I-295 (SR 9A) Buckman Bridge Safety Study

From SR 13 to US 17/SR 15
Section 72001000, MP 4.600 to MP 10.000,
Duval County, FL

Florida Department of Transportation, District 2

13 July 2015

Work Authorization No. #2, FPI No: 211083-1-62-14

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Executive Summary

The Florida Department of Transportation – District 2 retained Atkins to perform a safety study of the existing I-295 Interstate segment from the SR 13 Interchange to the US 17 Interchange in Duval County. This segment includes the 3.1 mile long Buckman Bridge that crosses the St. Johns River. The tasks in the study include data collection of crash reports over a five year period, field reviews, a traffic safety review, analysis of Active Traffic Management Systems, and development of potential countermeasures including a Benefit-Cost analysis.

The study determined that during the five year period from 2009 through 2013, there were 1,199 crashes within the study area with 395 of those occurring on the bridge itself. There were 738 Property Damage Only crashes, 451 crashes with injury and 10 fatality crashes. There were two additional fatal crashes reported in 2014 that are referenced throughout the report. Rear end crashes were the most prominent crash type with 49% of the total crashes. Sideswipe, hit guardrail (off-bridge) and hit barrier (on-bridge) crashes comprised 36% of the total crashes. A total of 136 crashes hit one or both of the barrier walls on the bridge with one vehicle departing the bridge during the five year period. An additional vehicle hit the outside barrier wall and departed the bridge in 2014.

The crash rate for the entire study area for the five year period is 0.90 crashes per million vehicle miles travelled. The crash rate for the bridge span only is 0.58 crashes per million vehicle miles travelled and the crash rate for the off-bridge segments is 1.33 crashes per mile vehicle miles travelled. According to the FDOT Crash Analysis Reporting System, the average crash rate for Urban Interstates in Duval County from 2009 to 2013 was 0.844 crashes per million miles travelled.

Careless Driving, at 61% of all crashes, is the primary cause of crashes within the study area. Other major causes include Improper Lane Change, Followed Too Closely, Exceeded State Speed Limit, Failed to Maintain Equipment, and Driver Distraction. The study looked at each of the crashes that included a departure from the bridge, other crashes on the bridge resulting in fatalities, and other fatal crashes off of the bridge and within the study area. Each of these crashes involving fatalities and vehicles departing the bridge was caused by driver error with the primary causes being Careless Driving, Speeding, and/or Alcohol and Drugs. There was no reporting or indication that the cause of the any crashes was due to the design of the Buckman Bridge, the I-295 mainline within the study area, or the adjacent interchanges.

The study has evaluated numerous potential countermeasures for implementation, including Active Traffic Management applications. These countermeasures include the following:

- High Friction Surface Treatment at the US 17 Interchange
- High Friction Surface Treatment at the SR 13 Interchange
- Additional Barrier Height: Replace Barrier Wall
- Additional Barrier Height: Add Metal Railing to Existing Barrier
- Active Traffic Management (Speed Harmonization and Queue Warning System)

A Long Range Estimate (LRE) cost has been developed for each countermeasure. Also, a Benefit Cost Analysis and Net Present Value has been determined. The benefits occur when the number of crashes and/or severity of crashes is expected to be reduced based on a countermeasure. The benefits associated with the reduction of crashes resulting from implementation of the proposed countermeasures are estimated based upon the FDOT Historical Crash Method (HCM). In the FDOT HCM, Crash Reduction Factors (CRF), developed by industry research or crash experience, are used to estimate the effects the corresponding countermeasure has on the crash occurrence type. The CRFs are applied to the number of crashes that are correctable by the proposed countermeasure. The study used the 2015 FDOT Highway Safety Improvement Program Guideline (HSIPG) cost per crash value of $161,634 for Divided Urban Interstates. The Benefit to Cost ratio represents the ratio of the crash reduction benefits to the cost for the crash countermeasure. The Net Present Value for each countermeasure is determined by bringing all costs and benefits to the present year.

The Table below provides the summary of the CRF, the Correctable Crash Type, the Average Annual Crash Reduction, Annualized Cost, B/C Ratio, and Net Present Value.

Benefit Cost Results

Countermeasure	CRF & Crash Data Impact	Correctable Crashes in Range	Average Annual Crash Reduction	Total Cost[3]	Annualized Benefit / Annualized Cost	B/C Ratio	Net Present Value
High Friction Pavement (near US 17)[4]	13.4% for Rear End crashes, 20% for Single Vehicle crashes	105 Rear End, 49 Single	4.8	$1,258,664	$771,641 / $209,693	**3.68**	**$3,194,629**
High Friction Pavement (near SR 13)[4]	13.4% for Rear End crashes, 20% for Single Vehicle crashes	33 Rear End, 29 Single	2.0	$1,011,264	$330,445 / $168,477	**1.96**	**$895,797**
Replace Bridge Barrier Wall with 42" Wall (current wall is 32")	No reduction in crashes expected	0	0	$40,250,000	$0 / na	**na[2]**	**Not applicable**
Install 18" Metal Railing to existing Barrier Wall	No reduction in crashes expected	0	0	$8,326,000	$0 / na	**na[2]**	**Not applicable**
ATM (Speed Harmonization & Queue Warning System) [1,5,6]	16% of Rear End Injury crashes, 7% of Injury Related Crashes	228, 461	13.25	$10,861,469	$2,141,651 / $1,020,833	**2.10**	**$12,034,702**

1. Includes the costs of a Vehicle Detection System of $2,656,560
2. na = this calculation is not applicable
3. Costs include Construction, Design, and CE&I
4. CRF source: NCHRP Report 617 – Accident Modification Factors For Traffic Engineering and ITS Improvements
5. CRF source: Crash Modification Factors Clearinghouse
6. Assumes a 5% reduction in mean speed.

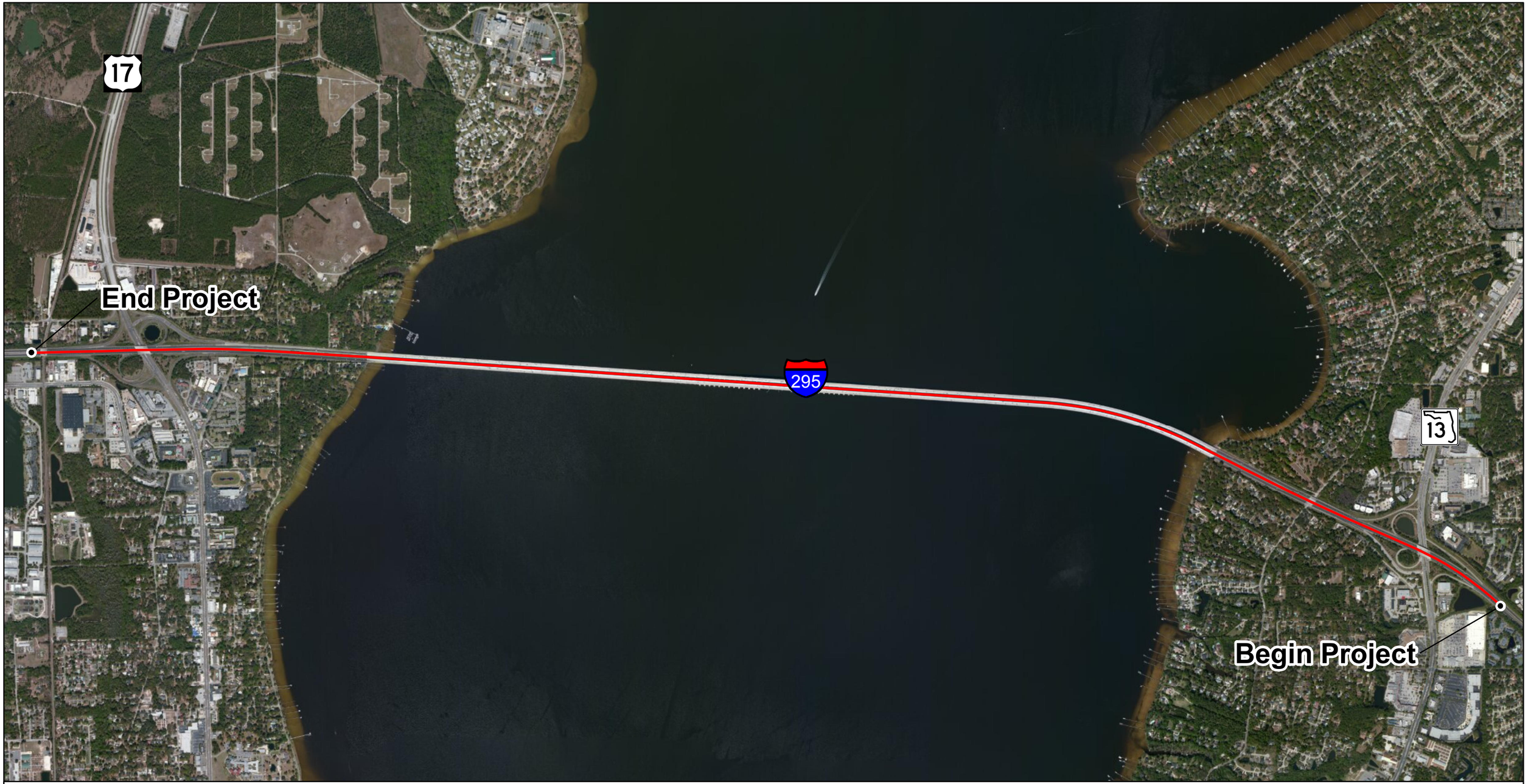
The study has identified that the main cause of crashes within the study area is Careless Driving, making up 61% of the total number of crashes. Even without implementation of any of the countermeasures previously discussed in this Executive Summary, enhanced enforcement through the Florida Highway Patrol (FHP) will provide definite benefits.

1. Introduction

Atkins has been retained by The Florida Department of Transportation (FDOT) to perform a safety study of the existing I-295 Interstate segment crossing the Buckman Bridge between the SR 13 and US 17 interchanges. The aerial map of the study limits is included as Figure 1-1.

The following tasks were conducted as part of the study. Each of these tasks are further described in the following sections.

- Data Collection including crash reports within the study area for the 5-year period from 2009 through 2013. In addition, fatal crashes from 2014 were included in the review.
- Field reviews and existing traffic reviews
- Traffic Safety Review
    - Collection and mapping of long and short form crash reports
    - Identification of crash trends
    - Identification of potential countermeasures to mitigate predominate crash types
    - Prepare concepts with Benefit/Cost analysis and Net Present Value(NPV) Calculations
- Active Traffic Management Systems (ATMS)
    - ATMS will be analyzed as a potential countermeasure
    - Develop a concept and cost estimate for an ATMS on the Buckman Bridge
- Speed management
    - Evaluate Motorist speed
    - Evaluate Speed Management countermeasures
- Evaluate Traffic Railing Height.



Study Area Map

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FDOT District 2
Jacksonville, Florida

Centerline of Study Area

Figure 1-1

1 in = 1,750 feet

0 1,500 3,000

Feet

Figure Date: 4/14/2015

2. Existing Conditions

2.1. Site Characteristics

The study segment of I-295 is approximately 5.4 miles long and spans both directions of travel from south of the SR 13 interchange to north of the US 17 interchange The study area includes the entire length the Buckman Bridge within it's limits. I-295 is an 8-lane divided facility functionally classified as an urban principal arterial-interstate. In the vicinity of the US 17 and SR 13 interchanges, the lanes taper to 6 lanes. The speed limit along the study segment of I-295 is 65 mph. Street lighting is present along the study segment.

The Buckman Bridge is approximately 3.1 miles long and spans the St. Johns River. The northbound and southbound I-295 lanes of the Buckman Bridge are separate bridges. These bridges were originally constructed in the 1960's as two-lanes in each direction and widened in the 1990's to four-lanes, with shoulders, in each direction. The profile grade across the bridge is generally flat with an elevation of 14.0 feet above sea level. There is an elevation change to allow navigation under the bridge near the center of the span. The maximum elevation is approximately 76 feet above sea level with 3% maximum grades on each side.

The I-295 Interchange with US 17 is near the north end of the Buckman Bridge. I-295 crosses over US 17 approximately one mile from the northern end of the bridge. US 17 is functionally classified as an urban principal arterial-other. It serves the residential areas of Orange Park and Fleming Island to the south and Ortega, Avondale and Riverside to the north. NAS Jacksonville is located between US 17 and the St. Johns River north of I-295.

The I-295 Interchange with SR 13 is the first interchange on the southern end of the bridge with I-295 crossing over SR 13 approximately 4,400 feet south of the bridge. SR 13 is functionally classified as an urban minor arterial. SR 13 serves the residential areas of Mandarin, both north and south of the I-295.

2.2. Historical Speed Analysis

The existing posted speed limit for I-295 in the study area is 65 miles per hour in both directions. Historical speed data, was collected though the FDOT SunGuide - Florida's Intelligent Transportation System, and made available to the review team by FDOT staff. The data consists of the average daily speeds as collected at existing vehicle detector stations (VDS) located on either side of the Buckman Bridge from April 30, 2010 to April 30, 2015. Graphs representing the speed data are provided in Appendix E. The data is graphed so that each data point represents the daily average speed for the entire study period.

Based on visual inspection of the graphs, it appears that both the northbound and southbound speed data depict an average daily speed of approximately 72 mph at the respective VDS locations. In the southbound direction, the common range of average daily speeds appeared to fall between 64 mph and 78 mph. In the northbound direction the common range of average daily speeds appeared to fall between 68 mph and 75 mph. It should be noted that the FDOT staff acknowledged that a VDS calibration issue was the likely cause of the irregular speed values occurring in the middle of the graph. Considering the data represents a daily average, it is reasonable to assume, depending on the time of day, that there were vehicles travelling at speeds much higher than the average while others were travelling at speeds much lower. It is also reasonable to assume that the 85th percentile speed would be a minimum of several miles per hour higher than the average speed.

It was not confirmed as part of this study, but the variability in average daily speeds can be attributed to several conditions. A few hypotheses as to why there is such a range in average speeds are as follows:

1. Variability in traffic volumes resulting in higher speeds on the weekends and lower speeds on weekdays
2. Presence of a traffic incident that causes longer than average delays.
3. Speed variability amongst the lanes. (For example, lanes dropping off into an exit may be slower than the through lanes).

3. Programmed Improvements

There are three major projects programmed within the District 2 Five Year Work Program. These are described below and shown on Figures 3-1 and 3-2.

I-295 Managed Express Lanes from the Buckman Bridge to I-95 – FPID 213345

The Florida Department of Transportation (FDOT) is currently constructing Express Lanes on I-295 from the Buckman Bridge to the I-95 south interchange. The design currently consists of an 8-lane layout consisting of 6 general purpose lanes (3 lanes in each direction) and 2 Express Lanes (1 lane in each direction). However, contingent upon FHWA approval, the final design could consist of a 10-lane layout with 6 general purpose lanes (3 lanes in each direction) and 4 Express Lanes (2 lanes in each direction). The Express Lanes will use dynamic pricing to provide more reliable travel times than the general purpose lanes. Tolls will be collected electronically using the SunPass system. All vehicles within the Express Lanes will be tolled. Noise walls will be constructed adjacent to residential areas.

For southbound I-295 traffic, vehicles using the Express Lane(s) will enter just beyond the southern end of the Buckman Bridge and will remain in the Express Lane(s) through the San Jose Boulevard and Old St. Augustine Road interchanges. The southbound Express Lane(s) will terminate approximately 7,700 feet before the gore to the ramp to I-95 northbound. Vehicles entering I-295 from either San Jose Boulevard or Old St. Augustine Road will not have access to the Express Lane(s).

For northbound I-295 traffic, the Express Lane(s) will begin approximately 5,600 feet downstream from the gore of the ramp from both northbound and southbound I-95. Vehicles will remain in the northbound Express Lane(s) through the Old St. Augustine Road and San Jose Boulevard interchanges. The northbound Express Lane(s) shall terminate approximately 3,500 feet before the Buckman Bridge and continue as a non-tolled lane.

The start date of the project was October 2014 and the estimated completion date is late 2016.

US 17 (SR 15) Operational Improvement from south of I-295 to Collins Road – FPID No. 211185

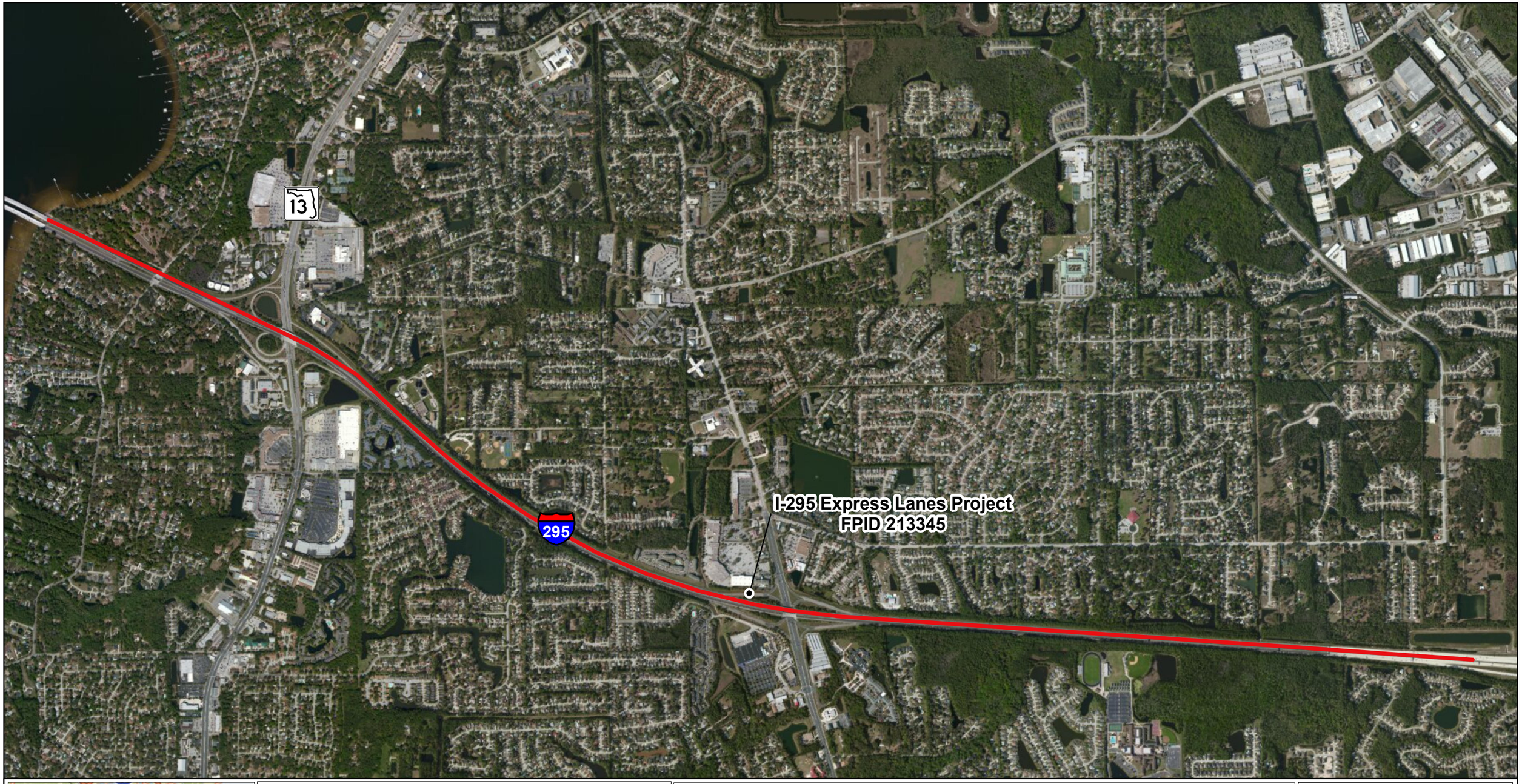
The FDOT is currently investigating operational improvements along southbound US 17. This project provides additional capacity on US 17 in the southbound direction, primarily for traffic accessing both I-295 northbound and I-295 southbound. An additional southbound lane will be added starting at the intersection with Collins Road for US 17 traffic accessing both directions of I-295. This lane will be physically separated from the southbound US 17 through lanes allowing continuous flow through the US 17 intersection with the I-295 northbound off-ramp.

Construction is not currently funded in the FY 2016-2020 Tentative Work Program.

I-295 at US 17 (SR 15) to South of Wells Road – FPID No. 435575

The FDOT is currently conducting a Project Development and Environment (PD&E) Study for the I-295 at US-17 interchange. The project will look at widening and reconstruction alternatives and alignments to improve operations for the I-295 northbound exit ramp to US 17.

Construction is not currently funded in the FY 2016-2020 Tentative Work Program.



Programmed Improvements:
I-295 Express Lanes

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I-295 Express Lanes Project Limits

Figure 3-1

1 in = 1,502 feet

0 1,200 2,400
Feet

Figure Date: 4/14/2015

US 17 (SR 15)
Operational Improvements
FPID 211185

I-295 at US 17 (SR 15)
Operational Improvements
FPID 435575

Programmed Improvements:
US 17 SB Improvements &
US 17/I-295 Interchange PD&E

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US 17 (SR 15) Operational Improvements

I-295 at US 17 (SR 15) Operational Improvements

Figure 3-2

1 in = 400 feet

0 350 700
Feet

Figure Date:
4/14/2015

4. Field Review

Field reviews were conducted to observe traffic and roadway operations during the AM Peak, Midday, and PM Peak. The midday field review was conducted on October 15, 2014 between 10:00 AM and 11:30 AM. The AM peak review was conducted on November 12, 2014 from 6:15 AM to 8:30 AM and PM peak review was conducted on October 15, 2014 from 3:45 PM to 6:15 PM. The mid-day review consisted of driving the Interstate three times in each direction, driving all the US 17 and SR 13 ramps, and driving two miles in both directions of US 17 and SR 13. It was determined that the study area lacked a suitable field location from which traffic operations along the entire bridge could be observed, so the AM and PM peak period reviews were performed from the Jacksonville DOT Urban Office Traffic Management Center (TMC) using existing CCTVs to observe traffic flow. The TMC was chosen over on-site field reviews due to the high levels of peak congestion limiting the number of times the driver could cross the facility during the peak. The TMC also provided engineers the ability to simultaneously observe aerial perspectives of traffic and queuing patterns at multiple locations of the facility. The TMC staff aided by operating the Pan, Tilt, Zoom (PTZ) CCTV cameras so that maximum coverage of the facility could be obtained from multiple cameras. Notes from the field reviews are provided in the subsequent sections below:

4.1. AM Traffic Review Observations

- At 6:20 AM, traffic on US 17 heading towards the southbound I-295 ramp fell below free flow speeds
- At 6:45 AM, I-295 southbound backed up from I-95 to the southern shoreline of the Buckman Bridge. The far left lane was stop-and-go, other lanes backed up to San Jose Boulevard interchange.
- At 6:47 AM, the Southbound left two lanes began a stop-and-go pattern.
- At 6:55 AM, the Southbound lanes near San Jose Boulevard and traffic on the bridge were all stop-and-go. Because portions of the bridge were free flowing while others were stopped these conditions were attributed to shockwave tendencies seen when a facility is near capacity.
- At 7:00 AM, the southbound traffic congestion reached the approach to the bridge vertical curve and the sun was directly in face of SB traffic
- At 7:15 AM, all southbound lanes were moving slowly at an estimated speed of 5-20 mph
- At 7:20 AM, southbound stop-and-go traffic conditions extended beyond the US 17 interchange
- At 7:30 AM, southbound traffic began to increase in speed with less instances of stop-and-go conditions
- At 7:40 AM, all southbound lanes were moving slowly and shockwave conditions were still detected

AM Traffic Summary

- Northbound I-295 traffic was free flow during the AM Peak period
- Southbound I-295 traffic was over saturated between 6:45 AM to 8:20 AM
    - Southbound congestion reached the vertical curve on the bridge around 6:50 AM.
    - The rising sun was in the face of southbound motorists.
    - The US-17 ramps leading to southbound I-295 experienced excessive delay the entire peak period

4.2. Mid-Day Field Review Observations

- I-295 Mainline Northbound (including bridge)
    - There were no traffic disturbances to note
    - There were several stalled vehicles observed in the northbound outside shoulder
    - Approaching the bridge is an overhead sign that reads “4 PM to 7 PM, Right 2 Lanes Be Prepared to Stop”. See Figure 4-1.
    - Soon after entering onto the bridge, the painted lane striping between the left two lanes changes from a skip to a solid white line. (Figure 4-2). At times there appeared to be a more defined

black border on the edges of the white lane line than there was at other locations. There appeared to be some inconsistency in the amount of contrasting black paint surrounding the adjacent white lane striping. See Figure 4-3.
    - Just south of the vertical curve: the lane line located between the middle two lanes changes from skip to a solid white line. There is also a side mounted sign that reads “4 PM to 7 PM, Right 2 Lanes Be Prepared to Stop” (see Figure 4-4). Also, shown in this image is an “ONLY” painted pavement marking and right turn arrow painted pavement marking in the outer lane.
    - While approaching the crest of the vertical curve it was observed that it might be difficult to see vehicles on the other side. (Figure 4-5)
    - At the northbound crest of the vertical curve is a second side mounted sign that reads “4 PM to 7 PM, Right 2 Lanes Be Prepared to Stop” (Figure 4-6)
    - Just north of the vertical curve is a third side mounted sign that reads “4 PM to 7 PM, Right 2 Lanes Be Prepared to Stop” (Figure 4-7). It can also been seen in this picture that there appears to be a contrast stripe on the painted solid white line to the right but not one on the painted solid while line to the left.
    - Just north of the vertical curve the only remaining skip lane line changes from a skip to a solid white line. (Figure 4-8). The solid white lane lines continue beyond the downstream interchange with US-17.
    - Before exiting the bridge is a static overhead sign that reads “Unlawful to Cross Double White Lines”. There were no double white lines observed during the field observations. (Figure 4-9)
    - An extended painted gore begins approximately a quarter mile from the physical gore with the US17 interchange (Figure 4-10).
- US-17
    - The northbound merge onto northbound US 17 felt short from the drivers perspective.
    - The loop ramp from southbound US 17 to I-295 southbound merge lane felt short from the drivers perspective
- SR-13
    - No observations warranting comment.

Mid-Day Traffic Summary

- All directions of travel on the interstate and arterials were free flowing and up to speed.

Figure 4-1 Northbound Entry to Bridge

Figure 4-2 Start of Solid Lane Stripe in Left Lane

Figure 4-3 Lane Striping Contrast

Figure 4-4 Solid Lane Striping in 2nd Lane and First Side Mounted Warning Sign

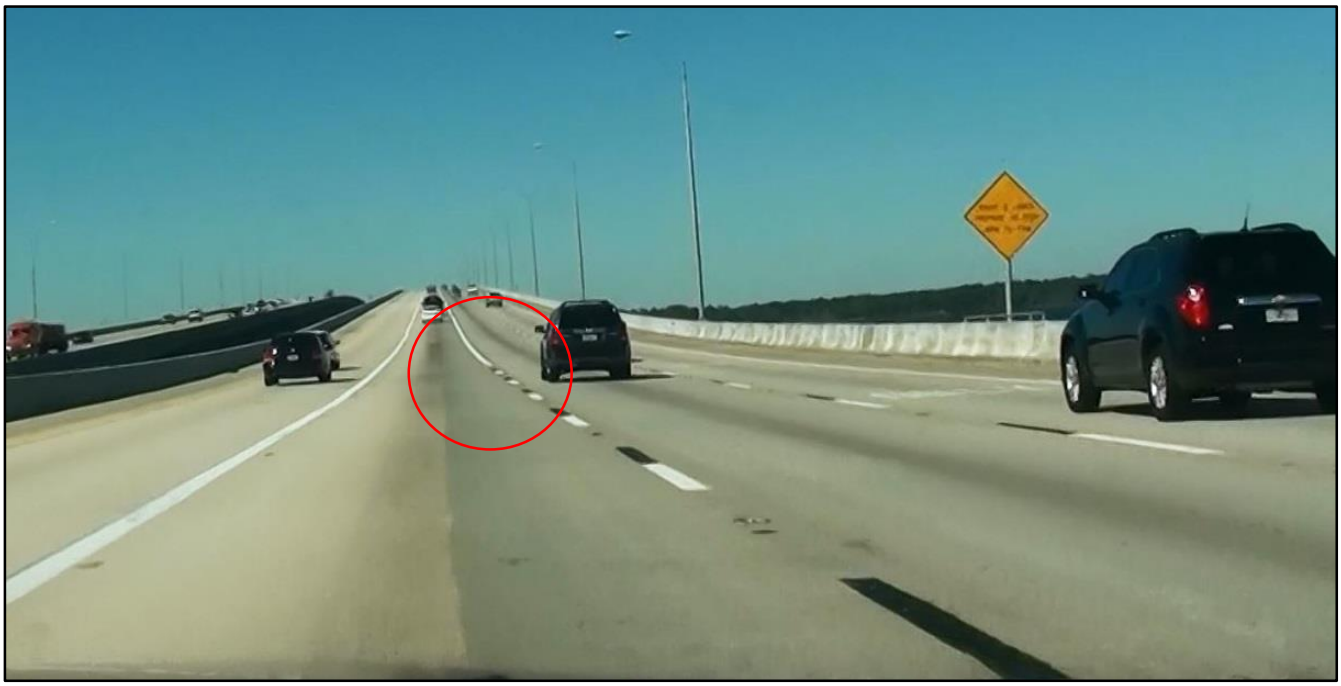


Figure 4-5 Top of Crurve Crest

Figure 4-6 Second Side Mounted Warning Sign

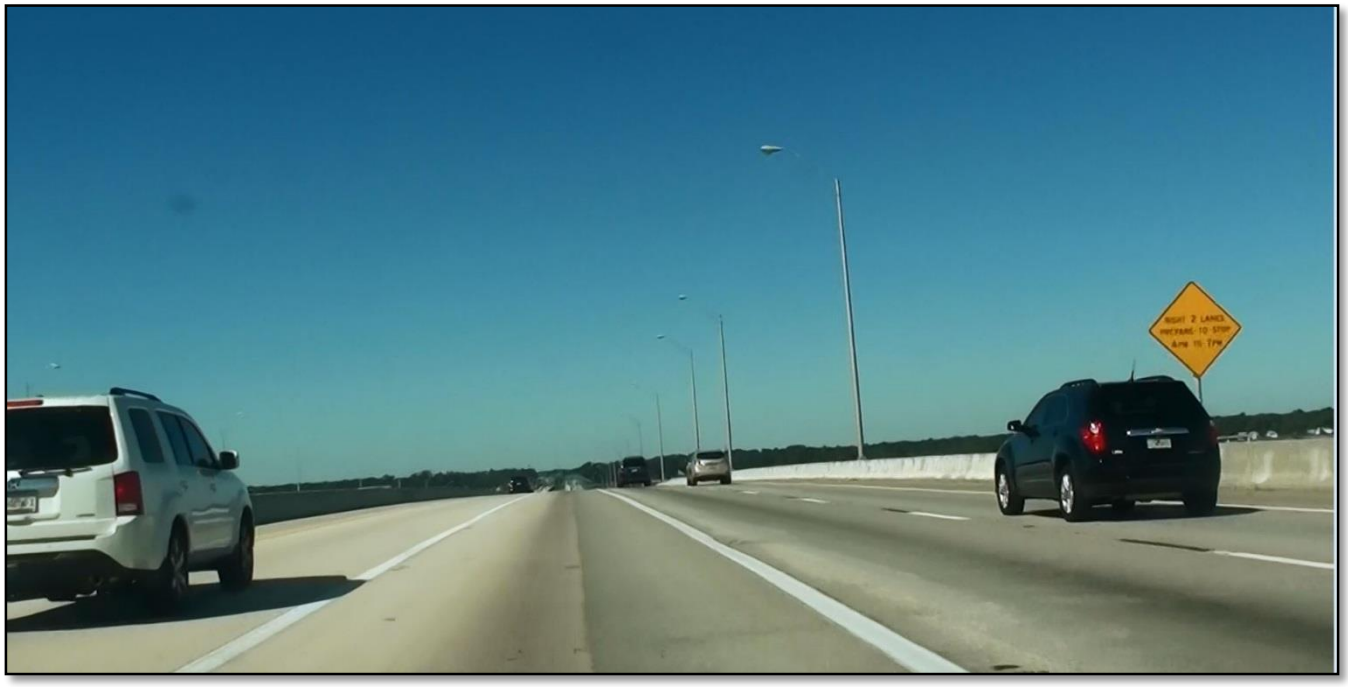


Figure 4-7 Thrid Side Mounted Warning Sign

Figure 4-8 Beginning of Solid Lane Striping in 3rd Lane

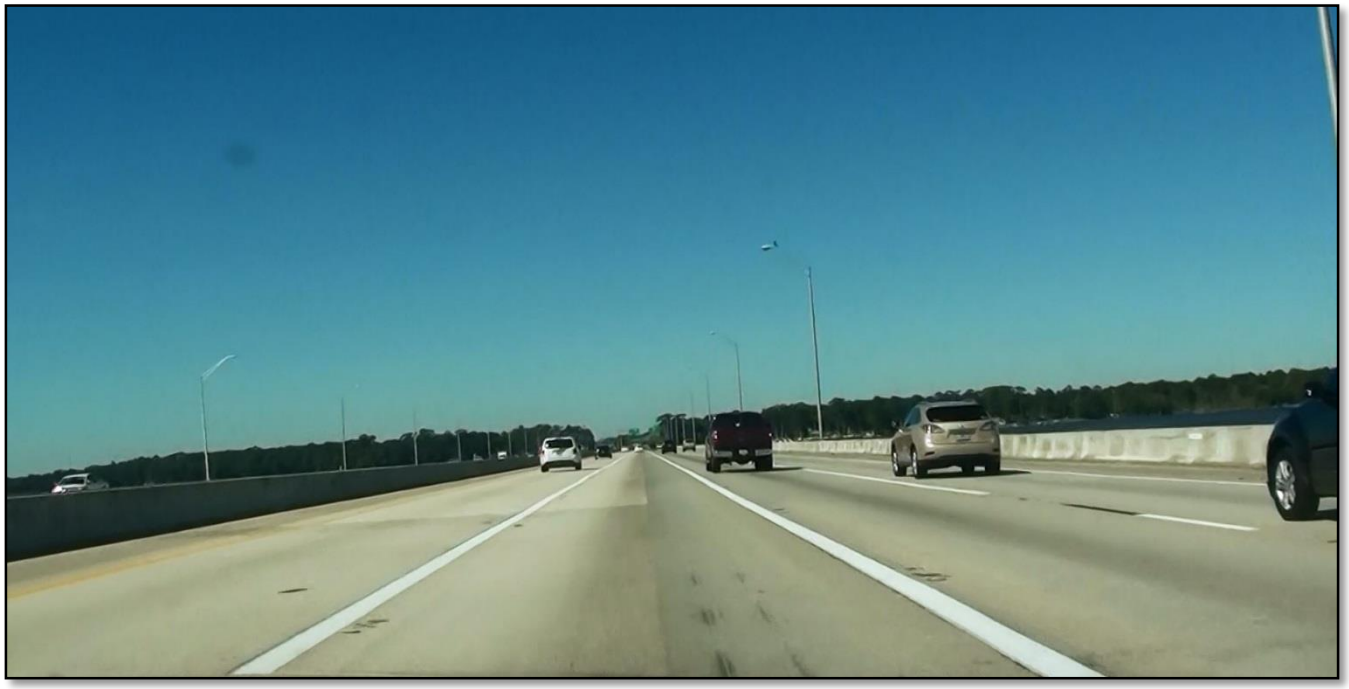
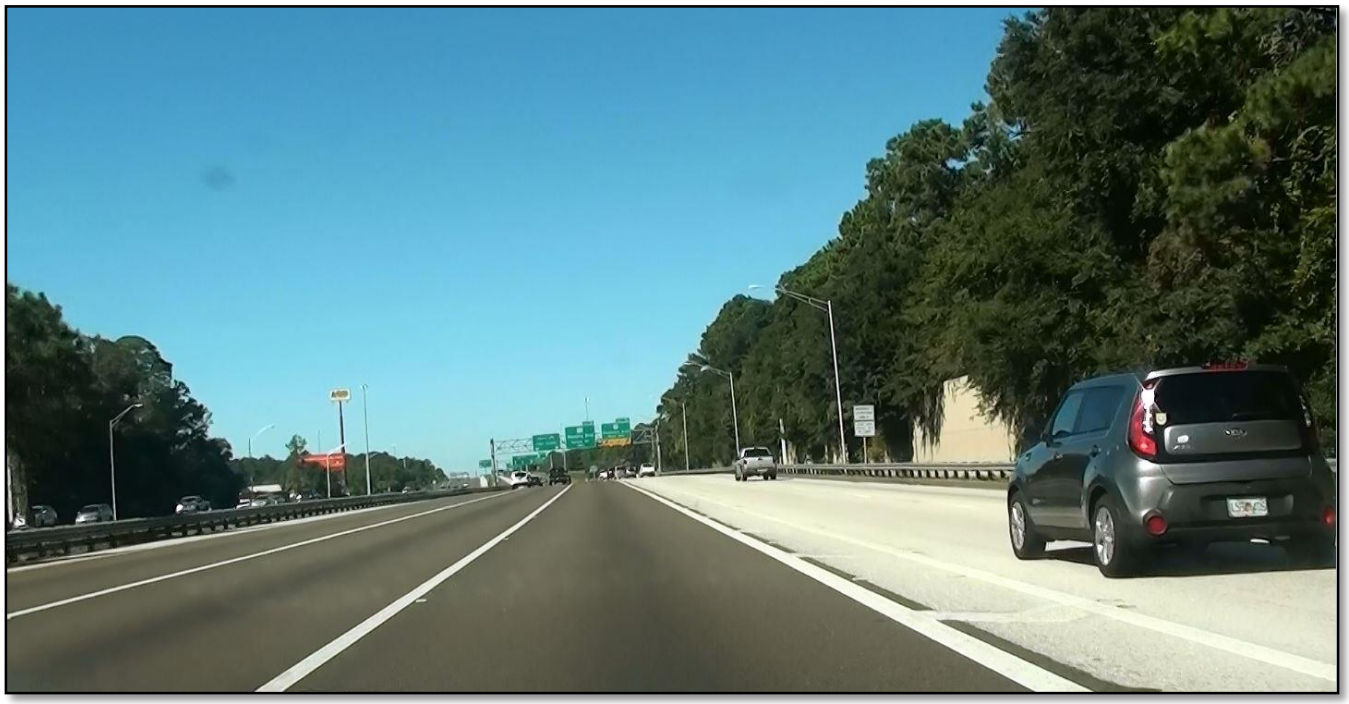


Figure 4-9 Sign Ganrty Prior to Bridge Exit

Figure 4-10 Extended Painted Gore Striping



4.3. PM Traffic Review Observations

- At 4:00 PM, there was no queuing present on the interstate but queues were developing at the northbound off ramps to US 17. Ramp queues were clearing every two to three cycles.
- At 4:20 PM, vehicles travelling northbound on I-295 were observed to avoid the US 17 off ramp queuing by driving over the painted gore.
- At 5:00 PM, the northbound US 17 off ramp backed up to the entry point at the interstate.
- At 5:10 PM, the northbound US 17 off ramp traffic queue began to impact interstate operations. This caused northbound traffic to slow to around 40-50 mph for as far back as the north end of the bridge.
- At 5:15 PM, stop-and-go traffic was observed in the right two northbound lanes from the US 17 off ramp to the beginning of the vertical curve on the bridge.
- At 5:30 PM, the northbound I-295 queue developing at the US 17 off ramp extended south of the vertical curve in the right two lanes. All other lanes along the bridge were slow but not stopping (the assumed speed was around 20-40 mph).
- At 5:45 PM, the northbound queue developing at the US 17 off ramp has caused a shockwave of stop-and-go traffic from the ramp to the southern shoreline of the river. Several vehicles were observed changing lanes in short gaps in order to weave though slower traffic.
- At 6:00 PM, the queuing at the northbound US 17 off ramp had been reduced to the gore point in the northbound direction
- At 6:15 PM, northbound queuing began to disperse throughout the interstate but traffic is still slower than free flow.

PM Traffic Summary

- Southbound I-295 traffic was free flow during the PM Peak period
- Northbound I-295 traffic was over saturated between 4:20 PM to 6:00 PM
    - Heavy volumes caused traffic across the entire northbound portion of the bridge to back up
    - Northbound congestion reached the crest of the bridge vertical curve around 5:15 PM
    - The left two lanes were significantly faster than the right two lanes thus causing a speed variability between the lanes. This led to non-exiting drivers to depart from the queued lanes into faster moving left two lanes. This also caused some exiting drivers to use the faster left two lanes to avoid long queues in the right two lanes only to change back into the exit lane at a later point, also known as “queue jumping.”
    - US-17 ramps experienced excessive delay the entire peak period

5. Traffic Count Data

The Average Annual Daily Traffic (AADT) for the study segment of I-295 was 125,000 vehicles per day in 2013 according to FDOT Traffic Information Online website. The FDOT portable traffic monitoring site (PTMS 723896) is located 0.6 miles northwest of SR 13 (San Jose Boulevard). Over the past 10 years, the historical AADT for this location varies from a low of 109,000 in 2004 to a high of 129,500 in 2006 (See Table 5-1). No traffic count data was collected in the field as part of this study.

Table 5-1 Historical AADT Counts for FDOT Count Station 723896

Year	AADT	Northbound	Southbound
2013	125,000	61,000	64,000
2012	116,500	58,500	58,000
2011	112,500	56,500	56,000
2010	121,000	60,500	60,500
2009	121,500	60,500	61,000
2008	125,000	62,500	62,500
2007	129,000	65,000	64,000
2006	129,500	65,000	64,500
2005	112,000	56,000	56,000
2004	109,000	54,500	54,500
2003	119,000	59,000	60,000
2002	112,000	56,500	55,500
2001	109,500	56,000	53,500
2000	115,500	58,000	57,500
1999	117,000	58,000	59,000
1998	109,500	55,500	54,000

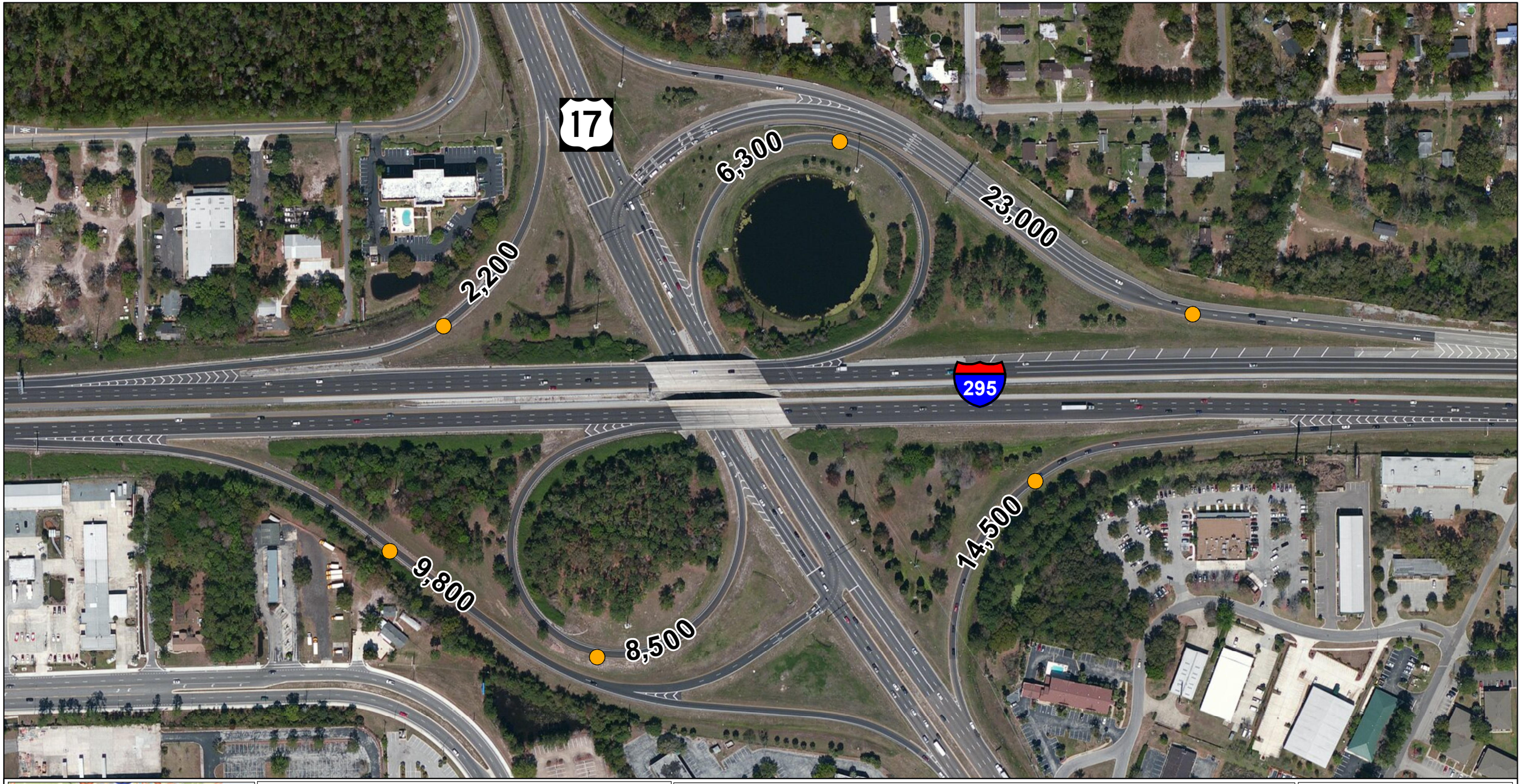
Source: FDOT Florida Traffic Online

Ramp traffic data was also obtained from the FDOT Traffic Information Online website for ramps at the interchanges of I-295 at US 17 and I-295 at SR 13. Historical ramp AADTs from FDOT are summarized in Table 5-2. The 2013 AADT at the US 17 and SR 13 Interchanges are shown in Figures 5-1 and 5-2.

Table 5-2 Historical Ramp AADT Counts

Location	AADT								
	2005	2006	2007	2008	2009	2010	2011	2012	2013
I-295 NB to SR 13 NB	3,000	3,600	3,800	3,100	3,600	3,300	2,900	3,600	3,400
I-295 NB to SR 13 SB	21,500	18,500	17,500	16,000	17,000	17,000	16,500	10,000	9,100
I-295 SB to SR 13	17,000	18,500	18,000	16,500	17,500	16,000	16,500	18,000	17,000
SR 13 NB to I-295 SB	10,500	11,000	11,000	9,800	11,000	10,500	10,500	11,000	10,500
SR 13 SB to I-295 NB	8,500	9,600	9,800	8,900	9,400	9,200	9,300	18,500	17,000
SR 13 SB to I-295 SB	2,900	2,700	3,000	2,800	3,000	2,700	2,500	3,000	2,900
I-295 NB to US 17	26,000	23,000	22,000	20,000	22,500	22,500	21,500	22,500	23,000
I-295 SB to US 17	14,500	11,000	11,000	10,000	12,000	11,500	10,000	9,700	9,800
US 17 NB to I-295 SB	16,000	15,500	14,500	13,000	15,000	14,500	14,000	14,500	14,500
US 17 NB to I-295 NB	8,700	7,400	7,200	6,400	7,400	7,100	6,600	6,300	6,300
US 17 SB to I-295 NB	3,300	3,400	3,100	2,800	3,200	3,100	2,800	2,300	2,200
US 17 SB to I-295 SB	8,900	8,400	8,100	7,000	8,000	8,200	8,100	8,400	8,500

Source: FDOT Florida Traffic Online



2013 AADT Ramp Counts:
US 17/I-295 Interchange

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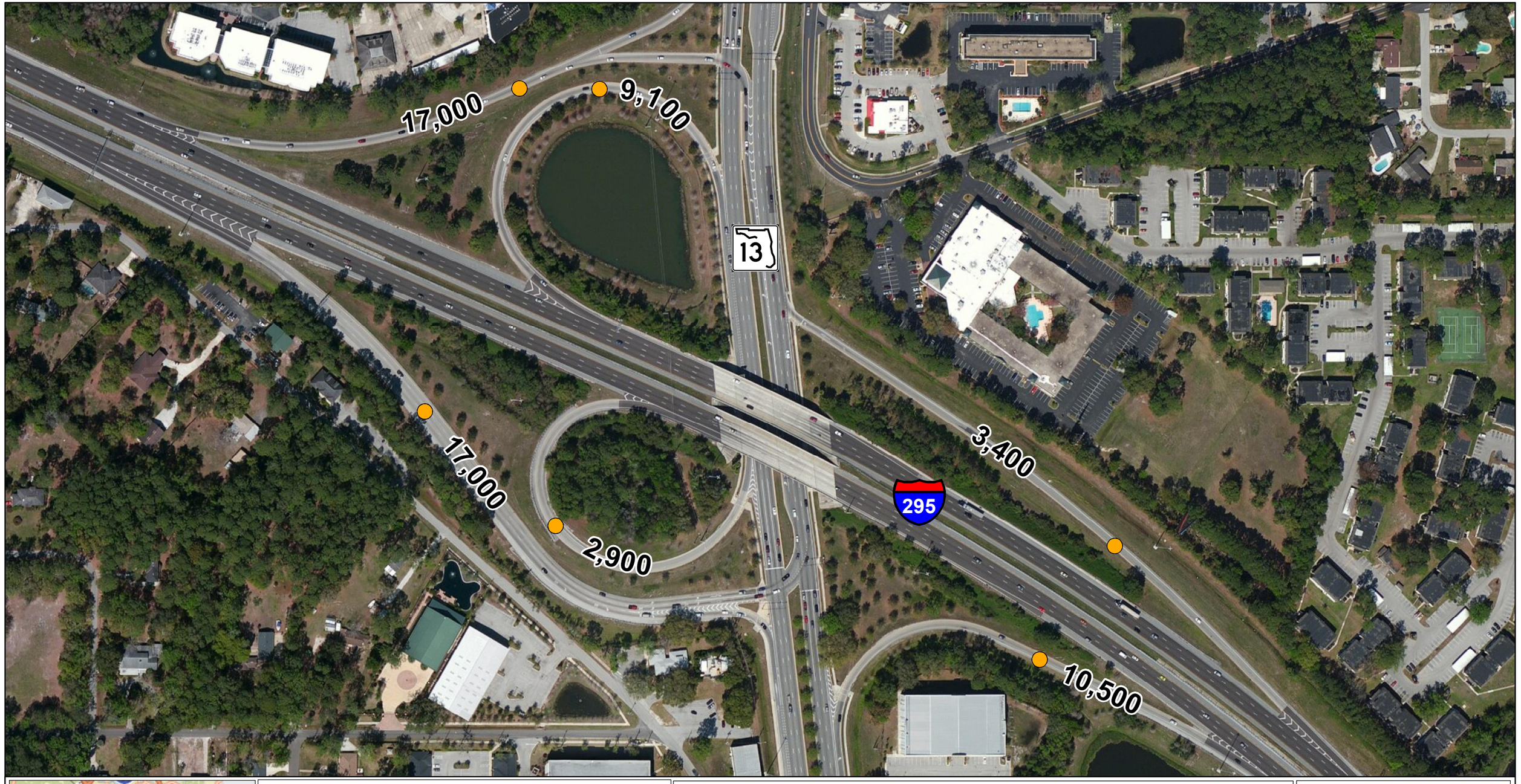
Portable Traffic Monitoring Sites

Figure 5-1

1 in = 200 feet

0 200 400
Feet

Figure Date: 4/16/2015



2013 AADT Ramp Counts:
SR 13/I-295 Interchange

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Jacksonville, Florida

Portable Traffic Monitoring Sites

Figure 5-2

1 in = 200 feet

0 200 400
Feet

N

Figure Date:
4/16/2015

6. Crash Analysis

6.1. Data Collection

For this study, crash data was obtained for a five-year period from January 2009 through December 2013. Three sources were used to generate a comprehensive set of crash records.

- Long-form crash reports were obtained from the Department's Crash Analysis Reporting System (CARS)
- Short-form crash reports were provided by the Jacksonville Sheriff's Office Central Records department. It should be noted that the Jacksonville Sheriff's Office was only able to provide short-form crash reports for the years 2011-2013. No short-form crash reports are included for 2009 and 2010. A total of 116 short-form crash reports are included for 2011-2013.
- Fatal crashes occurring in 2014 were obtained from Signal Four Analytic to supplement the 2009-2013 data. For this case, Signal 4 was used because the CARS database has not yet been verified for 2014 at the time of this study,

The limits of the data collection included the existing Interstate-295 segment crossing the Buckman Bridge with the limits on either side being represented by the far side of the ramp terminals (Mile Post 4.600 to Mile Post 10.000). Within these limits are the Interstate mainline and 6 ramps at each interchange (12 ramps total). No crash data was collected for US 17 or SR 13.

6.2. Crash Data Review Methodology

The initial Florida Traffic Crash Report data collection process resulted in 1,184 Long Forms and 158 Short Forms, or 1,342 total crash reports. During the initial review of the crash report details, it was discovered that some of the crash data coded into CARS deviated from the accounts provided by the reporting officer of the crash. As part of this study, the crash report study team manually reviewed all 1,342 crash reports for accuracy and applicability to the project location.

The team identified five crash characteristics to manually verify by reading the entire crash report narratives and by comparing the write-ups to the data entered into the crash database. Five crash characteristics were identified as data inputs having the most impact to this study. Those characteristics included:

1. Crash section or subsection (either mainline or 1 of the 12 ramps)
2. Crash location mile post
3. First harmful event
4. Travelling direction
5. Pavement conditions

The following list provides some examples of crash report inconsistencies that were discovered during the manual review. In cases where inconsistencies led to inconclusive evidence as to whether the data should be altered or not, the original inputs were used.

- Some crashes were originally coded as occurring within the project limits however the crash report write-ups clearly state otherwise.
- Some crash locations were coded using generalized mile-post locations (ie. One half mile north of SR 13, or 1 mile south of US 17) when the narrative gives more precise location of the crash location based on other landmarks.
- Some crashes were coded to the wrong section of roadway. In some cases crashes occurring on the mainline were coded on the ramps or vice versa. In other cases, the crash occurred on the ramp but the wrong ramp terminal was coded into the data.
- In some reports, the wrong harmful event was coded in result of inconsistent understanding of crash descriptors. For example, a crash was coded as a head on collision because the first impact between

two vehicles was from their front bumpers colliding. However, when the crash data was reviewed, it was determined that after hitting debris in the roadway the vehicle began to spin 180 degrees, thus allowing the following vehicle to collide with the first vehicle's front bumper. Based on the vehicle damage, the "Head On" crash description was selected but the crash would have been more properly coded as a "Collision with Moveable Object on Road" as the first harmful event

- Some crashes occurring on wet pavement were not coded correctly or in other cases the entry box was entirely left empty when the crash narrative provided evidence of the observed pavement condition.

In addition to data correction efforts, the crash data review team recorded additional data not originally part of the State crash data system that would prove to be useful in the analysis of crash trends. That additional crash information included whether or not a vehicle struck the bridge barrier wall at any point in the crash sequence. If a vehicle was determined to hit the wall, the wall that was struck was recorded (inside or outside bridge wall). In addition, any additional notes to the crash were recorded to determine if there were any other factors influencing crashes and crash locations. These notes often included details based on driver statements that did not get reflected in one of the standard recorded data entries on the crash forms.

6.3. Crash Data Results

After review of the crash data, it was determined that of the original 1,342 crash reports, 1,199 (1,083 long form and 116 short form) crashes occurred within the project limits of the study area. The remaining analysis is based on the data from the 1,199 confirmed crashes. Two fatal crashes occurring in 2014 were added to the crash review based on their severity. Table 6-1 and Figure 6-1 below illustrate the crash distribution by year.

Table 6-1 Crashes by Year and Form Type (I-295 MP 4.6 to MP 10.0)

Total Number of Crashes (2009-2013)							
	Severity	**2009**	**2010**	**2011**	**2012**	**2013**	**Total**
Long Forms	Property Damage Only (PDO) Crashes	72	66	124	144	216	**622**
	Injury Crashes	70	79	93	92	117	**451**
	Fatal Crashes	3	1	1	3	2	**10**
	Sub-Total	**145**	**146**	**218**	**239**	**335**	**1083**
Short Forms	Property Damage Only (PDO) Crashes	n/a	n/a	62	46	8	**116**
Total	Property Damage Only (PDO) Crashes	72	66	186	190	224	**738**
	Injury Crashes	70	79	93	92	117	**451**
	Fatal Crashes	3	1	1	3	2	**10**
	Total	**145**	**146**	**280**	**285**	**343**	**1,199**

* Table does not include 2 fatal crashes reported in 2014
Short forms were not available between 2009-2010
Collins Road / US 17 Interchange Improvements were under construction during 2011-2013.

Figure 6-1 Crash Distribution by Year (I-295 MP 4.6 to MP 10.0)

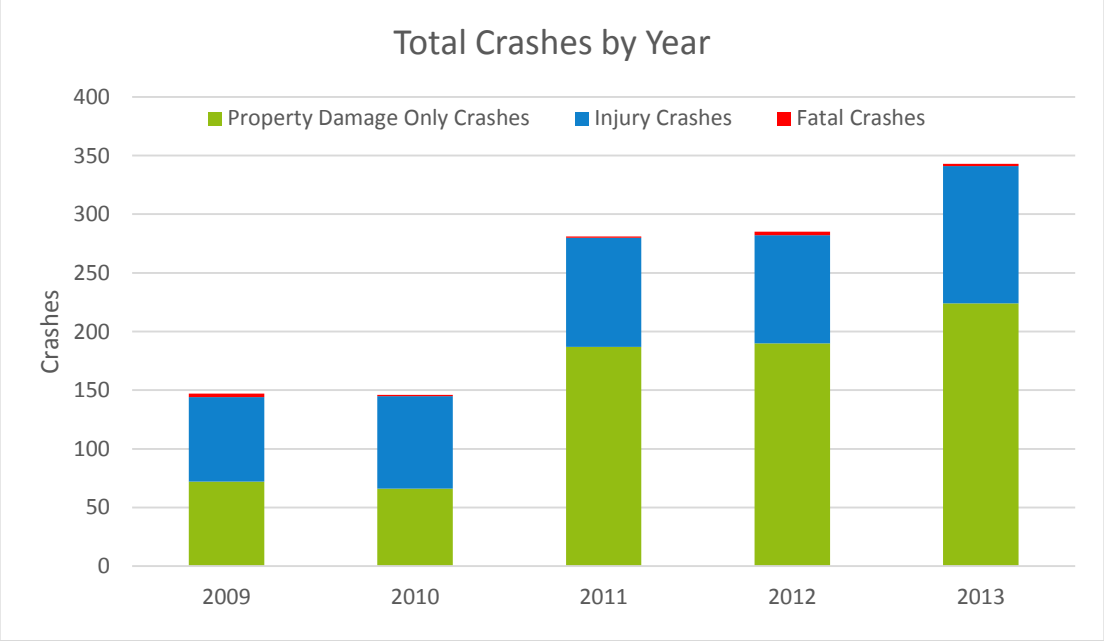


Figure does not include short form crash reports for 2009 and 2010, which were not available

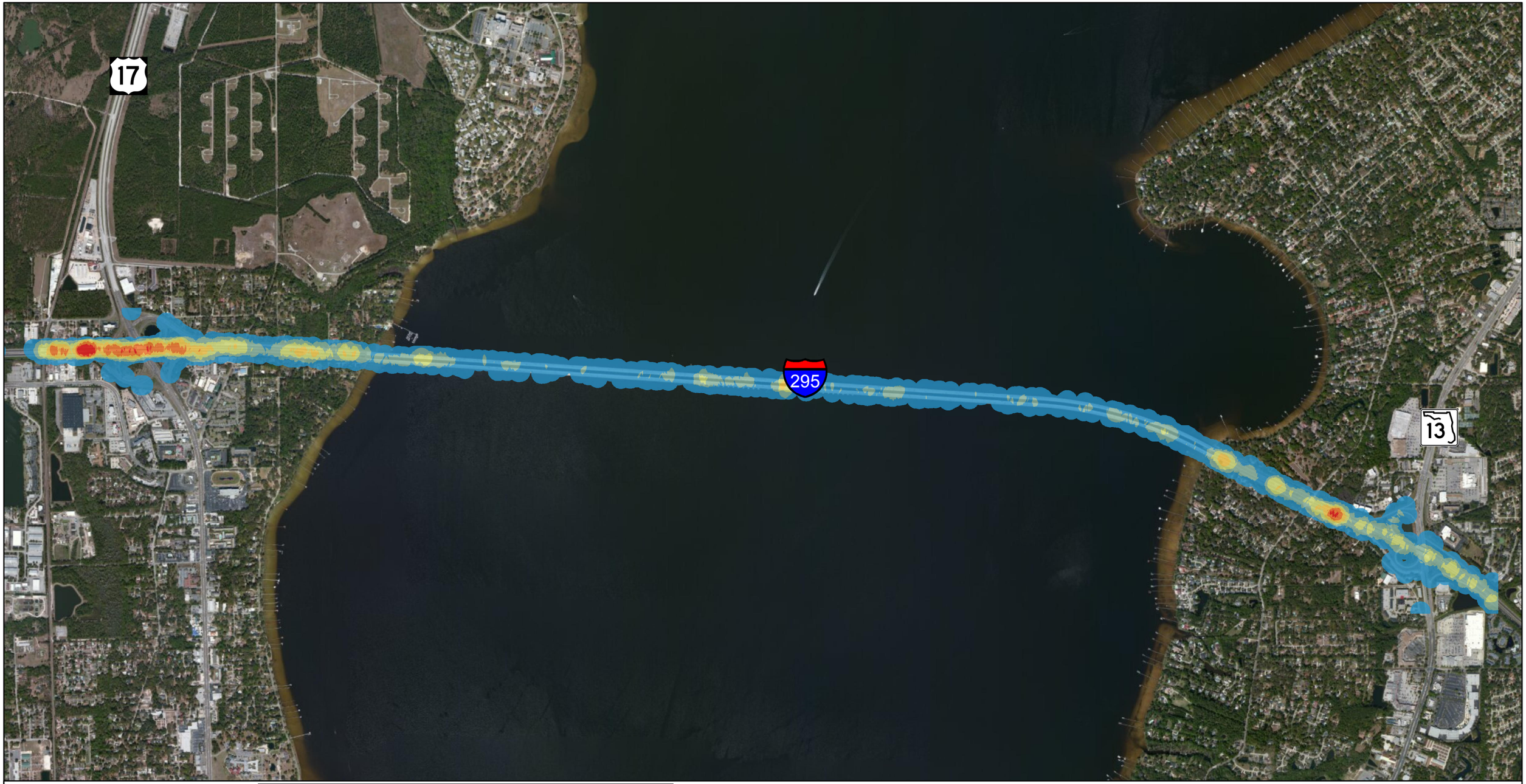
Furthermore, the 1,199 crashes were separated by the section of roadway in which they occurred. Table 6-2 below shows the breakdown between crashes occurring on the mainline of I-295 versus the interchange ramps connecting to US 17 and SR 13. Also included in this table is the breakdown of crash severity by section. As expected, the mainline of I-295 has the most crashes with 1,096 crashes (631 crashes northbound and 465 crashes southbound). The ramps experiencing the highest number of crashes were the I-295 northbound to US 17 Ramp (Section 72001014) with 43 crashes and US 17 northbound to I-295 SB Ramp (Section 72001013) with 22 crashes.

Table 6-2 Crash Location Breakdown

Total Number of Crashes (2009-2013)					
Section Location	**Section #**	**PDO**	**Injury**	**Fatal**	**Total Crashes**
Mainline I-295 NB (Land)	72001000	228	149	3	**380**
Mainline I-295 NB (Buckman Bridge)	72001000	130	89	4	**223**
Mainline I-295 SB (Land)	72001000	180	105	1	**286**
Mainline I-295 SB (Buckman Bridge)	72001000	109	62	1	**172**
Ramp: I-295 NB to SR 13 NB	72001006	4	3	0	**7**
Ramp: I-295 NB to SR 13 SB	72001009	8	1	0	**9**
Ramp: I-295 SB to SR 13	72001011	11	1	0	**12**
Ramp: SR 13 NB to I-295 SB	72001005	2	3	0	**5**
Ramp: SR 13 to I-295 NB	72001007	6	0	0	**6**
Ramp: SR 13 SB to I-295 SB	72001010	0	3	0	**3**
Ramp: I-295 NB to US 17	72001014	27	16	0	**43**
Ramp: I-295 SB to US 17	72001019	7	2	0	**9**
Ramp: US 17 NB to I-295 SB	72001013	9	12	1	**22**
Ramp: US 17 NB to I-295 NB	72001015	3	2	0	**5**
Ramp: US 17 SB to I-295 NB	72001020	6	0	0	**6**
Ramp: US 17 SB to I-295 SB	72001018	8	3	0	**11**
	Total	**738**	**451**	**10**	**1,199**

In 2014 one fatal crash occurred on I-295 NB (Bridge) and one occurred on Section 72001005

Crash severities were also classified by time of day based upon the hour reported in the crash records. This data showed that the most crashes occurred during the hours of 8 AM (129 crashes), 5 PM (139 crashes), and 6 PM (155 crashes). Of the ten (10) fatal crashes, four (4) occurred during the peak commuting hours (7:00-9:00 AM & 5:00-7:00 PM) and six (6) occurred during the off peak hours. Five (5) of the six (6) off peak hour fatal crashes occurred in the late hours of the night between 10:00 PM and 5:00 AM. Table 6-3 and Figure 6-2 illustrate the crash distribution by time and severity.



Crash Density Map
All Crashes (2009-2013)

I-295 (SR 9A) Buckman Bridge Safety Study
FPI No. 211083-1-62-14
FDOT District 2
Jacksonville, Florida

Density of Crashes - All Crashes (2009-2013)

High

Low

Figure 6-2

1 in = 1,750 feet

0 1,500 3,000

Feet

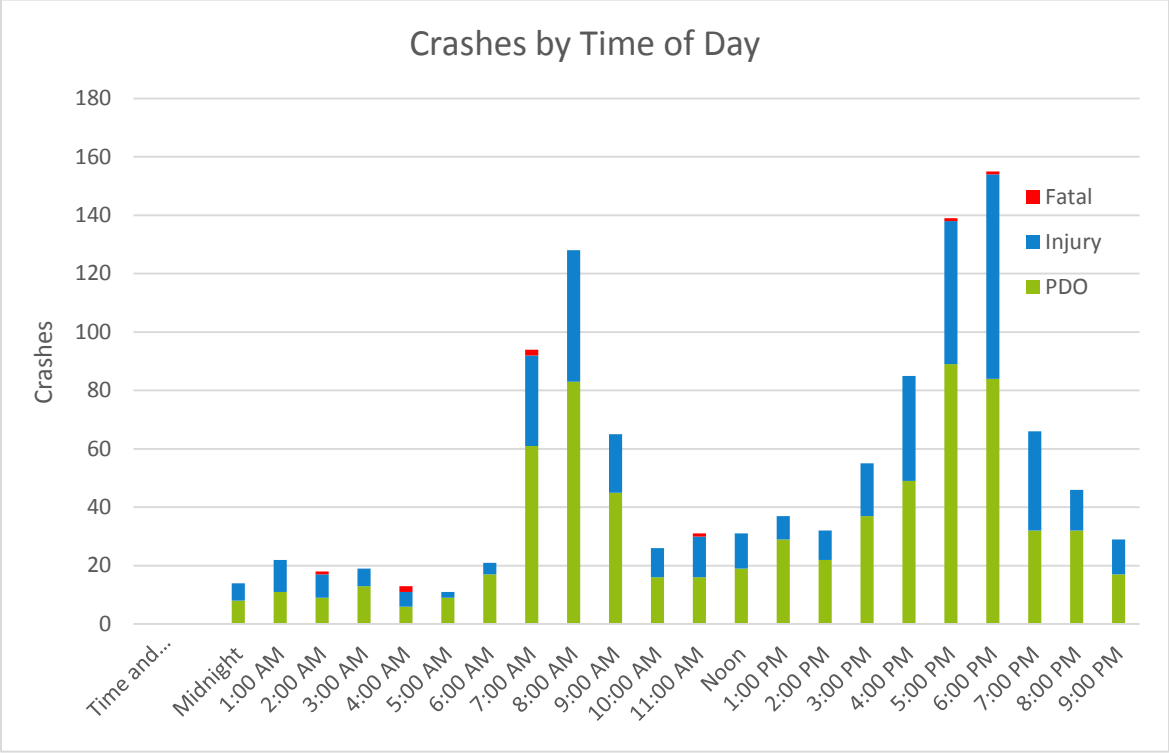
Figure Date: 4/16/2015

Table 6-3 Crash Distribution by Time and Severity

Total Number of Crashes (2009-2013)				
Beginning of Hour	**PDO**	**Injury**	**Fatal**	**Total Crashes**
12:00 AM	8	6	0	14
1:00 AM	11	11	0	22
2:00 AM	9	8	1	18
3:00 AM	13	6	0	19
4:00 AM	6	5	2	13
5:00 AM	9	2	0	11
6:00 AM	17	4	0	21
7:00 AM	61	31	1	93
8:00 AM	83	45	1	129
9:00 AM	45	20	0	65
10:00 AM	16	10	0	26
11:00 AM	16	14	1	31
12:00 PM	19	12	0	31
1:00 PM	29	8	0	37
2:00 PM	22	10	0	32
3:00 PM	37	18	0	55
4:00 PM	49	36	0	85
5:00 PM	89	49	1	139
6:00 PM	84	70	1	155
7:00 PM	32	34	0	66
8:00 PM	32	14	0	46
9:00 PM	17	12	0	29
10:00 PM	15	12	2	29
11:00 PM	19	14	0	33

In 2014 there were two recorded fatal crashes, one at 12:05 AM and one at 7:50 AM

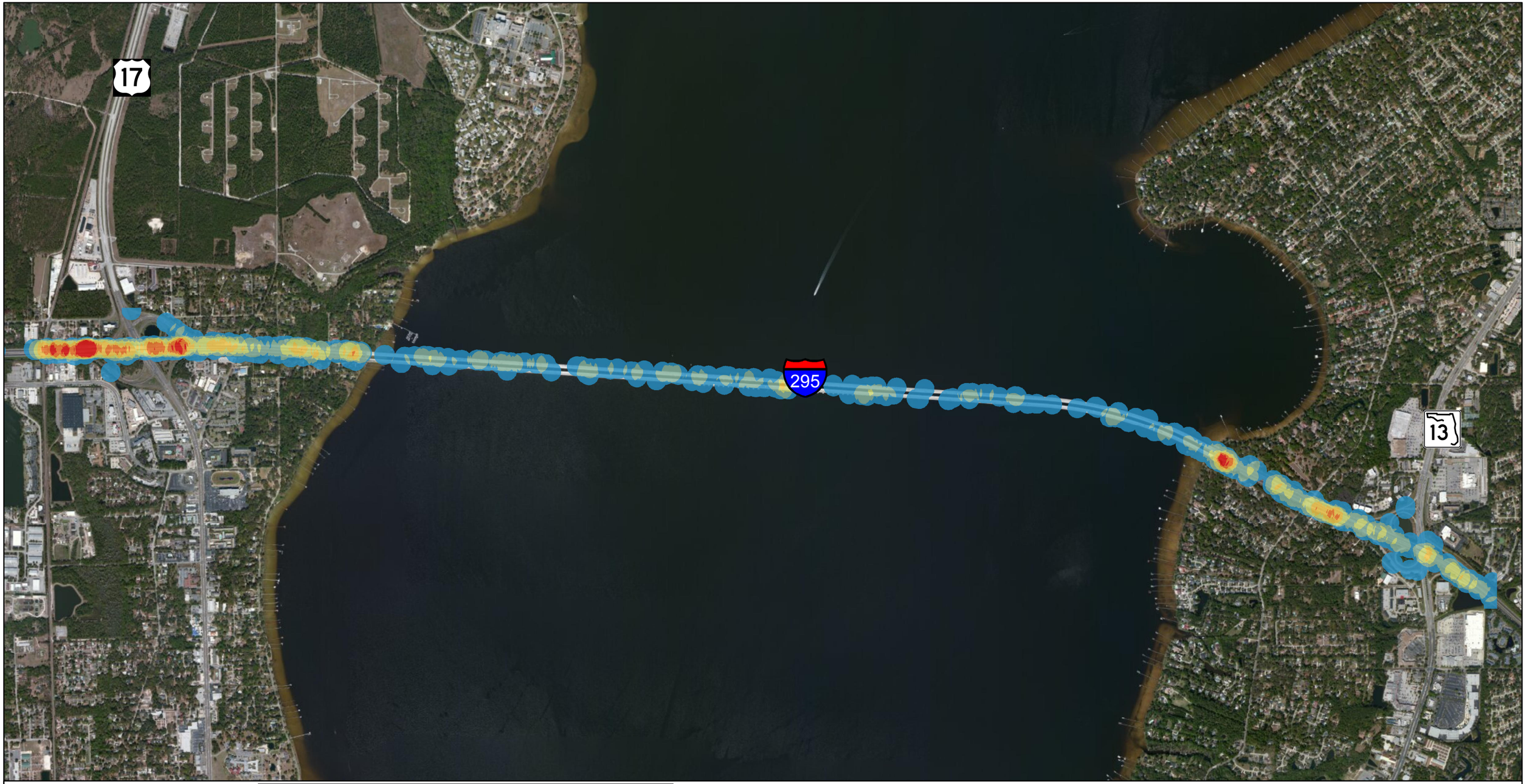
Figure 6-3 Crash Distribution by Time of Day (2009-2013)



Crashes were also classified by the Crash Type (known as on the Florida Crash codes as First Harmful Event) and separated by years in Table 6-4. The most reoccurring crash types were Rear End (588), Sideswipe (199), Hit Guardrail (133), and Hit Bridge Wall (91). It should be noted that the crashes in this table represent the characteristics of the collision and not necessarily what led to the crash. For example, a "Hit Wall (on bridge)" crash may have been the result of a vehicle encroaching upon another's path thus forcing one of the vehicles to swerve into the bridge wall. This represents a 'near-miss' sideswipe but is coded as a "Hit Wall (on bridge)" since without the wall, the collision may have been avoided. Conversely, this table does not represent all the crashes where the guardrail or bridge wall was struck as a result of the initial collision. For example, if a vehicle is rear ended, and as a result, runs into the bridge wall this crash would be coded as a "Rear End", not a "Hit Wall (on bridge)." The tables and figures are provided to quantify and illustrate the Crash types over the five year study period.

