3991.78	ksi

STRESS LIMITS AT FINAL 1 (P/S + DL + LL):

	PRECAST		DECK	
Max comp	5.10	ksi	2.70	ksi

				Sheet #	13
				Job #	RJB 21030
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Version:	21.00.00.24	www.bentley.com	Phone: 1-800-778-4277	Checked	AW
File Name:	SW 87 Ave Bridge Superstructure.lbcx			Date	Oct/20/2021

STRESS LIMITS AT FINAL 2 (P/S + DL):

	PRECAST		DECK	
Max comp	3.82	ksi	2.02	ksi

FATIGUE I STRESS LIMITS AT FINAL 3 (50% P/S + 50% DL + F_LL) (Art. 5.5.3.1):

	PRECAST		DECK	
Max comp	3.40	ksi	-	ksi

SERVICE III (Tension):

	PRECAST		DECK	
Max tens	-0.55	ksi	-0.40	ksi

RESISTANCE FACTORS (Art. 5.5.4.2):

Flexure Reinforced	
Compression controlled sections	0.75
Tension controlled sections	0.90
Flexure Prestressed	
Compression controlled sections	0.75
Tension controlled sections	1.00
Shear	0.90

PRESTRESS LOSSES:

Time Dependent Losses, Approximate Method (Art.5.9.3.3)
Days to release = 0.75
Rel. Humid.(RH) = 75.0 %



				Sheet #	14
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RATING PARAMETERS

Rating Factors	References	Values
Condition Factor	Table 6A.4.2.3-1	1.00
System Factor for Flexural Effect	Table 6A.4.2.4-1	1.00
System Factor for Shear Effect	Art. 6A.4.2.4	1.00
ADTT	Section C3.6.1.1.2	5000
Dynamic Load Factor for Design Level	Art. 6A.4.3.3	0.33
Dynamic Load Factor for Legal and Permit Level	Table C6A.4.4.3-1	0.33

For Flexural Effect: Condition Factor * System Factor = 1.00 >= 0.85 (Art. 6A.4.2.1) OK

For Shear Effect: Condition Factor * System Factor = 1.00 >= 0.85 (Art. 6A.4.2.1 and 6A.4.2.4) OK

Dead Load Factors (Table 6A.4.2.2-1)

Limit State	DC	DW
Strength I	1.25	1.50
Strength II	1.25	1.50
Service I	1.00	1.00
Service III	1.00	1.00

Design Live Load Factors (Table 6A.4.3.2.2-1)

Limit State	Inventory	Operating
Strength I	1.75	1.35
Service I	-	-
Service III	0.80	-

Legal Live Load Factors (Table 6A.4.4.2.3a-1)

Limit State	Values
Strength I	1.35
Service I	-
Service III	0.80

Permit Live Load Factors (Table 6A.4.5.4.2a-1)

Load	Type	Frequency	Loading Condition	Permit Factor
FL120	Routine	Unlimited	Mix with traffic	1.35

Permit Live Load Stresses Factors

Limit State	Values
Service I	1.00
Service III	-

Allowable Stresses (ksi)

Rating Level	Concrete Compression	Concrete Tension	Steel
Design Inventory	0.60 x f'c = 5.10	0.19 x sqrt(f'c) = 0.55	0.90 x f'y = 218.70
Design Operating	0.60 x f'c = 5.10	0.24 x sqrt(f'c) = 0.69	0.90 x f'y = 218.70
Legal	0.60 x f'c = 5.10	0.24 x sqrt(f'c) = 0.69	-
Permit	0.60 x f'c = 5.10	0.24 x sqrt(f'c) = 0.69	0.90 x f'y = 218.70

Consider shear reinf. across plane (FDOT alternative): Yes



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BEAM REINFORCEMENT

BEAM SPECIFIC MATERIAL PROPERTIES:

Span#, Beam#	Tendon-ID	Girder-f'ci ksi	Girder-f'c ksi	Deck-f'c ksi
Span:1, Beam:1	9/16-270K-LL	6.00	8.50	4.50
Span:1, Beam:2	9/16-270K-LL	6.00	8.50	4.50
Span:1, Beam:3	9/16-270K-LL	6.00	8.50	4.50
Span:1, Beam:4	9/16-270K-LL	6.00	8.50	4.50
Span:1, Beam:5	9/16-270K-LL	6.00	8.50	4.50
Span:1, Beam:6	9/16-270K-LL	6.00	8.50	4.50
Span:1, Beam:7	9/16-270K-LL	6.00	8.50	4.50
Span:1, Beam:8	9/16-270K-LL	6.00	8.50	4.50
Span:1, Beam:9	9/16-270K-LL	6.00	8.50	4.50
Span:1, Beam:10	9/16-270K-LL	6.00	8.50	4.50
Span:1, Beam:11	9/16-270K-LL	6.00	8.50	4.50
Span:1, Beam:12	9/16-270K-LL	6.00	8.50	4.50
Span:1, Beam:13	9/16-270K-LL	6.00	8.50	4.50
Span:1, Beam:14	9/16-270K-LL	6.00	8.50	4.50

Span:1, Beam:1

PRESTRESSED STEEL:

38 strands, 9/16-270K-LL, Low relaxation strands
Straight Pattern

END PATTERN (Ycg = 3.95 in):

20 @ 3.000 in | 18 @ 5.000 in | |

REINFORCING STEEL:

Tension	steel:	
fy	60.0	ksi
Es	29000	ksi

Stirrups:

# legs	Size	fy (ksi)	Area (in2)	Spacing (in)	Start (ft)	End (ft)	Extends into Deck
2	US#4[M13]	60.0	0.40	3.00	0.0000	2.0000	Yes
2	US#4[M13]	60.0	0.40	4.00	2.0000	3.5000	Yes
2	US#4[M13]	60.0	0.40	4.00	3.5000	62.5000	Yes
2	US#4[M13]	60.0	0.40	4.00	62.5000	64.0000	Yes
2	US#4[M13]	60.0	0.40	3.00	64.0000	66.0000	Yes



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Span:1, Beam:2

PRESTRESSED STEEL:

38 strands, 9/16-270K-LL, Low relaxation strands
Straight Pattern

END PATTERN (Ycg = 3.95 in):

20 @ 3.000 in	18 @ 5.000 in		
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REINFORCING STEEL:

Tension	steel:	
fy	60.0	ksi
Es	29000	ksi

Stirrups:

# legs	Size	fy (ksi)	Area (in2)	Spacing (in)	Start (ft)	End (ft)	Extends into Deck
2	US#4[M13]	60.0	0.40	3.00	0.0000	2.0000	Yes
2	US#4[M13]	60.0	0.40	4.00	2.0000	3.5000	Yes
2	US#4[M13]	60.0	0.40	4.00	3.5000	62.5000	Yes
2	US#4[M13]	60.0	0.40	4.00	62.5000	64.0000	Yes
2	US#4[M13]	60.0	0.40	3.00	64.0000	66.0000	Yes

Span:1, Beam:3

PRESTRESSED STEEL:

38 strands, 9/16-270K-LL, Low relaxation strands
Straight Pattern

END PATTERN (Ycg = 3.95 in):

20 @ 3.000 in	18 @ 5.000 in		
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REINFORCING STEEL:



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Tension	steel:	
fy	60.0	ksi
Es	29000	ksi

Stirrups:

# legs	Size	fy (ksi)	Area (in2)	Spacing (in)	Start (ft)	End (ft)	Extends into Deck
2	US#4[M13]	60.0	0.40	3.00	0.0000	2.0000	Yes
2	US#4[M13]	60.0	0.40	4.00	2.0000	3.5000	Yes
2	US#4[M13]	60.0	0.40	4.00	3.5000	62.5000	Yes
2	US#4[M13]	60.0	0.40	4.00	62.5000	64.0000	Yes
2	US#4[M13]	60.0	0.40	3.00	64.0000	66.0000	Yes

Span:1, Beam:4

PRESTRESSED STEEL:

38 strands, 9/16-270K-LL, Low relaxation strands
Straight Pattern

END PATTERN (Ycg = 3.95 in):

20 @ 3.000 in	18 @ 5.000 in		
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REINFORCING STEEL:

Tension	steel:	
fy	60.0	ksi
Es	29000	ksi

Stirrups:

# legs	Size	fy (ksi)	Area (in2)	Spacing (in)	Start (ft)	End (ft)	Extends into Deck
2	US#4[M13]	60.0	0.40	3.00	0.0000	2.0000	Yes
2	US#4[M13]	60.0	0.40	4.00	2.0000	3.5000	Yes
2	US#4[M13]	60.0	0.40	4.00	3.5000	62.5000	Yes
2	US#4[M13]	60.0	0.40	4.00	62.5000	64.0000	Yes
2	US#4[M13]	60.0	0.40	3.00	64.0000	66.0000	Yes

Span:1, Beam:5



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PRESTRESSED STEEL:

38 strands, 9/16-270K-LL, Low relaxation strands
Straight Pattern

END PATTERN (Ycg = 3.95 in):

20 @ 3.000 in | 18 @ 5.000 in | |

REINFORCING STEEL:

Tension	steel:	
fy	60.0	ksi
Es	29000	ksi

Stirrups:

# legs	Size	fy (ksi)	Area (in2)	Spacing (in)	Start (ft)	End (ft)	Extends into Deck
2	US#4[M13]	60.0	0.40	3.00	0.0000	2.0000	Yes
2	US#4[M13]	60.0	0.40	4.00	2.0000	3.5000	Yes
2	US#4[M13]	60.0	0.40	4.00	3.5000	62.5000	Yes
2	US#4[M13]	60.0	0.40	4.00	62.5000	64.0000	Yes
2	US#4[M13]	60.0	0.40	3.00	64.0000	66.0000	Yes

Span:1, Beam:6**PRESTRESSED STEEL:**

38 strands, 9/16-270K-LL, Low relaxation strands
Straight Pattern

END PATTERN (Ycg = 3.95 in):

20 @ 3.000 in | 18 @ 5.000 in | |

REINFORCING STEEL:

Tension	steel:	
fy	60.0	ksi
Es	29000	ksi

Stirrups:



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# legs	Size	fy (ksi)	Area (in2)	Spacing (in)	Start (ft)	End (ft)	Extends into Deck
2	US#4[M13]	60.0	0.40	3.00	0.0000	2.0000	Yes
2	US#4[M13]	60.0	0.40	4.00	2.0000	3.5000	Yes
2	US#4[M13]	60.0	0.40	4.00	3.5000	62.5000	Yes
2	US#4[M13]	60.0	0.40	4.00	62.5000	64.0000	Yes
2	US#4[M13]	60.0	0.40	3.00	64.0000	66.0000	Yes

Span:1, Beam:7

PRESTRESSED STEEL:

38 strands, 9/16-270K-LL, Low relaxation strands
Straight Pattern

END PATTERN (Ycg = 3.95 in):

20 @ 3.000 in	18 @ 5.000 in		
---------------	---------------	--	--

REINFORCING STEEL:

Tension	steel:	
fy	60.0	ksi
Es	29000	ksi

Stirrups:

# legs	Size	fy (ksi)	Area (in2)	Spacing (in)	Start (ft)	End (ft)	Extends into Deck
2	US#4[M13]	60.0	0.40	3.00	0.0000	2.0000	Yes
2	US#4[M13]	60.0	0.40	4.00	2.0000	3.5000	Yes
2	US#4[M13]	60.0	0.40	4.00	3.5000	62.5000	Yes
2	US#4[M13]	60.0	0.40	4.00	62.5000	64.0000	Yes
2	US#4[M13]	60.0	0.40	3.00	64.0000	66.0000	Yes

Span:1, Beam:8

PRESTRESSED STEEL:

38 strands, 9/16-270K-LL, Low relaxation strands
Straight Pattern

END PATTERN (Ycg = 3.95 in):



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20 @ 3.000 in | 18 @ 5.000 in | |

REINFORCING STEEL:

Tension	steel:	
fy	60.0	ksi
Es	29000	ksi

Stirrups:

# legs	Size	fy (ksi)	Area (in2)	Spacing (in)	Start (ft)	End (ft)	Extends into Deck
2	US#4[M13]	60.0	0.40	3.00	0.0000	2.0000	Yes
2	US#4[M13]	60.0	0.40	4.00	2.0000	3.5000	Yes
2	US#4[M13]	60.0	0.40	4.00	3.5000	62.5000	Yes
2	US#4[M13]	60.0	0.40	4.00	62.5000	64.0000	Yes
2	US#4[M13]	60.0	0.40	3.00	64.0000	66.0000	Yes

Span:1, Beam:9

PRESTRESSED STEEL:

38 strands, 9/16-270K-LL, Low relaxation strands
Straight Pattern

END PATTERN (Ycg = 3.95 in):

20 @ 3.000 in | 18 @ 5.000 in | |

REINFORCING STEEL:

Tension	steel:	
fy	60.0	ksi
Es	29000	ksi

Stirrups:

# legs	Size	fy (ksi)	Area (in2)	Spacing (in)	Start (ft)	End (ft)	Extends into Deck
2	US#4[M13]	60.0	0.40	3.00	0.0000	2.0000	Yes
2	US#4[M13]	60.0	0.40	4.00	2.0000	3.5000	Yes
2	US#4[M13]	60.0	0.40	4.00	3.5000	62.5000	Yes
2	US#4[M13]	60.0	0.40	4.00	62.5000	64.0000	Yes
2	US#4[M13]	60.0	0.40	3.00	64.0000	66.0000	Yes



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Span:1, Beam:10

PRESTRESSED STEEL:

38 strands, 9/16-270K-LL, Low relaxation strands
Straight Pattern

END PATTERN (Ycg = 3.95 in):

20 @ 3.000 in 18 @ 5.000 in

REINFORCING STEEL:

Tension	steel:	
fy	60.0	ksi
Es	29000	ksi

Stirrups:

# legs	Size	fy (ksi)	Area (in2)	Spacing (in)	Start (ft)	End (ft)	Extends into Deck
2	US#4[M13]	60.0	0.40	3.00	0.0000	2.0000	Yes
2	US#4[M13]	60.0	0.40	4.00	2.0000	3.5000	Yes
2	US#4[M13]	60.0	0.40	4.00	3.5000	62.5000	Yes
2	US#4[M13]	60.0	0.40	4.00	62.5000	64.0000	Yes
2	US#4[M13]	60.0	0.40	3.00	64.0000	66.0000	Yes

Span:1, Beam:11

PRESTRESSED STEEL:

38 strands, 9/16-270K-LL, Low relaxation strands
Straight Pattern

END PATTERN (Ycg = 3.95 in):

20 @ 3.000 in 18 @ 5.000 in

REINFORCING STEEL:



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Tension steel:		
fy	60.0	ksi
Es	29000	ksi

Stirrups:

# legs	Size	fy (ksi)	Area (in2)	Spacing (in)	Start (ft)	End (ft)	Extends into Deck
2	US#4[M13]	60.0	0.40	3.00	0.0000	2.0000	Yes
2	US#4[M13]	60.0	0.40	4.00	2.0000	3.5000	Yes
2	US#4[M13]	60.0	0.40	4.00	3.5000	62.5000	Yes
2	US#4[M13]	60.0	0.40	4.00	62.5000	64.0000	Yes
2	US#4[M13]	60.0	0.40	3.00	64.0000	66.0000	Yes

Span:1, Beam:12

PRESTRESSED STEEL:

38 strands, 9/16-270K-LL, Low relaxation strands
Straight Pattern

END PATTERN (Ycg = 3.95 in):

20 @ 3.000 in	18 @ 5.000 in		
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REINFORCING STEEL:

Tension steel:		
fy	60.0	ksi
Es	29000	ksi

Stirrups:

# legs	Size	fy (ksi)	Area (in2)	Spacing (in)	Start (ft)	End (ft)	Extends into Deck
2	US#4[M13]	60.0	0.40	3.00	0.0000	2.0000	Yes
2	US#4[M13]	60.0	0.40	4.00	2.0000	3.5000	Yes
2	US#4[M13]	60.0	0.40	4.00	3.5000	62.5000	Yes
2	US#4[M13]	60.0	0.40	4.00	62.5000	64.0000	Yes
2	US#4[M13]	60.0	0.40	3.00	64.0000	66.0000	Yes

Span:1, Beam:13



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PRESTRESSED STEEL:

38 strands, 9/16-270K-LL, Low relaxation strands
Straight Pattern

END PATTERN (Ycg = 3.95 in):

20 @ 3.000 in | 18 @ 5.000 in | |

REINFORCING STEEL:

Tension	steel:	
fy	60.0	ksi
Es	29000	ksi

Stirrups:

# legs	Size	fy (ksi)	Area (in2)	Spacing (in)	Start (ft)	End (ft)	Extends into Deck
2	US#4[M13]	60.0	0.40	3.00	0.0000	2.0000	Yes
2	US#4[M13]	60.0	0.40	4.00	2.0000	3.5000	Yes
2	US#4[M13]	60.0	0.40	4.00	3.5000	62.5000	Yes
2	US#4[M13]	60.0	0.40	4.00	62.5000	64.0000	Yes
2	US#4[M13]	60.0	0.40	3.00	64.0000	66.0000	Yes

Span:1, Beam:14

PRESTRESSED STEEL:

38 strands, 9/16-270K-LL, Low relaxation strands
Straight Pattern

END PATTERN (Ycg = 3.95 in):

20 @ 3.000 in | 18 @ 5.000 in | |

REINFORCING STEEL:

Tension	steel:	
fy	60.0	ksi
Es	29000	ksi

Stirrups:



Sheet # 24

Job # RJB 21030

Program: LEAP® Bridge Concrete CONNECT Edition

RJ Behar

Designed JAPR

Module: Precast/Prestressed Girder

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# legs	Size	fy (ksi)	Area (in2)	Spacing (in)	Start (ft)	End (ft)	Extends into Deck
2	US#4[M13]	60.0	0.40	3.00	0.0000	2.0000	Yes
2	US#4[M13]	60.0	0.40	4.00	2.0000	3.5000	Yes
2	US#4[M13]	60.0	0.40	4.00	3.5000	62.5000	Yes
2	US#4[M13]	60.0	0.40	4.00	62.5000	64.0000	Yes
2	US#4[M13]	60.0	0.40	3.00	64.0000	66.0000	Yes

		Sheet #	1
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PROPERTIES

Span:1, Beam:1

PRECAST DATA:

Section Id	18" FSB					
Type	Non-Voided Rectangular					
Fling width	Top	54.120	in	Bot	54.120	in
thick	Top	18.000	in	Bot	18.000	in
Stems	No	0				
	Top	N/A				
	Bot	N/A				
Shear width		54.120	in			

Minimum Thickness Criteria, Article 5.12.3.2 checked: OK.

GENERAL BRIDGE DATA:

Bridge Width	63.16	ft
Curb-to-curb	61.00	ft
Beam Spac. Lt./Rt	2.20/ 4.52	ft
Lane width	12.00	ft
Number of lanes	2	
Interior/Exterior	Exterior	
Start Skew Angle	0.00	degrees
End Skew Angle	0.00	degrees

TOPPING DATA:

Effective Deck	Thickness	6.000	in	
Sacrificial Deck	Thickness	0.000	in	
Haunch:	Thickness	0.000	in	
	Width	54.150	in	
Effective	width	53.520	in	(Art. 4.6.2.6.1)

Note: Haunch is ignored for composite section properties. Haunch self weight is included.

GENERAL LOAD DATA:

DEAD LOADS ON PRECAST - NONE

Dead loads on composite: See Project info for composite loads

GENERAL SPAN DATA:

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Overall length	66.000	ft
Release length	66.000	ft
Design length	63.916	ft

KERN POINTS:

Upper	12.00	in
Lower	6.00	in

DISTRIBUTION FACTORS (Art. 4.6.2.2):

Type f, with deck

Live Moment	(2+ lanes loaded)	0.316	(Calculated)
Live Moment	(1 lane loaded)	0.060	(Calculated)
Live Shear	(2+ lanes loaded)	0.331	(Calculated)
Live Shear	(1 lane loaded)	0.067	(Calculated)

The LL distribution computation is using the effective slab depth (ts = 6.00in).

Include sacrificial deck thick in ts: NO

Pedestrian	0.071	(Calculated)
Comp. DC	0.071	(Calculated)
Comp. DW	0.071	(Calculated)

Dead Loads and Pedestrian Load distributed equally to all beams (Art. 4.6.2.2.1)

RESISTANCE FACTORS (Art. 5.5.4.2):

Flexure Reinforced	
Compression controlled sections	0.75
Tension controlled sections	0.90
Flexure Prestressed	
Compression controlled sections	0.75
Tension controlled sections	1.00
Shear	0.90

SECTION PROPERTIES:

				Sheet #	3
				Job #	RJB 21030
Program:	LEAP® Bridge Concrete CONNECT Edition	RJ Behar		Designed	JAPR
Module:	Precast/Prestressed Girder	Copyright © Bentley Systems, Inc. 2021		Date	Oct/19/2021
Version:	21.00.00.24	www.bentley.com	Phone: 1-800-778-4277	Checked	AW
File Name:	SW 87 Ave Bridge Superstructure.lbcx			Date	Oct/20/2021

	PRECAST		COMPOSITE		
Area	974.1	in2	1234.4	in2	#
Total Height	18.00	in	24.00	in	
Mom. of Inertia (Ixx)	26302	in4	56664	in4	#
Ht. of c.g.	9.00	in	11.53	in	#
Density	150.00	pcf	150.00	pcf	
Lambda	1.00		1.00		
Self-weight	1014.7	plf	1349.2	plf	
Mom. of Inertia (Iyy)	237774.3	in4			
Poisson's Ratio	0.2				
Thermal Coeff.	0.000006000	1/°F			

(#) Of Total Section using $E_c/E_c = 0.8107$

NOTE: Poisson's ratio may be assumed as 0.2 for lightweight concrete with specified compressive strengths up to 10.0 ksi and for normal weight concrete with specified compressive strengths up to 15.0 ksi.

Use transformed strand and rebar: Strand Only

Location,	ft	Bearing 0.00	Trans 1.77	H/2 1.00	0.10L 5.56	0.20L 12.16	0.30L 18.76	0.40L 25.36	Midspan 31.96
Precast:(At Release, using	Ec =	4389.3ksi)							
Area,	in2	988.9	1014.2	1003.2	1014.2	1014.2	1014.2	1014.2	1014.2
Yb,	in	8.92	8.80	8.85	8.80	8.80	8.80	8.80	8.80
MI(Ixx),	in4	26675	27285	27023	27285	27285	27285	27285	27285
Composite:(At Final, using	Ec =	4924.0ksi)							
Area,	in2	1247.4	1269.4	1259.8	1269.4	1269.4	1269.4	1269.4	1269.4
Yb,	in	11.45	11.32	11.38	11.32	11.32	11.32	11.32	11.32
MI(Ixx),	in4	57401	58618	58094	58618	58618	58618	58618	58618

Span:1, Beam:1

STRESS LIMITS (Art. 5.9.2):

STRESS LIMITS AT RELEASE BEFORE LOSSES (Using Advanced Settings):

		PRECAST	
Strength		6.00	ksi
Elasticity		4389.3	ksi
Max comp		3.60	ksi
Outer	15.00 %		
Max tens		-0.23	ksi
Max tens,	w/reinf	-0.93	ksi
Center	70.00 %		
Max tens		-0.23	ksi
Max tens,	w/reinf	-0.59	ksi

STRESS LIMITS AT FINAL AFTER LOSSES:

				Sheet #	4
				Job #	RJB 21030
Program:	LEAP® Bridge Concrete CONNECT Edition	RJ Behar		Designed	JAPR
Module:	Precast/Prestressed Girder	Copyright © Bentley Systems, Inc. 2021		Date	Oct/19/2021
Version:	21.00.00.24	www.bentley.com	Phone: 1-800-778-4277	Checked	AW
File Name:	SW 87 Ave Bridge Superstructure.lbcx			Date	Oct/20/2021

	PRECAST		DECK	
Strength	8.50	ksi	4.50	ksi
Elasticity	4923.96	ksi	3991.78	ksi

STRESS LIMITS AT FINAL 1 (P/S + DL + LL):

	PRECAST		DECK	
Max comp	5.10	ksi	2.70	ksi

STRESS LIMITS AT FINAL 2 (P/S + DL):

	PRECAST		DECK	
Max comp	3.83	ksi	2.03	ksi

FATIGUE I STRESS LIMITS AT FINAL 3 (50% P/S + 50% DL + F_LL) (Art. 5.5.3.1):

	PRECAST		DECK	
Max comp	3.40	ksi	-	ksi

SERVICE III (Tension):

	PRECAST		DECK	
Max tens	-0.55	ksi	-0.40	ksi

Span:1, Beam:1

PRESTRESSED STEEL:

38 strands, 9/16-270K-LL, Low relaxation strands
Straight Pattern

END PATTERN (Ycg = 3.95 in):

20 @ 3.000 in	18 @ 5.000 in		
---------------	---------------	--	--

Strand Diameter	0.562	in
Strand Area	0.192	in ²
Total Strand Area	7.296	in ²
Trans. Len,bonded	2.812	ft
Trans. Len,debonded	2.812	ft
Dev. Len, bonded	5.248	ft
Dev. Len, debonded	10.495	ft
Holddown Force	0.000	kips
Tensile Strength(fpu)	270.0	ksi
Initial Prestress = 0.75fpu	202.5	ksi
Initial Pull	1477.4	kips
Beam Shrtng (PL/AE)	0.266	in

		Sheet #	5
		Job #	RJB 21030
Program:	LEAP® Bridge Concrete CONNECT Edition	RJ Behar	Designed JAPR
Module:	Precast/Prestressed Girder	Copyright © Bentley Systems, Inc. 2021	Date Oct/19/2021
Version:	21.00.00.24	www.bentley.com Phone: 1-800-778-4277	Checked AW
File Name:	SW 87 Ave Bridge Superstructure.lbcx	Date	Oct/20/2021

Span:1, Beam:1
ESTIMATED QUANTITIES

Prestressing (linear ft)	Strands (LB/1000ft)	(LB)	Beam Vol(C.Y.)	Concrete Wt(LB)	Stirrups (LB)	Longitudinal Bars (LB)
2508.000	651	1632.708	16.536	66969.516	524.438	0.000

Span:1, Beam:1
REINFORCING STEEL:

Tension steel:		
fy	60.0	ksi
Es	29000	ksi

Stirrups:

# legs	Size	fy (ksi)	Area (in2)	Spacing (in)	Start (ft)	End (ft)	Extends into Deck
2	US#4[M13]	60.0	0.40	3.00	0.0000	2.0000	Yes
2	US#4[M13]	60.0	0.40	4.00	2.0000	3.5000	Yes
2	US#4[M13]	60.0	0.40	4.00	3.5000	62.5000	Yes
2	US#4[M13]	60.0	0.40	4.00	62.5000	64.0000	Yes
2	US#4[M13]	60.0	0.40	3.00	64.0000	66.0000	Yes

LOSSES

Note: Values are calculated at Midspan

Str. area	7.2960	in2
Ycg	3.95	in
P_init	1477.4	kips
Ecc	5.05	in
Days to release	0.75	
Rel. Humid.(RH)	75.0	%
Es	28500.0	ksi
Eci	4389	ksi

AASHTO LOSSES

Elastic Shortening ** 9.70 ksi (Eq 5.9.5.2.3a-1), (fcgp= 1.494 ksi)

	Elastic Gains		Gains		Adjustment	
due to Precast Loads		-2.11	ksi		0.00	ksi
due to Composite Loads		-1.08	ksi		0.00	ksi
due to Live Loads		-3.28	ksi		0.00	ksi

Time Dependent Losses (Approximate Method (Art.5.9.3.3))

			Sheet #	6
			Job #	RJB 21030
Program:	LEAP® Bridge Concrete CONNECT Edition	RJ Behar		Designed JAPR
Module:	Precast/Prestressed Girder	Copyright © Bentley Systems, Inc. 2021		Date Oct/19/2021
Version:	21.00.00.24	www.bentley.com	Phone: 1-800-778-4277	Checked AW
File Name:	SW 87 Ave Bridge Superstructure.lbcx			Date Oct/20/2021

		Initial		Final		
Steel relaxation	0.00	ksi		2.40	ksi	(Eq 5.9.3.3-1)
Concrete shrinkage	0.00	ksi		8.14	ksi	(Eq 5.9.3.3-1)
Concrete creep	0.00	ksi		10.29	ksi	(Eq 5.9.3.3-1)
Sub-total	9.70	ksi	(4.79 %)	14.36	ksi	(7.09 %)
Total Prestress Losses				24.06	ksi	(11.88 %)

Prestressing Stress Limit Check (Table 5.9.3.1)

initial fpi = 202.5 ksi < 0.75 fpu, OK

initial fpe = 178.4 ksi < 0.80 fpy, OK

** Since the transformed section properties option has been selected, even though ES losses have been calculated explicitly here, they are not included as a part of stress calculations. Please see theory section for complete explanation.

				Sheet #	7
				Job #	RJB 21030
Program:	LEAP® Bridge Concrete CONNECT Edition	RJ Behar		Designed	JAPR
Module:	Precast/Prestressed Girder	Copyright © Bentley Systems, Inc. 2021		Date	Oct/19/2021
Version:	21.00.00.24	www.bentley.com	Phone: 1-800-778-4277	Checked	AW
File Name:	SW 87 Ave Bridge Superstructure.lbcx			Date	Oct/20/2021

SHEAR/MOMENT ENVELOPE (&REACTIONS)

SHEAR AND MOMENT ENVELOPE : Span : 1, Beam : 1, SERVICE I

Shears: kips, Moments: kft

		Bearing	Trans	H/2	0.10L	0.20L	0.30L	0.40L	Midspan
Location,	ft	0.00	1.77	1.00	5.56	12.16	18.76	25.36	31.96
Self wt. :	M	0.0	55.8	31.9	164.6	319.3	429.8	496.1	518.2
(Max)	V	32.4	30.6	31.4	26.8	20.1	13.4	6.7	0.0
DL-Prec. :	M	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
DC(Max)	V	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
DL-Prec. :	M	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
DW(Max)	V	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Deck + :	M	0.0	18.4	10.5	54.2	105.2	141.7	163.5	170.8
Haunch (Max)	V	10.7	10.1	10.4	8.8	6.6	4.4	2.2	0.0
Diaphragm :	M	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
(Max)	V	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
DL-Comp :	M	0.0	9.7	5.6	28.7	55.7	75.0	86.6	90.5
DC(Max)	V	5.7	5.3	5.5	4.7	3.5	2.3	1.2	0.0
DL-Comp :	M	0.0	3.6	2.1	10.6	20.6	27.7	32.0	33.4
DW(Max)	V	2.1	2.0	2.0	1.7	1.3	0.9	0.4	0.0
LL + I :	M+	0.0	54.6	31.3	159.7	304.4	400.4	457.2	469.5
	V	33.8	32.5	33.1	29.5	24.9	6.9	14.6	10.0
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	33.8	32.5	33.1	29.5	25.1	20.9	16.8	12.9
	M	-0.0	55.8	32.0	159.7	291.1	374.1	407.6	394.2
Pedestrian:	M+	0.0	2.4	1.3	7.0	13.5	18.2	21.0	21.9
	V	1.4	1.3	1.3	1.1	0.8	0.6	0.3	0.0
Pedestrian:	M-	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	V	1.4	0.9	1.1	0.0	0.0	0.0	0.0	0.0
Pedestrian:	Vmx	1.4	1.3	1.3	1.1	0.9	0.6	0.4	0.3
	M	0.0	2.4	1.4	7.0	12.5	15.1	11.3	12.3
Total :	M+	0.0	144.6	82.7	424.8	818.7	1092.7	1256.3	1304.2
	V	86.1	81.8	83.7	72.6	57.3	28.4	25.4	10.0
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	86.1	81.8	83.7	72.6	57.4	42.5	27.8	13.2
	M	-0.0	145.8	83.5	424.8	804.4	1063.3	1197.1	1219.4



				Sheet #	8
				Job #	RJB 21030
Program:	LEAP® Bridge Concrete CONNECT Edition	RJ Behar		Designed	JAPR
Module:	Precast/Prestressed Girder	Copyright © Bentley Systems, Inc. 2021		Date	Oct/19/2021
Version:	21.00.00.24	www.bentley.com	Phone: 1-800-778-4277	Checked	AW
File Name:	SW 87 Ave Bridge Superstructure.lbcx			Date	Oct/20/2021

		0.60L	0.70L	0.80L	0.90L	H/2	Trans	Bearing
Location,	ft	38.56	45.16	51.76	58.36	62.92	62.15	63.92
Self wt. :	M	496.1	429.8	319.3	164.6	31.9	55.8	0.0
(Max)	V	6.7	13.4	20.1	26.8	31.4	30.6	32.4
DL-Prec. :	M	0.0	0.0	0.0	0.0	0.0	0.0	0.0
DC(Max)	V	0.0	0.0	0.0	0.0	0.0	0.0	0.0
DL-Prec. :	M	0.0	0.0	0.0	0.0	0.0	0.0	0.0
DW(Max)	V	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Deck + :	M	163.5	141.7	105.2	54.2	10.5	18.4	0.0
Haunch (Max)	V	2.2	4.4	6.6	8.8	10.4	10.1	10.7
Diaphragm :	M	0.0	0.0	0.0	0.0	0.0	0.0	0.0
(Max)	V	0.0	0.0	0.0	0.0	0.0	0.0	0.0
DL-Comp :	M	86.6	75.0	55.7	28.7	5.6	9.7	0.0
DC(Max)	V	1.2	2.3	3.5	4.7	5.5	5.3	5.7
DL-Comp :	M	32.0	27.7	20.6	10.6	2.1	3.6	0.0
DW(Max)	V	0.4	0.9	1.3	1.7	2.0	2.0	2.1
LL + I :	M+	457.2	400.4	304.4	159.7	31.3	54.6	0.0
	V	14.6	6.9	24.9	29.5	33.1	32.5	33.8
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	16.8	20.9	25.1	29.5	33.1	32.5	33.8
	M	407.6	374.1	291.1	159.7	32.0	55.8	-0.0
Pedestrian:	M+	21.0	18.2	13.5	7.0	1.3	2.4	0.0
	V	0.3	0.6	0.8	1.1	1.3	1.3	1.4
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	1.1	0.9	1.4
Pedestrian:	Vmx	0.5	0.7	0.9	1.1	1.3	1.3	1.4
	M	13.9	13.9	11.7	6.7	1.4	2.4	0.0
Total :	M+	1256.3	1092.7	818.7	424.8	82.7	144.6	0.0
	V	25.4	28.4	57.3	72.6	83.7	81.8	86.1
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	27.8	42.5	57.5	72.7	83.7	81.8	86.1
	M	1199.7	1062.2	803.6	424.6	83.5	145.7	-0.0

REACTIONS (kips), SERVICE I

Load Type		Left Support	Right Support
Self Wt.		32.4	32.4
Deck+Haunch		10.7	10.7
Diaphragm		0.0	0.0
DL-Prec.(DC)		0.0	0.0
DL-Prec.(DW)		0.0	0.0
DL-Comp.(DC)		79.3	79.3
DL-Comp.(DW)		29.2	29.2
Live		81.9	81.9
	Truck	61.5	61.5
	Lane	20.5	20.5
Pedestrian		19.2	19.2

				Sheet #	9
				Job #	RJB 21030
Program:	LEAP® Bridge Concrete CONNECT Edition	RJ Behar		Designed	JAPR
Module:	Precast/Prestressed Girder	Copyright © Bentley Systems, Inc. 2021		Date	Oct/19/2021
Version:	21.00.00.24	www.bentley.com	Phone: 1-800-778-4277	Checked	AW
File Name:	SW 87 Ave Bridge Superstructure.lbcx			Date	Oct/20/2021

Upward reactions are positive.