Table 6-4 Crash Distribution by Year and Type (Both Directions)

Number of Crashes (2009-2013)							
Crash Type	**2009**	**2010**	**2011**	**2012**	**2013**	**Total**	**%**
Rear End	47	64	142	144	191	**588**	**49%**
Sideswipe	32	30	39	46	52	**199**	**17%**
Hit Guardrail	23	16	34	26	34	**133**	**11%**
Hit Wall (on bridge)	18	13	20	18	22	**91**	**8%**
Hit Moveable Object	5	6	11	13	12	**47**	**4%**
Cargo Loss or Shift	6	4	6	11	14	**41**	**3%**
Overturned	3	4	7	13	8	**35**	**3%**
Hit Parked Car	2	5	5	1	5	**18**	**1%**
Ran Into Ditch	4	1	2	5	2	**14**	**1%**
Hit Wall (not on bridge)	1	1	4	3	0	**9**	**1%**
Hit Tree	2	1	1	1	0	**5**	**<1%**
Angle	2	0	2	0	1	**5**	**<1%**
Hit Sign	0	1	2	1	0	**4**	**<1%**
Separation of Units	0	0	0	1	2	**3**	**<1%**
Hit Utility Pole	0	0	2	0	0	**2**	**<1%**
Hit Fence	0	0	2	0	0	**2**	**<1%**
Fell From Vehicle	0	0	0	2	0	**2**	**<1%**
Hit Pedestrian	0	0	1	0	0	**1**	**<1%**
Total	**145**	**146**	**280**	**285**	**343**	**1,199**	**100%**



Crash Density Map
Rear End Crashes (2009-2013)

I-295 (SR 9A) Buckman Bridge Safety Study
FPI No. 211083-1-62-14
FDOT District 2
Jacksonville, Florida

Density of Crashes - Rear End Crashes (2009-2013)

High

Low

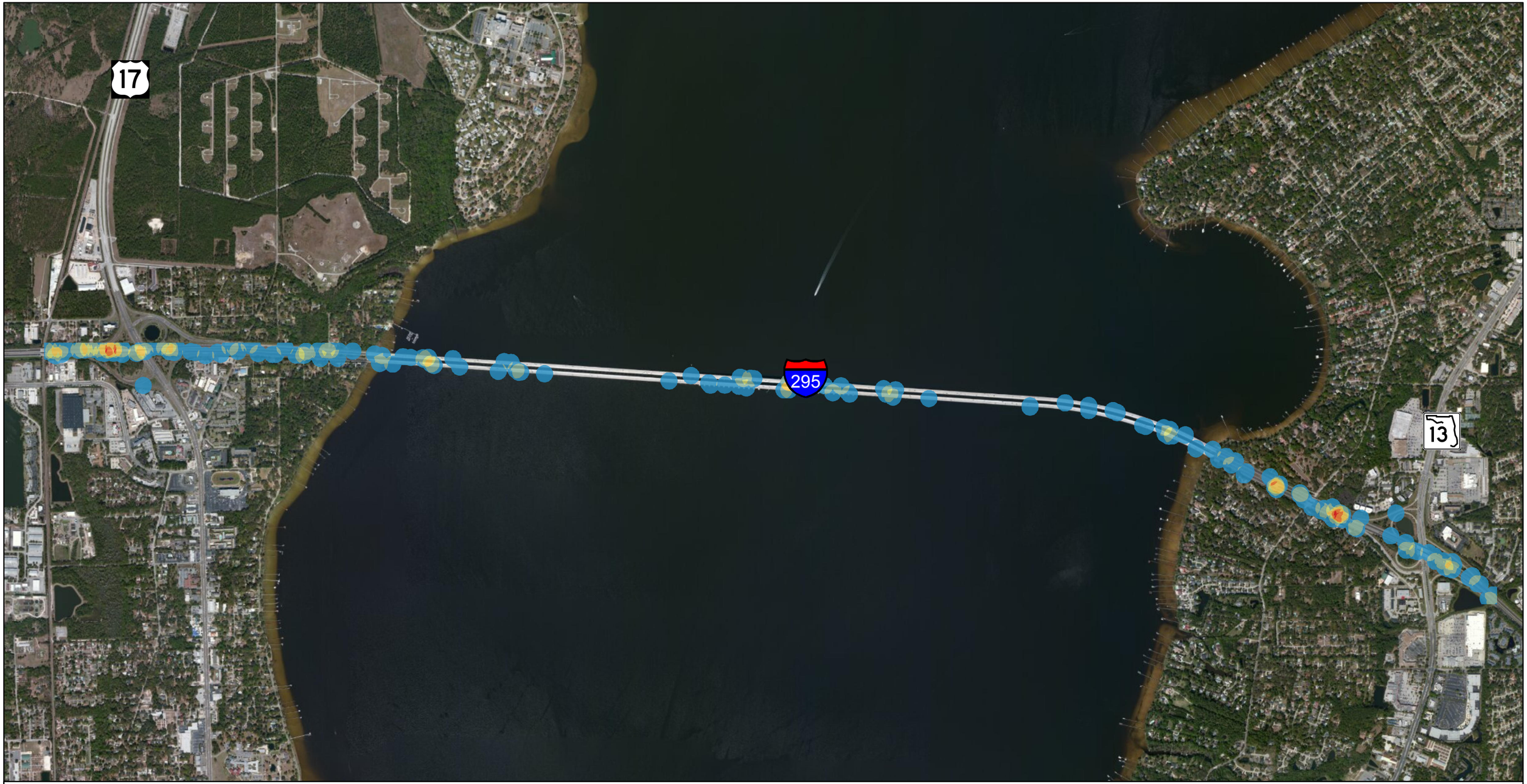
Figure 6-4

1 in = 1,750 feet

0 1,500 3,000

Feet

Figure Date: 4/16/2015



Crash Density Map
Sideswipe Crashes (2009-2013)

I-295 (SR 9A) Buckman Bridge Safety Study
FPI No. 211083-1-62-14
FDOT District 2
Jacksonville, Florida

Density of Crashes - Sideswipe Crashes (2009-2013)

High

Low

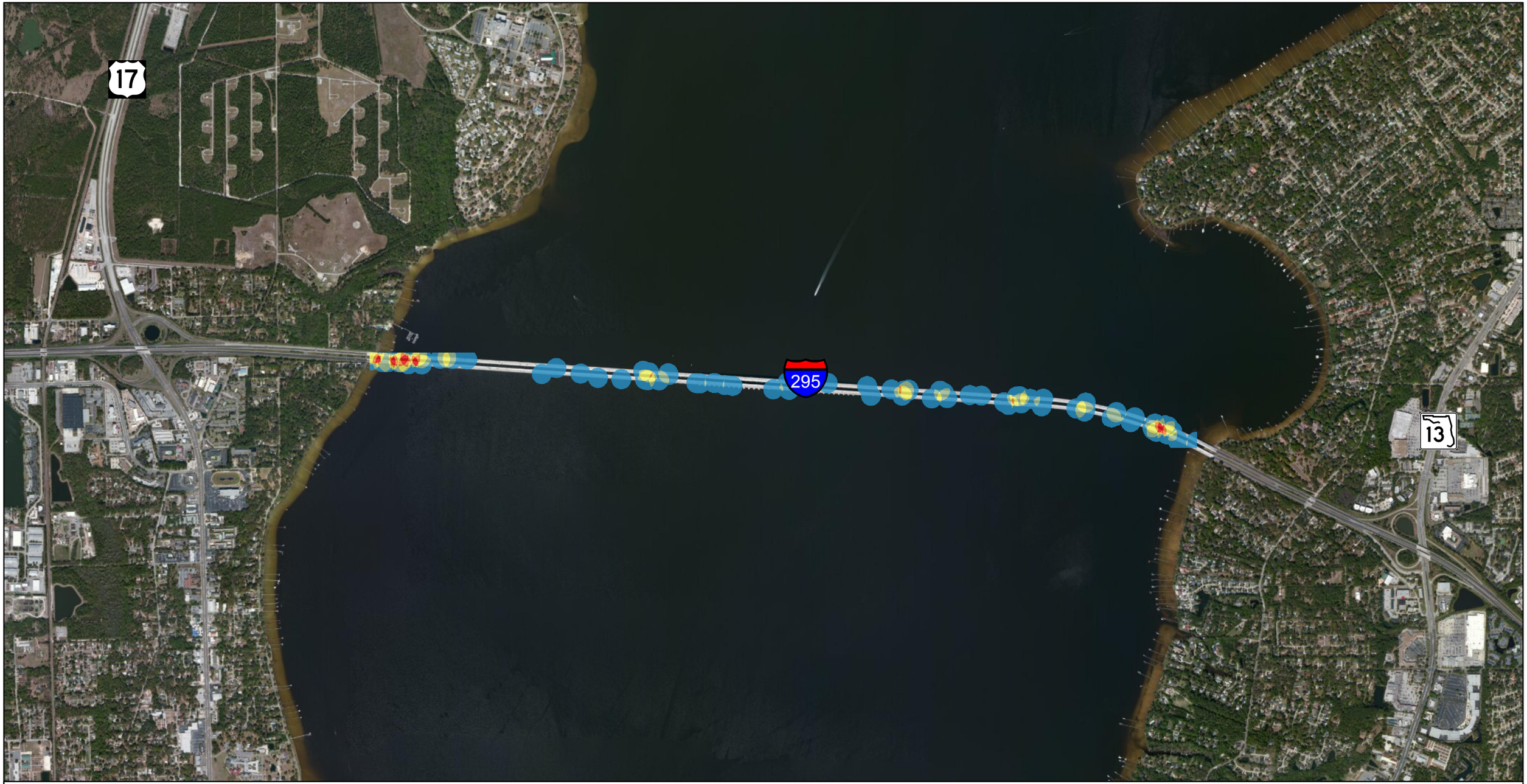
Figure 6-5

1 in = 1,750 feet

0 1,500 3,000

Feet

Figure Date: 4/16/2015



Crash Density Map
Wall or Barrier Crashes

I-295 (SR 9A) Buckman Bridge Safety Study
FPI No. 211083-1-62-14
FDOT District 2
Jacksonville, Florida

Density of Crashes - Wall/Barrier Crashes (2009-2013)

High

Low

Figure 6-6

1 in = 1,750 feet

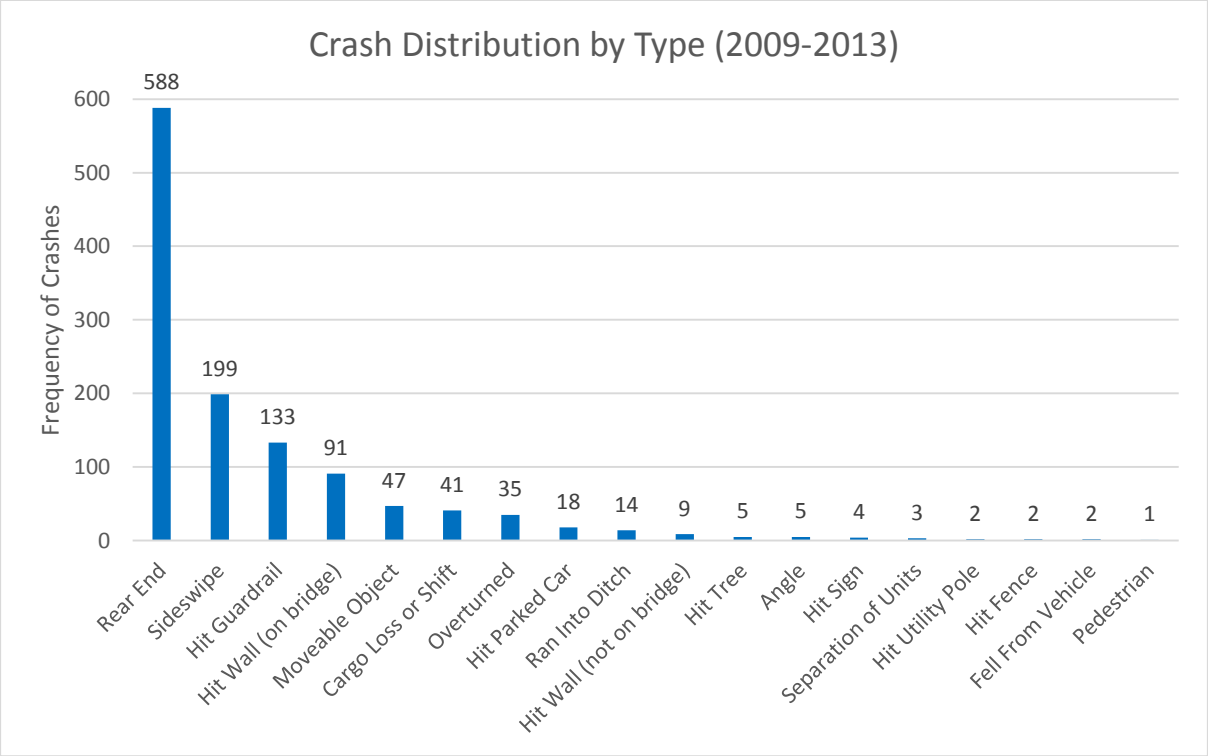
0 1,500 3,000

Feet

Figure Date: 4/16/2015

The below figure provides an illustrative snapshot of the data provided in Table 6-4.

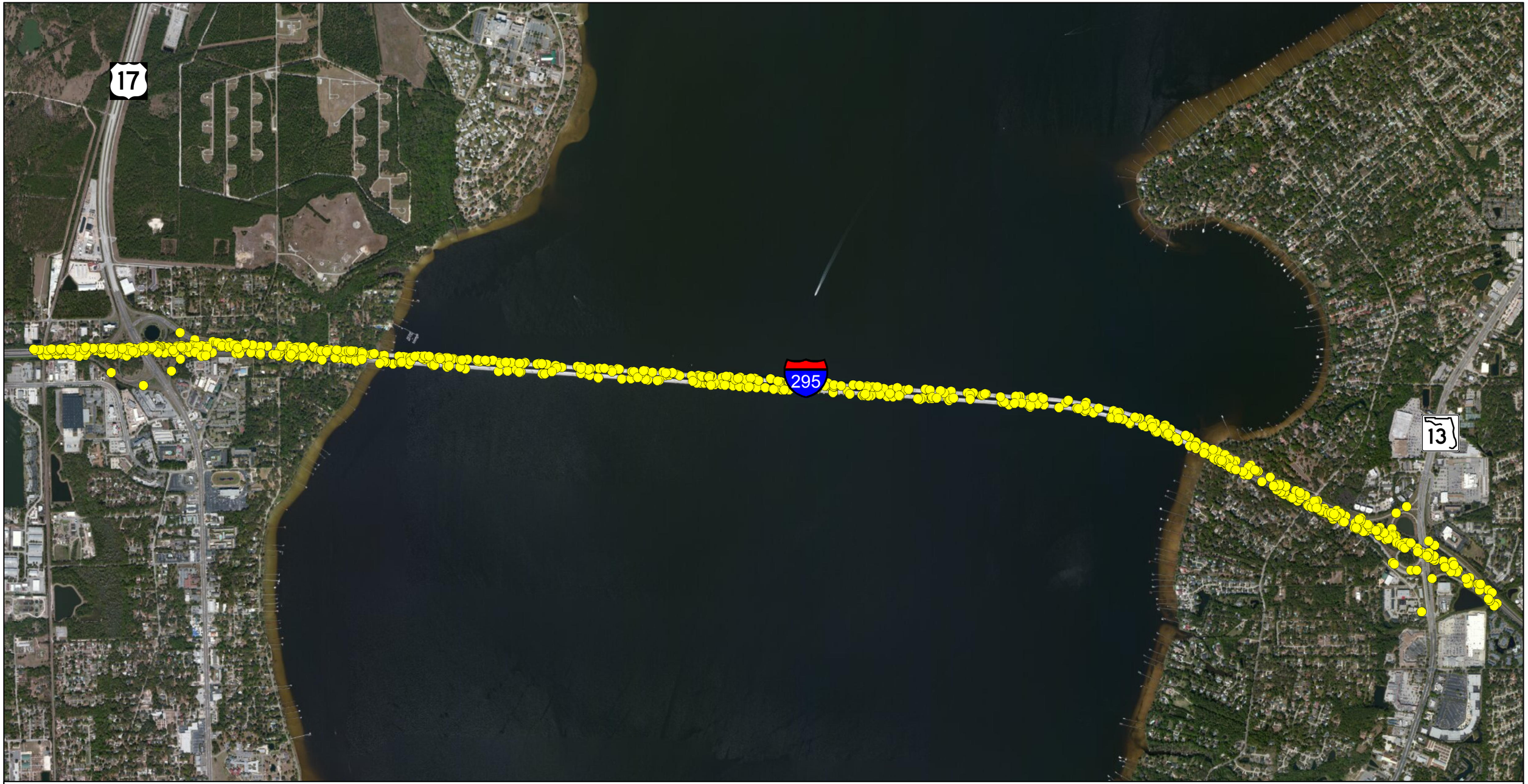
Figure 6-7 Crash Distribution by Crash Type



Crash analysis of the Pavement Surface at time of the crash showed that there were 843 crashes recorded during dry pavement conditions (or 70% of the total crashes) and 356 crashes recorded during wet pavement conditions (or 30% of the total crashes). Table 6-5 summarizes these crashes by year. Figures 6-8 and 6-9 illustrate the locations of these crashes.

Table 6-5 Crash Distribution by Pavement Surface

Crashes Distribution by Pavement Surface							
Pavement Condition	**2009**	**2010**	**2011**	**2012**	**2013**	**Total**	**%**
Dry Pavement	104	128	188	189	234	**843**	**70%**
Wet Pavement	41	18	92	96	109	**356**	**30%**



Crash Locations:
Dry Pavement Conditions

I-295 (SR 9A) Buckman Bridge Safety Study
FPI No. 211083-1-62-14
FDOT District 2
Jacksonville, Florida

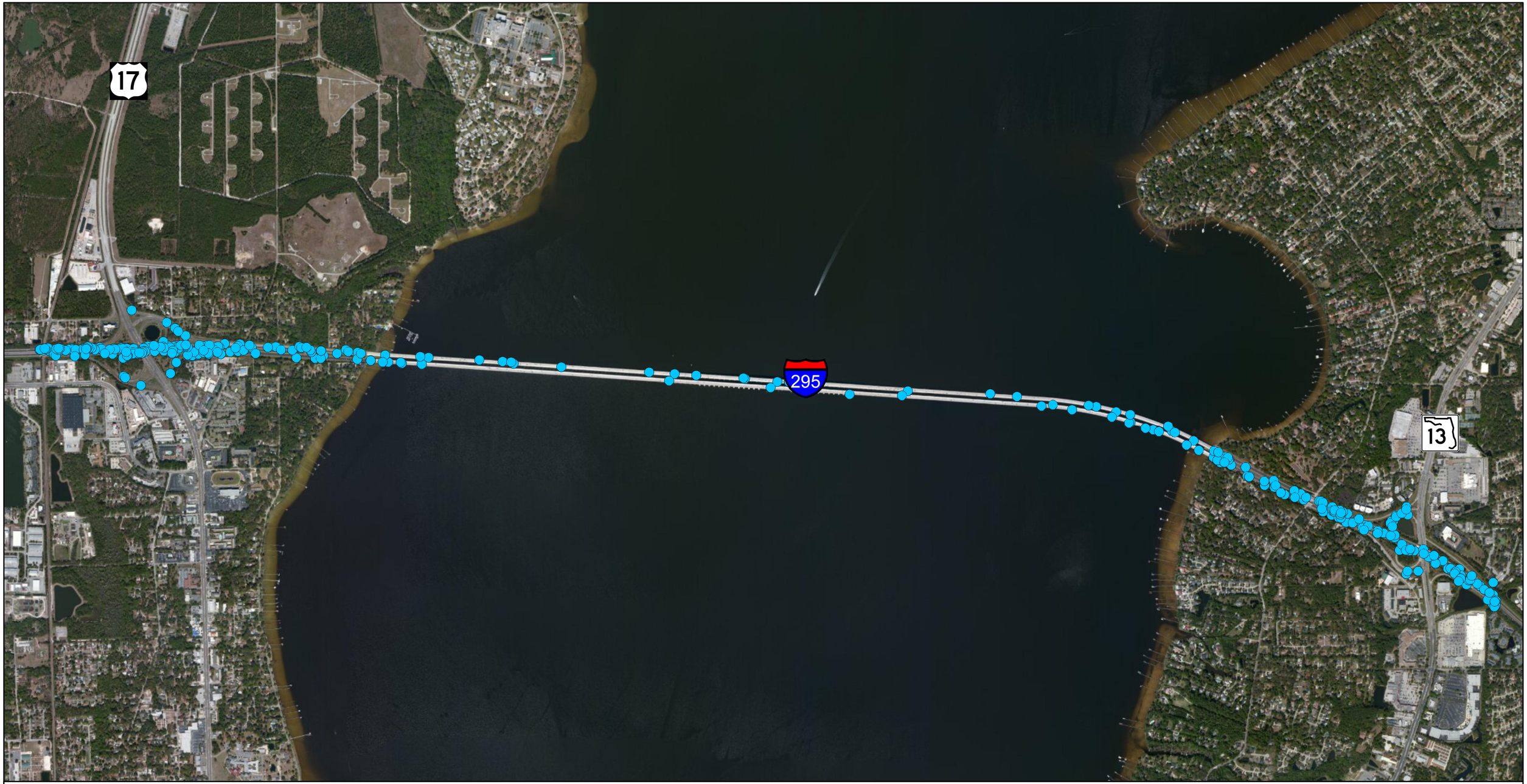
Dry Pavement Conditions Crash Locations

Figure 6-8

1 in = 1,750 feet

0 1,500 3,000
Feet

Figure Date: 4/16/2015



Crash Locations:
Wet Pavement Conditions

I-295 (SR 9A) Buckman Bridge Safety Study
FPI No. 211083-1-62-14
FDOT District 2
Jacksonville, Florida

Wet Pavement Conditions Crash Locations

Figure 6-9

1 in = 1,750 feet

0 1,500 3,000
Feet

Figure Date: 4/16/2015

This study investigated the crashes that resulted in one or more of the vehicles making contact with the bridge wall along the Buckman Bridge. The two tables below provide statistics on the quantity and type of crashes occurring within the entire study area that did not involve the bridge wall versus how many resulted in a vehicle hitting some part of the bridge wall. Also included in these tables is information as to which bridge wall a vehicle made contact (either inside wall, outside wall, or both walls) and whether the crash resulted in a vehicle going over the wall.

For the northbound direction, the data shows that 74 crashes resulted in the bridge wall being struck. Of those 74 crashes, no crashes (0%) resulted in a vehicle departing the bridge. The crash in 2014 that resulted in a vehicle departing the bridge was the result of a sideswipe, with the outside barrier wall being hit and the vehicle departing the bridge resulting in one fatality. For the Southbound direction, the data shows that 62 crashes resulted in the bridge wall being struck, of which one (1) crash (or 1.6%) resulted in a vehicle departing the bridge. The southbound crash was the subsequent result of an initial sideswipe crash, resulting in a fatality. Table 6-8 shows the quantity and percentages of crashes involving a vehicle departure.

Table 6-6 Distribution of Crashes that Made Contact with the Bridge Wall in the NB direction

Number of Crashes (2009-2013)										
Crash Type	Total NB	Not On Bridge	On Bridge	Breakdown of Crashes Occurring On NB Bridge Span						
				% of Total On Bridge	Hit Bridge Wall	% of Bridge crashes Hit Wall	Bridge Wall Impact			
							Inside Wall	Outside Wall	Both Walls	Over Wall
Rear End	367	266	101	28%	13	13%	7	6	0	0
Sideswipe	97	67	30	31%	8	27%	5	3	0	0
Hit Guardrail	72	72	0	1%	0	-	0	0	0	0
Hit Wall (on bridge)	47	0	47	100%	47	100%	22	19	6	0
Hit Moveable Object	24	11	13	54%	1	8%	0	1	0	0
Cargo Loss or Shift	28	12	16	57%	0	0%	0	0	0	0
Overturned	15	13	2	13%	1	50%	0	1	0	0
Hit Parked Car	16	4	12	75%	4	33%	1	3	0	0
Ran Into Ditch	4	4	0	0%	0	-	0	0	0	0
Hit Wall (not on bridge)	2	2	0	0%	0	-	0	0	0	0
Hit Tree	1	1	0	0%	0	-	0	0	0	0
Angle	2	2	0	0%	0	-	0	0	0	0
Hit Sign	1	1	0	0%	0	-	0	0	0	0
Separation of Units	1	1	0	0%	0	-	0	0	0	0
Hit Utility Pole	0	0	0	-	0	-	0	0	0	0
Hit Fence	0	0	0	-	0	-	0	0	0	0
Fell From Vehicle	2	2	0	0%	0	-	0	0	0	0
Hit Pedestrian	1	0	1	100%	0	0	0	0	0	0
Total	**680**	**457**	**223**	**33%**	**74**	**25%**	**35**	**33**	**6**	**0**

In 2014 there was one recorded crash that resulted in a vehicle departing the outside wall following a sideswipe crash

Table 6-7 Distribution of Crashes that Made Contact with the Bridge Wall in the SB direction

Number of Crashes (2009-2013)										
Crash Type	Total SB	Not on Bridge	On Bridge	Breakdown of Crashes Occurring On SB Bridge Span						
				% of Total On Bridge	Hit Bridge Wall	% of Bridge crashes Hit Wall	Bridge Wall Impact			
							Inside Wall	Outside Wall	Both Walls	Over Wall
Rear End	221	159	62	28%	3	5%	1	2	0	0
Sideswipe	102	63	39	38%	12	31%	6	4	1	1
Hit Guardrail	61	61	0	0%	0	-	0	0	0	0
Hit Wall (on bridge)	44	0	44	100%	44	100%	19	22	3	0
Hit Moveable Object	23	10	13	57%	0	0%	0	0	0	0
Cargo Loss or Shift	13	3	10	77%	0	0%	0	0	0	0
Overturned	20	19	1	5%	1	100%	0	1	0	0
Hit Parked Car	2	1	1	50%	1	100%	0	0	1	0
Ran Into Ditch	10	10	0	0%	0	-	0	0	0	0
Hit Wall (not on bridge)	7	7	0	0%	0	-	0	0	0	0
Hit Tree	4	4	0	0%	0	-	0	0	0	0
Angle	3	3	0	0%	0	-	0	0	0	0
Hit Sign	3	3	0	0%	0	-	0	0	0	0
Separation of Units	2	0	2	100%	1	50%	0	1	0	0
Hit Utility Pole	2	2	0	0%	0	-	0	0	0	0
Hit Fence	2	2	0	0%	0	-	0	0	0	0
Fell From Vehicle	0	0	0	-	0	-	0	0	0	0
Hit Pedestrian	0	0	0	-	0	-	0	0	0	0
Total	**519**	**347**	**172**	**33%**	**62**	**32%**	**26**	**30**	**5**	**1**

In 2014 there was one SB fatality that occurred off the Bridge Span

In 2012 there was one SB Sideswipe where the vehicle did not strike the bridge wall but resulted in a pedestrian falling off the bridge deck

Table 6-8 Percentage of Crashes Involving Bridge Wall that Resulted in a Vehicle Bridge Departure

Number of Crashes (2009-2013)				
Direction	Hit Wall	Bridge Departure	% of Crashes involving the Wall that went over	Fatalities
NB	74	0	0%	0
SB	62	1	1.6%	1
Both Directions	**136**	**1**	**0.7%**	**1**

In 2014 there was one recorded crash that departed the outside wall and lead to one fatality.

6.4. Crash Rates

For this study, the *FDOT Crash Reduction Guide* methodology is used to calculate crash rates using a variety of different conditions that are described in more detail below. In this methodology, the total number of crashes occurring in the study period is divided by the mean ADT and length of the study area. The mean ADT is defined in the *FDOT Crash Reduction Guide* as the summation of individual ADTs associated with each crash divided by the total number of crashes. The results of this methodology are reported in crashes per one million vehicle miles of travel.

The formula used for calculating a crash rate per one million miles of travel is as follows:

$$Crash\ Rate = \frac{Total\ Number\ of\ Crashes\ x\ 1{,}000{,}000}{Number\ of\ Days\ x\ Mean\ ADT\ x\ Project\ Section\ Length\ in\ Miles}$$

Each crash record typically includes the corresponding average daily traffic (ADT). Therefore an approximation of the mean ADT can be calculated as:

$$Mean\ ADT = \frac{Summation\ of\ Indivdual\ ADTs\ Assocated\ with\ each\ Crash}{Total\ Number\ of\ Crashes}$$

This facility is a divided interstate thus the directions of travel have no interaction with the other. Therefore, the crash rates were calculated for northbound and southbound separately. Crashes occurring on the ramps were not included for this analysis. Each crash rate was calculated for the entire 5 year study (2009-2013) and for each individual year.

The mainline crash rates, as well as crash rates for northbound mainline and southbound mainline separately, were calculated using the following four different conditions:

1. Crash rate for the entire mainline study area (5.4 miles)
2. Crash rate for the bridge span only (3.1 miles)
3. Crash rate for all mainline off-bridge areas (2.3 miles)
4. Crash rate for all mainline off-bridge areas - North and South ends of Bridge

The resulting mainline crash rates are provided in the following table, Table 6-9. Crashes on the ramps within the US 17 and SR 13 Interchanges are not included in this analysis. All results are shown as 'per one million vehicle miles of travel.'

Table 6-9 Crash Rates Table for I-295 Mainline Only

Mainline Only Crash Rates (No Ramp Crashes) (per million vehicle miles of travel)															
	Entire Study Area 5.4 Miles			Bridge Span Only 3.1 Miles			Off-Bridge Areas 2.3 Miles			Off-Bridge Areas – North: 1.2 Miles			Off-Bridge Areas – South: 1.1 Miles		
Year	Both Directions	NB Only	SB Only	Both Directions	NB Only	SB Only	Both Directions	NB Only	SB Only	Both Directions	NB Only	SB Only	Both Directions	NB Only	SB Only
2009	0.56	0.61	0.52	0.36	0.41	0.30	0.84	0.89	0.80	0.77	1.02	0.52	0.92	0.75	1.10
2010	0.56	0.58	0.54	0.45	0.50	0.39	0.71	0.69	0.73	0.79	0.94	.64	0.62	0.41	0.82
2011	1.07	1.16	0.98	0.64	0.74	0.55	1.64	1.73	1.55	1.70	2.30	1.10	1.57	1.10	2.05
2012	1.07	1.28	0.85	0.66	0.73	0.59	1.62	2.04	1.19	1.84	2.81	0.87	1.37	1.19	1.55
2013	1.26	1.53	1.01	0.82	0.96	0.69	1.86	2.30	1.43	2.17	3.26	1.14	1.51	1.27	1.75
Avg.	**0.90**	**1.03**	**0.78**	**0.58**	**0.66**	**0.51**	**1.33**	**1.53**	**1.14**	**1.46**	**2.07**	**0.86**	**1.20**	**0.94**	**1.45**

It should be noted that no Short-Form crash reports were available for the years 2009 and 2010. Also, from early 2011 through December 2013, the Collins Road interchange construction project was ongoing. It was not determined as part of this study if this construction had any impact to the number of crashes occurring during this time.

According to the FDOT Crash Analysis Reporting System, the average crash rate for Urban Interstates in Duval County from 2009 to 2013 was 0.844 crashes per million vehicle miles of travel. When compared to the countywide average for the five year period, the study area has a slightly higher crash rate (0.90).

Table 6-9 shows an increase in the crash rates for the Entire Study Area beginning in 2011 and continuing through 2013. The overall crash rate was 0.56 crashes per million miles travelled in 2009 and 1.26 crashes per million mile travelled in 2013. The crash rate for the Bridge Span increased from 0.36 to 0.82 during the same five year period. It should be noted that no Short-Form crash reports were available for the years 2009 and 2010. Also, the Collins Road interchange project was under construction from early 2011 through December 2013.

The Off-Bridge Areas had higher crash rates with northbound I-295 experiencing a 2.30 crash rate in 2013 and northbound I-295 on the north side of the bridge experiencing a crash rate of 3.26 in 2013. This area had the Collins Road interchange construction project going on from early 2011 through December 2013. While the impact of this construction project on the number of crashes during this period cannot be determined, the number of post-construction crashes should continue to be monitored. The two improvement projects at the US 17 Interchange described in Section 3 of this report could also provide operational improvements potentially lowering the crash rates.

6.5. Crash Causes

In addition to the crash data already discussed, all crash reports include a coding for the cause of the crash. Upon review of the crash cause it was discovered that many of the reports contained insufficient information to verify or revise the accuracy of the cause. The fact that the reporting officer was not present at the time of the crash means that in a majority of crash write-ups the officer relied upon driver statements to determine the cause of the crash. Therefore, in many cases, the crashes were coded as “Careless Driving” when there may have been a more descriptive code to use. Table 6-10 shows the causes of all crashes, crashes on the bridge, and crashes off the bridge as reported in the crash reports.

Careless Driving, at 61% of all crashes, is the primary cause of crashes within the study area. Other major causes include Improper Lane Change, Followed Too Closely, Exceeded State Speed Limit, Failed to Maintain Equipment, and Driver Distraction. Thirteen percent of the crashes were coded as No Improper Driving/Action. All other crashes were coded as either a driver error or a vehicle condition crash.

Table 6-10 Crash Cause as listed in Crash Reports

Recorded Crash Cause (2009-2013)						
Crash Type	Total Crashes		On Bridge Crashes		Off Bridge Crashes	
	#	%	#	%	#	%
Careless Driving	735	61%	215	54%	520	65%
No Improper Driving/Action	161	13%	66	17%	95	12%
Improper Lane Change	80	7%	33	8%	47	6%
Followed too Closely	47	4%	13	3%	34	4%
Exceeded State Speed Limit	17	1%	1	0%	16	2%
Failed to Maintain Equip/Vehicle	17	1%	14	4%	3	0%
Alcohol	13	1%	4	1%	9	1%
Driver Distraction	11	1%	4	1%	7	1%
Improper Load	8	1%	4	1%	4	0%
Alcohol and drugs	7	1%	3	1%	4	0%
Improper Turn	4	0%	1	0%	3	0%
Drugs	4	0%	3	1%	1	0%
Improper Passing	3	0%	1	0%	2	0%
Obstructing Traffic	3	0%	3	1%	0	0%
Failure to Yield Right of Way	2	0%	0	0%	2	0%
Driving Wrong Side/way	2	0%	0	0%	2	0%
Disregarded Other Traffic Control	1	0%	0	0%	1	0%
All other	73	6%	30	8%	43	5%
Blank	11	1%	0	0%	11	1%
Total	**1,199**	**-**	**395**	-	**804**	-

6.6. Fatal Crash Summary

During the period of 2009 through 2013, there were twelve crashes within the study area that resulted in fatalities or a vehicle or a passenger departing from the bridge. There were an additional two crashes in 2014 that have been added to this analysis for a total of 14 fatal crashes.

Figure 6-10 shows the location of each of the fourteen crashes and includes a summary of information relative to each crash. Eight of these crashes were on the Buckman Bridge and six of these were not on the bridge, four on the south end of the Study Area and two on the north end.

Crashes on the Buckman Bridge resulting in Vehicles/Trailers/Passengers Exiting the Bridge

There have been four crashes that resulted in either a vehicle (2 crashes), a passenger in a vehicle (1 crash), or a trailer (1 crash) going over the wall into the St. Johns River.

Two crashes resulted in a vehicle leaving the bridge, these are shown as No. 4 and 11 on the Figure 6-10. The first of these crashes, No. 4, occurred on February 27, 2010 at approximately 9:50 PM. The summary shows the Crash Type as a sideswipe resulting into a rollover crash. It was observed that the driver of a southbound vehicle

– Vehicle 1 - was driving in the outside center lane in a reckless manner and failing to maintain her lane. Vehicle 1 drifted into the outside lane where another vehicle – Vehicle 2 – was travelling. The driver of Vehicle 2 slowed and moved their vehicle to the right onto the right shoulder. The right rear of Vehicle 1 possibly struck the left front of Vehicle 2. Both vehicles began moving back and forth while travelling southbound. Vehicle 2 began to rotate, overturned several times and travelled over the outside concrete barrier wall. Vehicle 2 was eventually removed from the river and the driver pronounced deceased at the scene. The driver of Vehicle 1 fled the scene. The Jacksonville Sheriff's Office was notified of her location and brought her back to the crash scene. Driver 1 tested positive for three types of drugs and was charged with DUI Manslaughter.

The second crash, No. 11, which resulted in a vehicle leaving the bridge occurred on July 16, 2014 at 7:50 AM. Vehicle 1 was travelling northbound on I-295 in the outside lane. Vehicle 2, a small pickup truck, was travelling in the outside center. The roadway was wet from a previous rain. The driver of Vehicle 1 was slowing/stopping for traffic ahead and started to change lanes into the right center lane. The two vehicles collided on the lane line between the two lanes. Vehicle 1 rotated clockwise and came to rest in the inside and left center lanes of the bridge. Vehicle 2 rotated clockwise, travelled into the outside shoulder and struck the concrete barrier wall on the left front and left side of the vehicle. The vehicle overturned onto the wall, after striking the wall, and went into the river. The driver of the vehicle was able to exit the vehicle and remained afloat for several minutes before submerging and ultimately drowning.

A third crash, No. 13, resulted in a passenger being ejected from a vehicle and ultimately passing over the barrier wall and into the river. This crash occurred on February 13, 2012 at 2:17 PM. Three vehicles were travelling southbound, Vehicle 1 in the right center lane, Vehicle 2 in the left center lane, and Vehicle 3 in the left lane. Vehicle 1 attempted to change lanes in front of Vehicle 2, causing the driver of Vehicle 2 to take evasive action. Vehicle 2 travelled into the left lane and the left front of Vehicle 2 struck Vehicle 3 in the right rear causing Vehicle 3 to spin and eventually overturn several times before coming to rest in the right southbound lane. Vehicle 3 did not hit the outside barrier wall. The driver and two passengers of Vehicle 3 were ejected with one passenger ending up in the St. Johns River. The crash report does not indicate the manner in which the passenger passed over the barrier wall and into the river. None were wearing seat belts. All three survived.

The fourth crash, No 14, occurred on November 2, 2012 at 6:56 AM. The driver of a pick-up truck reported that while travelling southbound in the outside lane, the utility trailer that was being towed became unhitched, struck the outside barrier wall, collided with a light pole and travelled over the wall into the river. The driver and the vehicle were unharmed.

Other Crashes on the Buckman Bridge Resulting in Fatalities

During the study period, there were an additional four crashes that resulted in fatalities. The first, No. 2 on Figure 6-10, occurred on January 25, 2009 at 3:49 AM and involved an impaired driver travelling northbound on the bridge and hitting a vehicle parked on the shoulder of the bridge. The driver of the parked vehicle was pronounced deceased at the scene.

The second fatal crash occurred on April 17, 2009 at 4:55 PM. This is shown as No. 3 on Figure 6-10. This crash occurred when a northbound vehicle in the outside lane approached queued vehicles in this lane and attempted to stop. The driver steered left to avoid striking the vehicle in the back if the queue. The right front of the vehicle hit the left rear of the queued vehicle and the front seat passenger died as a result.

The third fatal crash, No. 5 on Figure 6-10, occurred on January 18, 2011 at 6:48 AM. This crash involved a single vehicle where the driver, travelling northbound, lost control of the vehicle for an unknown reason and slid sideways into the concrete barrier wall prior to overturning several times and being ejected from the vehicle. The driver was not wearing a seat belt and tested positive for drugs.

The fourth fatal crash, No 8 on Figure 6-10, occurred December 16, 2012 at 6:13 P.M. This crash involved three vehicles. A vehicle became disabled and parked on the outside shoulder of the northbound lanes. A second vehicle stopped to provide assistance. The third vehicle travelling in the outside lane steered onto the shoulder and struck the rear of the second vehicle which in turn struck the barrier wall and the rear of the first vehicle that was stopped. The driver of the second vehicle died an hour after the crash. The driver of the third vehicle was

cited with Operating a Motor Vehicle in a Careless or Negligent Manner. The crash report cites the driver was distracted by the use of a cell phone. No drugs or alcohol was involved.

Fatal Crashes Off of the Bridge but within the Study Area.

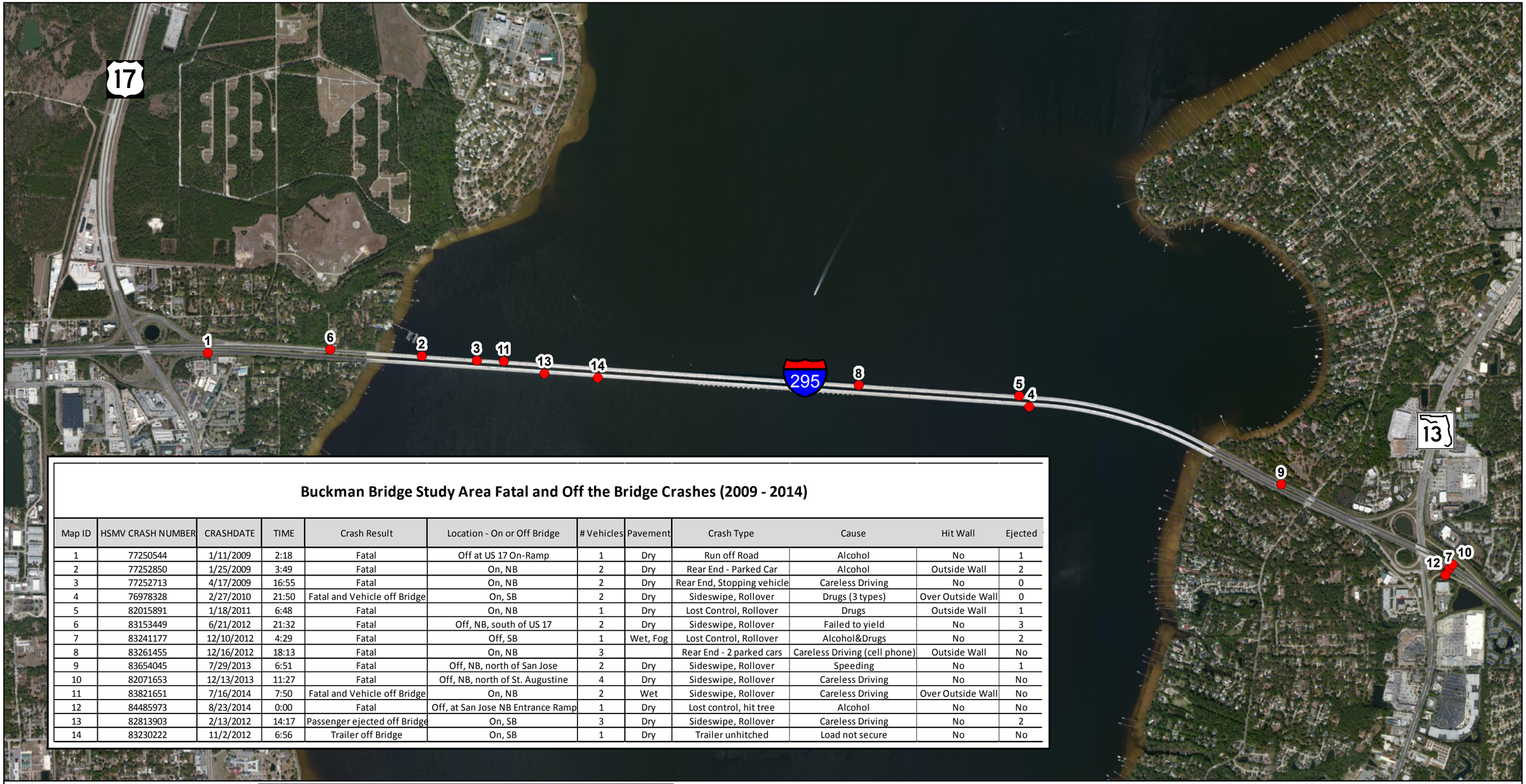
There were an additional six fatal crashes within the study area that occurred off of the bridge. A summary of those is shown in Table 6-11.

Table 6-11 Fatal Crashes Occurring Off Bridge (2009-2014)

Crash Number	Date	Time	Crash Type	Cause	Other
1	January 11, 2009	2:18 AM	Run Off the Road	Alcohol	Single Vehicle, Ejected from Vehicle
6	June 21, 2012	9:32 PM	Sideswipe and Rollover	Failed to Yield	Three occupants ejected
7	December 10, 2012	4:29 AM	Lost Control and Rollover	Alcohol and Drugs	Single vehicle, Wet and Fog
9	July 29, 2013	6:51 AM	Sideswipe and Rollover	Speeding	Ejected from Vehicle
10	December 13, 2013	11:27 AM	Sideswipe and Rollover	Careless Driving	4 vehicles involved
12	August 23, 2014	12:00 Midnight	Lost Control and Hit tree	Alcohol	Single vehicle

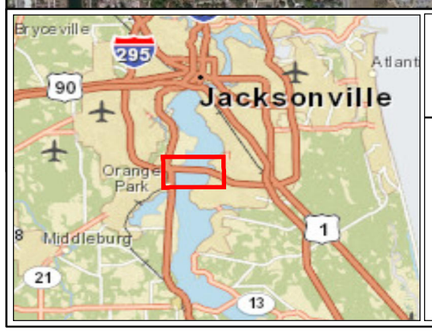
6.7. Crash Data Summary

The review of the cause of the crashes within the study area and the detailed review of those crashes resulting in fatalities, and vehicles departing the bridge has shown that driver error is the predominant cause of crashes. Each of the crashes involving fatalities and vehicles departing the bridge was caused by driver error with the primary causes being Careless Driving, Speeding, and Alcohol and Drugs. There was no reporting or indication that the cause of any crashes was due to the design of the Buckman Bridge, the I-295 mainline within the study area or the adjacent interchanges.



Buckman Bridge Study Area Fatal and Off the Bridge Crashes (2009 - 2014)

Map ID	HSMV CRASH NUMBER	CRASHDATE	TIME	Crash Result	Location - On or Off Bridge	# Vehicles	Pavement	Crash Type	Cause	Hit Wall	Ejected
1	77250544	1/11/2009	2:18	Fatal	Off at US 17 On-Ramp	1	Dry	Run off Road	Alcohol	No	1
2	77252850	1/25/2009	3:49	Fatal	On, NB	2	Dry	Rear End - Parked Car	Alcohol	Outside Wall	2
3	77252713	4/17/2009	16:55	Fatal	On, NB	2	Dry	Rear End, Stopping vehicle	Careless Driving	No	0
4	76978328	2/27/2010	21:50	Fatal and Vehicle off Bridge	On, SB	2	Dry	Sideswipe, Rollover	Drugs (3 types)	Over Outside Wall	0
5	82015891	1/18/2011	6:48	Fatal	On, NB	1	Dry	Lost Control, Rollover	Drugs	Outside Wall	1
6	83153449	6/21/2012	21:32	Fatal	Off, NB, south of US 17	2	Dry	Sideswipe, Rollover	Failed to yield	No	3
7	83241177	12/10/2012	4:29	Fatal	Off, SB	1	Wet, Fog	Lost Control, Rollover	Alcohol&Drugs	No	2
8	83261455	12/16/2012	18:13	Fatal	On, NB	3		Rear End - 2 parked cars	Careless Driving (cell phone)	Outside Wall	No
9	83654045	7/29/2013	6:51	Fatal	Off, NB, north of San Jose	2	Dry	Sideswipe, Rollover	Speeding	No	1
10	82071653	12/13/2013	11:27	Fatal	Off, NB, north of St. Augustine	4	Dry	Sideswipe, Rollover	Careless Driving	No	No
11	83821651	7/16/2014	7:50	Fatal and Vehicle off Bridge	On, NB	2	Wet	Sideswipe, Rollover	Careless Driving	Over Outside Wall	No
12	84485973	8/23/2014	0:00	Fatal	Off, at San Jose NB Entrance Ramp	1	Dry	Lost control, hit tree	Alcohol	No	No
13	82813903	2/13/2012	14:17	Passenger ejected off Bridge	On, SB	3	Dry	Sideswipe, Rollover	Careless Driving	No	2
14	83230222	11/2/2012	6:56	Trailer off Bridge	On, SB	1	Dry	Trailer unhitched	Load not secure	No	No



Crash Locations:
Fatal and Off-Bridge Crashes

I-295 (SR 9A) Buckman Bridge Safety Study
FPI No. 211083-1-62-14
FDOT District 2
Jacksonville, Florida

● Fatal and Off Bridge Crash Locations

Figure 6-10

1 in = 1,750 feet

0 1,500 3,000
Feet

Figure Date: 4/16/2015

7. Alternative Countermeasures

Atkins has been tasked to evaluate the feasibility of implementing alternative countermeasures to reduce the number and potentially the severity of crashes within the Buckman Bridge study area. As described earlier in this report, these countermeasures will be used to estimate the annual reduction is crashes by applying an industry accepted Crash Reduction Factor (CRF) to certain crash types to determine the crash benefit of applying each countermeasure. This benefit will be compared to the cost of the countermeasure to determine an overall Benefit-Cost ratio and Net Present Value (NPV) of the countermeasure.

After analyzing the crash types and the array of countermeasures that can be applied, the following countermeasures were selected for further analysis.

1. High Friction Surface Treatment at the US 17 Interchange
2. High Friction Surface Treatment at the SR 13 Interchange
3. Replace the existing 2'-8" bridge barrier wall with 3'-6" barrier wall
4. Add 1'-6" metal railing to the existing bridge barrier wall
5. Active Traffic Management (Speed Harmonization and Queue Warning System)

Each countermeasure is further described in the following sections.

There are other countermeasures that can potentially reduce the number of crashes within the study area. These are potential countermeasures for which the FDOT has either previously implemented, considered implementing or has potential improvements being planned in the Work Program. These additional improvements, for which CRFs are not available, are discussed at the end of this Section.

7.1. High Friction Pavement Sections

Maintaining the appropriate amount of pavement friction is critical for safe driving. Challenging conditions may require higher friction demand from the road surface than is necessary on a flat, straight section of highway. This can be especially true at interchange ramps, locations with ramp traffic merging and weaving with mainline traffic, and locations where vehicles often brake excessively.

7.1.1. Description

High Friction Surface Treatments (HFSTs) are pavement surfacing systems with exceptional skid-resistant properties not typically provided with conventional materials. The spot application of a thin layer of durable, high friction aggregates as a topping on specially engineered resins or a polymer binder affords long lasting traction, while making the overlay much more resistant to water and polishing.

The high-performance properties of the binder lock the aggregates firmly in place, creating a durable surface capable of withstanding extreme roadway friction demands, such as heavy braking, severe horizontal curves, and steep grades. HFST installations in Florida are guided by Developmental FDOT Specification 333.

Numerous case studies are available. The FDOT has installed a number of HFSTs around the state to date. Among the sites are the northbound interchange ramp at Royal Palm Beach Boulevard and I-75 in Broward County and the I-595 interchange ramp to the Ft. Lauderdale airport. These involved sharply curved ramps with increased friction demands. There has been an across the board reduction of crashes at each site and friction numbers have met the specification requirements. Other positive case studies include the Kentucky Transportation Cabinet and the Pennsylvania DOT.

For the Buckman Bridge Safety study, this countermeasure has been applied to the I-295 interchanges with US 17 at the north end of the study area and SR 13 at the south end of the study. In reviewing Figure 6-4, these are the areas where rear end crashes are most prevalent and there is a higher likelihood of merging and weaving vehicles due to the interchanges as well as a history of run-off the road crashes. The Buckman Bridge itself has a lower density of rear end crashes and was not considered for this countermeasure.

For both interchanges, the majority of the interchange ramps were included in the areas that would receive the HFST. Also the outside northbound and outside southbound I-295 lanes from the bridge ends through the interchanges were included to receive the HFST. These are the lanes that have the most weaving and merging traffic and the highest likelihood of rear end crashes.

7.1.2. Potential Benefits

The implementation of High Friction Surface Treatment has the potential to provide many benefits. These include:

- Increase in the surface Friction Number
- Reduction in crashes, especially wet weather crashes. Primary crash type to be reduced include rear-end crashes and run-off the road crashes
- Potential for reduction in injuries and fatalities

7.1.3. Cost Estimate

The preliminary conceptual cost estimate prepared for the High Friction Surface Treatment is estimated for each major section of pavement.

- The estimated construction cost for this countermeasure near the US 17 interchange is $1,094,490. With design and CE&I estimated at 15% of construction cost, the total cost for this countermeasure is $1,258,664.
- The estimated construction cost for this countermeasure near the SR 13 interchange is $879,360. With design and CE&I estimated at 15% of construction cost, the total cost for this countermeasure is $1,011,264.

7.2. Additional Barrier Height

In the 2009 through 2013 period, there were 74 northbound and 62 southbound crashes that hit either or both of the bridge barrier walls. An additional northbound crash in 2014 was included that hit the barrier wall. Of these, a total of two vehicles departed the bridge. The details of these crashes are included in Section 6.6 - Crash Data Commentary. In the review of these two crash reports, there was no information relative to the height of the vehicle when passing over the barrier walls. The bridge barrier wall is the standard 32” F-Shape Concrete Barrier wall. There are no available studies that suggest a height of barrier wall that is required to further deter vehicles passing over the barrier wall.

This study includes a cost estimate for two barrier alternatives. The first is to replace the existing 32” F-Shape Concrete Barrier wall with a higher 42” F-Shape Barrier. A load rating analysis of the existing structure has been performed to determine the structural viability of this alternative. This study does not suggest that this higher barrier will act as a further deterrent to vehicles departing the bridge. The cost estimate is included to provide an estimate of the cost should the Department wish to further explore this alternative.

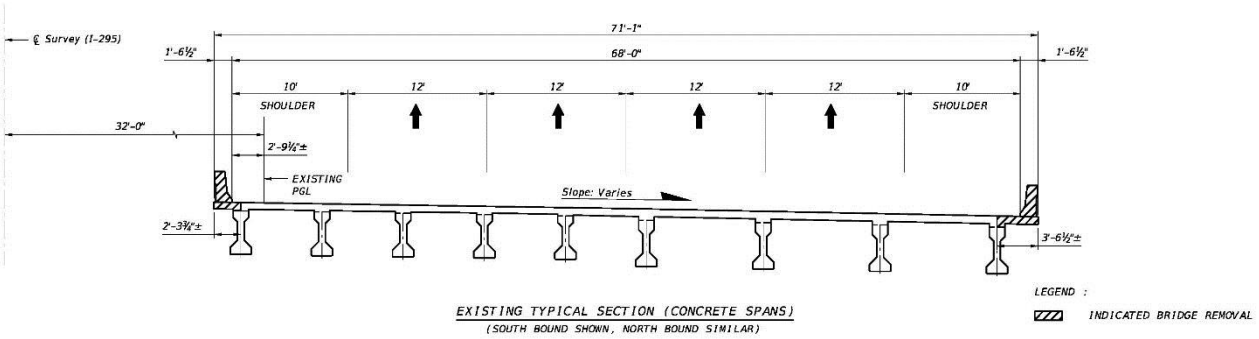
The second alternative is to provide a 1’- 6” elliptical metal railing that can be mounted on top of the existing 32” concrete barrier wall. This will provide limited amount of additional protection should a vehicle impact the barrier and have the potential to roll over the wall. The cost estimate is included to provide a comparison to the total concrete barrier replacement.

7.2.1. Replace Barrier Wall

This section presents the results of the load rating analysis performed to determine the structural viability of replacing the existing 32” F-Shape concrete barrier with a higher 42” F-Shape barrier. The replacement was proposed to determine the viability of replacing the existing barrier. While the barrier can be replaced, the overall crash-worthy criteria of the existing bridge may not be changed since the deck thickness cannot be altered from the existing thickness. The existing cross-section showing the changes in the traffic barrier and the limits of the existing bridge deck that will need to be removed to allow the installation of the new barriers, is shown in Figure

7-1. The existing bridge deck will need to be reconstructed to the center of the first beam for both sides of the bridge. This will require deck replacement of 2'-3¾" to the inside and 3'-6½" to the outside of the structure.

Figure 7-1 Limits of Bridge Deck Replacement



A previous load rating analysis of the existing bridge was performed by ATKINS in May, 2011. Results then indicated that this bridge has an inventory rating of 0.91 and an operating rating of 1.18 for the 250'-0" main span portion of the continuous steel spans at the St. John's River Crossing. The approach concrete spans were found to have satisfactory rating factors (greater than one) for the design inventory, operating and legal truck levels.

A new analysis was performed to account for the additional weight of the proposed barrier and the weight of the additional deck width required for maintaining the original roadway section (68ft from curb to curb). This analysis is intended to show proof of concept and is not intended to be a final load rating analysis. The analysis for the main spans (steel girder) using MDX (version 6.5.2639) also included an update of the rating factors for the current condition of the bridge in order to eliminate discrepancies in results due to the MDX program updates to the date. The results obtained for the load rating of the approach concrete span (pre-stressed beams) using LEAP Conspan (version 13.00.00.68) were found to be consistent with the results from the previous load rating in 2011, so an update of the load ratings for the existing condition of the bridge was not necessary.

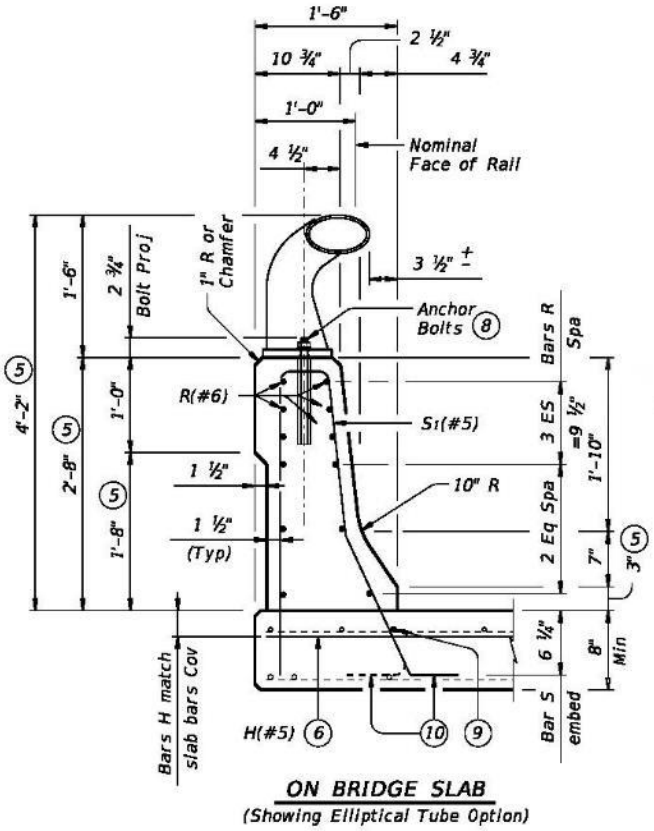
The results of the loading rating analysis indicate that the 250'-0" main portion of the continuous steel spans continues to be the critical section of the bridge with small drops in the inventory and operating rating factors from 0.92 to 0.88 and from 1.20 to 1.14, respectively. Legal load rating was performed in order to investigate the potential posting needs of the bridge for the proposed condition. Results indicate that all the legal rating factors are satisfactory (greater than one). A summary of the results is presented in the Appendix.

A construction cost estimate has been prepared for this barrier replacement alternative. The cost includes the replacement of both barriers on each bridge for a total length of 65,200 feet, removal and replacement of portions of the existing bridge deck as shown above, and the replacement of the existing light poles that are mounted on the existing barrier. Total construction cost is approximately $35.00 Million. With design and CE&I estimated at 15% of construction costs, the cost would be approximately $40.25 Million. This cost does not include the impacts to three proposed sign structures that are to be constructed on the southbound bridge as part of the I-295 Express Lane project.

7.2.2. Add Metal Railing to Existing Barrier

The proposed 1'-6" high Metal Elliptical Tube Railing can be mounted on the existing bridge concrete barrier wall without any structural improvements required. This alternative has been included to compare the cost of this alternative to the total replacement of the bridge concrete barrier wall. A typical section of the proposed rail is shown in Figure 7-2 below.

Figure 7-2 Metal Railing Typical Section



A construction cost estimate has been prepared for the Metal Elliptical Tube Railing alternative. The cost includes the railing to be added on both existing barriers on each bridge for a total length of 65,200 feet. No other work on the bridge is required. Total construction cost is approximately $7.24 Million. With design and CE&I estimated at 15% of construction costs, the cost would be approximately $8.326 Million. There would be no impacts to the I-295 Express Lane project.

7.3. Active Traffic Management applications

Active Traffic Management (ATM) applications provide the ability for operators to "actively" monitor and manage traffic operations in real-time through the use of field hardware and central software. ATM applications optimize the efficiencies of existing roadway systems, increase throughput, and enhance safety. The ATM suite of applications provide the ability to dynamically (real-time or near real-time) manage recurring and non-recurring congestion based on current traffic conditions.

Potential improvements to traffic conditions include, but are not limited to:

- Enhanced throughput for congested periods;
- An increase in overall capacity;
- A decrease in primary accidents;
- A decrease in secondary accidents;
- An overall harmonization of speeds during congested periods and
- The ability to delay the onset of freeway breakdown

Typical ATM applications include:

- Speed Harmonization
- Queue Warning
- Junction/Lane control
- Temporary (Hard) shoulder use
- Dynamic Signing and Routing
- Traveller information
- Managed Lanes

Preliminary review and analysis reduced the number of feasible candidate applications suitable for the Buckman Bridge ATM. The following ATM application was identified and further evaluated for feasibility for the Buckman Bridge Safety Improvements project:

- Speed Harmonization and Queue Warning System

7.3.1. Vehicle Detection System

The candidate option detailed herein will require the implementation of a vehicle detection system. The new detection system will provide real-time (and historical) data for traffic flows within the project limits. Radar detection technologies were selected for this study. Data will be aggregated at the Traffic Management Center (TMC) and ingested by the SunGuide ATM module.

7.3.1.1. Description

The primary goal of the detection system is to provide a real-time condition reporting system for the Buckman Bridge project area. This base option will deploy radar detection within the project limits. The Conceptual Design calls for the use of radar detection devices (located as noted on the Conceptual Plans). However, some locations may require alternative detection technologies, including inductive loops, Bluetooth, video, etc., depending on local design conditions. For planning purposes, radar detectors were identified for all locations, and used in the cost estimate. Initial planning efforts located point detectors on quarter-mile intervals. Actual design may reveal the need to enhance coverage zones, or possibly even identify areas where detection devices may be reduced.

7.3.1.2. Potential Benefits

The implementation of a Vehicle Detection System has the potential to provide many benefits and enhancements to current operational conditions. These include, but are not limited to:

- Real-time information regarding traffic flows;

- Travel time data;
- Routing and re-routing assistance;
- Incident detection support; and
- Data for historical analysis

7.3.1.3. Cost Estimate

The preliminary construction cost estimate for the Vehicle Detection System is $2,656,560. It should be noted that the cost is required if the ATM countermeasure is selected for implementation. The cost includes radar detectors, mounted and installed, conduit and fiber-optic cables, and all necessary equipment and appurtenances. The estimate is planning level, for the purpose of project funding estimates. For additional cost information, the Long Range Estimate (LRE) is included in the Appendix.

Assumptions:
1. Communications link from roadside cabinet to FDOT TMC exists.
2. All detectors are radar-based.

7.3.2. Speed Harmonization and Queue Warning System

The system would utilize real time data from the vehicle detection scheme identified in Section 7.3.1, plus time of day and weather conditions to determine an optimal speed in or before areas of congestion, high-accident areas or areas of special events on a per-lane basis. Speed harmonization systems (also known as Dynamic Speed Limits or Variable Speed Limits) utilize dynamic message signs posted over each lane to regulate freeway speeds based on prevailing traffic conditions. Speed limits can be adjusted when freeway conditions are unsuitable for high speed operations, such as under adverse weather conditions or low visibility. Speed limits can also be lowered when there is an incident or congestion on specific segments in order to reduce the chances of secondary accidents and facilitate a smoother flow of traffic.

7.3.2.1. Speed Harmonization Description

The system will utilize point detection and other real-time traffic data to evaluate conditions, calculate optimal speeds and post the speeds on dedicated variable speed limit (dynamic) signs mounted over each lane. The SunGuide ATM module will evaluate Buckman Bridge traffic conditions, including approaches, and calculate an optimal speed based on optimized throughput and incident reduction data. Setting of advisory speed limits can be completely automated, computed by the SunGuide algorithm. Signs typically change by no more than five (5) mph with each change in speed, and can be updated every 30 seconds. Algorithms can also be configured to automatically adjust speeds based on real-time and forecasted weather conditions.

Figure 7-3 I-24 Active Traffic Management System. Virginia Beach, Virginia

The images above detail a typical variable speed limit sign. The center image details inside electronics and sign panel configuration for the full color and full matrix lane control sign.

Speed Harmonization could also implement lane control messages over each travel lane. The Lane Control application will provide real-time capabilities for the operations and management of each of the individual lanes.

The DMS signs would utilize (red) "X" and (green) arrow symbols above each lane. Each lane will ultimately be independently controllable, depending on prevailing and localized conditions. The lane control DMS will utilize full color, full-matrix displays.

Figure 7-4 I-66 Active Traffic Management System. Fairfax, Virginia

Dynamic Lane control signals would typically be utilized to close lanes in the event of an incident, or to signal that the lane is open for standard use. Green Arrows for open flow and yellow arrows for cautionary traffic flow are typically utilized in conjunction with a standard DMS. Blank out or "X" signs are used to signify lane closings. These DMS signs are approximately 5’ X 5’ in size.

Speed Harmonization applications have been deployed worldwide, for a wide array of applications. The two primary uses for Speed Harmonization are for congestion management and weather related operations.

Congestion Management

Congestion-related speed harmonization is typically used during congested periods, but can also be deployed during non-congested periods. The key to this philosophy is a slower, more consistent flow is less likely to incur incidents or "breakdown", therefore improving overall travel times.

Weather Management

Operating agencies have found the use of speed harmonization in conjunction with varying weather conditions can be extremely beneficial. Weather-based speed harmonization can be applied to weather conditions such as fog, rain, wind, etc. that affect the overall safety of the ATM corridor. Varying or reducing speeds under certain weather conditions has been shown to produce a significant reduction in primary and secondary accidents. In many installations, speed harmonization has been deployed in conjunction with existing/new Road Weather Information System (RWIS) sites.

7.3.2.2. Queue Warning System Description

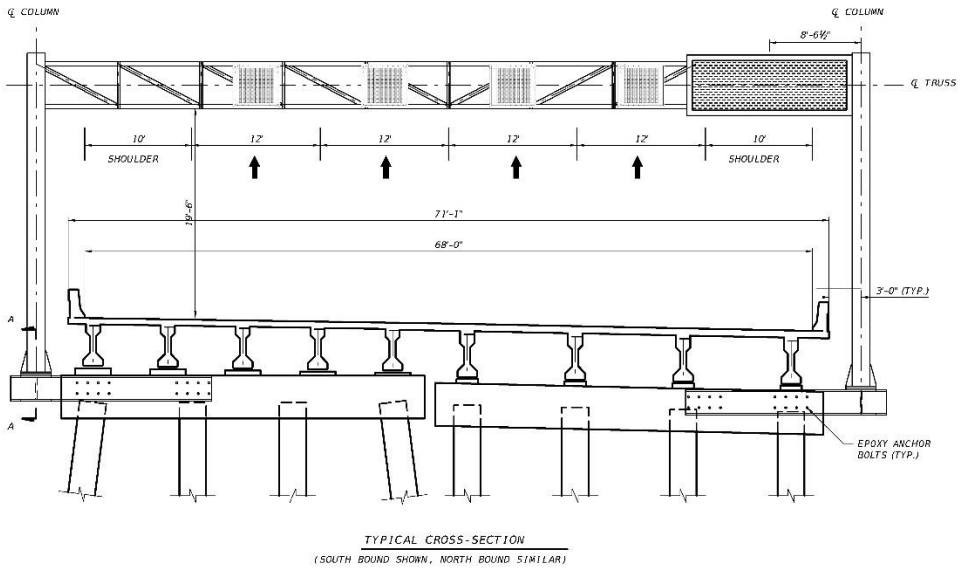
An additional DMS sign is proposed on the right side of the Speed Harmonization structures above the outside shoulder to provide the Queue Warning System messages. This DMS will be sized at 5’-8” X 15’-5”, and will be used to notify drivers of approaching conditions.

The basic principle of the Queue Warning application is to provide real-time downstream guidance to travellers regarding upstream traffic and environmental conditions. This strategy prepares motorists entering the project area with real-time information regarding potential braking or deceleration conditions ahead, or that could potentially exist, and in some design scenarios, provide the ability for routing modifications. The Queue Warning application utilizes real-time traffic data provided by the new vehicle detection subsystem and Dynamic Message Signs (DMS) to warn motorists of upstream queues.

The system would also utilize the vehicle detection scheme, and other real-time traffic volume data to evaluate real-time existing conditions and determine if pre-defined thresholds have been surpassed. Once queue length thresholds have been exceeded, the prevailing DMS would notify drivers of approaching conditions. DMS signs, sized at 7'-3" by 13'- 5", were included for the cost estimate.

The figure below shows the five DMS mounted on the structure and the locations of each of the signs. The figure also shows the method of attachment to the bridge structure. Structural details are included in Appendix D.

Figure 7-5 Active Traffic Management System Concept Design



7.3.2.3. Potential Benefits

The implementation of a Speed Harmonization and Queue Warning system has the potential to provide many benefits and enhancements to current operational conditions. These include, but are not limited to:

- Increased throughput;
- Decrease in primary incidents;
- Decrease secondary incidents;
- Decrease in incident severity;
- More uniform speeds;
- Decreased headways;
- More uniform driver behavior;
- Increase trip reliability; and
- Delay onset of freeway breakdown.

7.3.2.4. Cost Estimate

The preliminary construction cost estimate for the Speed Harmonization and Queue Warning System is $6,788,195. This cost is in addition to the cost of the Vehicle Detection System. This includes the 14 overhead sign structures, the over lane DMS signs and the Queue Warning signs, fiber-optic cable, power service and all required equipment. The total cost for this countermeasure, including the Vehicle Detection System and the 15% factor for design and CE&I, is $10,861,469. This estimate is a planning level value for the purpose of project funding estimates. For additional cost information, the Long Range Estimate (LRE) is included in the Appendix.

Cost Estimate Assumptions:

1. Communications link from roadside cabinet to FDOT TMC exists.

7.3.2.5. Compliance and Enforcement

Initial projects have shown that the overall success of a Speed Harmonization system is closely related to the extent in which drivers adhere to the fluctuating speeds and maintain speed limits, if reduced. Therefore compliance and enforcement are critical components to the overall success of the Speed Harmonization system.

This includes initial public outreach prior to launch of the system, notifying drivers of the functionality and new operational strategies for the corridor. Driver familiarity with digital speed limit signs is minimal, so education prior to system launch is essential.

Speed enforcement will also be critical to the systems overall success. If reduced speeds are not obeyed, the system will quickly lose credibility and overall effectiveness. It is recommended that the Department consider more extensive law enforcement-based speed monitoring.

7.3.3. Central Software

The Florida Department of Transportation's (FDOT) SunGuide Advanced Traffic Management System (ATMS) software would provide a platform for the integration of the devices. There are many modules already built into the software used on most of Florida's limited access facilities in all FDOT Districts. In order to support the ATM applications identified for this project, there would need to be modifications made to the SunGuide software. Additionally, deployment, training, operations, and maintenance would also need to be considered.

The Vehicle Detection System would not require modification to the SunGuide software as long as detectors are selected from the approved products list.

Speed Harmonization is very similar to the Variable Speed Limit (VSL) Subsystem currently available within the SunGuide software. The VSL business logic in the SunGuide software is configured to operate speed limits across all lanes of a corridor and does not have the capability to configure and operate different speed limits across different lanes at the same point along the corridor. Also, VSL calculates the congestion from real-time data received by the Vehicle Detection System, and recommends a speed limit plan along a corridor to be executed upon operator approval. If there were any business logic requirements on how speeds would be related across lanes, such as a maximum speed limit differential between adjacent lanes to be enforced by the software, or if the project requires fully automated operation without operator intervention, then the SunGuide software would need modification to meet these requirements.

The Queue Warning system will be able to use real-time data collected by the Vehicle Detection System, as well as any third party data feeds brought into the SunGuide software. SunGuide software already has the ability to monitor the speed, occupancy, or the combination of speed and occupancy and provide warnings and alerts for operators to take action. The operator can quickly create a congestion event with a response plan that will post messages to the DMS signs. This currently does not support thresholds set on volume and does not currently support fully automated response plans. If those specific features are required, then a moderate modification to the user interface and business logic of SunGuide would be required.

If the Lane Control system would be implemented on the Speed Harmonization application, the following would apply. The Lane Control System is not currently available in the SunGuide software; however, the SunGuide software is a derivative of Texas's Lonestar ATMS software, and the Lonestar software does have a Lane Control System module. SunGuide software has in the past been able to take advantage of the reuse of modules built for the Lonestar software without having to completely design the module from scratch. It would be a moderate effort to port over the Lane Control Module from Lonestar to SunGuide software.

For the deployment and configuration of the software, an on-site visit and meetings with the TMC management, purchasing of equipment, and installation, testing, and training would be required for initial setup.

SunGuide technical support would also be needed for issues with the software during operations.

The modifications and support of the SunGuide software could be done by the FDOT as project owner, their contractor, or by the FDOT Central Office.

7.4. Additional Countermeasures

There are other countermeasures that can potentially reduce the number of crashes within the study area. These are potential countermeasures for which the FDOT has either previously implemented or considered implementing or has potential improvements being planned in the Work Program.

7.4.1. Enhanced Enforcement

The study has identified that the main cause of crashes within the study area is Careless Driving, making up 61% of the total number of crashes. Other major causes include Improper Lane Change, Followed Too Closely, Exceeded Safe Speed Limit, Failed to Maintain Equipment, and Driver Distraction. . There were 516 crashes during the peak hours of 7:00-9:00 AM and 5:00-7:00 PM, comprising 43% of the total number of crashes during the five year period. Even without implementation of any of the countermeasures previously discussed in this Section, enhanced enforcement through the FHP or Jacksonville Sheriff's Office will provide definite benefits. While the 'Hire Back Florida Highway Patrol (FHP) Officer' contract was developed specifically for Work Zone Traffic Control, other methods of contracting with the Florida Department of Highway Safety and Motor Vehicles (HSMV) for additional FHP enforcement should be investigated.

This study has also discussed Speed Harmonization and Queue Warning as a potential Active Traffic Management (ATM) application that can be used to increase throughput, decrease primary and secondary crashes, and decrease crash severity. The application will provide full color matrix lane control signs that will provide digital speed limit signs above each lane. For this application to be effective, these revised speed limits will need to be actively enforced.

7.4.2. Additional Improvements

As discussed in Section 3, Programmed Improvements, the FDOT is constructing or planning several improvements in the study area. The I-295 Managed Express Lane project is currently under construction and is scheduled to be complete in late 2016.

There are two projects in the Planning or PD&E phase that could potentially improve traffic operations within the US 17 Interchange. The US 17 Operational Improvement from south of I-295 to Collins Road (FPID No. 211185) will separate southbound US 17 traffic accessing I-295 from the northbound I-295 intersection with US 17, thereby improving traffic flow and potentially reducing the length of the northbound I-295 to US 17 ramp queue.

The I-295 at US 17 to south of Wells Road PD&E study (FPID No. 435575) includes an alternative to provide a second northbound I-295 exit lane at the US 17 Interchange. This option lane improvement will reduce the number of vehicles merging at the northbound I-295 to US 17 exit ramp and will provide additional storage length for queued vehicles, thereby improving operations.

8. Benefit Cost Analysis and Net Present Value

Safety benefits are one of the principal enhancements that can result from transportation improvements. Benefits occur when the number of crashes and/or severity of the crashes is reduced on a facility or set of facilities because of the improvement. The benefits associated with the expected reduction in crashes resulting from the proposed improvements are estimated based on the FDOT Historical Crash Method (FDOT HCM). The FDOT HCM is a safety improvement method of calculating the ratio (benefit/cost) of the estimated annual reduction in crash costs to the estimated annual increase in combined design, construction, and maintenance costs. This annualized conversion shows whether the projected expenditure of funds for the crash benefit will exceed the direct cost for the improvement.

The steps provided below summarize the FDOT HCM and following text provides more detail of the process.

Step 1: Research Countermeasure and Crash Reduction Factors (CRF)
Step 2: Identify the historical crashes associated with the crash type and crash severity that the CRF was developed using; (i.e. rear end crashes resulting in an injury)
Step 3: Using crashes identified in Step 2, filter the crashes in the historical data that are within impactful range of the countermeasure improvement
Step 4: Estimate number of potential crash reduction using the CRF from Step 1, and the crashes from Step 3
Step 5: Calculate average annual crash reduction benefit using FDOT Highway Safety Improvement Program Guidelines (HSIPG) cost per crash.
Step 6: Calculate benefit-cost ratio using annual benefit and annualized cost
Step 7: Calculate the Net Present Value

Step 1: In the FDOT HCM, the Crash Reduction Factors (CRF), which are developed by industry research or crash experience, are used to estimate the effects the corresponding countermeasures have on the crash occurrence type. For this study FDOT CRF's were used when one was available for the improvement, however, when FDOT CRF's were not available, other sources were referenced; such as the FHWA Crash Modification Factors Clearinghouse and the National Cooperative Highway Research Program (NCHRP) *Report 617-Accident Modification Factors for Traffic Engineering and ITS Improvements*. For a detailed description of CRF's used in the analysis see Appendix A.

Step 2 & 3: CRFs are then applied to the number of crashes that are correctable by the proposed improvement. In this study there were 1,199 crashes occurring between 2009 and 2013. Because of the diverse nature of the crashes, it is unreasonable to believe any countermeasure could potentially impact all 1,199 of the crashes. Therefore, identifying the 'correctable crashes' that are potentially impacted by the improvement, is an important step to calculating the benefits. Identifying the number of correctable crashes is broken into two steps. Step Two is to identify the historical crashes associated with the crash type and crash severity that the CRF was developed using. In many cases the research to develop a CRF is based on only a select type of crashes or severity so its uses are only justified for similar crashes for reduction purposes. Step Three is to identify the crashes in the historical data that are within impactful range of the countermeasure improvement. After filtering the historical crash records what is left over are the crashes potentially being impacted by the countermeasure, or the 'number of correctable crashes.'

Step 4: Once the CRF and number of correctable crashes are identified they are multiplied together to estimate the number of crashes that could potentially be reduced as a result of the countermeasure. It should be noted

that this procedure is based upon historical crash trends and the assumption that future crash trends will continue to be similar to the past if no improvements are installed.

Step 5: To calculate the reduced crash benefit to society, the HCM uses the FDOT Highway Safety Improvement Program Guideline (HSIPG) cost per crash value (dated 2015). For a Divided Urban Interstate the latest Average Crash Cost is $161,634 per crash. The estimated annual number of reduced crashes is multiplied by the Average Crash Cost to determine the annualized benefit of the safety countermeasure.

Step 6: To calculate the Benefit to Cost ratio the estimated crash benefits are divided by the estimated costs. The resulting value represents the ratio of the benefits to the costs for the crash countermeasure.

Step 7: The net present value of each countermeasure is determined by bringing all costs and benefits to the present year. According to the Florida Plans Preparation Manual (PPM) Volume 1, Section 23.5 the Discount (interest) rate to be utilized in benefit/cost analysis is 4%.

Table 8-1 provides a summary of the CRF, the Correctable Crash Type, The Average Annual Crash Reduction, the Average Annual Crash Benefit, Annualized Cost, B/C ratio, and Net Present Value. For a detailed table of the Benefit Cost and Net Present Value Calculations see Appendix B.

The average annual benefit resulting from estimated reduction in crashes due to the proposed improvements is estimated in the table below. It should be noted that many of the ITS applications in place in the United States are still in their infancy and do not have comprehensible published CRFs to apply in this study. Therefore, the CRFs only apply to particular crash types or particular severities. For the bridge barrier wall countermeasures, it is not applicable to calculate a benefit to cost ratio because raising the wall or adding a railing to wall is not expected to reduce the number of crashes. The objective of these countermeasures is to keep crashes occurring on the bridge from departing the bridge once the crash has occurred.

Multiple Improvements

Due to the frequency of sign structure supports required to implement the Speed Harmonization system, there is the opportunity to combine the Queue Warning System to the supports already being installed in these applications. The benefit to cost ratio calculations were carried out assuming adding Queue Warning System capabilities to infrastructure being installed for the Speed Harmonization system. The results are provided in the final row of Table 8-1. For the Speed Harmonization System, the CRFs were applied only to the individual correctable crashes in which they apply to.

Table 8-1 Benefit Cost Results

Countermeasure	CRF & Crash Data Impact	Correctable Crashes in Range	Average Annual Crash Reduction	Total Cost[3]	Annualized Benefit / Annualized Cost	B/C Ratio	Net Present Value
High Friction Pavement (near US 17)[4]	13.4% for Rear End crashes, 20% for Single Vehicle crashes	105 Rear End, 49 Single	4.8	$1,258,664	$771,641 / $209,693	**3.68**	**$3,194,629**
High Friction Pavement (near SR 13)[4]	13.4% for Rear End crashes, 20% for Single Vehicle crashes	33 Rear End, 29 Single	2.0	$1,011,264	$330,445 / $168,477	**1.96**	**$895,797**
Replace Bridge Barrier Wall with 42" Wall (current wall is 32")	No reduction in crashes expected	0	0	$40,250,000	$0 / **na**	**na[2]**	**Not applicable**
Install 18" Metal Railing to existing Barrier Wall	No reduction in crashes expected	0	0	$8,326,000	$0 / **na**	**na[2]**	**Not applicable**
ATM (Speed Harmonization & Queue Warning System)[1,5,6]	16% of Rear End Injury crashes, 7% of Injury Related crashes	228, 461	13.25	$10,861,469	$2,141,651 / $1,020,833	**2.10**	**$12,034,702**

1. Includes the costs of a Vehicle Detection System of $2,656,560
2. na = this calculation is not applicable
3. Costs include Construction, Design, and CE&I
4. CRF source: NCHRP Report 617 – Accident Modification Factors For Traffic Engineering and ITS Improvements
5. CRF source: Crash Modification Factors Clearinghouse
6. Assumes a 5% reduction in mean speed.

9. ATM Concept Drawing

Included in this chapter are concept drawings for the Active Traffic Management (ATM) alternative as described in Chapter 7. In addition to showing proposed ATM concepts, the drawings include sign structures that appear in the area of this study that are part of the proposed managed lanes project. (I-295 Managed Express Lanes from the Buckman Bridge to I-95 – FPID 213345).

LEGEND

EXISTING DMS

LANE CONTROL / VARIABLE SPEED LIMIT SIGN / QUEUE WARNING DMS

RADAR VEHICLE DETECTOR

BRIDGE MOUNT CONDUIT FOR POWER AND FIBER OPTIC CABLE

EXISTING CANTILEVER STATIC SIGN STRUCTURE

UTILIZE EXISTING
FIBER OPTIC SPLICE VAULT
200 LF 96SM SLACK

633-1-123	200 LF
633-2-31	96 EA
633-3-51	1 EA
633-3-12	7 EA

UTILIZE EXISTING
BRIDGE MOUNT CONDUIT
1-1" SIDR HDPE INNERDUCT CONDUIT
1-96SM FOC

633-1-123	X LF
633-8-1	X LF
639-2-1	X LF

N

0 20 100
Feet

200

205

MATCH LINE STA. 206+00.00

EXISTING CCTV (2X) AND MVDS (2X) MOUNTED ON CONCRETE POLE

EXISTING FOC PULL BOX (2X)

EXISTING CABINET

EXISTING FOC SPLICE VAULT

EXISTING FOC PULL BOX

EXISTING CANTILEVER DMS 815' WEST OF BRIDGE DECK (STA 191+19)

REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
I-295	DUVAL	

ATM PLAN SHEET
BUCKMAN BRIDGE

SHEET NO. 1

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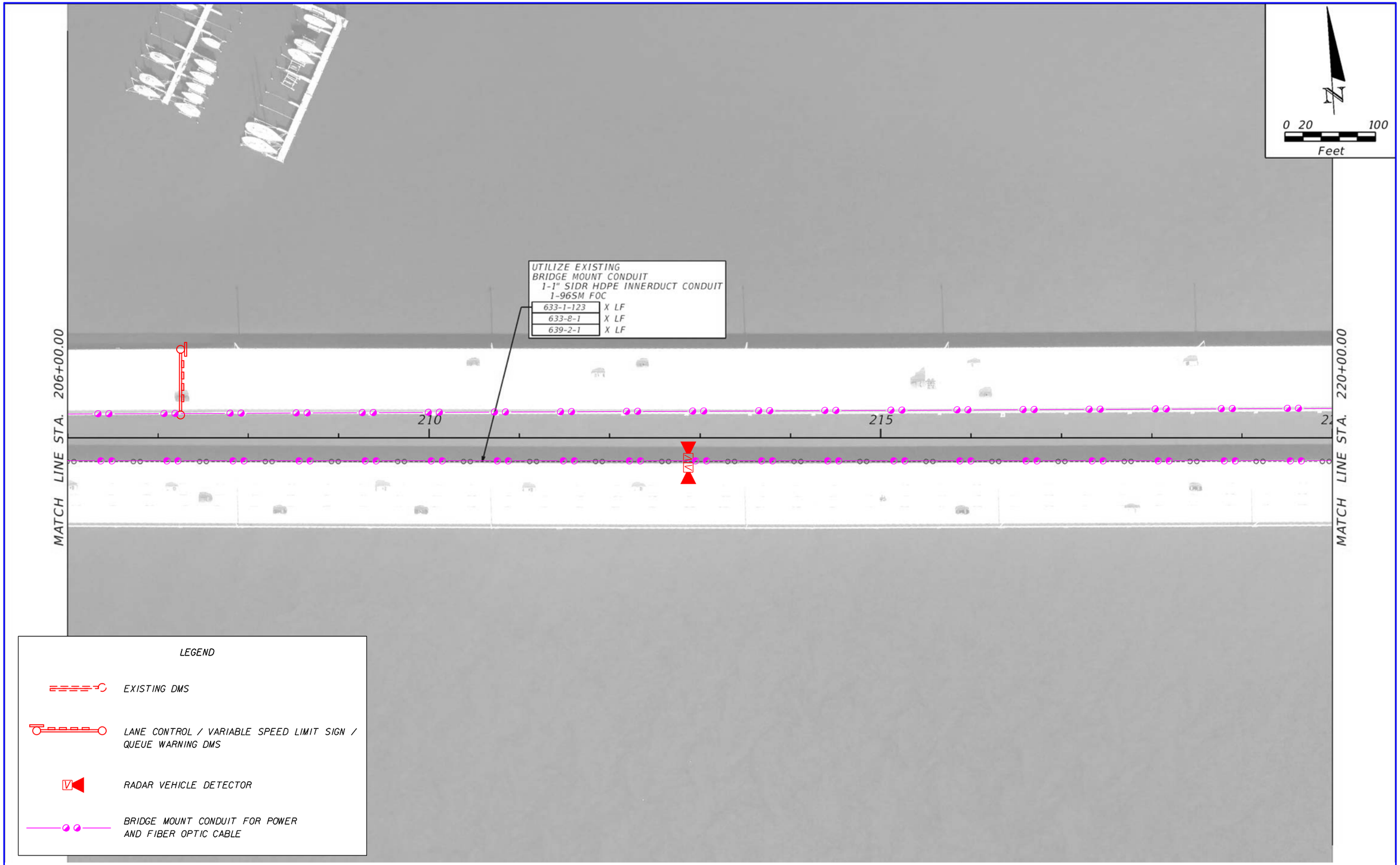

REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
I-295	DUVAL	

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STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
I-295	DUVAL	

ATM PLAN SHEET
BUCKMAN BRIDGE

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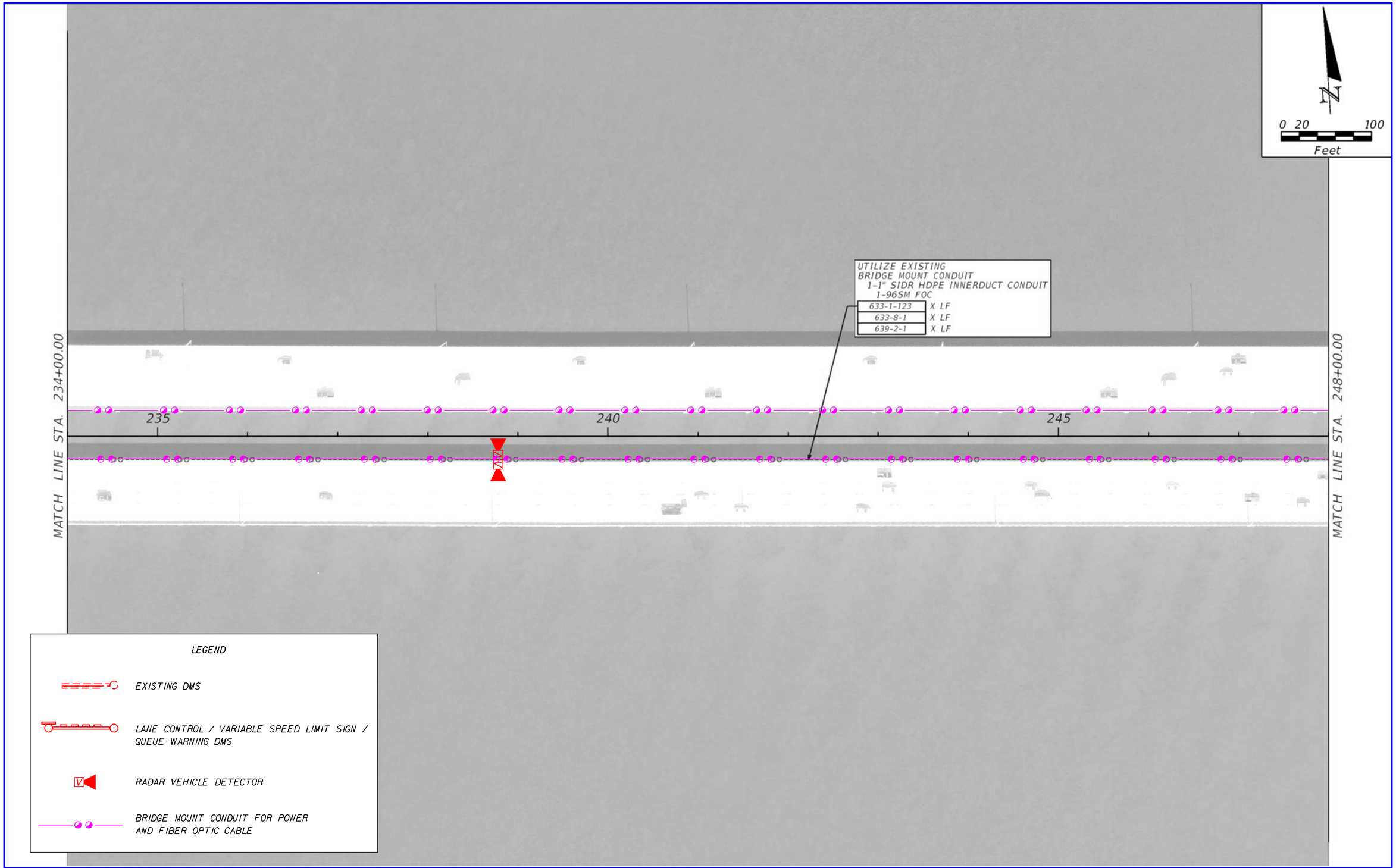

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STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
I-295	DUVAL	

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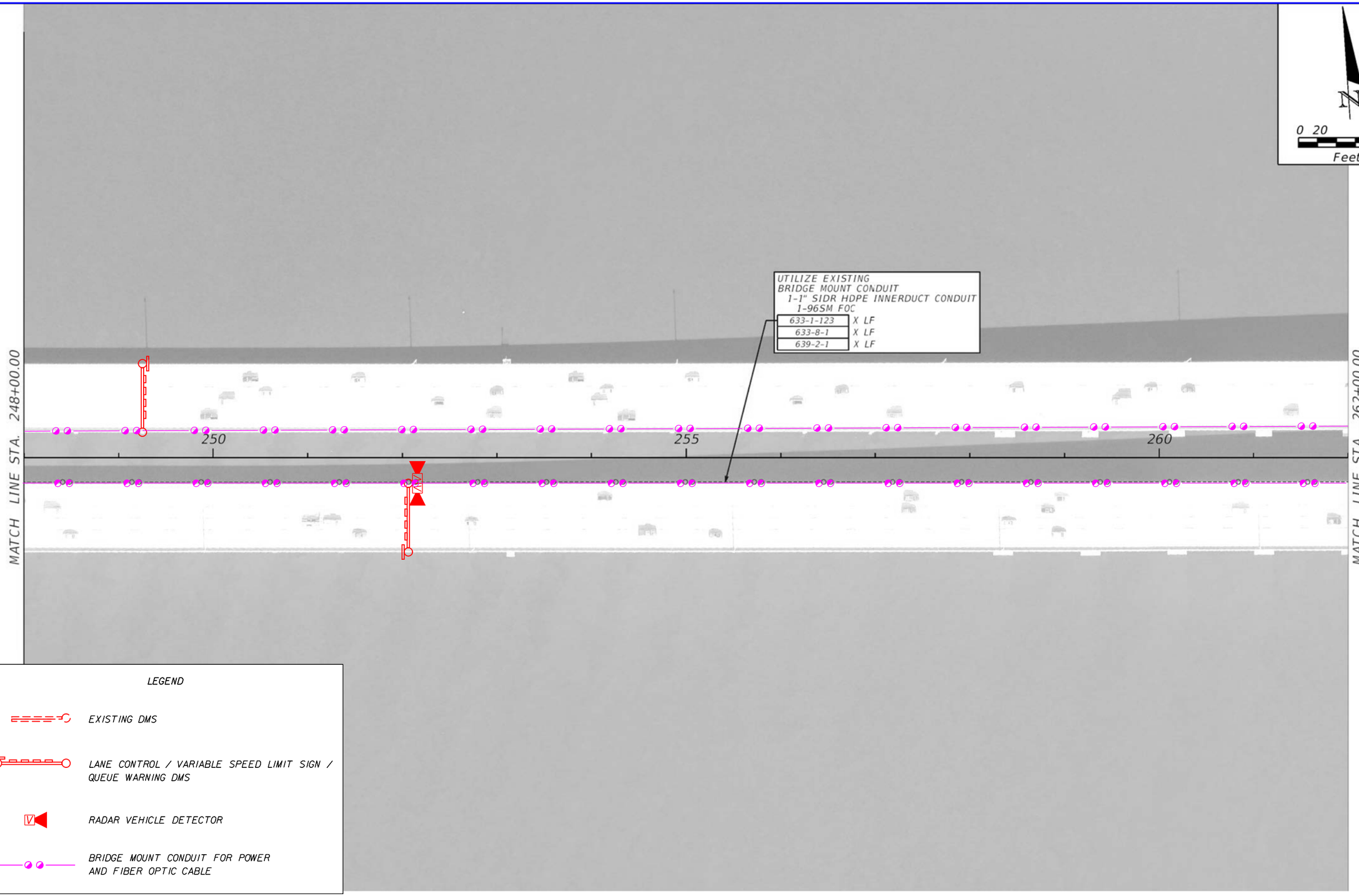

REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
I-295	DUVAL	

ATM PLAN SHEET
BUCKMAN BRIDGE

SHEET NO. 5

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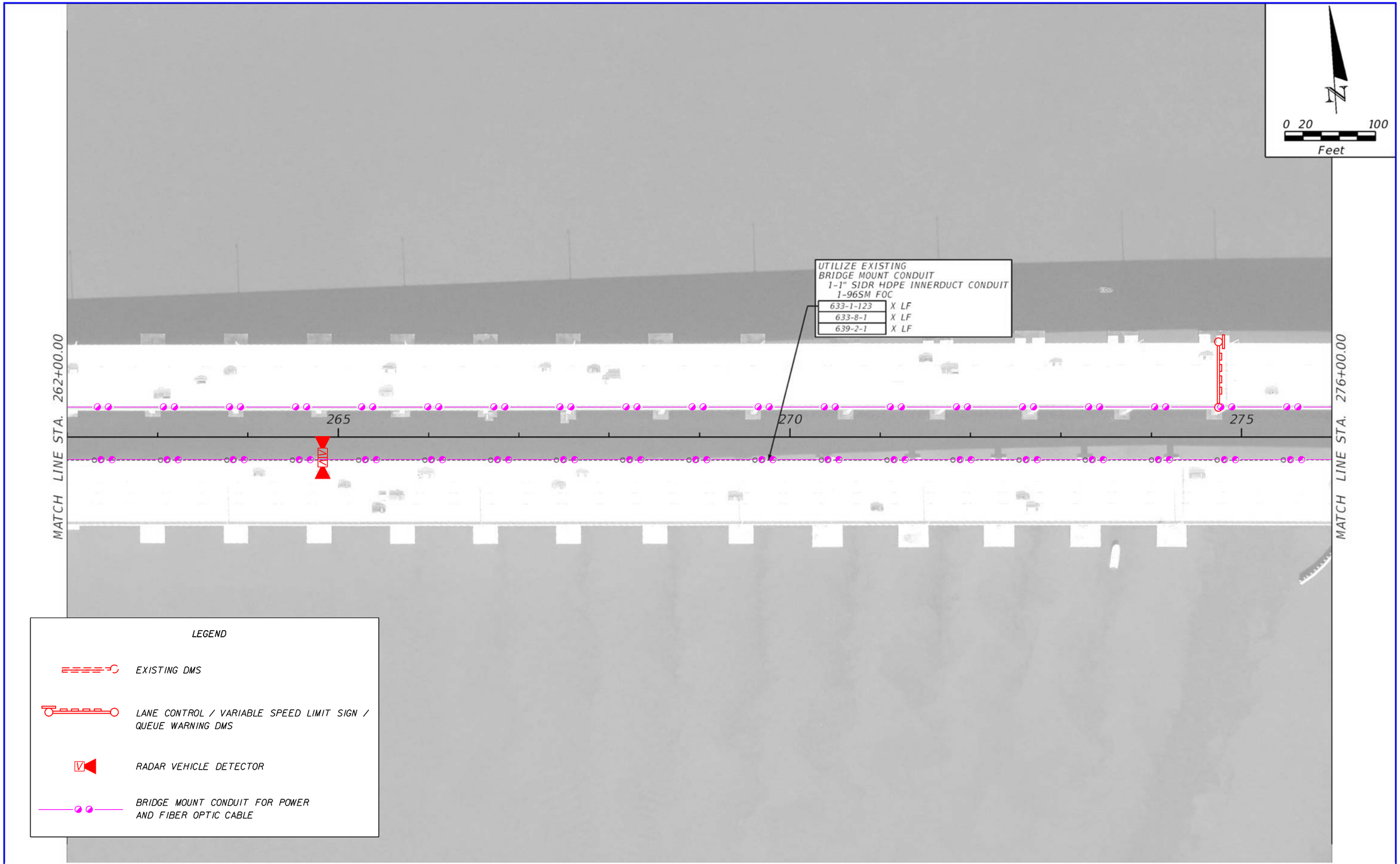

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BUCKMAN BRIDGE

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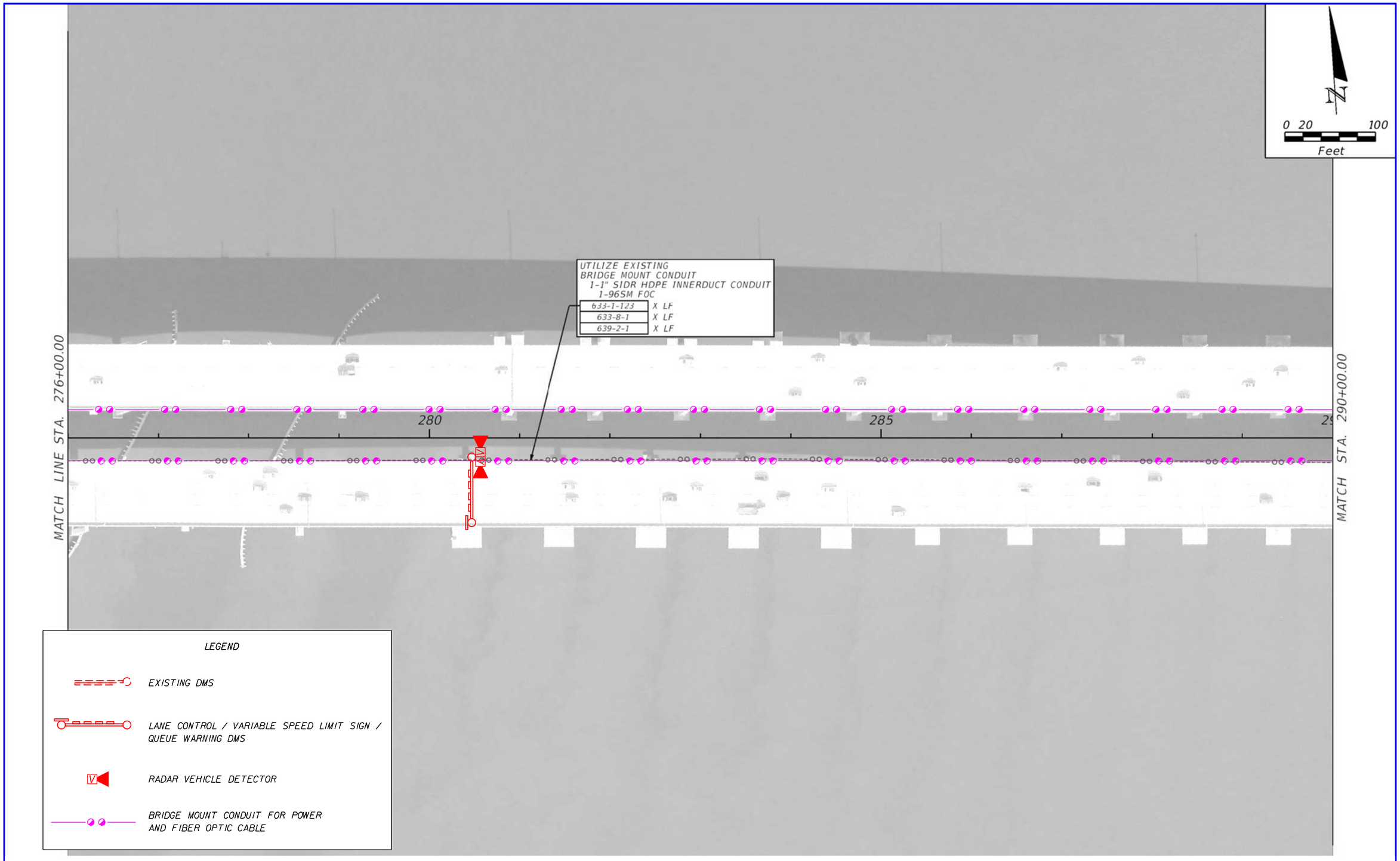

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DATE	DESCRIPTION	DATE	DESCRIPTION

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
I-295	DUVAL	

ATM PLAN SHEET BUCKMAN BRIDGE

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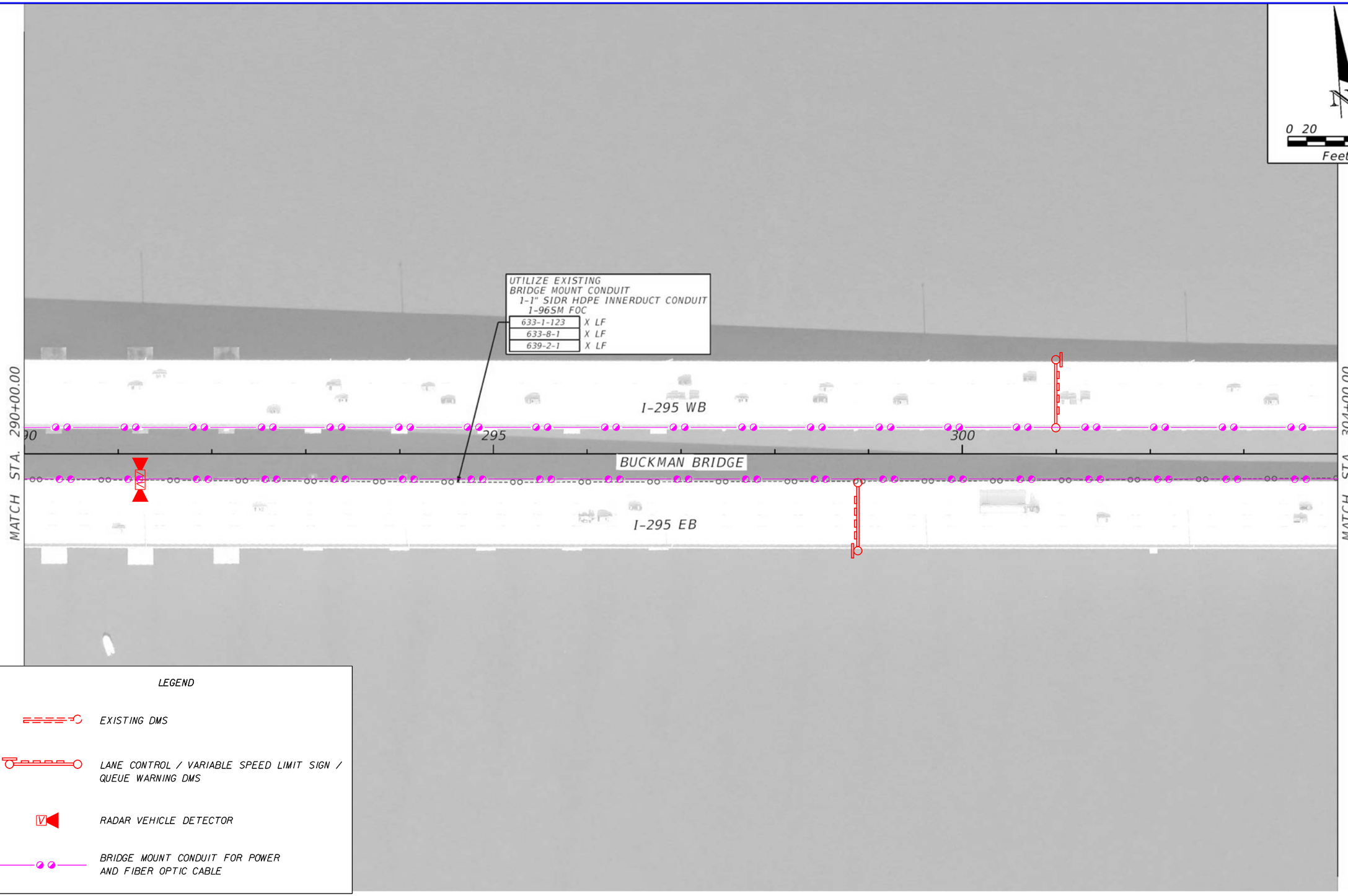

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DATE	DESCRIPTION	DATE	DESCRIPTION

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
I-295	DUVAL	

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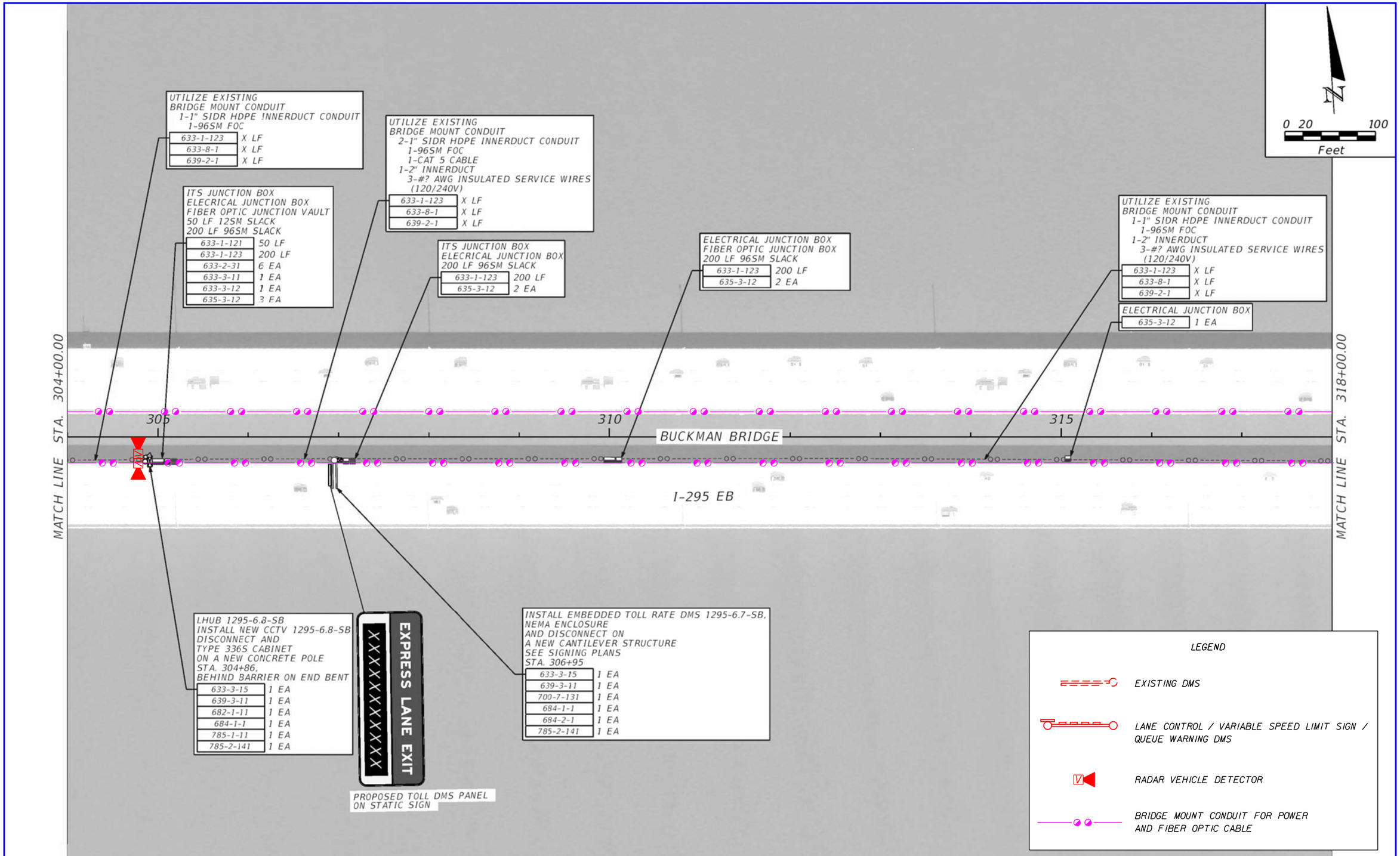

REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
I-295	DUVAL	

ATM PLAN SHEET
BUCKMAN BRIDGE

SHEET NO. 9

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LEGEND

EXISTING DMS

LANE CONTROL / VARIABLE SPEED LIMIT SIGN / QUEUE WARNING DMS

RADAR VEHICLE DETECTOR

BRIDGE MOUNT CONDUIT FOR POWER AND FIBER OPTIC CABLE

N

0 20 100
Feet

UTILIZE EXISTING
BRIDGE MOUNT CONDUIT
2-1" SIDR HDPE INNERDUCT CONDUIT
1-96SM FOC
1-CAT 5 CABLE
1-2" INNERDUCT
3-#? AWG INSULATED SERVICE WIRES
(120/240V)

633-1-123	X LF
633-8-1	X LF
639-2-1	X LF

ELECRICAL JUNCTION BOX
FIBER OPTIC JUNCTION BOX
200 LF 96SM SLACK

633-1-123	200 LF
635-3-12	2 EA

UTILIZE EXISTING
BRIDGE MOUNT CONDUIT
1-1" SIDR HDPE INNERDUCT CONDUIT
1-96SM FOC
1-2" INNERDUCT
3-#? AWG INSULATED SERVICE WIRES
(120/240V)

633-1-123	X LF
633-8-1	X LF
639-2-1	X LF

UTILIZE EXISTING
BRIDGE MOUNT CONDUIT
1-1" SIDR HDPE INNERDUCT CONDUIT
1-96SM FOC
1-2" INNERDUCT
3-#? AWG INSULATED SERVICE WIRES
(120/240V)

633-1-123	X LF
633-8-1	X LF
639-2-1	X LF

MATCH LINE STA. 318+00.00

MATCH LINE STA. 332+00.00

I-295 WB

320

325

BUCKMAN BRIDGE

330

I-295 EB

LHUB 1295-6.5-SB
INSTALL NEW CCTV 1295-6.5-SB
DISCONNECT AND
TYPE 336S CABINET
ON A NEW CONCRETE POLE
STA. 319+95,
BEHIND BARRIER ON END BENT

1 EA	633-3-15
1 EA	639-3-11
1 EA	682-1-11
1 EA	684-1-1
1 EA	785-1-11
1 EA	785-2-141

ITS JUNCTION BOX
ELECRICAL JUNCTION BOX
FIBER OPTIC JUNCTION VAULT
50 LF 12SM SLACK
200 LF 96SM SLACK

50 LF	633-1-121
200 LF	633-1-123
6 EA	633-2-31
1 EA	633-3-11
1 EA	633-3-12
3 EA	635-3-12

PROPOSED TOLL DMS PANEL
ON STATIC SIGN

INSTALL EMBEDDED TOLL RATE DMS 1295-6.4-SB,
NEMA ENCLOSURE
AND DISCONNECT ON
A NEW CANTILEVER STRUCTURE
SEE SIGNING PLANS
STA. 322+05

633-3-15	1 EA
639-3-11	1 EA
700-7-131	1 EA
684-1-1	1 EA
684-2-1	1 EA
785-2-141	1 EA

ELECTRICAL JUNCTION BOX
FIBER OPTIC JUNCTION BOX
200 LF 96SM SLACK

633-1-123	200 LF
635-3-12	2 EA

UTILIZE EXISTING
BRIDGE MOUNT CONDUIT
1-1" SIDR HDPE INNERDUCT CONDUIT
1-96SM FOC
1-2" INNERDUCT
3-#? AWG INSULATED SERVICE WIRES
(120/240V)

633-1-123	X LF
633-8-1	X LF
639-2-1	X LF

REVISIONS					STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION			ATM PLAN SHEET BUCKMAN BRIDGE	SHEET NO.
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					I-295	DUVAL			10

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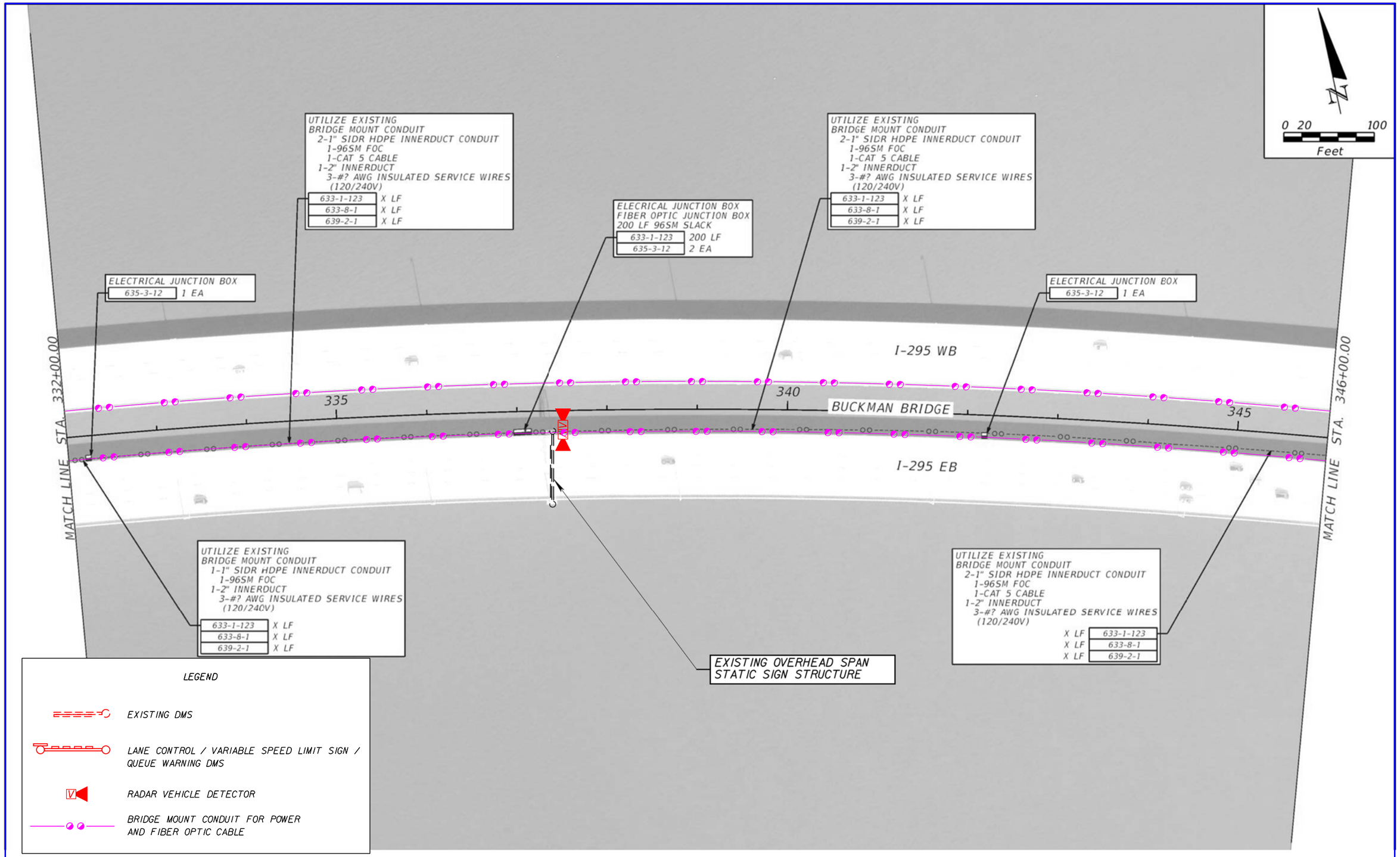

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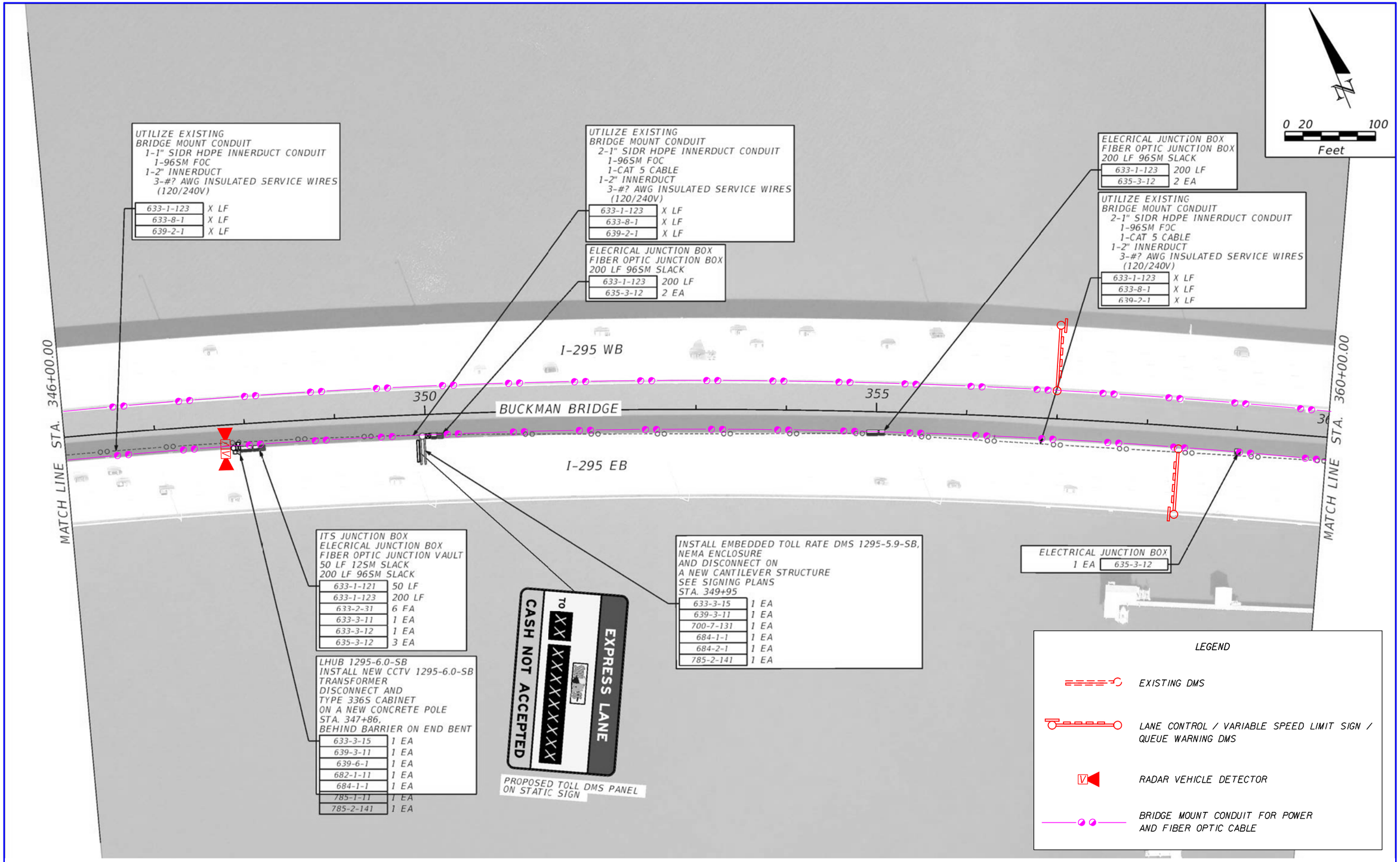

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ATM PLAN SHEET
BUCKMAN BRIDGE

SHEET NO. 12

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LEGEND

EXISTING DMS

LANE CONTROL / VARIABLE SPEED LIMIT SIGN / QUEUE WARNING DMS

RADAR VEHICLE DETECTOR

BRIDGE MOUNT CONDUIT FOR POWER AND FIBER OPTIC CABLE

0 20 100
Feet

ELECRICAL PULL BOX
FIBER OPTIC SPLICE VAULT
50 LF 12SM SLACK
200 LF 96SM SLACK

633-1-121	50 LF
633-1-123	200 LF
633-2-31	4 EA
633-3-11	1 EA
633-3-12	1 EA
635-2-11	1 EA
635-2-13	1 EA

EXISTING NB CANTILEVER DMS 1833' EAST OF BRIDGE DECK (STA 380+85)

UNDERGROUND TRENCH
3-1.25" HDPE CONDUIT
1-96SM FOC
1-#12 AWG TONE WIRE
1-SPARE
1-2" HDPE CONDUIT
3-#? AWG INSULATED SERVICE WIRES
(120/240V)

630-2-11	X LF
633-1-123	X LF
639-2-1	X LF

ELECTRICAL PULL BOX

635-2-11	1 EA

UNDERGROUND TRENCH
4-1.25" HDPE CONDUIT
1-96SM FOC
1-CAT 5 COMM CABLE
1-#12 AWG TONE WIRE
1-SPARE
1-2" HDPE CONDUIT
3-#? AWG INSULATED SERVICE WIRES
(120/240V)

630-2-11	X LF
633-1-121	X LF
633-1-123	X LF
639-2-1	X LF

EXISTING OVERHEAD SPAN STATIC SIGN STRUCTURE

UNDERGROUND TRENCH
3-1.25" HDPE CONDUIT
1-96SM FOC
1-#12 AWG TONE WIRE
1-SPARE
...ATED SERVICE WIRES

630-2-11	X LF
633-1-123	X LF
639-2-1	X LF

I-295 WB

I-295 EB

365

370

MATCH LINE STA. 360+00.00

MATCH LINE STA. 374+00.00

DIRECTIONAL BORE
4-1.25" HDPE CONDUIT
1-96SM FOC
1-12SM FOC
1-#12 AWG TONE WIRE
1-SPARE
1-2" HDPE CONDUIT
3-#? AWG INSULATED SERVICE WIRES
(120/240V)

X LF	630-2-12
X LF	633-1-121
X LF	633-1-123
X LF	639-2-1

ELECRICAL PULL BOX
FIBER OPTIC SPLICE VAULT
50 LF 12SM SLACK
200 LF 96SM SLACK

633-1-121	50 LF
633-1-123	200 LF
633-2-31	6 EA
633-3-11	1 EA
633-3-12	1 EA
635-2-11	1 EA
635-2-13	1 EA

EXISTING OVERHEAD SPAN STATIC SIGN STRUCTURE

DIRECTIONAL BORE
3-1.25" HDPE CONDUIT
1-96SM FOC
1-#12 AWG TONE WIRE
1-SPARE
1-2" HDPE CONDUIT
3-#? AWG INSULATED SERVICE WIRES
(120/240V)

630-2-12	4 RUNS @ X LF
633-1-123	X LF
639-2-1	3 CONDUCTORS @ X LF

EXISTING CCTV (2X) AND MVDS (2X) MOUNTED ON CONCRETE POLE

EXISTING FOC SPLICE VAULT

EXISTING FOC PULL BOX (2X)

EXISTING CABINET

LHUB I295-5.7-NB
INSTALL NEW CCTV I295-5.7-NB
DISCONNECT AND
TYPE 336S CABINET
ON A NEW CONCRETE POLE
STA. 362+72, 5' FROM FOG

633-3-15	1 EA
639-3-11	1 EA
633-8-1	50 LF
682-1-11	1 EA
684-1-1	1 EA
684-3-11	1 EA
785-1-11	1 EA
785-2-141	1 EA

XXXXXXXXX
ONLY
EXPRESS LANE ENTRANCE
SR 9A
ONLY
NO TRUCKS
LEFT

PROPOSED TOLL DMS PANEL ON STATIC SIGN

STATUS DMS
INSTALL NEW ONE LINE DMS 1295-5.6-SB,
NEMA ENCLOSURE
AND DISCONNECT ON
A NEW MID SPAN STRUCTURE
SEE SIGNING PLANS
STA. 366+00

633-3-15	1 EA
639-3-11	1 EA
700-8-134	1 EA
684-1-1	1 EA
684-2-1	1 EA
684-3-11	1 EA
785-2-141	1 EA

REVISIONS			
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STATE OF FLORIDA
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ATM PLAN SHEET BUCKMAN BRIDGE

SHEET NO. 13

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RELOCATED EXISTING DMS PANEL

DMS PANEL TO BE RELOCATED

RELOCATE DMS I295-4.1-SB,
NEMA ENCLOSURE
AND CANTILEVER STRUCTURE
NEW SERVICE DISCONNECT
STA. 445+05, 8' FROM FOG

633-3-45	1 EA
639-3-11	1 EA
700-9-500	1 EA
700-10-400	1 EA
684-1-4	1 EA
684-2-4	1 EA
684-3-41	1 EA
785-2-400	1 EA

UNDERGROUND TRENCH
2-1.25" HDPE CONDUIT
48SM FOC
1-#12 AWG TONE WIRE
1-2" HDPE CONDUIT
3-#? AWG INSULATED SERVICE WIRES
(120/240V)

630-2-11	3 RUNS @ X LF
633-1-121	X LF
639-2-1	4 CONDUCTORS @ X LF

ITS PULL BOX
ELECRICAL PULL BOX
FIBER OPTIC SPLICE VAULT
50 LF 48SM SLACK
200 LF 96SM SLACK

633-1-122	50 LF
633-1-123	200 LF
633-2-31	16 EA
633-3-11	1 EA
633-3-12	1 EA
635-2-11	2 EA
635-2-13	1 EA

UNDERGROUND TRENCH
3-1.25" HDPE CONDUIT
1-96SM FOC
1-#12 AWG TONE WIRE
1-SPARE
1-2" HDPE CONDUIT
3-#? AWG INSULATED SERVICE WIRES
(120/240V)

630-2-11	X LF
633-1-123	X LF
639-2-1	X LF

REMOVE EXISTING CCTV,
MVDS,
ITS CABINET
AND ITS POLE
STA. 440+75, LT

660-3-60	1 EA
682-1-60	1 EA
785-1-60	1 EA
785-2-600	1 EA

0 20 100
Feet

MATCH LINE STA. 444+00.00

445

450

455

I-295 WB

I-295 EB

MATCH LINE STA. 458+00.00

ELECTRICAL PULL BOX
FIBER OPTIC PULL BOX
50 LF 72SM SLACK

633-1-123	50 LF
635-2-11	1 EA
635-2-12	1 EA

UNDERGROUND TRENCH
3-1.25" HDPE CONDUIT
1-96SM FOC
1-#12 AWG TONE WIRE
1-SPARE
1-2" HDPE CONDUIT
3-#? AWG INSULATED SERVICE WIRES
(120/240V)

630-2-11	X LF
633-1-123	X LF
639-2-1	X LF

LHUB I295-4.0-SB
INSTALL NEW CCTV I295-4.0-SB
MVDS I295-4.0-SB
DISCONNECT AND
TYPE 336S CABINET
ON A NEW CONCRETE POLE
STA. 449+16, 38' LT OF SB EOTL

1 EA	633-3-15
50 LF	633-8-1
1 EA	639-3-11
1 EA	660-3-12
1 EA	682-1-11
1 EA	684-1-1
1 EA	684-2-1
1 EA	684-3-11
1 EA	785-1-11
1 EA	785-2-141

ITS PULL BOX
ELECRICAL PULL BOX
FIBER OPTIC SPLICE VAULT
50 LF 12SM SLACK
200 LF 96SM SLACK

633-1-121	50 LF
633-1-123	200 LF
633-2-31	6 EA
633-3-11	1 EA
633-3-12	1 EA
635-2-11	2 EA
635-2-13	1 EA

UNDERGROUND TRENCH
5-1.25" HDPE CONDUIT
1-96SM FOC
1-12 SM FOC
1-#12 AWG TONE WIRE
1-SPARE
1-CAT 5 COMM CABLE
1-2" HDPE CONDUIT
3-#? AWG INSULATED SERVICE WIRES
(120/240V)

630-2-11	X LF
633-1-121	X LF
633-1-123	X LF
633-8-1	X LF
639-2-1	X LF

UNDERGROUND TRENCH
3-1.25" HDPE CONDUIT
1-96SM FOC
1-#12 AWG TONE WIRE
1-SPARE
1-2" HDPE CONDUIT
3-#? AWG INSULATED SERVICE WIRES
(120/240V)

630-2-11	X LF
633-1-123	X LF
639-2-1	X LF

LEGEND

EXISTING DMS

LANE CONTROL / VARIABLE SPEED LIMIT SIGN / QUEUE WARNING DMS

RADAR VEHICLE DETECTOR

BRIDGE MOUNT CONDUIT FOR POWER AND FIBER OPTIC CABLE

REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
I-295	DUVAL	

ATM PLAN SHEET
BUCKMAN BRIDGE

SHEET NO. 14

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Appendix A. Crash Modification Factors

NCHRP
REPORT 617

NATIONAL COOPERATIVE HIGHWAY RESEARCH PROGRAM

Accident Modification Factors for Traffic Engineering and ITS Improvements

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NATIONAL COOPERATIVE HIGHWAY RESEARCH PROGRAM

NCHRP REPORT 617

Accident Modification Factors for Traffic Engineering and ITS Improvements

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environments where the road diets were implemented. The sites in Iowa ranged in AADT from 3,718 to 13,908 and were predominately on U.S. or state routes in small urban towns with an average population of 17,000. The sites in Washington and California ranged in AADT from 6,194 to 26,376 and were predominately on corridors in suburban environments that surrounded larger cities, with an average population of 269,000. In addition, in Iowa there appeared to be a calming effect as evidenced in a study (*44*) of one site that revealed a 4 to 5 mph reduction in 85th-percentile free flow speed and a 30-percent reduction in percentage of vehicles traveling more than 5 mph over the speed limit (i.e., vehicles traveling 35 mph or higher). The researchers' speculation is that this calming effect would be less likely in the larger cities in the HSIS study, where the approaching speed limits (and traffic speeds) might have been lower to start with.

The "new" Iowa results also seem to be incompatible with those in the earlier Iowa analysis of the same treatment site data (*44*). However, the 25-percent reduction reported in that study was based on average effects per mile derived by comparing average crashes per mile after treatment with expected average crashes per mile without treatment. These results are not comparable to the "new" results since sites of different lengths were weighted equally. (The "new" results are overall effects that provide more weight to sites of longer length.) In addition, the "new" results use a much larger comparison group than the previous study, which used an equal number of treatment and comparison sites.

Increasing Pavement Friction on Roadway Segments and at Intersection Approaches

Description of Treatment and Crash Types of Interest

This analysis examined the safety impacts of improving pavement skid resistance using data from the state of New York. The New York State DOT has implemented a skid accident reduction program (SKARP), which identifies sections of pavement with a high proportion of wet-road accidents, performs friction tests on these locations, and treats those with both a high proportion of wet-road accidents and low friction numbers (below the Programmatic Design Target Friction Number, FN40R, of 32). The treatment generally involves a 1.5-in. resurfacing or a 0.5-in. microsurfacing using non-carbonate aggregates. This treatment is applied principally on the major road approaches at intersections, but is often extended some distance away from the intersection as well.

The goal of this analysis was to develop separate AMFs for different crash types occurring at seven different intersection types (i.e., all intersections combined; three-leg signalized, stop-controlled and yield-controlled; and four-leg signalized, stop-controlled and yield-controlled) and on five types of roadway segments (i.e., all segments combined, rural two-lane segments, rural multilane segments; urban two-lane segments, and urban multilane segments). Appendix D provides the details associated with this evaluation. The target crash types of interest in the intersection analyses included the following:

- Total,
- Wet road,
- Dry road,
- Rear end,
- Rear end wet,
- Right angle, and
- Right-angle wet-road.

The target crash types considered for segments included:

- Total,
- Wet road,
- Dry road,
- Rear end,
- Rear-end wet-road,
- Rear-end dry-road,
- Single vehicle, and
- Single-vehicle wet-road.

Data Used

The data for this study were provided by the New York State DOT and included crash, geometric, and AADT data for treated and untreated intersections and segments during the period of 1994 to 2003. Data were included for 256 treated intersections and 3,993 untreated reference intersections, as well as for 36.3 miles (118 segments) of treated non-intersection locations and 1,242.4 miles (2,108 segments) of untreated reference locations.

Methodology

The general analysis methodology used was the EB before-after analysis, as previously described. SPFs and annual correction factors were successfully developed for each of the site type/crash type combinations noted above.

Results

Intersection Treatments

Estimates of the AMFs for the crash frequency analyses for intersection skid-reduction treatments are given in Table 9. Results that are statistically significant at the 95-percent level are in shown in boldface type.

Table 9. Crash frequency AMFs (and standard error) by crash type for intersection skid-reduction treatments.

Intersection Type	Total crashes (s.e.)	Wet-road (s.e.)	Rear-end (s.e.)	Dry (s.e.)	Rear-end wet (s.e.)	Right-angle (s.e.)	Right-angle wet (s.e.)
All	**0.799 (0.028)**	**0.426 (0.030)**	**0.582 (0.034)**	**1.149 (0.051)**	**0.322 (0.041)**	1.045 (0.078)	0.799 (0.123)
Three-leg signalized	**0.667 (0.050)**	**0.372 (0.053)**	**0.554 (0.065)**	0.959 (0.093)	**0.261 (0.066)**	0.787 (0.125)	**0.470 (0.161)**
Three-leg stop-controlled	**0.819 (0.048)**	**0.355 (0.046)**	**0.586 (0.057)**	**1.302 (0.095)**	**0.335 (0.075)**	0.828 (0.218)	0.828 (0.218)
Three-leg yield-controlled	**0.590 (0.114)**	**0.217 (0.103)**	**0.304 (0.086)**	1.392 (0.321)	**0.221 (0.161)**	n/a	n/a
Four-leg signalized	**0.797 (0.052)**	**0.546 (0.070)**	**0.585 (0.068)**	0.992 (0.081)	**0.361 (0.084)**	0.898 (0.117)	1.105 (0.294)
Four-leg stop-controlled	1.271 (0.143)	**0.597 (0.137)**	0.943 (0.188)	1.754 (0.242)	**0.482 (0.215)**	**1.687 (0.323)**	0.829 (0.351)
Four-leg yield-controlled	0.589 (0.216)	0.361 (0.371)	**0.504 (0.248)**	0.651 (0.273)	n/a	n/a	n/a

The results show statistically significant reductions at almost all types of intersections in total crashes; wet-road; rear-end; and rear-end, wet-road crashes. As expected, the largest effects were on total wet-road crashes (i.e., 40-percent to 78-percent reductions) and rear-end, wet-road crashes (i.e., 52-percent to 78-percent reductions). There was very little effect on wet-road, right-angle crashes. Overall, dry road crashes showed a statistically significant 14-percent increase. However, this did not negate the effects on wet-road crashes, as shown by the statistically significant 20-percent decrease in total crashes when all intersection and crash types were combined. To see if the principal benefits of improved skid resistance on wet-road crashes declined over time, the effect on wet-road accidents was analyzed by year after treatment. The analysis indicated no discernable decreasing trend over the 6 years of after-treatment-period data.

Segment Treatments

Estimates of the AMFs for the crash frequency analyses for segment-based skid-resistance treatments are given in Table 10. Results that are statistically significant at the 95-percent level are in bold.

In general, the results show statistically significant reductions in total crashes and in wet-road; rear-end; rear-end, wet-road; single-vehicle; and single-vehicle, wet-road crashes for most roadway categories. The only exception was for two-lane rural roads, where no significant decreases or increases in frequency were found. As expected, the largest statistically significant effects were on total wet-road crashes (i.e., 46-percent to 74-percent reductions), on wet-road, rear-end crashes (i.e., 36-percent to 66-percent reductions) and on wet-road, single-vehicle crashes (i.e., 38-percent to 71-percent reductions). The only statistically significant increase found was for dry-road crashes on urban multilane roads (i.e., a 13-percent increase). However, that increase did not negate the overall treatment effect in that there was a 14-percent reduction in total crashes (i.e., dry plus wet) on these roads.

A final analysis examined changes in the overall proportions of wet-road crashes before and after the treatments. It found a statistically significant reduction in the proportion of wet-road accidents at intersection locations (i.e., 40 percent

Table 10. Crash frequency AMFs (and standard errors) by crash type for segment skid-reduction treatments.

Segment Type	Total Crashes (s.e.)	Wet-road (s.e.)	Rear-end (s.e.)	Dry (s.e.)	Rear-end wet-road (s.e.)	Rear-end dry-road (s.e.)	Single-vehicle (s.e.)	Single-vehicle wet-road (s.e.)
All	**0.764 (0.023)**	**0.434 (0.024)**	**0.828 (0.043)**	1.003 (0.043)	**0.575 (0.055)**	0.977 (0.068))	**0.698 (0.040)**	**0.399 (0.039)**
Rural 2 lanes	0.964 (0.073)	0.852 (0.126)	1.047 (0.149)	1.167 (0.114)	0.971 (0.256)	1.235 (0.219)	1.078 (0.141)	1.125 (0.287)
Rural >2 lanes	**0.684 (0.032)**	**0.346 (0.028)**	**0.776 (0.068)**	**0.875 (0.061)**	**0.474 (0.079)**	0.838 (0.098)	**0.588 (0.046)**	**0.292 (0.038)**
Urban 2 lanes	**0.599 (0.082)**	**0.260 (0.066)**	**0.612 (0.142)**	0.992 (0.195)	**0.344 (0.145)**	0.695 (0.216)	0.921 (0.232)	0.523 (0.247)
Urban > 2 lanes	**0.862 (0.038)**	**0.538 (0.045)**	**0.866 (0.059)**	**1.132 (0.065)**	**0.640 (0.084)**	1.120 (0.099)	**0.800 (0.083)**	**0.615 (0.115)**

before treatment versus 16 percent after treatment) and segment locations (i.e., 38 percent before treatment versus 16 percent after treatment).

Signalized Intersection Treatments in Urban Areas

Description of Treatment and Crash Types of Interest

This analysis examined the safety impacts of four urban safety treatments implemented at signalized intersections in Winston-Salem, North Carolina. The treatments were the following:

- Modification of left-turn signal phase (three combinations),
- Conversion of nighttime flashing operation to steady operation,
- Replacement of 8-in. signal heads with 12-in. heads, and
- Replacement of single red signal head with dual red signal heads.

The basic objective was to estimate the change in target crashes for each of the treatments. Target crashes, which differed depending on the treatment, included left-turn crashes, nighttime angle crashes, and right-angle crashes. However, since the treatment might increase other types of crashes (e.g., the conversion back to regular nighttime phasing could increase rear-end crashes on the major road), additional crash types and total crashes were examined. The specific crash types for each treatment are presented below. Appendix E provides the details associated with this evaluation.

Data Used

Unlike many other jurisdictions, the City of Winston-Salem has documented the installation records for a large number of urban safety treatments implemented at intersection and non-intersection locations and has systematically conducted simple before-after studies of those treatments. Documentation exists for over 70 individual treatments or combinations of treatments installed since the 1980s, along with target and total crash counts for before-treatment and after-treatment periods of 3 to 5 years. The City of Winston-Salem provided these files to the research team. The team then chose the four treatments for evaluation based on the following:

- A statistical analysis of available crash sample size to ensure the possibility of statistically significant results;
- The timeliness of the treatments to ensure a reasonable current driver and vehicle population (i.e., treatments in 1994 and later);
- The quality of the existing AMF, based on the information described in Chapter 2 of this report; and
- The availability of a group of similar but untreated intersections to be used as a reference group.

The original Winston-Salem documentation did not include information on before-treatment-period and after-treatment-period AADTs. Research team members traveled to Winston-Salem and extracted the AADTs for each treatment intersection approach for each before-treatment and after-treatment year from AADT books available at the City of Winston-Salem DOT.

Winston-Salem does not have a computerized intersection inventory that is linkable to crash records. Thus, they could not provide the research team with data to be used in the development of a reference group of similar untreated sites. After consideration of other alternatives, a reference group was manually developed. The Winston-Salem Traffic Engineer and his staff identified 75 untreated signalized intersections that were similar to the treated sites in terms of traffic volume, number of legs, number of approach lanes, and other characteristics during the study period (1990 to 2004). Crash data for all crashes in Winston-Salem for the full study period were extracted from the North Carolina DOT crash files, which contain data on all crashes statewide, and these data were manually matched to the reference intersections based on street names found on the crash reports. AADT data for each year in the full period were then extracted for each reference intersection from the Winston-Salem AADT books noted above. After eliminating intersections lacking in AADT or other data, 60 untreated intersections were available for developing the required SPFs.

Methodology

The general analysis methodology used was the EB before-after analysis previously described. SPFs and annual correction factors were successfully developed for total crashes. Efforts at estimating SPFs for specific crash types were not successful. Hence, the proportion of crashes for each crash type and a recalibrated over-dispersion parameter were used in the EB analysis.

Results

Table 11 presents the results of the EB analyses for each of the four treatment types. For each treatment, results are presented for both the primary target crashes and for other important crash types. Statistically significant results are indicated by asterisks.

Modification of Left-Turn Phase

Three types of left-turn phasing treatments were identified. In all cases, the target crashes for these treatments were

CRASH MODIFICATION FACTORS CLEARINGHOUSE

CMF / CRF Details

CMF ID: 76

Install changeable "Queue Ahead" warning signs

Description:

Prior Condition: ***No Prior Condition(s)***

Category: Advanced technology and ITS

Study: ***Handbook of Road Safety Measures*, Elvik, R. and Vaa, T., 2004**

Star Quality Rating:	★★★☆☆

Crash Modification Factor (CMF)	
Value:	0.84
Adjusted Standard Error:	0.1
Unadjusted Standard Error:	0.06

Crash Reduction Factor (CRF)	
Value:	16 *(This value indicates a **decrease** in crashes)*

Adjusted Standard Error:	10
Unadjusted Standard Error:	6

Applicability

Crash Type:	Rear end
Crash Severity:	Serious Injury,Minor Injury
Roadway Types:	Principal Arterial Other Freeways and Expressways
Number of Lanes:	
Road Division Type:	
Speed Limit:	
Area Type:	Urban
Traffic Volume:	
Time of Day:	

If countermeasure is intersection-based

Intersection Type:	
Intersection Geometry:	
Traffic Control:	
Major Road Traffic Volume:	
Minor Road Traffic Volume:	

Development Details	
Date Range of Data Used:	
Municipality:	
State:	
Country:	
Type of Methodology Used:	Meta-analysis
Sample Size Used:	

Other Details	
Included in Highway Safety Manual?	Yes. HSM lists this CMF in **bold** font to indicate that it has the highest reliability since it has an adjusted standard error of 0.1 or less.
Date Added to Clearinghouse:	11-01-2009
Comments:	Countermeasure name changed to match HSM

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CMF / CRF Details

CMF ID: 142

5% reduction in mean speed

Description:

Prior Condition: ***No Prior Condition(s)***

Category: Speed management

Study: ***Speed and Road Accidents An Evaluation of the Power Model*****, Elvik et al., 2004**

Star Quality Rating:	★★★★★

Crash Modification Factor (CMF)	
Value:	0.93
Adjusted Standard Error:	0.03
Unadjusted Standard Error:	

Crash Reduction Factor (CRF)	
Value:	7 *(This value indicates a* ***decrease*** *in crashes)*

Adjusted Standard Error:	3
Unadjusted Standard Error:	

Applicability

Crash Type:	All
Crash Severity:	Serious injury,Minor injury
Roadway Types:	All
Number of Lanes:	
Road Division Type:	
Speed Limit:	
Area Type:	All
Traffic Volume:	All to All
Time of Day:	

If countermeasure is intersection-based

Intersection Type:	
Intersection Geometry:	
Traffic Control:	
Major Road Traffic Volume:	
Minor Road Traffic Volume:	

Development Details	
Date Range of Data Used:	
Municipality:	
State:	
Country:	
Type of Methodology Used:	Meta-analysis
Sample Size Used:	

Other Details	
Included in Highway Safety Manual?	No
Date Added to Clearinghouse:	11-01-2009
Comments:	

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CMF / CRF Details

CMF ID: 3340

Install variable speed limit signs

Description: Install variable speed limit signs

Prior Condition: No variable speed limit sign present

Category: Speed management

Study: *Evaluation of Variable Speed Limits on I-270/I-255 in St. Louis*, Bham et al., 2010

Star Quality Rating:	★★★★☆ [View score details]

Crash Modification Factor (CMF)	
Value:	0.92
Adjusted Standard Error:	
Unadjusted Standard Error:	

Crash Reduction Factor (CRF)	
Value:	8 *(This value indicates a **decrease** in crashes)*

Adjusted Standard Error:	
Unadjusted Standard Error:	

Applicability

Crash Type:	All
Crash Severity:	All
Roadway Types:	Principal Arterial Interstate
Number of Lanes:	
Road Division Type:	
Speed Limit:	40 to 60
Area Type:	Urban
Traffic Volume:	
Time of Day:	All

If countermeasure is intersection-based

Intersection Type:	
Intersection Geometry:	
Traffic Control:	
Major Road Traffic Volume:	
Minor Road Traffic Volume:	

Development Details	
Date Range of Data Used:	2007 to 2009
Municipality:	St. Louis
State:	MO
Country:	U.S.A.
Type of Methodology Used:	Before/after using empirical Bayes or full Bayes
Sample Size Used:	Crashes
After Sample Size Used:	1636 Crashes

Other Details	
Included in Highway Safety Manual?	No
Date Added to Clearinghouse:	06-04-2012
Comments:	The crash count sum in Table S4 (p. 24) is for the 'after' period. The crash count for the 'before' period is not given. Although the crash count in the after period is substantial, the after period is only 1 year (p. 38); therefore, the crash count may give an inflated impression of the sample size. Traffic volume data is not given in this report. According to Table S2, the total length of the segments is 35.21 mi.

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Appendix B. Benefit Cost Analysis and Net Present Value Calculations

Roadway Design
Florida's Transportation Engineers

Rev. 02/2014

Benefit-Cost Analysis

District: **Two** County: **72 - Duval** Date Prepared: 04/08/15

Location:

Section : **72001000** Beg. Milepost : **4.6** End Milepost : **10**
Rdway Type: **Interstate Urban Divided**

Control Element: **Design Speed**

High Friction Pavement Installed north of Buckman Bridge near the US 17 interchange.

ANNUAL COST OF IMPROVEMENTS

Type		Cost	Service Life	Capital Recovery Factor		Total
ROW			100	0.0408	$	-
P.E.C.E.I.	$	164,173.53	7	0.1666	$	27,351.31
Structure			75	0.0425	$	-
Roadway	$	1,094,490.18	7	0.1666	$	182,342.06
Drainage			20	0.0736	$	-
Signal			20	0.0736	$	-
Other			15	0.0899	$	-
Sub-Total	$	1,258,663.71			$	209,693.37
				Annual Cost =	$	209,693.37

Total number of crashes = 1199
# of correctable crashes, PC = 154
# of years of crash data, YD = 5
PC/YD = 30.80
Crash reduction factor, CRF =
CRF x (PC/YD) =
Cost per crash, CPC = $161,634.00
Benefit =

Primary crash reduction factor (%): 13.4
105 -Rear End

Additional crash reduction factor: 20
49 -Single Vehicle

Additional crash reduction factor:

BENEFIT/COST RATIO

$$\frac{\text{Benefit}}{\text{Cost}} = \frac{}{\$209{,}693.37} = \text{See Notes Below}$$

This above benefits calculation method does not work in this situation because the Rear End and Single Vehicle crashes volumes do not have overlap. When you apply the CRF to each crash type you end up with crash reduction of 4.8 per year. (The reduction in rear end crashes is 2.8 crashes per year and the reduction in Single Veihcle crashes is 2 crashes per year.) The resulting annual benefit is $771,641 B/C ratio is 3.68.

Prepared by: Atkins

Roadway Design
Florida's Transportation Engineers

Rev. 02/2014

Benefit-Cost Analysis

District: **Two** County: **72 - Duval** Date Prepared: 04/08/15

Location:

Section : **72001000** Beg. Milepost : **4.6** End Milepost : **10**
Rdway Type: **Interstate Urban Divided**

Control Element: **Design Speed**

High Friction Pavement Installed south of Buckman Bridge near the SR 13 Interchange

ANNUAL COST OF IMPROVEMENTS

Type		Cost	Service Life	Capital Recovery Factor		Total
ROW			100	0.0408	$	-
P.E.C.E.I.	$	131,904.03	7	0.1666	$	21,975.21
Structure			75	0.0425	$	-
Roadway	$	879,360.17	7	0.1666	$	146,501.40
Drainage			20	0.0736	$	-
Signal			20	0.0736	$	-
Other			15	0.0899	$	-
Sub-Total	$	1,011,264.20			$	168,476.61
				Annual Cost =	$	168,476.61

Total number of crashes = 1199
# of correctable crashes, PC = 62
# of years of crash data, YD = 5
PC/YD = 12.40
Crash reduction factor, CRF =
CRF x (PC/YD) =
Cost per crash, CPC = $161,634.00
Benefit =

Primary crash reduction factor (%): 13.4
33 -Rear End
Additional crash reduction factor: 20
29 -Single Vehicle
Additional crash reduction factor:

BENEFIT/COST RATIO

$$\frac{\text{Benefit}}{\text{Cost}} = \frac{}{\$168,476.61} =$$ See Notes Below

This above benefits calculation method does not work in this situation because the Rear End and Single Vehicle crashes volumes do not have overlap. When you apply the CRF to each crash type you end up with crash reduction of 2.04 per year. (The reduction in rear end crashes is 0.88 crashes per year and the reduction in Single Veihcle crashes is 1.16 crashes per year.) The resulting annual benefit is $330,445 and the B/C ratio is 1.96.

Prepared by: Atkins

Roadway Design
Florida's Transportation Engineers

Rev. 02/2014

Benefit-Cost Analysis

District: **Two** County: **72 - Duval** Date Prepared: 05/08/15

Location:

Section : **72001000** Beg. Milepost : **4.6** End Milepost : **10**
Rdway Type: **Interstate Urban Divided**

Control Element: **Design Speed**

P.E.C.E.I = 15%
Signal Category = Queue Ahead Warning System
Other Category = Vehicle Detection System

ANNUAL COST OF IMPROVEMENTS

Type		Cost	Service Life	Capital Recovery Factor		Total
ROW			100	0.0408	$	-
P.E.C.E.I.	$	582,122.57	15	0.0899	$	52,332.82
Structure			75	0.0425	$	-
Roadway			20	0.0736	$	-
Drainage			20	0.0736	$	-
Signal	$	1,224,256.25	15	0.0899	$	110,060.64
Other	$	2,656,560.90	10	0.1233	$	327,553.96
Sub-Total	$	4,462,939.72			$	489,947.42
				Annual Cost =	$	489,947.42

Total number of crashes = 1199
# of correctable crashes, PC = 228
# of years of crash data, YD = 5
PC/YD = 45.60
Crash reduction factor, CRF = 16.00%
CRF x (PC/YD) = 7.30
Cost per crash, CPC = $161,634.00
Benefit = $1,179,282

Primary crash reduction factor (%): 16
Rear End Crashes Resulting in an Injury

Additional crash reduction factor:

Additional crash reduction factor:

BENEFIT/COST RATIO

$$\frac{\text{Benefit}}{\text{Cost}} = \frac{\$1,179,281.66}{\$489,947.42} = \mathbf{2.41}$$

Prepared by: Atkins

Roadway Design
Florida's Transportation Engineers

Rev. 02/2014

Benefit-Cost Analysis

District: **Two** County: **72 - Duval** Date Prepared: 04/08/15

Location:

Section : **72001000** Beg. Milepost : **4.6** End Milepost : **10**

Rdway Type: **Interstate Urban Divided**

Control Element: **Design Speed**

Signal = Speed Harmonization System (Variable Speed Limits)+Queue Warning System
Asssuming a 5mph reduction in speed
Other = Vehicle Detection System
Structure = DMS Support Structures
P.E.C.E.I = 15%

ANNUAL COST OF IMPROVEMENTS

Type		Cost	Service Life	Capital Recovery Factor		Total
ROW			100	0.0408	$	-
P.E.C.E.I.	$	1,416,713.35	15	0.0899	$	127,362.53
Structure	$	2,720,394.60	20	0.0736	$	200,221.04
Roadway			20	0.0736	$	-
Drainage			20	0.0736	$	-
Signal	$	4,067,800.19	15	0.0899	$	365,695.24
Other	$	2,656,560.90	10	0.1233	$	327,553.96
Sub-Total	$	10,861,469.04			$	1,020,832.77
				Annual Cost =	$	1,020,832.77

Total number of crashes = 1199
# of correctable crashes, PC = 228
# of years of crash data, YD = 5
PC/YD = 45.60
Crash reduction factor, CRF =
CRF x (PC/YD) =
Cost per crash, CPC = $161,634.00
Benefit =

Primary crash reduction factor (%): 16
Injury Related Crashes on Mainline and Ramp

Additional crash reduction factor: 7
Rear End Crashes Resulting in an Injury

Additional crash reduction factor:

BENEFIT/COST RATIO

$$\frac{\text{Benefit}}{\text{Cost}} = \frac{}{\$1{,}020{,}832.77} = \text{See Notes Below}$$

The above analysis does not work in this situation because the crash types overlap. Thre are 228 Injury Related Rear End Crashes. The first step is to reduce the 228 by Queue Warning System CRF of 16% (36.48 reduction). There are 461 Injury related crashes but 36 were reduced by the Queue Warning System so 425 remain. Appying the 7% Speed Harmonization CRF to 425 results in an additonal reduction of 29.75. When the two are combined there is ar reduction of (36.48+29.75) 66.23 crashes, or 13.25 per year. This results in an annual benefit of $2,141,651 and B/C Ratio of 2.10

Prepared by: Atkins

Net Present Value Calculations (Page 1)

Increase Pavement Friction (NORTH)

Year #	0	1	2	3	4	5	6	7	8	9	10	11
Calendar Year	2015	2016	2017	2018	2019	2020	2021	2022	2023			
Estimates Cost	$1,258,664											
Estimated Benefits			$771,641	$771,641	$771,641	$771,641	$771,641	$771,641	$771,641			
Discount Factor (4%)	1	0.9615	0.9246	0.889	0.8548	0.8219	0.7903	0.7599	0.7307			
Discounted Cost	-$1,258,664											
Discounted Benefits			$713,459	$685,989	$659,598	$634,212	$609,828	$586,370	$563,838			
	NPV	**$3,194,629**										

Increase Pavement Friction (SOUTH)

Year #	0	1	2	3	4	5	6	7	8	9	10	11
Calendar Year	2015	2016	2017	2018	2019	2020	2021	2022	2023			
Estimates Cost	$1,011,264											
Estimated Benefits			$330,445	$330,445	$330,445	$330,445	$330,445	$330,445	$330,445			
Discount Factor (4%)	1	0.9615	0.9246	0.889	0.8548	0.8219	0.7903	0.7599	0.7307			
Discounted Cost	-$1,011,264											
Discounted Benefits			$305,529	$293,765	$282,464	$271,592	$261,150	$251,105	$241,456			
	NPV	**$895,797**										

Queue Warning

Year #	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Calendar Year	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
Estimates Cost	$4,462,940																
Estimated Benefits			$1,179,282	$1,179,282	$1,179,282	$1,179,282	$1,179,282	$1,179,282	$1,179,282	$1,179,282	$1,179,282	$1,179,282	$1,179,282	$1,179,282	$1,179,282	$1,179,282	$1,179,282
Discount Factor (4%)	1	0.9615	0.9246	0.889	0.8548	0.8219	0.7903	0.7599	0.7307	0.7026	0.6756	0.6496	0.6246	0.6006	0.5775	0.5553	0.5339
Discounted Cost	-$4,462,940																
Discounted Benefits			$1,090,364	$1,048,381	$1,008,050	$969,252	$931,986	$896,136	$861,701	$828,563	$796,723	$766,061	$736,579	$708,277	$681,035	$654,855	$629,618
	NPV	**$8,144,643**															

Speed Harmonization and Queue Ahead Warning System

Year #	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Calendar Year	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
Estimates Cost	$10,861,469																
Estimated Benefits			$2,141,651	$2,141,651	$2,141,651	$2,141,651	$2,141,651	$2,141,651	$2,141,651	$2,141,651	$2,141,651	$2,141,651	$2,141,651	$2,141,651	$2,141,651	$2,141,651	$2,141,651
Discount Factor (4%)	1	0.9615	0.9246	0.889	0.8548	0.8219	0.7903	0.7599	0.7307	0.7026	0.6756	0.6496	0.6246	0.6006	0.5775	0.5553	0.5339
Discounted Cost	-$10,861,469																
Discounted Benefits			$1,980,170	$1,903,927	$1,830,683	$1,760,223	$1,692,546	$1,627,440	$1,564,904	$1,504,724	$1,446,899	$1,391,216	$1,337,675	$1,286,275	$1,236,803	$1,189,259	$1,143,427
	NPV	**$12,034,702**															

Appendix C. Long Range Estimates

Date: 3/12/2015 11:30:04 AM

FDOT Long Range Estimating System - Production

R3: Project Details by Sequence Report

Project: 211083-1-52-01 **Letting Date:** 01/2099

Description: SR 9A/I-295 AT BUCKMAN BRIDGE - DISTRICT TWO SAFETY STUDY.

District: 02 **County:** 72 DUVAL **Market Area:** 05 **Units:** English
Contract Class: 1 **Lump Sum Project:** N **Design/Build:** N **Project Length:** 3.087 MI

Project Manager: PHILIP SHAD

Version 4 Project Grand Total **$1,094,490.18**

Description: SR 9A/I-295 AT BUCKMAN BRIDGE. US 17 INTERCHANGE SCOPE OF WORK - RESURFACING INTERCHANGE RAMPS WITH HIGH FRICTION SURFACE COURSE. - OPTION 4

Sequence: 1 RSU - Resurfacing, Undivided **Net Length:** 0.283 MI
1,496 LF

Description: US17 INTERCHANGE - US17 SW RAMP - SCOPE OF WORK - RESURFACING INTERCHANGE RAMPS WITH HIGH FRICTION SURFACE COURSE.