Live Load reactions are per lane with no distribution factor and no impact.

Reactions are not multiplied by Load Modifiers (ductility, redundancy and operational importance).

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, SERVICE III

Shears: kips, Moments: kft

		Bearing	Trans	H/2	0.10L	0.20L	0.30L	0.40L	Midspan
Location,	ft	0.00	1.77	1.00	5.56	12.16	18.76	25.36	31.96
Self wt. :	M	0.0	55.8	31.9	164.6	319.3	429.8	496.1	518.2
(Max)	V	32.4	30.6	31.4	26.8	20.1	13.4	6.7	0.0
DL-Prec. :	M	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
DC(Max)	V	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
DL-Prec. :	M	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
DW(Max)	V	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Deck + :	M	0.0	18.4	10.5	54.2	105.2	141.7	163.5	170.8
Haunch (Max)	V	10.7	10.1	10.4	8.8	6.6	4.4	2.2	0.0
Diaphragm :	M	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
(Max)	V	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
DL-Comp :	M	0.0	9.7	5.6	28.7	55.7	75.0	86.6	90.5
DC(Max)	V	5.7	5.3	5.5	4.7	3.5	2.3	1.2	0.0
DL-Comp :	M	0.0	3.6	2.1	10.6	20.6	27.7	32.0	33.4
DW(Max)	V	2.1	2.0	2.0	1.7	1.3	0.9	0.4	0.0
LL + I :	M+	0.0	43.7	25.0	127.8	243.6	320.3	365.8	375.6
	V	27.1	26.0	26.4	23.6	19.9	5.5	11.7	8.0
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	27.1	26.0	26.4	23.6	20.1	16.7	13.5	10.3
	M	-0.0	44.6	25.6	127.8	232.9	299.3	326.1	315.4
Pedestrian:	M+	0.0	1.9	1.1	5.6	10.8	14.5	16.8	17.5
	V	1.1	1.0	1.1	0.9	0.7	0.5	0.2	0.0
Pedestrian:	M-	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	V	1.1	0.7	0.9	0.0	0.0	0.0	0.0	0.0
Pedestrian:	Vmx	1.1	1.0	1.1	0.9	0.7	0.5	0.4	0.2
	M	0.0	2.0	1.1	5.6	10.0	12.1	9.0	9.9
Total :	M+	0.0	133.2	76.2	391.5	755.2	1009.0	1160.7	1205.9
	V	79.0	75.1	76.8	66.5	52.1	27.0	22.4	8.0
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	79.0	75.1	76.8	66.5	52.3	38.2	24.3	10.6
	M	-0.0	134.1	76.8	391.5	743.7	985.5	1113.3	1138.1



				Sheet #	10
				Job #	RJB 21030
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Module:	Precast/Prestressed Girder	Copyright © Bentley Systems, Inc. 2021		Date	Oct/19/2021
Version:	21.00.00.24	www.bentley.com	Phone: 1-800-778-4277	Checked	AW
File Name:	SW 87 Ave Bridge Superstructure.lbcx			Date	Oct/20/2021

		0.60L	0.70L	0.80L	0.90L	H/2	Trans	Bearing
Location,	ft	38.56	45.16	51.76	58.36	62.92	62.15	63.92
Self wt. :	M	496.1	429.8	319.3	164.6	31.9	55.8	0.0
(Max)	V	6.7	13.4	20.1	26.8	31.4	30.6	32.4
DL-Prec. :	M	0.0	0.0	0.0	0.0	0.0	0.0	0.0
DC(Max)	V	0.0	0.0	0.0	0.0	0.0	0.0	0.0
DL-Prec. :	M	0.0	0.0	0.0	0.0	0.0	0.0	0.0
DW(Max)	V	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Deck + :	M	163.5	141.7	105.2	54.2	10.5	18.4	0.0
Haunch (Max)	V	2.2	4.4	6.6	8.8	10.4	10.1	10.7
Diaphragm :	M	0.0	0.0	0.0	0.0	0.0	0.0	0.0
(Max)	V	0.0	0.0	0.0	0.0	0.0	0.0	0.0
DL-Comp :	M	86.6	75.0	55.7	28.7	5.6	9.7	0.0
DC(Max)	V	1.2	2.3	3.5	4.7	5.5	5.3	5.7
DL-Comp :	M	32.0	27.7	20.6	10.6	2.1	3.6	0.0
DW(Max)	V	0.4	0.9	1.3	1.7	2.0	2.0	2.1
LL + I :	M+	365.8	320.3	243.6	127.8	25.0	43.7	0.0
	V	11.7	5.5	19.9	23.6	26.4	26.0	27.1
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	13.5	16.7	20.1	23.6	26.4	26.0	27.1
	M	326.1	299.3	232.9	127.8	25.6	44.6	-0.0
Pedestrian:	M+	16.8	14.5	10.8	5.6	1.1	1.9	0.0
	V	0.2	0.5	0.7	0.9	1.1	1.0	1.1
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	0.9	0.7	1.1
Pedestrian:	Vmx	0.4	0.5	0.7	0.9	1.1	1.0	1.1
	M	11.2	11.2	9.4	5.4	1.1	1.9	0.0
Total :	M+	1160.7	1009.0	755.2	391.5	76.2	133.2	0.0
	V	22.4	27.0	52.1	66.5	76.8	75.1	79.0
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	24.3	38.2	52.3	66.5	76.8	75.1	79.0
	M	1115.4	984.6	743.1	391.3	76.8	134.1	-0.0

SHEAR AND MOMENT ENVELOPE : Span : 1, Beam : 1, STRENGTH I
Shears: kips, Moments: kft

				Sheet #	11
				Job #	RJB 21030
Program:	LEAP® Bridge Concrete CONNECT Edition	RJ Behar		Designed	JAPR
Module:	Precast/Prestressed Girder	Copyright © Bentley Systems, Inc. 2021		Date	Oct/19/2021
Version:	21.00.00.24	www.bentley.com	Phone: 1-800-778-4277	Checked	AW
File Name:	SW 87 Ave Bridge Superstructure.lbcx			Date	Oct/20/2021

		Bearing	Trans	H/2	0.10L	0.20L	0.30L	0.40L	Midspan
Location,	ft	0.00	1.77	1.00	5.56	12.16	18.76	25.36	31.96
Self wt. :	M	0.0	69.8	39.9	205.7	399.1	537.2	620.1	647.7
(Max)	V	40.5	38.3	39.3	33.5	25.1	16.7	8.4	0.0
Self wt. :	M	0.0	50.2	28.7	148.1	287.3	386.8	446.5	466.3
(Min)	V	29.2	27.6	28.3	24.1	18.1	12.1	6.0	0.0
DL-Prec. :	M	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
DC(Max)	V	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
DL-Prec. :	M	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
DC(Min)	V	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
DL-Prec. :	M	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
DW(Max)	V	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
DL-Prec. :	M	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
DW(Min)	V	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Deck + :	M	0.0	23.0	13.2	67.8	131.6	177.1	204.4	213.5
Haunch (Max)	V	13.4	12.6	12.9	11.0	8.3	5.5	2.8	0.0
Deck + :	M	0.0	16.6	9.5	48.8	94.7	127.5	147.2	153.7
Haunch (Min)	V	9.6	9.1	9.3	7.9	6.0	4.0	2.0	0.0
Diaphragm :	M	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
(Max)	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
(Min)	V	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
DL-Comp :	M	0.0	12.2	7.0	35.9	69.7	93.8	108.3	113.1
DC(Max)	V	7.1	6.7	6.9	5.8	4.4	2.9	1.5	0.0
DL-Comp :	M	0.0	8.8	5.0	25.9	50.2	67.5	77.9	81.4
DC(Min)	V	5.1	4.8	4.9	4.2	3.2	2.1	1.1	0.0
DL-Comp :	M	0.0	5.4	3.1	15.9	30.8	41.5	47.9	50.1
DW(Max)	V	3.1	3.0	3.0	2.6	1.9	1.3	0.6	0.0
DL-Comp :	M	0.0	2.3	1.3	6.9	13.4	18.0	20.8	21.7
DW(Min)	V	1.4	1.3	1.3	1.1	0.8	0.6	0.3	0.0
LL + I :	M+	0.0	95.6	54.8	279.5	532.8	700.8	800.1	821.6
	V	59.2	56.8	57.9	51.6	43.6	12.0	25.5	17.5
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	59.2	56.8	57.9	51.6	43.9	36.5	29.5	22.6
	M	-0.0	97.6	56.1	279.5	509.4	654.7	713.4	689.9
Pedestrian:	M+	0.0	4.1	2.4	12.2	23.6	31.8	36.7	38.3
	V	2.4	2.3	2.3	2.0	1.5	1.0	0.5	0.0
Pedestrian:	M-	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	V	2.4	1.6	2.0	0.0	0.0	0.0	0.0	0.0
Pedestrian:	Vmx	2.4	2.3	2.3	2.0	1.5	1.1	0.8	0.5
	M	0.0	4.3	2.5	12.2	21.8	26.4	19.8	21.6
Total :	M+	0.0	210.1	120.2	617.0	1187.5	1582.1	1817.4	1884.2
	V	125.7	119.6	122.3	106.6	84.8	39.5	39.3	17.5
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	125.7	119.6	122.3	106.6	85.1	64.1	43.5	23.1
	M	-0.0	212.2	121.6	617.0	1162.4	1530.7	1713.8	1735.8

		Sheet #	12
		Job #	RJB 21030
Program:	LEAP® Bridge Concrete CONNECT Edition	RJ Behar	Designed JAPR
Module:	Precast/Prestressed Girder	Copyright © Bentley Systems, Inc. 2021	Date Oct/19/2021
Version:	21.00.00.24	www.bentley.com Phone: 1-800-778-4277	Checked AW
File Name:	SW 87 Ave Bridge Superstructure.lbcx		Date Oct/20/2021

		0.60L	0.70L	0.80L	0.90L	H/2	Trans	Bearing
Location,	ft	38.56	45.16	51.76	58.36	62.92	62.15	63.92
Self wt. :	M	620.1	537.2	399.1	205.7	39.9	69.8	0.0
(Max)	V	8.4	16.7	25.1	33.5	39.3	38.3	40.5
Self wt. :	M	446.5	386.8	287.3	148.1	28.7	50.2	0.0
(Min)	V	6.0	12.1	18.1	24.1	28.3	27.6	29.2
DL-Prec. :	M	0.0	0.0	0.0	0.0	0.0	0.0	0.0
DC(Max)	V	0.0	0.0	0.0	0.0	0.0	0.0	0.0
DL-Prec. :	M	0.0	0.0	0.0	0.0	0.0	0.0	0.0
DC(Min)	V	0.0	0.0	0.0	0.0	0.0	0.0	0.0
DL-Prec. :	M	0.0	0.0	0.0	0.0	0.0	0.0	0.0
DW(Max)	V	0.0	0.0	0.0	0.0	0.0	0.0	0.0
DL-Prec. :	M	0.0	0.0	0.0	0.0	0.0	0.0	0.0
DW(Min)	V	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Deck + :	M	204.4	177.1	131.6	67.8	13.2	23.0	0.0
Haunch (Max)	V	2.8	5.5	8.3	11.0	12.9	12.6	13.4
Deck + :	M	147.2	127.5	94.7	48.8	9.5	16.6	0.0
Haunch (Min)	V	2.0	4.0	6.0	7.9	9.3	9.1	9.6
Diaphragm :	M	0.0	0.0	0.0	0.0	0.0	0.0	0.0
(Max)	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
(Min)	V	0.0	0.0	0.0	0.0	0.0	0.0	0.0
DL-Comp :	M	108.3	93.8	69.7	35.9	7.0	12.2	0.0
DC(Max)	V	1.5	2.9	4.4	5.8	6.9	6.7	7.1
DL-Comp :	M	77.9	67.5	50.2	25.9	5.0	8.8	0.0
DC(Min)	V	1.1	2.1	3.2	4.2	4.9	4.8	5.1
DL-Comp :	M	47.9	41.5	30.8	15.9	3.1	5.4	0.0
DW(Max)	V	0.6	1.3	1.9	2.6	3.0	3.0	3.1
DL-Comp :	M	20.8	18.0	13.4	6.9	1.3	2.3	0.0
DW(Min)	V	0.3	0.6	0.8	1.1	1.3	1.3	1.4
LL + I :	M+	800.1	700.8	532.8	279.5	54.8	95.6	0.0
	V	25.5	12.0	43.6	51.6	57.9	56.8	59.2
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	29.5	36.5	43.9	51.6	57.9	56.8	59.2
	M	713.4	654.7	509.4	279.5	56.1	97.6	-0.0
Pedestrian:	M+	36.7	31.8	23.6	12.2	2.4	4.1	0.0
	V	0.5	1.0	1.5	2.0	2.3	2.3	2.4
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	2.0	1.6	2.4
Pedestrian:	Vmx	0.8	1.2	1.5	2.0	2.3	2.3	2.4
	M	24.4	24.4	20.5	11.8	2.4	4.2	0.0
Total :	M+	1817.4	1582.1	1187.5	617.0	120.2	210.1	0.0
	V	39.3	39.5	84.8	106.6	122.3	119.6	125.7
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	43.5	64.2	85.1	106.6	122.3	119.6	125.7
	M	1718.5	1528.7	1161.1	616.6	121.6	212.1	-0.0

				Sheet #	13
				Job #	RJB 21030
Program:	LEAP® Bridge Concrete CONNECT Edition	RJ Behar		Designed	JAPR
Module:	Precast/Prestressed Girder	Copyright © Bentley Systems, Inc. 2021		Date	Oct/19/2021
Version:	21.00.00.24	www.bentley.com	Phone: 1-800-778-4277	Checked	AW
File Name:	SW 87 Ave Bridge Superstructure.lbcx			Date	Oct/20/2021

REACTIONS (kips), STRENGTH I

Load Type		Left Support	Right Support
Self Wt.		40.5	40.5
Deck+Haunch		13.4	13.4
Diaphragm		0.0	0.0
DL-Prec.(DC)		0.0	0.0
DL-Prec.(DW)		0.0	0.0
DL-Comp.(DC)		99.1	99.1
DL-Comp.(DW)		43.9	43.9
Live		143.4	143.4
	Truck	107.6	107.6
	Lane	35.8	35.8
Pedestrian		33.6	33.6

Upward reactions are positive.

Live Load reactions are per lane with no distribution factor and no impact.

Reactions are not multiplied by Load Modifiers (ductility, redundancy and operational importance).

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, FATIGUE I

Shears: kips, Moments: kft

		Sheet #	14
		Job #	RJB 21030
Program:	LEAP® Bridge Concrete CONNECT Edition	RJ Behar	
Module:	Precast/Prestressed Girder	Copyright © Bentley Systems, Inc. 2021	Date
Version:	21.00.00.24	www.bentley.com	Checked
File Name:	SW 87 Ave Bridge Superstructure.lbcx	Phone: 1-800-778-4277	Date
			Oct/20/2021

		Bearing	Trans	H/2	0.10L	0.20L	0.30L	0.40L	Midspan
Location,	ft	0.00	1.77	1.00	5.56	12.16	18.76	25.36	31.96
Self wt. :	M	0.0	55.8	31.9	164.6	319.3	429.8	496.1	518.2
(Max)	V	32.4	30.6	31.4	26.8	20.1	13.4	6.7	0.0
Self wt. :	M	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
(Min)	V	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
DL-Prec. :	M	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
DC(Max)	V	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
DL-Prec. :	M	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
DC(Min)	V	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
DL-Prec. :	M	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
DW(Max)	V	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
DL-Prec. :	M	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
DW(Min)	V	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Deck + :	M	0.0	18.4	10.5	54.2	105.2	141.7	163.5	170.8
Haunch (Max)	V	10.7	10.1	10.4	8.8	6.6	4.4	2.2	0.0
Deck + :	M	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Haunch (Min)	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
(Max)	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
(Min)	V	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
DL-Comp :	M	0.0	9.7	5.6	28.7	55.7	75.0	86.6	90.5
DC(Max)	V	5.7	5.3	5.5	4.7	3.5	2.3	1.2	0.0
DL-Comp :	M	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
DC(Min)	V	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
DL-Comp :	M	0.0	3.6	2.1	10.6	20.6	27.7	32.0	33.4
DW(Max)	V	2.1	2.0	2.0	1.7	1.3	0.9	0.4	0.0
DL-Comp :	M	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
DW(Min)	V	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LL + I :	M+	0.0	8.8	5.1	25.4	46.5	60.7	66.9	63.4
	V	6.0	5.7	5.8	5.1	4.3	3.4	2.5	2.0
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	6.0	5.7	5.8	5.1	4.3	3.5	2.7	2.1
	M	0.0	8.8	5.1	25.4	46.5	57.8	61.2	60.2
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	96.4	55.2	283.5	547.3	734.8	845.1	876.2
	V	56.8	53.8	55.1	47.2	35.8	24.4	13.0	2.0
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	56.8	53.8	55.1	47.2	35.8	24.5	13.2	2.1
	M	0.0	96.4	55.2	283.5	547.3	732.0	839.3	873.0

				Sheet #	15
				Job #	RJB 21030
Program:	LEAP® Bridge Concrete CONNECT Edition	RJ Behar		Designed	JAPR
Module:	Precast/Prestressed Girder	Copyright © Bentley Systems, Inc. 2021		Date	Oct/19/2021
Version:	21.00.00.24	www.bentley.com	Phone: 1-800-778-4277	Checked	AW
File Name:	SW 87 Ave Bridge Superstructure.lbcx			Date	Oct/20/2021

		0.60L	0.70L	0.80L	0.90L	H/2	Trans	Bearing
Location,	ft	38.56	45.16	51.76	58.36	62.92	62.15	63.92
Self wt. :	M	496.1	429.8	319.3	164.6	31.9	55.8	0.0
(Max)	V	6.7	13.4	20.1	26.8	31.4	30.6	32.4
Self wt. :	M	0.0	0.0	0.0	0.0	0.0	0.0	0.0
(Min)	V	0.0	0.0	0.0	0.0	0.0	0.0	0.0
DL-Prec. :	M	0.0	0.0	0.0	0.0	0.0	0.0	0.0
DC(Max)	V	0.0	0.0	0.0	0.0	0.0	0.0	0.0
DL-Prec. :	M	0.0	0.0	0.0	0.0	0.0	0.0	0.0
DC(Min)	V	0.0	0.0	0.0	0.0	0.0	0.0	0.0
DL-Prec. :	M	0.0	0.0	0.0	0.0	0.0	0.0	0.0
DW(Max)	V	0.0	0.0	0.0	0.0	0.0	0.0	0.0
DL-Prec. :	M	0.0	0.0	0.0	0.0	0.0	0.0	0.0
DW(Min)	V	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Deck + :	M	163.5	141.7	105.2	54.2	10.5	18.4	0.0
Haunch (Max)	V	2.2	4.4	6.6	8.8	10.4	10.1	10.7
Deck + :	M	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Haunch (Min)	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
(Max)	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
(Min)	V	0.0	0.0	0.0	0.0	0.0	0.0	0.0
DL-Comp :	M	86.6	75.0	55.7	28.7	5.6	9.7	0.0
DC(Max)	V	1.2	2.3	3.5	4.7	5.5	5.3	5.7
DL-Comp :	M	0.0	0.0	0.0	0.0	0.0	0.0	0.0
DC(Min)	V	0.0	0.0	0.0	0.0	0.0	0.0	0.0
DL-Comp :	M	32.0	27.7	20.6	10.6	2.1	3.6	0.0
DW(Max)	V	0.4	0.9	1.3	1.7	2.0	2.0	2.1
DL-Comp :	M	0.0	0.0	0.0	0.0	0.0	0.0	0.0
DW(Min)	V	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LL + I :	M+	66.9	60.7	46.5	25.4	5.1	8.8	0.0
	V	2.5	3.4	4.3	5.1	5.8	5.7	6.0
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	2.7	3.5	4.3	5.1	5.8	5.7	6.0
	M	61.2	57.8	46.5	25.4	5.1	8.8	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+	845.1	734.8	547.3	283.5	55.2	96.4	0.0
	V	13.0	24.4	35.8	47.2	55.1	53.8	56.8
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	13.2	24.5	35.8	47.2	55.1	53.8	56.8
	M	839.3	732.0	547.3	283.5	55.2	96.4	0.0

				Sheet #	16
				Job #	RJB 21030
Program:	LEAP® Bridge Concrete CONNECT Edition	RJ Behar		Designed	JAPR
Module:	Precast/Prestressed Girder	Copyright © Bentley Systems, Inc. 2021		Date	Oct/19/2021
Version:	21.00.00.24	www.bentley.com	Phone: 1-800-778-4277	Checked	AW
File Name:	SW 87 Ave Bridge Superstructure.lbcx			Date	Oct/20/2021

POSITIVE ENVELOPE STRESSES

Span : 1, Beam : 1, SERVICE I

RELEASE STRESSES, (ksi) (LOSS = 0.00 %)

	Trans	0.10L /0.90L	0.20L /0.80L	0.30L /0.70L	0.40L /0.60L	Midspan
Location, ft	2.81	6.60	13.20	19.80	26.40	33.00
Beam-Self						
Precast-top	0.365	0.805	1.431	1.878	2.146	2.235
Bottom	-0.349	-0.770	-1.369	-1.796	-2.053	-2.138
Prestress						
Precast-top	-0.961	-0.961	-0.961	-0.961	-0.961	-0.961
Bottom	3.769	3.769	3.769	3.769	3.769	3.769
Total						
Precast-top	-0.596	-0.156	0.470	0.917	1.185	1.275
Bottom	3.420	3.000	2.401	1.973	1.716	1.631

SERVICE I

POSITIVE ENVELOPE STRESSES, (ksi) (LOSS = 10.29 %)



Sheet #	17
Job #	RJB 21030
Designed	JAPR
Date	Oct/19/2021
Checked	AW
Date	Oct/20/2021

	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	1.77	1.00	5.56	12.16	18.76	25.36	31.96
Prestress								
Precast-top	-0.335	-0.862	-0.639	-0.862	-0.862	-0.862	-0.862	-0.862
Bottom	1.314	3.382	2.506	3.382	3.382	3.382	3.382	3.382
Self wt.								
Precast-top	-0.000	0.226	0.130	0.666	1.292	1.739	2.007	2.097
Bottom	-0.000	-0.216	-0.125	-0.637	-1.236	-1.663	-1.920	-2.005
DL-Prec (DC)								
Precast-top	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000
Bottom	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000
DL-Prec (DW)								
Precast-top	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000
Bottom	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000
Diaphragm								
Precast-top	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000
Bottom	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000
Deck + Haunch								
Precast-top	-0.000	0.074	0.043	0.219	0.426	0.573	0.662	0.691
Bottom	-0.000	-0.071	-0.041	-0.210	-0.407	-0.548	-0.633	-0.661
DL-Comp (DC)								
Topping-top	-0.000	0.021	0.012	0.060	0.117	0.158	0.182	0.190
Precast-top	-0.000	0.013	0.008	0.039	0.076	0.103	0.118	0.124
Bottom	-0.000	-0.023	-0.013	-0.067	-0.129	-0.174	-0.201	-0.210
DL-Comp (DW)								
Topping-top	-0.000	0.008	0.004	0.022	0.043	0.058	0.067	0.070
Precast-top	-0.000	0.005	0.003	0.014	0.028	0.038	0.044	0.046
Bottom	-0.000	-0.008	-0.005	-0.025	-0.048	-0.064	-0.074	-0.077
LL+I(+)								
Topping-top	-0.000	0.115	0.066	0.336	0.641	0.843	0.962	0.988
Precast-top	-0.000	0.075	0.043	0.218	0.416	0.547	0.625	0.642
Bottom	-0.000	-0.127	-0.074	-0.370	-0.706	-0.928	-1.060	-1.088
Pedestrian(+)								
Topping-top	-0.000	0.005	0.003	0.015	0.028	0.038	0.044	0.046
Precast-top	-0.000	0.003	0.002	0.010	0.018	0.025	0.029	0.030
Bottom	-0.000	-0.005	-0.003	-0.016	-0.031	-0.042	-0.049	-0.051
Final 1 (P/S + DL + LL)								
Topping-top	-0.000	0.148	0.085	0.433	0.829	1.097	1.255	1.294
Precast-top	-0.335	-0.465	-0.411	0.305	1.395	2.163	2.623	2.767



				Sheet #	18
				Job #	RJB 21030
Program:	LEAP® Bridge Concrete CONNECT Edition	RJ Behar		Designed	JAPR
Module:	Precast/Prestressed Girder	Copyright © Bentley Systems, Inc. 2021		Date	Oct/19/2021
Version:	21.00.00.24	www.bentley.com	Phone: 1-800-778-4277	Checked	AW
File Name:	SW 87 Ave Bridge Superstructure.lbcx			Date	Oct/20/2021

	Bearing	Trans	H/2	0.10L /0.90L	0.20L /0.80L	0.30L /0.70L	0.40L /0.60L	Midspan
	1.314	2.931	2.245	2.057	0.825	-0.038	-0.554	-0.711
Final 2 (P/S + DL)								
Topping-top	-0.000	0.028	0.016	0.083	0.161	0.216	0.249	0.261
Precast-top	-0.335	-0.543	-0.456	0.077	0.960	1.591	1.969	2.095
Bottom	1.314	3.063	2.321	2.444	1.562	0.932	0.554	0.428

Span : 1, Beam : 1, SERVICE III

RELEASE STRESSES, (ksi) (LOSS = 0.00 %)

	Trans	0.10L /0.90L	0.20L /0.80L	0.30L /0.70L	0.40L /0.60L	Midspan
Location, ft	2.81	6.60	13.20	19.80	26.40	33.00
Beam-Self						
Precast-top	0.365	0.805	1.431	1.878	2.146	2.235
Bottom	-0.349	-0.770	-1.369	-1.796	-2.053	-2.138
Prestress						
Precast-top	-0.961	-0.961	-0.961	-0.961	-0.961	-0.961
Bottom	3.769	3.769	3.769	3.769	3.769	3.769
Total						
Precast-top	-0.596	-0.156	0.470	0.917	1.185	1.275
Bottom	3.420	3.000	2.401	1.973	1.716	1.631
As_top, in2	1.436	0.000	0.000	0.000	0.000	0.000
Ast_prvd, in2	0.000*	0.000	0.000	0.000	0.000	0.000

SERVICE III

POSITIVE ENVELOPE STRESSES, (ksi) (LOSS = 10.29 %)



Sheet #	19
Job #	RJB 21030
Designed	JAPR
Date	Oct/19/2021
Checked	AW
Date	Oct/20/2021

	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	1.77	1.00	5.56	12.16	18.76	25.36	31.96
Prestress								
Precast-top	-0.335	-0.862	-0.639	-0.862	-0.862	-0.862	-0.862	-0.862
Bottom	1.314	3.382	2.506	3.382	3.382	3.382	3.382	3.382
Self wt.								
Precast-top	-0.000	0.226	0.130	0.666	1.292	1.739	2.007	2.097
Bottom	-0.000	-0.216	-0.125	-0.637	-1.236	-1.663	-1.920	-2.005
DL-Prec (DC)								
Precast-top	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000
Bottom	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000
DL-Prec (DW)								
Precast-top	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000
Bottom	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000
Diaphragm								
Precast-top	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000
Bottom	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000
Deck + Haunch								
Precast-top	-0.000	0.074	0.043	0.219	0.426	0.573	0.662	0.691
Bottom	-0.000	-0.071	-0.041	-0.210	-0.407	-0.548	-0.633	-0.661
DL-Comp (DC)								
Topping-top	-0.000	0.021	0.012	0.060	0.117	0.158	0.182	0.190
Precast-top	-0.000	0.013	0.008	0.039	0.076	0.103	0.118	0.124
Bottom	-0.000	-0.023	-0.013	-0.067	-0.129	-0.174	-0.201	-0.210
DL-Comp (DW)								
Topping-top	-0.000	0.008	0.004	0.022	0.043	0.058	0.067	0.070
Precast-top	-0.000	0.005	0.003	0.014	0.028	0.038	0.044	0.046
Bottom	-0.000	-0.008	-0.005	-0.025	-0.048	-0.064	-0.074	-0.077
LL+I(+)								
Topping-top	-0.000	0.092	0.053	0.269	0.512	0.674	0.770	0.790
Precast-top	-0.000	0.060	0.034	0.175	0.333	0.438	0.500	0.513
Bottom	-0.000	-0.101	-0.059	-0.296	-0.565	-0.742	-0.848	-0.870
Pedestrian(+)								
Topping-top	-0.000	0.004	0.002	0.012	0.023	0.031	0.035	0.037
Precast-top	-0.000	0.003	0.001	0.008	0.015	0.020	0.023	0.024
Bottom	-0.000	-0.004	-0.003	-0.013	-0.025	-0.034	-0.039	-0.041
Final 1 (P/S + DL + LL)								
Topping-top	-0.000	0.124	0.071	0.363	0.696	0.921	1.054	1.088
Precast-top	-0.335	-0.481	-0.420	0.259	1.308	2.048	2.492	2.632

				Sheet #	20
				Job #	RJB 21030
Program:	LEAP® Bridge Concrete CONNECT Edition	RJ Behar		Designed	JAPR
Module:	Precast/Prestressed Girder	Copyright © Bentley Systems, Inc. 2021		Date	Oct/19/2021
Version:	21.00.00.24	www.bentley.com	Phone: 1-800-778-4277	Checked	AW
File Name:	SW 87 Ave Bridge Superstructure.lbcx			Date	Oct/20/2021

	Bearing	Trans	H/2	0.10L /0.90L	0.20L /0.80L	0.30L /0.70L	0.40L /0.60L	Midspan
	1.314	2.958	2.260	2.134	0.972	0.156	-0.333	-0.483

Span : 1, Beam : 1, FATIGUE I
POSITIVE ENVELOPE STRESSES, (ksi)

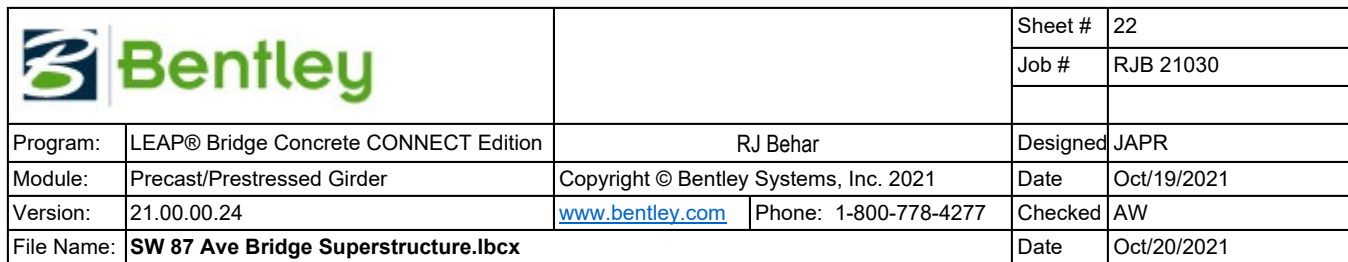
		Bearing	Trans	H/2	0.10L /0.90L	0.20L /0.80L	0.30L /0.70L	0.40L /0.60L	Midspan
Location, ft		0.00	1.77	1.00	5.56	12.16	18.76	25.36	31.96
F_LL+I(+)									
Topping-top		-0.000	0.019	0.011	0.053	0.098	0.128	0.141	0.133
Precast-top		-0.000	0.012	0.007	0.035	0.064	0.083	0.092	0.087
Bottom		-0.000	-0.020	-0.012	-0.059	-0.108	-0.141	-0.155	-0.147
Pedestrian(+)									
Topping-top		-0.000	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000
Precast-top		-0.000	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000
Bottom		-0.000	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000
Final 3 (50% P/S	+ 50%	DL + F_LL)							
Topping-top		-0.000	0.033	0.019	0.095	0.178	0.236	0.266	0.264
Precast-top		-0.167	-0.260	-0.221	0.073	0.544	0.878	1.076	1.134
Bottom		0.657	1.511	1.149	1.163	0.673	0.325	0.122	0.067

				Sheet #	21
				Job #	RJB 21030
Program:	LEAP® Bridge Concrete CONNECT Edition	RJ Behar		Designed	JAPR
Module:	Precast/Prestressed Girder	Copyright © Bentley Systems, Inc. 2021		Date	Oct/19/2021
Version:	21.00.00.24	www.bentley.com	Phone: 1-800-778-4277	Checked	AW
File Name:	SW 87 Ave Bridge Superstructure.lbcx			Date	Oct/20/2021

VERTICAL/HORIZONTAL SHEAR

VERTICAL SHEAR (Art. 5.8) - Span : 1, Beam : 1, STRENGTH I

Using General Beta Theta Equation procedure - Art.5.7.3.4

Units: U.S. Units Design Code: AASHTO LRFD Printed on: November 22, 2021 @ 4:21 P.M.

				Sheet #	23
				Job #	RJB 21030
Program:	LEAP® Bridge Concrete CONNECT Edition	RJ Behar		Designed	JAPR
Module:	Precast/Prestressed Girder	Copyright © Bentley Systems, Inc. 2021		Date	Oct/19/2021
Version:	21.00.00.24	www.bentley.com	Phone: 1-800-778-4277	Checked	AW
File Name:	SW 87 Ave Bridge Superstructure.lbcx			Date	Oct/20/2021

Location(ft)											
Vu (kips)	bv (in)	de (in)	Aps (in2)	Vp (kips)	eps_x	Theta	Vs-reqd (kips)	Av/s (in2/ft)	Av-prvd (in2/ft)	AI_reqd (in2)	
Mcor (kft)	a (in)	dv (in)	fpo (ksi)	vu/fc	Vc-com (kips)	Beta	Max.spc. (in)	min.Av/s (in2/ft)	pVn/Vu		
0.9L :	59.40										
106.6	54.12	20.05	7.296	0.0	-0.27e-3	28.1	0.0	0.998	1.200	0.00	
616.6	8.26	18.05	189.0	0.014	539.5	5.99	14.44	0.998	6.272		
Critical :	63.45										
120.5	54.12	20.05	5.162	0.0	-0.20e-3	28.3	0.0	0.998	1.200	0.00	
176.3	6.09	18.05	171.1	0.016	509.0	5.65	14.44	0.998	5.302		
Transfer :	63.19										
119.6	54.12	20.05	5.703	0.0	-0.26e-3	28.1	0.0	0.998	1.200	0.00	
212.1	6.67	18.05	189.0	0.016	534.3	5.94	14.44	0.998	5.546		
Bearing :	64.96										
125.7	54.12	20.05	2.113	0.0	1.72e-3	35.0	0.0	0.998	1.600	0.00	
0.0	2.66	18.72	70.0	0.016	195.8	2.10	14.98	0.998	2.932		

ANCHORAGE ZONE REINFORCEMENT (Art. 5.9.4.4)

Span : 1, Beam : 1

Fpi (kips)	fs (ksi)	h/4 (in)	Abrst_rqrd (in2)
1477.44	20.00	13.53	2.95

HORIZONTAL SHEAR (Art. 5.7.4) - Span : 1, Beam : 1

(Beam and Slab effects are INCLUDED in Vu).

Computed Interface width considered to be engaged in shear transfer, bvi = 54.12(in).