ROADWAY COMPONENT

User Input Data

Description	Value
Number of Lanes	1
Roadway Pavement Width L/R	9.00 / 9.00
Structural Spread Rate	0
Friction Course Spread Rate	0

EX-Items

Pay item	Description	Quantity	Unit	Unit Price	Extended Amount
0908-333- 1	HIGH FRICTION SURFACE COURSE	2,992.00	SY	$30.00	$89,760.00

Pavement Marking Subcomponent

Description	Value
Include Thermo/Tape/Other	Y
Pavement Type	Asphalt
Solid Stripe No. of Paint Applications	1
Solid Stripe No. of Stripes	2
Skip Stripe No. of Paint Applications	1
Skip Stripe No. of Stripes	0

Pay Items

Pay item	Description	Quantity	Unit	Unit Price	Extended Amount
710-11-111	PAINTED PAVT MARK,STD,WHITE,SOLID,6"	0.57	NM	$927.32	$528.57
711-15-111	THERMOPLASTIC, STD-OP, WHITE, SOLID, 6"	0.57	NM	$4,372.35	$2,492.24

	Roadway Component Total	$92,780.81

SHOULDER COMPONENT

User Input Data

Description	Value
Total Outside Shoulder Width L/R	10.00 / 10.00
Total Outside Shoulder Perf. Turf Width L/R	2.67 / 2.67
Paved Outside Shoulder Width L/R	0.00 / 0.00
Structural Spread Rate	110
Friction Course Spread Rate	80
Total Width (T) / 8" Overlap (O)	T
Rumble Strips No. of Sides	0

Erosion Control

Pay Items

Pay item	Description	Quantity	Unit	Unit Price	Extended Amount
104-11	FLOATING TURBIDITY BARRIER	28.33	LF	$6.00	$169.98
104-12	STAKED TURBIDITY BARRIER-NYL REINF PVC	28.33	LF	$4.46	$126.35
104-18	INLET PROTECTION SYSTEM	1.00	EA	$73.82	$73.82
107-1	LITTER REMOVAL	0.69	AC	$21.47	$14.81
107-2	MOWING	0.69	AC	$39.19	$27.04
	Shoulder Component Total				$412.01

Sequence 1 Total	$93,192.82

ROADWAY COMPONENT

User Input Data

Description	Value
Number of Lanes	1
Roadway Pavement Width L/R	8.00 / 8.00
Structural Spread Rate	0
Friction Course Spread Rate	0

EX-Items

Pay item	Description	Quantity	Unit	Unit Price	Extended Amount
0908-333- 1	HIGH FRICTION SURFACE COURSE	3,143.00	SY	$30.00	$94,290.00

Pavement Marking Subcomponent

Description	Value
Include Thermo/Tape/Other	Y
Pavement Type	Asphalt
Solid Stripe No. of Paint Applications	1
Solid Stripe No. of Stripes	2
Skip Stripe No. of Paint Applications	1
Skip Stripe No. of Stripes	0

Pay Items

Pay item	Description	Quantity	Unit	Unit Price	Extended Amount
710-11-111	PAINTED PAVT MARK,STD,WHITE,SOLID,6"	0.67	NM	$927.32	$621.30
711-15-111	THERMOPLASTIC, STD-OP, WHITE, SOLID, 6"	0.67	NM	$4,372.35	$2,929.47
	Roadway Component Total				$97,840.78

SHOULDER COMPONENT

User Input Data

Description	Value
Total Outside Shoulder Width L/R	10.00 / 10.00
Total Outside Shoulder Perf. Turf Width L/R	2.67 / 2.67
Paved Outside Shoulder Width L/R	0.00 / 0.00
Structural Spread Rate	110
Friction Course Spread Rate	80
Total Width (T) / 8" Overlap (O)	T
Rumble Strips No. of Sides	0

Erosion Control

Pay Items

Pay item	Description	Quantity	Unit	Unit Price	Extended Amount
104-11	FLOATING TURBIDITY BARRIER	33.48	LF	$6.00	$200.88
104-12	STAKED TURBIDITY BARRIER-NYL REINF PVC	33.48	LF	$4.46	$149.32
104-18	INLET PROTECTION SYSTEM	1.00	EA	$73.82	$73.82

107-1	LITTER REMOVAL	0.81 AC	$21.47	$17.39
107-2	MOWING	0.81 AC	$39.19	$31.74
	Shoulder Component Total			$473.16
Sequence 2 Total				$98,313.94

ROADWAY COMPONENT

User Input Data

Description	Value
Number of Lanes	1
Roadway Pavement Width L/R	8.00 / 8.00
Structural Spread Rate	0
Friction Course Spread Rate	0

EX-Items

Pay item	Description	Quantity	Unit	Unit Price	Extended Amount
0908-333- 1	HIGH FRICTION SURFACE COURSE	3,111.00	SY	$30.00	$93,330.00

Pavement Marking Subcomponent

Description	Value
Include Thermo/Tape/Other	Y
Pavement Type	Asphalt
Solid Stripe No. of Paint Applications	1
Solid Stripe No. of Stripes	2
Skip Stripe No. of Paint Applications	1
Skip Stripe No. of Stripes	0

Pay Items

Pay item	Description	Quantity	Unit	Unit Price	Extended Amount
710-11-111	PAINTED PAVT MARK,STD,WHITE,SOLID,6"	0.66	NM	$927.32	$612.03
711-15-111	THERMOPLASTIC, STD-OP, WHITE, SOLID, 6"	0.66	NM	$4,372.35	$2,885.75
	Roadway Component Total				$96,827.78

SHOULDER COMPONENT

User Input Data

Description	Value
Total Outside Shoulder Width L/R	10.00 / 10.00
Total Outside Shoulder Perf. Turf Width L/R	2.67 / 2.67
Paved Outside Shoulder Width L/R	0.00 / 0.00
Structural Spread Rate	110
Friction Course Spread Rate	80
Total Width (T) / 8" Overlap (O)	T
Rumble Strips No. of Sides	0

Erosion Control

Pay Items

Pay item	Description	Quantity	Unit	Unit Price	Extended Amount
104-11	FLOATING TURBIDITY BARRIER	33.14	LF	$6.00	$198.84
104-12	STAKED TURBIDITY BARRIER-NYL REINF PVC	33.14	LF	$4.46	$147.80
104-18	INLET PROTECTION SYSTEM	1.00	EA	$73.82	$73.82

107-1	LITTER REMOVAL	0.80 AC	$21.47	$17.18
107-2	MOWING	0.80 AC	$39.19	$31.35
	Shoulder Component Total			$468.99

Sequence 3 Total $97,296.77

ROADWAY COMPONENT

User Input Data

Description	Value
Number of Lanes	1
Roadway Pavement Width L/R	8.00 / 8.00
Structural Spread Rate	0
Friction Course Spread Rate	0

EX-Items

Pay item	Description	Quantity	Unit	Unit Price	Extended Amount
0908-333- 1	HIGH FRICTION SURFACE COURSE	3,111.00	SY	$30.00	$93,330.00

Pavement Marking Subcomponent

Description	Value
Include Thermo/Tape/Other	Y
Pavement Type	Asphalt
Solid Stripe No. of Paint Applications	1
Solid Stripe No. of Stripes	2
Skip Stripe No. of Paint Applications	1
Skip Stripe No. of Stripes	0

Pay Items

Pay item	Description	Quantity	Unit	Unit Price	Extended Amount
710-11-111	PAINTED PAVT MARK,STD,WHITE,SOLID,6"	0.66	NM	$927.32	$612.03
711-15-111	THERMOPLASTIC, STD-OP, WHITE, SOLID, 6"	0.66	NM	$4,372.35	$2,885.75
	Roadway Component Total				$96,827.78

SHOULDER COMPONENT

User Input Data

Description	Value
Total Outside Shoulder Width L/R	10.00 / 10.00
Total Outside Shoulder Perf. Turf Width L/R	2.67 / 2.67
Paved Outside Shoulder Width L/R	0.00 / 0.00
Structural Spread Rate	110
Friction Course Spread Rate	80
Total Width (T) / 8" Overlap (O)	T
Rumble Strips No. of Sides	0

Erosion Control

Pay Items

Pay item	Description	Quantity	Unit	Unit Price	Extended Amount
104-11	FLOATING TURBIDITY BARRIER	33.14	LF	$6.00	$198.84
104-12	STAKED TURBIDITY BARRIER-NYL REINF PVC	33.14	LF	$4.46	$147.80
104-18	INLET PROTECTION SYSTEM	1.00	EA	$73.82	$73.82

107-1	LITTER REMOVAL	0.80 AC	$21.47	$17.18
107-2	MOWING	0.80 AC	$39.19	$31.35
	Shoulder Component Total			$468.99

Sequence 4 Total $97,296.77

ROADWAY COMPONENT

User Input Data

Description	Value
Number of Lanes	2
Roadway Pavement Width L/R	12.00 / 12.00
Structural Spread Rate	0
Friction Course Spread Rate	0

EX-Items

Pay item	Description	Quantity	Unit	Unit Price	Extended Amount
0908-333- 1	HIGH FRICTION SURFACE COURSE	7,500.00	SY	$30.00	$225,000.00

Pavement Marking Subcomponent

Description	Value
Include Thermo/Tape/Other	Y
Pavement Type	Asphalt
Solid Stripe No. of Paint Applications	1
Solid Stripe No. of Stripes	2
Skip Stripe No. of Paint Applications	1
Skip Stripe No. of Stripes	1

Pay Items

Pay item	Description	Quantity	Unit	Unit Price	Extended Amount
706-3	RETRO-REFLECTIVE PAVEMENT MARKERS	87.00	EA	$3.55	$308.85
710-11-111	PAINTED PAVT MARK,STD,WHITE,SOLID,6"	1.29	NM	$927.32	$1,196.24
711-15-111	THERMOPLASTIC, STD-OP, WHITE, SOLID, 6"	1.29	NM	$4,372.35	$5,640.33
711-15-131	THERMOPLASTIC, STD-OP, WHITE, SKIP, 6"	0.64	GM	$1,194.64	$764.57
	Roadway Component Total				$232,909.99

SHOULDER COMPONENT

User Input Data

Description	Value
Total Outside Shoulder Width L/R	10.00 / 10.00
Total Outside Shoulder Perf. Turf Width L/R	2.67 / 2.67
Paved Outside Shoulder Width L/R	0.00 / 0.00
Structural Spread Rate	110
Friction Course Spread Rate	80
Total Width (T) / 8" Overlap (O)	T
Rumble Strips No. of Sides	0

Erosion Control

Pay Items

Pay item	Description	Quantity	Unit	Unit Price	Extended Amount

104-11	FLOATING TURBIDITY BARRIER	64.39 LF	$6.00	$386.34
104-12	STAKED TURBIDITY BARRIER-NYL REINF PVC	64.39 LF	$4.46	$287.18
104-18	INLET PROTECTION SYSTEM	2.00 EA	$73.82	$147.64
107-1	LITTER REMOVAL	1.56 AC	$21.47	$33.49
107-2	MOWING	1.56 AC	$39.19	$61.14
	Shoulder Component Total			$915.79

Sequence 5 Total $233,825.78

ROADWAY COMPONENT

User Input Data

Description	Value
Number of Lanes	1
Roadway Pavement Width L/R	6.00 / 6.00
Structural Spread Rate	0
Friction Course Spread Rate	0

EX-Items

Pay item	Description	Quantity	Unit	Unit Price	Extended Amount
0908-333- 1	HIGH FRICTION SURFACE COURSE	3,067.00	SY	$30.00	$92,010.00

Pavement Marking Subcomponent

Description	Value
Include Thermo/Tape/Other	Y
Pavement Type	Asphalt
Solid Stripe No. of Paint Applications	1
Solid Stripe No. of Stripes	2
Skip Stripe No. of Paint Applications	1
Skip Stripe No. of Stripes	0

Pay Items

Pay item	Description	Quantity	Unit	Unit Price	Extended Amount
710-11-111	PAINTED PAVT MARK,STD,WHITE,SOLID,6"	0.87	NM	$927.32	$806.77
711-15-111	THERMOPLASTIC, STD-OP, WHITE, SOLID, 6"	0.87	NM	$4,372.35	$3,803.94
	Roadway Component Total				$96,620.71

SHOULDER COMPONENT

User Input Data

Description	Value
Total Outside Shoulder Width L/R	10.00 / 10.00
Total Outside Shoulder Perf. Turf Width L/R	2.67 / 2.67
Paved Outside Shoulder Width L/R	0.00 / 0.00
Structural Spread Rate	110
Friction Course Spread Rate	80
Total Width (T) / 8" Overlap (O)	T
Rumble Strips No. of Sides	0

Erosion Control

Pay Items

Pay item	Description	Quantity	Unit	Unit Price	Extended Amount
104-11	FLOATING TURBIDITY BARRIER	43.56	LF	$6.00	$261.36
104-12	STAKED TURBIDITY BARRIER-NYL REINF PVC	43.56	LF	$4.46	$194.28
104-18	INLET PROTECTION SYSTEM	1.00	EA	$73.82	$73.82

107-1	LITTER REMOVAL	1.05 AC	$21.47	$22.54
107-2	MOWING	1.05 AC	$39.19	$41.15
	Shoulder Component Total			$593.15
Sequence 6 Total				$97,213.86

ROADWAY COMPONENT

User Input Data

Description	Value
Number of Lanes	1
Roadway Pavement Width L/R	6.00 / 6.00
Structural Spread Rate	0
Friction Course Spread Rate	0

EX-Items

Pay item	Description	Quantity	Unit	Unit Price	Extended Amount
0908-333- 1	HIGH FRICTION SURFACE COURSE	3,067.00	SY	$30.00	$92,010.00

Pavement Marking Subcomponent

Description	Value
Include Thermo/Tape/Other	Y
Pavement Type	Asphalt
Solid Stripe No. of Paint Applications	1
Solid Stripe No. of Stripes	2
Skip Stripe No. of Paint Applications	1
Skip Stripe No. of Stripes	0

Pay Items

Pay item	Description	Quantity	Unit	Unit Price	Extended Amount
710-11-111	PAINTED PAVT MARK,STD,WHITE,SOLID,6"	0.87	NM	$927.32	$806.77
711-15-111	THERMOPLASTIC, STD-OP, WHITE, SOLID, 6"	0.87	NM	$4,372.35	$3,803.94
	Roadway Component Total				$96,620.71

SHOULDER COMPONENT

User Input Data

Description	Value
Total Outside Shoulder Width L/R	10.00 / 10.00
Total Outside Shoulder Perf. Turf Width L/R	2.67 / 2.67
Paved Outside Shoulder Width L/R	0.00 / 0.00
Structural Spread Rate	110
Friction Course Spread Rate	80
Total Width (T) / 8" Overlap (O)	T
Rumble Strips No. of Sides	0

Erosion Control

Pay Items

Pay item	Description	Quantity	Unit	Unit Price	Extended Amount
104-11	FLOATING TURBIDITY BARRIER	43.56	LF	$6.00	$261.36
104-12	STAKED TURBIDITY BARRIER-NYL REINF PVC	43.56	LF	$4.46	$194.28
104-18	INLET PROTECTION SYSTEM	1.00	EA	$73.82	$73.82

107-1	LITTER REMOVAL	1.05 AC	$21.47	$22.54
107-2	MOWING	1.05 AC	$39.19	$41.15
	Shoulder Component Total			$593.15
Sequence 7 Total				$97,213.86

Date: 3/12/2015 11:30:05 AM

FDOT Long Range Estimating System - Production

R3: Project Details by Sequence Report

Project: 211083-1-52-01 **Letting Date:** 01/2099

Description: SR 9A/I-295 AT BUCKMAN BRIDGE - DISTRICT TWO SAFETY STUDY.

District: 02 **County:** 72 DUVAL **Market Area:** 05 **Units:** English
Contract Class: 1 **Lump Sum Project:** N **Design/Build:** N **Project Length:** 3.087 MI

Project Manager: PHILIP SHAD

Version 4 Project Grand Total **$1,094,490.18**
Description: SR 9A/I-295 AT BUCKMAN BRIDGE. US 17 INTERCHANGE SCOPE OF WORK - RESURFACING INTERCHANGE RAMPS WITH HIGH FRICTION SURFACE COURSE. - OPTION 4

Project Sequences Subtotal			**$814,353.80**
102-1	Maintenance of Traffic	10.00 %	$81,435.38
101-1	Mobilization	6.00 %	$53,747.35
Project Sequences Total			**$949,536.53**
Project Unknowns		10.00 %	$94,953.65
Design/Build		0.00 %	$0.00

Non-Bid Components:

Pay item	Description	Quantity	Unit	Unit Price	Extended Amount
999-25	INITIAL CONTINGENCY AMOUNT (DO NOT BID)		LS	$50,000.00	$50,000.00
Project Non-Bid Subtotal					**$50,000.00**
Version 4 Project Grand Total					**$1,094,490.18**

Date: 3/12/2015 10:18:26 AM

FDOT Long Range Estimating System - Production

R3: Project Details by Sequence Report

Project: 211083-1-52-01 **Letting Date:** 01/2099

Description: SR 9A/I-295 AT BUCKMAN BRIDGE - DISTRICT TWO SAFETY STUDY.

District: 02 **County:** 72 DUVAL **Market Area:** 05 **Units:** English
Contract Class: 1 **Lump Sum Project:** N **Design/Build:** N **Project Length:** 3.087 MI

Project Manager: PHILIP SHAD

Version 3 Project Grand Total **$879,360.17**

Description: SR 9A/I-295 AT BUCKMAN BRIDGE. SAN JOSE INTERCHANGE SCOPE OF WORK - RESURFACING INTERCHANGE RAMPS WITH HIGH FRICTION SURFACE COURSE. - OPTION 3

Sequence: 1 RSU - Resurfacing, Undivided **Net Length:** 0.355 MI
1,875 LF

Description: SAN JOSE INTERCHANGE - SAN JOSE NW RAMP - SCOPE OF WORK - RESURFACING INTERCHANGE RAMPS WITH HIGH FRICTION SURFACE COURSE. - OPTION 3

ROADWAY COMPONENT

User Input Data

Description	Value
Number of Lanes	1
Roadway Pavement Width L/R	9.00 / 9.00
Structural Spread Rate	0
Friction Course Spread Rate	0

EX-Items

Pay item	Description	Quantity	Unit	Unit Price	Extended Amount
0908-333- 1	HIGH FRICTION SURFACE COURSE	4,000.00	SY	$30.00	$120,000.00

Pavement Marking Subcomponent

Description	Value
Include Thermo/Tape/Other	Y
Pavement Type	Asphalt
Solid Stripe No. of Paint Applications	1
Solid Stripe No. of Stripes	2
Skip Stripe No. of Paint Applications	1
Skip Stripe No. of Stripes	0

Pay Items

Pay item	Description	Quantity	Unit	Unit Price	Extended Amount
710-11-111	PAINTED PAVT MARK,STD,WHITE,SOLID,6"	0.71	NM	$927.32	$658.40
711-15-111	THERMOPLASTIC, STD-OP, WHITE, SOLID, 6"	0.71	NM	$4,372.35	$3,104.37

	Roadway Component Total	$123,762.77

SHOULDER COMPONENT

User Input Data

Description	Value
Total Outside Shoulder Width L/R	10.00 / 10.00
Total Outside Shoulder Perf. Turf Width L/R	2.67 / 2.67
Paved Outside Shoulder Width L/R	0.00 / 0.00
Structural Spread Rate	110
Friction Course Spread Rate	80
Total Width (T) / 8" Overlap (O)	T
Rumble Strips No. of Sides	0

Erosion Control

Pay Items

Pay item	Description	Quantity	Unit	Unit Price	Extended Amount
104-11	FLOATING TURBIDITY BARRIER	35.51	LF	$6.00	$213.06
104-12	STAKED TURBIDITY BARRIER-NYL REINF PVC	35.51	LF	$4.46	$158.37
104-18	INLET PROTECTION SYSTEM	1.00	EA	$73.82	$73.82
107-1	LITTER REMOVAL	0.86	AC	$21.47	$18.46
107-2	MOWING	0.86	AC	$39.19	$33.70
	Shoulder Component Total				$497.42

Sequence 1 Total	$124,260.19

ROADWAY COMPONENT

User Input Data

Description	Value
Number of Lanes	1
Roadway Pavement Width L/R	9.00 / 9.00
Structural Spread Rate	0
Friction Course Spread Rate	0

EX-Items

Pay item	Description	Quantity	Unit	Unit Price	Extended Amount
0908-333- 1	HIGH FRICTION SURFACE COURSE	2,634.00	SY	$30.00	$79,020.00

Pavement Marking Subcomponent

Description	Value
Include Thermo/Tape/Other	Y
Pavement Type	Asphalt
Solid Stripe No. of Paint Applications	1
Solid Stripe No. of Stripes	2
Skip Stripe No. of Paint Applications	1
Skip Stripe No. of Stripes	0

Pay Items

Pay item	Description	Quantity	Unit	Unit Price	Extended Amount
710-11-111	PAINTED PAVT MARK,STD,WHITE,SOLID,6"	0.45	NM	$927.32	$417.29
711-15-111	THERMOPLASTIC, STD-OP, WHITE, SOLID, 6"	0.45	NM	$4,372.35	$1,967.56
	Roadway Component Total				$81,404.85

SHOULDER COMPONENT

User Input Data

Description	Value
Total Outside Shoulder Width L/R	10.00 / 10.00
Total Outside Shoulder Perf. Turf Width L/R	2.67 / 2.67
Paved Outside Shoulder Width L/R	0.00 / 0.00
Structural Spread Rate	110
Friction Course Spread Rate	80
Total Width (T) / 8" Overlap (O)	T
Rumble Strips No. of Sides	0

Erosion Control

Pay Items

Pay item	Description	Quantity	Unit	Unit Price	Extended Amount
104-11	FLOATING TURBIDITY BARRIER	22.73	LF	$6.00	$136.38
104-12	STAKED TURBIDITY BARRIER-NYL REINF PVC	22.73	LF	$4.46	$101.38
104-18	INLET PROTECTION SYSTEM	1.00	EA	$73.82	$73.82

107-1	LITTER REMOVAL	0.55 AC	$21.47	$11.81
107-2	MOWING	0.55 AC	$39.19	$21.55
	Shoulder Component Total			$344.94
Sequence 2 Total				$81,749.79

ROADWAY COMPONENT

User Input Data

Description	Value
Number of Lanes	1
Roadway Pavement Width L/R	8.00 / 8.00
Structural Spread Rate	0
Friction Course Spread Rate	0

EX-Items

Pay item	Description	Quantity	Unit	Unit Price	Extended Amount
0908-333- 1	HIGH FRICTION SURFACE COURSE	3,111.00	SY	$30.00	$93,330.00

Pavement Marking Subcomponent

Description	Value
Include Thermo/Tape/Other	Y
Pavement Type	Asphalt
Solid Stripe No. of Paint Applications	1
Solid Stripe No. of Stripes	2
Skip Stripe No. of Paint Applications	1
Skip Stripe No. of Stripes	0

Pay Items

Pay item	Description	Quantity	Unit	Unit Price	Extended Amount
710-11-111	PAINTED PAVT MARK,STD,WHITE,SOLID,6"	0.66	NM	$927.32	$612.03
711-15-111	THERMOPLASTIC, STD-OP, WHITE, SOLID, 6"	0.66	NM	$4,372.35	$2,885.75
	Roadway Component Total				$96,827.78

SHOULDER COMPONENT

User Input Data

Description	Value
Total Outside Shoulder Width L/R	10.00 / 10.00
Total Outside Shoulder Perf. Turf Width L/R	2.67 / 2.67
Paved Outside Shoulder Width L/R	0.00 / 0.00
Structural Spread Rate	110
Friction Course Spread Rate	80
Total Width (T) / 8" Overlap (O)	T
Rumble Strips No. of Sides	0

Erosion Control

Pay Items

Pay item	Description	Quantity	Unit	Unit Price	Extended Amount
104-11	FLOATING TURBIDITY BARRIER	33.14	LF	$6.00	$198.84
104-12	STAKED TURBIDITY BARRIER-NYL REINF PVC	33.14	LF	$4.46	$147.80
104-18	INLET PROTECTION SYSTEM	1.00	EA	$73.82	$73.82

107-1	LITTER REMOVAL	0.80 AC	$21.47	$17.18
107-2	MOWING	0.80 AC	$39.19	$31.35
	Shoulder Component Total			$468.99

Sequence 3 Total $97,296.77

ROADWAY COMPONENT

User Input Data

Description	Value
Number of Lanes	1
Roadway Pavement Width L/R	8.00 / 8.00
Structural Spread Rate	0
Friction Course Spread Rate	0

EX-Items

Pay item	Description	Quantity	Unit	Unit Price	Extended Amount
0908-333- 1	HIGH FRICTION SURFACE COURSE	2,347.00	SY	$30.00	$70,410.00

Pavement Marking Subcomponent

Description	Value
Include Thermo/Tape/Other	Y
Pavement Type	Asphalt
Solid Stripe No. of Paint Applications	1
Solid Stripe No. of Stripes	2
Skip Stripe No. of Paint Applications	1
Skip Stripe No. of Stripes	0

Pay Items

Pay item	Description	Quantity	Unit	Unit Price	Extended Amount
710-11-111	PAINTED PAVT MARK,STD,WHITE,SOLID,6"	0.50	NM	$927.32	$463.66
711-15-111	THERMOPLASTIC, STD-OP, WHITE, SOLID, 6"	0.50	NM	$4,372.35	$2,186.18
	Roadway Component Total				$73,059.84

SHOULDER COMPONENT

User Input Data

Description	Value
Total Outside Shoulder Width L/R	10.00 / 10.00
Total Outside Shoulder Perf. Turf Width L/R	2.67 / 2.67
Paved Outside Shoulder Width L/R	0.00 / 0.00
Structural Spread Rate	110
Friction Course Spread Rate	80
Total Width (T) / 8" Overlap (O)	T
Rumble Strips No. of Sides	0

Erosion Control

Pay Items

Pay item	Description	Quantity	Unit	Unit Price	Extended Amount
104-11	FLOATING TURBIDITY BARRIER	25.00	LF	$6.00	$150.00
104-12	STAKED TURBIDITY BARRIER-NYL REINF PVC	25.00	LF	$4.46	$111.50
104-18	INLET PROTECTION SYSTEM	1.00	EA	$73.82	$73.82

107-1	LITTER REMOVAL	0.60 AC	$21.47	$12.88
107-2	MOWING	0.60 AC	$39.19	$23.51
	Shoulder Component Total			$371.72

Sequence 4 Total $73,431.56

ROADWAY COMPONENT

User Input Data

Description	Value
Number of Lanes	1
Roadway Pavement Width L/R	8.00 / 8.00
Structural Spread Rate	0
Friction Course Spread Rate	0

EX-Items

Pay item	Description	Quantity	Unit	Unit Price	Extended Amount
0908-333- 1	HIGH FRICTION SURFACE COURSE	2,614.00	SY	$30.00	$78,420.00

Pavement Marking Subcomponent

Description	Value
Include Thermo/Tape/Other	Y
Pavement Type	Asphalt
Solid Stripe No. of Paint Applications	1
Solid Stripe No. of Stripes	2
Skip Stripe No. of Paint Applications	1
Skip Stripe No. of Stripes	0

Pay Items

Pay item	Description	Quantity	Unit	Unit Price	Extended Amount
710-11-111	PAINTED PAVT MARK,STD,WHITE,SOLID,6"	0.56	NM	$927.32	$519.30
711-15-111	THERMOPLASTIC, STD-OP, WHITE, SOLID, 6"	0.56	NM	$4,372.35	$2,448.52
	Roadway Component Total				$81,387.82

SHOULDER COMPONENT

User Input Data

Description	Value
Total Outside Shoulder Width L/R	10.00 / 10.00
Total Outside Shoulder Perf. Turf Width L/R	2.67 / 2.67
Paved Outside Shoulder Width L/R	0.00 / 0.00
Structural Spread Rate	110
Friction Course Spread Rate	80
Total Width (T) / 8" Overlap (O)	T
Rumble Strips No. of Sides	0

Erosion Control

Pay Items

Pay item	Description	Quantity	Unit	Unit Price	Extended Amount
104-11	FLOATING TURBIDITY BARRIER	27.84	LF	$6.00	$167.04
104-12	STAKED TURBIDITY BARRIER-NYL REINF PVC	27.84	LF	$4.46	$124.17
104-18	INLET PROTECTION SYSTEM	1.00	EA	$73.82	$73.82

107-1	LITTER REMOVAL	0.67 AC	$21.47	$14.38
107-2	MOWING	0.67 AC	$39.19	$26.26
	Shoulder Component Total			$405.67
Sequence 5 Total				$81,793.49

ROADWAY COMPONENT

User Input Data

Description	Value
Number of Lanes	1
Roadway Pavement Width L/R	6.00 / 6.00
Structural Spread Rate	0
Friction Course Spread Rate	0

EX-Items

Pay item	Description	Quantity	Unit	Unit Price	Extended Amount
0908-333- 1	HIGH FRICTION SURFACE COURSE	3,067.00	SY	$30.00	$92,010.00

Pavement Marking Subcomponent

Description	Value
Include Thermo/Tape/Other	Y
Pavement Type	Asphalt
Solid Stripe No. of Paint Applications	1
Solid Stripe No. of Stripes	2
Skip Stripe No. of Paint Applications	1
Skip Stripe No. of Stripes	0

Pay Items

Pay item	Description	Quantity	Unit	Unit Price	Extended Amount
710-11-111	PAINTED PAVT MARK,STD,WHITE,SOLID,6"	0.87	NM	$927.32	$806.77
711-15-111	THERMOPLASTIC, STD-OP, WHITE, SOLID, 6"	0.87	NM	$4,372.35	$3,803.94
	Roadway Component Total				$96,620.71

SHOULDER COMPONENT

User Input Data

Description	Value
Total Outside Shoulder Width L/R	10.00 / 10.00
Total Outside Shoulder Perf. Turf Width L/R	2.67 / 2.67
Paved Outside Shoulder Width L/R	0.00 / 0.00
Structural Spread Rate	110
Friction Course Spread Rate	80
Total Width (T) / 8" Overlap (O)	T
Rumble Strips No. of Sides	0

Erosion Control

Pay Items

Pay item	Description	Quantity	Unit	Unit Price	Extended Amount
104-11	FLOATING TURBIDITY BARRIER	43.56	LF	$6.00	$261.36
104-12	STAKED TURBIDITY BARRIER-NYL REINF PVC	43.56	LF	$4.46	$194.28
104-18	INLET PROTECTION SYSTEM	1.00	EA	$73.82	$73.82

107-1	LITTER REMOVAL	1.05 AC	$21.47	$22.54
107-2	MOWING	1.05 AC	$39.19	$41.15
	Shoulder Component Total			$593.15
Sequence 6 Total				$97,213.86

ROADWAY COMPONENT

User Input Data

Description	Value
Number of Lanes	1
Roadway Pavement Width L/R	6.00 / 6.00
Structural Spread Rate	0
Friction Course Spread Rate	0

EX-Items

Pay item	Description	Quantity	Unit	Unit Price	Extended Amount
0908-333- 1	HIGH FRICTION SURFACE COURSE	3,067.00	SY	$30.00	$92,010.00

Pavement Marking Subcomponent

Description	Value
Include Thermo/Tape/Other	Y
Pavement Type	Asphalt
Solid Stripe No. of Paint Applications	1
Solid Stripe No. of Stripes	2
Skip Stripe No. of Paint Applications	1
Skip Stripe No. of Stripes	0

Pay Items

Pay item	Description	Quantity	Unit	Unit Price	Extended Amount
710-11-111	PAINTED PAVT MARK,STD,WHITE,SOLID,6"	0.87	NM	$927.32	$806.77
711-15-111	THERMOPLASTIC, STD-OP, WHITE, SOLID, 6"	0.87	NM	$4,372.35	$3,803.94
	Roadway Component Total				$96,620.71

SHOULDER COMPONENT

User Input Data

Description	Value
Total Outside Shoulder Width L/R	10.00 / 10.00
Total Outside Shoulder Perf. Turf Width L/R	2.67 / 2.67
Paved Outside Shoulder Width L/R	0.00 / 0.00
Structural Spread Rate	110
Friction Course Spread Rate	80
Total Width (T) / 8" Overlap (O)	T
Rumble Strips No. of Sides	0

Erosion Control

Pay Items

Pay item	Description	Quantity	Unit	Unit Price	Extended Amount
104-11	FLOATING TURBIDITY BARRIER	43.56	LF	$6.00	$261.36
104-12	STAKED TURBIDITY BARRIER-NYL REINF PVC	43.56	LF	$4.46	$194.28
104-18	INLET PROTECTION SYSTEM	1.00	EA	$73.82	$73.82

107-1	LITTER REMOVAL	1.05 AC	$21.47	$22.54
107-2	MOWING	1.05 AC	$39.19	$41.15
	Shoulder Component Total			$593.15
Sequence 7 Total				$97,213.86

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FDOT Long Range Estimating System - Production

R3: Project Details by Sequence Report

Project: 211083-1-52-01 **Letting Date:** 01/2099

Description: SR 9A/I-295 AT BUCKMAN BRIDGE - DISTRICT TWO SAFETY STUDY.

District: 02 **County:** 72 DUVAL **Market Area:** 05 **Units:** English
Contract Class: 1 **Lump Sum Project:** N **Design/Build:** N **Project Length:** 3.087 MI

Project Manager: PHILIP SHAD

Version 3 Project Grand Total **$879,360.17**
Description: SR 9A/I-295 AT BUCKMAN BRIDGE. SAN JOSE INTERCHANGE SCOPE OF WORK - RESURFACING INTERCHANGE RAMPS WITH HIGH FRICTION SURFACE COURSE. - OPTION 3

Project Sequences Subtotal			**$652,959.52**
102-1	Maintenance of Traffic	10.00 %	$65,295.95
101-1	Mobilization	6.00 %	$43,095.33
Project Sequences Total			**$761,350.80**
Project Unknowns		10.00 %	$76,135.08
Design/Build		0.00 %	$0.00

Non-Bid Components:

Pay item	Description	Quantity	Unit	Unit Price	Extended Amount
999-25	INITIAL CONTINGENCY AMOUNT (DO NOT BID)		LS	$41,874.29	$41,874.29
Project Non-Bid Subtotal					**$41,874.29**
Version 3 Project Grand Total					**$879,360.17**

FDOT Long Range Estimating System - Production
R4: Project Details Composite Report
By Version

Project: 211083-1-52-01 **Letting Date:** 01/2099
Description: I-295 AT BUCKMAN BRIDGE. SCOPE OF WORK - REPLACE EXISTING CONCRETE BARRIER WALLS WITH CONCRETE TRAFFIC RAILING, BRIDGE 42" F-SHAPE.
District: 02 **County:** 72 DUVAL
Project Manager: PHILIP SHAD

Version 1-P Project Grand Total **$35,001,011.16**
Description: SR 9A/I-295 AT BUCKMAN BRIDGE. SCOPE OF WORK - REPLACE EXISTING CONCRETE BARRIER WALLS WITH CONCRETE TRAFFIC RAILING, BRIDGE 42" F-SHAPE.

Pay Items					
Pay Item	Description	Total Quantity	Unit	Weighted Avg. Unit Price	Total Amount
102-1	MAINTENANCE OF TRAFFIC	10.00			$2,988,937.49
101-1	MOBILIZATION	6.00			$1,972,698.75
110-3	REMOVAL OF EXISTING STRUCTURE	188,106.00	SF	$30.00	$5,643,180.00
630-2-15	CONDUIT, F& I, BRIDGE MOUNT	39,072.00	LF	$28.80	$212,552.00
635-2-11	PULL & SPLICE BOX, F&I, 13" X 24"	218.00	EA	$500.00	$109,000.00
715-1-13	LIGHTING CONDUCTORS, F&I, INSUL, NO.4-2	119,060.00	LF	$1.30	$154,778.00
715-515-145	LIGHT POLE COMP, F&I, SINGLE ARM BRIDGE MOUNT, ALUM, 45'	218.00	EA	$3,500.00	$763,000.00
715-500-1	POLE CABLE DIST SYS, CONVENTIONAL	218.00	EA	$500.00	$109,000.00
999-25	INITIAL CONTINGENCY AMOUNT (DO NOT BID)	1.00	LS	$150,000.00	$150,000.00
0521 5 2	CONCRETE TRAFFIC RAILING , BRIDGE 42" F-SHAPE	65,202.00	LF	$110.00	$7,172,220.00

SF Bridge Estimate
Bridge No. 1 Type=Medium Level, Widen **Length=16300.34 FT Width=5.77 FT**
Bridge Basic Cost based on Factored Cost $63.00 SF $5,925,336.59
Primary Estimate: YES
Bridge Final Cost Per SF $101.13

SF Bridge Estimate
Bridge No. 2 Type=Medium Level, Widen **Length=16300.34 FT Width=5.77 FT**
Bridge Basic Cost based on Factored Cost $63.00 SF $5,925,336.59
Primary Estimate: YES
Bridge Final Cost Per SF $101.13

Project Unknowns 10.00 % $3,874,971.74
Design/Build 0.00 % $0.00

Version 1-P Project Grand Total **$35,001,011.16**

FDOT Long Range Estimating System - Production					
R4: Project Details Composite Report					
By Version					
Project: 211083-1-52-01				**Letting Date:** 01/2099	
Description: SR 9A/I-295 AT BUCKMAN BRIDGE - DISTRICT TWO SAFETY STUDY.					
District: 02	**County:** 72 DUVAL				
Project Manager: PHILIP SHAD					
Version 2 Project Grand Total					**$7,236,062.23**
Description: SR 9A/I-295 AT BUCKMAN BRIDGE. SCOPE OF WORK - TRAFFIC RAILING ELLIPTICAL TUBE RETRO FIT TO EXISTING BARRIER WALL - OPTION 2.					
Pay Items					
Pay Item	Description	Total Quantity	Unit	Weighted Avg. Unit Price	Total Amount
102-1	MAINTENANCE OF TRAFFIC	10.00			$558,585.53
101-1	MOBILIZATION	6.00			$368,666.45
999-25	INITIAL CONTINGENCY AMOUNT (DO NOT BID)	1.00	LS	$71,644.18	$71,644.18
0515 4 1	TRAFFIC RAIL ELLIPTICAL TUBE, RETRO-FIT, STEEL	65,202.00	LF	$85.67	$5,585,855.34
SF Bridge Estimate					
Bridge No. 2 Type=Medium Level			**Length=16300.34 FT**		**Width=5.77 FT**
Bridge Basic Cost based on Factored Cost $0.00 SF					$0.00
Primary Estimate:		YES			
Bridge Final Cost Per SF $29.70					
SF Bridge Estimate					
Bridge No. 1 Type=Medium Level			**Length=16300.34 FT**		**Width=5.77 FT**
Bridge Basic Cost based on Factored Cost $0.00 SF					$0.00
Primary Estimate:		YES			
Bridge Final Cost Per SF $29.70					
Project Unknowns			10.00	%	$651,310.73
Design/Build			0.00	%	$0.00
Version 2 Project Grand Total					**$7,236,062.23**

FDOT Long Range Estimating System - Production

R4: Project Details Composite Report

By Version

Project: 720000-1-52-05 **Letting Date:** 01/2099

Description: BUCKMAN BRIDGE ACTIVE TRAFFIC MANAGEMENT (ATM)

District: 02 **County:** 72 DUVAL

Project Manager: STEPHEN AUSTIN

Version 5 Project Grand Total **$1,224,256.25**

Description: BUCKMAN BRIDGE ACTIVE TRAFFIC MANAGEMENT - QUEUE WARNING SYSTEM WO/FLASHING BEACONS. OPTION 2

Pay Items

Pay Item	Description	Total Quantity	Unit	Weighted Avg. Unit Price	Total Amount
102-1	MAINTENANCE OF TRAFFIC	10.00			$80,566.47
101-1	MOBILIZATION	6.00			$53,173.87
633-2-31	FIBER OPTIC CONNECTION, INSTALL, SPLICE	4.00	EA	$42.69	$170.76
633-3-11	FIBER OPTIC CONN HDWR, SPLICE ENCLOSURE	1.00	EA	$667.61	$667.61
633-3-12	FIBER OPTIC CONN HDWR, SPLICE TRAY	1.00	EA	$56.31	$56.31
633-3-15	FIBER OPTIC CONN HDWR, PRETERM PATCH PAN	1.00	EA	$1,328.90	$1,328.90
635-2-12	PULL & SPLICE BOX, F&I, 24" X 36"	2.00	EA	$1,395.18	$2,790.36
635-3-11	JUNCTION BOX, FURNISH & INSTALL, AERIAL	1.00	EA	$681.07	$681.07
639-1-112	ELECTRICAL POWER SRV,F&I,OH,M,PUR BY CON	2.00	AS	$1,643.28	$3,286.56
639-1-122	ELECTRICAL POWER SRV,F&I, UG,PUR CONT	2.00	AS	$2,300.00	$4,600.00
639-3-11	ELEC SERV DISCON, F&I, POLE MNT	2.00	EA	$681.07	$1,362.14
641-2-12	PREST CNC POLE,F&I,TYP P-II SRV POLE	2.00	EA	$1,543.55	$3,087.10
676-2-121	ITS CABINET- F&I, POLE, 336	3.00	EA	$10,000.00	$30,000.00
684-1-1	MANAGED FIELD ETHERNET SWITCH, F&I	1.00	EA	$2,633.85	$2,633.85
700-8-216	FRONT ACC DYN MESS SIGN, F&I, MONO,101-	4.00	EA	$108,750.00	$435,000.00
700-10-124	DMS SUPPORT STRUCTURE, CANT, 41-50 FT	4.00	EA	$80,000.00	$320,000.00
999-25	INITIAL CONTINGENCY AMOUNT (DO NOT BID)	1.00	LS	$50,000.00	$50,000.00
Project Unknowns			25.00	%	$234,851.25
Design/Build			0.00	%	$0.00
Version 5 Project Grand Total					**$1,224,256.25**

FDOT Long Range Estimating System - Production

R4: Project Details Composite Report

By Version

Project: 720000-1-52-05 **Letting Date:** 01/2099

Description: BUCKMAN BRIDGE ACTIVE TRAFFIC MANAGEMENT (ATM)

District: 02 **County:** 72 DUVAL

Project Manager: STEPHEN AUSTIN

Version 4 Project Grand Total **$6,788,194.79**

Description: BUCKMAN BRIDGE ACTIVE TRAFFIC MANAGEMENT - SPEED HARMONIZATION SYSTEM.

Pay Items

Pay Item	Description	Total Quantity	Unit	Weighted Avg. Unit Price	Total Amount
102-1	MAINTENANCE OF TRAFFIC	10.00			$524,012.55
101-1	MOBILIZATION	6.00			$345,848.28
633-2-31	FIBER OPTIC CONNECTION, INSTALL, SPLICE	44.00	EA	$73.32	$3,226.08
633-3-11	FIBER OPTIC CONN HDWR, SPLICE ENCLOSURE	10.00	EA	$687.74	$6,877.40
633-3-12	FIBER OPTIC CONN HDWR, SPLICE TRAY	10.00	EA	$53.45	$534.50
633-3-15	FIBER OPTIC CONN HDWR, PRETERM PATCH PAN	10.00	EA	$1,271.73	$12,717.30
635-3-11	JUNCTION BOX, FURNISH & INSTALL, AERIAL	10.00	EA	$637.30	$6,373.00
676-2-142	ITS CABINET- F&I, BASE WITH SUN, 336S	14.00	EA	$7,700.00	$107,800.00
684-1-1	MANAGED FIELD ETHERNET SWITCH, F&I	10.00	EA	$2,759.72	$27,597.20
700-7-132	EMBED DYNAMIC MESS SIGN, F&I, FULL,12-20	56.00	EA	$35,000.00	$1,960,000.00
700-8-135	FRONT ACC DYN MESS SIGN, F&I, FUL,51-100	14.00	EA	$72,500.00	$1,015,000.00
700-10-115	DMS SUPPORT STRUCTURE, SPAN, 51-100 FT	14.00	EA	$150,000.00	$2,100,000.00
999-25	INITIAL CONTINGENCY AMOUNT (DO NOT BID)	1.00	LS	$67,209.85	$67,209.85
Project Unknowns			10.00	%	$610,998.63
Design/Build			0.00	%	$0.00
Version 4 Project Grand Total					**$6,788,194.79**

FDOT Long Range Estimating System - Production

R4: Project Details Composite Report

By Version

Project: 720000-1-52-05 **Letting Date:** 01/2099

Description: BUCKMAN BRIDGE ACTIVE TRAFFIC MANAGEMENT (ATM)

District: 02 **County:** 72 DUVAL

Project Manager: STEPHEN AUSTIN

Version 1-P Project Grand Total **$2,656,560.90**

Description: BUCKMAN BRIDGE ACTIVE TRAFFIC MANAGEMENT. VECHICLE DETECTION SYSTEM (VDS).

Pay Items

Pay Item	Description	Total Quantity	Unit	Weighted Avg. Unit Price	Total Amount
102-1	MAINTENANCE OF TRAFFIC	10.00			$178,837.80
101-1	MOBILIZATION	6.00			$118,032.95
630-2-15	CONDUIT, F& I, BRIDGE MOUNT	16,355.00	LF	$34.12	$558,032.60
633-1-112	FIBER OPTIC CABLE, F&I,OVH,13-48	32,710.00	LF	$2.94	$96,167.40
633-2-31	FIBER OPTIC CONNECTION, INSTALL, SPLICE	12.00	EA	$130.19	$1,562.28
633-3-11	FIBER OPTIC CONN HDWR, SPLICE ENCLOSURE	3.00	EA	$687.74	$2,063.22
633-3-12	FIBER OPTIC CONN HDWR, SPLICE TRAY	3.00	EA	$53.45	$160.35
633-3-15	FIBER OPTIC CONN HDWR, PRETERM PATCH PAN	3.00	EA	$1,271.73	$3,815.19
633-8-1	MULTI-CONDUCTOR COMMUNICATION CABLE, F&I	9,600.00	LF	$4.50	$43,200.00
635-3-11	JUNCTION BOX, FURNISH & INSTALL, AERIAL	11.00	EA	$637.30	$7,010.30
639-1-112	ELECTRICAL POWER SRV,F&I,OH,M,PUR BY CON	2.00	AS	$2,891.00	$5,782.00
639-2-1	ELECTRICAL SERVICE WIRE	32,710.00	LF	$4.17	$136,400.70
639-3-11	ELEC SERV DISCON, F&I, POLE MNT	2.00	EA	$581.48	$1,162.96
641-2-12	PREST CNC POLE,F&I,TYP P-II SRV POLE	2.00	EA	$1,230.67	$2,461.34
649-1-13	STEEL STRAIN POLE, F&I, TYPE PS-VI	6.00	EA	$25,823.78	$154,942.68
660-3-11	VEHICLE DETECTION SYSTEM-MICRO,F&I, CAB	22.00	EA	$1,269.65	$27,932.30
660-3-12	VEHICLE DETECTION SYSTEM-MICRO,F&I, ABO	22.00	EA	$10,583.73	$232,842.06
676-2-121	ITS CABINET- F&I, POLE, 336	3.00	EA	$10,100.00	$30,300.00
676-3-10	SMALL EQUIPMENT ENCLOSURE, F&I,>10X13X11	8.00	EA	$6,501.00	$52,008.00
684-1-1	MANAGED FIELD ETHERNET SWITCH, F&I	3.00	EA	$3,490.92	$10,472.76
684-2-1	DEVICE SERVER, F&I	11.00	EA	$1,096.53	$12,061.83

FDOT Long Range Estimating System - Production					
R4: Project Details Composite Report					
By Version					
Project: 720000-1-52-05					**Letting Date:** 01/2099
Description: BUCKMAN BRIDGE ACTIVE TRAFFIC MANAGEMENT (ATM)					
District: 02	**County:** 72 DUVAL				
Project Manager: STEPHEN AUSTIN					
Version 1-P Project Grand Total					**$2,656,560.90**
Description: BUCKMAN BRIDGE ACTIVE TRAFFIC MANAGEMENT. VECHICLE DETECTION SYSTEM (VDS).					
999-25	INITIAL CONTINGENCY AMOUNT (DO NOT BID)	1.00	LS	$50,000.00	$50,000.00
600 1 1	VECHICLE DETECTION SYSTEM (RADAR)	1.00	LS	$410,000.00	$410,000.00
Project Unknowns			25.00	%	$521,312.18
Design/Build			0.00	%	$0.00
Version 1-P Project Grand Total					**$2,656,560.90**

Appendix D. Structural Calculations

Appendix D. Structural Design Calculations

1. Structural Analysis of Existing Intermediate Bents

1.1. Description and Analysis Summary

1.1.1. Figure D1-1 – VMS Only Alternative

1.1.2. Figure D1-2 – VMS and DMS Alternative

1.1.3. Figure D1-3 – DMS Only Alternative

1.2. Analysis of Proposed Span Sign Structure

1.2.1. Full Wind (V=150mph) – VMS Only

1.2.2. Full Wind (V=150mph) – VMS and DMS

1.2.3. Full Wind (V=150mph) – DMS Only

1.3. Analysis of Existing Bent Cap

1.3.1. Modelling Assumptions

1.3.2. RC-Pier Results – 1964 Intermediate Bent

1.3.3. RC-Pier Results – 1990 Intermediate Bent

1.4. References

1.4.1. Existing Intermediate Bent Details

1.4.2. VMS Details

1.4.3. DMS Details

2. Load Rating of Existing Bridge for Traffic Railing Replacement Alternative

2.1. Description and Summary of Findings

2.1.1. Figure D2.1 – Typical Cross-sections

2.1.2. Table D-1. Load Rating Summary for Main Spans (Steel Girder)

2.1.3. Table D-2. Load Rating Summary for Approach Spans (Prestressed Beams)

2.2. Load Rating of Main Spans (MDX)

2.2.1. HL-93 (32” Barrier)

2.2.2. HL-93 (42” Barrier)

2.2.3. C5 (32” Barrier)

2.2.4. C5 (42” Barrier)

2.2.5. ST5 (32” Barrier)

2.2.6. ST5 (42” Barrier)

2.2.7. SU4 (32” Barrier)

1. Structural Analysis of Existing Intermediate Bents

1.1. Description and Analysis Summary

This section presents the results of the structural analysis performed to determine the viability of using FDOT Standard span sign structures attached to the existing intermediate bents to support Variable Message Signs (VMS) and Dynamic Message Sings (DMS) as described in this report. The piers supporting the main spans are not included in this analysis. Three different cases were considered. The first case included only VMS attached to the span sign structure as shown in Figure D1.1. The second case considered the presence of VMS and DMS simultaneously following the configuration shown in Figure D1.2. A last case was analyzed for the condition when only a DMS were mounted on the span sign structure as shown in Figure D1.3.

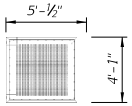
The subject bridge was originally built in 1960's and it experienced a major widening in 1990's. The intermediate bents used in both cases have the same cross-sections and similar shear and longitudinal reinforcement. Although it cannot be clearly identified from the existing bridge plans, it is expected that the intermediate bents built on 1960's (original bridge) present lower material strengths based on the construction practices at the time they were built (f'c = 3 ksi and fy=40ksi).

FDOT Standard Span Sign Structures (Index 11320) were assumed to be used to provide support to the proposed VMS and DMS. Details of the proposed VMS and DMS are included in Sections D.1.4.2 and D.1.4.3, respectively. The proposed structural detail to provide support to the uprights is shown in Figure D1.1. The concept detail consists of two steel channels that projects outside of the limits of the bridge deck and that are connected to each other at the free end by a build-up beam. The top flange of this beam will be used to provide support to the upright. The steel channels are attached to each side of the existing concrete pile cap by using steel anchor bolts which need to be designed for the combined effects of shear and tensile loads.

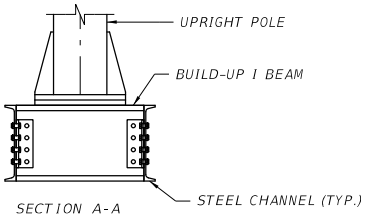
The existing intermediate bents were checked to verify the capacity of the pile caps to take the additional weight of the span sign structure and the proposed VMS and DMS attached to it as well as the significant torsion due to the bending moments at the base of the uprights as a result of the wind pressures acting on the front and back sides of the span sign structure. The preliminary design of the span sign structure was completed using the FDOT Span V6.0 program. The reactions at the base of the uprights were obtained for the cases of dead load only and dead load plus full wind in order to combine the reactions under the corresponding load case. The structural verification of the existing intermediate bents was performed using the RC-Pier program (LEAP Bridge). The reactions at the base of the uprights were applied to the intermediate bent caps following the assumptions described in section D.1.3.1.

The results of this preliminary analysis indicate that the existing bent caps have enough capacity to take the additional loads for the cases where only DMS or VMS are used (cases 1 and 3). For the case where VMS and DMS are used simultaneously, the intermediate bent built on 1990's fails under the induced significant torsion due to the greater exposed area for wind. At the same time, it could be identified that the existing bent caps does not meet the minimum shear reinforcement per AASHTO LRFD 5.8.2.5.

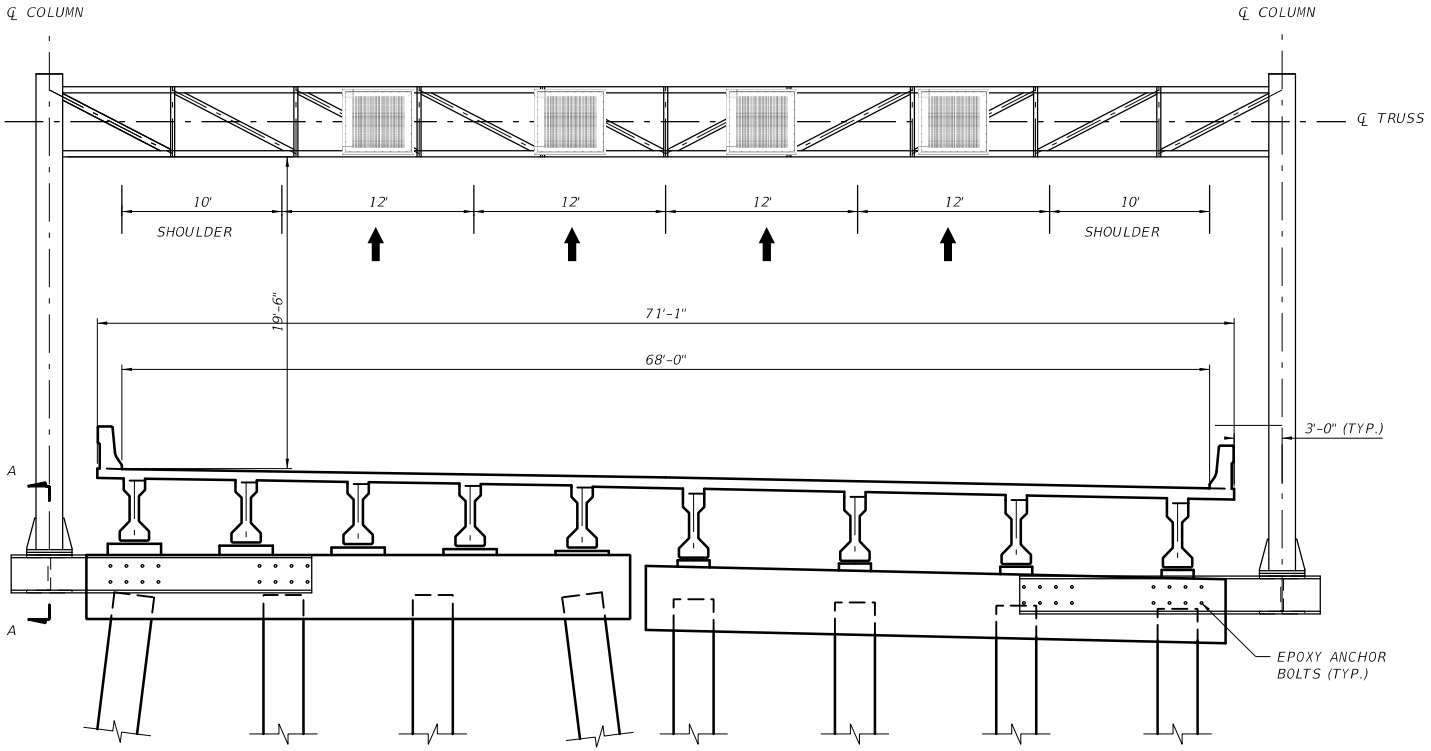
1.1.1. Figure D1-1 – VMS Only Alternative



VMS SIGN
WEIGHT = 250 LBS
(SIGN ONLY)



SECTION A-A



TYPICAL CROSS-SECTION

(SOUTH BOUND SHOWN, NORTH BOUND SIMILAR)

REVISIONS					
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION

DRAWN BY:
CHECKED BY:
DESIGNED BY:
CHECKED BY:

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID

SHEET TITLE: FIGURE D1-1

PROJECT NAME: VMS ALTERNATIVE

REF. DWG. NO.

SHEET NO.

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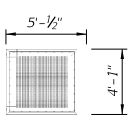
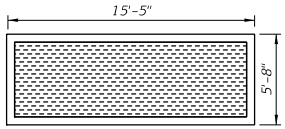
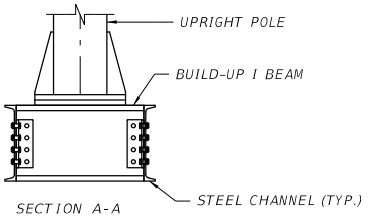
1.1.2. Figure D1-2 – VMS and DMS Alternative



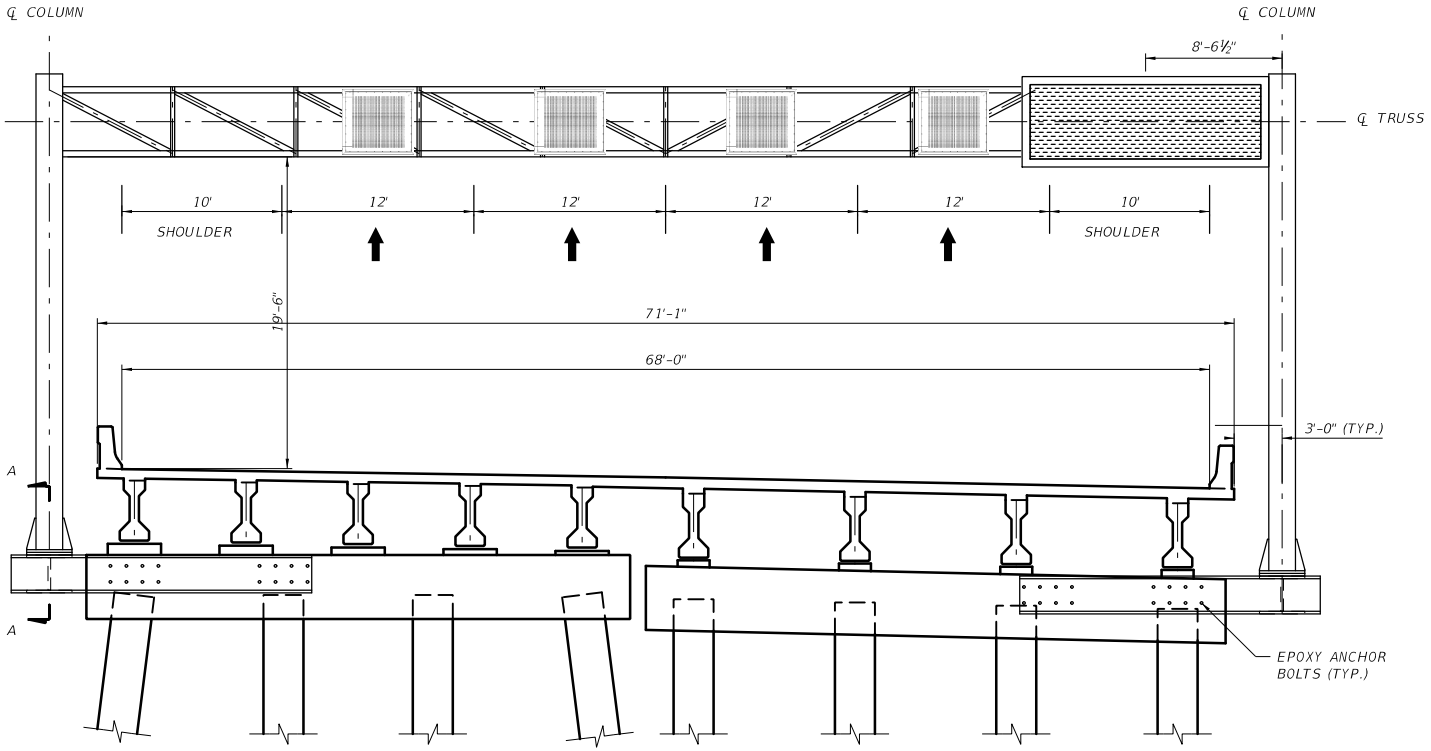
VMS SIGN
WEIGHT = 250 LBS
(SIGN ONLY)



DMS SIGN
WEIGHT = 950 LBS
(SIGN ONLY)



SECTION A-A



TYPICAL CROSS-SECTION

(SOUTH BOUND SHOWN, NORTH BOUND SIMILAR)

REVISIONS					
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION

DRAWN BY:
CHECKED BY:
DESIGNED BY:
CHECKED BY:

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID

SHEET TITLE: FIGURE D1-2

PROJECT NAME: VMS AND DMS ALTERNATIVE

REF. DWG. NO.

SHEET NO.

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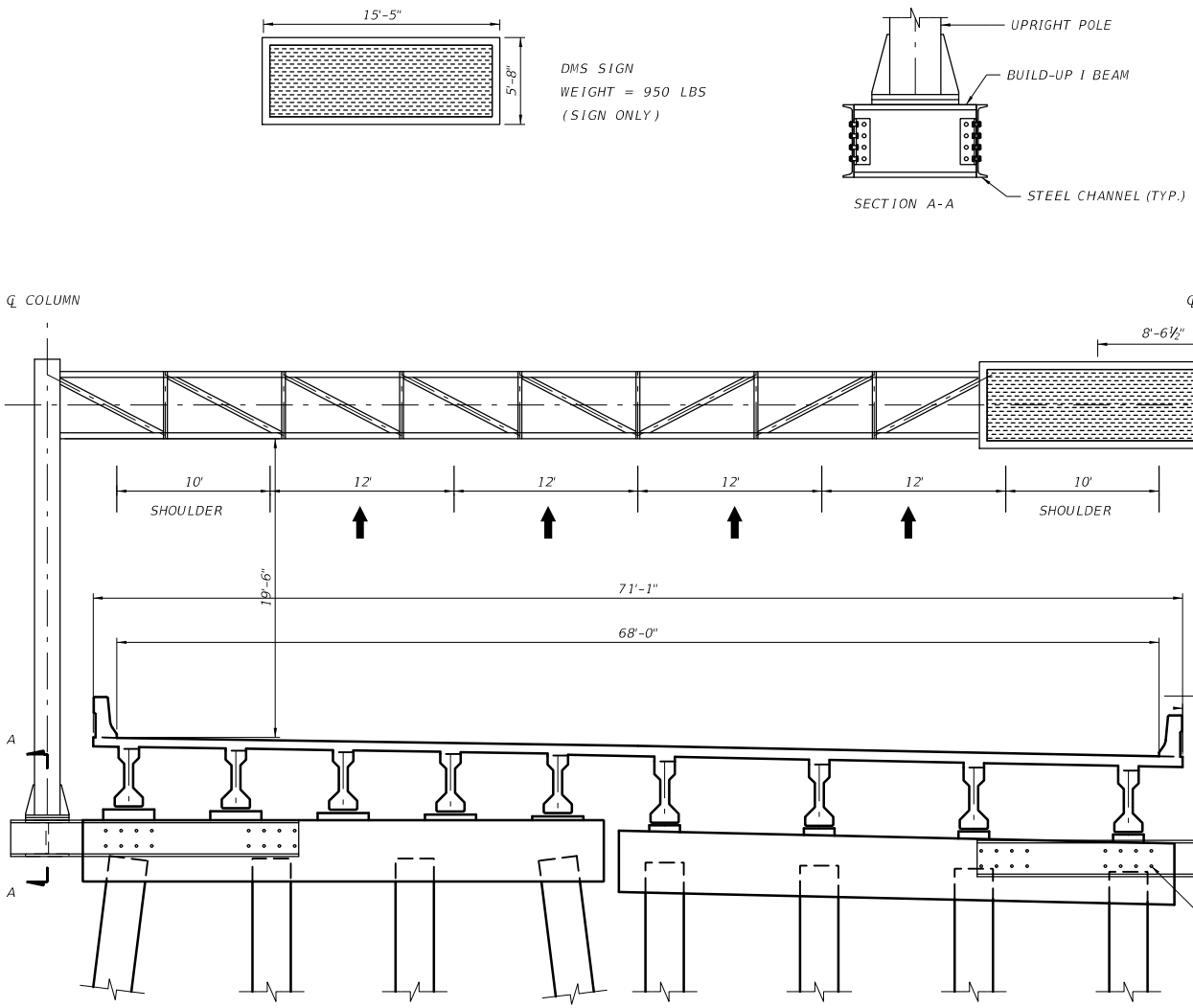
1.1.3. Figure D1-3 – DMS Only Alternative



TYPICAL CROSS-SECTION

(SOUTH BOUND SHOWN, NORTH BOUND SIMILAR)

REVISIONS					
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION

DRAWN BY:
CHECKED BY:
DESIGNED BY:
CHECKED BY:

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID

SHEET TITLE: FIGURE D1-3

PROJECT NAME: DMS ALTERNATIVE

REF. DWG. NO.

SHEET NO.

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1.2. Analysis of Proposed Span Sign Structure

1.2.1. Full Wind (V=150mph) – VMS Only

Span Overhead Sign Program v6.0

Florida Department of Transportation
Structures Design Office **http://www.dot.state.fl.us/structures**

User Manual

Data Files Folder

Change Folder

C:\Users\21682\Desktop\Projects\Buckman Bridge\SpanV6.0\Data\

Open Existing Data File (optional)

Ex1 - Static Sign Panels (Typical).dat
Ex2 - Static Sign Panels Front and Back.dat
Ex3 - Long Span Structure.dat
Ex4 - Walk-In DMS with Walkway.dat
Ex5 - Front-Access DMS with Static Signs.dat
Ex6 - Walk-In and Front-Access DMS.dat
Span Truss - Buckman Bridge.dat

Refresh List

Open File

Project Data

Project Name	Proposed Span Sign Structure at Buckman Bridge		
Project No.	NA		
Designed by	HL	Date	03 / 11 / 2015
Checked by	KZ	Date	03 / 11 / 2015

Sign Structure Data

Sign Number	OHT-1
Station	1000+00.000

Material Properties Data

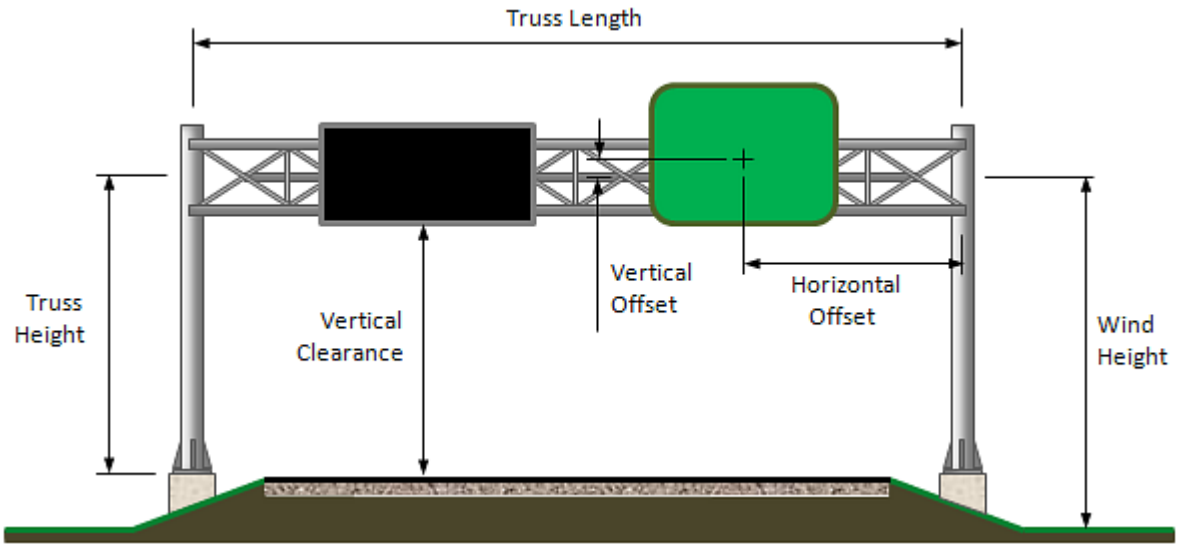
Fy of Upright	42	ksi
Fy of Web	36	ksi
Fy of Chord	42	ksi

Truss Data

Truss Length	77.08	ft
Left Truss Height	27.4	ft
Right Truss Height	30.6	ft
Vertical Clearance	19.5	ft
No. of Truss Panels	10	
Vert. Truss Depth	4	ft

Wind Load Data

Wind Height	51.9	ft
Design Wind Speed	150	mph



Load Data

Reset Load Data

Sign Panels

Show Panels 11-20

Sign Panel Number	Panel Length (ft)	Panel Height (ft)	Horizontal Offset (ft)	Vertical Offset* (ft)	Back-side Mounted?	Panel Weight (psf)
1					☐	
2					☐	
3					☐	
4					☐	
5					☐	
6					☐	
7					☐	
8					☐	
9					☐	
10					☐	

DMS Panels

DMS Panel Number	Panel Length (ft)	Panel Height (ft)	Panel Depth (ft)	Horizontal Offset (ft)	Vertical Offset* (ft)	Panel Weight (psf)
1	5.042	4.083	0.88	20.542	0	12.14
2	10.084	4.083	0.88	38.542	0	12.14
3	5.042	4.083	0.88	54.542	0	12.14

Walkways

Walkway Number	Walkway Length (ft)	Walkway Width (ft)	Number of Hangers	Horizontal Offset (ft)	Vertical Offset* (ft)	Walkway Weight (plf)
1						
2						

Attachments

Attachment Number	Projected Area (sq. ft)	Drag Coeff., C_d	Attached to Which Chord Member? (Top / Bottom / Back)	Horizontal Offset (ft)	Attachment Weight (lb)
1					
2					
3					

** Vertical offsets are input as negative values when element centroid is below the truss centerline.*

Member Data

Member Properties

Chord Size

- 3.50" O.D. Pipe, 0.216" Wall
- 4.00" O.D. Pipe, 0.226" Wall
- 4.50" O.D. Pipe, 0.237" Wall
- **4.50" O.D. Pipe, 0.337" Wall**
- 5.563" O.D. Pipe, 0.258" Wall
- 5.563" O.D. Pipe, 0.375" Wall
- 6.625" O.D. Pipe, 0.432" Wall
- 8.625" O.D. Pipe, 0.500" Wall
- CUSTOM

Design Properties

Outside Diameter (D)	4.5	in
Wall Thickness (t)	0.313	in
Area (A)	4.12	in^2
Moment of Inertia (I)	9.07	in^4
Radius of Gyration (r)	1.48	in
Torsional Constant (J)	18.1	in^4
Nominal Weight	15	plf

Web Size

- Angle 2-1/2" x 2-1/2" x 1/4"
- **Angle 3" x 3" x 1/4"**
- Angle 3" x 3" x 5/16"
- Angle 3-1/2" x 3-1/2" x 5/16"
- Angle 3-1/2" x 3-1/2" x 3/8"
- Angle 4" x 4" x 3/8"
- Angle 4" x 4" x 1/2"
- Angle 5" x 5" x 1/2"
- CUSTOM

Design Properties

Leg Length (b)	3	in
Leg Thickness (t)	0.25	in
Area (A)	1.44	in^2
Dist. to Centroid ($\bar{x}$)	0.836	in
X Moment of Inertia (I_x)	1.23	in^4
X Rad. of Gyration (r_x)	0.926	in
Z Rad. of Gyration (r_z)	0.585	in
Nominal Weight	4.9	plf

Left Upright Size

- 12.75" O.D. Pipe, 0.375" Wall
- 14" O.D. Pipe, 0.375" Wall
- 16" O.D. Pipe, 0.375" Wall
- 18" O.D. Pipe, 0.438" Wall
- **20" O.D. Pipe, 0.500" Wall**
- 24" O.D. Pipe, 0.375" Wall
- 24" O.D. Pipe, 0.562" Wall
- 24" O.D. Pipe, 0.750" Wall
- 30" O.D. Pipe, 0.500" Wall
- 30" O.D. Pipe, 0.625" Wall
- 30" O.D. Pipe, 0.750" Wall

Design Properties

Outside Diameter (D)	20	in
Wall Thickness (t)	0.465	in
Area (A)	28.5	in^2
Moment of Inertia (I)	1360	in^4
Radius of Gyration (r)	6.91	in
Torsional Constant (J)	2720	in^4
Nominal Weight	104	plf

Right Upright Size

- 12.75" O.D. Pipe, 0.375" Wall
- 14" O.D. Pipe, 0.375" Wall
- 16" O.D. Pipe, 0.375" Wall
- 18" O.D. Pipe, 0.438" Wall
- **20" O.D. Pipe, 0.500" Wall**
- 24" O.D. Pipe, 0.375" Wall
- 24" O.D. Pipe, 0.562" Wall
- 24" O.D. Pipe, 0.750" Wall
- 30" O.D. Pipe, 0.500" Wall
- 30" O.D. Pipe, 0.625" Wall
- 30" O.D. Pipe, 0.750" Wall

Design Properties

Outside Diameter (D)	20	in
Wall Thickness (t)	0.465	in
Area (A)	28.5	in^2
Moment of Inertia (I)	1360	in^4
Radius of Gyration (r)	6.91	in
Torsional Constant (J)	2720	in^4
Nominal Weight	104	plf

Connection Data

Gusset Plates

Min. Gusset Bolt Diameter: 5/8", 3/4", **7/8"**, 1", 1-1/4"

Min. Gusset Plate Thickness: 3/8", **1/2"**, 5/8", 3/4", 7/8", 1"

Truss Connections

Min. Truss Bolt Diameter: **7/8"**, 1"

Min. Horizontal Plate Thickness: 1/2", **5/8"**, 3/4", 7/8", 1"

Min. Vertical Plate Thickness: 1/2", **5/8"**, 3/4", 7/8", 1"

Base Connection

Min. Anchor Bolt Diameter: **1"**, 1-1/2", 1-3/4", 2", 2-1/4", 2-1/2"

Min. Number of Anchor Bolts: **8**, 10, 12

Min. Base Plate Thickness: 3/4", **1"**, 1-1/4", 1-1/2", 1-3/4", 2"

Min. Stiffener Plate Thickness: **3/8"**, 1/2", 5/8", 3/4", 7/8", 1"

Foundation Data

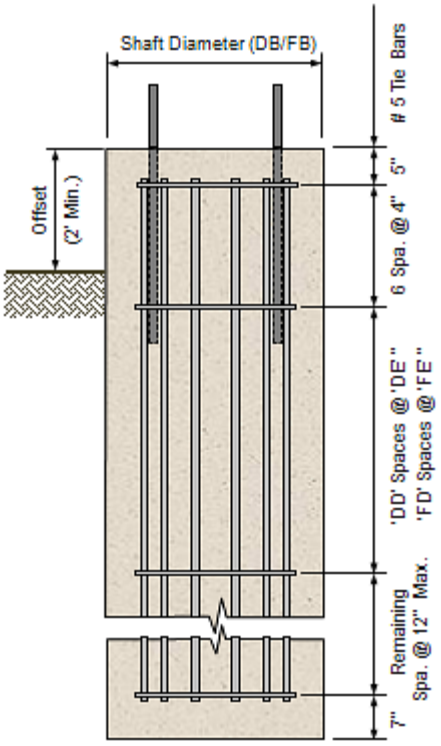
Foundation Type: Drilled Shafts / None

Left Drilled Shaft Data

Soil Type: Sand / Clay

Water Elevation: Below Bottom of Shaft / Above Top of Shaft

Soil Density, γ_{dry}		pcf
Friction Angle, ϕ		deg
SPT Number (N_{blows})		
Shear Strength, *c*		ksf
Safety Factor against Overturning		
Safety Factor against Torsion		
Shaft Diameter (DB)		ft
Ground to Top of Shaft Offset		ft
Number of Stirrup Spaces (DD)		
Stirrup Spacing (DE)		in



Right Drilled Shaft Data

Soil Type: Sand / Clay

Water Elevation: Below Bottom of Shaft / Above Top of Shaft

Soil Density, γ_{dry}		pcf
Friction Angle, ϕ		deg
SPT Number (N_{blows})		
Shear Strength, *c*		ksf
Safety Factor against Overturning		
Safety Factor against Torsion		
Shaft Diameter (FB)		ft
Ground to Top of Shaft Offset		ft
Number of Stirrup Spaces (FD)		
Stirrup Spacing (FE)		in

Save Data

Save Data File (optional)

☑ Use current input file

File Name Span Truss - Buckman Bridge.dat Save Data

Note: Select an output folder by using the "Change Folder" option above.

Data Initialization

Geometry Check Calculations

Preliminary Geometry Checks

Check_Truss_Panel_Length = "OK"

Check_Web_Clearance = "OK"

Check_Sign_Panel_Layout = "OK"

Check_for_Panel_Overlap = "OK"

Check_DMS_Truss_Reqs = "OK"

3D Model Data

Wireframe Diagram

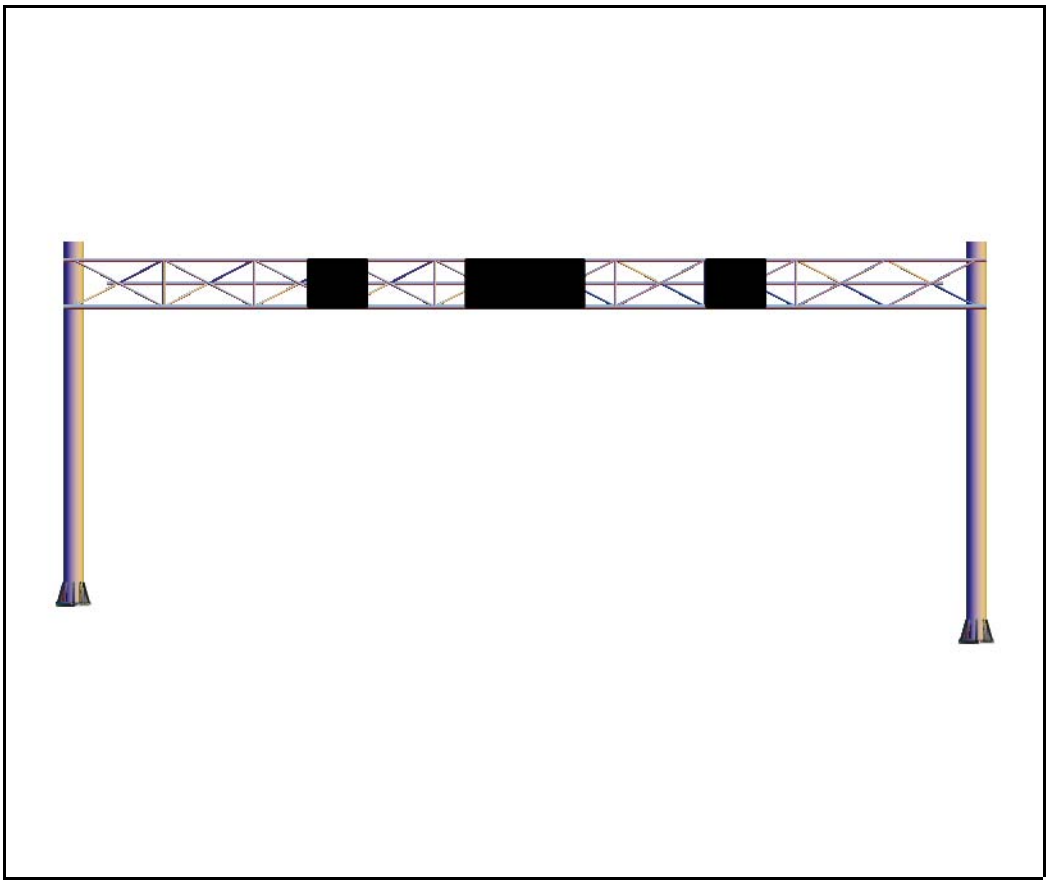
Design Forces

Fatigue Forces

Total Forces

Truss Diagram Data

Truss Diagram



Note: Use your mouse and keyboard to zoom in, zoom out or rotate the 3D plot above. (See "Rotating, Spinning, or Zooming a 3D Plot" in Mathcad Help for instructions.)

3D Structural Analysis

Run Analysis

Note: A new analysis MUST be run after any change in program input.

- PC-SAP Output Data
- Design Check Calculations
- Maximum Reactions
- Results Output

Results

Sign Structure Geometry

(A) Truss_Length = 77.08 ft

(B) Left_Truss_Height = 27.4 ft

(C) Right_Truss_Height = 30.6 ft

(D) Number_of_Truss_Panels = "10 @ 7' 8-1/2" (Total_Length = 77.08 ft.)"

(E) Vertical_Truss_Depth = 48·in

Horizontal_Truss_Depth = 41.5692·in

Sign Structure Members

(F) Chord_Member = "4.50" O.D. Pipe, 0.337" Wall" CSR_Chord = "0.557 OK"

(G) Web_Member = "Angle 3" x 3" x 1/4"" CSR_Web = "0.458 OK"

(H) Left_Upright_Member = "20" O.D. Pipe, 0.500" Wall" CSR_Left_Upright = "0.591 OK"

(J) Right_Upright_Member = "20" O.D. Pipe, 0.500" Wall" CSR_Right_Upright = "0.663 OK"

(K) Camber = "1""

Additional Design Checks

Check_Web_Slenderness = "OK"

Check_Chord_Slenderness = "OK"

Check_Chord_Elements = "OK"

Check_Sign_Hangers = "OK"

Check_Truss_Deflection = "OK"

Max. Reactions at Base of Left Upright

Left_Long_Moment = 234.833·kip·ft

Left_Long_Shear = 9.142·kip

Left_Trans_Moment = 49.433·kip·ft

Left_Trans_Shear = 3.673·kip

Left_Axial_Load = 7.294·kip

Left_Axial_Torque = 6.811·kip·ft

Max. Reactions at Base of Right Upright

Right_Long_Moment = 264.333·kip·ft

Right_Long_Shear = 9.413·kip

Right_Trans_Moment = 47.542·kip·ft

Right_Trans_Shear = 3.202·kip

Right_Axial_Load = 7.702·kip

Right_Axial_Torque = 5.937·kip·ft

- Splice Calculations
- Gusset Plate Calculations
- Truss Connection Calculations
- Base Plate Calculations
- Connection Output

Connection Values

Note: All truss bolted connections use A325 bolts, and upright anchor bolts are ASTM F1554. All welds are sized assuming E70xx electrodes.

Splice Connection

(SA) Angle_Size = "Angle 4" x 4" x 3/8""

(SB) Number_of_Bolts_Reqd_in_Splice = "6"

(SC) Bolt_Size_Required_for_Splice = "3/4" Dia."

Alternate Flange Splice Connection

(PA) Flange_Plate_Thickness = "1-1/4""

(PB) Bolt_Offset = "2""

(PC) Inside_Weld_Size = "5/16""

(PD) Outside_Weld_Size = "5/16""

(PE) Bolt_Diameter = "1""

(PF) Number_of_Bolts = "7"

Gusset Plates

(GA) Gusset_Plate_Thickness = "1/2""

(GB) Gusset_Plate_Bolt_Size = "7/8" Dia."

(GC) Back_Chord_Gusset_Plate_Length = "1' 6-3/4""

(GD) Back_Chord_Gusset_Plate_Height = "6-1/2""

(GE) Front_Chord_Gusset_Plate_Length = "1' 5-1/4""

(GF) Front_Chord_Gusset_Plate_Height = "6-1/2""

(GG) Center_Front_Gusset_Plate_Length = "2' 3/4""

(GH) Back_Truss_End_Plate_Length = "9-1/4""

(GJ) Back_Truss_End_Plate_Height = "7-3/4""

(GK) Front_Truss_End_Plate_Length = "11""

(GL) Fillet_Weld_Gusset_To_Chord = "3/16""

Left Truss Connection

(LA) Left_Bolt_Size_Required = "7/8" Dia."

(LB) Number_of_Bolts_Reqd_at_Left_Chord_Connection = "4"

(LC) Thickness_of_Left_Horizontal_Connection_Plate = "5/8""

(LD) Thickness_of_Left_Vertical_Connection_Plate = "5/8""

(LE) Fillet_Weld_Size_for_Left_Horz_PL_to_Upright = "1/4""

(LF) Fillet_Weld_Size_for_Left_Vert_PL_to_Upright = "3/16""

(LG) Fillet_Weld_Size_for_Left_Chord_to_Connection_PL = "3/16""

(LH) Fillet_Weld_Size_for_Left_Vert_PL_to_Horz_PL = "1/4""

Additional Left Truss Connection Checks

Left_Horz_Plate_Stress_Check = "OK"

Left_Vert_Plate_Stress_Check = "OK"

Left_Upright_Yielding_Check = "OK"

Right Truss Connection

(RA) Right_Bolt_Size_Required = "7/8" Dia."

(RB) Number_of_Bolts_Reqd_at_Right_Chord_Connection = "4"

(RC) Thickness_of_Right_Horizontal_Connection_Plate = "5/8""

(RD) Thickness_of_Right_Vertical_Connection_Plate = "5/8""

(RE) Fillet_Weld_Size_for_Right_Horz_PL_to_Upright = "1/4""

(RF) Fillet_Weld_Size_for_Right_Vert_PL_to_Upright = "3/16""

(RG) Fillet_Weld_Size_for_Right_Chord_to_Connection_PL = "3/16""

(RH) Fillet_Weld_Size_for_Right_Vert_PL_to_Horz_PL = "1/4""

Additional Right Truss Connection Checks

Right_Horz_Plate_Stress_Check = "OK"

Right_Vert_Plate_Stress_Check = "OK"

Right_Upright_Yielding_Check = "OK"

Left Base Connection

(BA) Left_Anchor_Bolt_Size = "1-3/4" Dia."

(BB) Left_Number_of_Anchor_Bolts_Reqd = "8"

(BC) Left_Base_Plate_Thickness = "1-1/4""

(BD) Left_Stiffener_Plate_Thickness = "3/8""

(BE) Left_Stiffener_Plate_Height = "1' 10-1/2""

(BF) Left_Inside_Base_Plate_Fillet_Weld = "5/16""

(BG) Left_Outside_Base_Plate_Fillet_Weld = "5/16""

(BH) Left_Stiffener_PL_to_Base_PL_Fillet_Weld = "5/16""

(BJ) Left_Stiffener_PL_to_Upright_Fillet_Weld = "3/16""

Right Base Connection

(CA) Right_Anchor_Bolt_Size = "1-3/4" Dia."

(CB) Right_Number_of_Anchor_Bolts_Reqd = "8"

(CC) Right_Base_Plate_Thickness = "1-1/4""

(CD) Right_Stiffener_Plate_Thickness = "3/8""

(CE) Right_Stiffener_Plate_Height = "1' 10-1/2""

(CF) Right_Inside_Base_Plate_Fillet_Weld = "5/16""

(CG) Right_Outside_Base_Plate_Fillet_Weld = "5/16""

(CH) Right_Stiffener_PL_to_Base_PL_Fillet_Weld = "5/16""

(CJ) Right_Stiffener_PL_to_Upright_Fillet_Weld = "3/16""

Additional Base Connection Checks

Left_Stiffener_to_Upright_Thickness_Check = "OK"

Right_Stiffener_to_Upright_Thickness_Check = "OK"

Fatigue Calculations

Fatigue Design Checks

Left Base Connection

Left_Upright_Fatigue_Check = "OK (2.09 ksi < 7 ksi)"

Left_Base_Fatigue_Check = "OK (1.24 ksi < 10 ksi)"

Left_Anchor_Bolts_Fatigue_Check = "OK (2.83 ksi < 7 ksi)"

Right Base Connection

Right_Upright_Fatigue_Check = "OK (2.23 ksi < 7 ksi)"

Right_Base_Fatigue_Check = "OK (1.31 ksi < 10 ksi)"

Right_Anchor_Bolts_Fatigue_Check = "OK (2.83 ksi < 7 ksi)"

Chord Member Connections

Chord_Splice_Fatigue_Check = "OK (1.52 ksi < 7 ksi)"

Chord_Slot_Fatigue_Check = "OK (0.29 ksi < 2.6 ksi)"

Half_Chord_Fatigue_Check = "OK (0.16 ksi < 2.6 ksi)"

Left_Truss_Bolts_Fatigue_Check = "OK (0.06 ksi < 7 ksi)"

Right_Truss_Bolts_Fatigue_Check = "OK (0.08 ksi < 7 ksi)"

Gusset Plates

Back_Plates_Fatigue_Check = "OK (0.02 ksi < 1.2 ksi)"

Back_End_Plates_Fatigue_Check = "OK (0.1 ksi < 1.2 ksi)"

Front_Plates_Fatigue_Check = "OK (0.02 ksi < 1.2 ksi)"

Front_End_Plates_Fatigue_Check = "OK (0.05 ksi < 1.2 ksi)"

Top_Center_Plate_Fatigue_Check = "OK (0.06 ksi < 1.2 ksi)"

Bot_Center_Plate_Fatigue_Check = "OK (0.02 ksi < 1.2 ksi)"

Web Members

Web_Member_Fatigue_Check = "OK (0.55 ksi < 7 ksi)"

Drilled Shaft Calculations

Anchor Bolt Calculations

Drilled Shaft Design

Left Drilled Shaft Design Checks

Left_Long_Reinf_Spacing_Check = "n/a"

Left_Long_Reinf_Capacity_Check = "n/a"

Left_Comb_Shear_Torsion_Check = "n/a"

Left_Max_Stirrup_Spacing_Check = "n/a"

Left Drilled Shaft Dimensions/Reinforcing

(DA) Left_Drilled_Shaft_Length = "n/a"

(DB) Left_Drilled_Shaft_Diameter = "n/a"

(DC) Left_Longitudinal_Reinforcement = "n/a"

(DD) Left_Num_Stirrup_Spaces = "n/a"

(DE) Left_Shear_Stirrup_Spacing = "n/a" ·in

Right Drilled Shaft Design Checks

Right_Long_Reinf_Spacing_Check = "n/a"

Right_Long_Reinf_Capacity_Check = "n/a"

Right_Comb_Shear_Torsion_Check = "n/a"

Right_Max_Stirrup_Spacing_Check = "n/a"

Right Drilled Shaft Dimensions/Reinforcing

(FA) Right_Drilled_Shaft_Length = "n/a"

(FB) Right_Drilled_Shaft_Diameter = "n/a"

(FC) Right_Longitudinal_Reinforcement = "n/a"

(FD) Right_Num_Stirrup_Spaces = "n/a"

(FE) Right_Shear_Stirrup_Spacing = "n/a" ·in

Anchor Bolt Design

Anchor Bolt Lengths

(DF) Left_Anchor_Bolt_Embed_Length = "n/a" ·in

(FF) Right_Anchor_Bolt_Embed_Length = "n/a" ·in

Additional Anchor Bolt Checks

Left_Anchor_Bolt_Capacity_Check = "n/a"

Left_Anchor_Bolt_Breakout_Check = "n/a"

Right_Anchor_Bolt_Capacity_Check = "n/a"

Left_Anchor_Bolt_Breakout_Check = "n/a"

MicroStation Data

Create MicroStation Text File

☑ Use same name as current data file

File Name Span Truss - Buckman Bridge.txt

Create MicroStation File

1.2.2. Full Wind (V=150mph) – VMS and DMS

Span Overhead Sign Program v6.0

Florida Department of Transportation
Structures Design Office **http://www.dot.state.fl.us/structures**

User Manual

Data Files Folder

Change Folder

C:\Users\21682\Desktop\Projects\Buckman Bridge\Bracket\SpanV6.0\Data\

Open Existing Data File (optional)

Refresh List

Open File

- Ex3 - Long Span Structure.dat
- Ex4 - Walk-In DMS with Walkway.dat
- Ex5 - Front-Access DMS with Static Signs.dat
- Ex6 - Walk-In and Front-Access DMS.dat
- Span Truss - Buckman Bridge.dat
- Span Truss - Buckman Bridge_DMS.dat
- Span Truss - Buckman Bridge_NoWind.dat
- Span Truss - Buckman Bridge_NoWind_DMS.dat

Project Data

Project Name	Proposed Span Sign Structure at Buckman Bridge		
Project No.	NA		
Designed by	HL	Date	04 / 15 / 2015
Checked by	KZ	Date	04 / 15 / 2015

Sign Structure Data

Sign Number	OHT-1
Station	1000+00.000

Material Properties Data

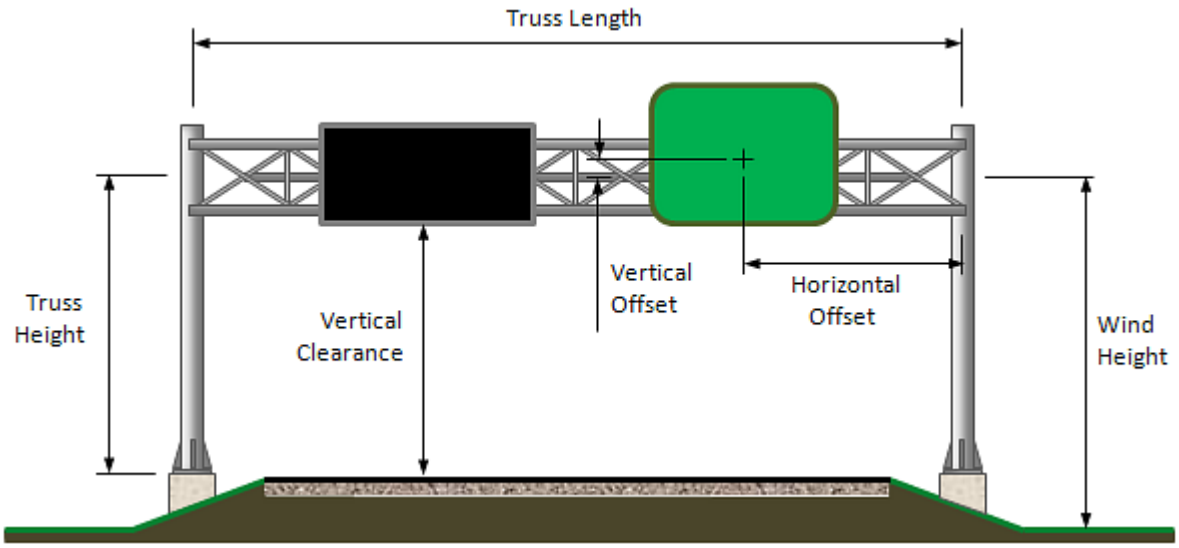
Fy of Upright	42	ksi
Fy of Web	36	ksi
Fy of Chord	42	ksi

Truss Data

Truss Length	77.08	ft
Left Truss Height	27.4	ft
Right Truss Height	30.6	ft
Vertical Clearance	19.5	ft
No. of Truss Panels	10	
Vert. Truss Depth	4	ft

Wind Load Data

Wind Height	51.9	ft
Design Wind Speed	150	mph



Load Data

Reset Load Data

Sign Panels

Show Panels 11-20

Sign Panel Number	Panel Length (ft)	Panel Height (ft)	Horizontal Offset (ft)	Vertical Offset* (ft)	Back-side Mounted?	Panel Weight (psf)
1					☐	
2					☐	
3					☐	
4					☐	
5					☐	
6					☐	
7					☐	
8					☐	
9					☐	
10					☐	

DMS Panels

DMS Panel Number	Panel Length (ft)	Panel Height (ft)	Panel Depth (ft)	Horizontal Offset (ft)	Vertical Offset* (ft)	Panel Weight (psf)
1	10.084	4.083	0.88	26.542	0	12.14
2	10.084	4.083	0.88	50.542	0	12.14
3	15.417	5.667	1.17	8.542	0	10.87

Walkways

Walkway Number	Walkway Length (ft)	Walkway Width (ft)	Number of Hangers	Horizontal Offset (ft)	Vertical Offset* (ft)	Walkway Weight (plf)
1						
2						

Attachments

Attachment Number	Projected Area (sq. ft)	Drag Coeff., C_d	Attached to Which Chord Member? (Top / Bottom / Back)	Horizontal Offset (ft)	Attachment Weight (lb)
1					
2					
3					

** Vertical offsets are input as negative values when element centroid is below the truss centerline.*

Member Data

Member Properties

Chord Size

- 3.50" O.D. Pipe, 0.216" Wall
- 4.00" O.D. Pipe, 0.226" Wall
- 4.50" O.D. Pipe, 0.237" Wall
- **4.50" O.D. Pipe, 0.337" Wall**
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- 5.563" O.D. Pipe, 0.375" Wall
- 6.625" O.D. Pipe, 0.432" Wall
- 8.625" O.D. Pipe, 0.500" Wall
- CUSTOM

Design Properties

Outside Diameter (D)	4.5	in
Wall Thickness (t)	0.313	in
Area (A)	4.12	in^2
Moment of Inertia (I)	9.07	in^4
Radius of Gyration (r)	1.48	in
Torsional Constant (J)	18.1	in^4
Nominal Weight	15	plf

Web Size

- Angle 2-1/2" x 2-1/2" x 1/4"
- Angle 3" x 3" x 1/4"
- **Angle 3" x 3" x 5/16"**
- Angle 3-1/2" x 3-1/2" x 5/16"
- Angle 3-1/2" x 3-1/2" x 3/8"
- Angle 4" x 4" x 3/8"
- Angle 4" x 4" x 1/2"
- Angle 5" x 5" x 1/2"
- CUSTOM

Design Properties

Leg Length (b)	3	in
Leg Thickness (t)	0.313	in
Area (A)	1.78	in^2
Dist. to Centroid ($\bar{x}$)	0.86	in
X Moment of Inertia (I_x)	1.5	in^4
X Rad. of Gyration (r_x)	0.918	in
Z Rad. of Gyration (r_z)	0.583	in
Nominal Weight	6.1	plf

Left Upright Size

- 12.75" O.D. Pipe, 0.375" Wall
- 14" O.D. Pipe, 0.375" Wall
- 16" O.D. Pipe, 0.375" Wall
- 18" O.D. Pipe, 0.438" Wall
- 20" O.D. Pipe, 0.500" Wall
- 24" O.D. Pipe, 0.375" Wall
- **24" O.D. Pipe, 0.562" Wall**
- 24" O.D. Pipe, 0.750" Wall
- 30" O.D. Pipe, 0.500" Wall
- 30" O.D. Pipe, 0.625" Wall
- 30" O.D. Pipe, 0.750" Wall

Design Properties

Outside Diameter (D)	24	in
Wall Thickness (t)	0.562	in
Area (A)	41.4	in^2
Moment of Inertia (I)	2843	in^4
Radius of Gyration (r)	8.29	in
Torsional Constant (J)	5686	in^4
Nominal Weight	140.8	plf

Right Upright Size

- 12.75" O.D. Pipe, 0.375" Wall
- 14" O.D. Pipe, 0.375" Wall
- 16" O.D. Pipe, 0.375" Wall
- 18" O.D. Pipe, 0.438" Wall
- 20" O.D. Pipe, 0.500" Wall
- 24" O.D. Pipe, 0.375" Wall
- **24" O.D. Pipe, 0.562" Wall**
- 24" O.D. Pipe, 0.750" Wall
- 30" O.D. Pipe, 0.500" Wall
- 30" O.D. Pipe, 0.625" Wall
- 30" O.D. Pipe, 0.750" Wall

Design Properties

Outside Diameter (D)	24	in
Wall Thickness (t)	0.562	in
Area (A)	41.4	in^2
Moment of Inertia (I)	2843	in^4
Radius of Gyration (r)	8.29	in
Torsional Constant (J)	5686	in^4
Nominal Weight	140.8	plf

Connection Data

Gusset Plates

Min. Gusset Bolt Diameter: 5/8", 3/4", **7/8"**, 1", 1-1/4"

Min. Gusset Plate Thickness: 3/8", **1/2"**, 5/8", 3/4", 7/8", 1"

Truss Connections

Min. Truss Bolt Diameter: **7/8"**, 1"

Min. Horizontal Plate Thickness: 1/2", **5/8"**, 3/4", 7/8", 1"

Min. Vertical Plate Thickness: 1/2", **5/8"**, 3/4", 7/8", 1"

Base Connection

Min. Anchor Bolt Diameter: **1"**, 1-1/2", 1-3/4", 2", 2-1/4", 2-1/2"

Min. Number of Anchor Bolts: **8**, 10, 12

Min. Base Plate Thickness: 3/4", **1"**, 1-1/4", 1-1/2", 1-3/4", 2"

Min. Stiffener Plate Thickness: **3/8"**, 1/2", 5/8", 3/4", 7/8", 1"

Foundation Data

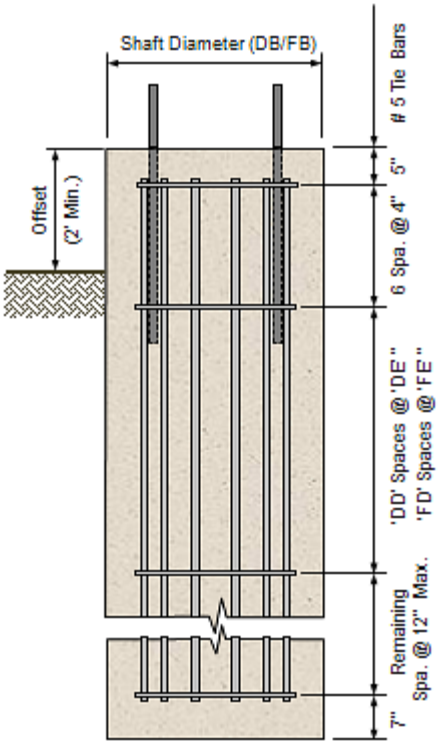
Foundation Type: Drilled Shafts / None

Left Drilled Shaft Data

Soil Type: Sand / Clay

Water Elevation: Below Bottom of Shaft / Above Top of Shaft

Soil Density, γ_{dry}		pcf
Friction Angle, ϕ		deg
SPT Number (N_{blows})		
Shear Strength, *c*		ksf
Safety Factor against Overturning		
Safety Factor against Torsion		
Shaft Diameter (DB)		ft
Ground to Top of Shaft Offset		ft
Number of Stirrup Spaces (DD)		
Stirrup Spacing (DE)		in



Right Drilled Shaft Data

Soil Type: Sand / Clay

Water Elevation: Below Bottom of Shaft / Above Top of Shaft

Soil Density, γ_{dry}		pcf
Friction Angle, ϕ		deg
SPT Number (N_{blows})		
Shear Strength, *c*		ksf
Safety Factor against Overturning		
Safety Factor against Torsion		
Shaft Diameter (FB)		ft
Ground to Top of Shaft Offset		ft
Number of Stirrup Spaces (FD)		
Stirrup Spacing (FE)		in

Save Data

Save Data File (optional)

☑ Use current input file

File Name Span Truss - Buckman Bridge_DMS.dat Save Data

Note: Select an output folder by using the "Change Folder" option above.

Data Initialization

Geometry Check Calculations

Preliminary Geometry Checks

Check_Truss_Panel_Length = "OK"

Check_Web_Clearance = "OK"

Check_Sign_Panel_Layout = "OK"

Check_for_Panel_Overlap = "OK"

Check_DMS_Truss_Reqs = "OK"

3D Model Data

Wireframe Diagram

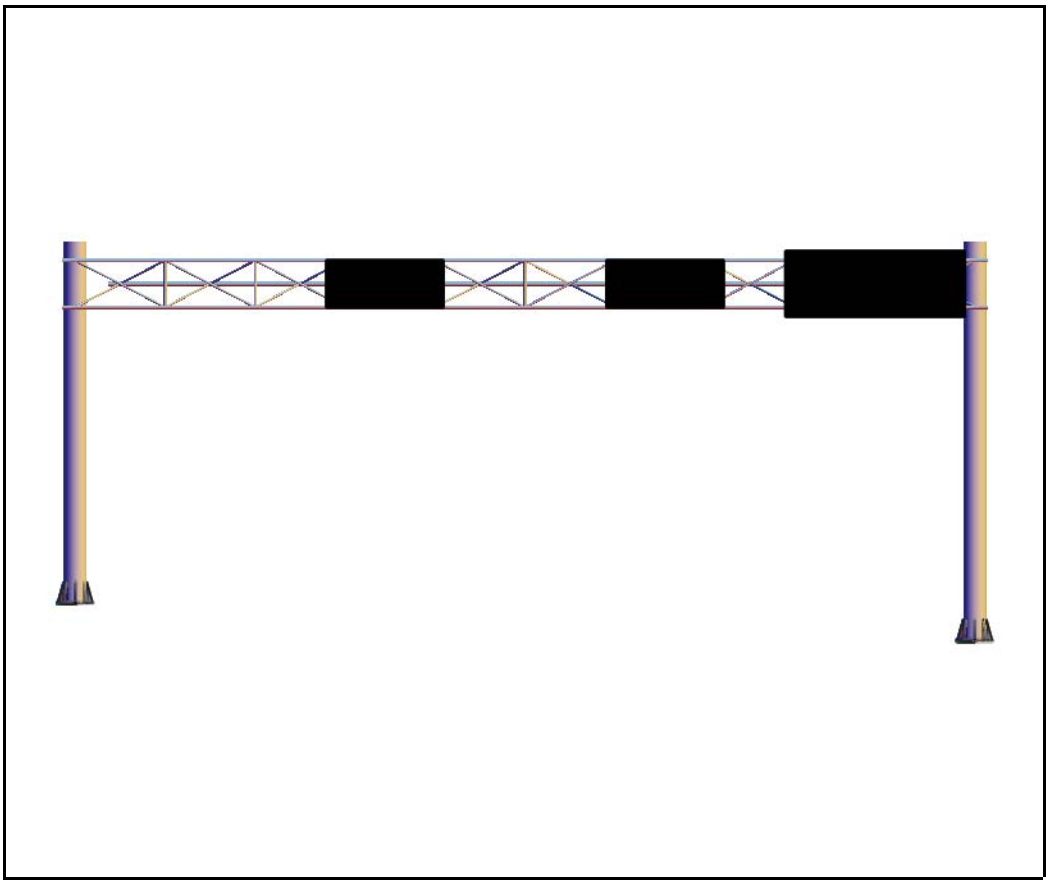
Design Forces

Fatigue Forces

Total Forces

Truss Diagram Data

Truss Diagram



Note: Use your mouse and keyboard to zoom in, zoom out or rotate the 3D plot above.
(See "Rotating, Spinning, or Zooming a 3D Plot" in Mathcad Help for instructions.)

3D Structural Analysis

Run Analysis

Note: A new analysis MUST be run after any change in program input.

- PC-SAP Output Data
- Design Check Calculations
- Maximum Reactions
- Results Output

Results

Sign Structure Geometry

(A) Truss_Length = 77.08 ft

(B) Left_Truss_Height = 27.4 ft

(C) Right_Truss_Height = 30.6 ft

(D) Number_of_Truss_Panels = "10 @ 7' 8-1/2" (Total_Length = 77.08 ft.)"

(E) Vertical_Truss_Depth = 48·in

Horizontal_Truss_Depth = 41.5692·in

Sign Structure Members

(F) Chord_Member = "4.50" O.D. Pipe, 0.337" Wall" CSR_Chord = "0.659 OK"

(G) Web_Member = "Angle 3" x 3" x 5/16"" CSR_Web = "0.698 OK"

(H) Left_Upright_Member = "24" O.D. Pipe, 0.562" Wall" CSR_Left_Upright = "0.405 OK"

(J) Right_Upright_Member = "24" O.D. Pipe, 0.562" Wall" CSR_Right_Upright = "0.754 OK"

(K) Camber = "3/4""

Additional Design Checks

Check_Web_Slenderness = "OK"

Check_Chord_Slenderness = "OK"

Check_Chord_Elements = "OK"

Check_Sign_Hangers = "OK"

Check_Truss_Deflection = "OK"

Max. Reactions at Base of Left Upright

Left_Long_Moment = 272.667·kip·ft

Left_Long_Shear = 10.520·kip

Left_Trans_Moment = 85.167·kip·ft

Left_Trans_Shear = 5.709·kip

Left_Axial_Load = 9.090·kip

Left_Axial_Torque = 11.533·kip·ft

Max. Reactions at Base of Right Upright

Right_Long_Moment = 530.417·kip·ft

Right_Long_Shear = 18.260·kip

Right_Trans_Moment = 80.642·kip·ft

Right_Trans_Shear = 5.002·kip

Right_Axial_Load = 10.380·kip

Right_Axial_Torque = 13.592·kip·ft

- Splice Calculations
- Gusset Plate Calculations
- Truss Connection Calculations
- Base Plate Calculations
- Connection Output

Connection Values

Note: All truss bolted connections use A325 bolts, and upright anchor bolts are ASTM F1554. All welds are sized assuming E70xx electrodes.

Splice Connection

(SA) Angle_Size = "Angle 4" x 4" x 3/8""

(SB) Number_of_Bolts_Reqd_in_Splice = "6"

(SC) Bolt_Size_Required_for_Splice = "3/4" Dia."

Alternate Flange Splice Connection

(PA) Flange_Plate_Thickness = "1-1/4""

(PB) Bolt_Offset = "2""

(PC) Inside_Weld_Size = "5/16""

(PD) Outside_Weld_Size = "5/16""

(PE) Bolt_Diameter = "1""

(PF) Number_of_Bolts = "7"

Gusset Plates

(GA) Gusset_Plate_Thickness = "1/2""

(GB) Gusset_Plate_Bolt_Size = "7/8" Dia."

(GC) Back_Chord_Gusset_Plate_Length = "1' 6-3/4""

(GD) Back_Chord_Gusset_Plate_Height = "6-1/2""

(GE) Front_Chord_Gusset_Plate_Length = "1' 5-1/4""

(GF) Front_Chord_Gusset_Plate_Height = "6-1/2""

(GG) Center_Front_Gusset_Plate_Length = "2' 3/4""

(GH) Back_Truss_End_Plate_Length = "11-1/4""

(GJ) Back_Truss_End_Plate_Height = "7-3/4""

(GK) Front_Truss_End_Plate_Length = "11""

(GL) Fillet_Weld_Gusset_To_Chord = "3/16""

Left Truss Connection

(LA) Left_Bolt_Size_Required = "7/8" Dia."

(LB) Number_of_Bolts_Reqd_at_Left_Chord_Connection = "4"

(LC) Thickness_of_Left_Horizontal_Connection_Plate = "5/8""

(LD) Thickness_of_Left_Vertical_Connection_Plate = "5/8""

(LE) Fillet_Weld_Size_for_Left_Horz_PL_to_Upright = "1/4""

(LF) Fillet_Weld_Size_for_Left_Vert_PL_to_Upright = "1/4""

(LG) Fillet_Weld_Size_for_Left_Chord_to_Connection_PL = "3/16""

(LH) Fillet_Weld_Size_for_Left_Vert_PL_to_Horz_PL = "1/4""

Additional Left Truss Connection Checks

Left_Horz_Plate_Stress_Check = "OK"

Left_Vert_Plate_Stress_Check = "OK"

Left_Upright_Yielding_Check = "OK"

Right Truss Connection

(RA) Right_Bolt_Size_Required = "7/8" Dia."

(RB) Number_of_Bolts_Reqd_at_Right_Chord_Connection = "4"

(RC) Thickness_of_Right_Horizontal_Connection_Plate = "5/8""

(RD) Thickness_of_Right_Vertical_Connection_Plate = "5/8""

(RE) Fillet_Weld_Size_for_Right_Horz_PL_to_Upright = "1/4""

(RF) Fillet_Weld_Size_for_Right_Vert_PL_to_Upright = "1/4""

(RG) Fillet_Weld_Size_for_Right_Chord_to_Connection_PL = "3/16""

(RH) Fillet_Weld_Size_for_Right_Vert_PL_to_Horz_PL = "1/4""

Additional Right Truss Connection Checks

Right_Horz_Plate_Stress_Check = "OK"

Right_Vert_Plate_Stress_Check = "OK"

Right_Upright_Yielding_Check = "OK"

Left Base Connection

(BA) Left_Anchor_Bolt_Size = "1-3/4" Dia."

(BB) Left_Number_of_Anchor_Bolts_Reqd = "8"

(BC) Left_Base_Plate_Thickness = "1-1/4""

(BD) Left_Stiffener_Plate_Thickness = "3/8""

(BE) Left_Stiffener_Plate_Height = "1' 10-1/2""

(BF) Left_Inside_Base_Plate_Fillet_Weld = "5/16""

(BG) Left_Outside_Base_Plate_Fillet_Weld = "5/16""

(BH) Left_Stiffener_PL_to_Base_PL_Fillet_Weld = "5/16""

(BJ) Left_Stiffener_PL_to_Upright_Fillet_Weld = "3/16""

Right Base Connection

(CA) Right_Anchor_Bolt_Size = "2" Dia."

(CB) Right_Number_of_Anchor_Bolts_Reqd = "12"

(CC) Right_Base_Plate_Thickness = "1-1/4""

(CD) Right_Stiffener_Plate_Thickness = "3/8""

(CE) Right_Stiffener_Plate_Height = "2' 2""

(CF) Right_Inside_Base_Plate_Fillet_Weld = "5/16""

(CG) Right_Outside_Base_Plate_Fillet_Weld = "5/16""

(CH) Right_Stiffener_PL_to_Base_PL_Fillet_Weld = "5/16""

(CJ) Right_Stiffener_PL_to_Upright_Fillet_Weld = "3/16""

Additional Base Connection Checks

Left_Stiffener_to_Upright_Thickness_Check = "OK"

Right_Stiffener_to_Upright_Thickness_Check = "OK"

Fatigue Calculations

Fatigue Design Checks

Left Base Connection

Left_Upright_Fatigue_Check = "OK (1.4 ksi < 7 ksi)"

Left_Base_Fatigue_Check = "OK (0.99 ksi < 10 ksi)"

Left_Anchor_Bolts_Fatigue_Check = "OK (2.82 ksi < 7 ksi)"

Right Base Connection

Right_Upright_Fatigue_Check = "OK (2.31 ksi < 7 ksi)"

Right_Base_Fatigue_Check = "OK (1.38 ksi < 10 ksi)"

Right_Anchor_Bolts_Fatigue_Check = "OK (1.43 ksi < 7 ksi)"

Chord Member Connections

Chord_Splice_Fatigue_Check = "OK (1.74 ksi < 7 ksi)"

Chord_Slot_Fatigue_Check = "OK (0.73 ksi < 2.6 ksi)"

Half_Chord_Fatigue_Check = "OK (1.12 ksi < 2.6 ksi)"

Left_Truss_Bolts_Fatigue_Check = "OK (0.07 ksi < 7 ksi)"

Right_Truss_Bolts_Fatigue_Check = "OK (1.32 ksi < 7 ksi)"

Gusset Plates

Back_Plates_Fatigue_Check = "OK (0.02 ksi < 1.2 ksi)"

Back_End_Plates_Fatigue_Check = "OK (0.14 ksi < 1.2 ksi)"

Front_Plates_Fatigue_Check = "OK (0.03 ksi < 1.2 ksi)"

Front_End_Plates_Fatigue_Check = "OK (0.12 ksi < 1.2 ksi)"

Top_Center_Plate_Fatigue_Check = "OK (0.01 ksi < 1.2 ksi)"

Bot_Center_Plate_Fatigue_Check = "OK (0.03 ksi < 1.2 ksi)"

Web Members

Web_Member_Fatigue_Check = "OK (0.96 ksi < 7 ksi)"

Drilled Shaft Calculations

Anchor Bolt Calculations

Drilled Shaft Design

Left Drilled Shaft Design Checks

Left_Long_Reinf_Spacing_Check = "n/a"

Left_Long_Reinf_Capacity_Check = "n/a"

Left_Comb_Shear_Torsion_Check = "n/a"

Left_Max_Stirrup_Spacing_Check = "n/a"

Left Drilled Shaft Dimensions/Reinforcing

(DA) Left_Drilled_Shaft_Length = "n/a"

(DB) Left_Drilled_Shaft_Diameter = "n/a"

(DC) Left_Longitudinal_Reinforcement = "n/a"

(DD) Left_Num_Stirrup_Spaces = "n/a"

(DE) Left_Shear_Stirrup_Spacing = "n/a" ·in

Right Drilled Shaft Design Checks

Right_Long_Reinf_Spacing_Check = "n/a"

Right_Long_Reinf_Capacity_Check = "n/a"

Right_Comb_Shear_Torsion_Check = "n/a"

Right_Max_Stirrup_Spacing_Check = "n/a"

Right Drilled Shaft Dimensions/Reinforcing

(FA) Right_Drilled_Shaft_Length = "n/a"

(FB) Right_Drilled_Shaft_Diameter = "n/a"

(FC) Right_Longitudinal_Reinforcement = "n/a"

(FD) Right_Num_Stirrup_Spaces = "n/a"

(FE) Right_Shear_Stirrup_Spacing = "n/a" ·in

Anchor Bolt Design

Anchor Bolt Lengths

(DF) Left_Anchor_Bolt_Embed_Length = "n/a" ·in

(FF) Right_Anchor_Bolt_Embed_Length = "n/a" ·in

Additional Anchor Bolt Checks

Left_Anchor_Bolt_Capacity_Check = "n/a"

Left_Anchor_Bolt_Breakout_Check = "n/a"

Right_Anchor_Bolt_Capacity_Check = "n/a"

Left_Anchor_Bolt_Breakout_Check = "n/a"

MicroStation Data

Create MicroStation Text File

☑ Use same name as current data file

File Name Span Truss - Buckman Bridge_DMS.txt

Create MicroStation File

1.2.3. Full Wind (V=150mph) – DMS Only

Span Overhead Sign Program v6.0

Florida Department of Transportation
Structures Design Office **http://www.dot.state.fl.us/structures**

User Manual

Data Files Folder

Change Folder

C:\Users\21682\Desktop\Projects\Buckman Bridge\Bracket\SpanV6.0\Data\

Open Existing Data File (optional)

Refresh List

Open File

- Ex4 - Walk-In DMS with Walkway.dat
- Ex5 - Front-Access DMS with Static Signs.dat
- Ex6 - Walk-In and Front-Access DMS.dat
- Span Truss - Buckman Bridge.dat
- Span Truss - Buckman Bridge_DMS.dat
- Span Truss - Buckman Bridge_NoWind.dat
- Span Truss - Buckman Bridge_NoWind_VMS-DMS.dat
- Span Truss - Buckman Bridge_VMS-DMS.dat

Project Data

Project Name	Proposed Span Sign Structure at Buckman Bridge		
Project No.	NA		
Designed by	HL	Date	04 / 15 / 2015
Checked by	KZ	Date	04 / 15 / 2015

Sign Structure Data

Sign Number	OHT-1
Station	1000+00.000

Material Properties Data

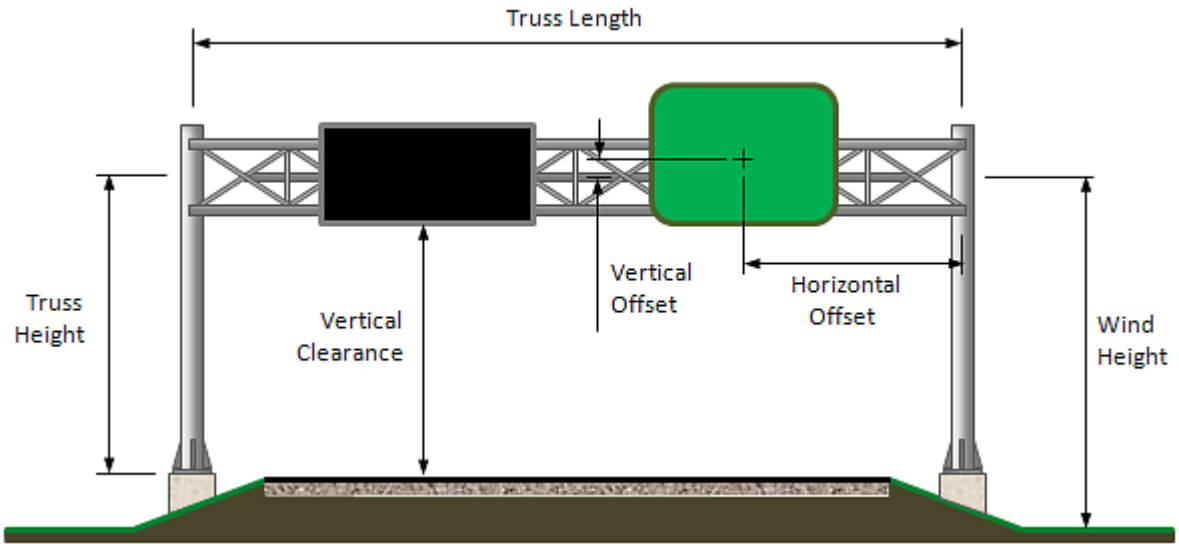
Fy of Upright	42	ksi
Fy of Web	36	ksi
Fy of Chord	42	ksi

Truss Data

Truss Length	77.08	ft
Left Truss Height	27.4	ft
Right Truss Height	30.6	ft
Vertical Clearance	19.5	ft
No. of Truss Panels	10	
Vert. Truss Depth	4	ft

Wind Load Data

Wind Height	51.9	ft
Design Wind Speed	150	mph



Load Data

Reset Load Data

Sign Panels

Show Panels 11-20

Sign Panel Number	Panel Length (ft)	Panel Height (ft)	Horizontal Offset (ft)	Vertical Offset* (ft)	Back-side Mounted?	Panel Weight (psf)
1					☐	
2					☐	
3					☐	
4					☐	
5					☐	
6					☐	
7					☐	
8					☐	
9					☐	
10					☐	

DMS Panels

DMS Panel Number	Panel Length (ft)	Panel Height (ft)	Panel Depth (ft)	Horizontal Offset (ft)	Vertical Offset* (ft)	Panel Weight (psf)
1	15.417	5.667	1.17	8.562	0	10.87
2						
3						

Walkways

Walkway Number	Walkway Length (ft)	Walkway Width (ft)	Number of Hangers	Horizontal Offset (ft)	Vertical Offset* (ft)	Walkway Weight (plf)
1						
2						

Attachments

Attachment Number	Projected Area (sq. ft)	Drag Coeff., C_d	Attached to Which Chord Member? (Top / Bottom / Back)	Horizontal Offset (ft)	Attachment Weight (lb)
1					
2					
3					

** Vertical offsets are input as negative values when element centroid is below the truss centerline.*

Member Data

Member Properties

Chord Size

- 3.50" O.D. Pipe, 0.216" Wall
- 4.00" O.D. Pipe, 0.226" Wall
- 4.50" O.D. Pipe, 0.237" Wall
- **4.50" O.D. Pipe, 0.337" Wall**
- 5.563" O.D. Pipe, 0.258" Wall
- 5.563" O.D. Pipe, 0.375" Wall
- 6.625" O.D. Pipe, 0.432" Wall
- 8.625" O.D. Pipe, 0.500" Wall
- CUSTOM

Design Properties

Outside Diameter (D)	4.5	in
Wall Thickness (t)	0.313	in
Area (A)	4.12	in^2
Moment of Inertia (I)	9.07	in^4
Radius of Gyration (r)	1.48	in
Torsional Constant (J)	18.1	in^4
Nominal Weight	15	plf

Web Size

- Angle 2-1/2" x 2-1/2" x 1/4"
- **Angle 3" x 3" x 1/4"**
- Angle 3" x 3" x 5/16"
- Angle 3-1/2" x 3-1/2" x 5/16"
- Angle 3-1/2" x 3-1/2" x 3/8"
- Angle 4" x 4" x 3/8"
- Angle 4" x 4" x 1/2"
- Angle 5" x 5" x 1/2"
- CUSTOM

Design Properties

Leg Length (b)	3	in
Leg Thickness (t)	0.25	in
Area (A)	1.44	in^2
Dist. to Centroid ($\bar{x}$)	0.836	in
X Moment of Inertia (I_x)	1.23	in^4
X Rad. of Gyration (r_x)	0.926	in
Z Rad. of Gyration (r_z)	0.585	in
Nominal Weight	4.9	plf

Left Upright Size

- 12.75" O.D. Pipe, 0.375" Wall
- 14" O.D. Pipe, 0.375" Wall
- 16" O.D. Pipe, 0.375" Wall
- 18" O.D. Pipe, 0.438" Wall
- **20" O.D. Pipe, 0.500" Wall**
- 24" O.D. Pipe, 0.375" Wall
- 24" O.D. Pipe, 0.562" Wall
- 24" O.D. Pipe, 0.750" Wall
- 30" O.D. Pipe, 0.500" Wall
- 30" O.D. Pipe, 0.625" Wall
- 30" O.D. Pipe, 0.750" Wall

Design Properties

Outside Diameter (D)	20	in
Wall Thickness (t)	0.465	in
Area (A)	28.5	in^2
Moment of Inertia (I)	1360	in^4
Radius of Gyration (r)	6.91	in
Torsional Constant (J)	2720	in^4
Nominal Weight	104	plf

Right Upright Size

- 12.75" O.D. Pipe, 0.375" Wall
- 14" O.D. Pipe, 0.375" Wall
- 16" O.D. Pipe, 0.375" Wall
- 18" O.D. Pipe, 0.438" Wall
- **20" O.D. Pipe, 0.500" Wall**
- 24" O.D. Pipe, 0.375" Wall
- 24" O.D. Pipe, 0.562" Wall
- 24" O.D. Pipe, 0.750" Wall
- 30" O.D. Pipe, 0.500" Wall
- 30" O.D. Pipe, 0.625" Wall
- 30" O.D. Pipe, 0.750" Wall

Design Properties

Outside Diameter (D)	20	in
Wall Thickness (t)	0.465	in
Area (A)	28.5	in^2
Moment of Inertia (I)	1360	in^4
Radius of Gyration (r)	6.91	in
Torsional Constant (J)	2720	in^4
Nominal Weight	104	plf

Connection Data

Gusset Plates

Min. Gusset Bolt Diameter: 5/8", 3/4", **7/8"**, 1", 1-1/4"

Min. Gusset Plate Thickness: 3/8", **1/2"**, 5/8", 3/4", 7/8", 1"

Truss Connections

Min. Truss Bolt Diameter: **7/8"**, 1"

Min. Horizontal Plate Thickness: 1/2", **5/8"**, 3/4", 7/8", 1"

Min. Vertical Plate Thickness: 1/2", **5/8"**, 3/4", 7/8", 1"

Base Connection

Min. Anchor Bolt Diameter: **1"**, 1-1/2", 1-3/4", 2", 2-1/4", 2-1/2"

Min. Number of Anchor Bolts: **8**, 10, 12

Min. Base Plate Thickness: 3/4", **1"**, 1-1/4", 1-1/2", 1-3/4", 2"

Min. Stiffener Plate Thickness: **3/8"**, 1/2", 5/8", 3/4", 7/8", 1"

Foundation Data

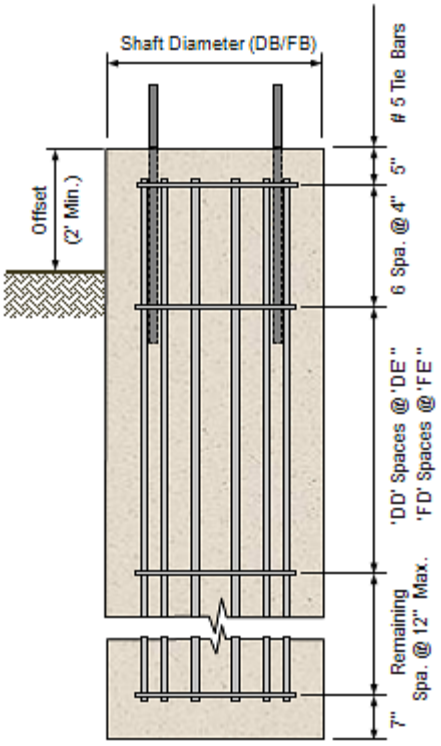
Foundation Type: Drilled Shafts / None

Left Drilled Shaft Data

Soil Type: Sand / Clay

Water Elevation: Below Bottom of Shaft / Above Top of Shaft

Soil Density, γ_{dry}		pcf
Friction Angle, ϕ		deg
SPT Number (N_{blows})		
Shear Strength, *c*		ksf
Safety Factor against Overturning		
Safety Factor against Torsion		
Shaft Diameter (DB)		ft
Ground to Top of Shaft Offset		ft
Number of Stirrup Spaces (DD)		
Stirrup Spacing (DE)		in



Right Drilled Shaft Data

Soil Type: Sand / Clay

Water Elevation: Below Bottom of Shaft / Above Top of Shaft

Soil Density, γ_{dry}		pcf
Friction Angle, ϕ		deg
SPT Number (N_{blows})		
Shear Strength, *c*		ksf
Safety Factor against Overturning		
Safety Factor against Torsion		
Shaft Diameter (FB)		ft
Ground to Top of Shaft Offset		ft
Number of Stirrup Spaces (FD)		
Stirrup Spacing (FE)		in

Save Data

Save Data File (optional)

☑ Use current input file

File Name Span Truss - Buckman Bridge_DMS.dat Save Data

Note: Select an output folder by using the "Change Folder" option above.

Data Initialization

Geometry Check Calculations

Preliminary Geometry Checks

Check_Truss_Panel_Length = "OK"

Check_Web_Clearance = "OK"

Check_Sign_Panel_Layout = "OK"

Check_for_Panel_Overlap = "OK"

Check_DMS_Truss_Reqs = "OK"

3D Model Data

Wireframe Diagram

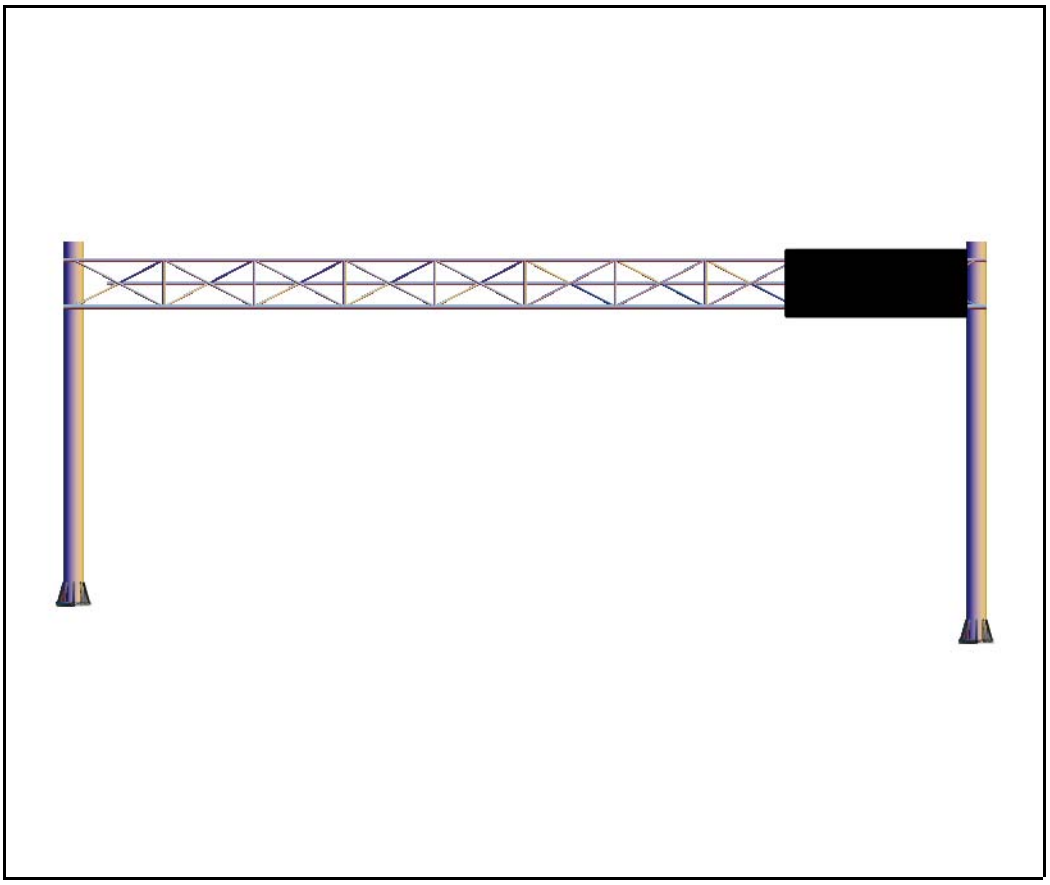
Design Forces

Fatigue Forces

Total Forces

Truss Diagram Data

Truss Diagram



Note: Use your mouse and keyboard to zoom in, zoom out or rotate the 3D plot above.
(See "Rotating, Spinning, or Zooming a 3D Plot" in Mathcad Help for instructions.)

3D Structural Analysis

Run Analysis

Note: A new analysis MUST be run after any change in program input.

- PC-SAP Output Data
- Design Check Calculations
- Maximum Reactions
- Results Output

Results

Sign Structure Geometry

(A) Truss_Length = 77.08 ft

(B) Left_Truss_Height = 27.4 ft

(C) Right_Truss_Height = 30.6 ft

(D) Number_of_Truss_Panels = "10 @ 7' 8-1/2" (Total_Length = 77.08 ft.)"

(E) Vertical_Truss_Depth = 48·in

Horizontal_Truss_Depth = 41.5692·in

Sign Structure Members

(F) Chord_Member = "4.50" O.D. Pipe, 0.337" Wall" CSR_Chord = "0.375 OK"

(G) Web_Member = "Angle 3" x 3" x 1/4"" CSR_Web = "0.727 OK"

(H) Left_Upright_Member = "20" O.D. Pipe, 0.500" Wall" CSR_Left_Upright = "0.402 OK"

(J) Right_Upright_Member = "20" O.D. Pipe, 0.500" Wall" CSR_Right_Upright = "0.968 OK"

(K) Camber = "1""

Additional Design Checks

Check_Web_Slenderness = "OK"

Check_Chord_Slenderness = "OK"

Check_Chord_Elements = "OK"

Check_Sign_Hangers = "OK"

Check_Truss_Deflection = "OK"

Max. Reactions at Base of Left Upright

Left_Long_Moment = 154.417·kip·ft

Left_Long_Shear = 6.039·kip

Left_Trans_Moment = 48.325·kip·ft

Left_Trans_Shear = 3.525·kip

Left_Axial_Load = 6.944·kip

Left_Axial_Torque = 6.537·kip·ft

Max. Reactions at Base of Right Upright

Right_Long_Moment = 392.167·kip·ft

Right_Long_Shear = 13.740·kip

Right_Trans_Moment = 44.667·kip·ft

Right_Trans_Shear = 3.022·kip

Right_Axial_Load = 8.087·kip

Right_Axial_Torque = 9.075·kip·ft

- Splice Calculations
- Gusset Plate Calculations
- Truss Connection Calculations
- Base Plate Calculations
- Connection Output

Connection Values

Note: All truss bolted connections use A325 bolts, and upright anchor bolts are ASTM F1554. All welds are sized assuming E70xx electrodes.

Splice Connection

(SA) Angle_Size = "Angle 4" x 4" x 3/8""

(SB) Number_of_Bolts_Reqd_in_Splice = "4"

(SC) Bolt_Size_Required_for_Splice = "3/4" Dia."

Alternate Flange Splice Connection

(PA) Flange_Plate_Thickness = "1-1/4""

(PB) Bolt_Offset = "2""

(PC) Inside_Weld_Size = "5/16""

(PD) Outside_Weld_Size = "5/16""

(PE) Bolt_Diameter = "1""

(PF) Number_of_Bolts = "7"

Gusset Plates

(GA) Gusset_Plate_Thickness = "1/2""

(GB) Gusset_Plate_Bolt_Size = "7/8" Dia."

(GC) Back_Chord_Gusset_Plate_Length = "1' 6-3/4""

(GD) Back_Chord_Gusset_Plate_Height = "6-1/2""

(GE) Front_Chord_Gusset_Plate_Length = "1' 5-1/4""

(GF) Front_Chord_Gusset_Plate_Height = "6-1/2""

(GG) Center_Front_Gusset_Plate_Length = "2' 3/4""

(GH) Back_Truss_End_Plate_Length = "9-3/4""

(GJ) Back_Truss_End_Plate_Height = "7-3/4""

(GK) Front_Truss_End_Plate_Length = "11""

(GL) Fillet_Weld_Gusset_To_Chord = "3/16""

Left Truss Connection

(LA) Left_Bolt_Size_Required = "7/8" Dia."

(LB) Number_of_Bolts_Reqd_at_Left_Chord_Connection = "4"

(LC) Thickness_of_Left_Horizontal_Connection_Plate = "5/8""

(LD) Thickness_of_Left_Vertical_Connection_Plate = "5/8""

(LE) Fillet_Weld_Size_for_Left_Horz_PL_to_Upright = "1/4""

(LF) Fillet_Weld_Size_for_Left_Vert_PL_to_Upright = "3/16""

(LG) Fillet_Weld_Size_for_Left_Chord_to_Connection_PL = "3/16""

(LH) Fillet_Weld_Size_for_Left_Vert_PL_to_Horz_PL = "1/4""

Additional Left Truss Connection Checks

Left_Horz_Plate_Stress_Check = "OK"

Left_Vert_Plate_Stress_Check = "OK"

Left_Upright_Yielding_Check = "OK"

Right Truss Connection

(RA) Right_Bolt_Size_Required = "7/8" Dia."

(RB) Number_of_Bolts_Reqd_at_Right_Chord_Connection = "4"

(RC) Thickness_of_Right_Horizontal_Connection_Plate = "5/8""

(RD) Thickness_of_Right_Vertical_Connection_Plate = "5/8""

(RE) Fillet_Weld_Size_for_Right_Horz_PL_to_Upright = "1/4""

(RF) Fillet_Weld_Size_for_Right_Vert_PL_to_Upright = "3/16""

(RG) Fillet_Weld_Size_for_Right_Chord_to_Connection_PL = "3/16""

(RH) Fillet_Weld_Size_for_Right_Vert_PL_to_Horz_PL = "1/4""

Additional Right Truss Connection Checks

Right_Horz_Plate_Stress_Check = "OK"

Right_Vert_Plate_Stress_Check = "OK"

Right_Upright_Yielding_Check = "OK"

Left Base Connection

(BA) Left_Anchor_Bolt_Size = "1-1/2" Dia."

(BB) Left_Number_of_Anchor_Bolts_Reqd = "8"

(BC) Left_Base_Plate_Thickness = "1""

(BD) Left_Stiffener_Plate_Thickness = "3/8""

(BE) Left_Stiffener_Plate_Height = "1' 6-3/4""

(BF) Left_Inside_Base_Plate_Fillet_Weld = "5/16""

(BG) Left_Outside_Base_Plate_Fillet_Weld = "5/16""

(BH) Left_Stiffener_PL_to_Base_PL_Fillet_Weld = "5/16""

(BJ) Left_Stiffener_PL_to_Upright_Fillet_Weld = "3/16""

Right Base Connection

(CA) Right_Anchor_Bolt_Size = "1-3/4" Dia."

(CB) Right_Number_of_Anchor_Bolts_Reqd = "12"

(CC) Right_Base_Plate_Thickness = "1-1/4""

(CD) Right_Stiffener_Plate_Thickness = "3/8""

(CE) Right_Stiffener_Plate_Height = "1' 10-1/2""

(CF) Right_Inside_Base_Plate_Fillet_Weld = "5/16""

(CG) Right_Outside_Base_Plate_Fillet_Weld = "5/16""

(CH) Right_Stiffener_PL_to_Base_PL_Fillet_Weld = "5/16""

(CJ) Right_Stiffener_PL_to_Upright_Fillet_Weld = "3/16""

Additional Base Connection Checks

Left_Stiffener_to_Upright_Thickness_Check = "OK"

Right_Stiffener_to_Upright_Thickness_Check = "OK"

Fatigue Calculations

Fatigue Design Checks

Left Base Connection

Left_Upright_Fatigue_Check = "OK (1.48 ksi < 7 ksi)"

Left_Base_Fatigue_Check = "OK (0.89 ksi < 10 ksi)"

Left_Anchor_Bolts_Fatigue_Check = "OK (2.68 ksi < 7 ksi)"

Right Base Connection

Right_Upright_Fatigue_Check = "OK (3.07 ksi < 7 ksi)"

Right_Base_Fatigue_Check = "OK (1.48 ksi < 10 ksi)"

Right_Anchor_Bolts_Fatigue_Check = "OK (1.32 ksi < 7 ksi)"

Chord Member Connections

Chord_Splice_Fatigue_Check = "OK (1.12 ksi < 7 ksi)"

Chord_Slot_Fatigue_Check = "OK (0.66 ksi < 2.6 ksi)"

Half_Chord_Fatigue_Check = "OK (1.07 ksi < 2.6 ksi)"

Left_Truss_Bolts_Fatigue_Check = "OK (0.06 ksi < 7 ksi)"

Right_Truss_Bolts_Fatigue_Check = "OK (1.28 ksi < 7 ksi)"

Gusset Plates

Back_Plates_Fatigue_Check = "OK (0.03 ksi < 1.2 ksi)"

Back_End_Plates_Fatigue_Check = "OK (0.13 ksi < 1.2 ksi)"

Front_Plates_Fatigue_Check = "OK (0.03 ksi < 1.2 ksi)"

Front_End_Plates_Fatigue_Check = "OK (0.11 ksi < 1.2 ksi)"

Top_Center_Plate_Fatigue_Check = "OK (0.01 ksi < 1.2 ksi)"

Bot_Center_Plate_Fatigue_Check = "OK (0.03 ksi < 1.2 ksi)"

Web Members

Web_Member_Fatigue_Check = "OK (1.16 ksi < 7 ksi)"

Drilled Shaft Calculations

Anchor Bolt Calculations

Drilled Shaft Design

Left Drilled Shaft Design Checks

Left_Long_Reinf_Spacing_Check = "n/a"

Left_Long_Reinf_Capacity_Check = "n/a"

Left_Comb_Shear_Torsion_Check = "n/a"

Left_Max_Stirrup_Spacing_Check = "n/a"

Left Drilled Shaft Dimensions/Reinforcing

(DA) Left_Drilled_Shaft_Length = "n/a"

(DB) Left_Drilled_Shaft_Diameter = "n/a"

(DC) Left_Longitudinal_Reinforcement = "n/a"

(DD) Left_Num_Stirrup_Spaces = "n/a"

(DE) Left_Shear_Stirrup_Spacing = "n/a" ·in

Right Drilled Shaft Design Checks

Right_Long_Reinf_Spacing_Check = "n/a"

Right_Long_Reinf_Capacity_Check = "n/a"

Right_Comb_Shear_Torsion_Check = "n/a"

Right_Max_Stirrup_Spacing_Check = "n/a"

Right Drilled Shaft Dimensions/Reinforcing

(FA) Right_Drilled_Shaft_Length = "n/a"

(FB) Right_Drilled_Shaft_Diameter = "n/a"

(FC) Right_Longitudinal_Reinforcement = "n/a"

(FD) Right_Num_Stirrup_Spaces = "n/a"

(FE) Right_Shear_Stirrup_Spacing = "n/a" ·in

Anchor Bolt Design

Anchor Bolt Lengths

(DF) Left_Anchor_Bolt_Embed_Length = "n/a" ·in

(FF) Right_Anchor_Bolt_Embed_Length = "n/a" ·in

Additional Anchor Bolt Checks

Left_Anchor_Bolt_Capacity_Check = "n/a"

Left_Anchor_Bolt_Breakout_Check = "n/a"

Right_Anchor_Bolt_Capacity_Check = "n/a"

Left_Anchor_Bolt_Breakout_Check = "n/a"

MicroStation Data

Create MicroStation Text File

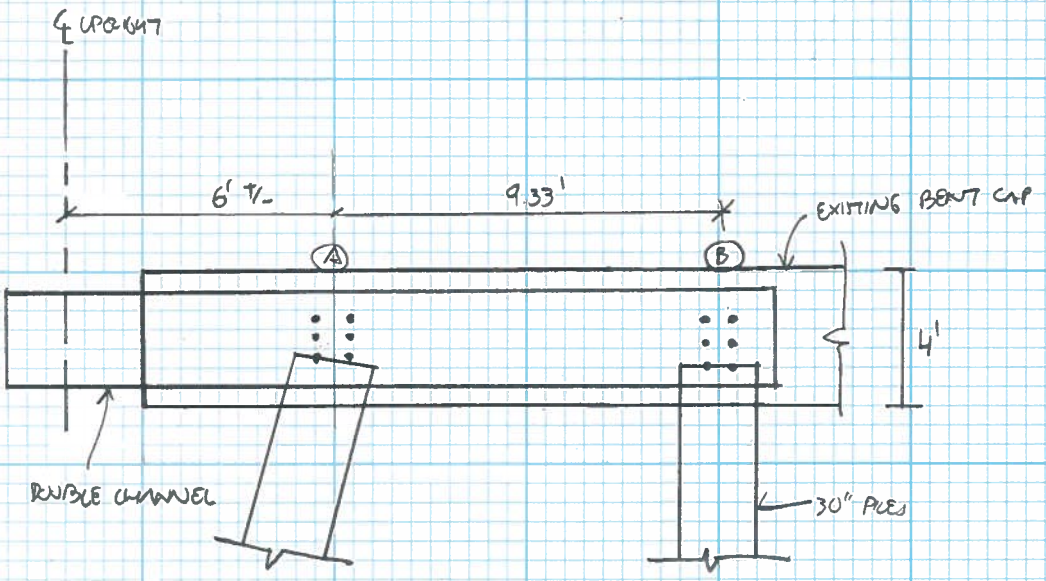
File Name

1.3. Analysis of Existing Bent Cap

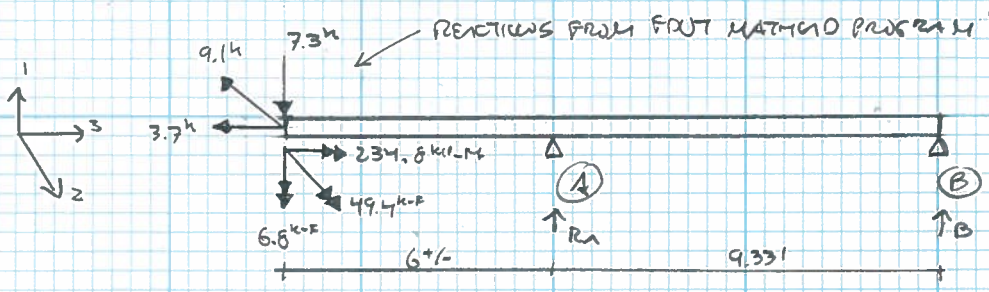
1.3.1. Modelling Assumptions

Subject: SPAN SIGN STRUCTURE AT BUCKMAN BRIDGE		
Comp by: HL	Date: 03/12/15	Sheet Number: 1
Check by: KB	Job Number:	

ATKINS



⇒ SIMPLIFIED MODEL TO FIND REACTIONS AT CONNECTION POINTS



→ $R_A = (7.3 \times 15.3 + 49.4) / 9.33' = 17.3^k \uparrow$

$R_B = 17.3 - 7.3 = 10^k \downarrow$

$M_{2-A} = 7.3 \times 6 + 49.4 = 93.2^{k\text{-ft}}$ ℄

$\text{TORSION}_A = 234.6^{k\text{-ft}}$ (ASSUME ENTIRE MOMENT IS RESISTED AT THIS SUPPORT)

$M_{1-1} = 9.1 \times 6 + 6.8^{k\text{-ft}} = 61.4^{k\text{-ft}}$ ← USE TO CHECK MOMENT ABOUT VERTICAL AXIS

→ THESE EFFECTS ARE MAINLY DUE TO WIND LOADS (WITH EXCEPTION OF THE VERTICAL REACTIONS) SO THEY WILL BE COMBINED WITH DC/LL FROM THE SUPERSTRUCTURE USING STRENGTH LOAD COMBINATION V (LOAD FACTOR OF 1.3)

1.3.2. RC-Pier Results – 1964 Intermediate Bent

Results are only presented for case 2 (DMS and VMS) since cap is adequate for this controlling condition.

CAP DESIGN

Code: AASHTO LRFD (6th Edition, 2012)
Units: US
Pier View: Downstation.

DESIGN PARAMETERS

f'c = 3000.0 psi	
Fy flex = 40000.0 psi	Fy shear = 40000.0 psi
phi tens = 0.90	
phi comp = 0.75	phi shear = 0.90
Tens below = 0.375	Comp Above = 0.600
Ec = 3320.6 ksi	Es = 29000.0 ksi
Crack check as per current LRFD	
Crack control Exposure = 1.00	
Concrete Type : Normal Weight.	
Design of cap at centerline of column.	

CAP GEOMETRY

Straight Cap : Length(X) = 34.00 ft Depth(Z) = 48.00 in

Cap Section Properties

Sec.	Area ft ^2	Iz in ^4	Iy in ^4
1	16.00	442368.00	442368.00

MAIN REINFORCEMENT

	Bar size	Quantity	Bar dist. in	As total in^2	From ft	To ft	Hook
TOP							
	US#10[M32]GR40	6	4.14	7.620	0.00	34.00	None
BOTTOM							
	US#10[M32]GR40	2	4.14	2.540	0.00	34.00	None
	US#10[M32]GR40	2	7.64	2.540	0.00	34.00	None
	US#10[M32]GR40	2	11.14	2.540	0.00	34.00	None

STIRRUPS

From ft	To ft	Stirrup Size	n legs	Spacing in	Aprv/s in^2 / ft	Bar Type
0.33	2.50	US#4[M13]GR40	2	13.00	0.37	Stirrup
2.50	3.50	US#4[M13]GR40	2	12.00	0.40	Stirrup
3.50	7.17	US#4[M13]GR40	2	11.00	0.44	Stirrup
7.17	8.17	US#4[M13]GR40	2	12.00	0.40	Stirrup
8.17	11.83	US#4[M13]GR40	2	11.00	0.44	Stirrup
11.83	12.83	US#4[M13]GR40	2	12.00	0.40	Stirrup
12.83	16.50	US#4[M13]GR40	2	11.00	0.44	Stirrup
16.50	17.50	US#4[M13]GR40	2	12.00	0.40	Stirrup
17.50	21.17	US#4[M13]GR40	2	11.00	0.44	Stirrup
21.17	22.17	US#4[M13]GR40	2	12.00	0.40	Stirrup
22.17	25.83	US#4[M13]GR40	2	11.00	0.44	Stirrup
25.83	26.83	US#4[M13]GR40	2	12.00	0.40	Stirrup
26.83	30.50	US#4[M13]GR40	2	11.00	0.44	Stirrup
30.50	31.50	US#4[M13]GR40	2	12.00	0.40	Stirrup
31.50	33.67	US#4[M13]GR40	2	13.00	0.37	Stirrup

Clear Cover on Sides = 3.00 in

FLEXURE DESIGN

Span 1: From 0.00 ft To 3.00 ft

Loc ft	AbsLoc ft	H in	Mmax Mmin kips-ft	Mr kips-ft	Comb	CL	c	d in	c/d	Phi	Asb-req in^2	Asb-prv in^2	Asb-eff in^2	Ast-req in^2	Ast-prv in^2	Ast-eff in^2
1.8	1.8	48	0.0	784.1	0	T	3.53	40.36	0.09	0.90	1.56	7.62	6.55	1.56	7.62	7.62
			-4.6	-712.7	1	T	3.88	43.86	0.09	0.90	1.56	7.62	7.62	1.56	7.62	4.68
3.0	3.0	48	0.0	901.9	0	T	3.66	40.36	0.09	0.90	1.56	7.62	7.62	1.56	7.62	7.62
			-13.5	-1066.5	1	T	4.63	43.86	0.11	0.90	1.56	7.62	7.62	1.56	7.62	7.62

Span 2: From 3.00 ft To 12.33 ft

Loc ft	AbsLoc ft	H in	Mmax Mmin kips-ft	Mr kips-ft	Comb	CL	c	d in	c/d	Phi	Asb-req in^2	Asb-prv in^2	Asb-eff in^2	Ast-req in^2	Ast-prv in^2	Ast-eff in^2
0.0	3.0	48	0.0	901.9	0	T	3.66	40.36	0.09	0.90	1.56	7.62	7.62	1.56	7.62	7.62
			-31.0	-1066.5	2	T	4.63	43.86	0.11	0.90	1.56	7.62	7.62	1.56	7.62	7.62
1.3	4.3	48	177.0	901.9	2	T	3.66	40.36	0.09	0.90	1.96	7.62	7.62	1.56	7.62	7.62
			-160.9	-1066.5	3	T	4.63	43.86	0.11	0.90	1.56	7.62	7.62	1.64	7.62	7.62
7.0	10.0	48	182.8	901.9	2	T	3.66	40.36	0.09	0.90	2.02	7.62	7.62	1.56	7.62	7.62
			0.0	-1066.5	0	T	4.63	43.86	0.11	0.90	1.56	7.62	7.62	1.56	7.62	7.62
8.1	11.1	48	43.9	901.9	4	T	3.66	40.36	0.09	0.90	1.56	7.62	7.62	1.56	7.62	7.62
			-46.0	-1066.5	1	T	4.63	43.86	0.11	0.90	1.56	7.62	7.62	1.56	7.62	7.62
9.3	12.3	48	0.0	901.9	0	T	3.66	40.36	0.09	0.90	1.56	7.62	7.62	1.56	7.62	7.62
			-166.7	-1066.5	1	T	4.63	43.86	0.11	0.90	1.56	7.62	7.62	1.70	7.62	7.62

Span 3: From 12.33 ft To 21.67 ft

Loc ft	AbsLoc ft	H in	Mmax Mmin kips-ft	Mr kips-ft	Comb	CL	c	d in	c/d	Phi	Asb-req in^2	Asb-prv in^2	Asb-eff in^2	Ast-req in^2	Ast-prv in^2	Ast-eff in^2
-0.0	12.3	48	0.0	901.9	0	T	3.66	40.36	0.09	0.90	1.56	7.62	7.62	1.56	7.62	7.62
			-195.8	-1066.5	1	T	4.63	43.86	0.11	0.90	1.56	7.62	7.62	1.99	7.62	7.62
1.2	13.6	48	0.0	901.9	0	T	3.66	40.36	0.09	0.90	1.56	7.62	7.62	1.56	7.62	7.62
			-95.8	-1066.5	1	T	4.63	43.86	0.11	0.90	1.56	7.62	7.62	1.56	7.62	7.62
4.7	17.0	48	177.6	901.9	2	T	3.66	40.36	0.09	0.90	1.97	7.62	7.62	1.56	7.62	7.62
			0.0	-1066.5	0	T	4.63	43.86	0.11	0.90	1.56	7.62	7.62	1.56	7.62	7.62
8.1	20.4	48	0.0	901.9	0	T	3.66	40.36	0.09	0.90	1.56	7.62	7.62	1.56	7.62	7.62
			-72.1	-1066.5	2	T	4.63	43.86	0.11	0.90	1.56	7.62	7.62	1.56	7.62	7.62
9.3	21.7	48	0.0	901.9	0	T	3.66	40.36	0.09	0.90	1.56	7.62	7.62	1.56	7.62	7.62
			-172.1	-1066.5	2	T	4.63	43.86	0.11	0.90	1.56	7.62	7.62	1.75	7.62	7.62

Span 4: From 21.67 ft To 31.00 ft

Loc ft	AbsLoc ft	H in	Mmax Mmin kips-ft	Mr kips-ft	Comb	CL	c	d in	c/d	Phi	Asb-req in^2	Asb-prv in^2	Asb-eff in^2	Ast-req in^2	Ast-prv in^2	Ast-eff in^2
-0.0	21.7	48	0.0	901.9	0	T	3.66	40.36	0.09	0.90	1.56	7.62	7.62	1.56	7.62	7.62
			-149.2	-1066.5	1	T	4.63	43.86	0.11	0.90	1.56	7.62	7.62	1.56	7.62	7.62
1.2	22.9	48	0.0	901.9	0	T	3.66	40.36	0.09	0.90	1.56	7.62	7.62	1.56	7.62	7.62
			-1.8	-1066.5	1	T	4.63	43.86	0.11	0.90	1.56	7.62	7.62	1.56	7.62	7.62
2.3	24.0	48	121.8	901.9	1	T	3.66	40.36	0.09	0.90	1.56	7.62	7.62	1.56	7.62	7.62
			0.0	-1066.5	0	T	4.63	43.86	0.11	0.90	1.56	7.62	7.62	1.56	7.62	7.62
8.1	29.8	48	32.1	901.9	1	T	3.66	40.36	0.09	0.90	1.56	7.62	7.62	1.56	7.62	7.62
			-16.0	-1066.5	4	T	4.63	43.86	0.11	0.90	1.56	7.62	7.62	1.56	7.62	7.62
9.3	31.0	48	7.2	901.9	3	T	3.66	40.36	0.09	0.90	1.56	7.62	7.62	1.56	7.62	7.62
			-54.5	-1066.5	2	T	4.63	43.86	0.11	0.90	1.56	7.62	7.62	1.56	7.62	7.62

Span 5: From 31.00 ft To 34.00 ft

Loc ft	AbsLoc ft	H in	Mmax Mmin kips-ft	Mr kips-ft	Comb	CL	c	d in	c/d	Phi	Asb-req in^2	Asb-prv in^2	Asb-eff in^2	Ast-req in^2	Ast-prv in^2	Ast-eff in^2
0.0	31.0	48	0.0	901.9	0	T	3.66	40.36	0.09	0.90	1.56	7.62	7.62	1.56	7.62	7.62
			-13.5	-1066.5	1	T	4.63	43.86	0.11	0.90	1.56	7.62	7.62	1.56	7.62	7.62
1.3	32.3	48	0.0	784.1	0	T	3.53	40.36	0.09	0.90	1.56	7.62	6.55	1.56	7.62	7.62
			-4.6	-712.7	1	T	3.88	43.86	0.09	0.90	1.56	7.62	7.62	1.56	7.62	4.68

Flexure Design : Notes

CL: Section classification as per LRFD 2006 interims for provided reinforcement.
C = Compression controlled, I = In-Transition, T = Tension controlled.
* The provided reinforcement is not adequate, either less than required or larger than maximum allowed.

SHEAR AND TORSION DESIGN:

Section Adequate (see hand calc for details) .The 0.79in2/ft shown is to meet the min transverse reinforcement requirement per AASHTO 5.8.2.5

Span 1: From 0.00 ft To 3.00 ft

Loc ft	AbsLoc ft	Pos	Vu kips	Comb	Tu kips-ft	Comb	phi*Vn kips	T-lim kips-ft	Avs/s in^2/ft	2Ats/s in^2/ft	Av/s in^2/ft	Aprv/s in^2/ft	Alx in^2	Vc kips	Vs kips	Beta	Theta deg	b in	dv in	E
1.75	1.75	L	5.3	1	0.0	0	476.8	112.2	0.00	0.00	0.00	0.37	0.00	403.96	125.87	3.64	22.42	48.00	42.21	0.