				Sheet #	24
				Job #	RJB 21030
Program:	LEAP® Bridge Concrete CONNECT Edition	RJ Behar		Designed	JAPR
Module:	Precast/Prestressed Girder	Copyright © Bentley Systems, Inc. 2021		Date	Oct/19/2021
Version:	21.00.00.24	www.bentley.com	Phone: 1-800-778-4277	Checked	AW
File Name:	SW 87 Ave Bridge Superstructure.lbcx			Date	Oct/20/2021

Location (ft)	Vu (kips)	Vnh-req (kips/in)	de (in)	a (in)	dv (in)	s_max (in)	Avh-min (in2/ft)	Avh-sm (in2/ft)	Avh-rg (in2/ft)	Avh-prvd (in2/ft)
Bearing :	0.00									
125.7	7.46	20.05	2.66	18.72	24.00	0.541	1.134	0.000		1.600
Transfer :	1.77									
119.6	7.95	20.05	6.67	16.72	24.00	0.541	1.297	0.000		1.200*
Critical :	1.50									
120.5	7.88	20.05	6.09	17.01	24.00	0.541	1.272	0.000		1.200*
0.1L :	5.56									
106.6	7.44	20.05	8.26	15.92	24.00	0.541	1.125	0.000		1.200
0.2L :	12.16									
85.1	5.94	20.05	8.26	15.92	24.00	0.541	0.626	0.000		1.200
0.3L :	18.76									
64.1	4.47	20.05	8.26	15.92	24.00	0.541	0.139	0.000		1.200
0.4L :	25.36									
43.5	3.03	20.05	8.26	15.92	24.00	0.541	0.000	0.000		1.200
0.5L :	31.96									
23.1	1.61	20.05	8.26	15.92	24.00	0.541	0.000	0.000		1.200
0.6L :	38.56									
43.5	3.04	20.05	8.26	15.92	24.00	0.541	0.000	0.000		1.200
0.7L :	45.16									
64.2	4.48	20.05	8.26	15.92	24.00	0.541	0.140	0.000		1.200
0.8L :	51.76									
85.1	5.94	20.05	8.26	15.92	24.00	0.541	0.627	0.000		1.200
0.9L :	58.36									
106.6	7.44	20.05	8.26	15.92	24.00	0.541	1.126	0.000		1.200
Critical :	62.41									
120.5	7.88	20.05	6.09	17.01	24.00	0.541	1.272	0.000		1.200*
Transfer :	62.15									
119.6	7.95	20.05	6.67	16.72	24.00	0.541	1.297	0.000		1.200*
Bearing :	63.92									
125.7	7.46	20.05	2.66	18.72	24.00	0.541	1.134	0.000		1.600

				Sheet #	25
				Job #	RJB 21030
Program:	LEAP® Bridge Concrete CONNECT Edition	RJ Behar		Designed	JAPR
Module:	Precast/Prestressed Girder	Copyright © Bentley Systems, Inc. 2021		Date	Oct/19/2021
Version:	21.00.00.24	www.bentley.com	Phone: 1-800-778-4277	Checked	AW
File Name:	SW 87 Ave Bridge Superstructure.lbcx			Date	Oct/20/2021

				Sheet #	26
				Job #	RJB 21030
Program:	LEAP® Bridge Concrete CONNECT Edition	RJ Behar		Designed	JAPR
Module:	Precast/Prestressed Girder	Copyright © Bentley Systems, Inc. 2021		Date	Oct/19/2021
Version:	21.00.00.24	www.bentley.com	Phone: 1-800-778-4277	Checked	AW
File Name:	SW 87 Ave Bridge Superstructure.lbcx			Date	Oct/20/2021

CAMBER/DEFLECTION

CAMBER AND DEFLECTIONS: SERVICE I

(Span : 1, Beam : 1; Units: in)

	Release	Mult	Erection	Mult	Final
At 0.1 x L =	5.56 ft				
Prestress	1.679	1.80	3.021	2.20	3.693
Self Wt.	-1.136	1.85	-2.101	2.40	-2.725
Deck + Haunch			-0.256	2.30	-0.590
DL-Prec. (DC)			0.000	3.00	0.000
Diaphragm			0.000	3.00	0.000
DL-Prec. (DW)			0.000	3.00	0.000
DL-Comp. (DC)			-0.063	3.00	-0.190
DL-Comp. (DW)			-0.023	3.00	-0.070
Live Load					-0.237
Pedestrian Load					-0.015
Total	0.543		0.578		-0.134

	Release	Mult	Erection	Mult	Final
At 0.2 x L =	12.16 ft				
Prestress	2.993	1.80	5.387	2.20	6.584
Self Wt.	-2.148	1.85	-3.974	2.40	-5.156
Deck + Haunch			-0.532	2.30	-1.223
DL-Prec. (DC)			0.000	3.00	0.000
Diaphragm			0.000	3.00	0.000
DL-Prec. (DW)			0.000	3.00	0.000
DL-Comp. (DC)			-0.131	3.00	-0.393
DL-Comp. (DW)			-0.048	3.00	-0.145
Live Load					-0.495
Pedestrian Load					-0.032
Total	0.845		0.702		-0.860

	Release	Mult	Erection	Mult	Final
At 0.3 x L =	18.76 ft				
Prestress	3.932	1.80	7.077	2.20	8.650
Self Wt.	-2.941	1.85	-5.441	2.40	-7.059
Deck + Haunch			-0.749	2.30	-1.723
DL-Prec. (DC)			0.000	3.00	0.000
Diaphragm			0.000	3.00	0.000
DL-Prec. (DW)			0.000	3.00	0.000
DL-Comp. (DC)			-0.185	3.00	-0.554
DL-Comp. (DW)			-0.068	3.00	-0.204
Live Load					-0.700
Pedestrian Load					-0.045
Total	0.991		0.634		-1.635



Bentley				Sheet #	27
				Job #	RJB 21030
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Module:	Precast/Prestressed Girder	Copyright © Bentley Systems, Inc. 2021		Date	Oct/19/2021
Version:	21.00.00.24	www.bentley.com	Phone: 1-800-778-4277	Checked	AW
File Name:	SW 87 Ave Bridge Superstructure.lbcx			Date	Oct/20/2021

	Release	Mult	Erection	Mult	Final
At 0.4 x L =	25.36 ft				
Prestress	4.495	1.80	8.091	2.20	9.889
Self Wt.	-3.445	1.85	-6.373	2.40	-8.267
Deck + Haunch			-0.887	2.30	-2.041
DL-Prec. (DC)			0.000	3.00	0.000
Diaphragm			0.000	3.00	0.000
DL-Prec. (DW)			0.000	3.00	0.000
DL-Comp. (DC)			-0.219	3.00	-0.656
DL-Comp. (DW)			-0.081	3.00	-0.242
Live Load					-0.831
Pedestrian Load					-0.053
Total	1.050		0.531		-2.202

	Release	Mult	Erection	Mult	Final
At 0.5 x L =	31.96 ft				
Prestress	4.683	1.80	8.429	2.20	10.302
Self Wt.	-3.617	1.85	-6.692	2.40	-8.681
Deck + Haunch			-0.935	2.30	-2.150
DL-Prec. (DC)			0.000	3.00	0.000
Diaphragm			0.000	3.00	0.000
DL-Prec. (DW)			0.000	3.00	0.000
DL-Comp. (DC)			-0.230	3.00	-0.691
DL-Comp. (DW)			-0.085	3.00	-0.255
Live Load					-0.877
Pedestrian Load					-0.056
Total	1.066		0.487		-2.409

	Release	Mult	Erection	Mult	Final
At 0.6 x L =	38.56 ft				
Prestress	4.495	1.80	8.091	2.20	9.889
Self Wt.	-3.445	1.85	-6.373	2.40	-8.267
Deck + Haunch			-0.887	2.30	-2.041
DL-Prec. (DC)			0.000	3.00	0.000
Diaphragm			0.000	3.00	0.000
DL-Prec. (DW)			0.000	3.00	0.000
DL-Comp. (DC)			-0.219	3.00	-0.656
DL-Comp. (DW)			-0.081	3.00	-0.242
Live Load					-0.831
Pedestrian Load					-0.053
Total	1.050		0.531		-2.202



				Sheet #	28
				Job #	RJB 21030
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Module:	Precast/Prestressed Girder	Copyright © Bentley Systems, Inc. 2021		Date	Oct/19/2021
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	Release	Mult	Erection	Mult	Final
At 0.7 x L =	45.16 ft				
Prestress	3.932	1.80	7.077	2.20	8.650
Self Wt.	-2.941	1.85	-5.441	2.40	-7.059
Deck + Haunch			-0.749	2.30	-1.723
DL-Prec. (DC)			0.000	3.00	0.000
Diaphragm			0.000	3.00	0.000
DL-Prec. (DW)			0.000	3.00	0.000
DL-Comp. (DC)			-0.185	3.00	-0.554
DL-Comp. (DW)			-0.068	3.00	-0.204
Live Load					-0.700
Pedestrian Load					-0.045
Total	0.991		0.634		-1.635

	Release	Mult	Erection	Mult	Final
At 0.8 x L =	51.76 ft				
Prestress	2.993	1.80	5.387	2.20	6.584
Self Wt.	-2.148	1.85	-3.974	2.40	-5.156
Deck + Haunch			-0.532	2.30	-1.223
DL-Prec. (DC)			0.000	3.00	0.000
Diaphragm			0.000	3.00	0.000
DL-Prec. (DW)			0.000	3.00	0.000
DL-Comp. (DC)			-0.131	3.00	-0.393
DL-Comp. (DW)			-0.048	3.00	-0.145
Live Load					-0.495
Pedestrian Load					-0.032
Total	0.845		0.702		-0.860

	Release	Mult	Erection	Mult	Final
At 0.9 x L =	58.36 ft				
Prestress	1.679	1.80	3.021	2.20	3.693
Self Wt.	-1.136	1.85	-2.101	2.40	-2.725
Deck + Haunch			-0.256	2.30	-0.590
DL-Prec. (DC)			0.000	3.00	0.000
Diaphragm			0.000	3.00	0.000
DL-Prec. (DW)			0.000	3.00	0.000
DL-Comp. (DC)			-0.063	3.00	-0.190
DL-Comp. (DW)			-0.023	3.00	-0.070
Live Load					-0.237
Pedestrian Load					-0.015
Total	0.543		0.578		-0.134

				Sheet #	29
				Job #	RJB 21030
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Module:	Precast/Prestressed Girder	Copyright © Bentley Systems, Inc. 2021		Date	Oct/19/2021
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ULTIMATE MOMENT

ULTIMATE - Span : 1, Beam : 1, STRENGTH I
(Mr-prvd computed by AASHTO equations, Art. 5.7.3.2/5.7.3.3)

Location (ft) Mu k.ft	dp in	Aps in ²	fps ksi	c in	a in	Mr-prvd k.ft	eps_t	Phi	Mcr k.ft	min Mr k.ft	Crkg Ratio	Mu-p/r Ratio
Transfer	1.77											
210.1	20.1	5.703	239.7	8.1	6.67	1876.1	0.005I	0.99	-	-	-	-
H/2	1.00											
120.2	20.1	4.140	247.2	6.0	5.00	1497.4	0.007T	1.00	-	-	-	-
0.1L	5.56											
617.0	20.1	7.296	232.4	10.0	8.26	1934.0	0.003I	0.86	1941.3	820.6	1.00	3.13
0.2L	12.16											
1187.5	20.1	7.296	232.4	10.0	8.26	1934.0	0.003I	0.86	1803.5	1579.4	1.07	-
0.3L	18.76											
1582.1	20.1	7.296	232.4	10.0	8.26	1934.0	0.003I	0.86	1705.1	1705.1	1.13	-
0.4L	25.36											
1817.4	20.1	7.296	232.4	10.0	8.26	1934.0	0.003I	0.86	1646.0	1646.0	1.17	-
0.5L	31.96											
1884.2	20.1	7.296	232.4	10.0	8.26	1934.0	0.003I	0.86	1626.3	1626.3	1.19	-
0.6L	38.56											
1817.4	20.1	7.296	232.4	10.0	8.26	1934.0	0.003I	0.86	1646.0	1646.0	1.17	-
0.7L	45.16											
1582.1	20.1	7.296	232.4	10.0	8.26	1934.0	0.003I	0.86	1705.1	1705.1	1.13	-
0.8L	51.76											
1187.5	20.1	7.296	232.4	10.0	8.26	1934.0	0.003I	0.86	1803.5	1579.4	1.07	-
0.9L	58.36											
617.0	20.1	7.296	232.4	10.0	8.26	1934.0	0.003I	0.86	1941.3	820.6	1.00	3.13
H/2	62.92											
120.2	20.1	4.140	247.2	6.0	5.00	1497.4	0.007T	1.00	-	-	-	-
Transfer	62.15											
210.1	20.1	5.703	239.7	8.1	6.67	1876.1	0.005I	0.99	-	-	-	-

Legend: C = Compression-Controlled ($0 < \text{eps}_t < 0.0020$)
I = In-Transition ($0.0020 \leq \text{eps}_t < 0.0050$)
T = Tension-Controlled ($\text{eps}_t \leq 0$ or $\text{eps}_t \geq 0.0050$)
Note : fr used for calculating Mcr is user input $0.24 \times \text{sqrt}(f_c) \times \lambda$
Consider Bottom Tension Steel Contribution : NO

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DETENSIONING

Span : 1, Beam : 1; Groups 1-19; Units: ksi

Grp	Str		Ys,in		2.81ft
1	2	E	3.00	Ft	0.290
		M	3.00	Fb	-0.127
2	2	E	5.00	Ft	0.267
		M	5.00	Fb	0.045
3	2	E	5.00	Ft	0.244
		M	5.00	Fb	0.217
4	2	E	5.00	Ft	0.221
		M	5.00	Fb	0.389
5	2	E	5.00	Ft	0.198
		M	5.00	Fb	0.561
6	2	E	5.00	Ft	0.175
		M	5.00	Fb	0.733
7	2	E	5.00	Ft	0.152
		M	5.00	Fb	0.905
8	2	E	5.00	Ft	0.129
		M	5.00	Fb	1.077
9	2	E	5.00	Ft	0.106
		M	5.00	Fb	1.249
10	2	E	5.00	Ft	0.083
		M	5.00	Fb	1.421
11	2	E	3.00	Ft	0.008
		M	3.00	Fb	1.643
12	2	E	3.00	Ft	-0.068
		M	3.00	Fb	1.865
13	2	E	3.00	Ft	-0.143
		M	3.00	Fb	2.087
14	2	E	3.00	Ft	-0.218
		M	3.00	Fb	2.309
15	2	E	3.00	Ft	-0.294
		M	3.00	Fb	2.531
16	2	E	3.00	Ft	-0.369
		M	3.00	Fb	2.754
17	2	E	3.00	Ft	-0.445
		M	3.00	Fb	2.976
18	2	E	3.00	Ft	-0.520
		M	3.00	Fb	3.198
19	2	E	3.00	Ft	-0.595
		M	3.00	Fb	3.420

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DESIGN SUMMARY

Span: 1, Beam: 1, Exterior beam

Beam type:	Non-Voided Rectangular,	18" FSB
Precast Length,	ft	66.00
Release Length,	ft	66.00
Strand Pattern:	Straight	
Strand:	9/16-270K-LL	
Strand Es,	ksi:	28500.0
No. of strands:	38	
	Draped:	0
	Straight:	38
Concrete Strength:		
	f'ci:	6.0 ksi
	f'c:	8.5 ksi
	f'ct:	4.5 ksi
Initial losses:	4.79 %	
Final losses:	11.88 %	

Specification	Allowable	Computed	Location	Status
Release Stresses (ksi) (Art. 5.9.4.1) (Using Advanced Settings)				
Precast Bot (compression)	3.600	3.420	Trans	OK
Outer	15.00 %			
Precast Top w/ no reinf. (tension)	-0.232	-0.596	Trans	
Precast Top w/ reinf. (tension)	-0.929			
Center	70.00 %			
Precast Top w/ no reinf. (tension)	-0.232	0.470	0.2L/0.8L	
Precast Top w/ reinf. (tension)	-0.588			
Strength I (Art. 3.4.1, 5.6.3.1)	Provided	Required	Location	Status
Ult. Moment (k.ft)	1933.97	1884.21	Midspan	OK
Debonding Limits (Art. 5.9.4.3.3)	Allowable	Computed		Status
Max. Debond per Row	40.00 %	0.00 %		OK
Max. Debond Total	25.00 %	0.00 %		OK

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Positive Moment Envelope Stresses (ksi) (Art. 3.4.1 and 5.9.2.3.2)

Specification	Allow	Final 1 Comp	Loc.	Allow	Final 2 Comp	Loc.	Allow	Final 3 Comp	Loc.
Service I Limit State - Compressive	Stresses	Only							
Topping Top	2.700	1.294	Midspan	2.025	0.261	Midspan			
Precast Top	5.100	2.767	Midspan	3.825	2.095	Midspan			
Precast Bot	5.100	2.931	Transfer	3.825	3.063	Transfer			
Service III Limit State - Tensile	Stresses	Only							
Topping Top	-0.403	-0.000	Bearing						
Precast Top	-0.554	-0.481	Transfer						
Precast Bot	-0.554	-0.483	Midspan						
Fatigue I Limit State - Compressive	Stresses	Only							
Precast Top							3.400	1.134	Midspan
Precast Bot							3.400	1.511	Transfer

CAMBER / DEFLECTION: (PCI Design Handbook - 7th Ed.- Table 5.8.2)

0.5 x L = 31.96 ft

	Release	Mult	Erection	Mult	Final
Prestress	4.683	1.80	8.429	2.20	10.302
Self Wt.	-3.617	1.85	-6.692	2.40	-8.681
Deck + Haunch			-0.935	2.30	-2.150
DL-Prec. (DC)			0.000	3.00	0.000
Diaphragm			0.000	3.00	0.000
DL-Prec. (DW)			0.000	3.00	0.000
DL-Comp. (DC)			-0.230	3.00	-0.691
DL-Comp. (DW)			-0.085	3.00	-0.255
Live Load					-0.877
Pedestrian Load					-0.056
Total	1.066		0.487		-2.409

Positive values indicate upward deflection.

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LOAD RATING SUMMARY

Load Rating Summary for Prestressed Concrete Bridges

Span:1, Beam:1

Design Load Rating

Limit State	Vehicle	Weight (tons)	LF LL	LF DC	LF DW	Moment DF	Mom or Str RF	Mom or Str Tons	Mom or Str Location	Mom or Str Dim	Shear DF	Shear RF	Shear Tons	Shear Location	Shear Dim
Strength I (Inv)	HL93 Design Load	-	1.75	1.25	1.50	0.32	1.11	-	0.5L	31.96	0.33	4.53	-	Bearing	0.00
Strength I (Op)	HL93 Design Load	-	1.35	1.25	1.50	0.32	1.44	-	0.5L	31.96	0.33	7.04	-	Bearing	0.00
Service III (Inv)	HL93 Design Load	-	0.80	1.00	1.00	0.32	1.13	-	0.5L	31.96	-	-	-	-	-
Service III (Op)	HL93 Design Load	-	0.80	1.00	1.00	0.32	1.29	-	0.5L	31.96	-	-	-	-	-

Legal Load Rating

Limit State	Vehicle	Weight (tons)	LF LL	LF DC	LF DW	Moment DF	Mom or Str RF	Mom or Str Tons	Mom or Str Location	Mom or Str Dim	Shear DF	Shear RF	Shear Tons	Shear Location	Shear Dim
Strength I	C5 Truck	40.00	1.35	1.25	1.50	0.32	1.84	73.69	0.5L	31.96	0.33	10.30	412.14	Bearing	0.00
Strength I	ST5 Truck	40.00	1.35	1.25	1.50	0.32	2.22	88.67	0.5L	31.96	0.33	11.16	446.49	Bearing	0.00
Strength I	SU4 Truck	35.00	1.35	1.25	1.50	0.32	1.69	59.15	0.5L	31.96	0.33	9.38	328.39	Bearing	0.00
Service III	C5 Truck	40.00	0.80	1.00	1.00	0.32	1.65	66.03	0.5L	31.96	-	-	-	-	-
Service III	ST5 Truck	40.00	0.80	1.00	1.00	0.32	1.99	79.44	0.5L	31.96	-	-	-	-	-
Service III	SU4 Truck	35.00	0.80	1.00	1.00	0.32	1.51	53.00	0.5L	31.96	-	-	-	-	-



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Permit Load Rating

Limit State	Vehicle	Weight (tons)	LF LL	LF DC	LF DW	Moment DF	Mom or Str RF	Mom or Str Tons	Mom or Str Location	Mom or Str Dim	Shear DF	Shear RF	Shear Tons	Shear Location	Shear Dim
Strength II	FL120	60.00	1.35	1.25	1.50	0.32	1.10	66.25	0.5L	31.96	0.33	4.35	260.71	Bearing	0.00
Service I	FL120	60.00	1.00	1.00	1.00	0.32	3.60	216.14	0.5L	31.96	-	-	-	-	-

Design Load Inventory Ratings are greater than 1.0. Legal Load Rating is not required in this case, but is being reported for reference.

Rating Factors	References	Values
Condition Factor	Table 6A.4.2.3-1	1.00
System Factor for Flexural Effect	Table 6A.4.2.4-1	1.00
System Factor for Shear Effect	Art. 6A.4.2.4	1.00
ADTT	Section C3.6.1.1.2	5000
Dynamic Load Factor for Design Level	Art. 6A.4.3.3	0.33
Dynamic Load Factor for Legal and Permit Level	Table C6A.4.4.3-1	0.33

For Flexural Effect: Condition Factor * System Factor = 1.00 $\geq$ 0.85 (Art. 6A.4.2.1) OK

For Shear Effect: Condition Factor * System Factor = 1.00 $\geq$ 0.85 (Art. 6A.4.2.1 and 6A.4.2.4) OK

Dead Load Factors (Table 6A.4.2.2-1)

Limit State	DC	DW
Strength I	1.25	1.50
Strength II	1.25	1.50
Service I	1.00	1.00
Service III	1.00	1.00

Design Live Load Factors (Table 6A.4.3.2.2-1)

Limit State	Inventory	Operating
Strength I	1.75	1.35
Service I	-	-
Service III	0.80	-

Legal Live Load Factors (Table 6A.4.4.2.3a-1)

Limit State	Values
Strength I	1.35
Service I	-
Service III	0.80

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Permit Live Load Factors (Table 6A.4.5.4.2a-1)

Load	Type	Frequency	Loading Condition	Permit Factor
FL120	Routine	Unlimited	Mix with traffic	1.35

Permit Live Load Stresses Factors

Limit State	Values
Service I	1.00
Service III	-

Allowable Stresses (ksi)

Rating Level	Concrete Compression	Concrete Tension	Steel
Design Inventory	$0.60 \times f_c = 5.10$	$0.19 \times \sqrt{f_c} = 0.55$	$0.90 \times f_y = 218.70$
Design Operating	$0.60 \times f_c = 5.10$	$0.24 \times \sqrt{f_c} = 0.69$	$0.90 \times f_y = 218.70$
Legal	$0.60 \times f_c = 5.10$	$0.24 \times \sqrt{f_c} = 0.69$	-
Permit	$0.60 \times f_c = 5.10$	$0.24 \times \sqrt{f_c} = 0.69$	$0.90 \times f_y = 218.70$

Consider shear reinf. across plane (FDOT alternative): Yes

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RATING RESULTS

Span:1, Beam:1

A) Design Live Load Rating

Inventory Rating Level

Shear and Moment RF's are for Strength I Limit State
Tension Stress RF's are for Service III Limit State

HL93 Design Load Positive Live Load

Location	Moment	K	Mom-K	Shear	CTens-T	CTens-B
Bearing : 0.0	N.A.	N.A.	N.A.	4.53	N.A.	N.A.
Transfer : 1.8	18.47	1.00	18.47	10.84	-	35.70
Critical : 1.5	-	-	-	10.36	-	-
0.1L : 5.6	5.76	1.00	5.76	11.76	-	10.12
0.2L : 12.2	2.45	1.00	2.45	13.65	-	3.75
0.3L : 18.8	1.55	1.00	1.55	16.07	-	2.00
0.4L : 25.4	1.19	1.00	1.19	19.29	-	1.31
0.5L : 32.0	1.11	1.00	1.11	25.76	-	1.13
0.6L : 38.6	1.19	1.00	1.19	19.29	-	1.31
0.7L : 45.2	1.55	1.00	1.55	16.07	-	2.00
0.8L : 51.8	2.45	1.00	2.45	13.65	-	3.75
0.9L : 58.4	5.76	1.00	5.76	11.76	-	10.12
Critical : 62.4	-	-	-	10.36	-	-
Transfer : 62.1	18.47	1.00	18.47	10.84	-	35.70
Bearing : 63.9	N.A.	N.A.	N.A.	4.53	N.A.	N.A.

Operating Rating Level

Shear and Moment RF's are for Strength I Limit StateTension Stress RF's are for Service III Limit State

				Sheet #	37
				Job #	RJB 21030
Program:	LEAP® Bridge Concrete CONNECT Edition	RJ Behar		Designed	JAPR
Module:	Precast/Prestressed Girder	Copyright © Bentley Systems, Inc. 2021		Date	Oct/19/2021
Version:	21.00.00.24	www.bentley.com	Phone: 1-800-778-4277	Checked	AW
File Name:	SW 87 Ave Bridge Superstructure.lbcx			Date	Oct/20/2021

HL93 Design Load Positive Live Load

Location	Moment	K	Mom-K	Shear	CTens-T	CTens-B
Bearing : 0.0	N.A.	N.A.	N.A.	7.04	N.A.	N.A.
Transfer : 1.8	23.94	1.00	23.94	14.13	-	37.06
Critical : 1.5	-	-	-	13.50	-	-
0.1L : 5.6	7.46	1.00	7.46	15.43	-	10.59
0.2L : 12.2	3.17	1.00	3.17	18.00	-	3.99
0.3L : 18.8	2.01	1.00	2.01	21.25	-	2.19
0.4L : 25.4	1.54	1.00	1.54	25.53	-	1.47
0.5L : 32.0	1.44	1.00	1.44	34.03	-	1.29
0.6L : 38.6	1.54	1.00	1.54	25.53	-	1.47
0.7L : 45.2	2.01	1.00	2.01	21.25	-	2.19
0.8L : 51.8	3.17	1.00	3.17	18.00	-	3.99
0.9L : 58.4	7.46	1.00	7.46	15.43	-	10.59
Critical : 62.4	-	-	-	13.50	-	-
Transfer : 62.1	23.94	1.00	23.94	14.13	-	37.06
Bearing : 63.9	N.A.	N.A.	N.A.	7.04	N.A.	N.A.

Span:1, Beam:1

B) Legal Live Load Rating

Shear and Moment RF's are for Strength I Limit State

Tension Stress RF's are for Service III Limit State

C5 Truck Positive Live Load

Location	Moment	K	Mom-K	Shear	CTens-T	CTens-B
Bearing : 0.0	N.A.	N.A.	N.A.	10.30	N.A.	N.A.
Transfer : 1.8	32.47	1.00	32.47	18.69	-	50.27
Critical : 1.5	-	-	-	17.84	-	-
0.1L : 5.6	10.00	1.00	10.00	20.51	-	14.19
0.2L : 12.2	4.15	1.00	4.15	23.64	-	5.22
0.3L : 18.8	2.53	1.00	2.53	28.07	-	2.76
0.4L : 25.4	1.97	1.00	1.97	33.65	-	1.87
0.5L : 32.0	1.84	1.00	1.84	45.12	-	1.65
0.6L : 38.6	1.97	1.00	1.97	33.65	-	1.87
0.7L : 45.2	2.53	1.00	2.53	28.07	-	2.76
0.8L : 51.8	4.15	1.00	4.15	23.64	-	5.22
0.9L : 58.4	10.00	1.00	10.00	20.51	-	14.19
Critical : 62.4	-	-	-	17.84	-	-
Transfer : 62.1	32.47	1.00	32.47	18.69	-	50.27
Bearing : 63.9	N.A.	N.A.	N.A.	10.30	N.A.	N.A.

				Sheet #	38
				Job #	RJB 21030
Program:	LEAP® Bridge Concrete CONNECT Edition	RJ Behar		Designed	JAPR
Module:	Precast/Prestressed Girder	Copyright © Bentley Systems, Inc. 2021		Date	Oct/19/2021
Version:	21.00.00.24	www.bentley.com	Phone: 1-800-778-4277	Checked	AW
File Name:	SW 87 Ave Bridge Superstructure.lbcx			Date	Oct/20/2021

ST5 Truck Positive Live Load

Location	Moment	K	Mom-K	Shear	CTens-T	CTens-B
Bearing : 0.0	N.A.	N.A.	N.A.	11.16	N.A.	N.A.
Transfer : 1.8	33.88	1.00	33.88	19.86	-	52.46
Critical : 1.5	-	-	-	18.95	-	-
0.1L : 5.6	10.64	1.00	10.64	21.86	-	15.10
0.2L : 12.2	4.60	1.00	4.60	25.61	-	5.79
0.3L : 18.8	2.95	1.00	2.95	30.68	-	3.21
0.4L : 25.4	2.35	1.00	2.35	37.24	-	2.24
0.5L : 32.0	2.22	1.00	2.22	47.57	-	1.99
0.6L : 38.6	2.35	1.00	2.35	37.24	-	2.24
0.7L : 45.2	2.95	1.00	2.95	30.68	-	3.21
0.8L : 51.8	4.60	1.00	4.60	25.61	-	5.79
0.9L : 58.4	10.64	1.00	10.64	21.86	-	15.10
Critical : 62.4	-	-	-	18.95	-	-
Transfer : 62.1	33.88	1.00	33.88	19.86	-	52.46
Bearing : 63.9	N.A.	N.A.	N.A.	11.16	N.A.	N.A.

SU4 Truck Positive Live Load

Location	Moment	K	Mom-K	Shear	CTens-T	CTens-B
Bearing : 0.0	N.A.	N.A.	N.A.	9.38	N.A.	N.A.
Transfer : 1.8	29.52	1.00	29.52	17.35	-	45.71
Critical : 1.5	-	-	-	16.57	-	-
0.1L : 5.6	9.18	1.00	9.18	18.77	-	13.02
0.2L : 12.2	3.88	1.00	3.88	21.30	-	4.89
0.3L : 18.8	2.40	1.00	2.40	24.46	-	2.62
0.4L : 25.4	1.83	1.00	1.83	28.44	-	1.74
0.5L : 32.0	1.69	1.00	1.69	36.40	-	1.51
0.6L : 38.6	1.83	1.00	1.83	28.44	-	1.74
0.7L : 45.2	2.40	1.00	2.40	24.46	-	2.62
0.8L : 51.8	3.88	1.00	3.88	21.30	-	4.89
0.9L : 58.4	9.18	1.00	9.18	18.77	-	13.02
Critical : 62.4	-	-	-	16.57	-	-
Transfer : 62.1	29.52	1.00	29.52	17.35	-	45.71
Bearing : 63.9	N.A.	N.A.	N.A.	9.38	N.A.	N.A.

Span:1, Beam:1

C) Permit Live Load Rating

Shear and Moment RF's are for Strength II Limit State
Compression Stress RF's are for Service I Limit State



				Sheet #	39
				Job #	RJB 21030
Program:	LEAP® Bridge Concrete CONNECT Edition	RJ Behar		Designed	JAPR
Module:	Precast/Prestressed Girder	Copyright © Bentley Systems, Inc. 2021		Date	Oct/19/2021
Version:	21.00.00.24	www.bentley.com	Phone: 1-800-778-4277	Checked	AW
File Name:	SW 87 Ave Bridge Superstructure.lbcx			Date	Oct/20/2021

FL120 Positive Live Load

Location	Moment	K	Mom-K	Shear	CComp-T	CComp-B
Bearing : 0.0	N.A.	N.A.	N.A.	4.35	N.A.	N.A.
Transfer : 1.8	18.04	1.00	18.04	10.49	56.94	-
Critical : 1.5	-	-	-	10.03	-	-
0.1L : 5.6	5.63	1.00	5.63	11.27	17.37	-
0.2L : 12.2	2.41	1.00	2.41	12.77	7.55	-
0.3L : 18.8	1.53	1.00	1.53	14.76	4.89	-
0.4L : 25.4	1.18	1.00	1.18	17.40	3.84	-
0.5L : 32.0	1.10	1.00	1.10	22.84	3.60	-
0.6L : 38.6	1.18	1.00	1.18	17.40	3.84	-
0.7L : 45.2	1.53	1.00	1.53	14.76	4.89	-
0.8L : 51.8	2.41	1.00	2.41	12.77	7.55	-
0.9L : 58.4	5.63	1.00	5.63	11.27	17.37	-
Critical : 62.4	-	-	-	10.03	-	-
Transfer : 62.1	18.04	1.00	18.04	10.49	56.94	-
Bearing : 63.9	N.A.	N.A.	N.A.	4.35	N.A.	N.A.

Notation:

CComp-T/ CComp-B - Concrete Compression at Top/Bottom;

CTens-T/ CTens-B - Concrete Tension at Top/Bottom;

PSStT - Prestress Steel Tension.

				Sheet #	40
				Job #	RJB 21030
Program:	LEAP® Bridge Concrete CONNECT Edition	RJ Behar		Designed	JAPR
Module:	Precast/Prestressed Girder	Copyright © Bentley Systems, Inc. 2021		Date	Oct/19/2021
Version:	21.00.00.24	www.bentley.com	Phone: 1-800-778-4277	Checked	AW
File Name:	SW 87 Ave Bridge Superstructure.lbcx			Date	Oct/20/2021

CONSOLIDATED FDOT RATING REPORT

Load Rating Summary for Prestressed Concrete Bridges

All Bridge

Design Load Rating - Summary

Limit State	Vehicle	Weight (tons)	LF LL	LF DC	LF DW	Moment DF	Mom or Str RF	Mom or Str Tons	Mom or Str Location	Mom or Str Dim	Controlling Span/Beam	Shear DF	Shear RF	Shear Tons	Shear Location
Strength I (Inv)	HL93 Design Load	-	1.75	1.25	1.50	0.32	1.11	-	0.5L	31.96	1/14	0.33	4.53	-	Bearing
Strength I (Op)	HL93 Design Load	-	1.35	1.25	1.50	0.32	1.44	-	0.5L	31.96	1/14	0.33	7.04	-	Bearing
Service III (Inv)	HL93 Design Load	-	0.80	1.00	1.00	0.32	1.13	-	0.5L	31.96	1/1	-	-	-	-
Service III (Op)	HL93 Design Load	-	0.80	1.00	1.00	0.32	1.29	-	0.5L	31.96	1/1	-	-	-	-

				Sheet #	41
				Job #	RJB 21030
Program:	LEAP® Bridge Concrete CONNECT Edition	RJ Behar		Designed	JAPR
Module:	Precast/Prestressed Girder	Copyright © Bentley Systems, Inc. 2021		Date	Oct/19/2021
Version:	21.00.00.24	www.bentley.com	Phone: 1-800-778-4277	Checked	AW
File Name:	SW 87 Ave Bridge Superstructure.lbcx			Date	Oct/20/2021

Design Load Rating

Span	Beam	Limit State	Vehicle	Weight (tons)	LF LL	LF DC	LF DW	Moment DF	Mom or Str RF	Mom or Str Tons	Mom or Str Location	Mom or Str Dim	Shear DF	Shear RF	Shear Tons	Shear Locat
1	1	Strength I (Inv)	HL93 Design Load	-	1.75	1.25	1.50	0.32	1.11	-	0.5L	31.96	0.33	4.53	-	Beari
1	1	Strength I (Op)	HL93 Design Load	-	1.35	1.25	1.50	0.32	1.44	-	0.5L	31.96	0.33	7.04	-	Beari
1	1	Service III (Inv)	HL93 Design Load	-	0.80	1.00	1.00	0.32	1.13	-	0.5L	31.96	-	-	-	-
1	1	Service III (Op)	HL93 Design Load	-	0.80	1.00	1.00	0.32	1.29	-	0.5L	31.96	-	-	-	-
1	2	Strength I (Inv)	HL93 Design Load	-	1.75	1.25	1.50	0.29	1.22	-	0.5L	31.96	0.29	5.84	-	Beari
1	2	Strength I (Op)	HL93 Design Load	-	1.35	1.25	1.50	0.29	1.58	-	0.5L	31.96	0.29	8.39	-	Beari
1	2	Service III (Inv)	HL93 Design Load	-	0.80	1.00	1.00	0.29	1.22	-	0.5L	31.96	-	-	-	-
1	2	Service III (Op)	HL93 Design Load	-	0.80	1.00	1.00	0.29	1.39	-	0.5L	31.96	-	-	-	-
1	3	Strength I (Inv)	HL93 Design Load	-	1.75	1.25	1.50	0.29	1.22	-	0.5L	31.96	0.29	5.84	-	Beari
1	3	Strength I (Op)	HL93 Design Load	-	1.35	1.25	1.50	0.29	1.58	-	0.5L	31.96	0.29	8.39	-	Beari
1	3	Service III (Inv)	HL93 Design Load	-	0.80	1.00	1.00	0.29	1.22	-	0.5L	31.96	-	-	-	-
1	3	Service III (Op)	HL93 Design Load	-	0.80	1.00	1.00	0.29	1.39	-	0.5L	31.96	-	-	-	-
1	4	Strength I (Inv)	HL93 Design Load	-	1.75	1.25	1.50	0.29	1.22	-	0.5L	31.96	0.29	5.84	-	Beari
1	4	Strength I (Op)	HL93 Design Load	-	1.35	1.25	1.50	0.29	1.58	-	0.5L	31.96	0.29	8.39	-	Beari
1	4	Service III (Inv)	HL93 Design Load	-	0.80	1.00	1.00	0.29	1.22	-	0.5L	31.96	-	-	-	-
		Service	HL93													

				Sheet #	42
				Job #	RJB 21030
Program:	LEAP® Bridge Concrete CONNECT Edition	RJ Behar		Designed	JAPR
Module:	Precast/Prestressed Girder	Copyright © Bentley Systems, Inc. 2021		Date	Oct/19/2021
Version:	21.00.00.24	www.bentley.com	Phone: 1-800-778-4277	Checked	AW
File Name:	SW 87 Ave Bridge Superstructure.lbcx			Date	Oct/20/2021

Span	Beam	Limit State	Vehicle	Weight (tons)	LF LL	LF DC	LF DW	Moment DF	Mom or Str RF	Mom or Str Tons	Mom or Str Location	Mom or Str Dim	Shear DF	Shear RF	Shear Tons	Shear Location
1	4	III (Op)	Design Load	-	0.80	1.00	1.00	0.29	1.39	-	0.5L	31.96	-	-	-	-
1	5	Strength I (Inv)	Design Load	-	1.75	1.25	1.50	0.29	1.22	-	0.5L	31.96	0.29	5.84	-	Bearing
1	5	Strength I (Op)	Design Load	-	1.35	1.25	1.50	0.29	1.58	-	0.5L	31.96	0.29	8.39	-	Bearing
1	5	Service III (Inv)	Design Load	-	0.80	1.00	1.00	0.29	1.22	-	0.5L	31.96	-	-	-	-
1	5	Service III (Op)	Design Load	-	0.80	1.00	1.00	0.29	1.39	-	0.5L	31.96	-	-	-	-
1	6	Strength I (Inv)	Design Load	-	1.75	1.25	1.50	0.29	1.22	-	0.5L	31.96	0.29	5.84	-	Bearing
1	6	Strength I (Op)	Design Load	-	1.35	1.25	1.50	0.29	1.58	-	0.5L	31.96	0.29	8.39	-	Bearing
1	6	Service III (Inv)	Design Load	-	0.80	1.00	1.00	0.29	1.22	-	0.5L	31.96	-	-	-	-
1	6	Service III (Op)	Design Load	-	0.80	1.00	1.00	0.29	1.39	-	0.5L	31.96	-	-	-	-
1	7	Strength I (Inv)	Design Load	-	1.75	1.25	1.50	0.29	1.22	-	0.5L	31.96	0.29	5.84	-	Bearing
1	7	Strength I (Op)	Design Load	-	1.35	1.25	1.50	0.29	1.58	-	0.5L	31.96	0.29	8.39	-	Bearing
1	7	Service III (Inv)	Design Load	-	0.80	1.00	1.00	0.29	1.22	-	0.5L	31.96	-	-	-	-
1	7	Service III (Op)	Design Load	-	0.80	1.00	1.00	0.29	1.39	-	0.5L	31.96	-	-	-	-
1	8	Strength I (Inv)	Design Load	-	1.75	1.25	1.50	0.29	1.22	-	0.5L	31.96	0.29	5.84	-	Bearing
1	8	Strength I (Op)	Design Load	-	1.35	1.25	1.50	0.29	1.58	-	0.5L	31.96	0.29	8.39	-	Bearing
1	8	Service III (Inv)	Design Load	-	0.80	1.00	1.00	0.29	1.22	-	0.5L	31.96	-	-	-	-

				Sheet #	43
				Job #	RJB 21030
Program:	LEAP® Bridge Concrete CONNECT Edition	RJ Behar		Designed	JAPR
Module:	Precast/Prestressed Girder	Copyright © Bentley Systems, Inc. 2021		Date	Oct/19/2021
Version:	21.00.00.24	www.bentley.com	Phone: 1-800-778-4277	Checked	AW
File Name:	SW 87 Ave Bridge Superstructure.lbcx			Date	Oct/20/2021

Span	Beam	Limit State	Vehicle	Weight (tons)	LF LL	LF DC	LF DW	Moment DF	Mom or Str RF	Mom or Str Tons	Mom or Str Location	Mom or Str Dim	Shear DF	Shear RF	Shear Tons	Shear Location
1	8	Service III (Op)	HL93 Design Load	-	0.80	1.00	1.00	0.29	1.39	-	0.5L	31.96	-	-	-	-
1	9	Strength I (Inv)	HL93 Design Load	-	1.75	1.25	1.50	0.29	1.22	-	0.5L	31.96	0.29	5.84	-	Bearing
1	9	Strength I (Op)	HL93 Design Load	-	1.35	1.25	1.50	0.29	1.58	-	0.5L	31.96	0.29	8.39	-	Bearing
1	9	Service III (Inv)	HL93 Design Load	-	0.80	1.00	1.00	0.29	1.22	-	0.5L	31.96	-	-	-	-
1	9	Service III (Op)	HL93 Design Load	-	0.80	1.00	1.00	0.29	1.39	-	0.5L	31.96	-	-	-	-
1	10	Strength I (Inv)	HL93 Design Load	-	1.75	1.25	1.50	0.29	1.22	-	0.5L	31.96	0.29	5.84	-	Bearing
1	10	Strength I (Op)	HL93 Design Load	-	1.35	1.25	1.50	0.29	1.58	-	0.5L	31.96	0.29	8.39	-	Bearing
1	10	Service III (Inv)	HL93 Design Load	-	0.80	1.00	1.00	0.29	1.22	-	0.5L	31.96	-	-	-	-
1	10	Service III (Op)	HL93 Design Load	-	0.80	1.00	1.00	0.29	1.39	-	0.5L	31.96	-	-	-	-
1	11	Strength I (Inv)	HL93 Design Load	-	1.75	1.25	1.50	0.29	1.22	-	0.5L	31.96	0.29	5.84	-	Bearing
1	11	Strength I (Op)	HL93 Design Load	-	1.35	1.25	1.50	0.29	1.58	-	0.5L	31.96	0.29	8.39	-	Bearing
1	11	Service III (Inv)	HL93 Design Load	-	0.80	1.00	1.00	0.29	1.22	-	0.5L	31.96	-	-	-	-
1	11	Service III (Op)	HL93 Design Load	-	0.80	1.00	1.00	0.29	1.39	-	0.5L	31.96	-	-	-	-
1	12	Strength I (Inv)	HL93 Design Load	-	1.75	1.25	1.50	0.29	1.22	-	0.5L	31.96	0.29	5.84	-	Bearing
1	12	Strength I (Op)	HL93 Design Load	-	1.35	1.25	1.50	0.29	1.58	-	0.5L	31.96	0.29	8.39	-	Bearing
1	12	Service III (Inv)	HL93 Design Load	-	0.80	1.00	1.00	0.29	1.22	-	0.5L	31.96	-	-	-	-

				Sheet #	44
				Job #	RJB 21030
Program:	LEAP® Bridge Concrete CONNECT Edition	RJ Behar		Designed	JAPR
Module:	Precast/Prestressed Girder	Copyright © Bentley Systems, Inc. 2021		Date	Oct/19/2021
Version:	21.00.00.24	www.bentley.com	Phone: 1-800-778-4277	Checked	AW
File Name:	SW 87 Ave Bridge Superstructure.lbcx			Date	Oct/20/2021

Span	Beam	Limit State	Vehicle	Weight (tons)	LF LL	LF DC	LF DW	Moment DF	Mom or Str RF	Mom or Str Tons	Mom or Str Location	Mom or Str Dim	Shear DF	Shear RF	Shear Tons	Shear Location
1	12	Service III (Op)	Load HL93 Design Load	-	0.80	1.00	1.00	0.29	1.39	-	0.5L	31.96	-	-	-	-
1	13	Strength I (Inv)	Load HL93 Design Load	-	1.75	1.25	1.50	0.29	1.22	-	0.5L	31.96	0.29	5.84	-	Bearing
1	13	Strength I (Op)	Load HL93 Design Load	-	1.35	1.25	1.50	0.29	1.58	-	0.5L	31.96	0.29	8.39	-	Bearing
1	13	Service III (Inv)	Load HL93 Design Load	-	0.80	1.00	1.00	0.29	1.22	-	0.5L	31.96	-	-	-	-
1	13	Service III (Op)	Load HL93 Design Load	-	0.80	1.00	1.00	0.29	1.39	-	0.5L	31.96	-	-	-	-
1	14	Strength I (Inv)	Load HL93 Design Load	-	1.75	1.25	1.50	0.32	1.11	-	0.5L	31.96	0.33	4.53	-	Bearing
1	14	Strength I (Op)	Load HL93 Design Load	-	1.35	1.25	1.50	0.32	1.44	-	0.5L	31.96	0.33	7.04	-	Bearing
1	14	Service III (Inv)	Load HL93 Design Load	-	0.80	1.00	1.00	0.32	1.13	-	0.5L	31.96	-	-	-	-
1	14	Service III (Op)	Load HL93 Design Load	-	0.80	1.00	1.00	0.32	1.29	-	0.5L	31.96	-	-	-	-

Legal Load Rating - Summary

Limit State	Vehicle	Weight (tons)	LF LL	LF DC	LF DW	Moment DF	Mom or Str RF	Mom or Str Tons	Mom or Str Location	Mom or Str Dim	Controlling Span/Beam	Shear DF	Shear RF	Shear Tons	Shear Location
Strength I	C5 Truck	40.00	1.35	1.25	1.50	0.32	1.84	73.69	0.5L	31.96	1/14	0.33	10.30	412.14	Bearing
Strength I	ST5 Truck	40.00	1.35	1.25	1.50	0.32	2.22	88.67	0.5L	31.96	1/14	0.33	11.16	446.49	Bearing
Strength I	SU4 Truck	35.00	1.35	1.25	1.50	0.32	1.69	59.15	0.5L	31.96	1/14	0.33	9.38	328.39	Bearing
Service III	C5 Truck	40.00	0.80	1.00	1.00	0.32	1.65	66.03	0.5L	31.96	1/1	-	-	-	-
Service III	ST5 Truck	40.00	0.80	1.00	1.00	0.32	1.99	79.44	0.5L	31.96	1/1	-	-	-	-
Service III	SU4 Truck	35.00	0.80	1.00	1.00	0.32	1.51	53.00	0.5L	31.96	1/1	-	-	-	-

				Sheet #	45
				Job #	RJB 21030
Program:	LEAP® Bridge Concrete CONNECT Edition	RJ Behar		Designed	JAPR
Module:	Precast/Prestressed Girder	Copyright © Bentley Systems, Inc. 2021		Date	Oct/19/2021
Version:	21.00.00.24	www.bentley.com	Phone: 1-800-778-4277	Checked	AW
File Name:	SW 87 Ave Bridge Superstructure.lbcx			Date	Oct/20/2021

Legal Load Rating

Span	Beam	Limit State	Vehicle	Weight (tons)	LF LL	LF DC	LF DW	Moment DF	Mom or Str RF	Mom or Str Tons	Mom or Str Location	Mom or Str Dim	Shear DF	Shear RF	Shear Tons	Sh Loc
1	1	Strength I	C5 Truck	40.00	1.35	1.25	1.50	0.32	1.84	73.69	0.5L	31.96	0.33	10.30	412.14	Beam
1	1	Strength I	ST5 Truck	40.00	1.35	1.25	1.50	0.32	2.22	88.67	0.5L	31.96	0.33	11.16	446.49	Beam
1	1	Strength I	SU4 Truck	35.00	1.35	1.25	1.50	0.32	1.69	59.15	0.5L	31.96	0.33	9.38	328.39	Beam
1	1	Service III	C5 Truck	40.00	0.80	1.00	1.00	0.32	1.65	66.03	0.5L	31.96	-	-	-	-
1	1	Service III	ST5 Truck	40.00	0.80	1.00	1.00	0.32	1.99	79.44	0.5L	31.96	-	-	-	-
1	1	Service III	SU4 Truck	35.00	0.80	1.00	1.00	0.32	1.51	53.00	0.5L	31.96	-	-	-	-
1	2	Strength I	C5 Truck	40.00	1.35	1.25	1.50	0.29	2.03	81.29	0.5L	31.96	0.29	12.22	488.70	Beam
1	2	Strength I	ST5 Truck	40.00	1.35	1.25	1.50	0.29	2.45	97.81	0.5L	31.96	0.29	13.22	528.90	Beam
1	2	Strength I	SU4 Truck	35.00	1.35	1.25	1.50	0.29	1.86	65.25	0.5L	31.96	0.29	11.14	389.83	Beam
1	2	Service III	C5 Truck	40.00	0.80	1.00	1.00	0.29	1.78	71.37	0.5L	31.96	-	-	-	-
1	2	Service III	ST5 Truck	40.00	0.80	1.00	1.00	0.29	2.15	85.87	0.5L	31.96	-	-	-	-
1	2	Service III	SU4 Truck	35.00	0.80	1.00	1.00	0.29	1.64	57.28	0.5L	31.96	-	-	-	-
1	3	Strength I	C5 Truck	40.00	1.35	1.25	1.50	0.29	2.03	81.29	0.5L	31.96	0.29	12.22	488.70	Beam
1	3	Strength I	ST5 Truck	40.00	1.35	1.25	1.50	0.29	2.45	97.81	0.5L	31.96	0.29	13.22	528.90	Beam
1	3	Strength I	SU4 Truck	35.00	1.35	1.25	1.50	0.29	1.86	65.25	0.5L	31.96	0.29	11.14	389.83	Beam
1	3	Service III	C5 Truck	40.00	0.80	1.00	1.00	0.29	1.78	71.37	0.5L	31.96	-	-	-	-
1	3	Service III	ST5 Truck	40.00	0.80	1.00	1.00	0.29	2.15	85.87	0.5L	31.96	-	-	-	-
1	3	Service III	SU4 Truck	35.00	0.80	1.00	1.00	0.29	1.64	57.28	0.5L	31.96	-	-	-	-
1	4	Strength I	C5 Truck	40.00	1.35	1.25	1.50	0.29	2.03	81.29	0.5L	31.96	0.29	12.22	488.70	Beam
1	4	Strength I	ST5 Truck	40.00	1.35	1.25	1.50	0.29	2.45	97.81	0.5L	31.96	0.29	13.22	528.90	Beam
1	4	Strength I	SU4 Truck	35.00	1.35	1.25	1.50	0.29	1.86	65.25	0.5L	31.96	0.29	11.14	389.83	Beam
1	4	Service III	C5 Truck	40.00	0.80	1.00	1.00	0.29	1.78	71.37	0.5L	31.96	-	-	-	-
1	4	Service III	ST5 Truck	40.00	0.80	1.00	1.00	0.29	2.15	85.87	0.5L	31.96	-	-	-	-

				Sheet #	46
				Job #	RJB 21030
Program:	LEAP® Bridge Concrete CONNECT Edition	RJ Behar		Designed	JAPR
Module:	Precast/Prestressed Girder	Copyright © Bentley Systems, Inc. 2021		Date	Oct/19/2021
Version:	21.00.00.24	www.bentley.com	Phone: 1-800-778-4277	Checked	AW
File Name:	SW 87 Ave Bridge Superstructure.lbcx			Date	Oct/20/2021

Span	Beam	Limit State	Vehicle	Weight (tons)	LF LL	LF DC	LF DW	Moment DF	Mom or Str RF	Mom or Str Tons	Mom or Str Location	Mom or Str Dim	Shear DF	Shear RF	Shear Tons	Sh Loc
1	4	Service III	SU4 Truck	35.00	0.80	1.00	1.00	0.29	1.64	57.28	0.5L	31.96	-	-	-	-
1	5	Strength I	C5 Truck	40.00	1.35	1.25	1.50	0.29	2.03	81.29	0.5L	31.96	0.29	12.22	488.70	Bea
1	5	Strength I	ST5 Truck	40.00	1.35	1.25	1.50	0.29	2.45	97.81	0.5L	31.96	0.29	13.22	528.90	Bea
1	5	Strength I	SU4 Truck	35.00	1.35	1.25	1.50	0.29	1.86	65.25	0.5L	31.96	0.29	11.14	389.83	Bea
1	5	Service III	C5 Truck	40.00	0.80	1.00	1.00	0.29	1.78	71.37	0.5L	31.96	-	-	-	-
1	5	Service III	ST5 Truck	40.00	0.80	1.00	1.00	0.29	2.15	85.87	0.5L	31.96	-	-	-	-
1	5	Service III	SU4 Truck	35.00	0.80	1.00	1.00	0.29	1.64	57.28	0.5L	31.96	-	-	-	-
1	6	Strength I	C5 Truck	40.00	1.35	1.25	1.50	0.29	2.03	81.29	0.5L	31.96	0.29	12.22	488.70	Bea
1	6	Strength I	ST5 Truck	40.00	1.35	1.25	1.50	0.29	2.45	97.81	0.5L	31.96	0.29	13.22	528.90	Bea
1	6	Strength I	SU4 Truck	35.00	1.35	1.25	1.50	0.29	1.86	65.25	0.5L	31.96	0.29	11.14	389.83	Bea
1	6	Service III	C5 Truck	40.00	0.80	1.00	1.00	0.29	1.78	71.37	0.5L	31.96	-	-	-	-
1	6	Service III	ST5 Truck	40.00	0.80	1.00	1.00	0.29	2.15	85.87	0.5L	31.96	-	-	-	-
1	6	Service III	SU4 Truck	35.00	0.80	1.00	1.00	0.29	1.64	57.28	0.5L	31.96	-	-	-	-
1	7	Strength I	C5 Truck	40.00	1.35	1.25	1.50	0.29	2.03	81.29	0.5L	31.96	0.29	12.22	488.70	Bea
1	7	Strength I	ST5 Truck	40.00	1.35	1.25	1.50	0.29	2.45	97.81	0.5L	31.96	0.29	13.22	528.90	Bea
1	7	Strength I	SU4 Truck	35.00	1.35	1.25	1.50	0.29	1.86	65.25	0.5L	31.96	0.29	11.14	389.83	Bea
1	7	Service III	C5 Truck	40.00	0.80	1.00	1.00	0.29	1.78	71.37	0.5L	31.96	-	-	-	-
1	7	Service III	ST5 Truck	40.00	0.80	1.00	1.00	0.29	2.15	85.87	0.5L	31.96	-	-	-	-
1	7	Service III	SU4 Truck	35.00	0.80	1.00	1.00	0.29	1.64	57.28	0.5L	31.96	-	-	-	-
1	8	Strength I	C5 Truck	40.00	1.35	1.25	1.50	0.29	2.03	81.29	0.5L	31.96	0.29	12.22	488.70	Bea
1	8	Strength I	ST5 Truck	40.00	1.35	1.25	1.50	0.29	2.45	97.81	0.5L	31.96	0.29	13.22	528.90	Bea
1	8	Strength I	SU4 Truck	35.00	1.35	1.25	1.50	0.29	1.86	65.25	0.5L	31.96	0.29	11.14	389.83	Bea
1	8	Service III	C5 Truck	40.00	0.80	1.00	1.00	0.29	1.78	71.37	0.5L	31.96	-	-	-	-
1	8	Service III	ST5 Truck	40.00	0.80	1.00	1.00	0.29	2.15	85.87	0.5L	31.96	-	-	-	-

				Sheet #	47
				Job #	RJB 21030
Program:	LEAP® Bridge Concrete CONNECT Edition	RJ Behar		Designed	JAPR
Module:	Precast/Prestressed Girder	Copyright © Bentley Systems, Inc. 2021		Date	Oct/19/2021
Version:	21.00.00.24	www.bentley.com	Phone: 1-800-778-4277	Checked	AW
File Name:	SW 87 Ave Bridge Superstructure.lbcx			Date	Oct/20/2021

Span	Beam	Limit State	Vehicle	Weight (tons)	LF LL	LF DC	LF DW	Moment DF	Mom or Str RF	Mom or Str Tons	Mom or Str Location	Mom or Str Dim	Shear DF	Shear RF	Shear Tons	Sh Loc
1	8	III Service	Truck SU4	35.00	0.80	1.00	1.00	0.29	1.64	57.28	0.5L	31.96	-	-	-	-
1	9	III Strength I	Truck C5	40.00	1.35	1.25	1.50	0.29	2.03	81.29	0.5L	31.96	0.29	12.22	488.70	Bea
1	9	III Strength I	Truck ST5	40.00	1.35	1.25	1.50	0.29	2.45	97.81	0.5L	31.96	0.29	13.22	528.90	Bea
1	9	III Strength I	Truck SU4	35.00	1.35	1.25	1.50	0.29	1.86	65.25	0.5L	31.96	0.29	11.14	389.83	Bea
1	9	III Service	Truck C5	40.00	0.80	1.00	1.00	0.29	1.78	71.37	0.5L	31.96	-	-	-	-
1	9	III Service	Truck ST5	40.00	0.80	1.00	1.00	0.29	2.15	85.87	0.5L	31.96	-	-	-	-
1	9	III Service	Truck SU4	35.00	0.80	1.00	1.00	0.29	1.64	57.28	0.5L	31.96	-	-	-	-
1	10	III Strength I	Truck C5	40.00	1.35	1.25	1.50	0.29	2.03	81.29	0.5L	31.96	0.29	12.22	488.70	Bea
1	10	III Strength I	Truck ST5	40.00	1.35	1.25	1.50	0.29	2.45	97.81	0.5L	31.96	0.29	13.22	528.90	Bea
1	10	III Strength I	Truck SU4	35.00	1.35	1.25	1.50	0.29	1.86	65.25	0.5L	31.96	0.29	11.14	389.83	Bea
1	10	III Service	Truck C5	40.00	0.80	1.00	1.00	0.29	1.78	71.37	0.5L	31.96	-	-	-	-
1	10	III Service	Truck ST5	40.00	0.80	1.00	1.00	0.29	2.15	85.87	0.5L	31.96	-	-	-	-
1	10	III Service	Truck SU4	35.00	0.80	1.00	1.00	0.29	1.64	57.28	0.5L	31.96	-	-	-	-
1	11	III Strength I	Truck C5	40.00	1.35	1.25	1.50	0.29	2.03	81.29	0.5L	31.96	0.29	12.22	488.70	Bea
1	11	III Strength I	Truck ST5	40.00	1.35	1.25	1.50	0.29	2.45	97.81	0.5L	31.96	0.29	13.22	528.90	Bea
1	11	III Strength I	Truck SU4	35.00	1.35	1.25	1.50	0.29	1.86	65.25	0.5L	31.96	0.29	11.14	389.83	Bea
1	11	III Service	Truck C5	40.00	0.80	1.00	1.00	0.29	1.78	71.37	0.5L	31.96	-	-	-	-
1	11	III Service	Truck ST5	40.00	0.80	1.00	1.00	0.29	2.15	85.87	0.5L	31.96	-	-	-	-
1	11	III Service	Truck SU4	35.00	0.80	1.00	1.00	0.29	1.64	57.28	0.5L	31.96	-	-	-	-
1	12	III Strength I	Truck C5	40.00	1.35	1.25	1.50	0.29	2.03	81.29	0.5L	31.96	0.29	12.22	488.70	Bea
1	12	III Strength I	Truck ST5	40.00	1.35	1.25	1.50	0.29	2.45	97.81	0.5L	31.96	0.29	13.22	528.90	Bea
1	12	III Strength I	Truck SU4	35.00	1.35	1.25	1.50	0.29	1.86	65.25	0.5L	31.96	0.29	11.14	389.83	Bea
1	12	III Service	Truck C5	40.00	0.80	1.00	1.00	0.29	1.78	71.37	0.5L	31.96	-	-	-	-

				Sheet #	48
				Job #	RJB 21030
Program:	LEAP® Bridge Concrete CONNECT Edition	RJ Behar		Designed	JAPR
Module:	Precast/Prestressed Girder	Copyright © Bentley Systems, Inc. 2021		Date	Oct/19/2021
Version:	21.00.00.24	www.bentley.com	Phone: 1-800-778-4277	Checked	AW
File Name:	SW 87 Ave Bridge Superstructure.lbcx			Date	Oct/20/2021

Span	Beam	Limit State	Vehicle	Weight (tons)	LF LL	LF DC	LF DW	Moment DF	Mom or Str RF	Mom or Str Tons	Mom or Str Location	Mom or Str Dim	Shear DF	Shear RF	Shear Tons	Sh Loc
1	12	Service III	ST5 Truck	40.00	0.80	1.00	1.00	0.29	2.15	85.87	0.5L	31.96	-	-	-	-
1	12	Service III	SU4 Truck	35.00	0.80	1.00	1.00	0.29	1.64	57.28	0.5L	31.96	-	-	-	-
1	13	Strength I	C5 Truck	40.00	1.35	1.25	1.50	0.29	2.03	81.29	0.5L	31.96	0.29	12.22	488.70	Bea
1	13	Strength I	ST5 Truck	40.00	1.35	1.25	1.50	0.29	2.45	97.81	0.5L	31.96	0.29	13.22	528.90	Bea
1	13	Strength I	SU4 Truck	35.00	1.35	1.25	1.50	0.29	1.86	65.25	0.5L	31.96	0.29	11.14	389.83	Bea
1	13	Service III	C5 Truck	40.00	0.80	1.00	1.00	0.29	1.78	71.37	0.5L	31.96	-	-	-	-
1	13	Service III	ST5 Truck	40.00	0.80	1.00	1.00	0.29	2.15	85.87	0.5L	31.96	-	-	-	-
1	13	Service III	SU4 Truck	35.00	0.80	1.00	1.00	0.29	1.64	57.28	0.5L	31.96	-	-	-	-
1	14	Strength I	C5 Truck	40.00	1.35	1.25	1.50	0.32	1.84	73.69	0.5L	31.96	0.33	10.30	412.14	Bea
1	14	Strength I	ST5 Truck	40.00	1.35	1.25	1.50	0.32	2.22	88.67	0.5L	31.96	0.33	11.16	446.50	Bea
1	14	Strength I	SU4 Truck	35.00	1.35	1.25	1.50	0.32	1.69	59.15	0.5L	31.96	0.33	9.38	328.39	Bea
1	14	Service III	C5 Truck	40.00	0.80	1.00	1.00	0.32	1.65	66.03	0.5L	31.96	-	-	-	-
1	14	Service III	ST5 Truck	40.00	0.80	1.00	1.00	0.32	1.99	79.44	0.5L	31.96	-	-	-	-
1	14	Service III	SU4 Truck	35.00	0.80	1.00	1.00	0.32	1.51	53.00	0.5L	31.96	-	-	-	-

Permit Load Rating - Summary

Limit State	Vehicle	Weight (tons)	LF LL	LF DC	LF DW	Moment DF	Mom or Str RF	Mom or Str Tons	Mom or Str Location	Mom or Str Dim	Controlling Span/Beam	Shear DF	Shear RF	Shear Tons	Sh Loc
Strength II	FL120	60.00	1.35	1.25	1.50	0.32	1.10	66.25	0.5L	31.96	1/14	0.33	4.35	260.71	Bea
Service I	FL120	60.00	1.00	1.00	1.00	0.32	3.60	216.14	0.5L	31.96	1/14	-	-	-	-

				Sheet #	49
				Job #	RJB 21030
Program:	LEAP® Bridge Concrete CONNECT Edition	RJ Behar		Designed	JAPR
Module:	Precast/Prestressed Girder	Copyright © Bentley Systems, Inc. 2021		Date	Oct/19/2021
Version:	21.00.00.24	www.bentley.com	Phone: 1-800-778-4277	Checked	AW
File Name:	SW 87 Ave Bridge Superstructure.lbcx			Date	Oct/20/2021

Permit Load Rating

Span	Beam	Limit State	Vehicle	Weight (tons)	LF LL	LF DC	LF DW	Moment DF	Mom or Str RF	Mom or Str Tons	Mom or Str Location	Mom or Str Dim	Shear DF	Shear RF	Shear Tons	S Lo
1	1	Strength II	FL120	60.00	1.35	1.25	1.50	0.32	1.10	66.25	0.5L	31.96	0.33	4.35	260.71	Be
1	1	Service I	FL120	60.00	1.00	1.00	1.00	0.32	3.60	216.14	0.5L	31.96	-	-	-	-
1	2	Strength II	FL120	60.00	1.35	1.25	1.50	0.29	1.22	73.08	0.5L	31.96	0.29	5.61	336.67	Be
1	2	Service I	FL120	60.00	1.00	1.00	1.00	0.29	3.94	236.18	0.5L	31.96	-	-	-	-
1	3	Strength II	FL120	60.00	1.35	1.25	1.50	0.29	1.22	73.08	0.5L	31.96	0.29	5.61	336.67	Be
1	3	Service I	FL120	60.00	1.00	1.00	1.00	0.29	3.94	236.18	0.5L	31.96	-	-	-	-
1	4	Strength II	FL120	60.00	1.35	1.25	1.50	0.29	1.22	73.08	0.5L	31.96	0.29	5.61	336.67	Be
1	4	Service I	FL120	60.00	1.00	1.00	1.00	0.29	3.94	236.18	0.5L	31.96	-	-	-	-
1	5	Strength II	FL120	60.00	1.35	1.25	1.50	0.29	1.22	73.08	0.5L	31.96	0.29	5.61	336.67	Be
1	5	Service I	FL120	60.00	1.00	1.00	1.00	0.29	3.94	236.18	0.5L	31.96	-	-	-	-
1	6	Strength II	FL120	60.00	1.35	1.25	1.50	0.29	1.22	73.08	0.5L	31.96	0.29	5.61	336.67	Be
1	6	Service I	FL120	60.00	1.00	1.00	1.00	0.29	3.94	236.18	0.5L	31.96	-	-	-	-
1	7	Strength II	FL120	60.00	1.35	1.25	1.50	0.29	1.22	73.08	0.5L	31.96	0.29	5.61	336.67	Be
1	7	Service I	FL120	60.00	1.00	1.00	1.00	0.29	3.94	236.18	0.5L	31.96	-	-	-	-
1	8	Strength II	FL120	60.00	1.35	1.25	1.50	0.29	1.22	73.08	0.5L	31.96	0.29	5.61	336.67	Be
1	8	Service I	FL120	60.00	1.00	1.00	1.00	0.29	3.94	236.18	0.5L	31.96	-	-	-	-
1	9	Strength II	FL120	60.00	1.35	1.25	1.50	0.29	1.22	73.08	0.5L	31.96	0.29	5.61	336.67	Be
1	9	Service I	FL120	60.00	1.00	1.00	1.00	0.29	3.94	236.18	0.5L	31.96	-	-	-	-
1	10	Strength II	FL120	60.00	1.35	1.25	1.50	0.29	1.22	73.08	0.5L	31.96	0.29	5.61	336.67	Be
1	10	Service I	FL120	60.00	1.00	1.00	1.00	0.29	3.94	236.18	0.5L	31.96	-	-	-	-
1	11	Strength II	FL120	60.00	1.35	1.25	1.50	0.29	1.22	73.08	0.5L	31.96	0.29	5.61	336.67	Be
1	11	Service I	FL120	60.00	1.00	1.00	1.00	0.29	3.94	236.18	0.5L	31.96	-	-	-	-
1	12	Strength II	FL120	60.00	1.35	1.25	1.50	0.29	1.22	73.08	0.5L	31.96	0.29	5.61	336.67	Be



				Sheet #	50
				Job #	RJB 21030
Program:	LEAP® Bridge Concrete CONNECT Edition	RJ Behar		Designed	JAPR
Module:	Precast/Prestressed Girder	Copyright © Bentley Systems, Inc. 2021		Date	Oct/19/2021
Version:	21.00.00.24	www.bentley.com	Phone: 1-800-778-4277	Checked	AW
File Name:	SW 87 Ave Bridge Superstructure.lbcx			Date	Oct/20/2021

Span	Beam	Limit State	Vehicle	Weight (tons)	LF LL	LF DC	LF DW	Moment DF	Mom or Str RF	Mom or Str Tons	Mom or Str Location	Mom or Str Dim	Shear DF	Shear RF	Shear Tons	S Lo
1	12	Service I	FL120	60.00	1.00	1.00	1.00	0.29	3.94	236.18	0.5L	31.96	-	-	-	-
1	13	Strength II	FL120	60.00	1.35	1.25	1.50	0.29	1.22	73.08	0.5L	31.96	0.29	5.61	336.67	Be
1	13	Service I	FL120	60.00	1.00	1.00	1.00	0.29	3.94	236.18	0.5L	31.96	-	-	-	-
1	14	Strength II	FL120	60.00	1.35	1.25	1.50	0.32	1.10	66.25	0.5L	31.96	0.33	4.35	260.71	Be
1	14	Service I	FL120	60.00	1.00	1.00	1.00	0.32	3.60	216.14	0.5L	31.96	-	-	-	-

3. ABUTMENT ANALYSIS & DESIGN

3.1. GEOMETRY

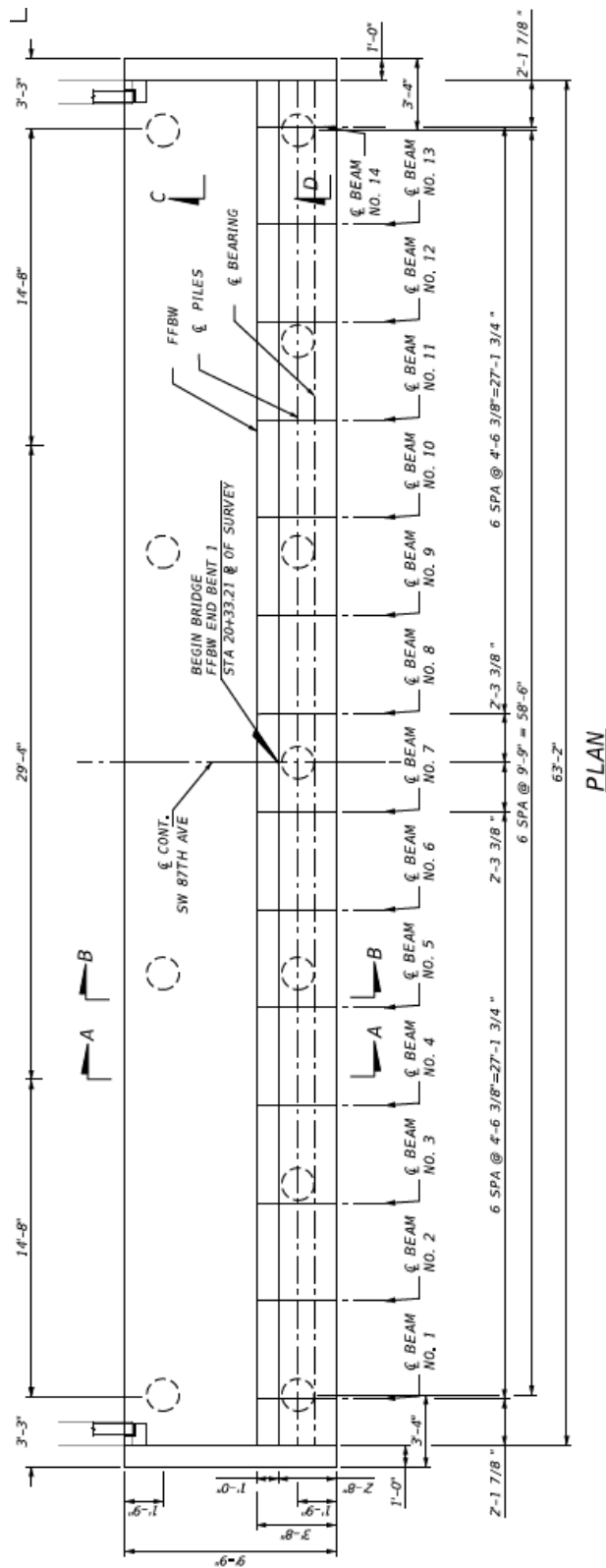
3.2. LOAD COMBINATIONS

3.3. ANALYSIS

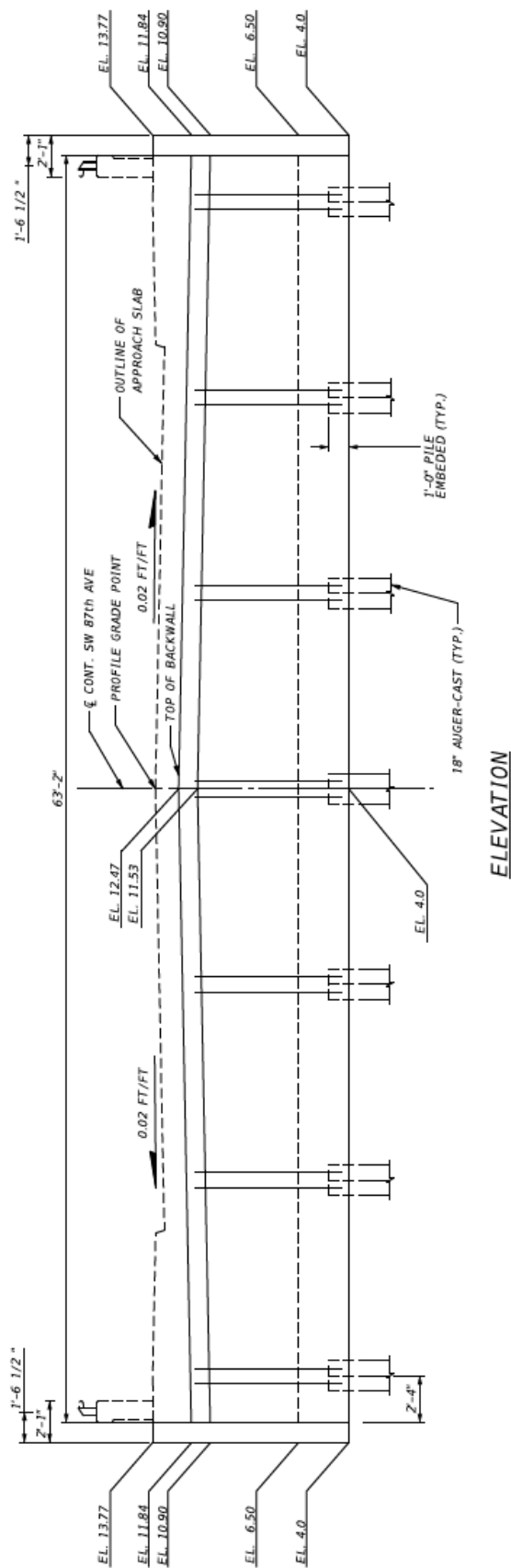
3.4. DESIGN

3.1 Abutment Geometry

PLAN



ELEVATION



3.2 LOAD ANALYSIS

Load Cases

Load cases have been selected according to AASHTO criteria: American Association of State Highway and Transportation Officials, AASHTO LRFD Bridge Design Specifications, 9th Edition 2020 (Section 3.3.2). Case designations follow the AASHTO nomenclature. Only Load Cases relevant to the Abutment Design have been listed.