Span 2: From 3.00 ft To 12.33 ft

Loc ft	AbsLoc ft	Pos	Vu kips	Comb	Tu kips-ft	Comb	phi*Vn kips	T-lim kips-ft	Avs/s in^2/ft	2Ats/s in^2/ft	Av/s in^2/ft	Aprv/s in^2/ft	Alx in^2	Vc kips	Vs kips	Beta	Theta deg	b in	dv in	E
1.25	4.25	R	45.6	1	259.1	1	320.2	112.2	0.39	0.40	0.79	0.44**	0.00	297.13	58.67	2.70	29.39	48.00	41.89	0
7.00	10.00	L	28.4	1	259.1	[illegible]	[illegible]	112.2	[illegible]	0.40	[illegible]	0.44**	0.00	[illegible]	[illegible]	[illegible]	[illegible]	48.00	[illegible]	0
		R	127.4	2	259.1	1	278.6	112.2	0.37	0.42	0.79	0.44**	0.15	260.78	48.77	2.58	30.67	48.00	38.39	0
8.08	11.08	L	130.6	2	259.1	2	291.9	112.2	0.39	0.40	0.79	0.44**	0.00	271.07	53.31	2.69	29.50	48.00	38.39	0

Span 3: From 12.33 ft To 21.67 ft

Loc ft	AbsLoc ft	Pos	Vu kips	Comb	Tu kips-ft	Comb	phi*Vn kips	T-lim kips-ft	Avs/s in^2/ft	2Ats/s in^2/ft	Av/s in^2/ft	Aprv/s in^2/ft	Alx in^2	Vc kips	Vs kips	Beta	Theta deg	b in	dv in	Ep
1.25	13.58	R	78.1	1	175.9	1	352.0	112.2	0.53	0.26	0.79	0.44**	0.00	310.43	80.63	2.82	28.06	48.00	41.89	0.0
4.67	17.00	L	67.9	1	175.9	2	306.8	112.2	0.52	0.26	0.79	0.40**	0.00	278.33	62.55	2.76	28.75	48.00	38.39	0.0
		R	67.9	2	175.9	1	306.8	112.2	0.52	0.26	0.79	0.40**	0.00	278.33	62.55	2.76	28.75	48.00	38.39	0.0
8.09	20.42	L	78.1	2	175.9	2	360.0	112.2	0.54	0.25	0.79	0.44**	0.00	316.38	83.59	2.87	27.46	48.00	41.89	0.0

Span 4: From 21.67 ft To 31.00 ft

Loc ft	AbsLoc ft	Pos	Vu kips	Comb	Tu kips-ft	Comb	phi*Vn kips	T-lim kips-ft	Avs/s in^2/ft	2Ats/s in^2/ft	Av/s in^2/ft	Aprv/s in^2/ft	Alx in^2	Vc kips	Vs kips	Beta	Theta deg	b in	dv in	
1.25	22.92	R	116.0	1	98.3	1	398.1	112.2	0.00	0.00	0.00	0.44	0.00	322.22	120.15	2.93	26.87	48.00	41.89	0
2.33	24.00	L	112.8	1	98.3	2	352.2	112.2	0.00	0.00	0.00	0.44	0.00	285.79	105.55	2.83	27.86	48.00	38.39	0
		R	13.8	2	98.3	1	407.2	112.2	0.00	0.00	0.00	0.44	0.00	328.80	123.69	3.26	24.28	48.00	38.39	0
8.08	29.75	L	31.0	2	98.3	2	454.9	112.2	0.00	0.00	0.00	0.44	0.00	368.08	137.31	3.34	23.91	48.00	41.89	0

Span 5: From 31.00 ft To 34.00 ft

Loc ft	AbsLoc ft	Pos	Vu kips	Comb	Tu kips-ft	Comb	phi*Vn kips	T-lim kips-ft	Avs/s in^2/ft	2Ats/s in^2/ft	Av/s in^2/ft	Aprv/s in^2/ft	Alx in^2	Vc kips	Vs kips	Beta	Theta deg	b in	dv in	E
1.25	32.25	R	5.3	1	0.0	0	476.2	112.2	0.00	0.00	0.00	0.37	0.00	403.36	125.70	3.63	22.44	48.00	42.21	0.

Shear and Torsion Design : Notes

** Provided stirrup area (Aprv/s) is not adequate.
- Pos is the design position. L suggests the calculation is done at immediate left of "Loc" and R suggests at immediate right of it.
- T-lim is the limiting value of torsion for the concrete section. If actual torsion is higher than this value, torsional steel has to be provided.
- Avs/s is the required area of steel per unit length for shear force.
- 2Ats/s is the required area of steel per unit length for two legs of torsional reinforcement.
- Av/s is the total required area of steel per unit length due to shear plus torsion.
- Aprvs/s is the total provided area of transverse steel reinforcement.
- Alx is the EFFECTIVE longitudinal steel required in addition to the PROVIDED EFFECTIVE flexural steel.
- Vc is the nominal shear resistence of concrete.
- Vs is the nominal shear resistence of transverse reinforcement.
- Beta is the factor indicating ability of diagonally cracked concrete to transmit tension and shear.
- Theta is the angle of inclination of diagonal compressive stress.
- # Vu is greater tha phi*Vn.

1 - DESIGN SPECIFICATIONS :

*	STANDARDS/SPECIFICATIONS	(S)	AASHTO LRFD 5th. Edition
		(SDG)	FDOT - Structures Design Guidelines 2011

2 - FLEXURE DESIGN :

M_U : **183.00** k-ft

f'c :	**3.0**	ksi	
fy :	**40.0**	ksi	
wc :	**150**	pcf	
M_U :	**183.00**	k-ft	
fr = 0.24 √f'c	0.42	ksi	*S 5.4.2.6*
b :	**48.0**	in	
h :	**48.0**	in	
Ig = b h^3 / 12 :	442368	in^4	
yt :	24	in	
Mcr = fr Ig / yt	638.50	k-ft	*S Eqn. 5.7.3.6.2-2*
1.2 Mcr :	766.20	k-ft	
1.33 Mu :	243.39	k-ft	

Mu = max { Mu ; min { 1.2 Mcr ; 1.33 Mu } } → Mu : 243.39 k-ft *S 5.7.3.3.2*

Cover :	**3**	in	
ϕ_f :	**0.9**		*S 5.5.4.2.1*
Stirrups # :	**4**	Bardia:	0.5
Rn = 12 Mu / (ϕ_f b d_e^2) :	0.04	ksi	
ρ :	0.001		
Asreq:	2.03	in^2	

d_e =h-cover - $\phi_{bar-stirrup}$ - ϕ_{bar}/2

Maximum size of the coarse aggregate : **1** in

Use	Layer	Quantity	Bar #	Bardia (in)	As (in^2)	d' (in)	d_e (in)	As d_e (in^3)	breq (in)	Check	Spacing (in)
	1	**2**	**10**	1.27	2.54	**4.14**	43.87	111.42	11.4	Ok!	38.46
	2	**2**	**10**	1.27	2.54	**7.64**	40.37	102.53	11.4	Ok!	38.46
	2	**2**	**10**	1.27	2.54	**11.14**	36.87	93.64	11.4	Ok!	38.46
		6			7.62			307.58			

d_e : 40.37 in

2.1 - CHECK NET TENSILE STRAIN IN THE EXTREME TENSION STEEL : *S 5.5.4.2*

T = As fy :	304.80	kips			
a = T / 0.85 f'c b :	2.490	in			
β_1 :	0.85				
C = a / β_1 :	2.93	in			
ε_c :	0.003				
ε_t = ε_c (d-c)/c	0.038	> 0.005	→	Tension Controlled Section!	
ϕ_f :	0.90				*S Eqn. 5.5.4.2.1-1*
M_r = $\phi_f M_n$:	894.28	k-ft	→	Ok!	*S Eqn. 5.7.3.2.1-1*

3- SHEAR DESIGN :

				COMB	1	2		*S 5.8.3.3*
Use Combination:	1			NODE	2	2	COMB	
V_U :	127	kips		V_U	127	0	2	
Mu :	183	kip-ft		Mu	183	0	2	
Tu :	259	kip-ft		Tu	259	0	1	

Vn = min { $Vn_1 = Vc + Vs$; $Vn_2 = 0.25\ f'c\ b_v\ d_v$ }

$Vc = 0.0316\ \beta\ \sqrt{f'c}\ b_v\ d_v$ — *S Eqn. 5.8.3.3-3*

$Vs = \dfrac{Av\ fy\ d_v\ (\cot\theta + \cot\alpha)\ \sin\alpha}{s}$ — *S Eqn. 5.8.3.3-4*

S Eqn. 5.8.3.3-2

d_v = max { $d_e - a/2$ = 39.12 in ; $0.9\ d_e$ = 36.33 in ; $0.72\ h$ = 34.56 in } → d_v : 39.1 in — *S 5.8.2.9*

b_v :	48	in	Use stem width				
Bar #:	4		Shear Reinforcement				
Area bar:	0.20	in^2					
# Legs :	2						
Av :	0.393	in^2					
S :	11	in					
Av/s prov :	0.43	in^2/ft					
vu :	0.08	ksi					
Av/s min :	0.79	in^2/ft	→	N.G			*S Eqn. 5.8.2.5-1*
S max :	24.00	in	→	Ok!			*S 5.8.2.7*

Check torsion requirements: — *S 5.8.2.1*

A_{cp} :	2304	in^2					
P_c :	192	in					
Tcr :	498.8	kip-ft					*S 5.8.2.1.4*
Tmin :	112.2	kip-ft	→	Tu	>	Tmin	Consider torsional effects — *S 5.8.2.1.3*
Aoh :	1764	in^2					
Ao :	1499	in^2	Ao=0.85Aoh				
P_h :	166						

GENERAL PROCEDURE - APPENDIX B5 *S 5.8.3.4.2*

$V_U d_v$:	414.0	kip-ft						
ε_s :	0.00115							*S 5.8.3.4.2-4*
Sx :	39.12	in	assume dv					
Sxe :	33.1199	in						
β :	**2.58**	**	from RC-Pier					*S 5.8.3.4.2-1*
θ :	**30.7**	°	from RC-Pier					*S 5.8.3.4.2-3*
Vc :	265.16	kips						*S 5.8.3.3-3*
Avs/s:	0.00	in^2/ft	Steel area required for shear only					
2At/s:	0.41	in^2/ft	Steel area required for torsion only (2 legs for torsion)					
Av/s :	0.41	in^2/ft	Total steel area for shear and torsion					
Sreq :	11.49	in	Required stirrup spacing for shear+torsion					
Sprov :	11.00	in	→ Ok!					
Avs/s pr:	0.018	in^2/ft	Effective provided stirrup area for shear					
Vs :	3.99	kips/ft		ϕVs :	3.6	kips		*S 5.8.3.3-4*
Vn_1 :	269.14	kips						
			→	Use Vn :	269.14	kips		
Vn_2 :	1408.3	kips		ϕ_v :	**0.9**			*S 5.5.4.2.1*
				ϕ_v Vn :	242.2	kips	> Vu → Ok!	

SHEAR REINFORCEMENT ADEQUATE FOR STRENGTH III

CAP DESIGN

Code: AASHTO LRFD (6th Edition, 2012)
Units: US
Pier View: Downstation.

DESIGN PARAMETERS

f'c = 3000.0 psi	
Fy flex = 40000.0 psi	Fy shear = 40000.0 psi
phi tens = 0.90	
phi comp = 0.75	phi shear = 0.90
Tens below = 0.375	Comp Above = 0.600
Ec = 3320.6 ksi	Es = 29000.0 ksi
Crack check as per current LRFD	
Crack control Exposure = 1.00	
Concrete Type : Normal Weight.	
Design of cap at centerline of column.	

CAP GEOMETRY

Straight Cap : Length(X) = 34.00 ft Depth(Z) = 48.00 in

Cap Section Properties

Sec.	Area ft ^2	Iz in ^4	Iy in ^4
1	16.00	442368.00	442368.00

MAIN REINFORCEMENT

	Bar size	Quantity	Bar dist. in	As total in^2	From ft	To ft	Hook
TOP							
	US#10[M32]GR40	6	4.14	7.620	0.00	34.00	None
BOTTOM							
	US#10[M32]GR40	2	4.14	2.540	0.00	34.00	None
	US#10[M32]GR40	2	7.64	2.540	0.00	34.00	None
	US#10[M32]GR40	2	11.14	2.540	0.00	34.00	None

STIRRUPS

From ft	To ft	Stirrup Size	n legs	Spacing in	Aprv/s in^2 / ft	Bar Type
0.33	2.50	US#4[M13]GR40	2	13.00	0.37	Stirrup
2.50	3.50	US#4[M13]GR40	2	12.00	0.40	Stirrup
3.50	7.17	US#4[M13]GR40	2	11.00	0.44	Stirrup
7.17	8.17	US#4[M13]GR40	2	12.00	0.40	Stirrup
8.17	11.83	US#4[M13]GR40	2	11.00	0.44	Stirrup
11.83	12.83	US#4[M13]GR40	2	12.00	0.40	Stirrup
12.83	16.50	US#4[M13]GR40	2	11.00	0.44	Stirrup
16.50	17.50	US#4[M13]GR40	2	12.00	0.40	Stirrup
17.50	21.17	US#4[M13]GR40	2	11.00	0.44	Stirrup
21.17	22.17	US#4[M13]GR40	2	12.00	0.40	Stirrup
22.17	25.83	US#4[M13]GR40	2	11.00	0.44	Stirrup
25.83	26.83	US#4[M13]GR40	2	12.00	0.40	Stirrup
26.83	30.50	US#4[M13]GR40	2	11.00	0.44	Stirrup
30.50	31.50	US#4[M13]GR40	2	12.00	0.40	Stirrup
31.50	33.67	US#4[M13]GR40	2	13.00	0.37	Stirrup

Clear Cover on Sides = 3.00 in

FLEXURE DESIGN

Span 1: From 0.00 ft To 3.00 ft

Loc ft	AbsLoc ft	H in	Mmax Mmin kips-ft	Mr kips-ft	Comb	CL	c	d in	c/d	Phi	Asb-req in^2	Asb-prv in^2	Asb-eff in^2	Ast-req in^2	Ast-prv in^2	Ast-eff in^2
1.8	1.8	48	0.0	784.1	0	T	3.53	40.36	0.09	0.90	1.56	7.62	6.55	1.56	7.62	7.62
			-4.6	-712.7	1	T	3.88	43.86	0.09	0.90	1.56	7.62	7.62	1.56	7.62	4.68
3.0	3.0	48	0.0	901.9	0	T	3.66	40.36	0.09	0.90	1.56	7.62	7.62	1.56	7.62	7.62
			-13.5	-1066.5	1	T	4.63	43.86	0.11	0.90	1.56	7.62	7.62	1.56	7.62	7.62

Span 2: From 3.00 ft To 12.33 ft

Loc ft	AbsLoc ft	H in	Mmax Mmin kips-ft	Mr kips-ft	Comb	CL	c	d in	c/d	Phi	Asb-req in^2	Asb-prv in^2	Asb-eff in^2	Ast-req in^2	Ast-prv in^2	Ast-eff in^2
0.0	3.0	48	0.0	901.9	0	T	3.66	40.36	0.09	0.90	1.56	7.62	7.62	1.56	7.62	7.62
			-56.8	-1066.5	34	T	4.63	43.86	0.11	0.90	1.56	7.62	7.62	1.56	7.62	7.62
1.3	4.3	48	72.0	901.9	41	T	3.66	40.36	0.09	0.90	1.56	7.62	7.62	1.56	7.62	7.62
			-39.3	-1066.5	79	T	4.63	43.86	0.11	0.90	1.56	7.62	7.62	1.56	7.62	7.62
7.0	10.0	48	346.9	901.9	34	T	3.66	40.36	0.09	0.90	3.87	7.62	7.62	1.56	7.62	7.62
			0.0	-1066.5	0	T	4.63	43.86	0.11	0.90	1.56	7.62	7.62	1.56	7.62	7.62
8.1	11.1	48	108.3	901.9	95	T	3.66	40.36	0.09	0.90	1.56	7.62	7.62	1.56	7.62	7.62
			-69.6	-1066.5	3	T	4.63	43.86	0.11	0.90	1.56	7.62	7.62	1.56	7.62	7.62
9.3	12.3	48	0.0	901.9	0	T	3.66	40.36	0.09	0.90	1.56	7.62	7.62	1.56	7.62	7.62
			-250.2	-1066.5	20	T	4.63	43.86	0.11	0.90	1.56	7.62	7.62	2.55	7.62	7.62

Span 3: From 12.33 ft To 21.67 ft

Loc ft	AbsLoc ft	H in	Mmax Mmin kips-ft	Mr kips-ft	Comb	CL	c	d in	c/d	Phi	Asb-req in^2	Asb-prv in^2	Asb-eff in^2	Ast-req in^2	Ast-prv in^2	Ast-eff in^2
-0.0	12.3	48	0.0	901.9	0	T	3.66	40.36	0.09	0.90	1.56	7.62	7.62	1.56	7.62	7.62
			-255.3	-1066.5	25	T	4.63	43.86	0.11	0.90	1.56	7.62	7.62	2.61	7.62	7.62
1.2	13.6	48	17.9	901.9	103	T	3.66	40.36	0.09	0.90	1.56	7.62	7.62	1.56	7.62	7.62
			-148.4	-1066.5	23	T	4.63	43.86	0.11	0.90	1.56	7.62	7.62	1.56	7.62	7.62
4.7	17.0	48	461.3	901.9	48	T	3.66	40.36	0.09	0.90	5.18	7.62	7.62	1.56	7.62	7.62
			0.0	-1066.5	0	T	4.63	43.86	0.11	0.90	1.56	7.62	7.62	1.56	7.62	7.62
8.1	20.4	48	13.1	901.9	75	T	3.66	40.36	0.09	0.90	1.56	7.62	7.62	1.56	7.62	7.62
			-143.6	-1066.5	50	T	4.63	43.86	0.11	0.90	1.56	7.62	7.62	1.56	7.62	7.62
9.3	21.7	48	0.0	901.9	0	T	3.66	40.36	0.09	0.90	1.56	7.62	7.62	1.56	7.62	7.62
			-250.4	-1066.5	45	T	4.63	43.86	0.11	0.90	1.56	7.62	7.62	2.56	7.62	7.62

Span 4: From 21.67 ft To 31.00 ft

Loc ft	AbsLoc ft	H in	Mmax Mmin kips-ft	Mr kips-ft	Comb	CL	c	d in	c/d	Phi	Asb-req in^2	Asb-prv in^2	Asb-eff in^2	Ast-req in^2	Ast-prv in^2	Ast-eff in^2
-0.0	21.7	48	0.0	901.9	0	T	3.66	40.36	0.09	0.90	1.56	7.62	7.62	1.56	7.62	7.62
			-246.6	-1066.5	24	T	4.63	43.86	0.11	0.90	1.56	7.62	7.62	2.52	7.62	7.62
1.2	22.9	48	99.3	901.9	84	T	3.66	40.36	0.09	0.90	1.56	7.62	7.62	1.56	7.62	7.62
			-60.6	-1066.5	14	T	4.63	43.86	0.11	0.90	1.56	7.62	7.62	1.56	7.62	7.62
2.3	24.0	48	334.4	901.9	10	T	3.66	40.36	0.09	0.90	3.73	7.62	7.62	1.56	7.62	7.62
			0.0	-1066.5	0	T	4.63	43.86	0.11	0.90	1.56	7.62	7.62	1.56	7.62	7.62
8.1	29.8	48	42.4	901.9	3	T	3.66	40.36	0.09	0.90	1.56	7.62	7.62	1.56	7.62	7.62
			-9.7	-1066.5	99	T	4.63	43.86	0.11	0.90	1.56	7.62	7.62	1.56	7.62	7.62
9.3	31.0	48	0.0	901.9	0	T	3.66	40.36	0.09	0.90	1.56	7.62	7.62	1.56	7.62	7.62
			-61.6	-1066.5	37	T	4.63	43.86	0.11	0.90	1.56	7.62	7.62	1.56	7.62	7.62

Span 5: From 31.00 ft To 34.00 ft

Loc ft	AbsLoc ft	H in	Mmax Mmin kips-ft	Mr kips-ft	Comb	CL	c	d in	c/d	Phi	Asb-req in^2	Asb-prv in^2	Asb-eff in^2	Ast-req in^2	Ast-prv in^2	Ast-eff in^2
0.0	31.0	48	0.0	901.9	0	T	3.66	40.36	0.09	0.90	1.56	7.62	7.62	1.56	7.62	7.62
			-13.5	-1066.5	1	T	4.63	43.86	0.11	0.90	1.56	7.62	7.62	1.56	7.62	7.62
1.3	32.3	48	0.0	784.1	0	T	3.53	40.36	0.09	0.90	1.56	7.62	6.55	1.56	7.62	7.62
			-4.6	-712.7	1	T	3.88	43.86	0.09	0.90	1.56	7.62	7.62	1.56	7.62	4.68

Flexure Design : Notes

CL: Section classification as per LRFD 2006 interims for provided reinforcement.
C = Compression controlled, I = In-Transition, T = Tension controlled.
* The provided reinforcement is not adequate, either less than required or larger than maximum allowed.

SHEAR AND TORSION DESIGN:

Section Adequate (see hand calc for details) .The 0.79in2/ft shown is to meet the min transverse reinforcement requirement per AASHTO 5.8.2.5

Span 1: From 0.00 ft To 3.00 ft

Loc ft	AbsLoc ft	Pos	Vu kips	Comb	Tu kips-ft	Comb	phi*Vn kips	T-lim kips-ft	Avs/s in^2/ft	2Ats/s in^2/ft	Av/s in^2/ft	Aprv/s in^2/ft	Alx in^2	Vc kips	Vs kips	Beta	Theta deg	b in	dv in	E
1.75	1.75	L	5.3	1	0.0	0	476.8	112.2	0.00	0.00	0.00	0.37	0.00	403.96	125.87	3.64	22.42	48.00	42.21	0.

Span 2: From 3.00 ft To 12.33 ft

Loc ft	AbsLoc ft	Pos	Vu kips	Comb	Tu kips-ft	Comb	phi*Vn kips	T-lim kips-ft	Avs/s in^2/ft	2Ats/s in^2/ft	Av/s in^2/ft	Aprv/s in^2/ft	Alx in^2	Vc kips	Vs kips	Beta	Theta deg	b in	dv in
1.25	4.25	R	66.1	7	110.9	12	422.6	112.2	0.00	0.00	0.00	0.44	0.00	341.57	128.01	3.10	25.44	48.00	41.89
7.00	10.00	L	49.0	7	110.9	38	348.1	112.2	0.00	0.00	0.00	0.44	0.00	282.85	103.05	2.80	28.32	48.00	38.39
		R	229.0	45	164.9	19	273.3	112.2	0.50	0.29	0.79	0.44**	4.39	246.12	57.51	2.44	32.87	48.00	38.39
8.08	11.08	L	232.2	45	164.9	44	288.8	112.2	0.52	0.27	0.79	0.44**	2.96	257.42	63.44	2.55	31.16	48.00	38.39

Span 3: From 12.33 ft To 21.67 ft

Loc ft	AbsLoc ft	Pos	Vu kips	Comb	Tu kips-ft	Comb	phi*Vn kips	T-lim kips-ft	Avs/s in^2/ft	2Ats/s in^2/ft	Av/s in^2/ft	Aprv/s in^2/ft	Alx in^2	Vc kips	Vs kips	Beta	Theta deg	b in	dv in	E
1.25	13.58	R	145.5	21	135.1	16	340.5	112.2	0.58	0.21	0.79	0.44**	0.00	296.35	82.01	2.69	29.46	48.00	41.89	0
4.67	17.00	L	135.3	21	135.1	42	279.3	112.2	0.56	0.23	0.79	0.40**	1.47	252.10	58.27	2.50	32.01	48.00	38.39	0
		R	135.3	49	135.1	5	279.3	112.2	0.56	0.23	0.79	0.40**	1.56	252.10	58.27	2.50	32.01	48.00	38.39	0
8.09	20.42	L	145.5	49	135.1	33	355.1	112.2	0.59	0.20	0.79	0.44**	0.00	307.45	87.13	2.79	28.34	48.00	41.89	0

Span 4: From 21.67 ft To 31.00 ft

Loc ft	AbsLoc ft	Pos	Vu kips	Comb	Tu kips-ft	Comb	phi*Vn kips	T-lim kips-ft	Avs/s in^2/ft	2Ats/s in^2/ft	Av/s in^2/ft	Aprv/s in^2/ft	Alx in^2	Vc kips	Vs kips	Beta	Theta deg	b in	dv in
1.25	22.92	R	229.2	25	132.0	27	298.9	112.2	0.58	0.21	0.79	0.44**	2.29	260.97	71.18	2.59	30.62	48.00	38.39
2.33	24.00	L	226.0	25	132.0	53	280.9	112.2	0.56	0.23	0.79	0.44**	3.96	247.93	64.16	2.46	32.60	48.00	38.39
		R	45.9	37	78.1	4	350.8	112.2	0.00	0.00	0.00	0.44	0.00	284.86	104.91	2.82	28.01	48.00	38.39
8.08	29.75	L	63.1	37	78.1	29	388.0	112.2	0.00	0.00	0.00	0.44	0.00	313.60	117.52	3.11	25.40	48.00	38.39

Span 5: From 31.00 ft To 34.00 ft

Loc ft	AbsLoc ft	Pos	Vu kips	Comb	Tu kips-ft	Comb	phi*Vn kips	T-lim kips-ft	Avs/s in^2/ft	2Ats/s in^2/ft	Av/s in^2/ft	Aprv/s in^2/ft	Alx in^2	Vc kips	Vs kips	Beta	Theta deg	b in	dv in	E
1.25	32.25	R	5.3	1	0.0	0	476.2	112.2	0.00	0.00	0.00	0.37	0.00	403.36	125.70	3.63	22.44	48.00	42.21	0.

Shear and Torsion Design : Notes

** Provided stirrup area (Aprv/s) is not adequate.
- Pos is the design position. L suggests the calculation is done at immediate left of "Loc" and R suggests at immediate right of it.
- T-lim is the limiting value of torsion for the concrete section. If actual torsion is higher than this value, torsional steel has to be provided.
- Avs/s is the required area of steel per unit length for shear force.
- 2Ats/s is the required area of steel per unit length for two legs of torsional reinforcement.
- Av/s is the total required area of steel per unit length due to shear plus torsion.
- Aprvs/s is the total provided area of transverse steel reinforcement.
- Alx is the EFFECTIVE longitudinal steel required in addition to the PROVIDED EFFECTIVE flexural steel.
- Vc is the nominal shear resistence of concrete.
- Vs is the nominal shear resistence of transverse reinforcement.
- Beta is the factor indicating ability of diagonally cracked concrete to transmit tension and shear.
- Theta is the angle of inclination of diagonal compressive stress.
- # Vu is greater tha phi*Vn.

1 - DESIGN SPECIFICATIONS :

* STANDARDS/SPECIFICATIONS	(S)	AASHTO LRFD 5th. Edition	
	(SDG)	FDOT - Structures Design Guidelines 2011	

2 - FLEXURE DESIGN :

M_U : **347.00** k-ft

f'c :	**3.0**	ksi	
fy :	**40.0**	ksi	
wc :	**150**	pcf	
M_U :	**347.00**	k-ft	
fr = 0.24 √f'c	0.42	ksi	*S 5.4.2.6*
b :	**48.0**	in	
h :	**48.0**	in	
Ig = b h^3 / 12 :	442368	in^4	
yt :	24	in	
Mcr = fr Ig / yt	638.50	k-ft	*S Eqn. 5.7.3.6.2-2*
1.2 Mcr :	766.20	k-ft	
1.33 Mu :	461.51	k-ft	

Mu = max { Mu ; min { 1.2 Mcr ; 1.33 Mu } } → Mu : 461.51 k-ft *S 5.7.3.3.2*

Cover :	**3**	in		
ϕ_f :	**0.9**			*S 5.5.4.2.1*
Stirrups # :	**4**	Bardia:	0.5	
Rn = 12 Mu / (ϕ_f b d_e^2) :	0.08	ksi		
ρ :	0.002			
Asreq:	3.87	in^2		

d_e =h-cover - $\phi_{bar-stirrup}$ - ϕ_{bar}/2

Maximum size of the coarse aggregate : **1** in

Use	Layer	Quantity	Bar #	Bardia (in)	As (in^2)	d' (in)	d_e (in)	As d_e (in^3)	breq (in)	Check	Spacing (in)
	1	**2**	**10**	1.27	2.54	**4.14**	43.87	111.42	11.4	Ok!	38.46
	2	**2**	**10**	1.27	2.54	**7.64**	40.37	102.53	11.4	Ok!	38.46
	2	**2**	**10**	1.27	2.54	**11.14**	36.87	93.64	11.4	Ok!	38.46
		6			7.62			307.58			

d_e : 40.37 in

2.1 - CHECK NET TENSILE STRAIN IN THE EXTREME TENSION STEEL : *S 5.5.4.2*

T = As fy :	304.80	kips			
a = T / 0.85 f'c b :	2.490	in			
β_1 :	0.85				
C = a / β_1 :	2.93	in			
ε_c :	0.003				
ε_t = ε_c (d-c)/c	0.038	> 0.005	→	Tension Controlled Section!	
ϕ_f :	0.90				*S Eqn. 5.5.4.2.1-1*
M_r = $\phi_f M_n$:	894.28	k-ft	→	Ok!	*S Eqn. 5.7.3.2.1-1*

3- SHEAR DESIGN :

				COMB	1	2		*S 5.8.3.3*
Use Combination:	1			NODE	2	2	COMB	
V_U :	229	kips		V_U	229	0	45	
Mu :	347	kip-ft		Mu	347	0	34	
Tu :	165	kip-ft		Tu	165	0	19	

Vn = min { $Vn_1 = Vc + Vs$; $Vn_2 = 0.25\ f'c\ b_v\ d_v$ }

$Vc = 0.0316\ \beta\ \sqrt{f'c}\ b_v\ d_v$ — *S Eqn. 5.8.3.3-3*

$Vs = \dfrac{Av\ fy\ d_v\ (\cot\theta + \cot\alpha)\ \sin\alpha}{s}$ — *S Eqn. 5.8.3.3-4*

S Eqn. 5.8.3.3-2

d_v = max { $d_e - a/2$ = 39.12 in ; $0.9\ d_e$ = 36.33 in ; $0.72\ h$ = 34.56 in } → d_v : 39.1 in — *S 5.8.2.9*

b_v :	48	in	Use stem width				
Bar #:	4		Shear Reinforcement				
Area bar:	0.20	in^2					
# Legs :	2						
Av :	0.393	in^2					
S :	11	in					
Av/s prov :	0.43	in^2/ft					
vu :	0.14	ksi					
Av/s min :	0.79	in^2/ft	→	N.G			*S Eqn. 5.8.2.5-1*
S max :	24.00	in	→	Ok!			*S 5.8.2.7*

Check torsion requirements: — *S 5.8.2.1*

A_{cp} :	2304	in^2					
P_c :	192	in					
Tcr :	498.8	kip-ft					*S 5.8.2.1.4*
Tmin :	112.2	kip-ft	→	Tu	>	Tmin	Consider torsional effects — *S 5.8.2.1.3*
Aoh :	1764	in^2					
Ao :	1499	in^2	Ao=0.85Aoh				
P_h :	166						

GENERAL PROCEDURE - APPENDIX B5 *S 5.8.3.4.2*

$V_U d_v$:	746.5	kip-ft		
ε_s :	0.00207			*S 5.8.3.4.2-4*
Sx :	39.12	in	assume dv	
Sxe :	33.1199	in		
β :	**2.44**	**	from RC-Pier	*S 5.8.3.4.2-1*
θ :	**32.9**	°	from RC-Pier	*S 5.8.3.4.2-3*
Vc :	250.77	kips		*S 5.8.3.3-3*
Avs/s:	0.02	in^2/ft	Steel area required for shear only	
2At/s:	0.28	in^2/ft	Steel area required for torsion only (2 legs for torsion)	
Av/s :	0.30	in^2/ft	Total steel area for shear and torsion	
Sreq :	15.57	in	Required stirrup spacing for shear+torsion	
Sprov :	11.00	in	→ Ok!	
Avs/s pr:	0.144	in^2/ft	Effective provided stirrup area for shear	
Vs :	29.05	kips/ft	ϕVs : 26.1 kips	*S 5.8.3.3-4*

SHEAR REINFORCEMENT ADEQUATE FOR STRENGTH V

Vn_1 :	279.82	kips					
			→	Use Vn :	279.82	kips	
Vn_2 :	1408.3	kips		ϕ_v :	**0.9**		*S 5.5.4.2.1*
				ϕ_v Vn :	251.8	kips > Vu → Ok!	

1.3.3. RC-Pier Results – 1990 Intermediate Bent

CAP DESIGN

Code: AASHTO LRFD (6th Edition, 2012)
Units: US
Pier View: Downstation.

DESIGN PARAMETERS

f'c = 5500.0 psi	
Fy flex = 60000.0 psi	Fy shear = 60000.0 psi
phi tens = 0.90	
phi comp = 0.75	phi shear = 0.90
Tens below = 0.375	Comp Above = 0.600
Ec = 4046.0 ksi	Es = 29000.0 ksi
Crack check as per current LRFD	
Crack control Exposure = 1.00	
Concrete Type : Normal Weight.	
Design of cap at centerline of column.	

CAP GEOMETRY

Straight Cap : Length(X) = 36.25 ft Depth(Z) = 54.00 in

Cap Section Properties

Sec.	Area ft ^2	Iz in ^4	Iy in ^4
1	18.00	497664.00	629856.00

MAIN REINFORCEMENT

	Bar size	Quantity	Bar dist. in	As total in^2	From ft	To ft	Hook
TOP							
	US#10[M32]	9	4.25	11.430	0.00	36.25	Both 180
BOTTOM							
	US#9[M29]	4	4.25	4.000	0.00	36.25	Both 180
	US#9[M29]	2	7.25	2.000	0.00	36.25	Both 180

STIRRUPS

From ft	To ft	Stirrup Size	n legs	Spacing in	Aprv/s in^2 / ft	Bar Type
0.42	1.50	US#4[M13]	2	6.50	0.74	Stirrup
1.50	4.50	US#4[M13]	2	12.00	0.40	Stirrup
4.50	11.58	US#4[M13]	2	9.44	0.51	Stirrup
11.58	14.58	US#4[M13]	2	12.00	0.40	Stirrup
14.58	21.67	US#4[M13]	2	9.44	0.51	Stirrup
21.67	24.67	US#4[M13]	2	12.00	0.40	Stirrup
24.67	31.75	US#4[M13]	2	9.44	0.51	Stirrup
31.75	34.75	US#4[M13]	2	12.00	0.40	Stirrup
34.75	35.83	US#4[M13]	2	6.50	0.74	Stirrup

Clear Cover on Sides = 3.00 in

FLEXURE DESIGN

Span 1: From 0.00 ft To 3.00 ft

Loc ft	AbsLoc ft	H in	Mmax Mmin kips-ft	Mr kips-ft	Comb	CL	c	d in	c/d	Phi	Asb-req in^2	Asb-prv in^2	Asb-eff in^2	Ast-req in^2	Ast-prv in^2	Ast-eff in^2
1.8	1.8	48	0.0	820.0	0	T	3.06	42.75	0.07	0.90	1.24	6.00	3.94	1.24	11.43	10.50
			-5.2	-908.0	1	T	2.82	43.75	0.06	0.90	1.24	6.00	6.00	1.24	11.43	4.22
3.0	3.0	48	0.0	1183.5	0	T	3.31	42.75	0.08	0.90	1.24	6.00	6.00	1.24	11.43	11.43
			-15.2	-1457.9	1	T	3.33	43.75	0.08	0.90	1.24	6.00	6.00	1.24	11.43	7.24

Span 2: From 3.00 ft To 13.08 ft

Loc ft	AbsLoc ft	H in	Mmax Mmin kips-ft	Mr kips-ft	Comb	CL	c	d in	c/d	Phi	Asb-req in^2	Asb-prv in^2	Asb-eff in^2	Ast-req in^2	Ast-prv in^2	Ast-eff in^2
0.0	3.0	48	9.8	1183.5	3	T	3.31	42.75	0.08	0.90	1.24	6.00	6.00	1.24	11.43	11.43
			-45.4	-1457.9	2	T	3.33	43.75	0.08	0.90	1.24	6.00	6.00	1.24	11.43	7.24
1.3	4.3	48	20.8	1183.5	3	T	3.31	42.75	0.08	0.90	1.24	6.00	6.00	1.24	11.43	11.43
			-21.8	-2006.0	2	T	3.90	43.75	0.09	0.90	1.24	6.00	6.00	1.24	11.43	10.25
8.8	11.8	48	8.3	1183.5	2	T	3.31	42.75	0.08	0.90	1.24	6.00	6.00	1.24	11.43	11.43
			0.0	-2209.9	0	T	3.87	43.75	0.09	0.90	1.24	6.00	6.00	1.24	11.43	11.43
10.1	13.1	48	0.0	1183.5	0	T	3.31	42.75	0.08	0.90	1.24	6.00	6.00	1.24	11.43	11.43
			-12.5	-2209.9	1	T	3.87	43.75	0.09	0.90	1.24	6.00	6.00	1.24	11.43	11.43
10.1	13.1	48	0.0	1183.5	0	T	3.31	42.75	0.08	0.90	1.24	6.00	6.00	1.24	11.43	11.43
			-12.6	-2209.9	1	T	3.87	43.75	0.09	0.90	1.24	6.00	6.00	1.24	11.43	11.43

Span 3: From 13.08 ft To 23.17 ft

Loc ft	AbsLoc ft	H in	Mmax Mmin kips-ft	Mr kips-ft	Comb	CL	c	d in	c/d	Phi	Asb-req in^2	Asb-prv in^2	Asb-eff in^2	Ast-req in^2	Ast-prv in^2	Ast-eff in^2
0.0	13.1	48	15.8	1183.5	3	T	3.31	42.75	0.08	0.90	1.24	6.00	6.00	1.24	11.43	11.43
			-34.8	-2209.9	2	T	3.87	43.75	0.09	0.90	1.24	6.00	6.00	1.24	11.43	11.43
1.3	14.3	48	21.9	1183.5	1	T	3.31	42.75	0.08	0.90	1.24	6.00	6.00	1.24	11.43	11.43
			-8.9	-2209.9	4	T	3.87	43.75	0.09	0.90	1.24	6.00	6.00	1.24	11.43	11.43
8.8	21.9	48	50.4	1183.5	2	T	3.31	42.75	0.08	0.90	1.24	6.00	6.00	1.24	11.43	11.43
			-37.4	-2209.9	3	T	3.87	43.75	0.09	0.90	1.24	6.00	6.00	1.24	11.43	11.43
10.1	23.2	48	44.3	1183.5	4	T	3.31	42.75	0.08	0.90	1.24	6.00	6.00	1.24	11.43	11.43
			-63.2	-2209.9	1	T	3.87	43.75	0.09	0.90	1.24	6.00	6.00	1.24	11.43	11.43
10.1	23.2	48	44.3	1183.5	4	T	3.31	42.75	0.08	0.90	1.24	6.00	6.00	1.24	11.43	11.43
			-63.3	-2209.9	1	T	3.87	43.75	0.09	0.90	1.24	6.00	6.00	1.24	11.43	11.43

Span 4: From 23.17 ft To 33.25 ft

Loc ft	AbsLoc ft	H in	Mmax Mmin kips-ft	Mr kips-ft	Comb	CL	c	d in	c/d	Phi	Asb-req in^2	Asb-prv in^2	Asb-eff in^2	Ast-req in^2	Ast-prv in^2	Ast-eff in^2
0.0	23.2	48	21.8	1183.5	4	T	3.31	42.75	0.08	0.90	1.24	6.00	6.00	1.24	11.43	11.43
			-37.2	-2209.9	1	T	3.87	43.75	0.09	0.90	1.24	6.00	6.00	1.24	11.43	11.43
1.3	24.4	48	57.3	1183.5	2	T	3.31	42.75	0.08	0.90	1.24	6.00	6.00	1.24	11.43	11.43
			-43.2	-2209.9	3	T	3.87	43.75	0.09	0.90	1.24	6.00	6.00	1.24	11.43	11.43
8.8	32.0	48	175.1	1183.5	4	T	3.31	42.75	0.08	0.90	1.24	6.00	6.00	1.24	11.43	11.43
			-176.1	-2209.9	1	T	3.87	43.75	0.09	0.90	1.24	6.00	6.00	1.24	11.43	11.43
10.1	33.2	48	0.0	1183.5	0	T	3.31	42.75	0.08	0.90	1.24	6.00	6.00	1.24	11.43	11.43
			-22.7	-2209.9	2	T	3.87	43.75	0.09	0.90	1.24	6.00	6.00	1.24	11.43	11.43
10.1	33.3	48	0.0	1183.5	0	T	3.31	42.75	0.08	0.90	1.24	6.00	6.00	1.24	11.43	11.43
			-22.6	-2209.9	2	T	3.87	43.75	0.09	0.90	1.24	6.00	6.00	1.24	11.43	11.43

Span 5: From 33.25 ft To 36.25 ft

Loc ft	AbsLoc ft	H in	Mmax Mmin kips-ft	Mr kips-ft	Comb	CL	c	d in	c/d	Phi	Asb-req in^2	Asb-prv in^2	Asb-eff in^2	Ast-req in^2	Ast-prv in^2	Ast-eff in^2
0.0	33.3	48	0.0	1183.5	0	T	3.31	42.75	0.08	0.90	1.24	6.00	6.00	1.24	11.43	11.43
			-15.2	-2209.9	1	T	3.87	43.75	0.09	0.90	1.24	6.00	6.00	1.24	11.43	11.43
1.3	34.5	48	0.0	1182.6	0	T	3.27	42.75	0.08	0.90	1.24	6.00	6.00	1.24	11.43	10.50
			-5.2	-2209.9	1	T	3.87	43.75	0.09	0.90	1.24	6.00	6.00	1.24	11.43	11.43

Flexure Design : Notes

CL: Section classification as per LRFD 2006 interims for provided reinforcement.
C = Compression controlled, I = In-Transition, T = Tension controlled.
* The provided reinforcement is not adequate, either less than required or larger than maximum allowed.

SHEAR AND TORSION DESIGN:

Span 1: From 0.00 ft To 3.00 ft

Loc ft	AbsLoc ft	Pos	Vu kips	Comb	Tu kips-ft	Comb	phi*Vn kips	T-lim kips-ft	Avs/s in^2/ft	2Ats/s in^2/ft	Av/s in^2/ft	Aprv/s in^2/ft	Alx in^2	Vc kips	Vs kips	Beta	Theta deg	b in	dv in	E
1.75	1.75	L	5.9	1	0.0	0	739.0	181.0	0.00	0.00	0.00	0.40	0.00	616.03	205.10	3.61	22.54	54.00	42.56	0.

Span 2: From 3.00 ft To 13.08 ft

Loc ft	AbsLoc ft	Pos	Vu kips	Comb	Tu kips-ft	Comb	phi*Vn kips	T-lim kips-ft	Avs/s in^2/ft	2Ats/s in^2/ft	Av/s in^2/ft	Aprv/s in^2/ft	Alx in^2	Vc kips	Vs kips	Beta	Theta deg	b in	dv in	E
1.25	4.25	R	16.8	2	209.3	2	585.8	181.0	0.64	0.16	0.80	0.40**	0.00	512.77	138.11	3.03	25.96	54.00	42.24	0
8.83	11.83	L	14.4	1	209.3	1	531.2	181.0	0.62	0.18	0.80	0.40**	0.00	468.66	121.61	2.84	27.84	54.00	41.25	0

Span 3: From 13.08 ft To 23.17 ft

Loc ft	AbsLoc ft	Pos	Vu kips	Comb	Tu kips-ft	Comb	phi*Vn kips	T-lim kips-ft	Avs/s in^2/ft	2Ats/s in^2/ft	Av/s in^2/ft	Aprv/s in^2/ft	Alx in^2	Vc kips	Vs kips	Beta	Theta deg	b in	dv in	Ep
1.25	14.33	R	20.3	2	375.4	2	524.6	181.0	0.49	0.31	0.80	0.40**	0.00	484.48	98.38	2.86	27.55	54.00	42.25	0.(
8.83	21.92	L	20.3	1	375.4	1	520.0	181.0	0.48	0.32	0.80	0.40**	0.00	480.97	96.79	2.84	27.79	54.00	42.25	0.(

Span 4: From 23.17 ft To 33.25 ft

Loc ft	AbsLoc ft	Pos	Vu kips	Comb	Tu kips-ft	Comb	phi*Vn kips	T-lim kips-ft	Avs/s in^2/ft	2Ats/s in^2/ft	Av/s in^2/ft	Aprv/s in^2/ft	Alx in^2	Vc kips	Vs kips	Beta	Theta deg	b in	dv in	Ep
1.25	24.42	R	28.5	2	539.0	2	594.5	181.0	0.34	0.50	0.80	0.40**	0.00	488.78	87.54	2.43	28.08	54.00	41.25	0.(
8.83	32.00	L	30.6	1	539.0	1	451.3	181.0	0.30	0.50	0.80	0.40**	0.00	446.45	54.96	2.64	30.02	54.00	42.25	0.(

Span 5: From 33.25 ft To 36.25 ft

Loc ft	AbsLoc ft	Pos	Vu kips	Comb	Tu kips-ft	Comb	phi*Vn kips	T-lim kips-ft	Avs/s in^2/ft	2Ats/s in^2/ft	Av/s in^2/ft	Aprv/s in^2/ft	Alx in^2	Vc kips	Vs kips	Beta	Theta deg	b in	dv in	E
1.25	34.50	R	5.9	1	0.0	0	749.7	181.0	0.00	0.00	0.00	0.40	0.00	625.42	207.61	3.70	22.15	54.00	42.25	0.

In this case, the required total transverse reinforcement is only due to torsion since beams are placed right on top of piles (Strength III Used). The required reinforcement for torsion is =0.5in2/ft but still higher than what is provided (see hand calculations). The 0.8in2/ft shown is to meet the min transverse reinforcement requirement per AASHTO 5.8.2.5.

Shear and Torsion Design : Notes

** Provided stirrup area (Aprv/s) is not adequate.
- Pos is the design position. L suggests the calculation is done at immediate left of "Loc" and R suggests at immediate right of it.
- T-lim is the limiting value of torsion for the concrete section. If actual torsion is higher than this value, torsional steel has to be provided.
- Avs/s is the required area of steel per unit length for shear force.
- 2Ats/s is the required area of steel per unit length for two legs of torsional reinforcement.
- Av/s is the total required area of steel per unit length due to shear plus torsion.
- Aprvs/s is the total provided area of transverse steel reinforcement.
- Alx is the EFFECTIVE longitudinal steel required in addition to the PROVIDED EFFECTIVE flexural steel.
- Vc is the nominal shear resistence of concrete.
- Vs is the nominal shear resistence of transverse reinforcement.
- Beta is the factor indicating ability of diagonally cracked concrete to transmit tension and shear.
- Theta is the angle of inclination of diagonal compressive stress.
- # Vu is greater tha phi*Vn.

1 - DESIGN SPECIFICATIONS :

*	STANDARDS/SPECIFICATIONS	(S)	AASHTO LRFD 5th. Edition
		(SDG)	FDOT - Structures Design Guidelines 2011

2 - FLEXURE DESIGN :

			M_U :	**121.16**	k-ft
f'c :	**5.5**	ksi	M_S :	**93.20**	k-ft
fy :	**60.0**	ksi			
wc :	**150**	pcf			
M_U :	**121.16**	k-ft			
fr = 0.24 √f'c	0.56	ksi			*S 5.4.2.6*
b :	**54.0**	in			
h :	**48.0**	in			
Ig = b h^3 / 12 :	497664	in^4			
yt :	24	in			
Mcr = fr Ig / yt	972.60	k-ft			*S Eqn. 5.7.3.6.2-2*
1.2 Mcr :	1167.13	k-ft			
1.33 Mu :	161.14	k-ft			

Mu = max { Mu; min { 1.2 Mcr; 1.33 Mu } } → Mu : 161.14 k-ft *S 5.7.3.3.2*

Cover :	**3**	in		
ϕ_f :	**0.9**			*S 5.5.4.2.1*
Stirrups # :	**4**	Bardia:	0.5	
Rn = 12 Mu / (ϕ_f b d_e^2) :	0.02	ksi		
ρ :	0.000			
Asreq:	0.84	in^2		

d_e =h-cover - $\phi_{bar\text{-}stirrup}$ - ϕ_{bar}/2

Maximum size of the coarse aggregate : **1** in

Use	Layer	Quantity	Bar #	Bardia (in)	As (in^2)	d' (in)	d_e (in)	As d_e (in^3)	breq (in)	Check	Spacing (in)
	1	**4**	**9**	1.128	4.00	**4.25**	43.75	175.00	16.6	Ok!	14.16
	2	**2**	**9**	1.128	2.00	**7.25**	40.75	81.50	10.9	Ok!	44.74
	2	**0**	**10**	1.27	0.00	**10.75**	0.00	0.00	0.0	Ok!	0.00
		6			6.00			256.50			

d_e : 42.75 in

2.1 - CHECK NET TENSILE STRAIN IN THE EXTREME TENSION STEEL : *S 5.5.4.2*

T = As fy :	360.00	kips			
a = T / 0.85 f'c b :	1.426	in			
β_1 :	0.775				
C = a / β_1 :	1.84	in			
ε_c :	0.003				
ε_t = ε_c (d-c)/c	0.067	> 0.005	→	Tension Controlled Section!	
ϕ_f :	0.90				*S Eqn. 5.5.4.2.1-1*
M_r = $\phi_f M_n$:	1135.00	k-ft	→	Ok!	*S Eqn. 5.7.3.2.1-1*

2-2 - CHECK CRACK CONTROL : *S 5.7.3.4*

$S \le S_{max}$: $\frac{700\,\gamma_e}{\beta_s\,f_s} - 2d_c$ where : $\beta_s = 1 + \frac{d_c}{0.7(h-d_c)}$ *S Eqn. 5.7.3.4-1*

γ_e : **1** Exposure factor 1 for class 1 exposure condition
0.75 for class 2 exposure condition

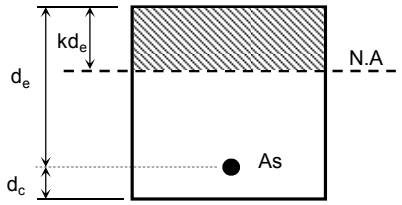
Thickness of clear cover measured from extreme tension fiber to center of the flexural reinforcement located closest :

d_c = cover - $\phi_{bar\text{-}stirrup}$ - $\phi_{bar}/2$: 5.6 in

$\beta_s = 1 + \frac{d_c}{0.7(h-d_c)}$: 1.2

Es :		29000	ksi	*S 5.4.3.2*
K_1 :		**0.9**		*SDG 1.4.1*
Ec = 33000 K_1 $w_c^{1.5}$ $\sqrt{f'c}$:		4046.5	ksi	*S 5.4.2.4*
n = Es/Ec :	7.2 use n :	7		*S 5.7.1*

M_{SH} :	Service III	**93.20**	k-ft/ft
b :		54.0	in
d_e :		42.75	in
As :		6.00	in^2/ft
ρ :		0.0026	
k =	$\sqrt{(\rho n)^2 + 2\rho n} - \rho n$:	0.173	
k d_e :		7.41	in
It =	1/3 b$(kd_e)^3$ + n As $(d_e(1-k))^2$:	59778.1	in^4



y = d_e - kd_e : 35.34 in

fs = n M_{SH} y / It : 4.63 ksi < f_{Smax} : 24.00 ksi → Ok! *SDG 3.10*

$S_{max} = \frac{700\,\gamma_e}{\beta_s\,f_s} - 2d_c$: 115.90 in

Bar Spacing → S : 14.2 in* < S_{max} : 115.90 in → Ok!

* for the closest layer to the tension face

3- SHEAR DESIGN :

				COMB	1	2		*S 5.8.3.3*
Use Combination:		1		NODE	2	2	COMB	
V_U :		30.6	kips	V_U	30.6	0	1	
Mu :		175	kip-ft	Mu	175	362	4	
Tu :		539	kip-ft	Tu	539	0	1	

Vn = min { $Vn_1 = Vc + Vs$; $Vn_2 = 0.25\ f'c\ b_v\ d_v$ }

$Vc = 0.0316\ \beta\ \sqrt{f'c}\ b_v\ d_v$ — *S Eqn. 5.8.3.3-3*

$Vs = \frac{Av\ fy\ d_v\ (\cot\theta + \cot\alpha)\ \sin\alpha}{s}$ — *S Eqn. 5.8.3.3-4*

S Eqn. 5.8.3.3-2

d_v = max { $d_e - a/2$ = 42.04 in ; $0.9\ d_e$ = 38.48 in ; $0.72\ h$ = 34.56 in } → d_v : 42.0 in — *S 5.8.2.9*

b_v :	54	in	Use stem width				
Bar #:	4		Shear Reinforcement				
Area bar:	0.20	in^2					
# Legs :	2						
Av :	0.393	in^2					
S :	12	in					
Av/s prov :	0.39	in^2/ft					
vu :	0.01	ksi					
Av/s min :	0.80	in^2/ft	→	N.G			*S Eqn. 5.8.2.5-1*
S max :	24.00	in	→	Ok!			*S 5.8.2.7*

Check torsion requirements: — *S 5.8.2.1*

A_{cp} :	2592	in^2					
P_c :	204	in					
Tcr :	804.5	kip-ft					*S 5.8.2.1.4*
Tmin :	181.0	kip-ft	→	Tu	>	Tmin	Consider torsional effects — *S 5.8.2.1.3*
Aoh :	2016	in^2					
Ao :	1714	in^2	Ao=0.85Aoh				
P_h :	178						

GENERAL PROCEDURE - APPENDIX B5 *S 5.8.3.4.2*

$V_U d_v$:	107.2	kip-ft							
ε_s :	0.00046								*S 5.8.3.4.2-4*
Sx :	42.04	in	assume dv						
Sxe :	35.5896	in							
β :	**2.60**		from RC-Pier						*S 5.8.3.4.2-1*
θ :	**30.4**	°	from RC-Pier						*S 5.8.3.4.2-3*
Vc :	437.39	kips							*S 5.8.3.3-3*
Avs/s:	0.00	in^2/ft	Steel area required for shear only						
2At/s:	0.49	in^2/ft	Steel area required for torsion only (2 legs for torsion)						
Av/s :	0.49	in^2/ft	Total steel area for shear and torsion						
Sreq :	9.58	in	Required stirrup spacing for shear+torsion						
Sprov :	12.00	in	→	N.G					
Avs/s pr:	0.000	in^2/ft	Effective provided stirrup area for shear						
Vs :	0.00	kips/ft		ϕVs :	0.0	kips			*S 5.8.3.3-4*
Vn_1 :	437.39	kips							
			→	Use Vn :	437.39	kips			
Vn_2 :	3121.2	kips		ϕ_v :	**0.9**				*S 5.5.4.2.1*
				ϕ_v Vn :	393.6	kips	>	Vu →	Ok!

SHEAR REINFORCEMENT NOT ADEQUATE FOR STRENGTH III

CAP DESIGN

Code: AASHTO LRFD (6th Edition, 2012)
Units: US
Pier View: Downstation.

DESIGN PARAMETERS

f'c = 5500.0 psi	
Fy flex = 60000.0 psi	Fy shear = 60000.0 psi
phi tens = 0.90	
phi comp = 0.75	phi shear = 0.90
Tens below = 0.375	Comp Above = 0.600
Ec = 4046.0 ksi	Es = 29000.0 ksi
Crack check as per current LRFD	
Crack control Exposure = 1.00	
Concrete Type : Normal Weight.	
Design of cap at centerline of column.	

CAP GEOMETRY

Straight Cap : Length(X) = 36.25 ft Depth(Z) = 54.00 in

Cap Section Properties

Sec.	Area ft ^2	Iz in ^4	Iy in ^4
1	18.00	497664.00	629856.00

MAIN REINFORCEMENT

	Bar size	Quantity	Bar dist. in	As total in^2	From ft	To ft	Hook
TOP							
	US#10[M32]	9	4.25	11.430	0.00	36.25	Both 180
BOTTOM							
	US#9[M29]	4	4.25	4.000	0.00	36.25	Both 180
	US#9[M29]	2	7.25	2.000	0.00	36.25	Both 180

STIRRUPS

From ft	To ft	Stirrup Size	n legs	Spacing in	Aprv/s in^2 / ft	Bar Type
0.42	1.50	US#4[M13]	2	6.50	0.74	Stirrup
1.50	4.50	US#4[M13]	2	12.00	0.40	Stirrup
4.50	11.58	US#4[M13]	2	9.44	0.51	Stirrup
11.58	14.58	US#4[M13]	2	12.00	0.40	Stirrup
14.58	21.67	US#4[M13]	2	9.44	0.51	Stirrup
21.67	24.67	US#4[M13]	2	12.00	0.40	Stirrup
24.67	31.75	US#4[M13]	2	9.44	0.51	Stirrup
31.75	34.75	US#4[M13]	2	12.00	0.40	Stirrup
34.75	35.83	US#4[M13]	2	6.50	0.74	Stirrup

Clear Cover on Sides = 3.00 in

FLEXURE DESIGN

Span 1: From 0.00 ft To 3.00 ft

Loc ft	AbsLoc ft	H in	Mmax Mmin kips-ft	Mr kips-ft	Comb	CL	c	d in	c/d	Phi	Asb-req in^2	Asb-prv in^2	Asb-eff in^2	Ast-req in^2	Ast-prv in^2	Ast-eff in^2
1.8	1.8	48	0.0	820.0	0	T	3.06	42.75	0.07	0.90	1.24	6.00	3.94	1.24	11.43	10.50
			-5.2	-908.0	1	T	2.82	43.75	0.06	0.90	1.24	6.00	6.00	1.24	11.43	4.22
3.0	3.0	48	0.0	1183.5	0	T	3.31	42.75	0.08	0.90	1.24	6.00	6.00	1.24	11.43	11.43
			-15.2	-1457.9	1	T	3.33	43.75	0.08	0.90	1.24	6.00	6.00	1.24	11.43	7.24

Span 2: From 3.00 ft To 13.08 ft

Loc ft	AbsLoc ft	H in	Mmax Mmin kips-ft	Mr kips-ft	Comb	CL	c	d in	c/d	Phi	Asb-req in^2	Asb-prv in^2	Asb-eff in^2	Ast-req in^2	Ast-prv in^2	Ast-eff in^2
0.0	3.0	48	0.0	1183.5	0	T	3.31	42.75	0.08	0.90	1.24	6.00	6.00	1.24	11.43	11.43
			-35.5	-1457.9	2	T	3.33	43.75	0.08	0.90	1.24	6.00	6.00	1.24	11.43	7.24
1.3	4.3	48	12.4	1183.5	3	T	3.31	42.75	0.08	0.90	1.24	6.00	6.00	1.24	11.43	11.43
			-13.3	-2006.0	2	T	3.90	43.75	0.09	0.90	1.24	6.00	6.00	1.24	11.43	10.25
8.8	11.8	48	8.3	1183.5	1	T	3.31	42.75	0.08	0.90	1.24	6.00	6.00	1.24	11.43	11.43
			0.0	-2209.9	0	T	3.87	43.75	0.09	0.90	1.24	6.00	6.00	1.24	11.43	11.43
10.1	13.1	48	0.0	1183.5	0	T	3.31	42.75	0.08	0.90	1.24	6.00	6.00	1.24	11.43	11.43
			-10.9	-2209.9	1	T	3.87	43.75	0.09	0.90	1.24	6.00	6.00	1.24	11.43	11.43
10.1	13.1	48	0.0	1183.5	0	T	3.31	42.75	0.08	0.90	1.24	6.00	6.00	1.24	11.43	11.43
			-11.0	-2209.9	1	T	3.87	43.75	0.09	0.90	1.24	6.00	6.00	1.24	11.43	11.43

Span 3: From 13.08 ft To 23.17 ft

Loc ft	AbsLoc ft	H in	Mmax Mmin kips-ft	Mr kips-ft	Comb	CL	c	d in	c/d	Phi	Asb-req in^2	Asb-prv in^2	Asb-eff in^2	Ast-req in^2	Ast-prv in^2	Ast-eff in^2
0.0	13.1	48	6.5	1183.5	3	T	3.31	42.75	0.08	0.90	1.24	6.00	6.00	1.24	11.43	11.43
			-25.5	-2209.9	2	T	3.87	43.75	0.09	0.90	1.24	6.00	6.00	1.24	11.43	11.43
1.3	14.3	48	15.9	1183.5	1	T	3.31	42.75	0.08	0.90	1.24	6.00	6.00	1.24	11.43	11.43
			-2.9	-2209.9	4	T	3.87	43.75	0.09	0.90	1.24	6.00	6.00	1.24	11.43	11.43
8.8	21.9	48	36.0	1183.5	2	T	3.31	42.75	0.08	0.90	1.24	6.00	6.00	1.24	11.43	11.43
			-23.0	-2209.9	3	T	3.87	43.75	0.09	0.90	1.24	6.00	6.00	1.24	11.43	11.43
10.1	23.2	48	26.6	1183.5	4	T	3.31	42.75	0.08	0.90	1.24	6.00	6.00	1.24	11.43	11.43
			-45.5	-2209.9	1	T	3.87	43.75	0.09	0.90	1.24	6.00	6.00	1.24	11.43	11.43
10.1	23.2	48	26.5	1183.5	4	T	3.31	42.75	0.08	0.90	1.24	6.00	6.00	1.24	11.43	11.43
			-45.6	-2209.9	1	T	3.87	43.75	0.09	0.90	1.24	6.00	6.00	1.24	11.43	11.43

Span 4: From 23.17 ft To 33.25 ft

Loc ft	AbsLoc ft	H in	Mmax Mmin kips-ft	Mr kips-ft	Comb	CL	c	d in	c/d	Phi	Asb-req in^2	Asb-prv in^2	Asb-eff in^2	Ast-req in^2	Ast-prv in^2	Ast-eff in^2
0.0	23.2	48	14.0	1183.5	4	T	3.31	42.75	0.08	0.90	1.24	6.00	6.00	1.24	11.43	11.43
			-29.4	-2209.9	1	T	3.87	43.75	0.09	0.90	1.24	6.00	6.00	1.24	11.43	11.43
1.3	24.4	48	41.9	1183.5	2	T	3.31	42.75	0.08	0.90	1.24	6.00	6.00	1.24	11.43	11.43
			-27.7	-2209.9	3	T	3.87	43.75	0.09	0.90	1.24	6.00	6.00	1.24	11.43	11.43
8.8	32.0	48	113.3	1183.5	4	T	3.31	42.75	0.08	0.90	1.24	6.00	6.00	1.24	11.43	11.43
			-114.3	-2209.9	1	T	3.87	43.75	0.09	0.90	1.24	6.00	6.00	1.24	11.43	11.43
10.1	33.2	48	0.0	1183.5	0	T	3.31	42.75	0.08	0.90	1.24	6.00	6.00	1.24	11.43	11.43
			-23.7	-2209.9	2	T	3.87	43.75	0.09	0.90	1.24	6.00	6.00	1.24	11.43	11.43
10.1	33.3	48	0.0	1183.5	0	T	3.31	42.75	0.08	0.90	1.24	6.00	6.00	1.24	11.43	11.43
			-23.6	-2209.9	2	T	3.87	43.75	0.09	0.90	1.24	6.00	6.00	1.24	11.43	11.43

Span 5: From 33.25 ft To 36.25 ft

Loc ft	AbsLoc ft	H in	Mmax Mmin kips-ft	Mr kips-ft	Comb	CL	c	d in	c/d	Phi	Asb-req in^2	Asb-prv in^2	Asb-eff in^2	Ast-req in^2	Ast-prv in^2	Ast-eff in^2
0.0	33.3	48	0.0	1183.5	0	T	3.31	42.75	0.08	0.90	1.24	6.00	6.00	1.24	11.43	11.43
			-15.2	-2209.9	1	T	3.87	43.75	0.09	0.90	1.24	6.00	6.00	1.24	11.43	11.43
1.3	34.5	48	0.0	1182.6	0	T	3.27	42.75	0.08	0.90	1.24	6.00	6.00	1.24	11.43	10.50
			-5.2	-2209.9	1	T	3.87	43.75	0.09	0.90	1.24	6.00	6.00	1.24	11.43	11.43

Flexure Design : Notes

CL: Section classification as per LRFD 2006 interims for provided reinforcement.
C = Compression controlled, I = In-Transition, T = Tension controlled.
* The provided reinforcement is not adequate, either less than required or larger than maximum allowed.

SHEAR AND TORSION DESIGN:

Span 1: From 0.00 ft To 3.00 ft

Loc ft	AbsLoc ft	Pos	Vu kips	Comb	Tu kips-ft	Comb	phi*Vn kips	T-lim kips-ft	Avs/s in^2/ft	2Ats/s in^2/ft	Av/s in^2/ft	Aprv/s in^2/ft	Alx in^2	Vc kips	Vs kips	Beta	Theta deg	b in	dv in	E
1.75	1.75	L	5.9	1	0.0	0	739.0	181.0	0.00	0.00	0.00	0.40	0.00	616.03	205.10	3.61	22.54	54.00	42.56	0.

Span 2: From 3.00 ft To 13.08 ft

Loc ft	AbsLoc ft	Pos	Vu kips	Comb	Tu kips-ft	Comb	phi*Vn kips	T-lim kips-ft	Avs/s in^2/ft	2Ats/s in^2/ft	Av/s in^2/ft	Aprv/s in^2/ft	Alx in^2	Vc kips	Vs kips	Beta	Theta deg	b in	dv in	E
1.25	4.25	R	15.6	2	155.0	2	729.8	181.0	0.00	0.00	0.00	0.40	0.00	608.20	202.65	3.60	22.63	54.00	42.24	0
8.83	11.83	L	13.3	1	155.0	1	701.6	181.0	0.00	0.00	0.00	0.40	0.00	584.31	195.21	3.54	22.91	54.00	41.25	0

Span 3: From 13.08 ft To 23.17 ft

Loc ft	AbsLoc ft	Pos	Vu kips	Comb	Tu kips-ft	Comb	phi*Vn kips	T-lim kips-ft	Avs/s in^2/ft	2Ats/s in^2/ft	Av/s in^2/ft	Aprv/s in^2/ft	Alx in^2	Vc kips	Vs kips	Beta	Theta deg	b in	dv in	E
1.25	14.33	R	17.7	2	277.9	2	563.8	181.0	0.58	0.22	0.80	0.40**	0.00	503.18	123.26	2.97	26.39	54.00	42.25	0
8.83	21.92	L	17.7	1	277.9	1	558.0	181.0	0.58	0.22	0.80	0.40**	0.00	498.33	121.63	2.95	26.61	54.00	42.25	0

Span 4: From 23.17 ft To 33.25 ft

Loc ft	AbsLoc ft	Pos	Vu kips	Comb	Tu kips-ft	Comb	phi*Vn kips	T-lim kips-ft	Avs/s in^2/ft	2Ats/s in^2/ft	Av/s in^2/ft	Aprv/s in^2/ft	Alx in^2	Vc kips	Vs kips	Beta	Theta deg	b in	dv in	Ep
1.25	24.42	R	22.3	2	398.7	2	443.4	181.0	0.41	0.30	0.80	0.40**	0.00	431.13	70.48	2.55	31.17	54.00	41.25	0.4
8.83	32.00	L	24.5	1	398.7	1	504.8	181.0	0.46	0.35	0.80	0.40**	0.00	471.94	88.93	2.79	28.37	54.00	42.25	0.4

Span 5: From 33.25 ft To 36.25 ft

Loc ft	AbsLoc ft	Pos	Vu kips	Comb	Tu kips-ft	Comb	phi*Vn kips	T-lim kips-ft	Avs/s in^2/ft	2Ats/s in^2/ft	Av/s in^2/ft	Aprv/s in^2/ft	Alx in^2	Vc kips	Vs kips	Beta	Theta deg	b in	dv in	E
1.25	34.50	R	5.9	1	0.0	0	749.7	181.0	0.00	0.00	0.00	0.40	0.00	625.42	207.61	3.70	22.15	54.00	42.25	0.

In this case, the required total transverse reinforcement is only due to torsion since beams are placed right on top of piles (Strength III Used). The required reinforcement for torsion is =0.35in2/ft which is less than what is provided (see hand calculations). The 0.8in2/ft shown is to meet the min transverse reinforcement requirement per AASHTO 5.8.2.5.

Shear and Torsion Design : Notes

** Provided stirrup area (Aprv/s) is not adequate.
- Pos is the design position. L suggests the calculation is done at immediate left of "Loc" and R suggests at immediate right of it.
- T-lim is the limiting value of torsion for the concrete section. If actual torsion is higher than this value, torsional steel has to be provided.
- Avs/s is the required area of steel per unit length for shear force.
- 2Ats/s is the required area of steel per unit length for two legs of torsional reinforcement.
- Av/s is the total required area of steel per unit length due to shear plus torsion.
- Aprvs/s is the total provided area of transverse steel reinforcement.
- Alx is the EFFECTIVE longitudinal steel required in addition to the PROVIDED EFFECTIVE flexural steel.
- Vc is the nominal shear resistence of concrete.
- Vs is the nominal shear resistence of transverse reinforcement.
- Beta is the factor indicating ability of diagonally cracked concrete to transmit tension and shear.
- Theta is the angle of inclination of diagonal compressive stress.
- # Vu is greater tha phi*Vn.

1 - DESIGN SPECIFICATIONS :

*	STANDARDS/SPECIFICATIONS	(S)	AASHTO LRFD 5th. Edition
		(SDG)	FDOT - Structures Design Guidelines 2011

2 - FLEXURE DESIGN :

M_U : **113.00** k-ft

f'c :	**5.5**	ksi		
fy :	**60.0**	ksi		
wc :	**150**	pcf		
M_U :	**113.00**	k-ft		
fr = 0.24 √f'c	0.56	ksi		*S 5.4.2.6*
b :	**54.0**	in		
h :	**48.0**	in		
Ig = b h^3 / 12 :	497664	in^4		
yt :	24	in		
Mcr = fr Ig / yt	972.60	k-ft		*S Eqn. 5.7.3.6.2-2*
1.2 Mcr :	1167.13	k-ft		
1.33 Mu :	150.29	k-ft		

Mu = max { Mu ; min { 1.2 Mcr ; 1.33 Mu } } → Mu : 150.29 k-ft *S 5.7.3.3.2*

Cover :	**3**	in	
ϕ_f :	**0.9**		*S 5.5.4.2.1*
Stirrups # :	**4**	Bardia:	0.5
Rn = 12 Mu / (ϕ_f b d_e^2) :	0.02	ksi	
ρ :	0.000		
Asreq:	0.78	in^2	

d_e =h-cover - $\phi_{bar-stirrup}$ - ϕ_{bar}/2

Maximum size of the coarse aggregate : **1** in

Use	Layer	Quantity	Bar #	Bardia (in)	As (in^2)	d' (in)	d_e (in)	As d_e (in^3)	breq (in)	Check	Spacing (in)
	1	**4**	**9**	1.128	4.00	**4.25**	43.75	175.00	16.6	Ok!	14.16
	2	**2**	**9**	1.128	2.00	**7.25**	40.75	81.50	10.9	Ok!	44.74
	2	**0**	**10**	1.27	0.00	**10.75**	0.00	0.00	0.0	Ok!	0.00
		6			6.00			256.50			

d_e : 42.75 in

2.1 - CHECK NET TENSILE STRAIN IN THE EXTREME TENSION STEEL : *S 5.5.4.2*

T = As fy :	360.00	kips			
a = T / 0.85 f'c b :	1.426	in			
β_1 :	0.775				
C = a / β_1 :	1.84	in			
ε_c :	0.003				
ε_t = ε_c (d-c)/c	0.067	> 0.005	→	Tension Controlled Section!	
ϕ_f :	0.90				*S Eqn. 5.5.4.2.1-1*
M_r = $\phi_f M_n$:	1135.00	k-ft	→	Ok!	*S Eqn. 5.7.3.2.1-1*

3- SHEAR DESIGN :

				COMB	1	2		
Use Combination:	1			NODE	18	18	COMB	
V_U :	24.5	kips		V_U	24.5	0	1	
Mu :	113	kip-ft		Mu	113	0	4	
Tu :	399	kip-ft		Tu	399	0	1	

S 5.8.3.3

$Vn = \min \begin{cases} Vn_1 = Vc + Vs \\ Vn_2 = 0.25\, f'c\, b_v\, d_v \end{cases}$

$Vc = 0.0316\, \beta\, \sqrt{f'c}\, b_v\, d_v$ — *S Eqn. 5.8.3.3-3*

$Vs = \dfrac{Av\, fy\, d_v\, (\cot\theta + \cot\alpha) \sin\alpha}{s}$ — *S Eqn. 5.8.3.3-4*

S Eqn. 5.8.3.3-2

$d_v = \max \begin{cases} d_e - a/2 = 42.04 \text{ in} \\ 0.9\, d_e = 38.48 \text{ in} \\ 0.72\, h = 34.56 \text{ in} \end{cases}$ → d_v : 42.0 in — *S 5.8.2.9*

b_v :	54	in	Use stem width				
Bar #:	4		Shear Reinforcement				
Area bar:	0.20	in^2					
# Legs :	2						
Av :	0.393	in^2					
S :	12	in					
Av/s prov :	0.39	in^2/ft					
vu :	0.01	ksi					
Av/s min :	0.80	in^2/ft	→	N.G			*S Eqn. 5.8.2.5-1*
S max :	24.00	in	→	Ok!			*S 5.8.2.7*

Check torsion requirements: *S 5.8.2.1*

A_{cp} :	2592	in^2					
P_c :	204	in					
Tcr :	804.5	kip-ft					*S 5.8.2.1.4*
Tmin :	181.0	kip-ft	→	Tu	>	Tmin	Consider torsional effects — *S 5.8.2.1.3*
Aoh :	2016	in^2					
Ao :	1714	in^2	Ao=0.85Aoh				
P_h :	178						

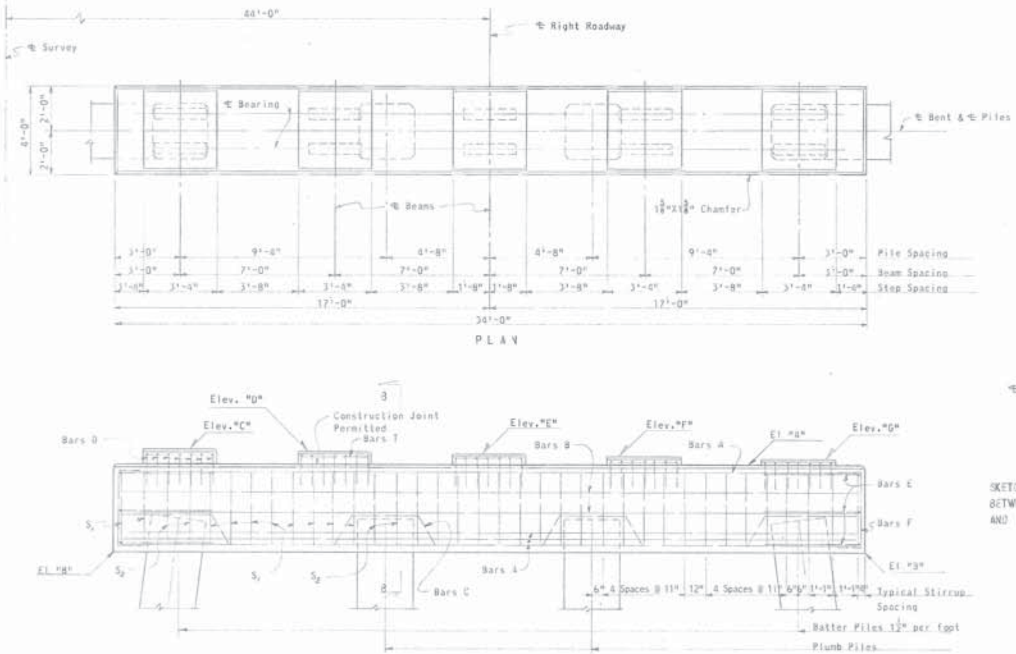
GENERAL PROCEDURE - APPENDIX B5 *S 5.8.3.4.2*

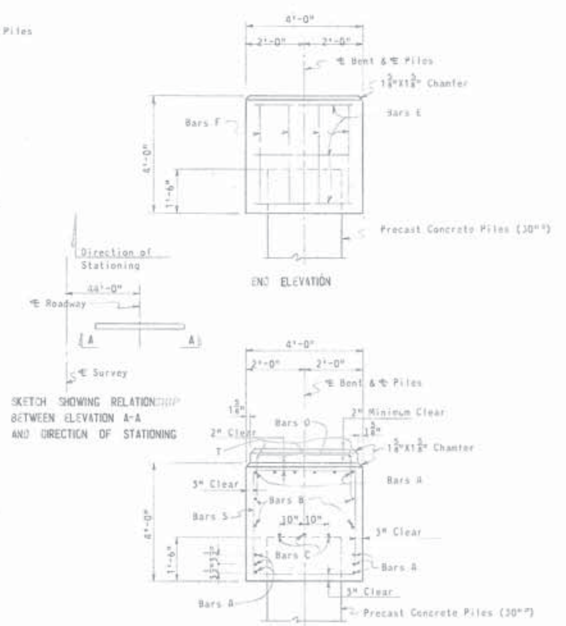
$V_U d_v$:	85.8	kip-ft							
ε_s :	0.00033								*S 5.8.3.4.2-4*
Sx :	42.04	in	assume dv						
Sxe :	35.5896	in							
β :	**2.79**		from RC-Pier						*S 5.8.3.4.2-1*
θ :	**28.4**	°	from RC-Pier						*S 5.8.3.4.2-3*
Vc :	469.35	kips							*S 5.8.3.3-3*
Avs/s:	0.00	in^2/ft	Steel area required for shear only						
2At/s:	0.34	in^2/ft	Steel area required for torsion only (2 legs for torsion)						
Av/s :	0.34	in^2/ft	Total steel area for shear and torsion						
Sreq :	14.04	in	Required stirrup spacing for shear+torsion						
Sprov :	12.00	in	→ Ok!						
Avs/s pr:	0.057	in^2/ft	Effective provided stirrup area for shear						
Vs :	22.15	kips/ft		ϕVs :	19.9	kips			*S 5.8.3.3-4*
Vn_1 :	491.50	kips	→	Use Vn :	491.50	kips			
Vn_2 :	3121.2	kips		ϕ_v :	**0.9**				*S 5.5.4.2.1*
				ϕ_v Vn :	442.3	kips	> Vu	→ Ok!	

1.4. References

1.4.1. Existing Intermediate Bent Details

FED. ROAD DIV. NO.	STATE	PROJECT NO.	FISCAL YEAR	SHEET NO.
3	FLA.		65	A-5

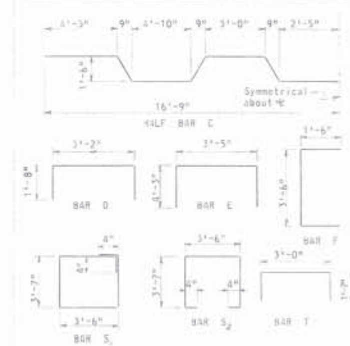




BILL OF REINFORCING STEEL *

MARK	SIZE	NO REQ'D	LENGTH	BENDING
A	10	12	33'- 6"	Straight
B	8	4	33'- 6"	"
C	8	5	39'- 1"	See Diagram
D	4	35	6'- 6"	" "
E	10	6	11'-11"	" "
F	6	8	6'- 6"	" "
S_1	4	28	14'-10"	" "
S_2	4	8	11'- 4"	" "
T	4	12	6'- 2"	" "

BENDING DIAGRAMS



NOTE: All bar dimensions are out-to-out

ESTIMATED QUANTITIES *

ITEM	UNIT	QUANTITY
Class A Concrete (Substructure)	Cu. Yd.	19.85
Reinforcing Steel	Lb.	3326
Precast Concrete Piles (30"")	Lin. Ft.	**

* Concrete and Reinforcing Steel Quantities shown are for One Bent, One Roadway only.