CASE	DESCRIPTION
DC	Dead Load: Structure Self-weight (include Wearing Surface, walkway and Railing)
EH	Horizontal Earth Pressure
EV	Vertical Earth Load
ES	Surcharge
BR	Vehicular Braking Force
CT	Vehicular Collision Force
LL	Vehicular Live Load: (1) One Lane Loaded, (2) Load on Two Lanes and (3) Lane Load associated with Collision Force
PL	Pedestrian Load
WSr	Wind Forces on the Structure for Reference Wind Speed of 100 MPH
WL	Wind Forces on Live Load
WS	Wind Forces on the Structure for Design Wind Speed, for cases not involving Wind Load on Live Load

The Dynamic Effect (IM) factors are to be included in the Load Combinations, as applicable.

Design Load Combinations

Strength Design Load Combinations

STRENGTH LOAD COMBINATIONS

N	ID	1	2	3	4	5	6	7	8	9	10	11	12	13
		DC	EH	EV	ES	BR	CT	LL1	LL2	LL3	PL	WSr	WL	WS
1	S-I	1.25	1.35	1.35	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	S-I	0.90	0.90	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3	S-V	1.25	1.35	1.35	1.50	1.75	0.00	2.33	0.00	0.00	1.75	1.00	1.00	0.00
4	S-V	0.90	0.90	1.00	0.75	1.75	0.00	2.33	0.00	0.00	1.75	1.00	1.00	0.00
5	S-V	1.25	1.35	1.35	1.50	1.75	0.00	0.00	2.33	0.00	0.00	1.00	1.00	0.00
6	S-V	0.90	0.90	1.00	0.75	1.75	0.00	0.00	2.33	0.00	0.00	1.00	1.00	0.00
7	S-III	1.25	1.35	1.35	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00
8	S-III	0.90	0.90	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00
9	E-II	1.00	1.00	1.00	1.00	0.50	1.00	0.00	0.00	0.50	0.00	0.00	0.00	0.00

“S” are the regular Strength Design Combinations, to be used for the structural design of abutment walls and components; “E” identifies Extreme Event Combinations. The values for LL Load Factors include the Dynamic Load Allowance (IM) as applicable.

Allowable Strength Design Load Combinations

STRENGTH LOAD COMBINATIONS

N	ID	1	2	3	4	5	6	7	8	9	10	11	12	13
		DC	EH	EV	ES	BR	CT	LL1	LL2	LL3	PL	WSr	WL	WS
1	D-I	1.00	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	D-I	1.00	1.00	1.00	1.00	1.00	0.00	1.00	0.00	0.00	1.00	1.00	1.00	0.00
3	D-I	1.00	1.00	1.00	1.00	1.00	0.00	0.00	1.00	0.00	0.00	1.00	1.00	0.00
4	D-IV	1.00	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00

“D” are the regular Allowable Strength Combinations. These combinations are intended for use in the design of Piles, and do not include Dynamic Load Allowance (IM)

Dead Load

DC - Structure self-weight: This load is based on the weight of structural components, as obtained from Section Geometry and unit weights for materials, in this case Concrete (145 lb/ft³) and Wearing Surface (140 lb/ft³).

COMPONENT	b	b	t	n	q	W
	ft	in	in		lb/ft ³	lb/ft
FSB + TOPPING	61.0	0	24	1	145	17690
WEARING SURFACE	23.5	0	2	1	140	548
SEPARATOR	3.0	0	6	2	145	435
WALKWAY	8.5	0	8	2	145	1643
RAILING	2.0	8	13	2	145	838
TOTAL						21154

Total Bridge Length is 66' – 4" = 66.33 ft

Assume support Centerline at 1' – 6" from Abutment Wall face

Effective Span, use 63' – 4" = 63.33 ft

Total Bridge Weight: $W = 21154 \times 66.33 = 1,403,145 \text{ lb}$

Reaction on Abutment: $q_{DC} = 1,403,145 / 62.0 = 22,631 \text{ lb / ft}$
(Use 62' – 0" curb-to-curb deck width)

Earth Pressures

Use vertical elevation 7.70 ft, use 120 lb/ft³ as weight density

EV: Vertical Component $q_{EV} = 7.70 \times 120 = 924 \text{ lb / ft}^2$

EH: Horizontal Component, use "at Rest" earth pressure $k_1 = 0.71$

$$q_{EH} = 0.71 \times 924 = 656 \text{ lb / ft}^2$$

ES: Surcharge (95 lb / ft²): $q_{ES} = 0.71 \times 95 = 67 \text{ lb / ft}^2$

Vehicular or Pedestrian Loadings

Vehicular Braking Force

Use 25% of the Design Truck Load or Tandem (HL-93); apply the multiple presence factor; in this case:

$$P_{BR} = 0.25 \times 72 \text{ kip} \times 1.20 = 21.6 \text{ kip}$$

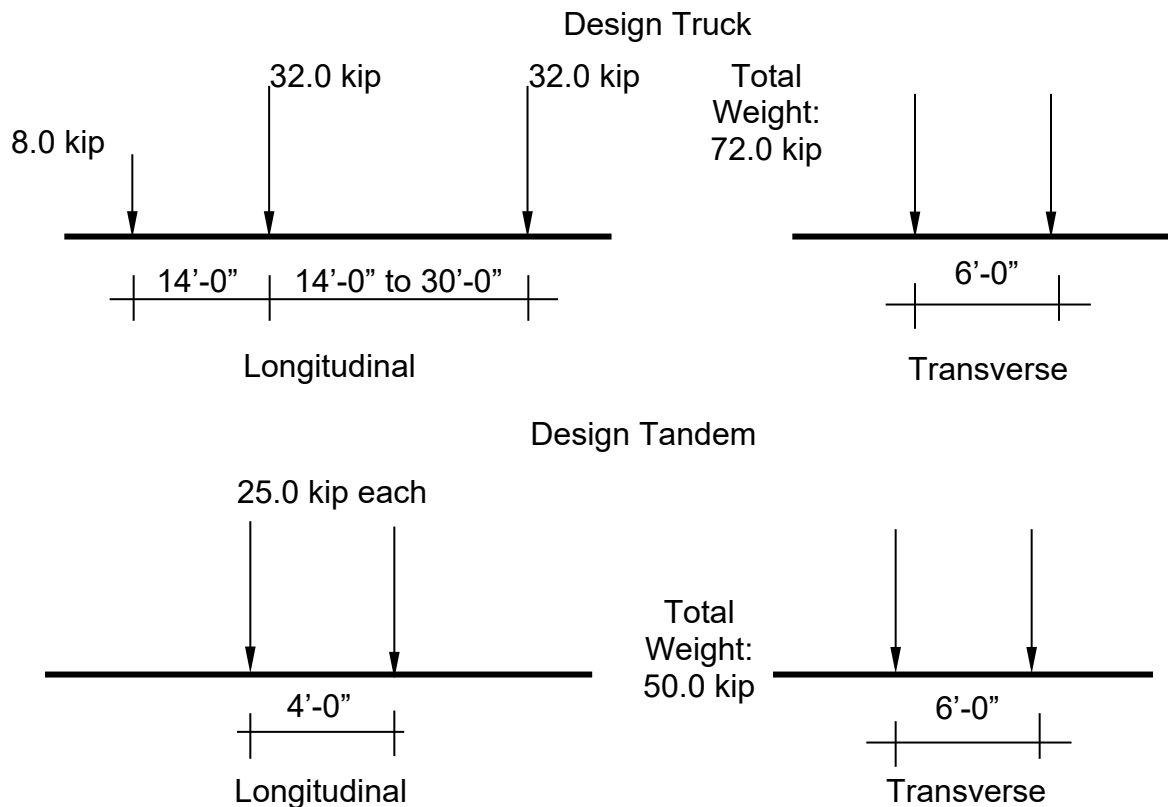
Apply on a 12 ft wide lane: $q_{BR} = 21.6 / 12 = 1800 \text{ lb / ft}$

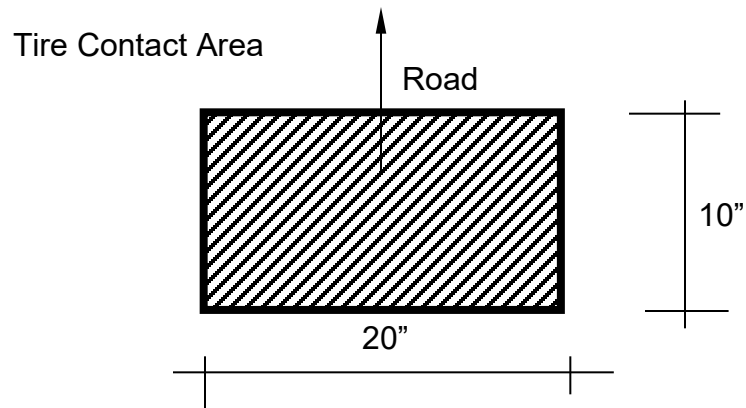
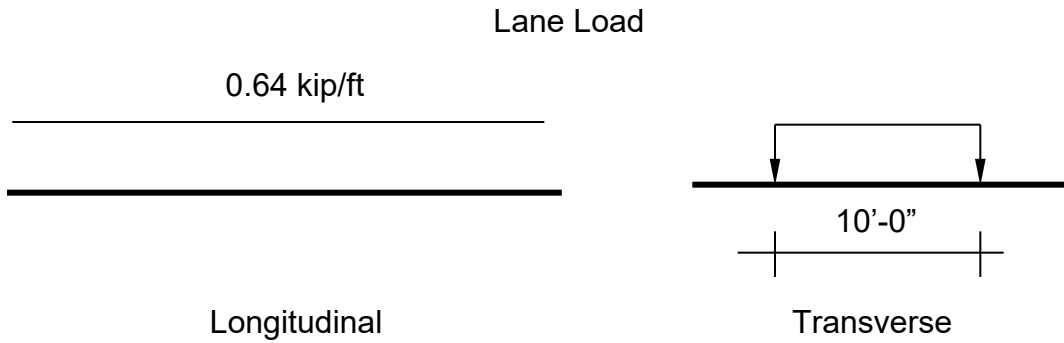
Vehicle Collision Force

Horizontal (Lateral) Component: $F_{HCT} = 27 \text{ kip}$

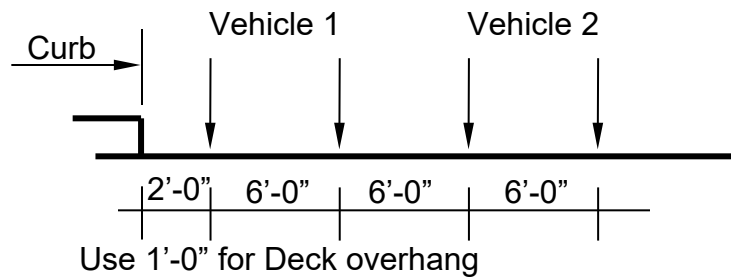
Vehicle Live Load

HL-93 Vehicular Live Load consists of a combination of the Design Truck, or Design Tandem, plus a Design Lane Load.





Transverse Load Disposition



Dynamic Load Allowance applies to both Truck and Tandem loads but does not apply to Lane load:

$$IM = 0.33$$

Pedestrian Live Load

PL - Pedestrian Live Load, per AASHTO shall be taken at 75 lb/ft².

Use 10 ft width: $q_L = 75 \times 66.33 / 2 = 2487 \text{ lb / ft}$

Slab Bridge Equivalent Strip Analysis

One Lane Loaded (includes the 1.20 multiple presence factor):

$$E = 10.0 + 5.0 (L_i \cdot W_i)^{1/2}$$

Each Lane, when more than one lane is loaded:

$$E = 84.0 + 1.44 (L_i \cdot W_i)^{1/2} \leq 12.0 W / N_L$$

Where:

- E = Effective Width (in)
- L_i = Span Length, but not more than 60 ft
- W_i = Actual Width (Edge to Edge), but not more than 30 ft
- W = Physical (Edge to Edge) width (ft)
- N_L = Number of Design Lanes

EQUIVALENT WIDTH STRIP FOR SLAB BRIDGES

L	63.33	ft	Actual Span
W	60.00	ft	Physical Edge to Edge Width
N_L	2		Number of Design Lanes in W

L_i	62.00	ft	Span for Analysis
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Analysis for Load on One Lane (includes 1.20 Presence Factor)

W_i	30.00	ft	Width for Analysis
E	18.51	ft	Equivalent Strip Width

Analysis for Load on more than One Lane (no Presence Factor)

W_i	60.00	ft	Width for Analysis
E	14.20	ft	Equivalent Strip Width

For the case with two loaded lanes, each 12 ft wide, the combined width will be 26.20 ft.

LIVE LOAD REACTION
ONE LANE LOAD HL-93

L	63.33	ft
LANE	20.27	kip
TANDEM	48.42	kip
TRUCK	61.39	kip
IM	0	%
V	81.65	kip

Dynamic Allowance has been omitted since these combinations are used to dimension Foundation Piles.

Effective Load to apply in each case (rounded for Elements used in the Model):

CASE	R	N	b	q
	kip		ft	kip/ft
One Lane	81.65	1	18.00	4.536
Two Lanes	81.65	2	26.00	6.296
Collision	81.65	1	18.00	4.536

Wind Loads

Wind Design Speed Selection

Wind Design Speed will be selected on the basis of Florida Design Criteria; for Miami-Dade County, the speed is selected as 175 MPH

Reference Wind Pressures on the Structure

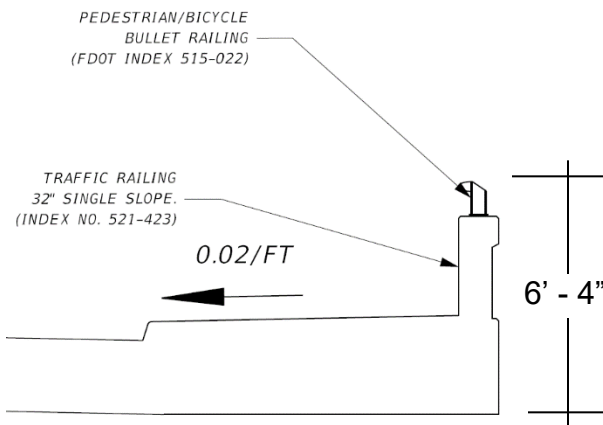
These Pressures are stipulated by the Specification, for a Wind Speed of 100 MPH, at an elevation of 30 ft above ground or water level, to be scaled as Site conditions require.

Windward Horizontal Load:

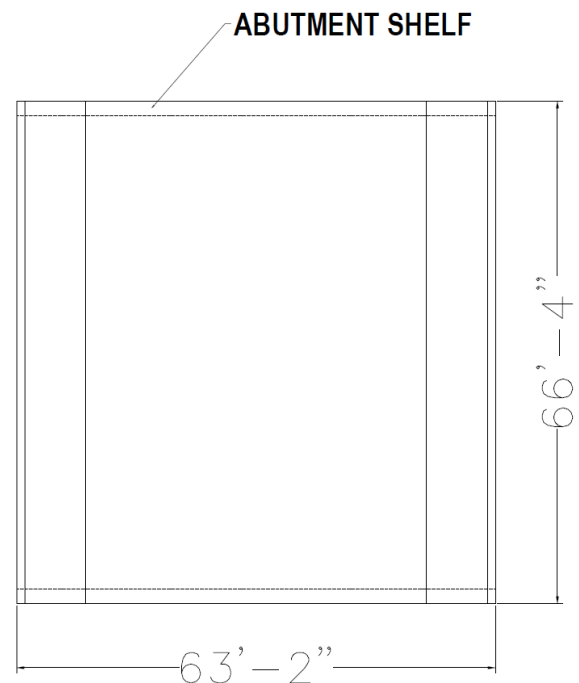
Base Pressure: $P_B = 50 \text{ psf}$

This Pressure shall be taken Normal to the Structure Longitudinal Axis.

WALKWAY AND RAILING



PLAN



Vertical Wind Pressure: this Load is 20 psf over the entire deck surface, applied upwards at 1/4 of the Bridge Deck width:

Total Nominal Reaction at the Abutment (Case WSr):

Horizontal: $q = 50 \times 6.33 = 317 \text{ lb/ft}$
 $H_{Wr} = 317 \times 66.33 / 2 = 10513 \text{ lb}$
 $q_H = 10513 / 62.0 = 170 \text{ lb/ft}$

Vertical: $V_{Wr} = 20 \times 63.17 \times 66.33 / 2 = 41901 \text{ lb}$
 $q_v = 41901 / (62.0 / 2) = 1352 \text{ lb / ft}$
 (Apply on half the Abutment)

Design Wind Pressures on the Structure

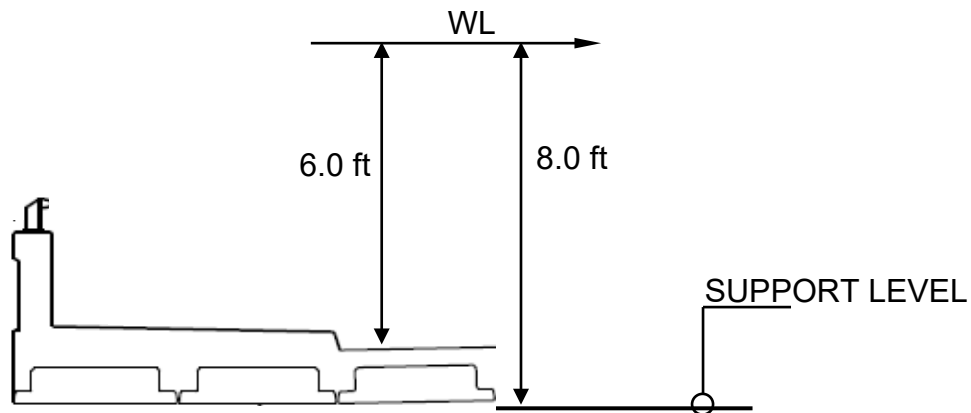
Factor to the Reference Wind: $f = (175 / 100)^2 = 3.06$

Design Reaction at the Abutment (Case WS)

Horizontal: $q_H = 166 \times 3.08 = 508 \text{ lb/ft}$
 Vertical: $q_v = 1327 \times 3.08 = 4087 \text{ lb / ft}$
 (Apply on half the Abutment)

Wind on Live Load

Horizontal Force (WL) is 100 lb/ft along the bridge, applied at 6 ft above the Deck surface.



Total Reaction, transverse to the bridge:

$$H_{WLt} = 100 \times 66.33 / 2 = 3317 \text{ lb}$$

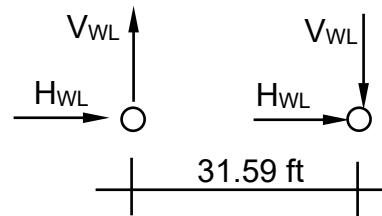
Moment (Torsion along the Bridge Axis):

$$M_{WL} = 8.0 \times 3317 = 26536 \text{ lb.ft}$$

These forces can be applied at two points on the abutment: $s = 63.17 / 2 = 31.59 \text{ ft}$

$$H_{WL} = 3317 / 2 = 1659 \text{ lb}$$

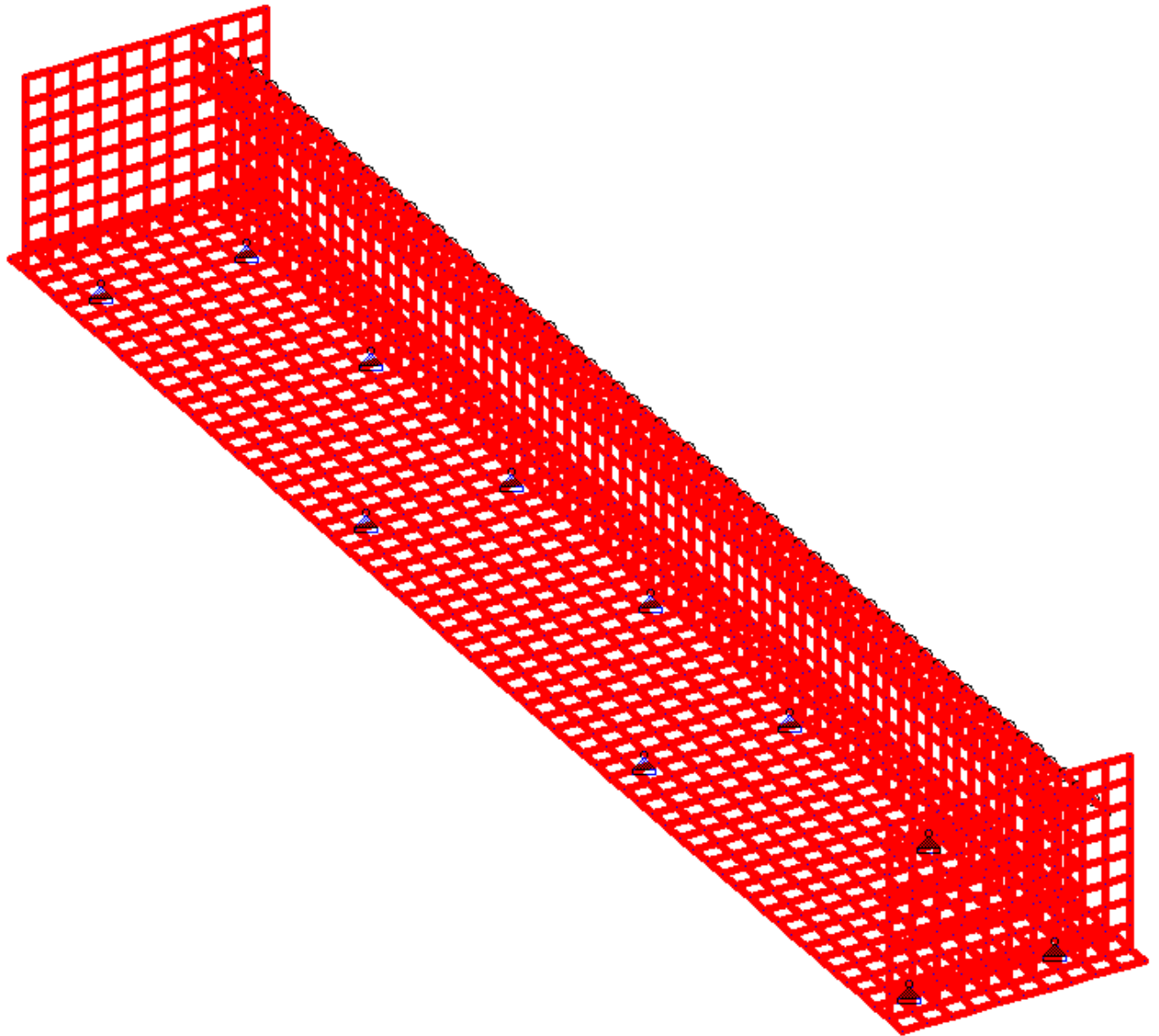
$$V_{WL} = 26536 / 31.59 = 840 \text{ lb}$$



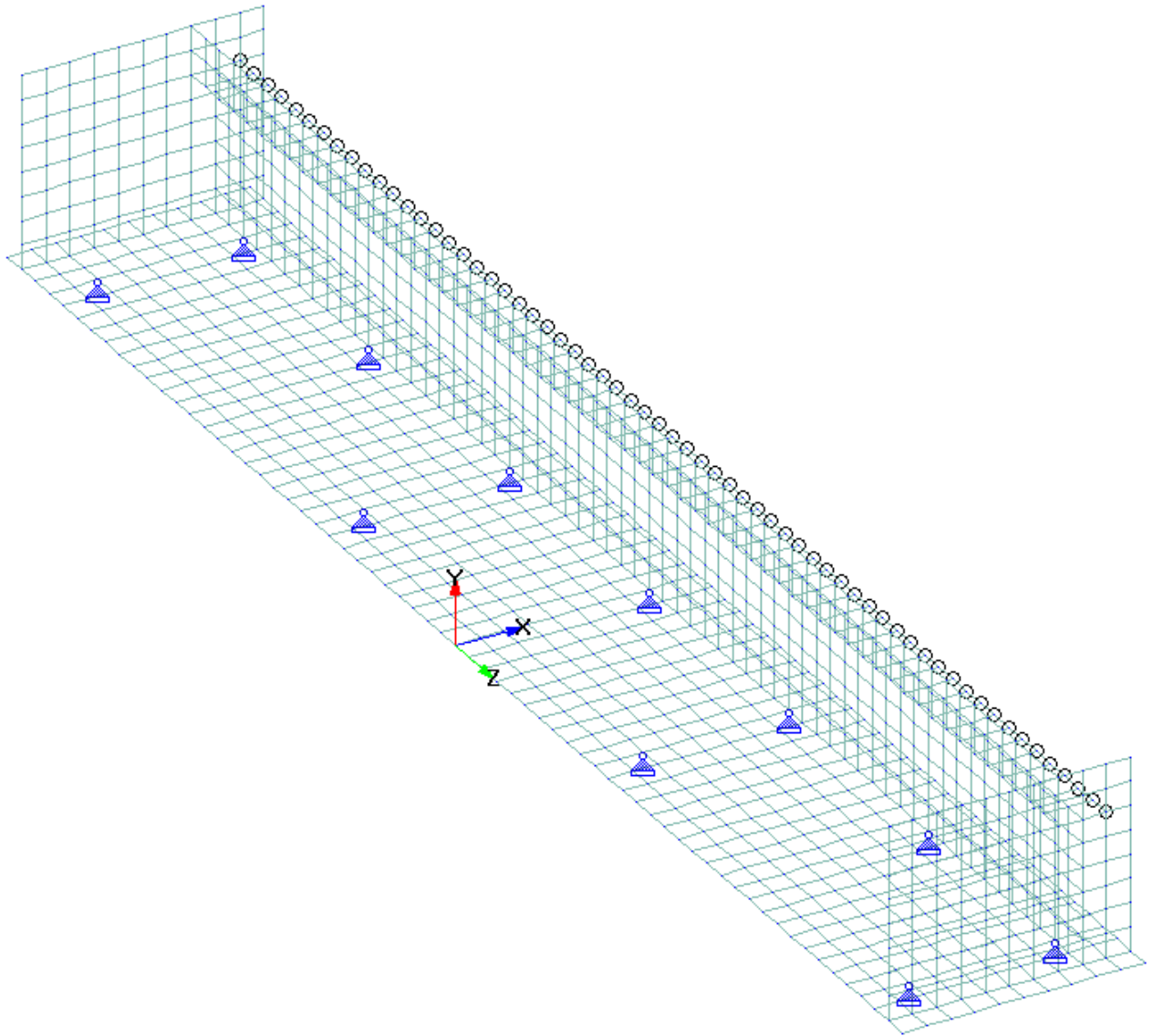
3.3 STRUCTURAL ANALYSIS

Model Description

General View



View Showing Pile Disposition



Foundation

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West Wing Wall

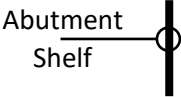
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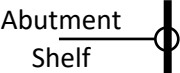
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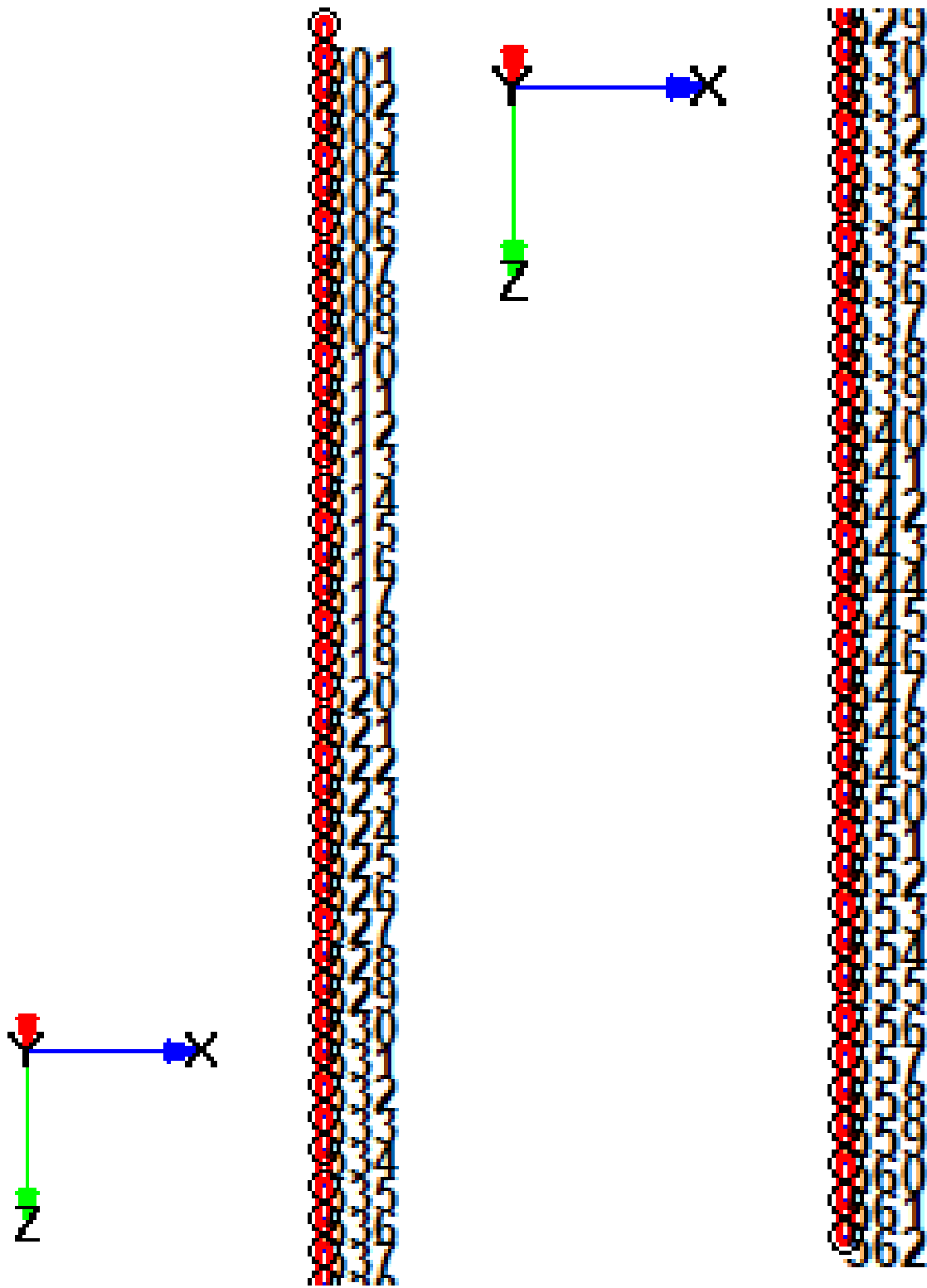


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2186	2185	2184	2183	2182	2181	2180	2179	2178	2177	2176	2175	2174	2173	2172	2171	2170	2169	2168	2167	2166	2165	2164	2163	2162	2161	2160	2159	2158	2157	2156	2
2124	2123	2122	2121	2120	2119	2118	2117	2116	2115	2114	2113	2112	2111	2110	2109	2108	2107	2106	2105	2104	2103	2102	2101	2100	2099	2098	2097	2096	2095	2094	2
2062	2061	2060	2059	2058	2057	2056	2055	2054	2053	2052	2051	2050	2049	2048	2047	2046	2045	2044	2043	2042	2041	2040	2039	2038	2037	2036	2035	2034	2033	2032	2



2554	2553	2552	2551	2550	2549	2548	2547	2546	2545	2544	2543	2542	2541	2540	2539	2538	2537	2536	2535	2534	2533	2532	2531	2530	2529	2528	2527	2526	2525	2524	2563
2552	2551	2550	2549	2548	2547	2546	2545	2544	2543	2542	2541	2540	2539	2538	2537	2536	2535	2534	2533	2532	2531	2530	2529	2528	2527	2526	2525	2524	2523	2522	2501
2342	2341	2340	2339	2338	2337	2336	2335	2334	2333	2332	2331	2330	2329	2328	2327	2326	2325	2324	2323	2322	2321	2320	2319	2318	2317	2316	2315	2314	2313	2312	2341
2220	2219	2218	2217	2216	2215	2214	2213	2212	2211	2210	2209	2208	2207	2206	2205	2204	2203	2202	2201	2200	2199	2198	2197	2196	2195	2194	2193	2192	2191	2190	2249
2218	2217	2216	2215	2214	2213	2212	2211	2210	2209	2208	2207	2206	2205	2204	2203	2202	2201	2200	2199	2198	2197	2196	2195	2194	2193	2192	2191	2190	2189	2188	2187
2155	2154	2153	2152	2151	2150	2149	2148	2147	2146	2145	2144	2143	2142	2141	2140	2139	2138	2137	2136	2135	2134	2133	2132	2131	2130	2129	2128	2127	2126	2125	
2064	2063	2062	2061	2060	2059	2058	2057	2056	2055	2054	2053	2052	2051	2050	2049	2048	2047	2046	2045	2044	2043	2042	2041	2040	2039	2038	2037	2036	2035	2034	2063
2022	2021	2020	2019	2018	2017	2016	2015	2014	2013	2012	2011	2010	2009	2008	2007	2006	2005	2004	2003	2002	2001	2000	1999	1998	1997	1996	1995	1994	1993	1992	2001

Frame Elements used to Apply Loads on Bearing Shelf



General Report by STAAD Analysis Program

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	Part		
Job Title SW 87 ST BRIDGE - FOUNDATION	Ref		
	By ANTONIO GUELL at 9/8/2021 Cnd		
Client	File BR-87-43.STD	Date/Time 22-Nov-2021 08:07	

Job Information

	Engineer	Checked	Approved
Name:	ANTONIO GUELL		
Date:	9/8/2021		

Project ID	
Project Name	

Structure Type	SPACE FRAME
----------------	-------------

Number of Nodes	1512	Highest Node	2501
Number of Elements	73	Highest Beam	562
Number of Plates	1420	Highest Plate	4124

Number of Basic Load Cases	12
Number of Combination Load Cases	14

Included in this printout are data for:

All	The Whole Structure
-----	---------------------

Included in this printout are results for load cases:

Type	L/C	Name
Primary	7	LL1
Primary	8	LL2
Primary	9	LL3

Section Properties

Prop	Section	Area (in ²)	I _{yy} (in ⁴)	I _{zz} (in ⁴)	J (in ⁴)	Material
5	Rect 6.00x3.00	18.000	13.500	54.000	37.079	AL-NW
6	Cir 18.00	254.469	5.15E+3	5.15E+3	10.3E+3	C-4.0

Plate Thickness

Prop	Node A (in)	Node B (in)	Node C (in)	Node D (in)	Material
1	36.000	36.000	36.000	36.000	C-5.5
2	24.000	24.000	24.000	24.000	C-5.5
3	12.000	12.000	12.000	12.000	C-5.5
4	44.000	44.000	44.000	44.000	C-5.5

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Materials

Mat	Name	E (kip/in ²)	v	Density (kip/in ³)	α (/°F)
1	STEEL	29E+3	0.300	0.000283	6.5E-6
2	CONCRETE	3.15E+3	0.170	8.68e-05	5.5E-6
3	ALUMINUM	10E+3	0.330	9.8e-05	12.8E-6
4	STAINLESSSTEEL	28E+3	0.300	0.000283	9.9E-6
5	STEEL_36_KSI	29E+3	0.300	0.000283	6.5E-6
6	STEEL_50_KSI	29E+3	0.300	0.000283	6.5E-6
7	STEEL_275_NMM2	29.7E+3	0.300	0.000	6.67E-6
8	STEEL_355_NMM2	29.7E+3	0.300	0.000	6.67E-6
9	C-5.5	4.2E+3	0.200	0.000	5.5E-6
10	FM	29E+3	0.300	0	0.000
11	AL-NW	10E+3	0.330	0	12.8E-6
12	C-4.0	3.6E+3	0.200	0.000	5.5E-6

Primary Load Cases

Number	Name	Type
1	DC	Dead
2	EH	Soil
3	EV	Soil
4	ES	Traffic
5	BR	Traffic
6	CT	Accidental
7	LL1	Traffic
8	LL2	Traffic
9	LL3	Traffic
10	PL	Live
11	WSR	Wind
12	WL	Wind

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	Part		
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	By ANTONIO GUELL 22/9/2021 Chd		
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Combination Load Cases

Comb.	Combination L/C Name	Primary	Primary L/C Name	Factor
13	WS	11	WSR	3.08
14	S1	1	DC	1.25
		2	EH	1.35
		3	EV	1.35
15	S2	1	DC	0.90
		2	EH	0.90
		3	EV	1.00
16	S3	1	DC	1.25
		2	EH	1.35
		3	EV	1.35
		4	ES	1.50
		5	BR	1.75
		10	PL	1.75
		7	LL1	2.33
		11	WSR	1.00
		12	WL	1.00
17	S4	1	DC	0.90
		2	EH	0.90
		3	EV	1.00
		11	WSR	1.00
		12	WL	1.00
		4	ES	0.75
		5	BR	1.75
		10	PL	1.75
		7	LL1	2.33
18	S5	1	DC	1.25
		2	EH	1.35
		3	EV	1.35
		4	ES	1.50
		5	BR	1.75
		8	LL2	2.33
		11	WSR	1.00
		12	WL	1.00
19	S6	1	DC	0.90
		2	EH	0.90
		3	EV	1.00
		11	WSR	1.00
		12	WL	1.00
		4	ES	0.75
		5	BR	1.75
		8	LL2	2.33
20	S7	1	DC	1.25
		2	EH	1.35
		3	EV	1.35
		13	WS	1.00



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Combination Load Cases Cont...

Comb.	Combination L/C Name	Primary	Primary L/C Name	Factor
21	S8	1	DC	0.90
		2	EH	0.90
		3	EV	1.00
		13	WS	1.00
22	S9	1	DC	1.00
		2	EH	1.00
		3	EV	1.00
		4	ES	1.00
		5	BR	0.50
		9	LL3	0.50
		6	CT	1.00
23	D1	1	DC	1.00
		2	EH	1.00
		3	EV	1.00
24	D2	1	DC	1.00
		2	EH	1.00
		3	EV	1.00
		4	ES	1.00
		5	BR	1.00
		7	LL1	1.00
		10	PL	1.00
		11	WSR	1.00
		12	WL	1.00
25	D3	1	DC	1.00
		2	EH	1.00
		3	EV	1.00
		4	ES	1.00
		5	BR	1.00
		8	LL2	1.00
		11	WSR	1.00
		12	WL	1.00
26	D4	1	DC	1.00
		2	EH	1.00
		3	EV	1.00
		13	WS	1.00



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Sheet No
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Job Title SW 87 ST BRIDGE - FOUNDATION

Ref

By ANTONIO GUELL 09/8/2021 Cnd

Client

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7 LL1 : Beam Loads

Beam	Type	Direction	Fa	Da (ft)	Fb	Db	Ecc. (ft)
517	UNI	lb/ft	GY	-4.54E+3	-	-	-
518	UNI	lb/ft	GY	-4.54E+3	-	-	-
519	UNI	lb/ft	GY	-4.54E+3	-	-	-
520	UNI	lb/ft	GY	-4.54E+3	-	-	-
521	UNI	lb/ft	GY	-4.54E+3	-	-	-
522	UNI	lb/ft	GY	-4.54E+3	-	-	-
523	UNI	lb/ft	GY	-4.54E+3	-	-	-
524	UNI	lb/ft	GY	-4.54E+3	-	-	-
525	UNI	lb/ft	GY	-4.54E+3	-	-	-
526	UNI	lb/ft	GY	-4.54E+3	-	-	-
527	UNI	lb/ft	GY	-4.54E+3	-	-	-
528	UNI	lb/ft	GY	-4.54E+3	-	-	-
529	UNI	lb/ft	GY	-4.54E+3	-	-	-
530	UNI	lb/ft	GY	-4.54E+3	-	-	-
531	UNI	lb/ft	GY	-4.54E+3	-	-	-
532	UNI	lb/ft	GY	-4.54E+3	-	-	-
533	UNI	lb/ft	GY	-4.54E+3	-	-	-
534	UNI	lb/ft	GY	-4.54E+3	-	-	-

8 LL2 : Beam Loads

Beam	Type	Direction	Fa	Da (ft)	Fb	Db	Ecc. (ft)
513	UNI	lb/ft	GY	-6.3E+3	-	-	-
514	UNI	lb/ft	GY	-6.3E+3	-	-	-
515	UNI	lb/ft	GY	-6.3E+3	-	-	-
516	UNI	lb/ft	GY	-6.3E+3	-	-	-
517	UNI	lb/ft	GY	-6.3E+3	-	-	-
518	UNI	lb/ft	GY	-6.3E+3	-	-	-
519	UNI	lb/ft	GY	-6.3E+3	-	-	-
520	UNI	lb/ft	GY	-6.3E+3	-	-	-
521	UNI	lb/ft	GY	-6.3E+3	-	-	-
522	UNI	lb/ft	GY	-6.3E+3	-	-	-
523	UNI	lb/ft	GY	-6.3E+3	-	-	-
524	UNI	lb/ft	GY	-6.3E+3	-	-	-
525	UNI	lb/ft	GY	-6.3E+3	-	-	-
526	UNI	lb/ft	GY	-6.3E+3	-	-	-
527	UNI	lb/ft	GY	-6.3E+3	-	-	-
528	UNI	lb/ft	GY	-6.3E+3	-	-	-
529	UNI	lb/ft	GY	-6.3E+3	-	-	-
530	UNI	lb/ft	GY	-6.3E+3	-	-	-
531	UNI	lb/ft	GY	-6.3E+3	-	-	-
532	UNI	lb/ft	GY	-6.3E+3	-	-	-
533	UNI	lb/ft	GY	-6.3E+3	-	-	-

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8 LL2 : Beam Loads Cont...

Beam	Type	Direction	Fa	Da (ft)	Fb	Db	Ecc. (ft)
534	UNI	lb/ft	GY	-6.3E+3	-	-	-
535	UNI	lb/ft	GY	-6.3E+3	-	-	-
536	UNI	lb/ft	GY	-6.3E+3	-	-	-
537	UNI	lb/ft	GY	-6.3E+3	-	-	-
538	UNI	lb/ft	GY	-6.3E+3	-	-	-

9 LL3 : Beam Loads

Beam	Type	Direction	Fa	Da (ft)	Fb	Db	Ecc. (ft)
502	UNI	lb/ft	GY	-4.54E+3	-	-	-
503	UNI	lb/ft	GY	-4.54E+3	-	-	-
504	UNI	lb/ft	GY	-4.54E+3	-	-	-
505	UNI	lb/ft	GY	-4.54E+3	-	-	-
506	UNI	lb/ft	GY	-4.54E+3	-	-	-
507	UNI	lb/ft	GY	-4.54E+3	-	-	-
508	UNI	lb/ft	GY	-4.54E+3	-	-	-
509	UNI	lb/ft	GY	-4.54E+3	-	-	-
510	UNI	lb/ft	GY	-4.54E+3	-	-	-
511	UNI	lb/ft	GY	-4.54E+3	-	-	-
512	UNI	lb/ft	GY	-4.54E+3	-	-	-
513	UNI	lb/ft	GY	-4.54E+3	-	-	-
514	UNI	lb/ft	GY	-4.54E+3	-	-	-
515	UNI	lb/ft	GY	-4.54E+3	-	-	-
516	UNI	lb/ft	GY	-4.54E+3	-	-	-
517	UNI	lb/ft	GY	-4.54E+3	-	-	-
518	UNI	lb/ft	GY	-4.54E+3	-	-	-
519	UNI	lb/ft	GY	-4.54E+3	-	-	-

Pile Forces

Node	L/C	Horizontal	Vertical	Horizontal
		Fx lb	Fy lb	Fz lb
101	23 D1	-5884	18130	15196
	24 D2	-7191	8678	17901
	25 D3	-6636	4483	19912
	26 D4	-5513	19461	15502
102	23 D1	-6229	313579	69113
	24 D2	-7162	346933	77826
	25 D3	-6701	347703	86107
	26 D4	-5900	310484	69940
103	23 D1	-26340	341903	51924
	24 D2	-32670	377620	67251
	25 D3	-32755	385567	87650
	26 D4	-26143	338256	54851
104	23 D1	-8717	53528	5601
	24 D2	-14979	43867	6092
	25 D3	-15507	46251	7634
	26 D4	-8589	54048	6975
105	23 D1	-20655	361922	20446
	24 D2	-34540	400324	30391
	25 D3	-34718	414120	38193
	26 D4	-20604	358311	26272
106	23 D1	-27037	369678	0
	24 D2	-40282	405664	-13875
	25 D3	-41423	420027	-16792
	26 D4	-27045	366825	7701
107	23 D1	-8717	53528	-5601
	24 D2	-10325	44690	-6509
	25 D3	-10464	46142	-9351
	26 D4	-8827	54256	-4147

Node	L/C	Horizontal	Vertical	Horizontal
		Fx lb	Fy lb	Fz lb
108	23 D1	-20655	361922	-20446
	24 D2	-25992	392031	-31443
	25 D3	-25957	400784	-50794
	26 D4	-20642	359901	-14321
109	23 D1	-26340	341903	-51923
	24 D2	-29961	367874	-49289
	25 D3	-29450	367546	-62399
	26 D4	-26518	340216	-48259
110	23 D1	-5884	18130	-15196
	24 D2	-8035	9908	-16469
	25 D3	-7868	4882	-17711
	26 D4	-6205	18240	-14768
111	23 D1	-6229	313579	-69113
	24 D2	-8183	337130	-68018
	25 D3	-7841	329523	-68591
	26 D4	-6703	311679	-67493

Minima	-41423	4483	-69113
Maxima	-5513	420027	87650

Pile Extreme Forces

Node	Vertical Force	
	Min	Max
	lb	lb
1	4483	19461
2	310484	347703
3	338256	385567
4	43867	54048
5	358311	414120
6	366825	420027
7	44690	54256
8	359901	400784
9	340216	367874
10	4882	18240
11	311679	337130
12	4483	19461
13	310484	347703

Pile Numbering and Extreme Vertical Forces

2	10	 01	 02	155	174
---	----	--	--	-----	-----

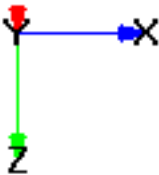
View from Above

Extreme Vertical Forces are indicated for each Pile (Ton)

MIN	MAX
-----	-----

 03	169	193
--	-----	-----

22	27	 04	 05	179	207
----	----	--	--	-----	-----



 06	183	210
--	-----	-----

22	27	 07	 08	180	200
----	----	--	--	-----	-----

 09	170	184
--	-----	-----

2	9	 10	 11	156	169
---	---	--	--	-----	-----

3.4 STRUCTURAL DESIGN

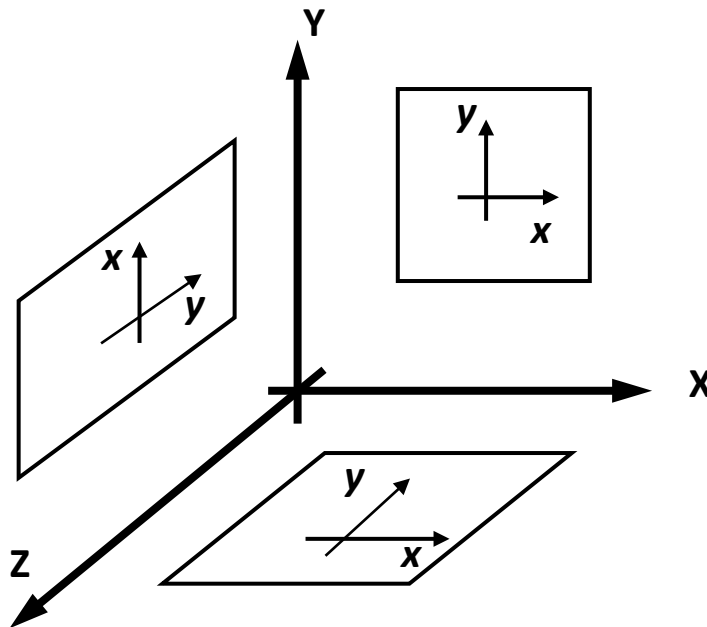
Plate Elements Strength Design

Element Local Axes

Plate Element Forces in STAAD are reported in terms of element local axes, as shown; the element x-face is that face perpendicular to local x axis; the element y-face is the face perpendicular to the local y axis. Local z axis is not shown, but it is perpendicular to the element face, positive in the direction of the right-hand rule vector product of local x and y.

Stresses associated with plate bending are SQX and SQY: shear parallel to local z in local faces x and y, MX, MY bending moment per unit width in local faces x and y.

Membrane stresses are SX and SY: axial on local faces x and y (negative for compression), and in-plane shear stress on both faces SXY.



X, Y, Z Global Axes

x, y Local Element Axes for elements in different positions

Strength Design

Strength Design is performed on the basis of Strength I Combinations as defined by AASHTO; these are 8 Load Combinations identified in the Model as “S” combinations, plus an Extreme Event case “E”. A spreadsheet is used to perform a detailed design under membrane forces in the plate elements, bending and shear for each design combination; then the extreme values found for each element are reported, and the envelope of these results is presented as the design output for each element. For this purpose, elements are grouped according to their characteristics and locations, and a single value, the most critical, is reported in each design component. The Tables presented in this Section show some of the most critical elements, and the envelope for the group.

Values reported are defined on Table 4-1.

TABLE 4-1 Plate Element Design Tables Legend	
PLATE	Plate Element Number in the Model
ASX	Calculated Steel area, per unit width, required on each face of the element, local x direction; does not include minimum reinforcement considerations
ASY	Calculated Steel area, per unit width, required on each face of the element, local y direction; does not include minimum reinforcement considerations
RVX	Ratio of required shear strength required on local x face, to Design Factored Strength; must not be greater than 1 for a safe design
RVY	Ratio of required shear strength required on local y face, to Design Factored Strength; must not be greater than 1 for a safe design
CX	An indicator of axial compressive stress, local x direction: “0” if compression stress is less than 10% of factored Design Strength of Concrete, “1” if the value is larger than 10%, but less than 50%, “2” if the value is less than Design Strength, but larger than 50%. When the value is “3”, the value of axial compression is larger than Concrete Strength, and special measures should be taken, like increasing plate thickness, and/or providing reinforcement and ties.
CY	An indicator, analogous to CX, for the local y direction

Flexure Reinforcement Limits

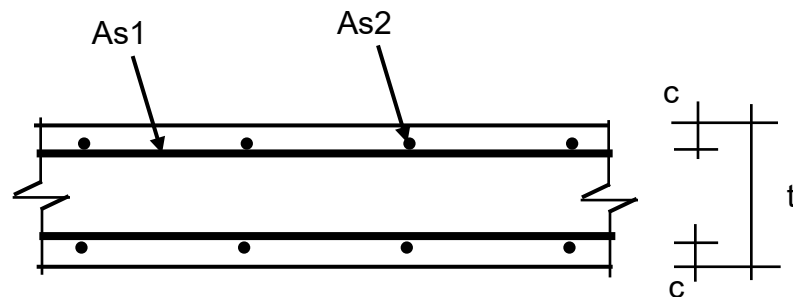
Minimum Flexural Reinforcement, per AASHTO in Section 5.6.3.3, depends on Critical Rupture Moment:

PLATE - MINIMUM STEEL - AASHTO 2020

f_y	60	ksi	Reinforcement Steel Yield Strength
f_c	5.50	ksi	Specified Concrete Strength
f_r	0.56	ksi	Modulus of Rupture
f_{Mcr}	1.07		Combined Critical Moment Factor

t	cover	Sc	$f_{Mcr} * M_{cr}$	As_{min}	USE	$As_{min}/2$	
in	in	in ³ /ft	kip.in/ft	in ² /ft		in ² /ft	
12	3	288	173	0.40	#6 @ 10 o/c	0.20	#4 @ 10 o/c
36	3	2592	1561	0.97	#8 @ 10 o/c	0.49	#6 @ 10 o/c
44	3	3872	2332	1.17	#8 @ 8 o/c	0.59	#6 @ 8 o/c

In cases where there is a significant flexure moment in both directions, this reinforcement would apply on both faces, and both directions, as a minimum; greater reinforcement areas may be needed per strength design.



Foundation Design

Foundation Flexure

Foundation includes 640 Plate Elements, and it is analyzed for a total of 9 combinations for Design Strength. The values reported in Table 4.2, are a sample including elements where ASX or ASY are maximum; an envelope is reported. The foundation is 36" thick.

Table 4.2 – Foundation Flexure						
PLATE	ASX	ASY	RVX	RVY	CX	CY
	IN2/FT	IN2/FT				
1318	0.51	0.24	1.16	1.25	0	0
1328	0.50	0.24	1.14	1.26	0	0
1228	0.47	0.26	1.09	1.24	0	0
1218	0.47	0.25	1.07	1.25	0	0
1128	0.46	0.25	1.09	1.14	0	0
1118	0.45	0.30	1.06	1.15	0	0
1308	0.44	0.06	0.06	0.45	0	0
1238	0.43	0.06	0.02	0.44	0	0
1138	0.42	0.06	0.08	0.43	0	0
1518	0.42	0.24	1.02	1.05	0	0
1118	0.45	0.30	1.06	1.15	0	0
1279	0.04	0.30	0.07	0.04	0	0
1269	0.04	0.29	0.07	0.02	0	0
1280	0.01	0.29	0.03	0.08	0	0
1270	0.01	0.28	0.03	0.04	0	0
1179	0.03	0.28	0.06	0.02	0	0
1289	0.04	0.27	0.10	0.11	0	0
1369	0.03	0.27	0.06	0.03	0	0
1418	0.42	0.27	1.04	1.18	0	0
1189	0.04	0.27	0.10	0.05	0	0
Envelope for the Group						
	0.51	0.30	1.16	1.27	0	0

Reports for Shear Strength Ratio exceed 1.00, warranting further investigation.

Foundation Shear

All elements where the ratio RVX is greater than 0.80 are listed in Table 4.3

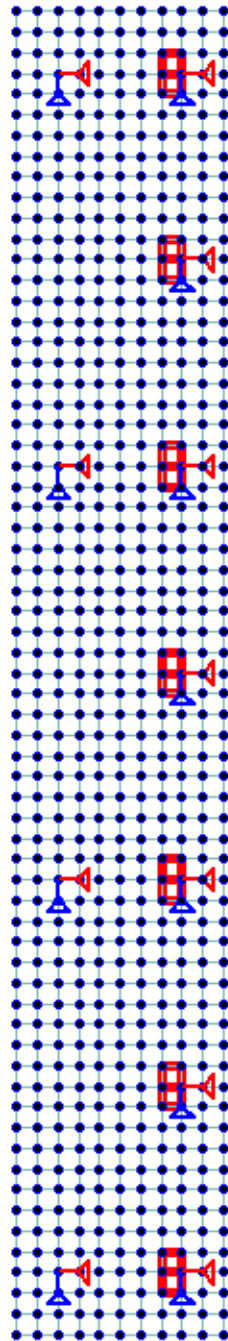
Table 4.3 - Foundation Shear X						
PLATE	ASX	ASY	RVX	RVY	CX	CY
	IN2/FT	IN2/FT				
1318	0.51	0.24	1.16	1.25	0	0
1328	0.50	0.24	1.14	1.26	0	0
1128	0.46	0.25	1.09	1.14	0	0
1228	0.47	0.26	1.09	1.24	0	0
1218	0.47	0.25	1.07	1.25	0	0
1118	0.45	0.30	1.06	1.15	0	0
1418	0.42	0.27	1.04	1.18	0	0
1518	0.42	0.24	1.02	1.05	0	0
1428	0.41	0.26	1.02	1.17	0	0
1528	0.41	0.23	1.00	1.06	0	0
1038	0.30	0.24	0.93	0.99	0	0
1028	0.27	0.23	0.88	1.05	0	0
1608	0.28	0.21	0.85	0.93	0	0
1618	0.26	0.20	0.82	0.97	0	0
1319	0.17	0.18	0.81	1.27	0	0
1329	0.18	0.18	0.80	1.24	0	0

All elements where the ratio RVY is greater than 0.80 are listed in Table 4.4

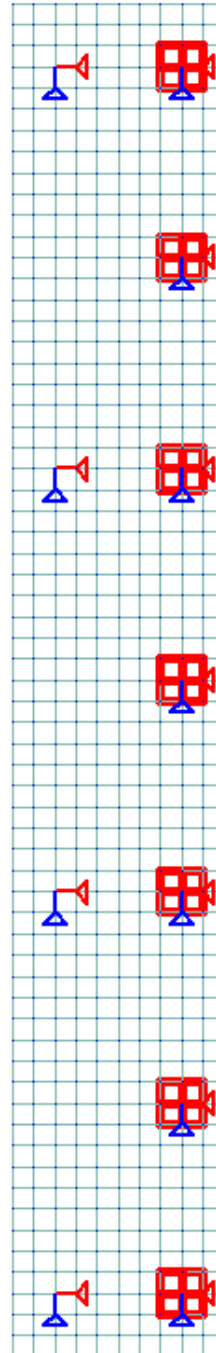
Table 4.4 - Foundation Shear Y						
PLATE	ASX	ASY	RVX	RVY	CX	CY
	IN2/FT	IN2/FT				
1319	0.17	0.18	0.81	1.27	0	0
1328	0.50	0.24	1.14	1.26	0	0
1318	0.51	0.24	1.16	1.25	0	0
1218	0.47	0.25	1.07	1.25	0	0
1229	0.15	0.19	0.79	1.25	0	0
1329	0.18	0.18	0.80	1.24	0	0
1228	0.47	0.26	1.09	1.24	0	0
1219	0.17	0.18	0.78	1.23	0	0
1419	0.15	0.22	0.78	1.21	0	0
1418	0.42	0.27	1.04	1.18	0	0
1129	0.15	0.20	0.77	1.18	0	0
1428	0.41	0.26	1.02	1.17	0	0
1118	0.45	0.30	1.06	1.15	0	0
1429	0.17	0.21	0.75	1.14	0	0
1128	0.46	0.25	1.09	1.14	0	0
1119	0.18	0.25	0.73	1.12	0	0
1519	0.14	0.20	0.71	1.09	0	0
1528	0.41	0.23	1.00	1.06	0	0
1518	0.42	0.24	1.02	1.05	0	0
1028	0.27	0.23	0.88	1.05	0	0
1039	0.12	0.22	0.70	1.03	0	0
1529	0.16	0.18	0.69	1.03	0	0
1029	0.16	0.24	0.68	1.01	0	0
1038	0.30	0.24	0.93	0.99	0	0
1618	0.26	0.20	0.82	0.97	0	0
1609	0.11	0.20	0.65	0.97	0	0
1619	0.15	0.19	0.64	0.94	0	0
1608	0.28	0.21	0.85	0.93	0	0

When the elements in Tables 4.3 and 4.4 are plotted on the Foundation, it is found that the all lay adjacent to Piles, and are located under the abutment wall, and thus are not critical for shear, and these values can be neglected.

Position where $RVX \geq 0.80$

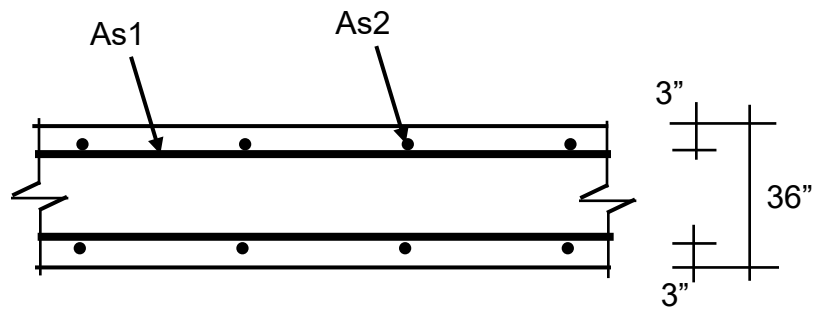


Position where $RVY \geq 0.80$



Foundation Detailing

DETAILING – FOUNDATION



STEEL	DETAIL	COMMENTS
As1	#8 @ 10" o/c	Both Faces
As2	#8 @ 10" o/c	Both Faces: dispose this reinforcement in a E-W Direction

Abutment Walls

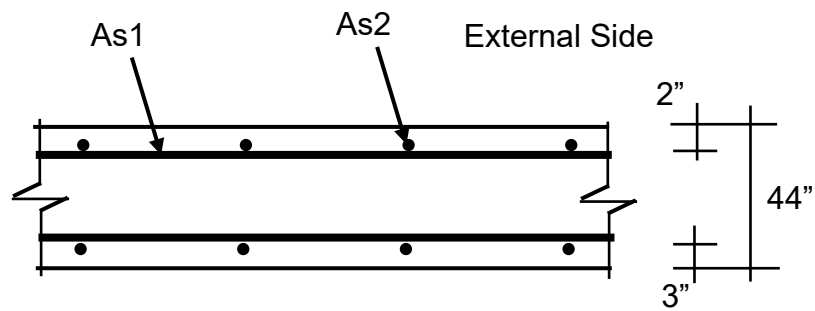
Main Wall

The Main (lower) Abutment Wall includes 372 Plate Elements, and it is analyzed for a total of 9 combinations for Design Strength. The values reported in Table 4.5, are a sample including elements where ASX or ASY are maximum; an envelope is reported. The Wall is 44" thick.

Table 4.5 – Foundation Flexure						
PLATE	ASX	ASY	RVX	RVY	CX	CY
	IN2/FT	IN2/FT				
2031	0.33	0.07	0.18	0.08	0	0
2030	0.32	0.05	0.08	0.06	0	0
2032	0.32	0.07	0.18	0.24	0	0
2033	0.31	0.06	0.07	0.18	0	0
2029	0.31	0.04	0.07	0.06	0	0
2022	0.31	0.05	0.17	0.05	0	0
2023	0.31	0.04	0.08	0.02	0	0
2021	0.30	0.05	0.16	0.18	0	0
2028	0.30	0.04	0.07	0.05	0	0
2020	0.30	0.04	0.08	0.14	0	0
2123	0.13	0.14	0.02	0.07	0	0
2064	0.14	0.13	0.02	0.07	0	0
2122	0.14	0.12	0.02	0.08	0	0
2185	0.12	0.11	0.03	0.04	0	0
2065	0.15	0.11	0.02	0.08	0	0
2126	0.12	0.11	0.03	0.04	0	0
2114	0.22	0.11	0.08	0.08	0	0
2113	0.23	0.10	0.08	0.07	0	0
2073	0.24	0.10	0.09	0.09	0	0
2184	0.14	0.09	0.01	0.04	0	0
Envelope for the Group						
	0.33	0.14	0.18	0.29	0	0

Lower Wall Detailing

DETAILING – LOWER WALL



STEEL	DETAIL	COMMENTS
As1	#6 @ 8" o/c	Both Faces, Horizontal Steel
As2	#8 @ 8" o/c	Both Faces: dispose this reinforcement in the Vertical Direction

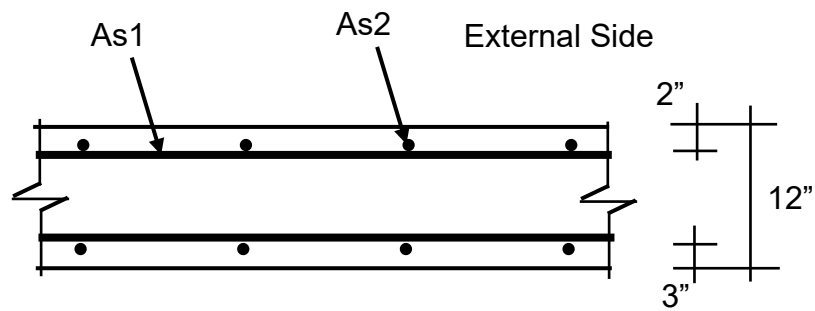
Upper Abutment Wall

The (Upper) Abutment Wall includes 124 Plate Elements, and it is analyzed for a total of 9 combinations for Design Strength. The values reported in Table 4.6, are a sample including elements where ASX or ASY are maximum; an envelope is reported. The Abutment Wall is 12" thick.

Table 4.6 – Foundation Flexure						
PLATE	ASX	ASY	RVX	RVY	CX	CY
	IN2/FT	IN2/FT				
2502	0.03	0.01	0.18	0.05	0	0
2561	0.03	0.01	0.18	0.05	0	0
2503	0.02	0.01	0.06	0.03	0	0
2560	0.02	0.01	0.06	0.03	0	0
2501	0.01	0.11	0.27	0.37	0	0
2562	0.01	0.11	0.27	0.37	0	0
2559	0.01	0.01	0.01	0.04	0	0
2504	0.01	0.01	0.01	0.04	0	0
2563	0.01	0.09	0.05	0.32	0	0
2624	0.01	0.09	0.05	0.31	0	0
2562	0.01	0.11	0.27	0.37	0	0
2501	0.01	0.11	0.27	0.37	0	0
2563	0.01	0.09	0.05	0.32	0	0
2624	0.01	0.09	0.05	0.31	0	0
2623	0.00	0.03	0.04	0.20	0	0
2564	0.00	0.03	0.04	0.20	0	0
2622	0.00	0.02	0.03	0.12	0	0
2565	0.00	0.02	0.03	0.12	0	0
2621	0.00	0.02	0.01	0.07	0	0
2566	0.00	0.01	0.01	0.07	0	0
Envelope for the Group						
	0.03	0.11	0.27	0.37	0	0

Abutment Wall Detailing

DETAILING – ABUTMENT (UPPER) WALL



STEEL	DETAIL	COMMENTS
As1	#6 @ 8" o/c	Both Faces, Horizontal Steel
As2	#6 @ 8" o/c	Both Faces: dispose this reinforcement in the Vertical Direction

Wing Walls

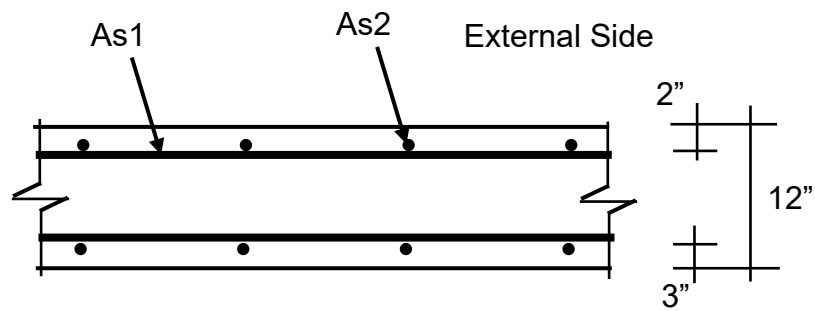
Wing Walls Flexure

The Wing Walls (East and West) include 160 Plate Elements, and it is analyzed for a total of 9 combinations for Design Strength. The values reported in Table 4.7, are a sample including elements where ASX or ASY are maximum; an envelope is reported. The Abutment Wall is 12" thick.