** See List of Pile Lengths on Sheet A-2.

TOWER AND INTERMEDIATE BENT NO.	A	B	C	D	E	F	G
83W thru 14W	8.672	4.672	9.360	9.250	9.141	9.031	8.922
13W	8.672	4.672	9.360	9.250	9.141	9.031	8.922
12W	8.696	4.696	9.384	9.274	9.165	9.055	8.946
11W	8.812	4.812	9.500	9.390	9.281	9.171	9.062
10W	9.280	5.200	9.968	9.858	9.749	9.639	9.530
9W	10.044	6.044	10.732	10.622	10.513	10.403	10.294
8W	11.101	7.101	11.789	11.679	11.570	11.460	11.351
7W	12.452	8.452	13.140	13.030	12.921	12.811	12.702
6W	14.098	10.098	14.785	14.676	14.567	14.457	14.348
5W	16.036	12.036	16.724	16.614	16.505	16.395	16.286
4W	18.173	14.173	18.861	18.751	18.642	18.532	18.423
3W	20.273	16.273	20.961	20.851	20.742	20.632	20.523
2W	22.373	18.373	23.061	22.951	22.842	22.732	22.623
1W	24.473	20.473	25.161	25.051	24.942	24.832	24.723
1E	23.061	19.061	23.749	23.639	23.530	23.420	23.311
2E	20.961	16.961	21.649	21.539	21.430	21.320	21.211
3E	18.861	14.861	19.549	19.439	19.330	19.220	19.111
4E	16.761	12.761	17.449	17.339	17.230	17.120	17.011
5E	14.700	10.700	15.388	15.278	15.168	15.059	14.950
6E	12.960	8.960	13.647	13.538	13.429	13.319	13.210
7E	11.512	7.512	12.200	12.090	11.981	11.871	11.762
8E	10.358	6.358	11.046	10.936	10.827	10.717	10.608
9E	9.498	5.498	10.186	10.076	9.967	9.857	9.748
10E	8.933	4.933	9.621	9.511	9.402	9.292	9.183
11E	8.662	4.662	9.350	9.240	9.131	9.021	8.912
12E	8.672	4.672	9.360	9.250	9.141	9.031	8.922
13E	8.672	4.672	9.360	9.250	9.141	9.031	8.922
14E thru 44E	8.672	4.672	9.360	9.250	9.141	9.031	8.922

~GENERAL NOTES~

DESIGN SPECIFICATIONS: Designed in accordance with the 1961 edition of the A.A.S.H.O. Standard Specifications for Highway Bridges and Approved Revisions (Working stress for Class A Concrete fc= 1200 p.s.i. Max.)

LOADING: HS20-44 (Modified for Military Loading as Required).

DESIGN LOAD FOR PILES: 90 Tons

BEARING LOCATION: For location of ℄ Bearings see sheet A-35 &/or A-36

BEARING SEATS: Bearing Seats for Shoe Assemblies shall be level.

INTERMEDIATE BENTS NOS. 83-W THRU 79-W, 77-W THRU 73-W 71-W THRU 67-W, 65-W THRU 61-W, 59-W THRU 55-W, 53-W THRU 49-W, 47-W THRU 43-W, 41-W THRU 37-W, 35-W THRU 31-W, 29-W THRU 25-W, 23-W THRU 19-W, 17-W THRU 13-W, 11 & 10-W, 8 & 7-W, 5 & 4-W, 2 & 1-W, 1 & 2-E, 4 & 5-E, 7 & 8-E, 10 & 11-E, 13-E THRU 17-E, 19-E THRU 23-E, 25-E THRU 29-E 31-E THRU 35-E, 37-E THRU 41-E, 43-E & 44-E. RIGHT ROADWAY

STATE ROAD DEPARTMENT OF FLORIDA
BRIDGE DIVISION

INTERSTATE ROUTE 295 OVER ST. JOHNS RIVER

REVISIONS	
Dates	Description

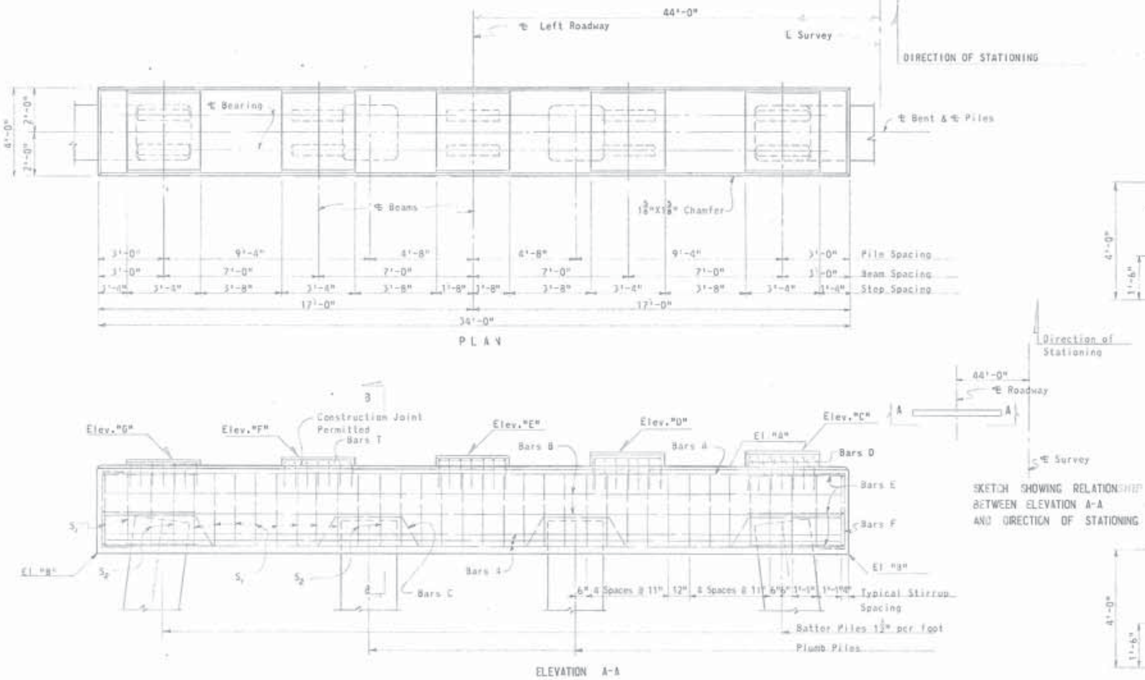
ROAD NO.	COUNTY	PROJECT NO.
9A	DUVAL	72001-3403

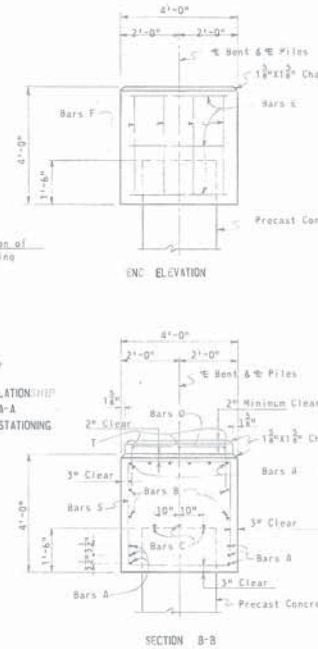
	Names	Dates
Detailed by	C.F.H.	6-64
Checked by	J.L.W.	7-64
Quantities by	C.F.H.	6-64
Checked by	J.L.W.	7-64
Traced by	C.F.H.	6-64

APPROVED BY: T. W. Sp... (signature)

Drawing No.: 5 of 57 — Index No.: 8590

FED. ROAD DIV. NO.	STATE	PROJECT NO.	FISCAL YEAR	SHEET NO.
3	FLA.			

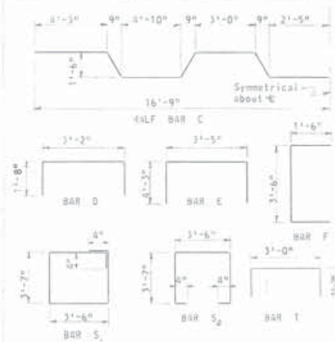




BILL OF REINFORCING STEEL *

MARK	SIZE	NO REQ'D	LENGTH	BENDING
A	# 10	12	33'- 6"	Straight
B	8	4	33'- 6"	"
C	8	2	39'- 1"	See Diagram
D	4	35	6'- 6"	" "
E	10	6	11'-11"	" "
F	6	8	6'- 6"	" "
S_1	4	28	14'-10"	" "
S_2	4	8	11'- 0"	" "
T	4	12	6'- 2"	" "

BENDING DIAGRAMS



NOTE: All bar dimensions are out-to-out

ESTIMATED QUANTITIES *

ITEM	UNIT	QUANTITY
Class A Concrete (Substructure)	Cu. Yd.	19.85
Reinforcing Steel	Lb.	3326
Precast Concrete Piles (30")	Lin. Ft.	**

* Concrete and Reinforcing Steel Quantities shown are for One Bent, One Roadway only.

** See List of Pile Lengths on Sheet A-2

ELEVATIONS

TOWER AND INTERMEDIATE BENT NO.	G	F	E	D	C	B	A
83W thru 13W	8.922	9.031	9.140	9.250	9.360	4.672	8.672
12W	8.922	9.031	9.140	9.250	9.360	4.672	8.672
11W	8.912	9.021	9.130	9.240	9.350	4.662	8.662
10W	9.183	9.292	9.402	9.511	9.621	4.933	8.933
9W	9.748	9.857	9.967	10.076	10.186	5.498	9.498
8W	10.608	10.717	10.827	10.936	11.046	6.358	10.358
7W	11.762	11.871	11.981	12.090	12.200	7.512	11.512
6W	13.210	13.319	13.429	13.538	13.648	8.960	12.960
5W	14.950	15.059	15.169	15.278	15.388	10.700	14.700
4W	17.011	17.120	17.230	17.339	17.449	12.761	16.761
3W	19.111	19.220	19.330	19.439	19.549	14.861	18.861
2W	21.211	21.320	21.430	21.539	21.649	16.961	20.961
1W	23.311	23.420	23.530	23.639	23.749	19.061	23.061
1E	24.723	24.832	24.942	25.051	25.161	20.473	24.473
2E	22.623	22.732	22.842	22.951	23.061	18.373	22.373
3E	20.523	20.632	20.742	20.851	20.961	16.273	20.273
4E	18.423	18.532	18.642	18.751	18.861	14.173	18.173
5E	16.286	16.395	16.505	16.614	16.724	12.036	16.036
6E	14.348	14.457	14.567	14.676	14.786	10.098	14.098
7E	12.702	12.811	12.921	13.030	13.140	8.452	12.452
8E	11.351	11.460	11.570	11.679	11.789	7.101	11.101
9E	10.294	10.403	10.513	10.622	10.732	6.044	10.044
10E	9.530	9.639	9.749	9.858	9.968	5.280	9.280
11E	9.062	9.171	9.281	9.390	9.500	4.812	8.812
12E	8.886	8.995	9.105	9.214	9.324	4.636	8.636
13E	8.922	9.031	9.141	9.250	9.360	4.672	8.672
14E thru 41E	8.922	9.031	9.141	9.250	9.360	4.672	8.672
42E	8.922	9.031	9.141	9.250	9.360	4.672	8.672
43E	9.183	9.225	9.267	9.309	9.351	4.933	8.933

- GENERAL NOTES -

DESIGN SPECIFICATIONS: Designed in accordance with the 1961 edition of the A.A.S.H.O. Standard Specifications for Highway Bridges and Approved Revisions (Working stress for Class A Concrete fc=1200 p.s.i. Max.)

LOADING: HS20-44 (Modified for Military Loading as Required).

DESIGN LOAD FOR PILES: 90 Tons

BEARING LOCATIONS: For location of ℄ Bearing see sheet A-36

BEARING SEATS: Bearing Seats for Shoe Assemblies shall be level.

INTERMEDIATE BENTS NOS. 83-W THRU 79-W, 77-W THRU 73-W, 71-W THRU 67-W, 65-W THRU 61-W, 59-W THRU 55-W, 53-W THRU 49-W, 47-W THRU 43-W, 41-W THRU 37-W, 35-W THRU 31-W, 29-W THRU 25-W, 23-W THRU 19-W, 17-W THRU 13-W, 11 & 10-W, 8 & 7-W, 5 & 4-W, 2 & 1-W, 1 & 2-E, 4 & 5-E, 7 & 8-E, 10 & 11-E, 13-E THRU 17-E, 19-E THRU 23-E, 25-E THRU 29-E, 31-E THRU 35-E, 37-E THRU 41-E & 43-E

LEFT ROADWAY

STATE ROAD DEPARTMENT OF FLORIDA
BRIDGE DIVISION

INTERSTATE ROUTE 295 OVER ST. JOHNS RIVER

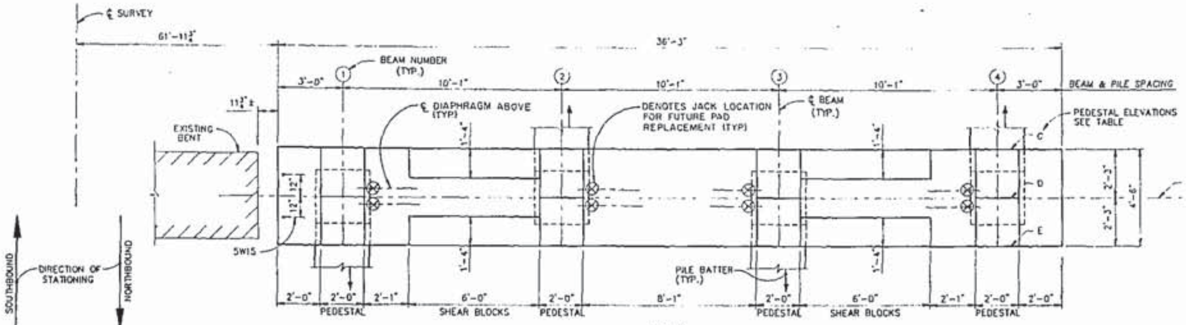
ROAD NO.	COUNTY	PROJECT NO.
9A	DUVAL	72001-3402

	Name	Date
Detailed by		
Checked by		
Quantities by	C.P.H.	6-64
Checked by		
Traced by	S.F.H.	5-64

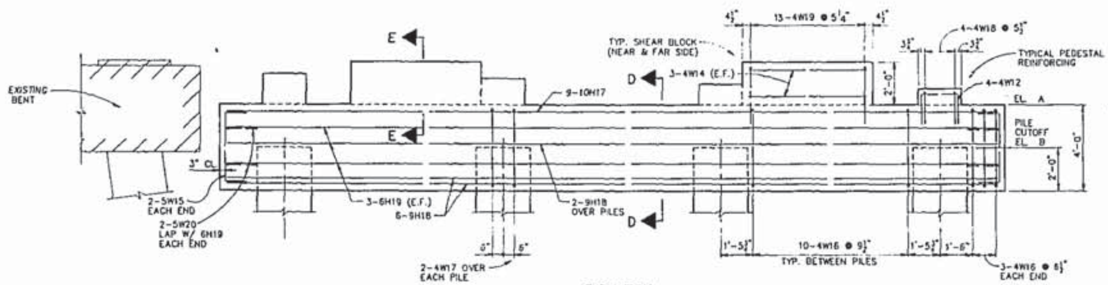
APPROVED BY

Drawing No. 6 of 51

3	FLA.			B35

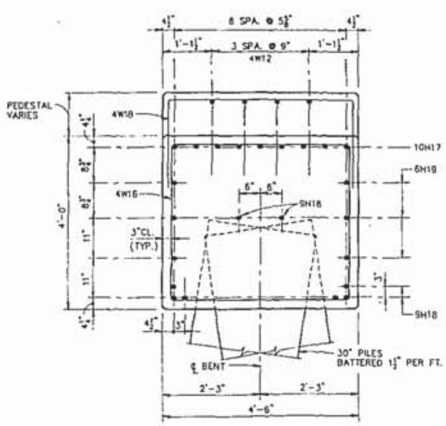


PLAN

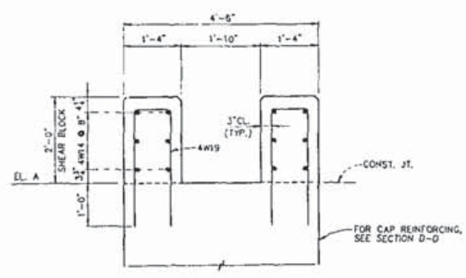


ELEVATION

NOTE:
LOCATION OF CENTERLINE BEARING VARIES WITH BEAM CASTING LENGTHS AND ACTUAL FIELD LOCATION OF BENTS. SEE SHT. B98 FOR METHOD OF LOCATING CENTERLINE BEARING AND METHOD OF PAD PLACEMENT.



SECTION D-D



SECTION E-E

TABLE OF ELEVATIONS

BENT	ELEVATIONS A	ELEVATIONS B	ELEV. \ BEAM	1	2	3	4
1W S.B. 1E N.B.	22.719	20.7	C	24.209	24.007	23.805	23.602
			D	24.141	23.939	23.738	23.536
			E	24.073	23.871	23.669	23.469
2W S.B. 2E N.B.	20.619	18.6	C	22.109	21.907	21.706	21.503
			D	22.041	21.839	21.638	21.436
			E	21.974	21.772	21.571	21.369
3W S.B. 3E N.B.	18.519	16.5	C	20.009	19.807	19.606	19.404
			D	19.941	19.739	19.538	19.336
			E	19.874	19.672	19.471	19.269
4W S.B. 4E N.B.	16.419	14.4	C	17.909	17.707	17.506	17.304
			D	17.841	17.639	17.438	17.236
			E	17.774	17.752	17.371	17.169
5W S.B. 5E N.B.	14.323	12.3	C	15.809	15.607	15.406	15.204
			D	15.741	15.539	15.338	15.136
			E	15.678	15.476	15.275	15.073
6W S.B. 6E N.B.	12.358	10.4	C	13.829	13.627	13.426	13.224
			D	13.766	13.564	13.363	13.161
			E	13.713	13.511	13.310	13.108
7W S.B. 7E N.B.	10.723	8.7	C	12.174	11.972	11.771	11.579
			D	12.121	11.919	11.718	11.516
			E	12.078	11.876	11.675	11.473
8W S.B. 8E N.B.	9.381	7.4	C	10.813	10.611	10.409	10.208
			D	10.770	10.568	10.367	10.165
			E	10.736	10.534	10.332	10.131
9W S.B. 9E N.B.	8.331	6.3	C	9.747	9.545	9.343	9.142
			D	9.713	9.511	9.310	9.108
			E	9.686	9.484	9.283	9.081
10W S.B. 10E N.B.	7.578	5.6	C	8.977	8.775	8.574	8.372
			D	8.950	8.748	8.547	8.345
			E	8.933	8.731	8.530	8.328
1W N.B. 1E S.B.	21.307	19.3	C	22.662	22.460	22.258	22.057
			D	22.729	22.527	22.326	22.124
			E	22.797	22.595	22.393	22.192
2W N.B. 2E S.B.	19.207	17.2	C	20.562	20.360	20.158	19.957
			D	20.629	20.427	20.226	20.024
			E	20.697	20.495	20.293	20.092
3W N.B. 3E S.B.	17.107	15.1	C	18.462	18.260	18.058	17.857
			D	18.529	18.327	18.126	17.924
			E	18.597	18.395	18.193	17.992
4W N.B. 4E S.B.	15.008	13.0	C	16.363	16.161	15.959	15.758
			D	16.429	16.227	16.026	15.824
			E	16.497	16.295	16.093	15.892
5W N.B. 5E S.B.	12.958	11.0	C	14.313	14.111	13.909	13.708
			D	14.369	14.167	13.966	13.764
			E	14.435	14.233	14.031	13.830
6W N.B. 6E S.B.	11.225	9.2	C	12.580	12.379	12.177	11.975
			D	12.627	12.425	12.224	12.022
			E	12.683	12.482	12.280	12.078
7W N.B. 7E S.B.	9.784	7.8	C	11.143	10.941	10.740	10.538
			D	11.180	10.978	10.777	10.575
			E	11.227	11.025	10.824	10.622
8W N.B. 8E S.B.	8.641	6.6	C	9.996	9.794	9.593	9.391
			D	10.027	9.825	9.624	9.422
			E	10.068	9.866	9.665	9.458

TABLE OF ELEVATIONS (CONT.)

BENT	ELEVATIONS A	ELEVATIONS B	ELEV. \ BEAM	1	2	3	4
9W N.B. 9E S.B.	7.792	5.8	C	9.147	8.945	8.744	8.542
			D	9.167	8.965	8.764	8.562
			E	9.198	8.996	8.795	8.593
10W N.B. 10E S.B.	7.237	5.2	C	8.592	8.390	8.189	7.987
			D	8.602	8.400	8.199	7.997
			E	8.622	8.420	8.219	8.017
11W S.B.	7.119	5.1	C	8.497	8.295	8.094	7.892
			D	8.480	8.278	8.077	7.875
			E	8.474	8.272	8.071	7.869
11W N.B.	6.975	5.0	C	8.330	8.128	7.927	7.725
			D	8.330	8.128	7.927	7.725
			E	8.338	8.136	7.935	7.733
12W S.B.	6.985	5.0	C	8.311	8.104	7.908	7.706
			D	8.305	8.103	7.902	7.700
			E	8.305	8.103	7.902	7.700
12W N.B.	6.985	5.0	C	8.340	8.138	7.937	7.735
			D	8.340	8.138	7.937	7.735
			E	8.340	8.138	7.937	7.735
35W THRU 13W S.B. & N.B.	6.985	5.0	C	8.340	8.138	7.937	7.735
			D	8.340	8.138	7.937	7.735
			E	8.340	8.138	7.937	7.735

NOTES:

1. FOR ESTIMATED QUANTITIES, SEE SHEET B34.

REVISIONS		
Date	By	Descriptions

INTERIOR BENT TYPE 4
35W THRU 1W, 1E THRU 10E

PITMAN – HARTENSTEIN & ASHE, INC.
ENGINEERS
101 CENTURY 21 DRIVE • JACKSONVILLE, FLORIDA • 32216

FLORIDA DEPARTMENT OF TRANSPORTATION
BUREAU OF STRUCTURES DESIGN

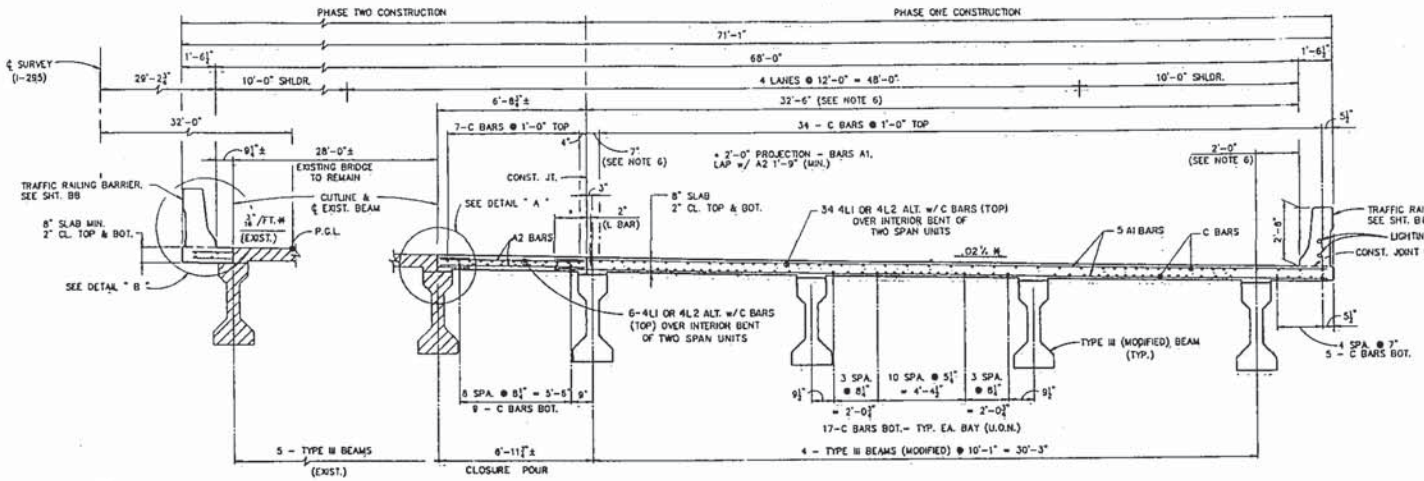
I-295 OVER ST. JOHNS RIVER
(WIDENING)

ROAD NO.	COUNTY	PROJECT NO.
9A	DUVAL	72001-3462

	Names	Dates
Designed by	R.E.A.	7-91
Checked by	S.W.J.	8-91
Quantities by	—	—
Checked by	—	—
Supervised by	R.E.A.	

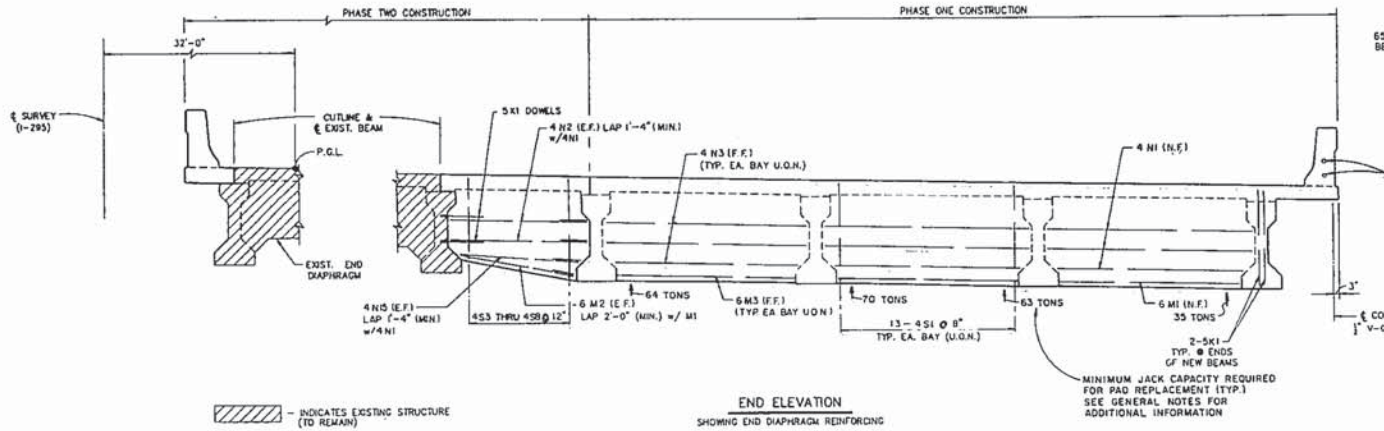
APPROVED BY
Drawing No.
Index No.

PLOT @ 1:32, LT, 24, DATE: 08-20-91
DRIVE: D, DIR: B-2, FILE: IBTYP4, DRN. BY WRR



SECTION THRU DECK

(SB LOOKING DOWN STATION NB LOOKING BACK STATION)



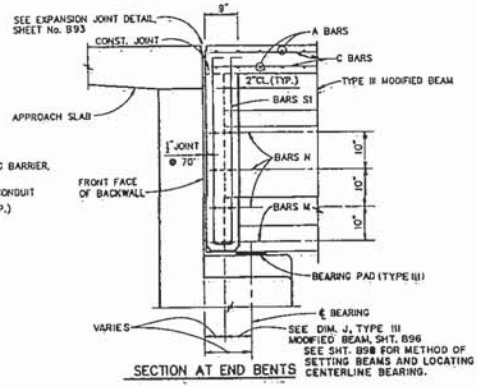
END ELEVATION

SHOWING END DIAPHRAGM REINFORCING

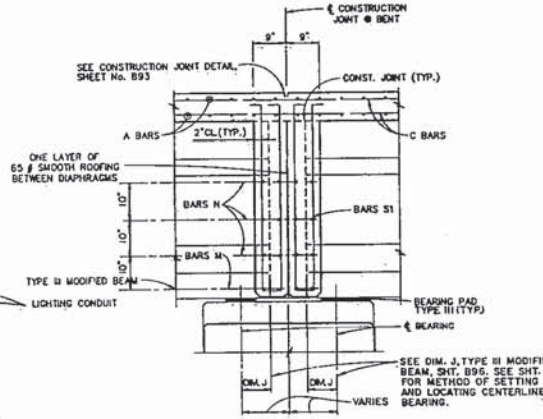
▨ – INDICATES EXISTING STRUCTURE (TO REMAIN)

NOTES:

1. N.F. DENOTES NEAR FACE
   F.F. DENOTES FAR FACE
   E.F. DENOTES EACH FACE
2. FOR TRAFFIC RAILING BARRIER REINFORCING STEEL, SEE SHEET 88
3. FOR DETAILS "A", "B" & "X1 DOWEL", SEE SHEET 892
4. FOR LONGITUDINAL SECTION AT EXPANSION JOINT, SEE SHEET 890
5. SEE LIGHTING PLANS FOR ADDITIONAL DETAILS AND SIZE OF CONDUITS.
6. FOR TYPE J, K, L, M, N, P, Q, & R UNIT AT ℄ JOINT @ BENT ONLY



SECTION AT END BENTS



SECTION AT INTERMEDIATE BENT

(CONTINUOUS DECK)

NOTE: FOR LOCATIONS WITH CONTINUOUS DECK SEE PLAN & ELEVATION SHEETS. CONTINUOUS DECK NOTED AS "F".

70'-0" SPAN SUPERSTRUCTURE DETAILS

REVISIONS		
Date	By	Description
	-	

PITMAN – HARTENSTEIN & ASHE, INC.
ENGINEERS
101 CENTURY 21 DRIVE • JACKSONVILLE, FLORIDA • 32216

FLORIDA DEPARTMENT OF TRANSPORTATION
BUREAU OF STRUCTURES DESIGN

I-295 OVER ST. JOHNS RIVER (WIDENING)

ROAD NO.	COUNTY	PROJECT NO.
9A	DUVAL	72001-3462

	Names	Dates
Designed by	J.Z.H.	1-90
Checked by	R.E.A.	3-90
Quantities by	---	---
Checked by	---	---
Supervised by	R.E.A.	

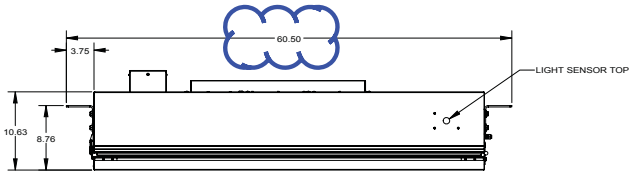
APPROVED BY

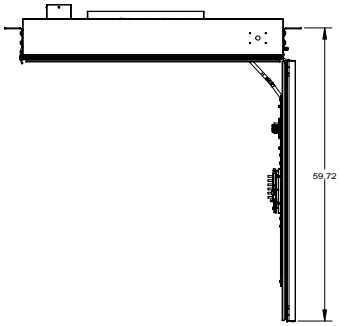
Drawing No. | Index No.

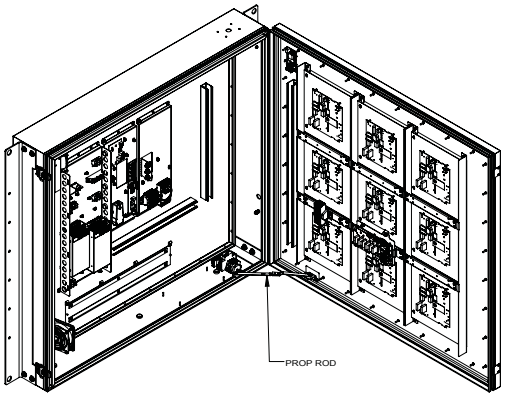
PLOT @ 1:32, LT: 32, DATE: 07-15-91
DRIVE: D, DIR: 8612-2, FILE: S7050, DRN. BY: EXC

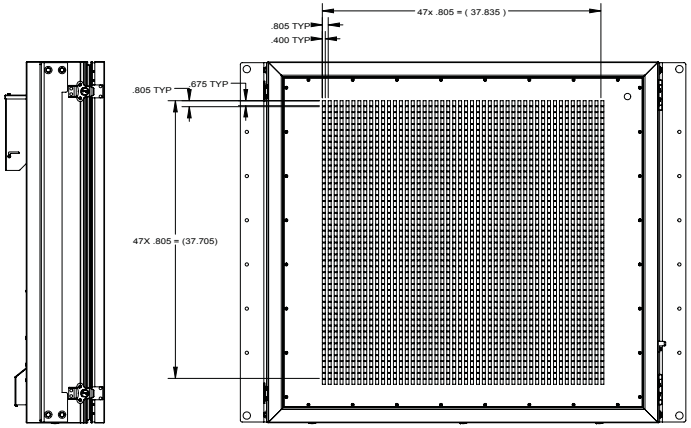
1.4.2. VMS Details

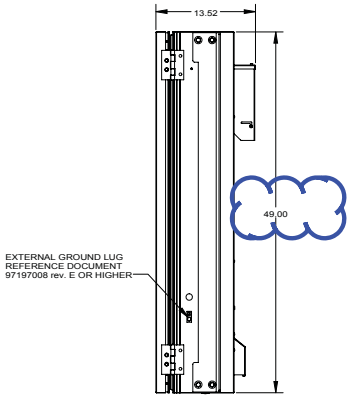
FRONT ACCESS STANDARD

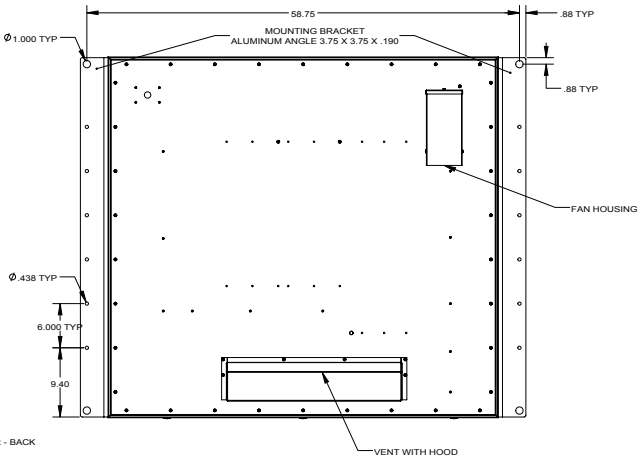


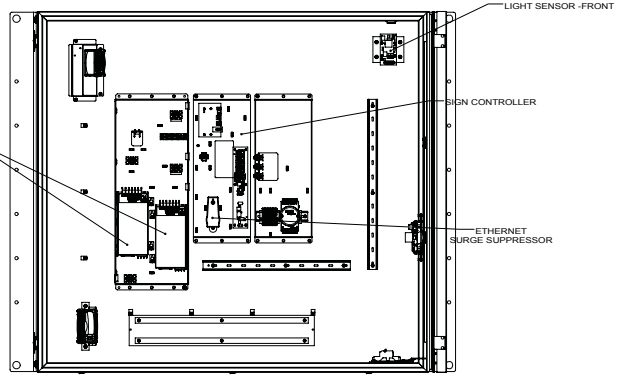


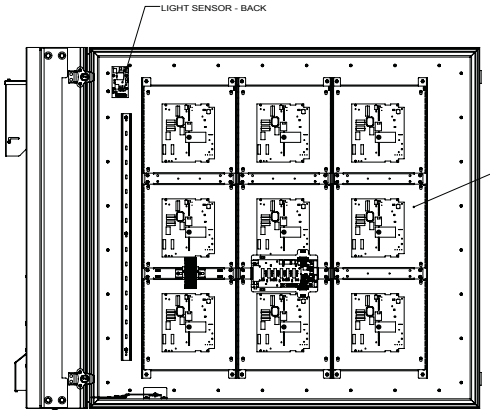












NOTES:
1) ALL DIMENSIONS ARE FOR REFERENCE ONLY.
2) DESIGN AND DIMESNIONS ARE SUBJECT TO CHANGE WITHOUT NOTICE.
3) USE ONLY SIDE VERTICAL BRACKETS TO MOUNT SIGN DIRECTLY TO SUPERSTRUCTURE.
4) SIGN MOUNTING HARDWARE IS NOT INCLUDED.
5) FINISH:
   FRONT MASK - POWDER COATED BLACK
   CASE, DOOR FRAME AND STRUCTURE - MILL FINISH
6) SIGN WEIGHT NTE 250 POUNDS.
7) SIGN GROUND LUG MUST BE CONNECTED TO EARTH GROUND
8) ESTIMATED SIGN MAXIMUM POWER REQUIREMENT 3.5 AMPS, 120 VAC, 2 WIRE PLUS GROUND, LINE, NEUTRAL, AND GROUND.

DESIGNED BY:	SDG	DATE:	8/29/2013
DRAWN BY:	AB	DATE:	11/4/2013
APPROVED BY:		DATE:	

Adaptive Digital Technologies
7640 North 86th Street
Milwaukee, WI 53223 USA
www.adaptivedigital.com

TITLE: DWG SPEC AX2080, 48X48 FRONT ACCESS RGB

SIZE	DOCUMENT NO. (SEE TABLE FOR P/N)	REVISION
D	15405013DR	A

SCALE:	STATUS:	SHT
1:8	Released	1 of 2

REV	DESCRIPTION	ECO#	BY	DATE
A	RELEASED FOR PRODUCTION	-	MW	11/11/13

1.4.3. DMS Details

VANGUARD® VF-2420-64x208-20-RGB

Full-Color (RGB)

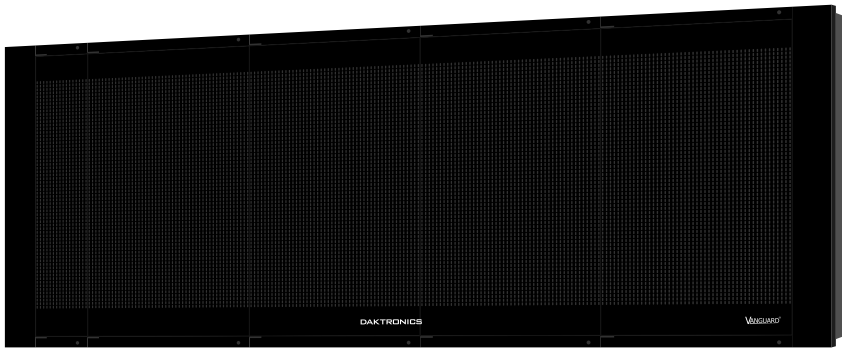
Display Technology	High-intensity LED
Cabinet Access	Front access
Cabinet Enclosure	NEMA 3R
Face Panel	Aluminum mask over polycarbonate face panel
Weight	950 lbs. (436 kg)
Dimensions[1]	5'8" x 15'5" x 1'2" (1.73 m x 4.70 m x .36 m)
Operating Temp. Range	-30° F to +165° F (-34° C to +74° C)
Humidity Range	0 to 99%, non-condensing
Ventilation	Pressurized, forced-air ventilation system
Controller Location	Sign cabinet or equipment cabinet
Display Type	Full-matrix (variable text and graphics)
Active Area	4'3" x 14'1" (1.32 m x 4.29 m)
Top/Bottom Border Width	8" (203 mm)
Left/Right Border Width	8" (203 mm)
Pixel Matrix	64 rows x 208 columns
Pixel Pitch	20mm (.81")
Viewing Distance	300' (91 m) using 6" characters
Sign Intensity	12,400 candelas/m^2 minimum (white)
LED Color	Full color (32,000 distinct colors using red, green and blue LEDs)
Power Requirements	120/240 VAC, single-phase power (3-wires plus ground)
Communications Protocol	NTCIP 1203 v02
Communications Options	Cellular, fiber optic, direct Ethernet and radio Ethernet
Structural Design Standard	AASHTO
NEMA Standards	NEMA TS 4 Section 2 Environmental Requirements

Power Specifications

Model	Viewing Angle (HxV)	Amps Per Leg[3]	Typical Power[4]
VF-2420-64x208-20-RGB	30° x 30°	18	1,374 W

Sample Character Capacity[2]

Character Height	Lines/ Characters	Example Font Size	Interline Spacing	Character Spacing
18"	2/11	23x15_3	12	4
12"	3/16	15x10_2	8	3
9"	3/21	12x8_2	6	2
6"	6/34	7x5_1	4	1



NOTES

1. Display cabinet depth measurement includes "Z" mounting brackets on the rear of the cabinet.
2. Many other font sizes are available.
3. Amps per leg calculation is based on the maximum load of a typical DMS, including a fully-loaded 15A convenience outlet. This value is measured for a 120/240 3W+G system and will vary with auxiliary options installed in the DMS.
4. Typical power includes a partially-illuminated LED sign (38% of the pixels at full intensity), the sign controller and ventilation system.
5. Sign front face paint color is semi-gloss black. Other sides are mill finish aluminum.
6. With the continuous improvement of all Daktronics products, the features and measurements on this page are subject to change without notice.
7. The product illustration on this page is for conceptual purposes only and may not represent the actual dimensions of the specified display.

117 Prince Drive PO Box 5120 Brookings, SD 57006
tel 888-325-8726 605-692-0200 x57060 fax 605-697-4700
www.daktronics.com/its email transportation@daktronics.com

DAKTRONICS

2. Load Rating of Existing Bridge for Traffic Railing Replacement Alternative

2.1. Description and Summary of Findings

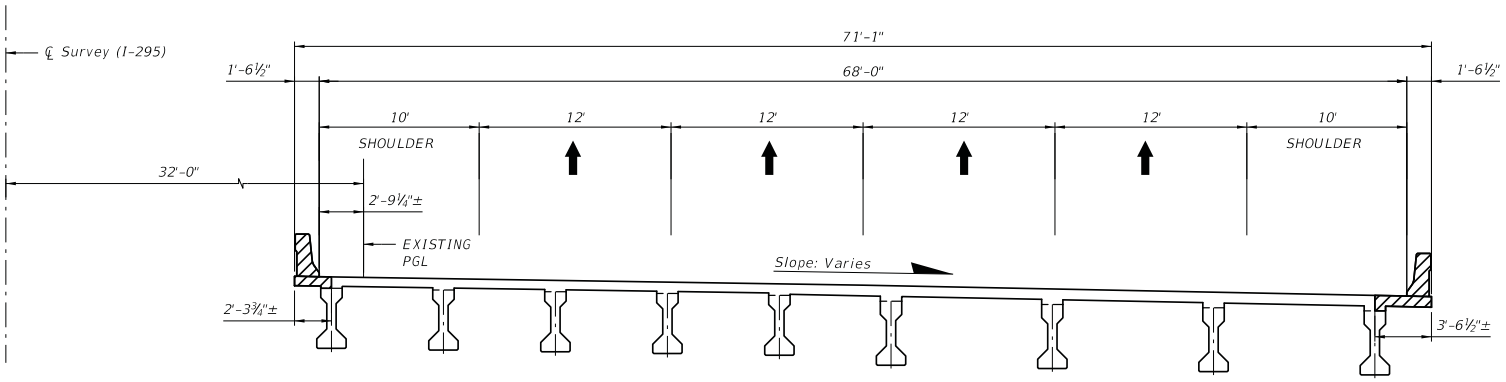
This section presents the results of the load rating analysis performed to determine the structural viability of replacing the existing 32” F-Shape concrete barrier with a higher 42” F-Shape barrier. The existing and proposed cross-sections showing the changes in the traffic railing, changes to the total bridge width and the limits of the structure that will need to be removed to allow the installation of the new barriers are shown in Figure D2.1.

A previous load rating analysis of the existing bridge was performed by ATKINS in May, 2001. Results then indicated that this bridge has an inventory rating of 0.91 and an operating rating of 1.18 for the 250’-0” main span portion of the continuous steel spans at the St. John’s River Crossing. The approach concrete spans were found to have satisfactory rating factors (greater than one) for the design inventory, operating and legal truck levels.

A new analysis was performed to account for the additional weight of the proposed barrier and the weight of the additional deck width required for maintaining the original roadway section (68ft from curb to curb). The analysis for the main spans (steel girder) using MDX (version 6.5.2639) also included an update of the rating factors for the current condition of the bridge in order to eliminate discrepancies in results due to the MDX program updates to the date. The results obtained for the load rating of the approach concrete span (prestressed beams) using LEAP Conspan (version 13.00.00.68) were found to be consistent with the results from the previous load rating in 2001, so an update of the load ratings for the existing condition of the bridge was not necessary.

The results of the loading rating analysis indicate that the 250’-0” main portion of the continuous steel spans continues to be the critical section of the bridge with small drops in the inventory and operating rating factors from 0.92 to 0.88 and from 1.20 to 1.14, respectively. Legal load rating was performed in order to investigate the potential posting needs of the bridge for the proposed condition. Results indicate that all the legal rating factors are satisfactory (greater than one). A summary of the results is presented in Tables D-1 and D-2.

2.1.1. Figure D2.1 – Typical Cross-sections

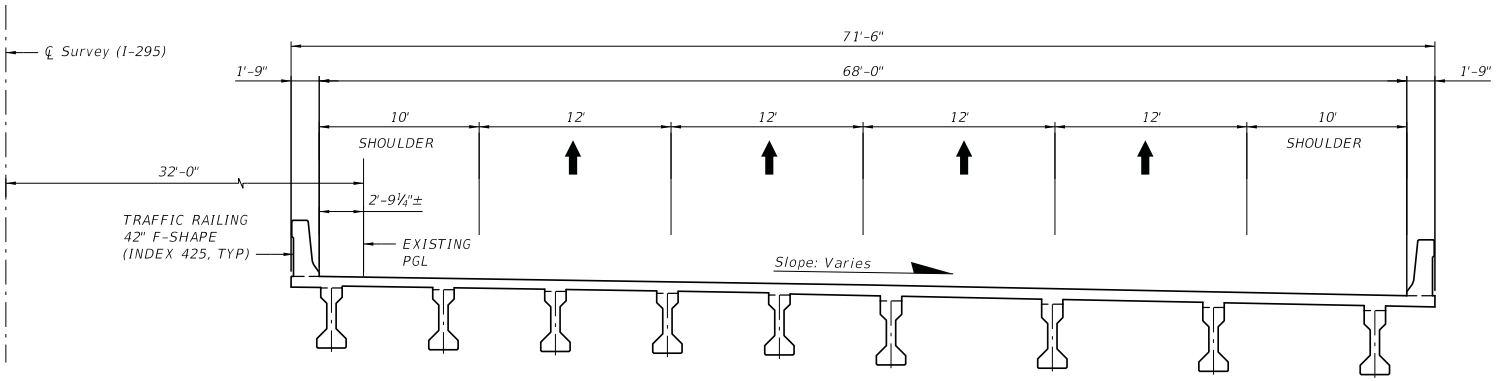


EXISTING TYPICAL SECTION (CONCRETE SPANS)

(SOUTH BOUND SHOWN, NORTH BOUND SIMILAR)

LEGEND :

INDICATED BRIDGE REMOVAL



PROPOSED TYPICAL SECTION (CONCRETE SPANS)

(SOUTH BOUND SHOWN, NORTH BOUND SIMILAR)

REVISIONS					
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION

DRAWN BY:
CHECKED BY:
DESIGNED BY:
CHECKED BY:

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID

SHEET TITLE:

FIGURE D2-1

PROJECT NAME:

REF. DWG. NO.

SHEET NO.

USER: L0PE1682 3/31/2015 3:35:28 PM \\Fusola1002\tcs\Planning\Buckman Bridge\CADD\Buckman_Cross_Section_Barrier.dgn

2.1.2. Table D-1. Load Rating Summary for Main Spans (Steel Girder)

Table D-1. Load Rating Summary for Main Spans (Steel Girders) uisng MDX

			Design Load Rating (Controlling Values)											
			2001 Load Rating (32" Barrier) MDX 6.5.1044/MDX 6.5.1192				2015 Load Rating (32" Barrier) MDX 6.5.2639				2015 Load Rating (42" Barrier) MDX 6.5.2639			
Limit State	Vehicle	Weight (Tons)	LR	Tons	Beam	Mode	LR	Tons	Beam	Mode	LR	Tons	Beam	Mode
Strength I (Inv)	HL-93	36	0.91	32.8	5	M	0.92	33.12	5	M	0.88	31.68	5	M
Strength I (Op)	HL-94	36	1.18	42.5	5	M	1.2	43.2	5	M	1.14	41.04	5	M

			Legal Load Rating (Controlling Values)											
			2001 Load Rating (32" Barrier) MDX 6.5.1044/MDX 6.5.1192				2015 Load Rating (32" Barrier) MDX 6.5.2639				2015 Load Rating (42" Barrier) MDX 6.5.2639			
Limit State	Vehicle	Weight (Tons)	LR	Tons	Beam	Mode	LR	Tons	Beam	Mode	LR	Tons	Beam	Mode
Strength I	C5	40	1.32	52.8	1	M	1.90	76	7	V	1.87	74.8	7	V
Strength I	ST5	40	1.53	61.2	1	M	2.27	90.8	5	M	2.16	86.4	5	M
Strength I	SU4	35	1.41	49.4	1	M	1.72	60.2	5	V	1.69	59.15	5	V

2.1.3. Table D-2. Load Rating Summary for Approach Spans (Prestressed Beams)

Table D-2. Load Rating Summary for Approach Spans (Prestressed Beams) uisng LEAP Conspan

Limit State	Vehicle	Mode	Design Load Rating							
			70' Span		92' Span		95' Span		102' Span	
			32" Barrier (2001)	42" Barrier (2015)	32" Barrier (2001)	42" Barrier (2015)	32" Barrier (2001)	42" Barrier (2015)	32" Barrier (2001)	42" Barrier (2015)
Strength I (Inv)	HL93 Design Load	Moment	1.45	1.44	1.59	1.58	1.36	1.35	1.44	1.42
		Shear	1.78	1.75	2.21	2.2	2.3	2.3	2.21	2.2
Strength I (Op)	HL93 Design Load	Moment	1.88	1.86	2.07	2.04	1.76	1.75	1.87	1.85
		Shear	2.66	2.65	2.91	2.9	3.03	3.03	2.91	2.89
Service III (Inv)	HL93 Design Load	Stress	1.36	1.34	1.43	1.4	1.15	1.13	1.18	1.14
Service III (Op)	HL93 Design Load	Stress	1.69	1.67	1.81	1.78	1.52	1.51	1.53	1.49

Limit State	Vehicle	Mode	Legal Load Rating							
			70' Span		92' Span		95' Span		102' Span	
			32" Barrier (2001)	42" Barrier (2015)	32" Barrier (2001)	42" Barrier (2015)	32" Barrier (2001)	42" Barrier (2015)	32" Barrier (2001)	42" Barrier (2015)
Strength I	C5 Truck	Moment	1.81	1.8	2.04	2.01	1.74	1.73	1.87	1.85
		Shear	2.63	2.62	2.87	2.85	2.99	2.99	2.88	2.86
Strength I	ST5 Truck	Moment	2.2	2.18	2.34	2.32	1.99	1.98	2.11	2.09
		Shear	2.8	2.78	3.07	3.05	3.21	3.21	3.1	3.08
Strength I	SU4 Truck	Moment	1.7	1.68	2.02	1.99	1.73	1.73	1.89	1.86
		Shear	2.32	2.3	2.75	2.73	2.89	2.89	2.82	2.8
Service III	C5 Truck	Stress	2.18	2.15	2.37	2.34	2.01	1.99	2.04	1.98
Service III	ST5 Truck	Stress	2.64	2.6	2.73	2.69	2.3	2.27	2.31	2.24
Service III	SU4 Truck	Stress	2.04	2.01	2.35	2.32	2.01	1.98	2.06	2

2.2. Load Rating of Main Spans (MDX)

2.2.1. HL-93 (32” Barrier)

I-295 HH BUCKMAN BRIDGE -720249
Girder System : Input File : Layout/Slab/Loading Definition
Mon Mar 30 11:47:16 2015

```
ID: I-295 HH BUCKMAN BRIDGE -720249
CONDITIONS
  ALL LANES
  ENGLISH INPUT
  ENGLISH OUTPUT
  FLOAT LANES
  GRID MODEL
  LRFD METHOD
  MEDIUM RESOLUTION MESH
  OVERLAY PERMIT TRUCK WITH LANE LOADING
  PERMIT TRUCK IN ALL LANES
  RATE MODE
  RATING PROJECT
  SELF WEIGHT FOR DEAD LOAD 1
DATA
  BR-1 18.3333 18.3333 18.3333 18.3333 18.3333 18.3333 18.3333 18.3333
  18.3333 36.1875 17.8542 17.8542 17.8542 17.8542 17.8542 17.875 17.875
  17.8542 17.8542 17.8542 17.8542 17.8542 36.1875 18.3333 18.3333
  18.3333 18.3333 18.3333 18.3333 18.3333 18.3333
  CURB -2.
  FPC 4.5
  GDSPC 9.3073 9.3073 9.3073 9.3073 9.3333 9.3333 9.3333
  LANES 12. 12. 12. 12. 12.
  PRLANE  0.2
  PRMITP 13.33 53.33 53.33
  PRMITSP 14. 14.
  ROADWP 68.
  SKEW-1 90. 90. 90. 90.
  SLABEXT 3.5417 2.3125
  SLABT 8.
  SLABWEAR  0.
  SPEED 65
  SPN-1 183.3333 250. 183.3333
  SUPER  0.01563
  WAC-1  0.164
  WAC-2  0.19
  WAC-3  0.19
  WAC-4  0.19
  WAC-5  0.19
  WAC-6  0.19
  WAC-7  0.19
  WAC-8  0.14
  WAS-1  0.
  WAS-2  0.
  WAS-3  0.
  WAS-4  0.
  WAS-5  0.0115
  WAS-6  0.0115
  WAS-7  0.0115
  WAS-8  0.0115
  WCONC 150.
  WEAR  0.
  WHLSPC 6.
  WR-1  0.123
  WR-2  0.14
  WR-3  0.14
  WR-4  0.14
  WR-5  0.14
  WR-6  0.14
  WR-7  0.14
  WR-8  0.105
  WS-1  0.105
  WS-2  0.105
  WS-3  0.105
  WS-4  0.105
  WS-5  0.105
  WS-6  0.105
  WS-7  0.105
  WS-8  0.105
GO
```

I-295 HH BUCKMAN BRIDGE -720249
Girder 1 : Rating Output : Lrfd Ratings
Mon Mar 30 09:35:26 2015

[This table uses the rating equation (6A.4.2.1-1) of the 2011 edition of the Manual for Bridge Evaluation.]

HL93

Strength I

Span 1

Location	Compct Mom Cap/Noncmpt Allow Stress	Shear Capacity	Rating Factors Bending Inv.		Bending Oper.		Shear Inv.	Shear Oper.
0.00	9253. B	488.42	>999.00	T	>999.00		1.95	2.52
18.33	36000. B	769.69	1.70	B	2.21		4.53	5.87
22.00L	36000. B	773.47	1.37	B	1.77		4.80	6.23
22.00R	36000. B	773.65	2.49	B	3.23		4.80	6.23
36.67	36000. B	617.31	1.55	B	2.01		4.68	6.07
55.00	36000. B	623.62	1.22	B	1.58		6.24	8.09
73.33	36000. B	632.76	1.25	B	1.62		7.12	9.23
91.67	36000. B	644.47	1.56	B	2.03		5.44	7.06
110.00	36000. B	658.50	2.26	B	2.93		4.19	5.43
122.00L	19642. C	918.49	4.02	B	5.21		5.29	6.86
122.00R	19671. C	918.79	4.03	B	5.22		5.29	6.86
124.00L	19779. C	922.00	4.13	B	5.35		5.19	6.72
124.00R	23042. C	1326.20	4.82	B	6.25		7.87	10.21
128.33	23137. B	1332.57	5.38	T	6.98		7.56	9.79
146.67	13919. C	1361.56	2.01	B	2.61		6.48	8.40
154.00L	45765. B	1373.66	1.58	B	2.05		6.06	7.85
154.00R	45762. B	1638.91	1.81	B	2.34		7.43	9.63
156.00L	44053. B	1644.31	1.63	B	2.11		7.25	9.40
156.00R	23727. C	1644.80	3.28	B	4.25		7.26	9.41
165.00	46619. B	1671.34	2.56	B	3.31		6.75	8.75
183.33	46375. B	1757.69	1.34	B	1.73		6.08	7.88

Span 2

Location	Compct Mom Cap/Noncmpt Allow Stress	Shear Capacity	Rating Factors Bending Inv.		Bending Oper.		Shear Inv.	Shear Oper.
0.00	46375. B	1778.71	1.34	B	1.73		5.93	7.69
25.00	46605. B	1747.50	3.57	B	4.63		7.28	9.43
28.00L	46984. B	1747.50	3.96	B	5.13		7.46	9.67
28.00R	21517. C	1747.50	3.22	B	4.17		7.46	9.67
30.00L	21583. C	1747.50	3.44	B	4.46		7.57	9.82
30.00R	45403. B	1450.84	2.10	B	2.72		6.10	7.91
50.00	48073. B	1450.84	3.87	B	5.01		7.02	9.10
55.33L	20854. B	1450.84	4.57	B	5.93		7.39	9.58
55.33R	20831. B	1450.84	4.57	B	5.92		7.39	9.58
57.33L	20831. B	1450.84	4.30	B	5.58		7.54	9.77
57.33R	25286. B	1450.84	5.25	B	6.81		7.54	9.77
75.00	27861. C	974.23	3.95	B	5.12		6.01	7.79
100.00	27861. C	974.23	2.95	B	3.82		8.00	10.37
125.00	27861. C	973.68	2.69	B	3.49		10.43	13.52
150.00	27861. C	974.23	2.95	B	3.83		8.07	10.47

175.00	27861.	C	921.46	3.96	B	5.13	5.67	7.36
190.67L	25286.	B	1450.84	4.98	B	6.46	7.95	10.31
190.67R	20071.	B	1450.84	3.94	T	5.10	7.95	10.31
192.67L	25314.	B	1450.84	5.27	B	6.83	7.80	10.11
192.67R	16744.	B	1450.84	3.47	B	4.49	7.80	10.11
200.00	48073.	B	1450.84	3.85	B	5.00	7.30	9.46
218.00L	45403.	B	1450.84	2.26	B	2.93	6.43	8.34
218.00R	45403.	B	1747.50	2.53	B	3.28	7.98	10.34
220.00L	43617.	B	1747.50	2.22	B	2.88	7.85	10.17
220.00R	43617.	B	1747.50	3.82	B	4.95	7.85	10.17
225.00	45403.	B	1747.50	3.44	B	4.46	7.51	9.73
250.00	46375.	B	2011.94	1.33	B	1.73	6.81	8.83

Span 3

Location	Compct Mom Cap/Noncmpt Allow Stress		Shear Capacity	Rating Factors Bending			Shear	
				Inv.		Oper.	Inv.	Oper.
0.00	46375.	B	1584.21	1.33	B	1.73	5.26	6.82
18.33	46620.	B	1671.32	2.56	B	3.32	6.68	8.67
25.33L	23797.	C	1650.72	3.13	B	4.06	6.98	9.05
25.33R	20549.	C	1650.22	2.55	B	3.30	6.98	9.05
27.33L	20554.	C	1644.80	2.70	B	3.51	7.06	9.16
27.33R	45724.	B	1377.06	1.51	B	1.96	5.74	7.44
36.67	13920.	C	1361.55	2.02	B	2.62	6.07	7.87
55.00	23153.	B	1332.56	5.40	T	7.00	7.71	9.99
57.33L	23133.	C	1329.18	5.60	B	7.26	7.91	10.26
57.33R	22483.	C	1328.93	5.44	B	7.05	7.91	10.26
59.33L	22383.	C	1326.20	4.69	B	6.08	8.09	10.48
59.33R	19759.	C	922.00	4.14	B	5.36	5.34	6.92
73.33	36000.	B	898.00	2.25	B	2.92	6.03	7.82
91.67	36000.	B	644.47	1.56	B	2.02	5.25	6.80
110.00	36000.	B	632.76	1.25	B	1.62	6.67	8.64
128.33	36000.	B	623.62	1.22	B	1.58	6.32	8.19
146.67	36000.	B	617.31	1.55	B	2.01	4.61	5.98
161.33L	36000.	B	773.65	2.49	B	3.23	4.61	5.98
161.33R	36000.	B	773.47	1.37	B	1.77	4.61	5.98
165.00	36000.	B	769.68	1.71	B	2.21	4.35	5.64
183.33	9253.	B	740.77	>999.00	T	>999.00	3.31	4.30

Service II

Span 1

Location	Allowable Stress		Rating Factors Bending			
			Inv.		Oper.	
0.00	34200.	S	> 999.00	B	>999.00	
18.33	34200.	S	2.38	B	3.09	
22.00L	34200.	S	1.95	B	2.53	
22.00R	34200.	S	3.38	B	4.40	
36.67	34200.	S	2.18	B	2.83	
55.00	34200.	S	1.74	B	2.26	
73.33	34200.	S	1.77	B	2.30	
91.67	34200.	S	2.13	B	2.77	
110.00	34200.	S	2.97	B	3.85	
122.00L	34200.	S	4.01	B	5.21	
122.00R	34200.	S	4.01	B	5.21	
124.00L	34200.	S	4.08	B	5.31	
124.00R	34200.	S	3.40	B	4.42	
128.33	47500.	S	5.29	B	6.88	
146.67	47500.	S	3.81	B	4.95	
154.00L	47500.	S	3.19	B	4.14	
154.00R	47500.	S	3.33	B	4.33	
156.00L	47500.	S	3.24	B	4.21	
156.00R	47500.	S	5.51	B	7.17	
165.00	47500.	S	4.48	B	5.83	

183.33	47500. S	2.62 B	3.41

Span 2

Location	Allowable Stress	Rating Factors Bending Inv.	Oper.
0.00	34200. S	2.62 B	3.41
25.00	34200. S	6.03 B	7.84
28.00L	34200. S	6.55 B	8.52
28.00R	34200. S	6.40 B	8.32
30.00L	34200. S	6.76 B	8.78
30.00R	34200. S	4.12 B	5.35
50.00	34200. S	6.47 B	8.41
55.33L	34200. S	5.86 B	7.61
55.33R	34200. S	5.85 B	7.60
57.33L	34200. S	5.53 B	7.19
57.33R	34200. S	6.74 B	8.76
75.00	34200. S	4.48 B	5.83
100.00	34200. S	3.27 B	4.25
125.00	47500. S	2.96 B	3.85
150.00	47500. S	3.28 B	4.26
175.00	47500. S	4.49 B	5.84
190.67L	47500. S	6.42 B	8.34
190.67R	47500. S	6.43 B	8.36
192.67L	47500. S	6.77 B	8.80
192.67R	47500. S	5.55 B	7.22
200.00	47500. S	6.45 B	8.39
218.00L	47500. S	4.38 B	5.69
218.00R	47500. S	4.52 B	5.87
220.00L	47500. S	4.25 B	5.53
220.00R	47500. S	6.90 B	8.97
225.00	47500. S	6.02 B	7.83
250.00	47500. S	2.62 B	3.40

Span 3

Location	Allowable Stress	Rating Factors Bending Inv.	Oper.
0.00	34200. S	2.62 B	3.40
18.33	34200. S	4.49 B	5.84
25.33L	34200. S	5.30 B	6.89
25.33R	34200. S	5.14 B	6.68
27.33L	34200. S	5.37 B	6.98
27.33R	34200. S	3.10 B	4.02
36.67	34200. S	3.82 B	4.97
55.00	34200. S	5.31 B	6.90
57.33L	34200. S	5.18 B	7.16
57.33R	34200. S	5.18 B	7.15
59.33L	34200. S	4.76 B	6.19
59.33R	34200. S	5.71 B	7.42
73.33	34200. S	2.96 B	3.84
91.67	34200. S	2.13 B	2.77
110.00	34200. S	1.77 B	2.30
128.33	34200. S	1.74 B	2.27
146.67	34200. S	2.18 B	2.83
161.33L	34200. S	3.38 B	4.40
161.33R	34200. S	1.95 B	2.54
165.00	34200. S	2.38 B	3.10
183.33	34200. S	> 999.00 B	>999.00

****
Minimum rating is 1.22 at location 55.00 in span 1.
****

Strength II

Span 1

Location	Allowable	Shear	Rating Factors Bending Inv.	Bending Oper.	Shear Inv.	Shear Oper.
0.00	9253. C	488.42		>999.00		2.07
18.33	36000. B	769.69		2.06		5.10
22.00L	36000. B	773.47		1.65		5.46
22.00R	36000. B	773.65		3.01		5.46
36.67	36000. B	617.31		1.87		5.32
55.00	36000. B	623.62		1.48		7.09
73.33	36000. B	632.76		1.54		6.13
91.67	36000. B	644.47		1.94		5.07
110.00	36000. B	658.50		2.81		4.18
122.00L	19642. C	918.49		4.97		5.43
122.00R	19671. C	918.79		4.98		5.43
124.00L	19779. C	922.00		5.10		5.34
124.00R	23042. C	1326.20		5.95		8.11
128.33	23137. C	1332.57		8.79		7.84
146.67	13919. C	1361.56		3.33		6.86
154.00L	45765. B	1373.66		2.67		6.69
154.00R	45762. B	1638.91		3.05		8.21
156.00L	44053. B	1644.31		5.83		8.37
156.00R	23727. C	1644.80		11.76		8.37
165.00	46619. B	1671.34		4.50		8.21
183.33	46375. B	1757.69		2.67		7.61

Span 2

Location	Allowable	Shear	Rating Factors Bending Inv.	Bending Oper.	Shear Inv.	Shear Oper.
0.00	46375. B	1778.71		2.67		7.52
25.00	46605. B	1747.50		5.61		8.85
28.00L	46984. B	1747.50		6.08		9.06
28.00R	21517. C	1747.50		4.94		9.06
30.00L	21583. C	1747.50		8.81		9.20
30.00R	45403. B	1450.84		5.38		7.41
50.00	48073. B	1450.84		5.68		8.79
55.33L	20854. B	1450.84		5.40		9.21
55.33R	20831. B	1450.84		5.39		9.21
57.33L	20831. B	1450.84		5.10		9.37
57.33R	25286. B	1450.84		6.23		9.37
75.00	27861. C	974.23		4.92		7.03
100.00	27861. C	974.23		3.76		9.20
125.00	27861. C	973.68		3.46		12.90
150.00	27861. C	974.23		3.77		9.91
175.00	27861. C	921.46		4.93		7.01
190.67L	25286. B	1450.84		5.94		10.03
190.67R	20071. B	1450.84		4.69		10.03
192.67L	25314. B	1450.84		6.25		9.85
192.67R	16744. B	1450.84		4.11		9.85
200.00	48073. B	1450.84		5.66		9.22
218.00L	45403. B	1450.84		3.38		7.93
218.00R	45403. B	1747.50		3.78		9.84
220.00L	43617. B	1747.50		5.69		9.67
220.00R	43617. B	1747.50		9.78		9.67
225.00	45403. B	1747.50		5.41		9.26
250.00	46375. B	2011.94		2.67		8.69

Span 3

Location	Allowable	Shear	Rating Factors Bending		Shear	
			Inv.	Oper.	Inv.	Oper.
0.00	46375. B	1584.21	2.67			6.73
18.33	46620. B	1671.32	4.51			8.11
25.33L	23797. C	1650.72	5.31			8.39
25.33R	20549. C	1650.22	4.32			8.39
27.33L	20554. C	1644.80	9.69			8.47
27.33R	45724. B	1377.06	5.42			6.89
36.67	13920. C	1361.55	3.34			7.30
55.00	23153. C	1332.56	8.82			9.21
57.33L	23133. C	1329.18	6.11			9.45
57.33R	22483. C	1328.93	5.93			9.45
59.33L	22383. C	1326.20	5.79			9.66
59.33R	19759. C	922.00	5.11			6.37
73.33	36000. B	898.00	2.80			7.21
91.67	36000. B	644.47	1.94			6.13
110.00	36000. B	632.76	1.54			7.76
128.33	36000. B	623.62	1.48			5.64
146.67	36000. B	617.31	1.87			4.24
161.33L	36000. B	773.65	3.01			5.09
161.33R	36000. B	773.47	1.65			5.09
165.00	36000. B	769.68	2.06			4.88
183.33	9253. C	740.77	>999.00			3.53

Service II

Span 1

Location	Allowable Stress	Rating Factors Bending		
		Inv.	Oper.	
0.00	34200. S	> 999.00	B	>999.00
18.33	34200. S	2.88	B	2.88
22.00L	34200. S	2.36	B	2.36
22.00R	34200. S	4.09	B	4.09
36.67	34200. S	2.63	B	2.63
55.00	34200. S	2.13	B	2.13
73.33	34200. S	2.19	B	2.19
91.67	34200. S	2.66	B	2.66
110.00	34200. S	3.70	B	3.70
122.00L	34200. S	4.97	B	4.97
122.00R	34200. S	4.97	B	4.97
124.00L	34200. S	5.05	B	5.05
124.00R	34200. S	4.21	B	4.21
128.33	47500. S	6.86	B	8.66
146.67	47500. S	6.31	B	6.31
154.00L	47500. S	5.40	B	5.40
154.00R	47500. S	5.63	B	5.63
156.00L	47500. S	11.63	B	11.63
156.00R	47500. S	19.81	B	19.81
165.00	47500. S	7.92	B	7.92
183.33	47500. S	5.25	B	5.25

Span 2

Location	Allowable Stress	Rating Factors Bending	
		Inv.	Oper.

0.00	34200.	S	5.25	B	5.25
25.00	34200.	S	9.51	B	9.51
28.00L	34200.	S	10.10	B	10.10
28.00R	34200.	S	9.85	B	9.85
30.00L	34200.	S	17.35	B	17.35
30.00R	34200.	S	10.57	B	10.57
50.00	34200.	S	8.01	B	9.54
55.33L	34200.	S	6.93	B	6.93
55.33R	34200.	S	6.92	B	6.92
57.33L	34200.	S	6.58	B	6.58
57.33R	34200.	S	8.02	B	8.02
75.00	34200.	S	5.60	B	5.60
100.00	34200.	S	4.19	B	4.19
125.00	47500.	S	3.82	B	3.82
150.00	47500.	S	4.19	B	4.19
175.00	47500.	S	5.61	B	5.61
190.67L	47500.	S	7.67	B	7.67
190.67R	47500.	S	7.69	B	7.69
192.67L	47500.	S	8.05	B	8.05
192.67R	47500.	S	6.60	B	6.60
200.00	47500.	S	8.03	B	9.51
218.00L	47500.	S	6.56	B	6.56
218.00R	47500.	S	6.77	B	6.77
220.00L	47500.	S	10.93	B	10.93
220.00R	47500.	S	17.72	B	17.72
225.00	47500.	S	9.50	B	9.50
250.00	47500.	S	5.24	B	5.24

Span 3

Location	Allowable Stress	Rating Factors Bending			
		Inv.		Oper.	
0.00	34200.	S	5.24	B	5.24
18.33	34200.	S	7.93	B	7.93
25.33L	34200.	S	9.01	B	9.01
25.33R	34200.	S	8.74	B	8.74
27.33L	34200.	S	19.28	B	19.28
27.33R	34200.	S	11.12	B	11.12
36.67	34200.	S	6.33	B	6.33
55.00	34200.	S	6.84	B	8.69
57.33L	34200.	S	6.02	B	6.02
57.33R	34200.	S	6.01	B	6.01
59.33L	34200.	S	5.89	B	5.89
59.33R	34200.	S	7.07	B	7.07
73.33	34200.	S	3.69	B	3.69
91.67	34200.	S	2.65	B	2.65
110.00	34200.	S	2.18	B	2.18
128.33	34200.	S	2.13	B	2.13
146.67	34200.	S	2.63	B	2.63
161.33L	34200.	S	4.09	B	4.09
161.33R	34200.	S	2.36	B	2.36
165.00	34200.	S	2.89	B	2.89
183.33	34200.	S	> 999.00	B	>999.00

****
Minimum rating is 1.48 at location 55.00 in span 1.
****

Rating Codes:
T - Top steel governs
B - Bottom steel governs
C - Concrete governs
R - Rebar governs
V - Shear governs
S - Serviceability governs

Mom Strength Codes:
C - Compact
B - Braced non-compact
U - Unbraced non-compact
T - Transition between compact and braced non-compact
S - Serviceability

Noncompact shapes ratings based on stress, as

$$IR = \frac{Fb - \text{factored dead load stress}}{\text{factored LL+I stress}}$$

Operating rating for Strength II is

$$OR = \frac{Fb - \text{factored dead load stress}}{\text{factored LL+I stress}}$$

Inventory rating for Strength II is

$$IR = OR/(LL+I \text{ factor})$$

I-295 HH BUCKMAN BRIDGE -720249
Girder 2 : Rating Output : Lrfd Ratings
Mon Mar 30 09:46:29 2015

[This table uses the rating equation (6A.4.2.1-1)
of the 2011 edition of the Manual for Bridge
Evaluation.]