Table 4.6 – Foundation Flexure						
PLATE	ASX	ASY	RVX	RVY	CX	CY
	IN2/FT	IN2/FT				
3077	0.22	0.02	0.13	0.07	0	0
3577	0.22	0.02	0.13	0.07	0	0
3067	0.22	0.04	0.28	0.04	0	0
3567	0.21	0.04	0.28	0.04	0	0
3057	0.16	0.03	0.19	0.24	0	0
3557	0.16	0.03	0.19	0.24	0	0
3076	0.15	0.01	0.15	0.00	0	0
3576	0.15	0.01	0.15	0.00	0	0
3066	0.13	0.02	0.14	0.04	0	0
3566	0.13	0.02	0.15	0.04	0	0
3001	0.03	0.25	0.03	0.31	0	0
3501	0.03	0.25	0.02	0.31	0	0
3002	0.03	0.19	0.03	0.26	0	0
3502	0.03	0.19	0.03	0.26	0	0
3011	0.00	0.14	0.00	0.24	0	0
3003	0.02	0.14	0.04	0.21	0	0
3511	0.00	0.14	0.00	0.24	0	0
3503	0.02	0.14	0.04	0.21	0	0
3012	0.02	0.11	0.02	0.15	0	0
3512	0.02	0.11	0.02	0.15	0	0
Envelope for the Group						
	0.22	0.25	0.28	0.31	0	0

Wing Walls Detailing

DETAILING – ABUTMENT (UPPER) WALL



STEEL	DETAIL	COMMENTS
As1	#6 @ 8" o/c	Both Faces, Horizontal Steel
As2	#6 @ 8" o/c	Both Faces: dispose this reinforcement in the Vertical Direction

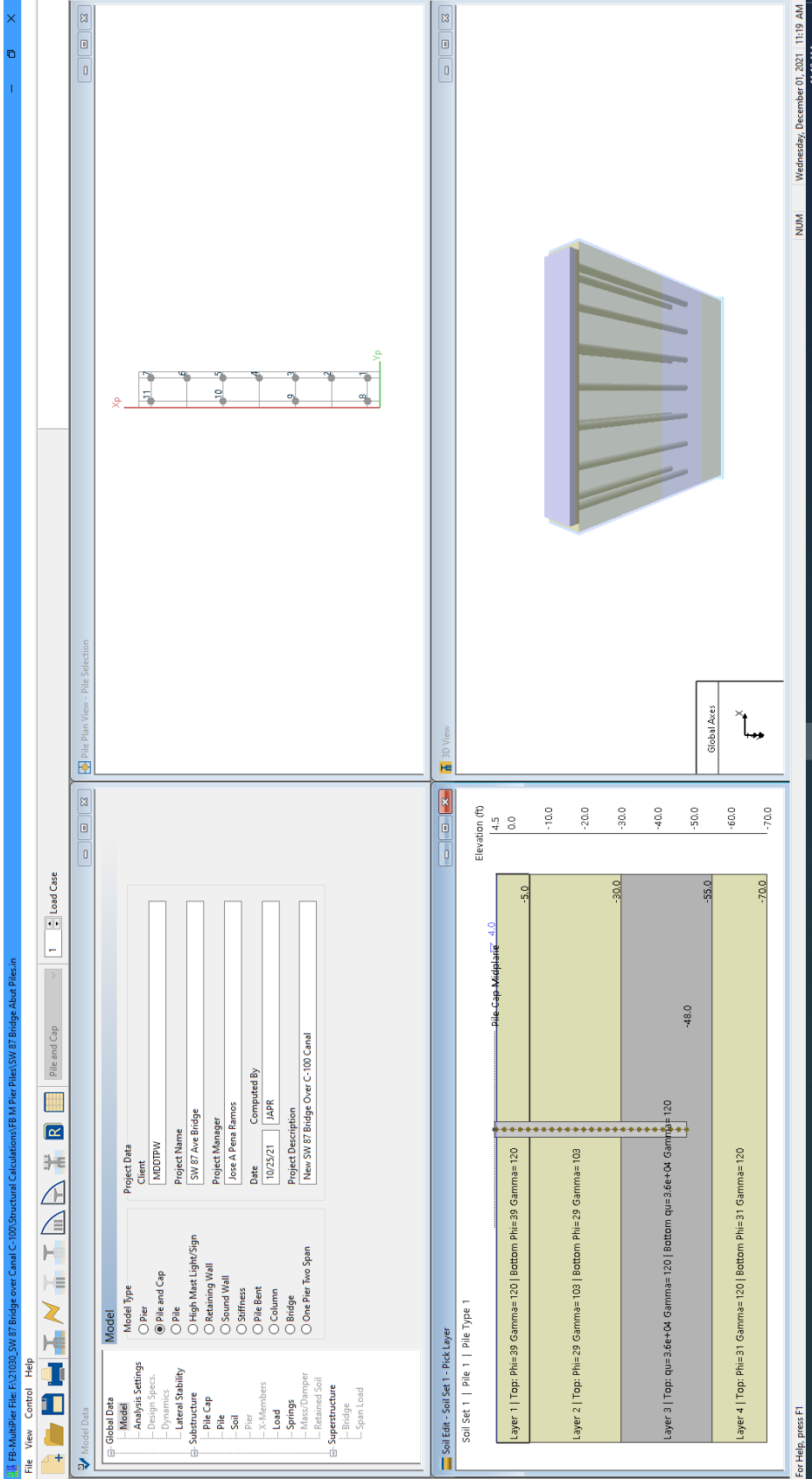
4. SUBSTRUTURE DESIGN

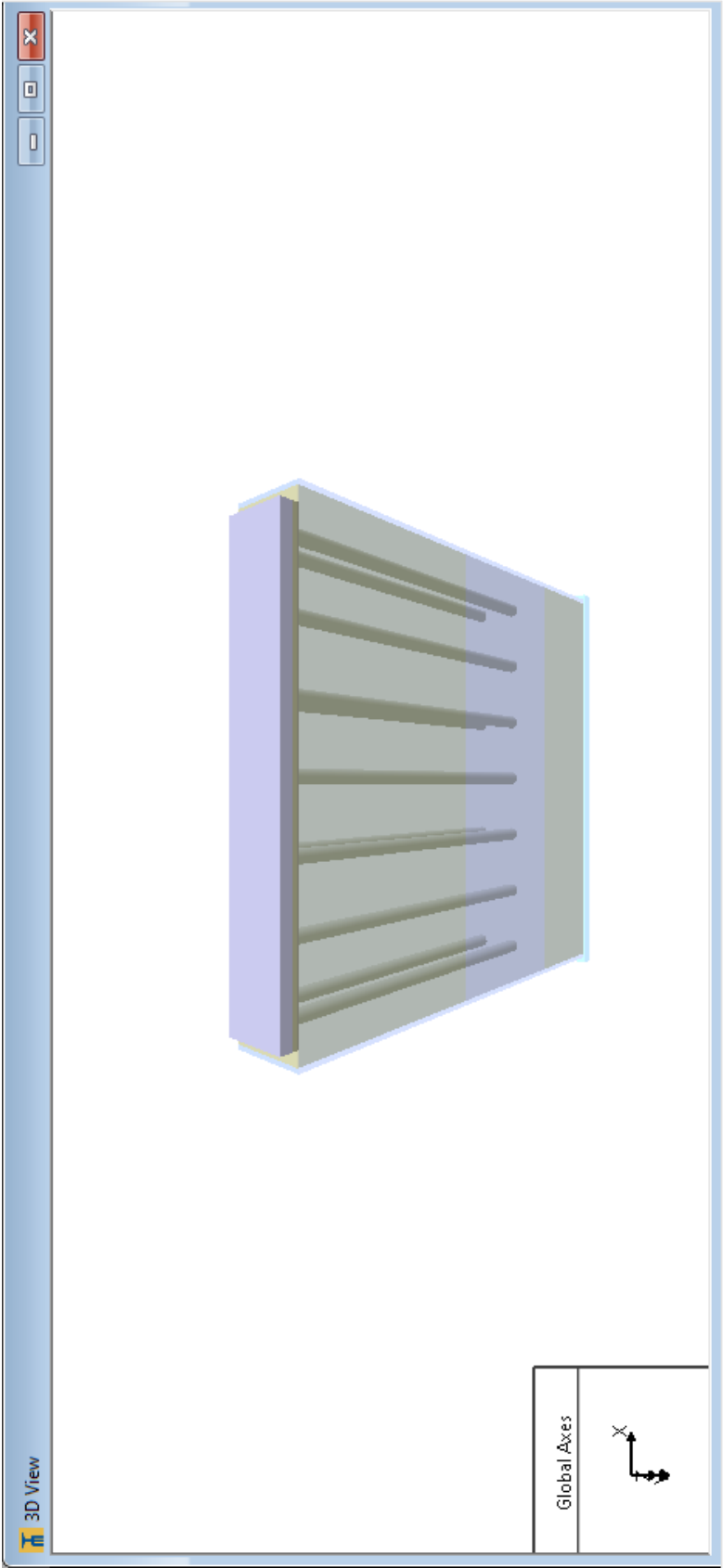
4.1. FOUNDATION MODEL – FB-PIER

4.2. LOADS INPUT

4.3. PILES LOAD REACTIONS

4.4. LATERAL STABILITY ANALYSIS & MIN TIPS ELEVATION





SOIL/ROCK PARAMETERS FOR LATERAL ANALYSIS OF AUGERCAST PILE WITH FB-MULTIPLIER

SW 87TH AVENUE BRIDGE OVER C-100 CANAL

MIAMI-DADE COUNTY DEPARTMENT OF TRANSPORTATION AND PUBLIC WORKS

MIAMI-DADE COUNTY, FLORIDA

HR ENGINEERING SERVICES. INC.

HRES PROJECT No. HR21-1691R

OCTOBER 29, 2021

Bent	Foundation Type	Borings	Layer No.	Top of Layer Elev. (ft.)	Bottom of Layer Elev. (ft.)	Soil Description	Soil Type	Average SPT N (blows/ft)	Lateral					Axial		Torsional					Tip		
									Soil Model	Internal Friction Angle (Deg.)	Total Unit Weight (lb/ft ³)	Lateral Soil Modulus, (lb/in ³)	Unconfined Compressive Strength, q _u (psf)	Soil Model	Total Unit Weight (lb/ft3)	Ult. Unit Skin Friction (psf)	Soil Model	Internal Friction Angle (Deg.)	Total Unit Weight (lb/ft3)	Shear Modulus (k/in ²)	Torsional Shear Stress (lb/ft ²)	Soil Model	Undrained Shear Strength (lb/ft ²)
End Bents 1 and 2	Augercast Pile	B-1 and B-2	1	4.0	-5.0	Limestone	Cohesionless	22	Sand Reese	39	120	56	-	Drilled Shaft Sand	120	270	Hyperbolic	39	120	1.8	270	Drilled Shaft Clay	0
			2	-5.0	-30.0	Soft Limestone Sand	Cohesionless	6	Sand Reese	29	103	12	-	Drilled Shaft Sand	103	370	Hyperbolic	29	103	0.5	370	Drilled Shaft Clay	0
			3	-30.0	-55.0	Limestone	Cohesionless	40	Limestone (McVay)	-	120	-	35776	DS Limestone (McVay)	120	8000	Hyperbolic	-	120	11.9	8000	Drilled Shaft Clay	0
			4	-55.0	-70.0	Limestone	Cohesionless	10	Sand Reese	31	120	20	-	Drilled Shaft Sand	120	900	Hyperbolic	31	120	0.8	900	Drilled Shaft Clay	0

Notes:

ϕ = 28*N(safety)/4 for sand and soft limestone.

γ = 105* ϕ /30 for sand and 120 pcf for limestone.

Axial unit skin friction and Torsional shear stress estimated using β -Method for drilled shafts in sand and soft limestone and fs=0.1 N (tsf) in limestone,

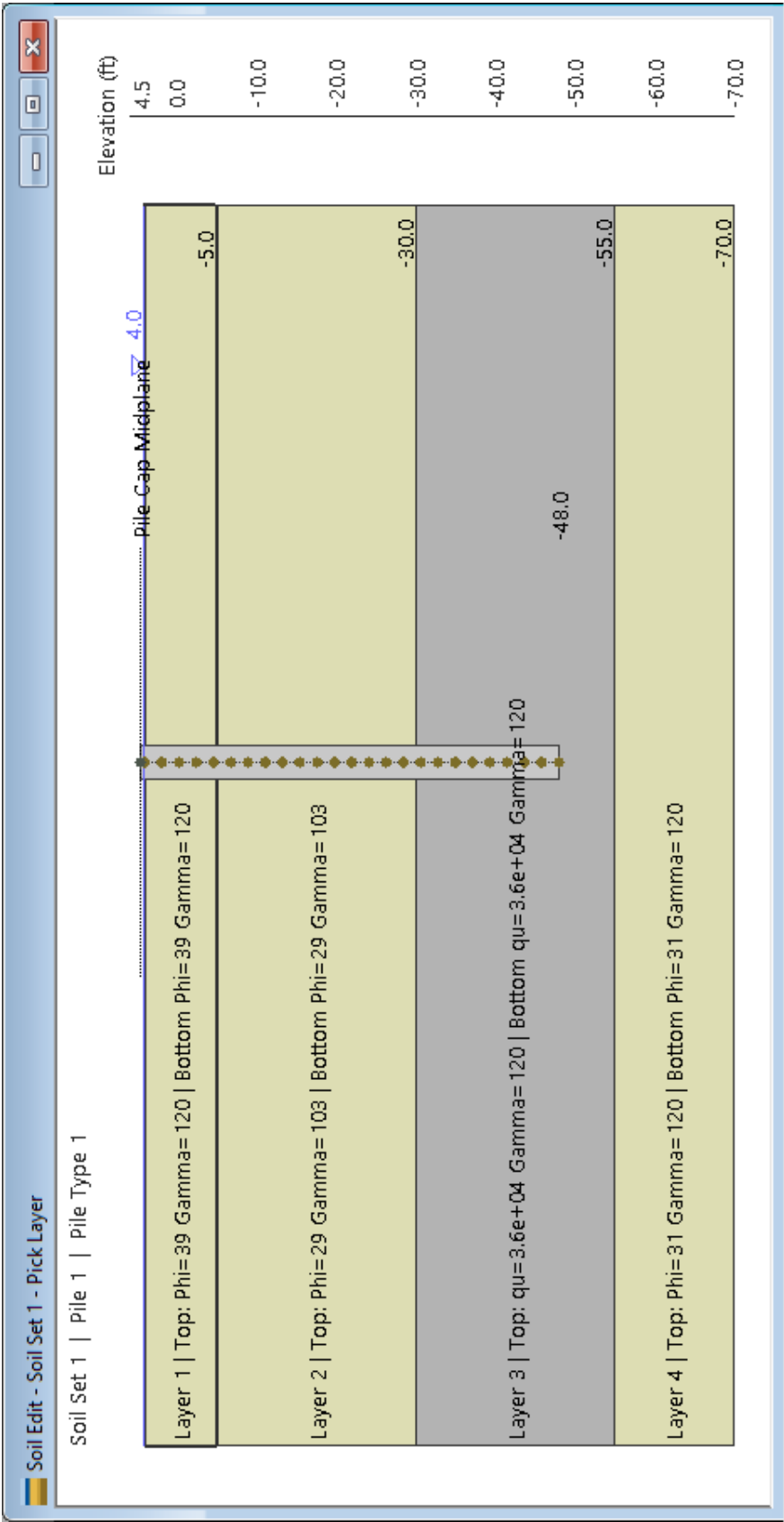
Lateral soil modulus (k) was estimated using FDOT Soils and Foundation Handbook -sand and soft limestone

Shear Modulus $G = E/2(1+\nu)$

$E(ksf) = 30*N$ for sand and soft limestone and , $E = 115qu$ for limestone $\nu = 0.3$ for sand and soft limestone, 0.2 for limestone.

qu for limestone estimated by equating the side friction obtained by 0.1 N (tsf) and McVay's equation $(0.5 (qu.q\tau)^{.5})$. It is assumed that $q\tau=20\%$ of qu.

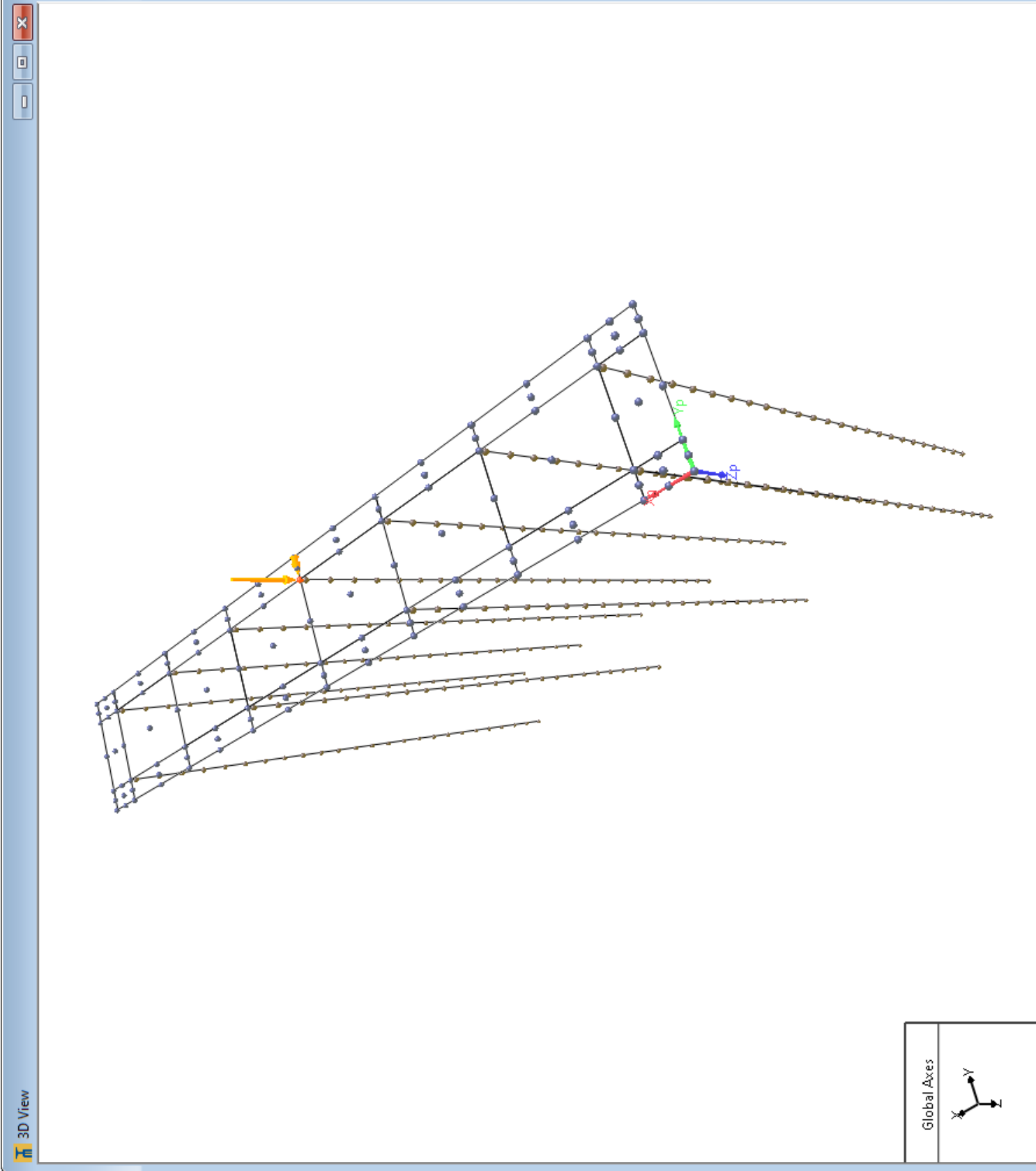
Clay with Cu value of 0 has been provided for tip modeling (no tip contribution on DS/MP axial capacity). A Cu value, as required for analysis convergence, may be used for lateral stability analysis purposes.



LOADS ON PILE CAP FOUNDATION AT SUPPORT LOCATION FROM STAAD MODEL

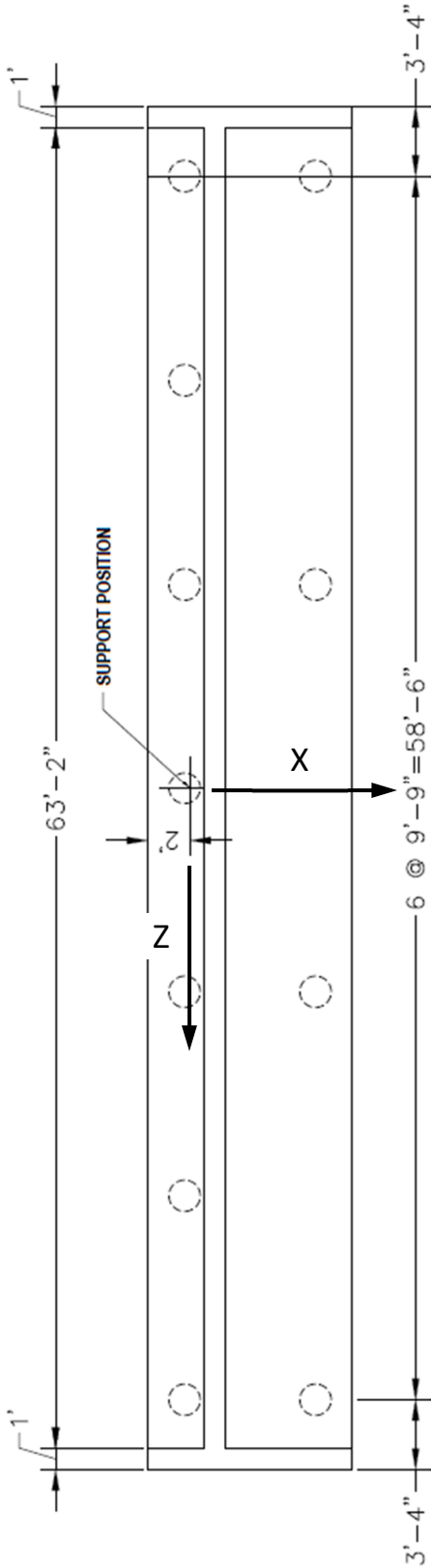
Node	L/C	Horizontal Fx lb (Yp)	Vertical Fy lb (Zp)	Horizontal Fz lb (Xp)	Moment Mx kip-in	My kip-in	Mz kip-in (Mxp)
1362	1 DC	0	1,956,440	0	0	0	-17,713
	2 EH	-162,688	0	0	0	0	5,206
	3 EV	0	591,360	0	0	0	-28,385
	4 ES	-33,232	60,800	0	0	0	-1,323
	5 BR	-23,400	0	0	0	1,825	1,685
	6 CT	0	0	27,000	1,944	0	0
	7 LL1	0	81,648	0	5,879	0	0
	8 LL2	0	163,696	0	11,786	0	0
	9 LL3	0	81,648	0	20,575	0	0
	10 PL	0	49,740	0	0	0	0
	11 WSR	0	-5,270	10,540	-221	0	0
	12 WL	0	0	3,318	561	0	0
	13 WS	0	-16,126	32,252	-677	0	0

LC	Xp kip	Yp kip	Zp kip	Mxp kip-ft	Myp kip-ft	Mzp kip-ft
1 DC	0.000	0.000	1,956.440	-1.476	0.000	0.000
2 EH	0.000	-162.688	0.000	0.434	0.000	0.000
3 EV	0.000	0.000	591.360	-2.365	0.000	0.000
4 ES	0.000	-33.232	60.800	-0.110	0.000	0.000
5 BR	0.000	-23.400	0.000	0.140	0.000	0.152
6 CT	27.000	0.000	0.000	0.000	0.162	0.000
7 LL1	0.000	0.000	81.648	0.000	0.490	0.000
8 LL2	0.000	0.000	163.696	0.000	0.982	0.000
9 LL3	0.000	0.000	81.648	0.000	1.715	0.000
10 PL	0.000	0.000	49.740	0.000	0.000	0.000
11 WSR	10.540	0.000	-5.270	0.000	-0.018	0.000
12 WL	3.318	0.000	0.000	0.000	0.047	0.000
13 WS	32.252	0.000	-16.126	0.000	-0.056	0.000



PILE CAP SUPPORT LOCATION – PILES ANALYSIS (FB-M Pier)

Y is the Vector (cross)
Product: $Z \times X$
and is positive vertical
upwards



PILE CAP BASE REACTIONS AT SUPPORT

Load Case	Horizontal	Vertical	Horizontal	Moment		
	Fx lb	Fy lb	Fz lb	Mx kip-in	My kip-in	Mz kip-in
1 DC	0	1,956,440	0	0	0	-17,713
2 EH	-162,688	0	0	0	0	5,206
3 EV	0	591,360	0	0	0	-28,385
4 ES	-33,232	60,800	0	0	0	-1,323
5 BR	-23,400	0	0	0	1,825	1,685
6 CT	0	0	27,000	1,944	0	0
7 LL1	0	81,648	0	5,879	0	0
8 LL2	0	163,696	0	11,786	0	0
9 LL3	0	81,648	0	20,575	0	0
10 PL	0	49,740	0	0	0	0
11 WSR	0	-5,270	10,540	-221	0	0
12 WL	0	0	3,318	561	0	0
13 WS	0	-16,126	32,252	-677	0	0



XML Report

XML File: SW 87 Bridge Abut Piles.XML

Project Information

Version	5.7.0
Client	MDDTPW
Project Name	SW 87 Ave Bridge
Project Manager	Jose A Pena Ramos
Description	New SW 87 Bridge Over C-100 Canal
Computed By	JAPR
Project Date	10/25/21

Load Case Data - Substructure 1

Load Factors

Load Case	Self Weight Factor	Buoyancy Factor
1	1.00	1.00
2	1.00	1.00
3	1.00	1.00
4	1.00	1.00
5	1.00	1.00
6	1.00	1.00
7	1.00	1.00
8	1.00	1.00
9	1.00	1.00
10	1.00	1.00
11	1.00	1.00
12	1.00	1.00
13	1.00	1.00
14	1.00	1.00
15	1.00	1.00
16	1.00	1.00
17	1.00	1.00

Load Values

Load Case	AASHTO Load Type	Node	Fx (kip)	Fy (kip)	Fz (kip)	Mx (kip-ft)	My (kip-ft)	Mz (kip-ft)
1	NA	4	0.00000	0.00000	1956.44	0.00000	-1.48	0.00000
2	NA	4	0.00000	-162.69	0.00000	0.43	0.00000	0.00000
3	NA	4	0.00000	0.00000	591.36	-2.36	0.00000	0.00000
4	NA	4	0.00000	0.00000	-33.23	60.80	-0.11	0.00000
5	NA	4	0.00000	-23.40	0.00000	0.14	0.00000	0.15
6	NA	4	27.00	0.00000	0.00000	0.00000	0.16	0.00000
7	NA	4	0.00000	0.00000	81.65	0.00000	0.49	0.00000
8	NA	4	0.00000	0.00000	163.70	0.00000	0.98	0.00000
9	NA	4	0.00000	0.00000	81.65	0.00000	1.72	0.00000
10	NA	4	0.00000	0.00000	49.74	0.00000	0.00000	0.00000
11	NA	4	10.54	0.00000	-5.27	0.00000	-0.02	0.00000
12	NA	4	3.32	0.00000	0.00000	0.00000	0.05	0.00000
13	NA	4	32.25	0.00000	-16.13	0.00000	-0.06	0.00000
14	NA	4	0.00000	-162.69	2547.80	-5.47	0.00000	0.00000
15	NA	4	13.86	-186.09	2640.69	57.02	4.90	0.00000
16	NA	4	13.86	-186.09	2672.99	57.02	10.80	0.00000
17	NA	4	32.25	-162.69	2531.67	-5.47	-0.68	0.00000



XML Report

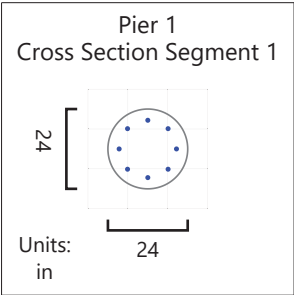
XML File: SW 87 Bridge Abut Piles.XML

Project Information

Version	5.7.0
Client	MDDTPW
Project Name	SW 87 Ave Bridge
Project Manager	Jose A Pena Ramos
Description	New SW 87 Bridge Over C-100 Canal
Computed By	JAPR
Project Date	10/25/21

Pile Geometry - Substructure 1

Segment Number 1



Dimensions

Width	24.00	(in)
Depth	24.00	(in)
Web thickness	0.00000	(in)
Flange thickness	0.00000	(in)
Orientation	0	
Void type	None	
Section void diameter	0.00000	(in)
Section void width	0.00000	(in)
Section void depth	0.00000	(in)
Embedded h-pile width	0.00000	(in)
Embedded h-pile depth	0.00000	(in)
Embedded h-pile web thickness	0.00000	(in)
Embedded h-pile flange thickness	0.00000	(in)
Embedded h-pile orientation	0	
Shell thickness	0.00000	(in)
Shear steel	spiral	
Length	630.00	(in)

Material Properties

Concrete compressive strength	6.00	(ksi)
Concrete elastic modulus	4415.00	(ksi)
Mild steel yield length	60.00	(ksi)
Mild steel elastic modulus	29000.00	(ksi)
Prestressing steel yield length	0.00000	(ksi)
Prestressing steel elastic modulus	0.00000	(ksi)
H-pile steel yield strength	0.00000	(ksi)
H-pile steel elastic modulus	0.00000	(ksi)

Steel casing yield strength	0.00000	(ksi)
Steel casing elastic modulus	0.00000	(ksi)

Gross Section Properties

Area	452.39	(in ²)
Elastic modulus	4415.00	(ksi)
Inertia 2	16286.02	(in ⁴)
Inertia 3	16286.02	(in ⁴)
Shear modulus	1839.58	(ksi)
Torsional inertia	32572.03	(in ⁴)
Unit weight	0.86806E-04	(k/in ³)

Steel Groups

Bar Group #1	
Bars	8
Layer diameter	17.25 (in)
Starting local "2" coordinate	0.00000 (in)
Starting local "3" coordinate	0.00000 (in)
Bar area	0.33 (in ²)
Prestress	0.00000 (ksi)
Orientation	0

Stress-Strain Curves

Concrete

Point	Stress (ksi)	Strain
1	0.00000	-0.60000E-02
2	0.00000	-0.50000E-02
3	-3.83	-0.40000E-02
4	-5.70	-0.25200E-02
5	-5.93	-0.22400E-02
6	-6.00	-0.19600E-02
7	-5.85	-0.16800E-02
8	-5.42	-0.14000E-02
9	-4.71	-0.11200E-02
10	-3.74	-0.84000E-03
11	-1.30	-0.28000E-03
12	0.00000	0.00000
13	0.61	0.13158E-03
14	0.00000	0.13816E-03
15	0.00000	0.01

Mild steel

Point	Stress (ksi)	Strain
1	0.00000	0.00000
2	60.00	0.20690E-02
3	60.00	0.01
4	68.13	0.02
5	73.72	0.02
6	77.75	0.03
7	80.74	0.04
8	83.01	0.04
9	84.75	0.05
10	86.11	0.06
11	87.16	0.07
12	88.62	0.08
13	89.46	0.09
14	89.88	0.11



XML Report

XML File: SW 87 Bridge Abut Piles.XML

Project Information

Version 5.7.0
Client MDDTPW
Project Name SW 87 Ave Bridge
Project Manager Jose A Pena Ramos
Description New SW 87 Bridge Over C-100 Canal
Computed By JAPR
Project Date 10/25/21

Output Summary - Substructure 1

Max/Min Pile Strains	Value	Load Case	Combination	Type	Segment	Pile
max strain in concrete	0.17891E-02 (in/in)	17	0	1	1	11
corresponding stress	0.00000 (ksi)	17	0	1	1	11
min strain in concrete	-0.57768E-03 (in/in)	16	0	1	1	4
corresponding stress	-2.44 (ksi)	16	0	1	1	4
max strain in steel (mild)	0.18864E-02 (in/in)	17	0	1	1	11
corresponding stress	54.70 (ksi)	17	0	1	1	11
min strain in steel (mild)	-0.60551E-03 (in/in)	16	0	1	1	4
corresponding stress	-17.56 (ksi)	16	0	1	1	4

Max/Min Pile Internal Forces	Value	Load Case	Combination	Pile
max shear in 2 direction	4.15 (kip)	17	0	2
min shear in 2 direction	-1.74 (kip)	17	0	3
max shear in 3 direction	23.28 (kip)	16	0	10
min shear in 3 direction	-10.32 (kip)	16	0	4
max moment about 2 axis	118.93 (kip-ft)	16	0	10
min moment about 2 axis	-7.21 (kip-ft)	15	0	5
max moment about 3 axis	1.27 (kip-ft)	17	0	3
min moment about 3 axis	-20.72 (kip-ft)	17	0	2
max axial force	125.21 (kip)	1	0	11
min axial force	-926.99 (kip)	16	0	4
max torsional force	0.00000 (kip-ft)	1	0	1
max demand/capacity ratio	0.88	1	0	11

Max/Min Soil Reaction Forces	Value	Load Case	Combination	Pile
max axial soil force	94.57 (kip)	16	0	4
min axial soil force	-22.36 (kip)	1	0	11
max lateral in X direction	1.78 (kip)	17	0	2
min lateral in X direction	-0.30 (kip)	17	0	3
max lateral in Y direction	1.81 (kip)	16	0	4
min lateral in Y direction	-10.00 (kip)	16	0	10
max torsional soil force	0.00000 (kip-ft)	1	0	1

Max/Min Pile Head Displacements	Value	Load Case	Combination	Pile
max displacement in axial	0.43 (in)	16	0	4
min displacement in axial	-0.18 (in)	16	0	11
max displacement in x	0.05 (in)	17	0	1

min displacement in x	-0.33638E-02 (in)	17	0	4
max displacement in y	0.02 (in)	16	0	4
min displacement in y	-0.29 (in)	16	0	4



Design Tables

Results generated by
FB-Multiplier Version 5.7.0
on Wednesday, December 1, 2021

Maximum Axial Forces at All Pile Heads
(USE TO COMPARE TO PILE DRIVE CAPACITY)
MAXIMUM COMPRESSION AND MAXIMUM TENSION FORCES

SUBSTRUCTURE	PILE	LOAD CASE	MAX TENSION (kips)	D/C (ratio)	LOAD CASE	MAX COMP (kips)	D/C (ratio)
1	1	16	31.20	0.22	1	-41.73	0.02
1	2	***	none	***	16	-238.30	0.13
1	3	***	none	***	16	-732.36	0.40
1	4	***	none	***	16	-926.90	0.51
1	5	***	none	***	16	-732.07	0.40
1	6	***	none	***	16	-237.34	0.13
1	7	16	30.53	0.21	1	-41.73	0.02
1	8	1	125.17	0.88	13	-26.04	0.01
1	9	***	none	***	1	-186.72	0.10
1	10	***	none	***	1	-186.77	0.10
1	11	1	125.18	0.88	13	-26.04	0.01

Maximum Demand/Capacity Ratio For All Pile Properties (Cross Sections)

Pile Properties Data for Substructure 1

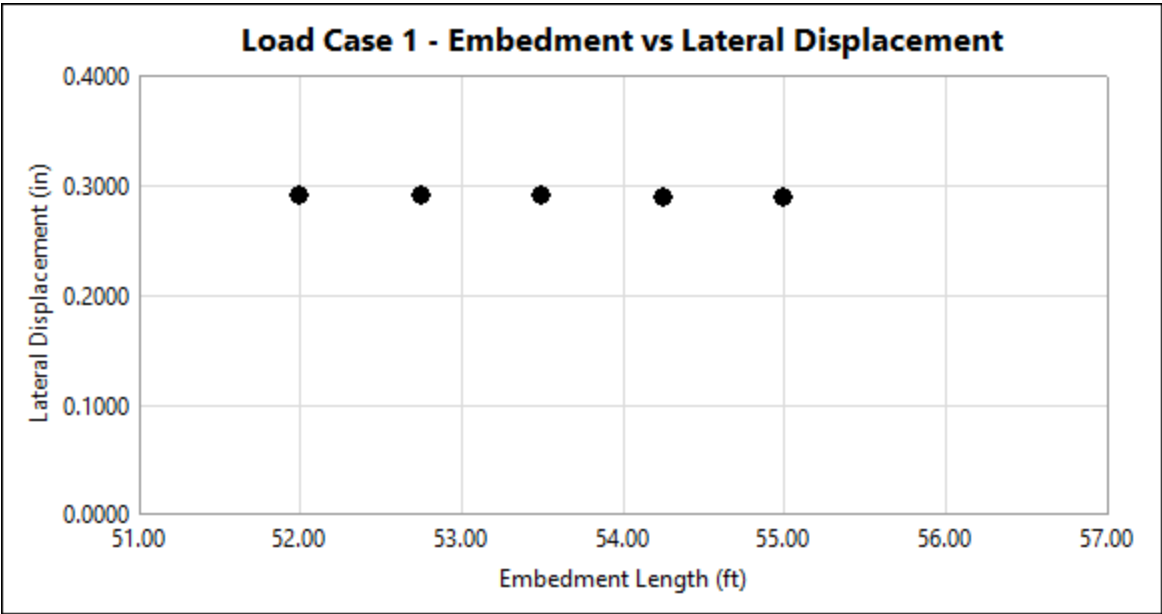
PROP NO.	PILE NO.	ELEM NO.	NODE NO.	LOAD CASE	I/J	FAX (Kips)	F22 (Kips)	F33 (Kips)	M22 (Kip-ft)	M33 (Kip-ft)	TORQUE (Kip-ft)	D/C (Ratio)
1	11	251	370	1	I	125.18	0.00	0.00	0.00	-0.00	0.00	0.88

Maximum Forces for All Pile Properties (Cross Sections)

Pile Properties Data for Substructure 1

PROP NO.	PILE NO.	ELEM NO.	NODE NO.	LOAD CASE	I/J	MAX/MIN FORCE	FAX (Kips)	F22 (Kips)	F33 (Kips)	M22 (Kip-ft)	M33 (Kip-ft)	TORQUE (Kip-ft)	D/C (Ratio)
1	11	252	370	1	J	Max Axial	125.21	0.00	0.00	0.00	-0.00	-0.00	0.88
1	4	77	196	16	I	Min Axial	-926.99	1.48	20.98	62.92	-4.44	0.00	0.51
1	2	26	2	17	J	Max f22	-216.06	4.15	18.38	0.00	-0.00	-0.00	0.12
1	3	57	175	17	J	Min f22	-658.93	-1.74	-8.15	74.72	-15.93	-0.00	0.38
1	10	226	10	16	J	Max f33	-158.61	1.69	23.28	0.00	-0.00	-0.00	0.09
1	4	82	200	16	J	Min f33	-901.85	-0.73	-10.32	92.69	-6.54	-0.00	0.51
1	10	229	348	16	I	Max m22	-157.28	0.54	7.50	118.93	-8.61	0.00	0.29
1	5	116	234	15	J	Min m22	-604.88	0.01	0.17	-7.21	0.48	-0.00	0.33
1	3	65	184	17	I	Max m33	-580.43	-0.04	-0.20	-5.94	1.27	0.00	0.32
1	2	29	148	17	I	Min m33	-214.04	1.19	5.26	91.72	-20.72	0.00	0.22
1	1	1	1	1	J	Max Torque	-41.73	0.00	0.00	0.00	-0.00	-0.00	0.02
1	1	1	1	1	J	Min Torque	-41.73	0.00	0.00	0.00	-0.00	-0.00	0.02

Minimum Pile Tip Embedment Analysis Results

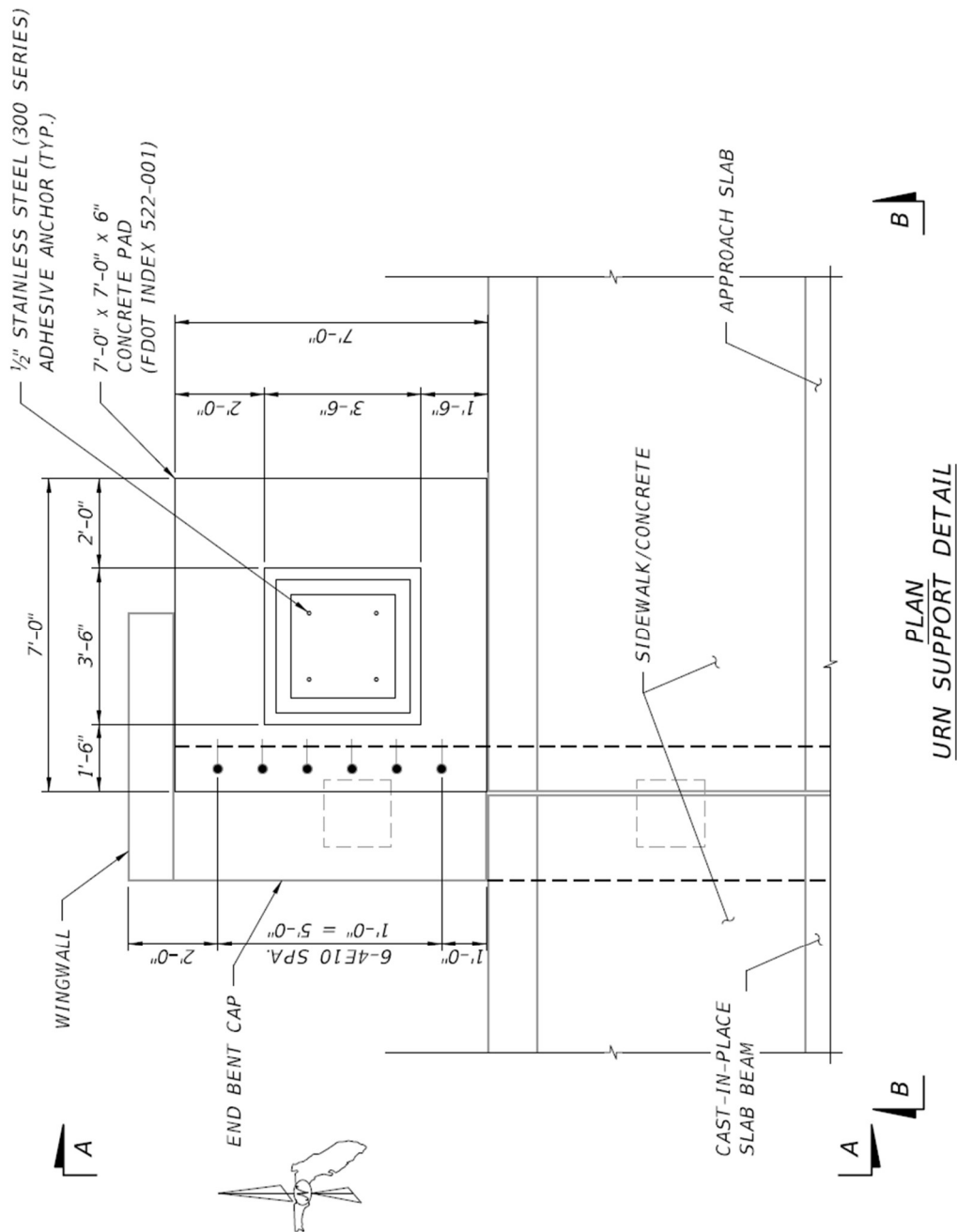


Trial	Load Case	Pile	Embedment (ft)	Displacement (in)
1	16	4	52.00	0.291870
2	16	4	52.75	0.291380
3	16	4	53.50	0.290660
4	16	4	54.25	0.290150
5	16	4	55.00	0.289040

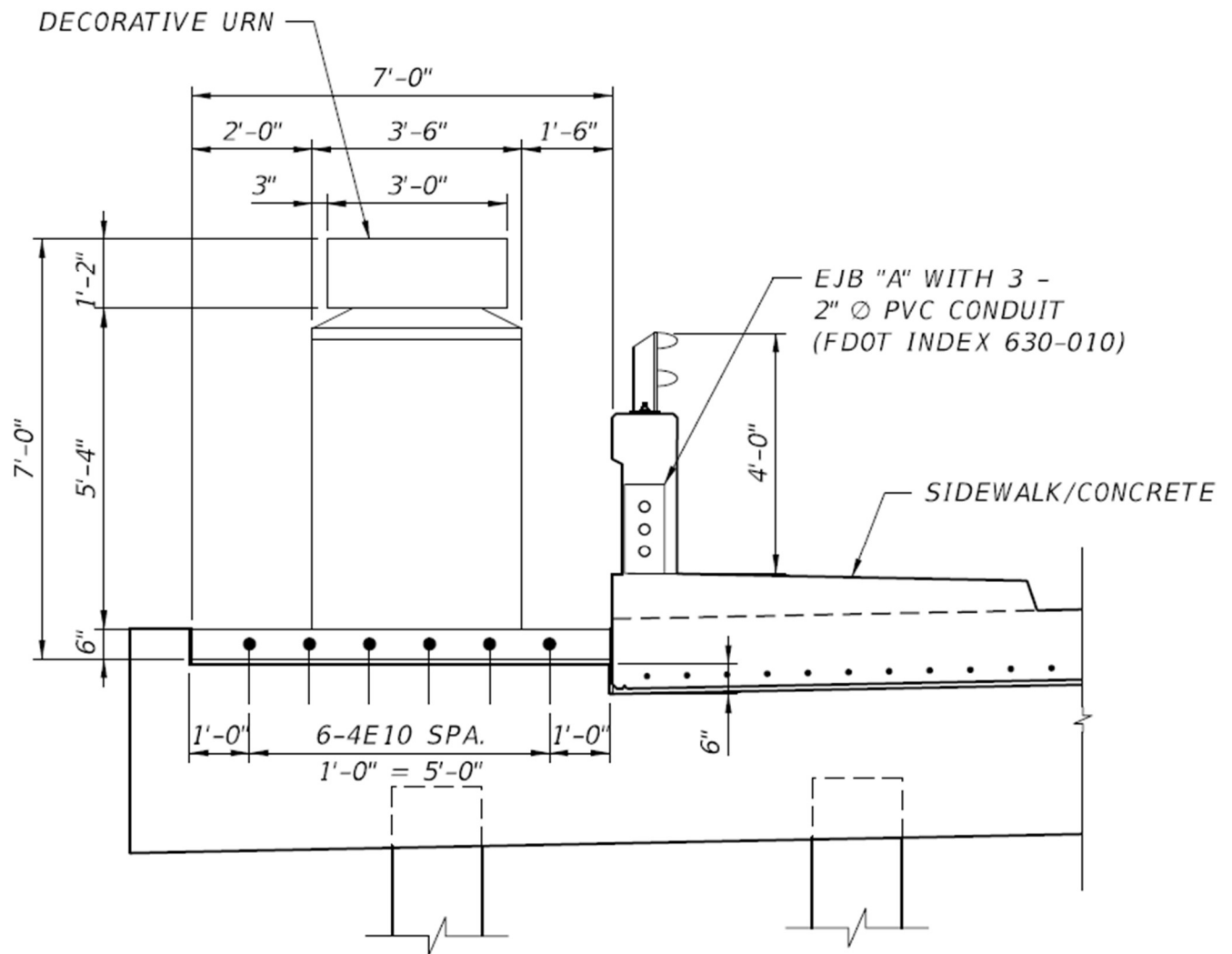
5 – URN SUPPORTS DESIGN

5.1 – General Layout

PLAN

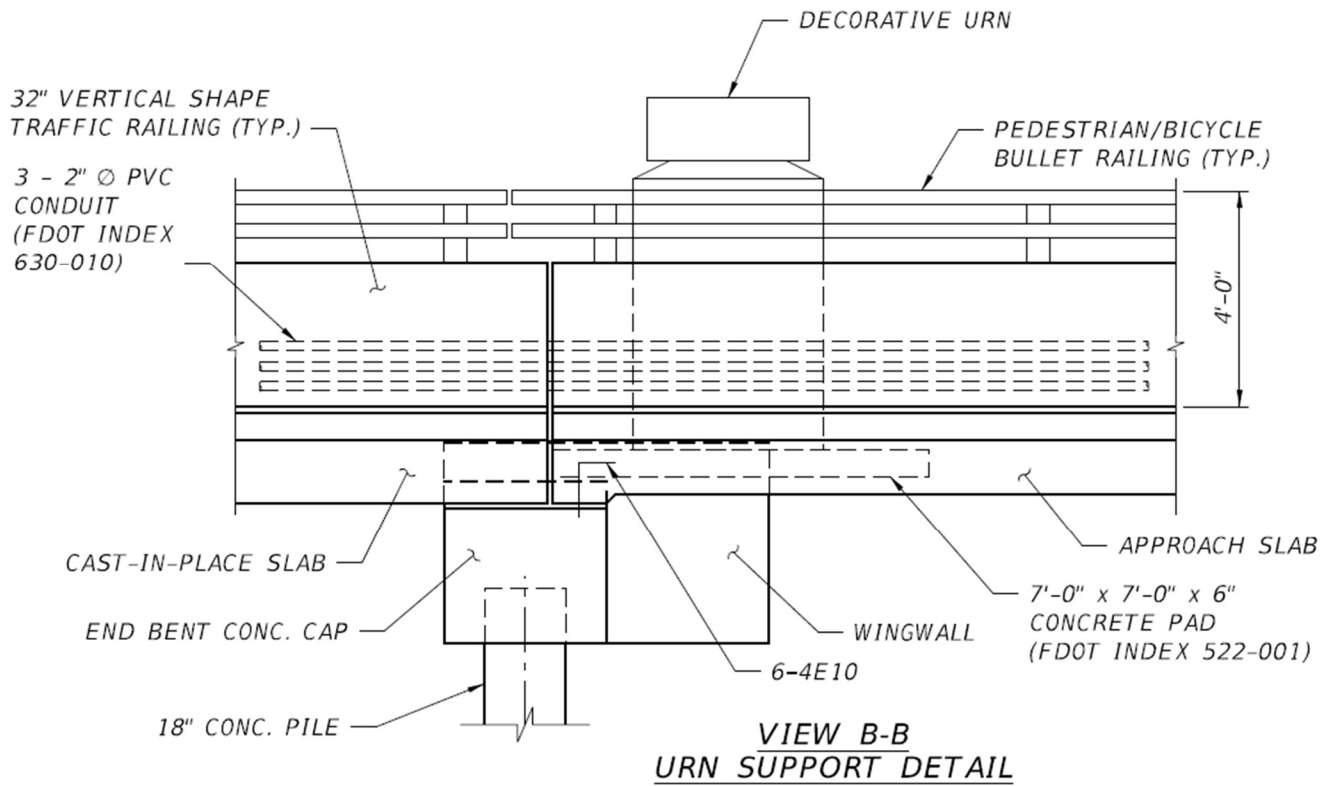


VIEW A-A



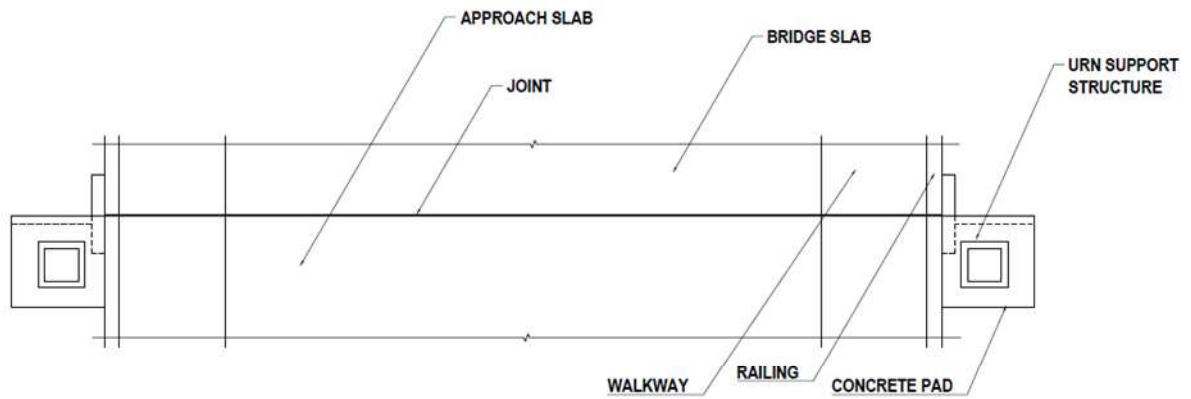
VIEW A-A
URN SUPPORT DETAIL

VIEW B-B

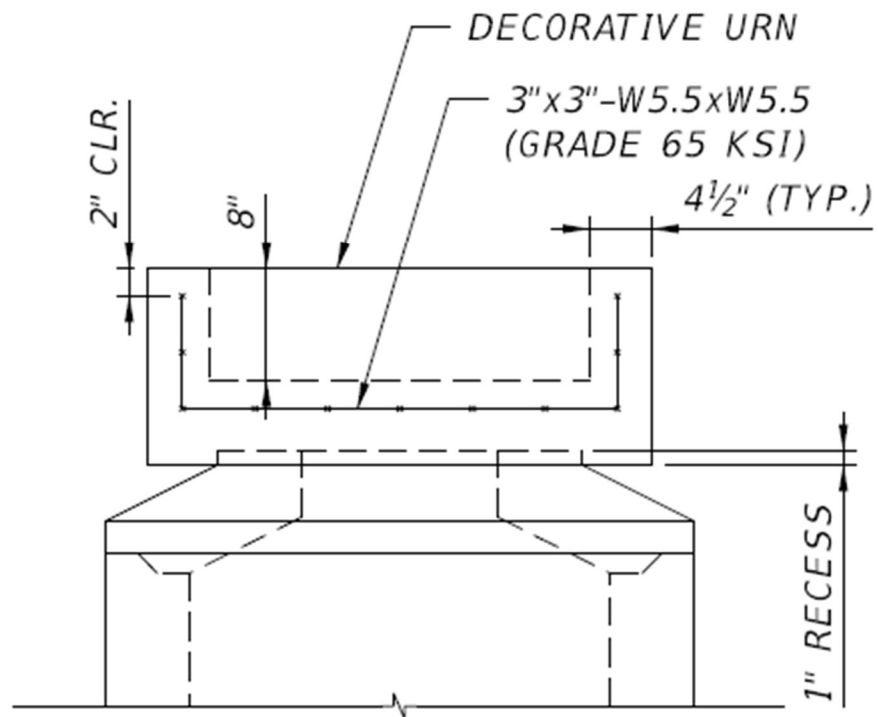


5.2 – Decorative Urn

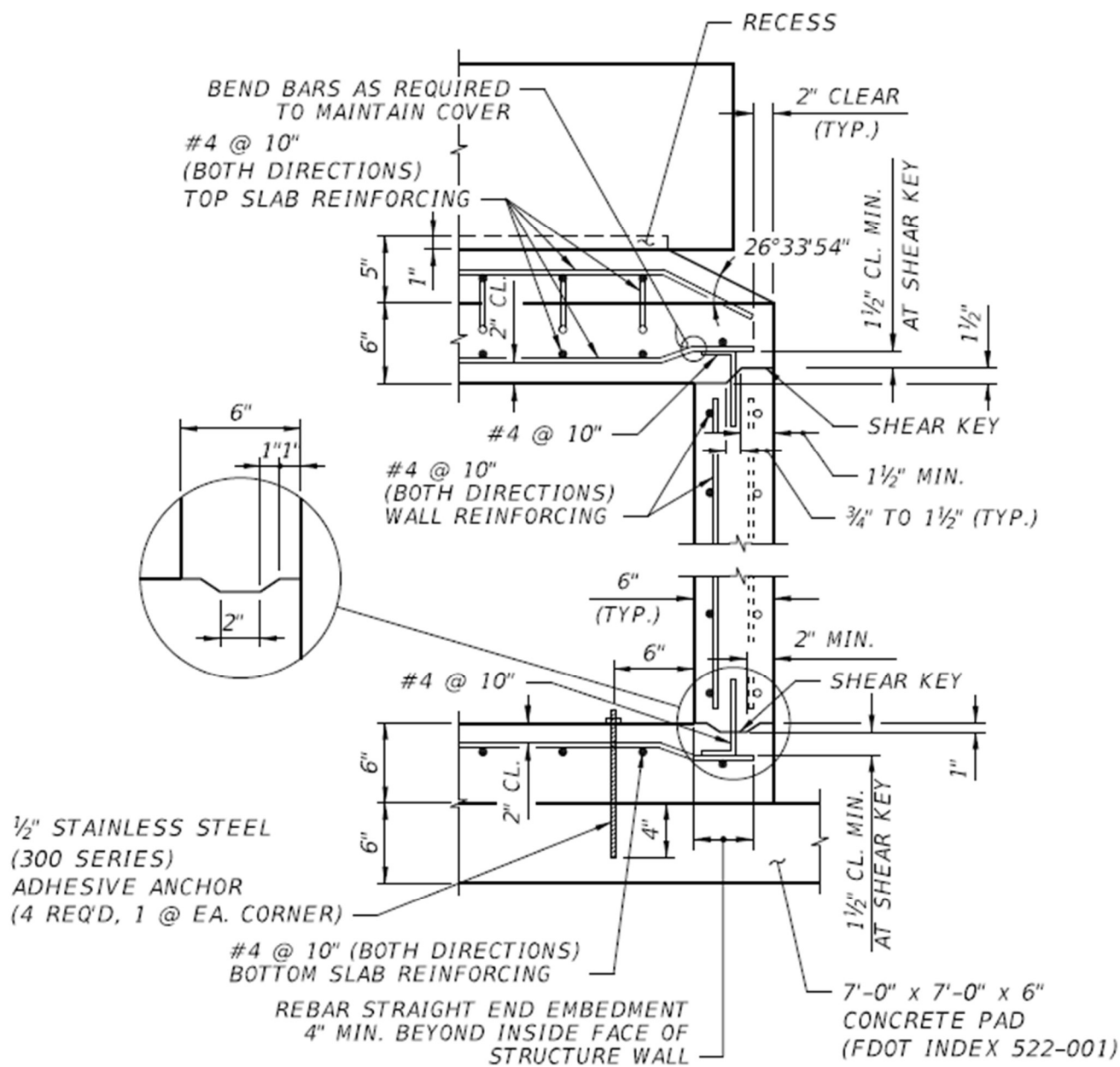
DECORATIVE URN DISPOSITION



5.3 – Decorative Urn Details



URN DETAIL



URN BASE DETAIL

5.4 – LOAD ANALYSIS

Load Cases

Load cases have been selected according to AASHTO criteria: American Association of State Highway and Transportation Officials, AASHTO LRFD Bridge Design Specifications, 9th Edition 2020 (Section 3.3.2). Case designations follow the AASHTO nomenclature. Only Load Cases relevant to the Urn support Design have been listed.

CASE	DESCRIPTION
DC	Dead Load: Structure Self-weight and Urn self weight, plus fill
PL	Pedestrian Load

Design Load Combinations

Strength Design Load Combinations

N	ID	1	2
		DC	PL
1	S-V	1.25	1.75

“S” are the regular Strength Design Combinations, to be used for the structural design of Urn support and components.

Dead Load

DC - Structure self-weight: This load is based on the weight of structural components, as obtained from Section Geometry and unit weights for materials, in this case Concrete (145 lb/ft³).

Urn Self Weight

GAMMA		145				
COMP	T	B	L	V	n	W
	in	ft	ft	ft ³		lb
BOTTOM	4	3.00	3.00	3.00	1	435
WALL 1	4	3.00	1.17	1.17	2	339
WALL 2	4	2.33	1.17	0.91	2	264
SUP BOT	6	3.50	3.50	6.13	1	888
S.WALL 1	6	3.50	5.33	9.33	2	2705
S.WALL 2	6	2.00	5.33	5.33	2	1546
TOP	6	1.70	3.50	2.98	1	431

TOTAL 6608

Earth fill self- weight: $W1 = 120 \times 10/12 \times 2.33 \times 2.33 = 543 \text{ lb}$

Total Urn Weight: $Wu = 6608 + 543 = 7151 \text{ lb}$

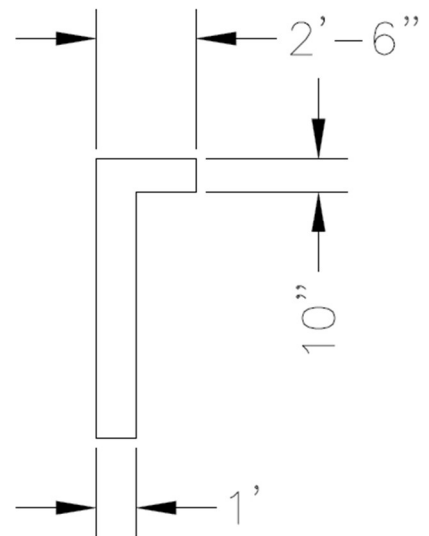
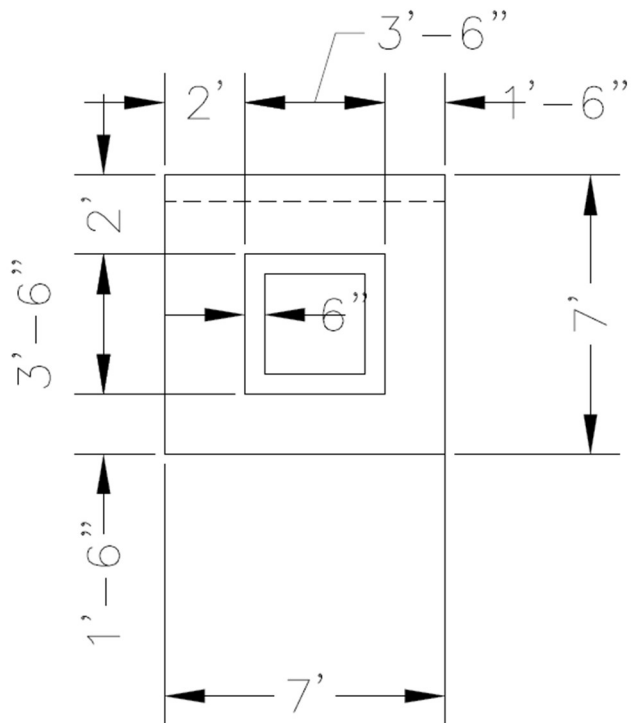
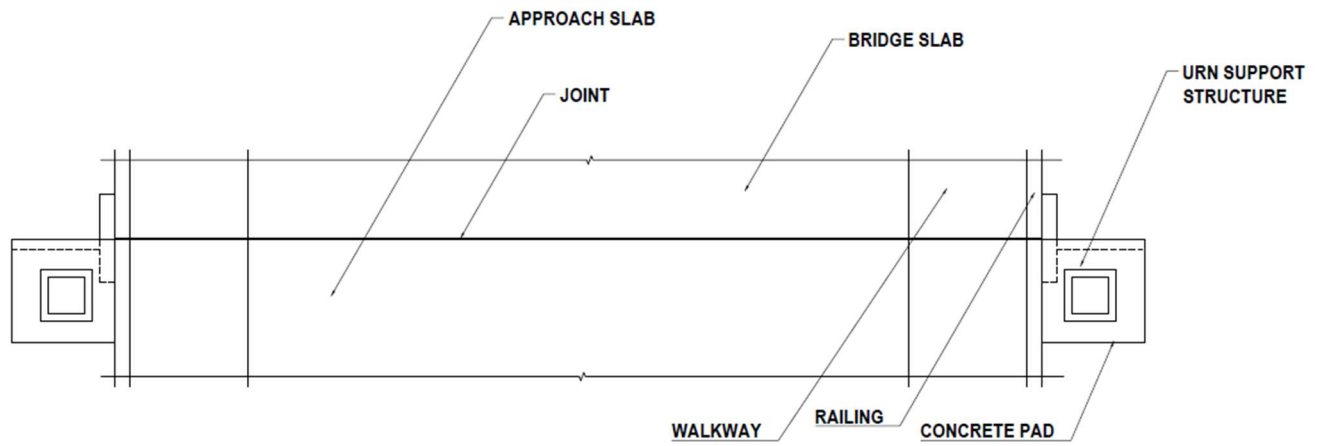
Slab Self-weight: $q = 145 \times 1.00 \times 1.00 = 145 \text{ lb/ft}^2$

Pedestrian Live Load

PL - Pedestrian Live Load, per AASHTO shall be taken at 75 lb/ft².

5.5 – STRUCTURAL ANALYSIS

Urn Support Geometry



Per foot width of Urn Support:

$$MDC = 145 \times 7.0^2 / 2 + 7151 \times 3.75 / 7 = 7383 \text{ lb-ft}$$

$$MPL = 75 \times 7.0^2 / 2 = 1838 \text{ lb-ft}$$

Factored Load:

$$Mu = 1.25 \times 7383 + 1.75 \times 1838 = 12445 \text{ lb-ft} = 149 \text{ kip-in}$$

Shear Factored Load:

$$VDC = 745 \times 7.0 + 7151 / 7 = 6237 \text{ lb}$$

$$VPL = 75 \times 7.0 = 525 \text{ lb}$$

$$Vu = 1.25 \times 6237 + 1.75 \times 525 = 8715 \text{ lb} = 8.72 \text{ kip}$$

Strength Design

REQUIRED STRENGTH

Mu	149.0	kip-in/ft	Flexure Required Strength, per unit width
Vu	8.72	kip/ft	Shear Required Strength, per unit width

MATERIAL AND DESIGN PARAMETERS

f _c	3.5	kip/in ²	Concrete Specified Minimum Strength
f _y	60.0	kip/in ²	Steel Yield Strength
E _s	29000	kip/in ²	Steel Modulus of Elasticity
Φ _f	0.90		Strength Reduction Factor, Flexure
Φ _v	0.75		Strength Reduction Factor, Shear
β ₁	0.85		Compressed Block to Neutral Axis Ratio

SLAB GEOMETRY AND REINFORCEMENT

t	12.00	in	Slab Thickness
r	3.00	in	Concrete Cover

FLEXURE

BAR	#5		Nominal Bar Size - Main Reinforcement
Ab	0.31	in ²	Area, each Bar
s	8	in	Bar spacing o/c
As	0.47	in ² /ft	Reinforcement Area, per unit width

STRENGTH CHECK - FLEXURE

T	27.90	kip	Steel Tension
c	0.78	in	Concrete Compression Block Depth
M _n	240.2	kip-in	Nominal Flexure Strength
ΦM _n	216.2	kip-in	Design Flexure Strength
RF	0.69	OK	Flexure Strength Ratio (Required/Design)

MINIMUM / MAXIMUM FLEXURE REINFORCEMENT

As _{min}	0.26	in ² /ft	Min Reinf Area
R _{MINF}	0.56	OK	Minimum/Actual Reinforcement Check
As _{max}	2.68	in ² /ft	Max Reinf Area
R _{MAXF}	0.17	OK	Maximum Reinforcement Check

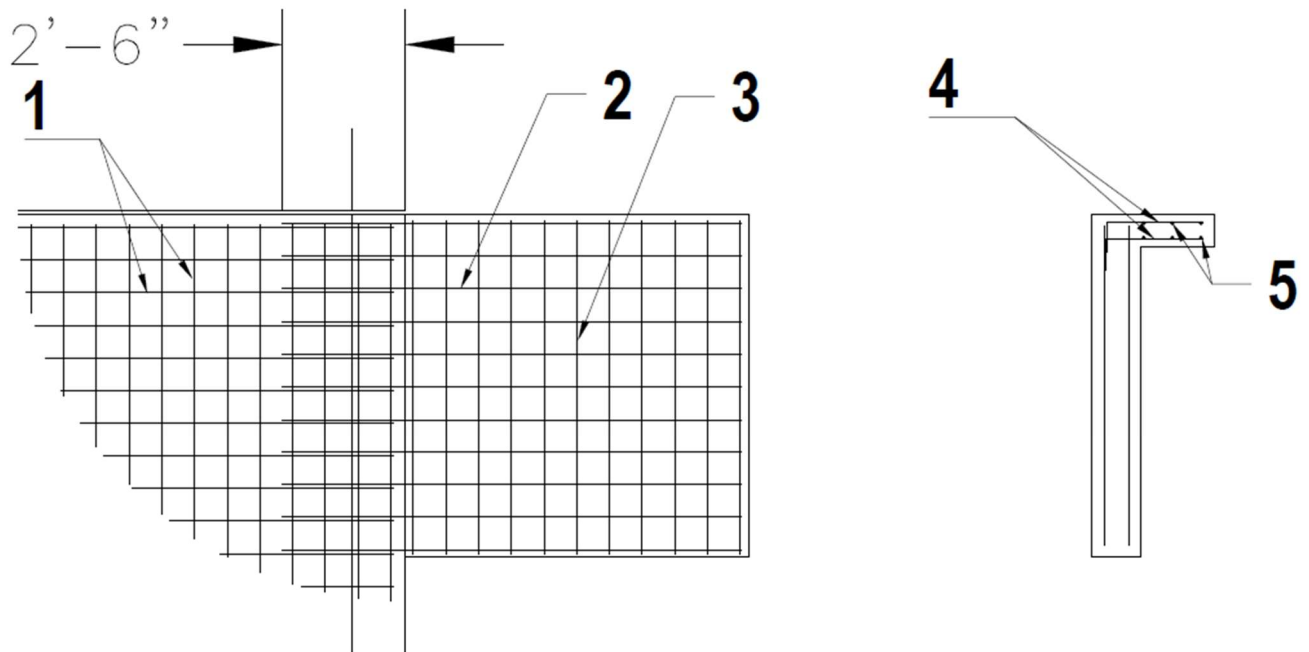
STRENGTH CHECK - SHEAR

V_c	12.8	kip	Concrete Nominal Shear Strength
ΦV_n	9.6	kip	Design Shear Strength
RV	0.91	OK	Shear Strength Ratio (Required/Design)

STRENGTH CHECK SUMMARY

R_{max}	0.91	OK	Highest Design Check Value
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Reinforcement Detailing



ITEM	DESCRIPTION
1	Regular reinforcement for the approach slab
2	Steel reinforcement in the Decorative Urn foundation perpendicular to the approach slab. Use 5UF01 @ 8" O/C on the top face, and 4UF02 @ 8" O/C on the bottom face;
3	Steel reinforcement in the Decorative Urn foundation parallel to the approach slab. Use 4UF03 @ 8" O/C both top and bottom
4	Main steel reinforcement in the shear key: 4UF04 @ 8" O/C both faces
5	Horizontal steel reinforcement in the shear key: 3 ~ 4UF05 equally spaced on both faces

Reinforcement Bar Schedule

MARK		LENGTH		NO	TYP	STY		B		C		D		E		F		H		J		K		N	Φ
SIZE	DES	FT	IN	BARS	BAR	A	G	FT	IN	FT	IN	FT	IN	FT	IN	FT	IN	FT	IN	FT	IN	FT	IN	NO	ANG
DECORATIVE URN FOUNDATION REINFORCEMENT SCHEDULE (QUANTITIES FOR TWO FOUNDATIONS, AT ONE END BENT)																									
5	UF01	9	3	22	1			9	3																
4	UF02	8	3	22	1			8	3																
4	UF03	6	6	22	1			6	6																
4	UF04	2	8	22	17	3		2	0																
4	UF05	2	8	22	17	3		2	0																