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Strength I

Span 1

Location	Compct Mom Cap/Noncmpt Allow Stress	Shear Capacity	Rating Factors Bending Inv.		Bending Oper.		Shear Inv.	Shear Oper.
0.00	9331. B	488.42	>999.00	T	>999.00		1.90	2.46
18.33	36000. B	769.69	1.88	B	2.44		4.56	5.91
22.00L	36000. B	773.47	1.52	B	1.96		4.83	6.26
22.00R	36000. B	773.65	2.77	B	3.58		4.83	6.26
36.67	36000. B	617.31	1.77	B	2.29		4.54	5.89
55.00	36000. B	623.62	1.42	B	1.84		5.78	7.49
73.33	36000. B	632.76	1.47	B	1.90		7.34	9.51
91.67	36000. B	644.47	1.82	B	2.36		5.82	7.54
110.00	36000. B	658.50	2.60	B	3.38		4.66	6.04
122.00L	36000. B	918.49	3.56	B	4.61		5.97	7.74
122.00R	36000. B	918.79	2.84	T	3.68		5.97	7.74
124.00L	20036. C	922.00	4.77	B	6.18		5.86	7.60
124.00R	23358. C	1326.20	5.56	B	7.21		8.89	11.53
128.33	23408. B	1332.57	6.43	T	8.33		8.55	11.09
146.67	13950. C	1361.56	2.41	B	3.13		7.30	9.46
154.00L	45675. B	1373.66	1.91	B	2.48		6.71	8.70
154.00R	45672. B	1638.91	2.17	B	2.81		8.24	10.68
156.00L	43981. B	1644.31	1.96	B	2.55		8.00	10.37
156.00R	23743. C	1644.80	3.94	B	5.11		8.00	10.37
165.00	46576. B	1671.34	3.08	B	4.00		7.25	9.39
183.33	46329. B	1757.69	1.59	B	2.07		6.10	7.90

Span 2

Location	Compct Mom Cap/Noncmpt Allow Stress	Shear Capacity	Rating Factors Bending Inv.		Bending Oper.		Shear Inv.	Shear Oper.
0.00	46329. B	1778.71	1.59	B	2.07		5.91	7.66
25.00	46559. B	1747.50	4.30	B	5.58		7.39	9.58
28.00L	46976. B	1747.50	4.78	B	6.20		7.62	9.87
28.00R	21778. C	1747.50	3.94	B	5.10		7.62	9.87
30.00L	21853. C	1747.50	4.21	B	5.46		7.77	10.07
30.00R	45307. B	1450.84	2.55	B	3.31		6.26	8.11
50.00	47985. B	1450.84	4.70	B	6.10		7.66	9.93
55.33L	21076. B	1450.84	5.11	B	6.63		8.05	10.43
55.33R	21060. B	1450.84	5.11	B	6.62		8.05	10.43
57.33L	21060. B	1450.84	4.83	B	6.26		8.20	10.63
57.33R	25555. B	1450.84	5.89	B	7.64		8.20	10.63
75.00	29713. C	974.23	4.83	B	6.26		6.11	7.92
100.00	29713. C	974.23	3.67	B	4.76		8.19	10.61
125.00	29713. C	973.68	3.39	B	4.39		10.07	13.05
150.00	29713. C	974.23	3.67	B	4.75		8.57	11.11

175.00	29713.	C	974.23	4.82	B	6.25	6.33	8.20
190.67L	25555.	B	1450.84	5.60	B	7.26	8.92	11.56
190.67R	20533.	B	1450.84	4.47	T	5.80	8.92	11.56
192.67L	25575.	B	1450.84	5.90	B	7.65	8.79	11.39
192.67R	16852.	B	1450.84	3.86	B	5.01	8.79	11.39
200.00	47985.	B	1450.84	4.69	B	6.08	8.27	10.72
218.00L	45307.	B	1450.84	2.75	B	3.56	7.00	9.07
218.00R	45307.	B	1747.50	3.06	B	3.97	8.68	11.26
220.00L	43540.	B	1747.50	2.69	B	3.49	8.50	11.01
220.00R	43540.	B	1747.50	4.60	B	5.97	8.50	11.01
225.00	45307.	B	1747.50	4.14	B	5.37	8.02	10.40
250.00	46330.	B	1778.84	1.59	B	2.06	5.91	7.66

Span 3

Location	Compct Mom Cap/Noncmpt Allow Stress		Shear Capacity	Rating Factors Bending			Shear	
				Inv.		Oper.	Inv.	Oper.
0.00	46330.	B	1757.54	1.59	B	2.06	5.70	7.39
18.33	46576.	B	1671.32	3.09	B	4.00	6.63	8.59
25.33L	23811.	C	1650.72	3.76	B	4.88	6.93	8.98
25.33R	20777.	C	1650.22	3.11	B	4.04	6.92	8.97
27.33L	20790.	C	1644.80	3.30	B	4.28	6.99	9.06
27.33R	45634.	B	1377.06	1.84	B	2.38	5.68	7.37
36.67	13952.	C	1361.55	2.43	B	3.14	5.90	7.65
55.00	23416.	B	1332.56	6.45	T	8.36	6.64	8.61
57.33L	23396.	C	1329.18	6.67	B	8.65	6.75	8.75
57.33R	23364.	C	1328.93	6.67	B	8.64	6.75	8.74
59.33L	23345.	C	1326.20	5.57	B	7.21	6.84	8.87
59.33R	20022.	C	922.00	4.77	B	6.18	4.51	5.85
73.33	36000.	B	658.50	2.60	B	3.38	3.48	4.52
91.67	36000.	B	644.47	1.83	B	2.37	4.10	5.32
110.00	36000.	B	632.76	1.47	B	1.90	4.93	6.39
128.33	36000.	B	623.62	1.42	B	1.84	4.71	6.10
146.67	36000.	B	617.31	1.77	B	2.29	4.31	5.59
161.33L	36000.	B	773.65	2.76	B	3.58	5.01	6.49
161.33R	36000.	B	773.47	1.51	B	1.96	5.00	6.49
165.00	36000.	B	769.68	1.87	B	2.43	4.75	6.16
183.33	9331.	B	488.42	>999.00	T	>999.00	1.90	2.47

Service II

Span 1

Location	Allowable Stress		Rating Factors Bending			
			Inv.		Oper.	
0.00	34200.	S	> 999.00	B	>999.00	
18.33	34200.	S	2.63	B	3.42	
22.00L	34200.	S	2.16	B	2.81	
22.00R	34200.	S	3.76	B	4.89	
36.67	34200.	S	2.49	B	3.23	
55.00	34200.	S	2.03	B	2.64	
73.33	34200.	S	2.07	B	2.69	
91.67	34200.	S	2.49	B	3.24	
110.00	34200.	S	3.42	B	4.45	
122.00L	34200.	S	4.56	B	5.92	
122.00R	34200.	S	4.56	B	5.93	
124.00L	34200.	S	4.70	B	6.11	
124.00R	34200.	S	3.93	B	5.10	
128.33	47500.	S	6.27	B	8.21	
146.67	47500.	S	4.59	B	5.96	
154.00L	47500.	S	3.86	B	5.02	
154.00R	47500.	S	4.02	B	5.22	
156.00L	47500.	S	3.93	B	5.10	
156.00R	47500.	S	6.66	B	8.66	
165.00	47500.	S	5.43	B	7.06	

183.33	47500. S	3.15 B	4.09

Span 2

Location	Allowable Stress	Rating Factors Bending Inv.	Oper.
0.00	34200. S	3.15 B	4.09
25.00	34200. S	7.31 B	9.50
28.00L	34200. S	7.95 B	10.34
28.00R	34200. S	7.77 B	10.11
30.00L	34200. S	8.22 B	10.68
30.00R	34200. S	5.02 B	6.53
50.00	34200. S	7.58 B	10.29
55.33L	34200. S	6.55 B	8.52
55.33R	34200. S	6.54 B	8.51
57.33L	34200. S	6.21 B	8.07
57.33R	34200. S	7.57 B	9.84
75.00	34200. S	5.16 B	6.71
100.00	34200. S	3.82 B	4.97
125.00	47500. S	3.49 B	4.54
150.00	47500. S	3.81 B	4.96
175.00	47500. S	5.15 B	6.70
190.67L	47500. S	7.21 B	9.37
190.67R	47500. S	7.22 B	9.39
192.67L	47500. S	7.57 B	9.85
192.67R	47500. S	6.21 B	8.08
200.00	47500. S	7.58 B	10.27
218.00L	47500. S	5.34 B	6.94
218.00R	47500. S	5.50 B	7.15
220.00L	47500. S	5.17 B	6.73
220.00R	47500. S	8.37 B	10.88
225.00	47500. S	7.29 B	9.48
250.00	47500. S	3.15 B	4.09

Span 3

Location	Allowable Stress	Rating Factors Bending Inv.	Oper.
0.00	34200. S	3.15 B	4.09
18.33	34200. S	5.44 B	7.07
25.33L	34200. S	6.41 B	8.34
25.33R	34200. S	6.23 B	8.10
27.33L	34200. S	6.50 B	8.46
27.33R	34200. S	3.77 B	4.90
36.67	34200. S	4.61 B	5.99
55.00	34200. S	6.26 B	8.24
57.33L	34200. S	5.88 B	8.53
57.33R	34200. S	5.88 B	8.52
59.33L	34200. S	5.48 B	7.12
59.33R	34200. S	6.55 B	8.52
73.33	34200. S	3.42 B	4.45
91.67	34200. S	2.49 B	3.24
110.00	34200. S	2.07 B	2.69
128.33	34200. S	2.03 B	2.63
146.67	34200. S	2.48 B	3.23
161.33L	34200. S	3.75 B	4.88
161.33R	34200. S	2.16 B	2.81
165.00	34200. S	2.62 B	3.41
183.33	34200. S	> 999.00 B	>999.00

****
Minimum rating is 1.42 at location 128.33 in span 3.
****

Strength II

Span 1

Location	Allowable	Shear	Rating Factors Bending Inv.	Bending Oper.	Shear Inv.	Shear Oper.
0.00	9331. C	488.42		>999.00		1.91
18.33	36000. B	769.69		2.22		5.42
22.00L	36000. B	773.47		1.79		5.87
22.00R	36000. B	773.65		3.27		5.88
36.67	36000. B	617.31		2.11		5.50
55.00	36000. B	623.62		1.71		7.10
73.33	36000. B	632.76		1.79		5.73
91.67	36000. B	644.47		2.24		4.81
110.00	36000. B	658.50		3.20		4.11
122.00L	36000. B	918.49		4.35		5.47
122.00R	36000. B	918.79		3.48		5.48
124.00L	20036. C	922.00		5.82		5.40
124.00R	23358. C	1326.20		6.79		8.20
128.33	23408. C	1332.57		10.54		7.97
146.67	13950. C	1361.56		4.02		7.04
154.00L	45675. B	1373.66		3.25		6.93
154.00R	45672. B	1638.91		3.68		8.51
156.00L	43981. B	1644.31		6.10		8.91
156.00R	23743. C	1644.80		12.22		8.91
165.00	46576. B	1671.34		5.43		8.70
183.33	46329. B	1757.69		3.28		7.25

Span 2

Location	Allowable	Shear	Rating Factors Bending Inv.	Bending Oper.	Shear Inv.	Shear Oper.
0.00	46329. B	1778.71		3.28		7.22
25.00	46559. B	1747.50		6.84		9.25
28.00L	46976. B	1747.50		7.41		9.54
28.00R	21778. C	1747.50		6.10		9.54
30.00L	21853. C	1747.50		8.70		9.73
30.00R	45307. B	1450.84		5.27		7.84
50.00	47985. B	1450.84		6.92		9.52
55.33L	21076. B	1450.84		5.94		9.86
55.33R	21060. B	1450.84		5.93		9.86
57.33L	21060. B	1450.84		5.64		9.97
57.33R	25555. B	1450.84		6.88		9.97
75.00	29713. C	974.23		5.95		6.73
100.00	29713. C	974.23		4.63		8.85
125.00	29713. C	973.68		4.30		13.33
150.00	29713. C	974.23		4.62		10.48
175.00	29713. C	974.23		5.94		7.75
190.67L	25555. B	1450.84		6.57		11.23
190.67R	20533. B	1450.84		5.25		11.23
192.67L	25575. B	1450.84		6.89		11.09
192.67R	16852. B	1450.84		4.51		11.09
200.00	47985. B	1450.84		6.90		10.53
218.00L	45307. B	1450.84		4.14		9.08
218.00R	45307. B	1747.50		4.61		11.27
220.00L	43540. B	1747.50		5.56		11.01
220.00R	43540. B	1747.50		9.52		11.01
225.00	45307. B	1747.50		6.59		10.35
250.00	46330. B	1778.84		3.27		7.22

Span 3

Location	Allowable	Shear	Rating Factors Bending		Shear	
			Inv.	Oper.	Inv.	Oper.
0.00	46330. B	1757.54	3.27			7.21
18.33	46576. B	1671.32	5.44			8.09
25.33L	23811. C	1650.72	6.36			8.45
25.33R	20777. C	1650.22	5.27			8.45
27.33L	20790. C	1644.80	10.23			8.55
27.33R	45634. B	1377.06	5.70			6.95
36.67	13952. C	1361.55	4.04			7.37
55.00	23416. C	1332.56	10.57			8.29
57.33L	23396. C	1329.18	6.93			8.42
57.33R	23364. C	1328.93	6.92			8.42
59.33L	23345. C	1326.20	6.80			8.53
59.33R	20022. C	922.00	5.82			5.63
73.33	36000. B	658.50	3.20			4.32
91.67	36000. B	644.47	2.24			5.09
110.00	36000. B	632.76	1.79			5.79
128.33	36000. B	623.62	1.71			5.62
146.67	36000. B	617.31	2.11			4.43
161.33L	36000. B	773.65	3.26			5.54
161.33R	36000. B	773.47	1.78			5.54
165.00	36000. B	769.68	2.21			5.24
183.33	9331. C	488.42	>999.00			1.91

Service II

Span 1

Location	Allowable Stress	Rating Factors Bending		
		Inv.	Oper.	
0.00	34200. S	> 999.00	B	>999.00
18.33	34200. S	3.11	B	3.11
22.00L	34200. S	2.56	B	2.56
22.00R	34200. S	4.45	B	4.45
36.67	34200. S	2.97	B	2.97
55.00	34200. S	2.45	B	2.45
73.33	34200. S	2.53	B	2.53
91.67	34200. S	3.07	B	3.07
110.00	34200. S	4.21	B	4.21
122.00L	34200. S	5.59	B	5.59
122.00R	34200. S	5.59	B	5.59
124.00L	34200. S	5.76	B	5.76
124.00R	34200. S	4.81	B	4.81
128.33	47500. S	7.65	B	10.39
146.67	47500. S	7.66	B	7.66
154.00L	47500. S	6.57	B	6.57
154.00R	47500. S	6.84	B	6.84
156.00L	47500. S	12.22	B	12.22
156.00R	47500. S	20.73	B	20.73
165.00	47500. S	9.60	B	9.60
183.33	47500. S	6.49	B	6.49

Span 2

Location	Allowable Stress	Rating Factors Bending	
		Inv.	Oper.

0.00	34200.	S	6.49	B	6.49
25.00	34200.	S	11.66	B	11.66
28.00L	34200.	S	12.37	B	12.37
28.00R	34200.	S	12.09	B	12.09
30.00L	34200.	S	17.02	B	17.02
30.00R	34200.	S	10.40	B	10.40
50.00	34200.	S	8.70	B	11.68
55.33L	34200.	S	7.63	B	7.63
55.33R	34200.	S	7.62	B	7.62
57.33L	34200.	S	7.27	B	7.27
57.33R	34200.	S	8.86	B	8.86
75.00	34200.	S	6.37	B	6.37
100.00	34200.	S	4.83	B	4.83
125.00	47500.	S	4.44	B	4.44
150.00	47500.	S	4.82	B	4.82
175.00	47500.	S	6.36	B	6.36
190.67L	47500.	S	8.49	B	8.49
190.67R	47500.	S	8.50	B	8.50
192.67L	47500.	S	8.87	B	8.87
192.67R	47500.	S	7.28	B	7.28
200.00	47500.	S	8.70	B	11.65
218.00L	47500.	S	8.06	B	8.06
218.00R	47500.	S	8.30	B	8.30
220.00L	47500.	S	10.73	B	10.73
220.00R	47500.	S	17.36	B	17.36
225.00	47500.	S	11.64	B	11.64
250.00	47500.	S	6.48	B	6.48

Span 3

Location	Allowable Stress		Rating Factors Bending Inv.		Oper.
0.00	34200.	S	6.48	B	6.48
18.33	34200.	S	9.61	B	9.61
25.33L	34200.	S	10.88	B	10.88
25.33R	34200.	S	10.58	B	10.58
27.33L	34200.	S	20.22	B	20.22
27.33R	34200.	S	11.72	B	11.72
36.67	34200.	S	7.69	B	7.69
55.00	34200.	S	7.64	B	10.42
57.33L	34200.	S	6.83	B	6.83
57.33R	34200.	S	6.82	B	6.82
59.33L	34200.	S	6.71	B	6.71
59.33R	34200.	S	8.03	B	8.03
73.33	34200.	S	4.21	B	4.21
91.67	34200.	S	3.07	B	3.07
110.00	34200.	S	2.53	B	2.53
128.33	34200.	S	2.45	B	2.45
146.67	34200.	S	2.97	B	2.97
161.33L	34200.	S	4.45	B	4.45
161.33R	34200.	S	2.56	B	2.56
165.00	34200.	S	3.10	B	3.10
183.33	34200.	S	> 999.00	B	>999.00

****
Minimum rating is 1.71 at location 128.33 in span 3.
****

Rating Codes:
T - Top steel governs
B - Bottom steel governs
C - Concrete governs
R - Rebar governs
V - Shear governs
S - Serviceability governs

Mom Strength Codes:
C - Compact
B - Braced non-compact
U - Unbraced non-compact
T - Transition between compact and braced non-compact
S - Serviceability

Noncompact shapes ratings based on stress, as

$$IR = \frac{Fb - \text{factored dead load stress}}{\text{factored LL+I stress}}$$

Operating rating for Strength II is

$$OR = \frac{Fb - \text{factored dead load stress}}{\text{factored LL+I stress}}$$

Inventory rating for Strength II is

$$IR = OR/(LL+I \text{ factor})$$

I-295 HH BUCKMAN BRIDGE -720249
Girder 3 : Rating Output : Lrfd Ratings
Mon Mar 30 09:48:28 2015

[This table uses the rating equation (6A.4.2.1-1)
of the 2011 edition of the Manual for Bridge
Evaluation.]

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Strength I

Span 1

Location	Compct Mom Cap/Noncmpt Allow Stress	Shear Capacity	Rating Factors Bending Inv.		Bending Oper.		Shear Inv.	Shear Oper.
0.00	9331. B	488.42	>999.00	T	>999.00		2.04	2.65
18.33	36000. B	769.69	1.99	B	2.58		4.98	6.45
22.00L	36000. B	773.47	1.61	B	2.09		5.29	6.86
22.00R	36000. B	773.65	2.94	B	3.80		5.30	6.87
36.67	36000. B	617.31	1.90	B	2.47		5.04	6.54
55.00	36000. B	623.62	1.56	B	2.02		6.36	8.25
73.33	36000. B	632.76	1.63	B	2.11		7.74	10.03
91.67	36000. B	644.47	2.03	B	2.64		6.37	8.26
110.00	36000. B	658.50	2.88	B	3.74		5.13	6.65
122.00L	36000. B	918.49	3.90	B	5.06		6.54	8.48
122.00R	36000. B	918.79	3.11	T	4.04		6.54	8.48
124.00L	20036. C	922.00	5.28	B	6.85		6.42	8.32
124.00R	23390. C	1326.20	6.17	B	8.00		9.71	12.59
128.33	23451. B	1332.57	7.62	T	9.88		9.30	12.06
146.67	13959. C	1361.56	2.82	B	3.66		7.75	10.05
154.00L	45675. B	1373.66	2.22	B	2.88		7.14	9.26
154.00R	45672. B	1638.91	2.51	B	3.25		8.76	11.36
156.00L	43981. B	1644.31	2.26	B	2.93		8.58	11.13
156.00R	23749. C	1644.80	4.47	B	5.80		8.59	11.13
165.00	46576. B	1671.34	3.45	B	4.48		7.79	10.09
183.33	46329. B	1757.69	1.77	B	2.29		6.45	8.36

Span 2

Location	Compct Mom Cap/Noncmpt Allow Stress	Shear Capacity	Rating Factors Bending Inv.		Bending Oper.		Shear Inv.	Shear Oper.
0.00	46329. B	1778.71	1.77	B	2.29		6.31	8.19
25.00	46559. B	1747.50	4.75	B	6.16		8.04	10.42
28.00L	46976. B	1747.50	5.28	B	6.85		8.30	10.75
28.00R	21796. C	1747.50	4.36	B	5.65		8.30	10.75
30.00L	21867. C	1747.50	4.67	B	6.05		8.47	10.98
30.00R	45307. B	1450.84	2.83	B	3.67		6.84	8.86
50.00	47985. B	1450.84	5.24	B	6.79		8.48	10.99
55.33L	45690. B	1450.84	5.16	B	6.69		8.90	11.54
55.33R	45690. B	1450.84	5.16	B	6.69		8.90	11.54
57.33L	21060. B	1450.84	5.37	B	6.96		9.06	11.74
57.33R	25555. B	1450.84	6.53	B	8.47		9.06	11.74
75.00	29713. C	974.23	5.45	B	7.07		6.60	8.55
100.00	29713. C	974.23	4.18	B	5.42		8.76	11.36
125.00	29713. C	973.68	3.86	B	5.01		10.58	13.71
150.00	29713. C	974.23	4.17	B	5.41		9.35	12.11

175.00	29713.	C	974.23	5.43	B	7.04	6.97	9.04
190.67L	25555.	B	1450.84	6.18	B	8.02	9.85	12.76
190.67R	20533.	B	1450.84	4.95	T	6.41	9.85	12.76
192.67L	25575.	B	1450.84	6.50	B	8.42	9.69	12.57
192.67R	16852.	B	1450.84	4.26	B	5.52	9.69	12.57
200.00	47985.	B	1450.84	5.27	B	6.83	9.10	11.80
218.00L	45307.	B	1450.84	3.07	B	3.98	7.60	9.85
218.00R	45307.	B	1747.50	3.41	B	4.42	9.41	12.20
220.00L	43540.	B	1747.50	3.00	B	3.89	9.20	11.93
220.00R	43540.	B	1747.50	5.11	B	6.63	9.20	11.93
225.00	45307.	B	1747.50	4.59	B	5.94	8.66	11.23
250.00	46330.	B	1778.84	1.77	B	2.29	6.33	8.21

Span 3

Location	Compct Mom Cap/Noncmpt Allow Stress		Shear Capacity	Rating Factors Bending			Shear	
				Inv.		Oper.	Inv.	Oper.
0.00	46330.	B	1757.54	1.77	B	2.29	6.02	7.81
18.33	46576.	B	1671.32	3.46	B	4.49	7.04	9.12
25.33L	23817.	C	1650.72	4.26	B	5.52	7.39	9.58
25.33R	20819.	C	1650.22	3.54	B	4.59	7.39	9.58
27.33L	20829.	C	1644.80	3.76	B	4.88	7.48	9.70
27.33R	45634.	B	1377.06	2.11	B	2.74	6.08	7.89
36.67	13958.	C	1361.55	2.82	B	3.65	6.39	8.29
55.00	23421.	B	1332.56	7.55	T	9.78	7.29	9.45
57.33L	23397.	C	1329.18	7.82	B	10.14	7.40	9.59
57.33R	23364.	C	1328.93	7.81	B	10.12	7.40	9.59
59.33L	23342.	C	1326.20	6.14	B	7.96	7.50	9.72
59.33R	20022.	C	922.00	5.26	B	6.82	4.95	6.42
73.33	36000.	B	658.50	2.90	B	3.76	3.75	4.86
91.67	36000.	B	644.47	2.03	B	2.64	4.30	5.58
110.00	36000.	B	632.76	1.62	B	2.10	5.11	6.62
128.33	36000.	B	623.62	1.54	B	2.00	5.10	6.61
146.67	36000.	B	617.31	1.89	B	2.45	4.73	6.13
161.33L	36000.	B	773.65	2.92	B	3.78	5.34	6.93
161.33R	36000.	B	773.47	1.60	B	2.07	5.34	6.92
165.00	36000.	B	769.68	1.98	B	2.56	5.05	6.55
183.33	9331.	B	488.42	>999.00	T	>999.00	2.03	2.64

Service II

Span 1

Location	Allowable Stress		Rating Factors Bending			
			Inv.		Oper.	
0.00	34200.	S	> 999.00	B	>999.00	
18.33	34200.	S	2.78	B	3.62	
22.00L	34200.	S	2.30	B	2.99	
22.00R	34200.	S	3.99	B	5.18	
36.67	34200.	S	2.67	B	3.47	
55.00	34200.	S	2.22	B	2.89	
73.33	34200.	S	2.30	B	2.99	
91.67	34200.	S	2.77	B	3.61	
110.00	34200.	S	3.79	B	4.92	
122.00L	34200.	S	5.01	B	6.51	
122.00R	34200.	S	5.01	B	6.51	
124.00L	34200.	S	5.22	B	6.78	
124.00R	34200.	S	4.36	B	5.67	
128.33	47500.	S	6.86	B	9.74	
146.67	47500.	S	5.34	B	6.94	
154.00L	47500.	S	4.44	B	5.77	
154.00R	47500.	S	4.61	B	5.99	
156.00L	47500.	S	4.47	B	5.82	
156.00R	47500.	S	7.54	B	9.81	
165.00	47500.	S	6.06	B	7.88	

183.33	47500. S	3.47 B	4.50

Span 2

Location	Allowable Stress	Rating Factors Bending Inv.	Oper.
0.00	34200. S	3.47 B	4.50
25.00	34200. S	8.06 B	10.48
28.00L	34200. S	8.78 B	11.41
28.00R	34200. S	8.59 B	11.16
30.00L	34200. S	9.08 B	11.81
30.00R	34200. S	5.56 B	7.23
50.00	34200. S	8.32 B	11.48
55.33L	34200. S	7.23 B	9.39
55.33R	34200. S	7.22 B	9.39
57.33L	34200. S	6.89 B	8.95
57.33R	34200. S	8.38 B	10.89
75.00	34200. S	5.84 B	7.59
100.00	34200. S	4.36 B	5.67
125.00	47500. S	3.98 B	5.18
150.00	47500. S	4.35 B	5.65
175.00	47500. S	5.81 B	7.55
190.67L	47500. S	7.96 B	10.34
190.67R	47500. S	7.97 B	10.36
192.67L	47500. S	8.34 B	10.84
192.67R	47500. S	6.85 B	8.90
200.00	47500. S	8.27 B	11.53
218.00L	47500. S	5.94 B	7.73
218.00R	47500. S	6.11 B	7.95
220.00L	47500. S	5.75 B	7.47
220.00R	47500. S	9.27 B	12.06
225.00	47500. S	8.06 B	10.48
250.00	47500. S	3.46 B	4.50

Span 3

Location	Allowable Stress	Rating Factors Bending Inv.	Oper.
0.00	34200. S	3.46 B	4.50
18.33	34200. S	6.08 B	7.90
25.33L	34200. S	7.23 B	9.40
25.33R	34200. S	7.04 B	9.15
27.33L	34200. S	7.37 B	9.58
27.33R	34200. S	4.30 B	5.59
36.67	34200. S	5.33 B	6.93
55.00	34200. S	6.89 B	9.65
57.33L	34200. S	6.48 B	10.00
57.33R	34200. S	6.48 B	9.99
59.33L	34200. S	6.04 B	7.85
59.33R	34200. S	7.23 B	9.39
73.33	34200. S	3.80 B	4.95
91.67	34200. S	2.77 B	3.61
110.00	34200. S	2.29 B	2.97
128.33	34200. S	2.21 B	2.87
146.67	34200. S	2.65 B	3.45
161.33L	34200. S	3.97 B	5.16
161.33R	34200. S	2.28 B	2.96
165.00	34200. S	2.77 B	3.60
183.33	34200. S	> 999.00 B	>999.00

****
Minimum rating is 1.54 at location 128.33 in span 3.
****

Strength II

Span 1

Location	Allowable	Shear	Rating Factors Bending Inv.	Bending Oper.	Shear Inv.	Shear Oper.
0.00	9331. C	488.42		>999.00		2.04
18.33	36000. B	769.69		2.30		5.87
22.00L	36000. B	773.47		1.87		6.38
22.00R	36000. B	773.65		3.40		6.38
36.67	36000. B	617.31		2.24		6.05
55.00	36000. B	623.62		1.86		7.77
73.33	36000. B	632.76		1.97		6.04
91.67	36000. B	644.47		2.47		5.31
110.00	36000. B	658.50		3.49		4.56
122.00L	36000. B	918.49		4.68		6.01
122.00R	36000. B	918.79		3.73		6.01
124.00L	20036. C	922.00		6.32		5.92
124.00R	23390. C	1326.20		7.38		8.96
128.33	23451. C	1332.57		7.67		8.67
146.67	13959. C	1361.56		4.71		7.46
154.00L	45675. B	1373.66		3.79		7.28
154.00R	45672. B	1638.91		4.28		8.93
156.00L	43981. B	1644.31		6.52		9.29
156.00R	23749. C	1644.80		12.91		9.29
165.00	46576. B	1671.34		6.19		8.99
183.33	46329. B	1757.69		3.53		7.50

Span 2

Location	Allowable	Shear	Rating Factors Bending Inv.	Bending Oper.	Shear Inv.	Shear Oper.
0.00	46329. B	1778.71		3.53		7.58
25.00	46559. B	1747.50		7.52		9.86
28.00L	46976. B	1747.50		8.17		10.19
28.00R	21796. C	1747.50		6.74		10.19
30.00L	21867. C	1747.50		9.35		10.41
30.00R	45307. B	1450.84		5.67		8.40
50.00	47985. B	1450.84		7.74		10.34
55.33L	45690. B	1450.84		5.93		10.73
55.33R	45690. B	1450.84		5.92		10.73
57.33L	21060. B	1450.84		6.19		10.86
57.33R	25555. B	1450.84		7.54		10.86
75.00	29713. C	974.23		6.60		7.32
100.00	29713. C	974.23		5.19		9.60
125.00	29713. C	973.68		4.83		13.51
150.00	29713. C	974.23		5.18		11.41
175.00	29713. C	974.23		6.57		8.56
190.67L	25555. B	1450.84		7.17		12.36
190.67R	20533. B	1450.84		5.74		12.36
192.67L	25575. B	1450.84		7.50		12.19
192.67R	16852. B	1450.84		4.92		12.19
200.00	47985. B	1450.84		7.78		11.52
218.00L	45307. B	1450.84		4.61		9.76
218.00R	45307. B	1747.50		5.13		12.09
220.00L	43540. B	1747.50		6.01		11.79
220.00R	43540. B	1747.50		10.24		11.79
225.00	45307. B	1747.50		7.25		11.03
250.00	46330. B	1778.84		3.53		7.58

Span 3

Location	Allowable	Shear	Rating Factors Bending		Shear	
			Inv.	Oper.	Inv.	Oper.
0.00	46330. B	1757.54	3.53			7.48
18.33	46576. B	1671.32	6.21			8.52
25.33L	23817. C	1650.72	7.36			8.97
25.33R	20819. C	1650.22	6.12			8.97
27.33L	20829. C	1644.80	10.81			9.10
27.33R	45634. B	1377.06	6.07			7.40
36.67	13958. C	1361.55	4.70			7.91
55.00	23421. C	1332.56	12.34			9.05
57.33L	23397. C	1329.18	7.47			9.20
57.33R	23364. C	1328.93	7.46			9.20
59.33L	23342. C	1326.20	7.34			9.33
59.33R	20022. C	922.00	6.29			6.16
73.33	36000. B	658.50	3.51			4.71
91.67	36000. B	644.47	2.47			5.51
110.00	36000. B	632.76	1.96			6.23
128.33	36000. B	623.62	1.84			6.20
146.67	36000. B	617.31	2.22			4.78
161.33L	36000. B	773.65	3.38			5.73
161.33R	36000. B	773.47	1.85			5.73
165.00	36000. B	769.68	2.28			5.42
183.33	9331. C	488.42	>999.00			2.04

Service II

Span 1

Location	Allowable Stress	Rating Factors Bending		
		Inv.	Oper.	
0.00	34200. S	> 999.00	B	>999.00
18.33	34200. S	3.23	B	3.23
22.00L	34200. S	2.67	B	2.67
22.00R	34200. S	4.64	B	4.64
36.67	34200. S	3.15	B	3.15
55.00	34200. S	2.66	B	2.66
73.33	34200. S	2.78	B	2.78
91.67	34200. S	3.38	B	3.38
110.00	34200. S	4.60	B	4.60
122.00L	34200. S	6.01	B	6.01
122.00R	34200. S	6.02	B	6.02
124.00L	34200. S	6.26	B	6.26
124.00R	34200. S	5.23	B	5.23
128.33	47500. S	7.56	B	7.56
146.67	47500. S	8.93	B	8.93
154.00L	47500. S	7.61	B	7.61
154.00R	47500. S	7.90	B	7.90
156.00L	47500. S	12.95	B	12.95
156.00R	47500. S	21.83	B	21.83
165.00	47500. S	10.90	B	10.90
183.33	47500. S	6.93	B	6.93

Span 2

Location	Allowable Stress	Rating Factors Bending	
		Inv.	Oper.

0.00	34200.	S	6.93	B	6.93
25.00	34200.	S	12.79	B	12.79
28.00L	34200.	S	13.61	B	13.61
28.00R	34200.	S	13.31	B	13.31
30.00L	34200.	S	18.24	B	18.24
30.00R	34200.	S	11.17	B	11.17
50.00	34200.	S	9.46	B	13.09
55.33L	34200.	S	8.32	B	8.32
55.33R	34200.	S	8.31	B	8.31
57.33L	34200.	S	7.96	B	7.96
57.33R	34200.	S	9.69	B	9.69
75.00	34200.	S	7.09	B	7.09
100.00	34200.	S	5.43	B	5.43
125.00	47500.	S	5.00	B	5.00
150.00	47500.	S	5.42	B	5.42
175.00	47500.	S	7.05	B	7.05
190.67L	47500.	S	9.25	B	9.25
190.67R	47500.	S	9.27	B	9.27
192.67L	47500.	S	9.65	B	9.65
192.67R	47500.	S	7.92	B	7.92
200.00	47500.	S	9.41	B	13.14
218.00L	47500.	S	8.96	B	8.96
218.00R	47500.	S	9.22	B	9.22
220.00L	47500.	S	11.55	B	11.55
220.00R	47500.	S	18.64	B	18.64
225.00	47500.	S	12.78	B	12.78
250.00	47500.	S	6.93	B	6.93

Span 3

Location	Allowable Stress	Rating Factors Bending Inv.		Oper.
0.00	34200. S	6.93	B	6.93
18.33	34200. S	10.92	B	10.92
25.33L	34200. S	12.54	B	12.54
25.33R	34200. S	12.20	B	12.20
27.33L	34200. S	21.21	B	21.21
27.33R	34200. S	12.38	B	12.38
36.67	34200. S	8.91	B	8.91
55.00	34200. S	8.23	B	12.16
57.33L	34200. S	7.37	B	7.37
57.33R	34200. S	7.36	B	7.36
59.33L	34200. S	7.24	B	7.24
59.33R	34200. S	8.67	B	8.67
73.33	34200. S	4.62	B	4.62
91.67	34200. S	3.38	B	3.38
110.00	34200. S	2.77	B	2.77
128.33	34200. S	2.64	B	2.64
146.67	34200. S	3.13	B	3.13
161.33L	34200. S	4.61	B	4.61
161.33R	34200. S	2.65	B	2.65
165.00	34200. S	3.21	B	3.21
183.33	34200. S	> 999.00	B	>999.00

****
Minimum rating is 1.84 at location 128.33 in span 3.
****

Rating Codes:
T - Top steel governs
B - Bottom steel governs
C - Concrete governs
R - Rebar governs
V - Shear governs
S - Serviceability governs

Mom Strength Codes:
C - Compact
B - Braced non-compact
U - Unbraced non-compact
T - Transition between compact and braced non-compact
S - Serviceability

Noncompact shapes ratings based on stress, as

$$IR = \frac{Fb - \text{factored dead load stress}}{\text{factored LL+I stress}}$$

Operating rating for Strength II is

$$OR = \frac{Fb - \text{factored dead load stress}}{\text{factored LL+I stress}}$$

Inventory rating for Strength II is

$$IR = OR/(LL+I \text{ factor})$$

I-295 HH BUCKMAN BRIDGE -720249
Girder 4 : Rating Output : Lrfd Ratings
Mon Mar 30 09:48:49 2015

[This table uses the rating equation (6A.4.2.1-1) of the 2011 edition of the Manual for Bridge Evaluation.]

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Strength I

Span 1

Location	Compct Mom Cap/Noncmpt Allow Stress	Shear Capacity	Rating Factors Bending Inv.	Bending Oper.	Shear Inv.	Shear Oper.
0.00	9331. B	488.42	>999.00 T	>999.00	2.05	2.66
18.33	36000. B	769.69	2.13 B	2.77	4.80	6.23
22.00L	36000. B	773.47	1.73 B	2.24	5.02	6.51
22.00R	36000. B	773.65	3.10 B	4.02	5.02	6.51
36.67	36000. B	617.31	1.98 B	2.56	4.87	6.31
55.00	36000. B	623.62	1.60 B	2.08	5.96	7.73
73.33	36000. B	632.76	1.66 B	2.15	7.30	9.46
91.67	36000. B	644.47	2.11 B	2.73	6.11	7.92
110.00	36000. B	658.50	3.05 B	3.95	5.09	6.59
122.00L	36000. B	918.49	4.23 B	5.48	6.90	8.95
122.00R	36000. B	918.79	3.38 T	4.39	6.90	8.95
124.00L	20036. C	922.00	5.64 B	7.31	6.83	8.85
124.00R	23347. C	1326.20	6.58 B	8.53	10.25	13.29
128.33	23422. B	1332.57	7.97 T	10.34	10.00	12.96
146.67	13973. C	1361.56	3.27 B	4.23	8.79	11.40
154.00L	45675. B	1373.66	2.66 B	3.45	8.01	10.38
154.00R	45672. B	1638.91	2.98 B	3.86	9.78	12.68
156.00L	43981. B	1644.31	2.73 B	3.54	9.46	12.26
156.00R	23766. C	1644.80	5.24 B	6.79	9.46	12.26
165.00	46576. B	1671.34	4.11 B	5.33	8.35	10.82
183.33	46329. B	1757.69	2.16 B	2.80	6.55	8.49

Span 2

Location	Compct Mom Cap/Noncmpt Allow Stress	Shear Capacity	Rating Factors Bending Inv.	Bending Oper.	Shear Inv.	Shear Oper.
0.00	46329. B	1778.71	2.16 B	2.80	7.02	9.10
25.00	46559. B	1747.50	4.69 B	6.07	8.63	11.19
28.00L	46976. B	1747.50	5.13 B	6.65	10.02	12.99
28.00R	21738. C	1747.50	4.21 B	5.45	10.02	12.99
30.00L	21800. C	1747.50	4.46 B	5.78	11.69	15.15
30.00R	45307. B	1450.84	2.68 B	3.47	9.52	12.34
50.00	47985. B	1450.84	4.93 B	6.39	8.44	10.94
55.33L	45690. B	1450.84	5.25 B	6.81	8.77	11.37
55.33R	45690. B	1450.84	6.56 B	8.50	8.77	11.37
57.33L	45690. B	1450.84	5.23 B	6.78	8.89	11.53
57.33R	29713. C	1450.84	8.12 B	10.52	8.89	11.53
75.00	29713. C	974.23	5.73 B	7.42	6.38	8.27
100.00	29713. C	974.23	4.29 B	5.56	7.92	10.27
125.00	29713. C	973.68	3.93 B	5.09	10.73	13.91
150.00	29713. C	974.23	4.32 B	5.59	8.19	10.62

175.00	29713.	C	974.23	5.77	B 7.49	6.68	8.66
190.67L	25555.	B	1450.84	6.72	B 8.71	10.10	13.09
190.67R	20533.	B	1450.84	5.39	T 6.99	10.10	13.09
192.67L	30626.	C	1450.84	8.43	B 10.93	10.02	12.99
192.67R	45936.	B	1450.84	4.26	B 5.52	10.02	12.99
200.00	47985.	B	1450.84	5.10	B 6.62	9.66	12.53
218.00L	45307.	B	1450.84	3.10	B 4.01	8.62	11.18
218.00R	45307.	B	1747.50	3.45	B 4.47	10.64	13.79
220.00L	43540.	B	1747.50	3.06	B 3.97	10.42	13.51
220.00R	43540.	B	1747.50	5.22	B 6.76	10.42	13.51
225.00	45307.	B	1747.50	4.80	B 6.22	9.84	12.75
250.00	46330.	B	1778.84	2.22	B 2.88	6.92	8.96

Span 3

Location	Compct Mom Cap/Noncmpt Allow Stress		Shear Capacity	Rating Factors Bending Inv.	Bending Oper.	Shear Inv.	Shear Oper.
0.00	46330.	B	1757.54	2.22 B	2.88	6.38	8.26
18.33	46576.	B	1671.32	3.92 B	5.08	7.48	9.70
25.33L	23824.	C	1650.72	4.67 B	6.05	7.73	10.02
25.33R	20868.	C	1650.22	3.91 B	5.06	7.73	10.02
27.33L	20868.	C	1644.80	4.11 B	5.33	7.77	10.07
27.33R	45634.	B	1377.06	2.33 B	3.02	6.34	8.22
36.67	13955.	C	1361.55	2.94 B	3.81	6.35	8.24
55.00	23342.	B	1332.56	7.48 T	9.70	7.02	9.10
57.33L	23317.	C	1329.18	7.72 B	10.01	7.10	9.20
57.33R	23275.	C	1328.93	7.70 B	9.99	7.10	9.20
59.33L	23262.	C	1326.20	7.91 B	10.25	7.16	9.29
59.33R	20001.	C	922.00	6.78 B	8.79	4.73	6.13
73.33	36000.	B	658.50	3.01 B	3.90	3.48	4.51
91.67	36000.	B	644.47	2.08 B	2.69	4.11	5.33
110.00	36000.	B	632.76	1.63 B	2.11	4.82	6.25
128.33	36000.	B	623.62	1.57 B	2.03	4.90	6.35
146.67	36000.	B	617.31	1.93 B	2.50	4.47	5.80
161.33L	36000.	B	773.65	3.04 B	3.94	5.48	7.10
161.33R	36000.	B	773.47	1.68 B	2.18	5.48	7.10
165.00	36000.	B	769.68	2.09 B	2.71	5.21	6.76
183.33	9331.	B	488.42	>999.00 T	>999.00	2.02	2.62

Service II

Span 1

Location	Allowable Stress		Rating Factors Bending Inv.	Bending Oper.
0.00	34200.	S	> 999.00 B	>999.00
18.33	34200.	S	2.96 B	3.85
22.00L	34200.	S	2.44 B	3.18
22.00R	34200.	S	4.19 B	5.45
36.67	34200.	S	2.76 B	3.59
55.00	34200.	S	2.29 B	2.97
73.33	34200.	S	2.33 B	3.03
91.67	34200.	S	2.87 B	3.73
110.00	34200.	S	3.99 B	5.18
122.00L	34200.	S	5.41 B	7.03
122.00R	34200.	S	5.41 B	7.04
124.00L	34200.	S	5.55 B	7.22
124.00R	34200.	S	4.64 B	6.03
128.33	47500.	S	7.47 B	10.19
146.67	47500.	S	6.12 B	7.95
154.00L	47500.	S	5.22 B	6.78
154.00R	47500.	S	5.40 B	7.01
156.00L	47500.	S	5.28 B	6.87
156.00R	47500.	S	8.75 B	11.38
165.00	47500.	S	7.11 B	9.24

183.33	47500. S	4.09 B	5.31

Span 2

Location	Allowable Stress	Rating Factors Bending Inv.	Oper.
0.00	34200. S	4.09 B	5.31
25.00	34200. S	7.98 B	10.37
28.00L	34200. S	8.56 B	11.13
28.00R	34200. S	8.37 B	10.88
30.00L	34200. S	8.77 B	11.40
30.00R	34200. S	5.32 B	6.91
50.00	34200. S	8.38 B	10.89
55.33L	34200. S	7.84 B	12.04
55.33R	34200. S	7.84 B	12.02
57.33L	34200. S	7.33 B	9.53
57.33R	34200. S	8.91 B	11.58
75.00	34200. S	6.15 B	7.99
100.00	34200. S	4.47 B	5.81
125.00	47500. S	4.05 B	5.26
150.00	47500. S	4.50 B	5.85
175.00	47500. S	6.20 B	8.06
190.67L	47500. S	8.62 B	11.20
190.67R	47500. S	8.62 B	11.21
192.67L	47500. S	9.00 B	11.70
192.67R	47500. S	7.41 B	9.64
200.00	47500. S	8.64 B	11.23
218.00L	47500. S	6.01 B	7.81
218.00R	47500. S	6.19 B	8.04
220.00L	47500. S	5.87 B	7.63
220.00R	47500. S	9.47 B	12.31
225.00	47500. S	8.42 B	10.94
250.00	47500. S	4.18 B	5.43

Span 3

Location	Allowable Stress	Rating Factors Bending Inv.	Oper.
0.00	34200. S	4.18 B	5.43
18.33	34200. S	6.81 B	8.86
25.33L	34200. S	7.90 B	10.27
25.33R	34200. S	7.70 B	10.01
27.33L	34200. S	7.99 B	10.39
27.33R	34200. S	4.69 B	6.10
36.67	34200. S	5.57 B	7.24
55.00	34200. S	7.36 B	9.56
57.33L	34200. S	6.96 B	9.86
57.33R	34200. S	6.96 B	9.85
59.33L	34200. S	6.59 B	10.11
59.33R	34200. S	7.84 B	12.13
73.33	34200. S	3.93 B	5.11
91.67	34200. S	2.83 B	3.67
110.00	34200. S	2.30 B	2.98
128.33	34200. S	2.24 B	2.91
146.67	34200. S	2.70 B	3.51
161.33L	34200. S	4.13 B	5.36
161.33R	34200. S	2.39 B	3.11
165.00	34200. S	2.91 B	3.78
183.33	34200. S	> 999.00 B	>999.00

****
Minimum rating is 1.57 at location 128.33 in span 3.
****

Strength II

Span 1

Location	Allowable	Shear	Rating Factors Bending Inv.	Bending Oper.	Shear Inv.	Shear Oper.
0.00	9331. C	488.42	>999.00			2.00
18.33	36000. B	769.69		2.45		5.73
22.00L	36000. B	773.47		1.99		5.84
22.00R	36000. B	773.65		3.57		5.84
36.67	36000. B	617.31		2.31		5.98
55.00	36000. B	623.62		1.91		7.35
73.33	36000. B	632.76		2.00		5.57
91.67	36000. B	644.47		2.58		4.92
110.00	36000. B	658.50		3.71		4.27
122.00L	36000. B	918.49		5.09		5.94
122.00R	36000. B	918.79		4.07		5.95
124.00L	20036. C	922.00		6.77		5.91
124.00R	23347. C	1326.20		7.90		8.87
128.33	23422. C	1332.57		12.93		8.72
146.67	13973. C	1361.56		5.36		7.88
154.00L	45675. B	1373.66		4.51		7.81
154.00R	45672. B	1638.91		5.05		9.55
156.00L	43981. B	1644.31		7.74		10.13
156.00R	23766. C	1644.80		14.85		10.14
165.00	46576. B	1671.34		7.43		9.83
183.33	46329. B	1757.69		4.29		7.61

Span 2

Location	Allowable	Shear	Rating Factors Bending Inv.	Bending Oper.	Shear Inv.	Shear Oper.
0.00	46329. B	1778.71		4.29		7.97
25.00	46559. B	1747.50		7.50		10.45
28.00L	46976. B	1747.50		8.04		12.18
28.00R	21738. C	1747.50		6.59		12.18
30.00L	21800. C	1747.50		9.09		14.24
30.00R	45307. B	1450.84		5.46		11.60
50.00	47985. B	1450.84		7.28		10.33
55.33L	45690. B	1450.84		6.05		10.61
55.33R	45690. B	1450.84		6.04		10.61
57.33L	45690. B	1450.84		6.00		10.70
57.33R	29713. C	1450.84		9.32		10.70
75.00	29713. C	974.23		6.89		7.05
100.00	29713. C	974.23		5.38		8.68
125.00	29713. C	973.68		4.99		9.58
150.00	29713. C	974.23		5.41		10.06
175.00	29713. C	974.23		6.96		8.26
190.67L	25555. B	1450.84		7.76		12.66
190.67R	20533. B	1450.84		6.23		12.66
192.67L	30626. C	1450.84		9.69		12.57
192.67R	45936. B	1450.84		4.89		12.57
200.00	47985. B	1450.84		7.51		12.16
218.00L	45307. B	1450.84		4.67		10.97
218.00R	45307. B	1747.50		5.20		13.53
220.00L	43540. B	1747.50		5.97		13.21
220.00R	43540. B	1747.50		10.18		13.21
225.00	45307. B	1747.50		7.59		12.32
250.00	46330. B	1778.84		4.38		7.91

Span 3

Location	Allowable	Shear	Rating Factors Bending		Shear	
			Inv.	Oper.	Inv.	Oper.
0.00	46330. B	1757.54	4.38			7.80
18.33	46576. B	1671.32	7.12			9.05
25.33L	23824. C	1650.72	8.15			9.44
25.33R	20868. C	1650.22	6.82			9.43
27.33L	20868. C	1644.80	11.92			9.52
27.33R	45634. B	1377.06	6.75			7.78
36.67	13955. C	1361.55	4.83			8.02
55.00	23342. C	1332.56	12.13			8.76
57.33L	23317. C	1329.18	7.87			8.85
57.33R	23275. C	1328.93	7.86			8.85
59.33L	23262. C	1326.20	7.70			8.93
59.33R	20001. C	922.00	6.60			5.89
73.33	36000. B	658.50	3.66			4.34
91.67	36000. B	644.47	2.53			5.13
110.00	36000. B	632.76	1.96			5.80
128.33	36000. B	623.62	1.86			5.98
146.67	36000. B	617.31	2.25			4.64
161.33L	36000. B	773.65	3.49			5.90
161.33R	36000. B	773.47	1.93			5.90
165.00	36000. B	769.68	2.39			5.57
183.33	9331. C	488.42	>999.00			1.98

Service II

Span 1

Location	Allowable Stress	Rating Factors Bending		
		Inv.	Oper.	
0.00	34200. S	> 999.00	B	>999.00
18.33	34200. S	3.41	B	3.41
22.00L	34200. S	2.82	B	2.82
22.00R	34200. S	4.84	B	4.84
36.67	34200. S	3.24	B	3.24
55.00	34200. S	2.73	B	2.73
73.33	34200. S	2.83	B	2.83
91.67	34200. S	3.51	B	3.51
110.00	34200. S	4.87	B	4.87
122.00L	34200. S	6.53	B	6.53
122.00R	34200. S	6.54	B	6.54
124.00L	34200. S	6.69	B	6.69
124.00R	34200. S	5.59	B	5.59
128.33	47500. S	8.96	B	12.75
146.67	47500. S	10.08	B	10.08
154.00L	47500. S	8.87	B	8.87
154.00R	47500. S	9.18	B	9.18
156.00L	47500. S	15.01	B	15.01
156.00R	47500. S	24.87	B	24.87
165.00	47500. S	12.89	B	12.89
183.33	47500. S	8.15	B	8.15

Span 2

Location	Allowable Stress	Rating Factors Bending	
		Inv.	Oper.

0.00	34200. S	8.15	B	8.15
25.00	34200. S	12.80	B	12.80
28.00L	34200. S	13.45	B	13.45
28.00R	34200. S	13.14	B	13.14
30.00L	34200. S	17.93	B	17.93
30.00R	34200. S	10.87	B	10.87
50.00	34200. S	10.20	B	12.39
55.33L	34200. S	8.56	B	8.56
55.33R	34200. S	8.55	B	8.55
57.33L	34200. S	8.44	B	8.44
57.33R	34200. S	10.26	B	10.26
75.00	34200. S	7.42	B	7.42
100.00	34200. S	5.62	B	5.62
125.00	47500. S	5.15	B	5.15
150.00	47500. S	5.66	B	5.66
175.00	47500. S	7.49	B	7.49
190.67L	47500. S	9.98	B	9.98
190.67R	47500. S	9.99	B	9.99
192.67L	47500. S	10.37	B	10.37
192.67R	47500. S	8.55	B	8.55
200.00	47500. S	10.14	B	12.76
218.00L	47500. S	9.09	B	9.09
218.00R	47500. S	9.36	B	9.36
220.00L	47500. S	11.48	B	11.48
220.00R	47500. S	18.53	B	18.53
225.00	47500. S	13.34	B	13.34
250.00	47500. S	8.28	B	8.28

Span 3

Location	Allowable Stress	Rating Factors Bending Inv.		Oper.
0.00	34200. S	8.28	B	8.28
18.33	34200. S	12.41	B	12.41
25.33L	34200. S	13.83	B	13.83
25.33R	34200. S	13.48	B	13.48
27.33L	34200. S	23.26	B	23.26
27.33R	34200. S	13.66	B	13.66
36.67	34200. S	9.19	B	9.19
55.00	34200. S	8.92	B	11.95
57.33L	34200. S	7.76	B	7.76
57.33R	34200. S	7.75	B	7.75
59.33L	34200. S	7.59	B	7.59
59.33R	34200. S	9.11	B	9.11
73.33	34200. S	4.80	B	4.80
91.67	34200. S	3.46	B	3.46
110.00	34200. S	2.77	B	2.77
128.33	34200. S	2.67	B	2.67
146.67	34200. S	3.16	B	3.16
161.33L	34200. S	4.75	B	4.75
161.33R	34200. S	2.75	B	2.75
165.00	34200. S	3.34	B	3.34
183.33	34200. S	> 999.00	B	>999.00

****
Minimum rating is 1.86 at location 128.33 in span 3.
****

Rating Codes:
T - Top steel governs
B - Bottom steel governs
C - Concrete governs
R - Rebar governs
V - Shear governs
S - Serviceability governs

Mom Strength Codes:
C - Compact
B - Braced non-compact
U - Unbraced non-compact
T - Transition between compact and braced non-compact
S - Serviceability

Noncompact shapes ratings based on stress, as

$$IR = \frac{Fb - \text{factored dead load stress}}{\text{factored LL+I stress}}$$

Operating rating for Strength II is

$$OR = \frac{Fb - \text{factored dead load stress}}{\text{factored LL+I stress}}$$

Inventory rating for Strength II is

$$IR = OR/(LL+I \text{ factor})$$

I-295 HH BUCKMAN BRIDGE -720249
Girder 5 : Rating Output : Lrfd Ratings
Mon Mar 30 09:46:59 2015

[This table uses the rating equation (6A.4.2.1-1) of the 2011 edition of the Manual for Bridge Evaluation.]

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Strength I

Span 1

Location	Compct Mom Cap/Noncmpt Allow Stress	Shear Capacity	Rating Factors Bending Inv.	Bending Oper.	Shear Inv.	Shear Oper.
0.00	36000. B	347.57	>999.00 B	>999.00	1.15	1.49
18.33	36000. B	461.91	3.00 B	3.89	2.74	3.56
36.67	36000. B	476.29	1.61 B	2.09	3.76	4.88
38.00L	36000. B	477.22	1.57 B	2.03	3.84	4.98
38.00R	36000. B	477.34	1.91 B	2.47	3.84	4.98
55.00	36000. B	435.91	1.59 B	2.06	4.45	5.77
73.33	36000. B	447.75	1.64 B	2.13	4.98	6.45
91.67	36000. B	514.98	1.99 B	2.58	4.35	5.63
94.00L	36000. B	520.37	2.09 B	2.70	4.24	5.49
94.00R	36000. B	520.76	1.94 B	2.52	4.24	5.50
110.00	36000. B	559.21	2.81 B	3.64	3.57	4.63
128.33	35223. B	695.47	3.21 B	4.16	3.38	4.38
146.67	35178. B	842.04	2.31 B	3.00	3.46	4.48
155.33L	28998. B	928.08	1.35 B	1.76	3.53	4.57
155.33R	28971. B	929.75	2.22 B	2.88	3.54	4.58
165.00	30326. B	1380.66	2.16 B	2.80	5.25	6.80
183.33	35100. B	1263.48	0.95 B	1.23	3.81	4.94

Span 2

Location	Compct Mom Cap/Noncmpt Allow Stress	Shear Capacity	Rating Factors Bending Inv.	Bending Oper.	Shear Inv.	Shear Oper.
0.00	35100. B	1274.84	0.95 B	1.23	3.49	4.52
21.00L	35318. B	923.38	2.23 B	2.89	2.54	3.30
21.00R	35318. B	922.51	1.33 B	1.72	2.54	3.29
25.00	35313. B	902.13	1.62 B	2.10	3.02	3.91
50.00	35226. B	789.55	4.16 B	5.39	3.89	5.04
75.00	36000. B	588.76	3.04 B	3.94	3.55	4.60
76.00L	36000. B	587.44	2.97 B	3.85	3.59	4.65
76.00R	36000. B	587.20	3.16 B	4.10	3.59	4.65
99.50L	36000. B	506.39	2.01 B	2.60	4.60	5.96
99.50R	36000. B	506.31	2.33 B	3.03	4.60	5.96
100.00	36000. B	506.10	2.32 B	3.01	4.65	6.03
125.00L	36000. B	502.51	2.02 B	2.62	5.25	6.81
125.00R	36000. B	502.55	2.02 B	2.62	5.25	6.81
150.00	36000. B	521.48	2.33 B	3.02	5.10	6.62
174.00L	36000. B	626.29	3.18 B	4.12	4.00	5.19
174.00R	36000. B	626.70	2.99 B	3.88	4.01	5.19
150.50L	36000. B	522.06	2.34 B	3.04	5.10	6.61
150.50R	36000. B	522.30	2.02 B	2.61	5.10	6.61
175.00	36000. B	628.95	3.06 B	3.97	3.96	5.13

200.00	35218.	B	865.31	4.04	B	5.23	4.60	5.96
225.00	30828.	B	1008.02	1.44	B	1.86	3.79	4.91
229.00L	30521.	B	1033.20	1.16	B	1.50	3.68	4.76
229.00R	30507.	B	1034.27	1.98	B	2.57	3.68	4.77
250.00	30889.	B	1415.29	0.92	B	1.20	4.10	5.32

Span 3

Location	Compct Mom Cap/Noncmpt Allow Stress		Shear Capacity	Rating Factors Bending			Shear	
				Inv.		Oper.	Inv.	Oper.
0.00	30889.	B	1416.13	0.92	B	1.20	3.96	5.13
18.33	32863.	B	1199.86	1.79	B	2.32	3.82	4.95
28.00L	32495.	B	765.29	2.19	B	2.84	2.14	2.78
28.00R	32509.	B	763.96	1.29	B	1.68	2.14	2.77
36.67	32340.	B	695.47	1.76	B	2.28	2.06	2.67
55.00	35223.	B	600.54	3.25	B	4.21	2.43	3.15
73.33	36000.	B	514.98	2.81	B	3.64	2.43	3.15
89.33L	36000.	B	504.07	2.00	B	2.59	3.13	4.06
89.33R	36000.	B	503.96	2.15	B	2.78	3.13	4.06
91.67	36000.	B	502.42	2.06	B	2.68	3.21	4.17
110.00	36000.	B	435.91	1.67	B	2.16	3.15	4.08
128.33	36000.	B	476.29	1.59	B	2.06	4.14	5.37
145.33L	36000.	B	463.01	1.90	B	2.46	3.40	4.41
145.33R	36000.	B	462.88	1.55	B	2.01	3.40	4.41
146.67	36000.	B	461.91	1.60	B	2.07	3.35	4.34
165.00	36000.	B	484.57	2.95	B	3.82	2.94	3.82
183.33	36000.	B	338.37	>999.00	B	>999.00	1.13	1.46

Service II

Span 1

Location	Allowable Stress		Rating Factors Bending			
			Inv.		Oper.	
0.00	34200.	S	> 999.00	B	>999.00	
18.33	34200.	S	4.07	B	5.29	
36.67	34200.	S	2.29	B	2.98	
38.00L	34200.	S	2.24	B	2.91	
38.00R	34200.	S	2.68	B	3.48	
55.00	34200.	S	2.26	B	2.93	
73.33	34200.	S	2.31	B	3.00	
91.67	34200.	S	2.71	B	3.52	
94.00L	34200.	S	2.82	B	3.66	
94.00R	34200.	S	2.63	B	3.42	
110.00	34200.	S	3.65	B	4.75	
128.33	34200.	S	4.86	B	6.32	
146.67	34200.	S	3.76	B	4.89	
155.33L	34200.	S	3.31	B	4.30	
155.33R	34200.	S	4.74	B	6.16	
165.00	34200.	S	4.53	B	5.89	
183.33	34200.	S	1.89	B	2.45	

Span 2

Location	Allowable Stress		Rating Factors Bending			
			Inv.		Oper.	
0.00	34200.	S	1.89	B	2.45	
21.00L	34200.	S	3.65	B	4.74	
21.00R	34200.	S	2.41	B	3.14	

25.00	34200. S	2.84 B	3.69
50.00	34200. S	6.36 B	8.27
75.00	34200. S	4.01 B	5.21
76.00L	34200. S	3.92 B	5.10
76.00R	34200. S	4.17 B	5.42
99.50L	34200. S	2.77 B	3.60
99.50R	34200. S	3.19 B	4.15
100.00	34200. S	3.17 B	4.13
125.00L	34200. S	2.81 B	3.65
125.00R	34200. S	2.81 B	3.65
150.00	34200. S	3.18 B	4.13
174.00L	34200. S	4.19 B	5.45
174.00R	34200. S	3.94 B	5.13
150.50L	34200. S	3.20 B	4.16
150.50R	34200. S	2.78 B	3.61
175.00	34200. S	4.03 B	5.24
200.00	34200. S	6.18 B	8.03
225.00	34200. S	3.19 B	4.15
229.00L	34200. S	2.81 B	3.65
229.00R	34200. S	4.11 B	5.34
250.00	34200. S	2.39 B	3.11

Span 3

Location	Allowable Stress	Rating Factors Bending	
		Inv.	Oper.
0.00	34200. S	2.39 B	3.11
18.33	34200. S	3.43 B	4.46
28.00L	34200. S	4.01 B	5.22
28.00R	34200. S	2.68 B	3.48
36.67	34200. S	3.36 B	4.36
55.00	34200. S	4.92 B	6.39
73.33	34200. S	3.66 B	4.76
89.33L	34200. S	2.71 B	3.52
89.33R	34200. S	2.90 B	3.77
91.67	34200. S	2.81 B	3.65
110.00	34200. S	2.35 B	3.05
128.33	34200. S	2.26 B	2.94
145.33L	34200. S	2.66 B	3.46
145.33R	34200. S	2.22 B	2.89
146.67	34200. S	2.28 B	2.96
165.00	34200. S	4.00 B	5.19
183.33	34200. S	> 999.00 B	>999.00

****
Minimum rating is 0.92 at location 250.00 in span 2.
****

Permit

Strength II

Span 1

Location	Allowable	Shear	Rating Factors Bending		Shear	
			Inv.	Oper.	Inv.	Oper.
0.00	36000. B	347.57	>999.00		1.13	
18.33	36000. B	461.91	3.44		3.16	
36.67	36000. B	476.29	1.88		4.75	
38.00L	36000. B	477.22	1.83		4.86	
38.00R	36000. B	477.34	2.23		4.86	

55.00	36000. B	435.91	1.89	5.42
73.33	36000. B	447.75	1.99	3.96
91.67	36000. B	514.98	2.43	3.65
94.00L	36000. B	520.37	2.54	3.59
94.00R	36000. B	520.76	2.37	3.59
110.00	36000. B	559.21	3.42	3.29
128.33	35223. B	695.47	5.20	3.32
146.67	35178. B	842.04	3.82	3.53
155.33L	28998. B	928.08	2.33	3.85
155.33R	28971. B	929.75	3.83	3.86
165.00	30326. B	1380.66	3.94	6.40
183.33	35100. B	1263.48	1.93	4.60

Span 2

Location	Allowable	Shear	Rating Factors Bending		Shear	
			Inv.	Oper.	Inv.	Oper.
0.00	35100. B	1274.84	1.93		4.36	
21.00L	35318. B	923.38	3.95		3.78	
21.00R	35318. B	922.51	2.35		3.77	
25.00	35313. B	902.13	2.79		3.90	
50.00	35226. B	789.55	6.21		4.89	
75.00	36000. B	588.76	3.58		3.87	
76.00L	36000. B	587.44	3.50		3.90	
76.00R	36000. B	587.20	3.73		3.90	
99.50L	36000. B	506.39	2.45		4.78	
99.50R	36000. B	506.31	2.85		4.78	
100.00	36000. B	506.10	2.84		4.83	
125.00L	36000. B	502.51	2.50		6.82	
125.00R	36000. B	502.55	2.50		6.82	
150.00	36000. B	521.48	2.85		5.72	
174.00L	36000. B	626.29	3.77		5.01	
174.00R	36000. B	626.70	3.54		5.02	
150.50L	36000. B	522.06	2.86		5.68	
150.50R	36000. B	522.30	2.46		5.68	
175.00	36000. B	628.95	3.62		4.99	
200.00	35218. B	865.31	6.00		6.06	
225.00	30828. B	1008.02	2.35		5.00	
229.00L	30521. B	1033.20	1.95		4.82	
229.00R	30507. B	1034.27	3.34		4.82	
250.00	30889. B	1415.29	1.79		5.11	

Span 3

Location	Allowable	Shear	Rating Factors Bending		Shear	
			Inv.	Oper.	Inv.	Oper.
0.00	30889. B	1416.13	1.79		5.13	
18.33	32863. B	1199.86	3.48		4.82	
28.00L	32495. B	765.29	3.91		2.77	
28.00R	32509. B	763.96	2.31		2.76	
36.67	32340. B	695.47	2.93		2.69	
55.00	35223. B	600.54	5.26		3.07	
73.33	36000. B	514.98	3.39		3.14	
89.33L	36000. B	504.07	2.42		3.86	
89.33R	36000. B	503.96	2.60		3.86	
91.67	36000. B	502.42	2.50		3.95	
110.00	36000. B	435.91	2.00		3.93	
128.33	36000. B	476.29	1.88		4.75	
145.33L	36000. B	463.01	2.21		3.70	
145.33R	36000. B	462.88	1.81		3.70	
146.67	36000. B	461.91	1.86		3.63	
165.00	36000. B	484.57	3.35		3.13	
183.33	36000. B	338.37	>999.00		1.10	

Service II

Span 1

Location	Allowable Stress	Rating Factors Bending Inv.		Oper.	
0.00	34200. S	> 999.00	B	>999.00	
18.33	34200. S	4.68	B	4.68	
36.67	34200. S	2.69	B	2.69	
38.00L	34200. S	2.62	B	2.62	
38.00R	34200. S	3.14	B	3.14	
55.00	34200. S	2.69	B	2.69	
73.33	34200. S	2.80	B	2.80	
91.67	34200. S	3.30	B	3.30	
94.00L	34200. S	3.44	B	3.44	
94.00R	34200. S	3.22	B	3.22	
110.00	34200. S	4.47	B	4.47	
128.33	34200. S	7.48	B	7.89	
146.67	34200. S	6.24	B	6.24	
155.33L	34200. S	5.72	B	5.72	
155.33R	34200. S	8.19	B	8.19	
165.00	34200. S	8.29	B	8.29	
183.33	34200. S	3.84	B	3.84	

Span 2

Location	Allowable Stress	Rating Factors Bending Inv.		Oper.	
0.00	34200. S	3.84	B	3.84	
21.00L	34200. S	6.49	B	6.49	
21.00R	34200. S	4.29	B	4.29	
25.00	34200. S	4.90	B	4.90	
50.00	34200. S	9.24	B	9.53	
75.00	34200. S	4.73	B	4.73	
76.00L	34200. S	4.64	B	4.64	
76.00R	34200. S	4.93	B	4.93	
99.50L	34200. S	3.39	B	3.39	
99.50R	34200. S	3.91	B	3.91	
100.00	34200. S	3.89	B	3.89	
125.00L	34200. S	3.49	B	3.49	
125.00R	34200. S	3.49	B	3.49	
150.00	34200. S	3.90	B	3.90	
174.00L	34200. S	4.98	B	4.98	
174.00R	34200. S	4.68	B	4.68	
150.50L	34200. S	3.92	B	3.92	
150.50R	34200. S	3.41	B	3.41	
175.00	34200. S	4.78	B	4.78	
200.00	34200. S	9.21	B	9.21	
225.00	34200. S	5.25	B	5.25	
229.00L	34200. S	4.74	B	4.74	
229.00R	34200. S	6.94	B	6.94	
250.00	34200. S	4.65	B	4.65	

Span 3

Location	Allowable Stress	Rating Factors Bending Inv.		Oper.	
0.00	34200. S	4.65	B	4.65	
18.33	34200. S	6.70	B	6.70	

28.00L	34200.	S	7.17	B	7.17
28.00R	34200.	S	4.79	B	4.79
36.67	34200.	S	5.61	B	5.61
55.00	34200.	S	7.29	B	7.99
73.33	34200.	S	4.44	B	4.44
89.33L	34200.	S	3.29	B	3.29
89.33R	34200.	S	3.52	B	3.52
91.67	34200.	S	3.40	B	3.40
110.00	34200.	S	2.82	B	2.82
128.33	34200.	S	2.68	B	2.68
145.33L	34200.	S	3.11	B	3.11
145.33R	34200.	S	2.59	B	2.59
146.67	34200.	S	2.65	B	2.65
165.00	34200.	S	4.56	B	4.56
183.33	34200.	S	> 999.00	B	>999.00

****
Minimum rating is 1.10 at location 183.33 in span 3.
****

Rating Codes:
T - Top steel governs
B - Bottom steel governs
C - Concrete governs
R - Rebar governs
V - Shear governs
S - Serviceability governs

Mom Strength Codes:
C - Compact
B - Braced non-compact
U - Unbraced non-compact
T - Transition between compact and braced non-compact
S - Serviceability

Noncompact shapes ratings based on stress, as

$$IR = \frac{Fb - \text{factored dead load stress}}{\text{factored LL+I stress}}$$

Operating rating for Strength II is

$$OR = \frac{Fb - \text{factored dead load stress}}{\text{factored LL+I stress}}$$

Inventory rating for Strength II is

$$IR = OR/(LL+I \text{ factor})$$

I-295 HH BUCKMAN BRIDGE -720249
Girder 6 : Rating Output : Lrfd Ratings
Mon Mar 30 09:49:06 2015

[This table uses the rating equation (6A.4.2.1-1) of the 2011 edition of the Manual for Bridge Evaluation.]

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Strength I

Span 1

Location	Compct Mom Cap/Noncmpt Allow Stress	Shear Capacity	Rating Factors Bending Inv.	Bending Oper.	Shear Inv.	Shear Oper.
0.00	36000. B	347.57	>999.00 B	>999.00	1.20	1.56
18.33	36000. B	461.91	3.08 B	3.99	2.74	3.55
36.67	36000. B	476.29	1.65 B	2.14	3.53	4.57
38.00L	36000. B	477.22	1.61 B	2.08	3.60	4.67
38.00R	36000. B	477.34	1.95 B	2.52	3.61	4.67
55.00	36000. B	435.91	1.57 B	2.03	4.41	5.71
73.33	36000. B	447.75	1.62 B	2.10	4.77	6.18
91.67	36000. B	514.98	1.96 B	2.53	4.16	5.39
94.00L	36000. B	520.37	2.05 B	2.66	4.09	5.30
94.00R	36000. B	520.76	1.91 B	2.48	4.09	5.30
110.00	36000. B	559.21	2.82 B	3.65	3.74	4.85
128.33	35178. B	695.47	3.29 B	4.27	3.74	4.84
146.67	30325. B	842.04	2.10 B	2.73	4.12	5.34
155.33L	28997. B	928.08	1.67 B	2.16	4.15	5.38
155.33R	28970. B	929.75	2.59 B	3.36	4.16	5.39
165.00	30888. B	1380.66	2.66 B	3.44	5.87	7.61
183.33	35100. B	1263.48	1.27 B	1.64	4.04	5.23

Span 2

Location	Compct Mom Cap/Noncmpt Allow Stress	Shear Capacity	Rating Factors Bending Inv.	Bending Oper.	Shear Inv.	Shear Oper.
0.00	35100. B	1274.84	1.27 B	1.64	4.08	5.29
21.00L	35318. B	923.38	2.32 B	3.00	2.81	3.64
21.00R	35318. B	922.51	1.41 B	1.83	2.81	3.64
25.00	35201. B	902.13	1.64 B	2.13	3.40	4.40
50.00	35252. B	789.55	3.90 B	5.06	3.78	4.90
75.00	36000. B	588.76	3.10 B	4.02	3.22	4.17
76.00L	36000. B	587.44	3.02 B	3.92	3.25	4.21
76.00R	36000. B	587.20	3.22 B	4.17	3.25	4.21
99.50L	36000. B	506.39	1.92 B	2.48	4.25	5.51
99.50R	36000. B	506.31	2.23 B	2.89	4.25	5.51
100.00	36000. B	506.10	2.21 B	2.87	4.30	5.58
125.00L	36000. B	502.51	1.87 B	2.42	5.40	7.00
125.00R	36000. B	502.55	1.87 B	2.42	5.40	7.01
150.00	36000. B	521.48	2.25 B	2.92	4.63	6.00
174.00L	36000. B	626.29	3.30 B	4.28	3.65	4.73
174.00R	36000. B	626.70	3.10 B	4.02	3.65	4.73
150.50L	36000. B	522.06	2.27 B	2.94	4.62	5.99
150.50R	36000. B	522.30	1.96 B	2.54	4.63	6.00
175.00	36000. B	628.95	3.18 B	4.13	3.62	4.69

200.00	35218.	B	865.31	3.91	B	5.07	4.73	6.13
225.00	30827.	B	1008.02	1.60	B	2.07	4.45	5.76
229.00L	30520.	B	1033.20	1.35	B	1.75	4.34	5.63
229.00R	30506.	B	1034.27	2.21	B	2.87	4.35	5.63
250.00	30888.	B	1415.29	1.29	B	1.67	4.70	6.09

Span 3

Location	Compct Mom Cap/Noncmpt Allow Stress		Shear Capacity	Rating Factors Bending Inv.		Bending Oper.	Shear Inv.	Shear Oper.
0.00	30888.	B	1416.13	1.29	B	1.67	4.45	5.76
18.33	32862.	B	1199.86	2.05	B	2.66	4.44	5.76
28.00L	32494.	B	765.29	2.36	B	3.06	2.45	3.17
28.00R	32508.	B	763.96	1.44	B	1.87	2.44	3.17
36.67	32339.	B	695.47	1.82	B	2.35	2.28	2.95
55.00	35223.	B	600.54	3.11	B	4.03	2.58	3.35
73.33	36000.	B	514.98	2.78	B	3.60	2.34	3.04
89.33L	36000.	B	504.07	1.94	B	2.51	3.11	4.03
89.33R	36000.	B	503.96	2.08	B	2.69	3.11	4.03
91.67	36000.	B	502.42	2.00	B	2.59	3.20	4.14
110.00	36000.	B	435.91	1.63	B	2.11	3.01	3.90
128.33	36000.	B	476.29	1.55	B	2.01	4.11	5.32
145.33L	36000.	B	463.01	1.91	B	2.48	3.17	4.11
145.33R	36000.	B	462.88	1.57	B	2.04	3.17	4.11
146.67	36000.	B	461.91	1.62	B	2.10	3.12	4.05
165.00	36000.	B	484.57	2.99	B	3.87	2.97	3.85
183.33	36000.	B	338.37	>999.00	B	>999.00	1.17	1.51

Service II

Span 1

Location	Allowable Stress		Rating Factors Bending Inv.		Bending Oper.
0.00	34200.	S	> 999.00	B	>999.00
18.33	34200.	S	4.14	B	5.38
36.67	34200.	S	2.33	B	3.03
38.00L	34200.	S	2.27	B	2.96
38.00R	34200.	S	2.71	B	3.52
55.00	34200.	S	2.21	B	2.88
73.33	34200.	S	2.26	B	2.93
91.67	34200.	S	2.64	B	3.43
94.00L	34200.	S	2.75	B	3.58
94.00R	34200.	S	2.57	B	3.35
110.00	34200.	S	3.66	B	4.75
128.33	34200.	S	4.99	B	6.48
146.67	34200.	S	4.20	B	5.45
155.33L	34200.	S	3.81	B	4.95
155.33R	34200.	S	5.33	B	6.93
165.00	34200.	S	5.18	B	6.73
183.33	34200.	S	2.33	B	3.03

Span 2

Location	Allowable Stress		Rating Factors Bending Inv.		Bending Oper.
0.00	34200.	S	2.33	B	3.03
21.00L	34200.	S	3.76	B	4.89
21.00R	34200.	S	2.52	B	3.28

25.00	34200. S	2.86	B	3.72
50.00	34200. S	6.00	B	7.80
75.00	34200. S	4.07	B	5.29
76.00L	34200. S	3.97	B	5.16
76.00R	34200. S	4.22	B	5.49
99.50L	34200. S	2.64	B	3.43
99.50R	34200. S	3.03	B	3.94
100.00	34200. S	3.02	B	3.92
125.00L	34200. S	2.60	B	3.38
125.00R	34200. S	2.60	B	3.38
150.00	34200. S	3.06	B	3.98
174.00L	34200. S	4.32	B	5.62
174.00R	34200. S	4.07	B	5.29
150.50L	34200. S	3.08	B	4.01
150.50R	34200. S	2.68	B	3.49
175.00	34200. S	4.17	B	5.42
200.00	34200. S	6.02	B	7.82
225.00	34200. S	3.44	B	4.47
229.00L	34200. S	3.10	B	4.04
229.00R	34200. S	4.46	B	5.80
250.00	34200. S	2.95	B	3.84

Span 3

Location	Allowable Stress	Rating Factors Bending Inv.	Oper.
0.00	34200. S	2.95 B	3.84
18.33	34200. S	3.81 B	4.95
28.00L	34200. S	4.25 B	5.52
28.00R	34200. S	2.88 B	3.75
36.67	34200. S	3.43 B	4.46
55.00	34200. S	4.72 B	6.14
73.33	34200. S	3.61 B	4.69
89.33L	34200. S	2.61 B	3.40
89.33R	34200. S	2.80 B	3.64
91.67	34200. S	2.70 B	3.51
110.00	34200. S	2.28 B	2.96
128.33	34200. S	2.20 B	2.86
145.33L	34200. S	2.67 B	3.47
145.33R	34200. S	2.24 B	2.91
146.67	34200. S	2.29 B	2.98
165.00	34200. S	4.03 B	5.24
183.33	34200. S	> 999.00 B	>999.00

****
Minimum rating is 1.17 at location 183.33 in span 3.
****

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Strength II

Span 1

Location	Allowable	Shear	Rating Factors Bending Inv.	Oper.	Shear Inv.	Oper.
0.00	36000. B	347.57	>999.00		1.18	
18.33	36000. B	461.91	3.53		3.12	
36.67	36000. B	476.29	1.94		4.55	
38.00L	36000. B	477.22	1.88		4.66	
38.00R	36000. B	477.34	2.28		4.66	

55.00	36000. B	435.91	1.88	5.24
73.33	36000. B	447.75	1.96	3.97
91.67	36000. B	514.98	2.39	3.50
94.00L	36000. B	520.37	2.51	3.45
94.00R	36000. B	520.76	2.34	3.46
110.00	36000. B	559.21	3.42	3.36
128.33	35178. B	695.47	5.36	3.47
146.67	30325. B	842.04	3.53	3.97
155.33L	28997. B	928.08	2.90	4.37
155.33R	28970. B	929.75	4.52	4.38
165.00	30888. B	1380.66	4.86	7.12
183.33	35100. B	1263.48	2.60	4.81

Span 2

Location	Allowable	Shear	Rating Factors Bending		Shear	
			Inv.	Oper.	Inv.	Oper.
0.00	35100. B	1274.84	2.60		4.89	
21.00L	35318. B	923.38	4.23		4.22	
21.00R	35318. B	922.51	2.57		4.21	
25.00	35201. B	902.13	2.92		4.30	
50.00	35252. B	789.55	5.87		4.68	
75.00	36000. B	588.76	3.61		3.52	
76.00L	36000. B	587.44	3.52		3.55	
76.00R	36000. B	587.20	3.75		3.55	
99.50L	36000. B	506.39	2.33		4.51	
99.50R	36000. B	506.31	2.71		4.51	
100.00	36000. B	506.10	2.69		4.57	
125.00L	36000. B	502.51	2.30		6.73	
125.00R	36000. B	502.55	2.30		6.73	
150.00	36000. B	521.48	2.74		5.78	
174.00L	36000. B	626.29	3.85		4.45	
174.00R	36000. B	626.70	3.63		4.45	
150.50L	36000. B	522.06	2.76		5.69	
150.50R	36000. B	522.30	2.38		5.69	
175.00	36000. B	628.95	3.72		4.42	
200.00	35218. B	865.31	5.85		6.05	
225.00	30827. B	1008.02	2.65		5.81	
229.00L	30520. B	1033.20	2.30		5.61	
229.00R	30506. B	1034.27	3.76		5.62	
250.00	30888. B	1415.29	2.48		5.61	

Span 3

Location	Allowable	Shear	Rating Factors Bending		Shear	
			Inv.	Oper.	Inv.	Oper.
0.00	30888. B	1416.13	2.48		5.59	
18.33	32862. B	1199.86	4.04		5.47	
28.00L	32494. B	765.29	4.28		3.15	
28.00R	32508. B	763.96	2.61		3.14	
36.67	32339. B	695.47	3.09		2.96	
55.00	35223. B	600.54	5.05		3.15	
73.33	36000. B	514.98	3.35		3.02	
89.33L	36000. B	504.07	2.35		3.78	
89.33R	36000. B	503.96	2.52		3.78	
91.67	36000. B	502.42	2.42		3.87	
110.00	36000. B	435.91	1.96		3.70	
128.33	36000. B	476.29	1.84		4.41	
145.33L	36000. B	463.01	2.23		3.58	
145.33R	36000. B	462.88	1.83		3.58	
146.67	36000. B	461.91	1.88		3.52	
165.00	36000. B	484.57	3.40		3.16	
183.33	36000. B	338.37	>999.00		1.14	

Service II

Span 1

Location	Allowable Stress	Rating Factors Bending Inv.		Oper.	
0.00	34200. S	> 999.00	B	>999.00	
18.33	34200. S	4.76	B	4.76	
36.67	34200. S	2.74	B	2.74	
38.00L	34200. S	2.67	B	2.67	
38.00R	34200. S	3.18	B	3.18	
55.00	34200. S	2.66	B	2.66	
73.33	34200. S	2.75	B	2.75	
91.67	34200. S	3.24	B	3.24	
94.00L	34200. S	3.37	B	3.37	
94.00R	34200. S	3.16	B	3.16	
110.00	34200. S	4.45	B	4.45	
128.33	34200. S	7.54	B	8.14	
146.67	34200. S	7.06	B	7.06	
155.33L	34200. S	6.65	B	6.65	
155.33R	34200. S	9.32	B	9.32	
165.00	34200. S	9.51	B	9.51	
183.33	34200. S	4.78	B	4.78	

Span 2

Location	Allowable Stress	Rating Factors Bending Inv.		Oper.	
0.00	34200. S	4.78	B	4.78	
21.00L	34200. S	6.88	B	6.88	
21.00R	34200. S	4.61	B	4.61	
25.00	34200. S	5.11	B	5.11	
50.00	34200. S	9.05	B	9.05	
75.00	34200. S	4.75	B	4.75	
76.00L	34200. S	4.64	B	4.64	
76.00R	34200. S	4.94	B	4.94	
99.50L	34200. S	3.22	B	3.22	
99.50R	34200. S	3.70	B	3.70	
100.00	34200. S	3.68	B	3.68	
125.00L	34200. S	3.21	B	3.21	
125.00R	34200. S	3.21	B	3.21	
150.00	34200. S	3.74	B	3.74	
174.00L	34200. S	5.06	B	5.06	
174.00R	34200. S	4.77	B	4.77	
150.50L	34200. S	3.76	B	3.76	
150.50R	34200. S	3.28	B	3.28	
175.00	34200. S	4.87	B	4.87	
200.00	34200. S	9.01	B	9.01	
225.00	34200. S	5.73	B	5.73	
229.00L	34200. S	5.30	B	5.30	
229.00R	34200. S	7.60	B	7.60	
250.00	34200. S	5.70	B	5.70	

Span 3

Location	Allowable Stress	Rating Factors Bending Inv.		Oper.	
0.00	34200. S	5.70	B	5.70	
18.33	34200. S	7.51	B	7.51	

28.00L	34200.	S	7.71	B	7.71
28.00R	34200.	S	5.24	B	5.24
36.67	34200.	S	5.84	B	5.84
55.00	34200.	S	7.28	B	7.69
73.33	34200.	S	4.36	B	4.36
89.33L	34200.	S	3.18	B	3.18
89.33R	34200.	S	3.40	B	3.40
91.67	34200.	S	3.29	B	3.29
110.00	34200.	S	2.75	B	2.75
128.33	34200.	S	2.62	B	2.62
145.33L	34200.	S	3.12	B	3.12
145.33R	34200.	S	2.61	B	2.61
146.67	34200.	S	2.68	B	2.68
165.00	34200.	S	4.60	B	4.60
183.33	34200.	S	> 999.00	B	>999.00

****
Minimum rating is 1.14 at location 183.33 in span 3.
****

Rating Codes:
T - Top steel governs
B - Bottom steel governs
C - Concrete governs
R - Rebar governs
V - Shear governs
S - Serviceability governs

Mom Strength Codes:
C - Compact
B - Braced non-compact
U - Unbraced non-compact
T - Transition between compact and braced non-compact
S - Serviceability

Noncompact shapes ratings based on stress, as

$$IR = \frac{Fb - \text{factored dead load stress}}{\text{factored LL+I stress}}$$

Operating rating for Strength II is

$$OR = \frac{Fb - \text{factored dead load stress}}{\text{factored LL+I stress}}$$

Inventory rating for Strength II is

$$IR = OR/(LL+I \text{ factor})$$

I-295 HH BUCKMAN BRIDGE -720249
Girder 7 : Rating Output : Lrfd Ratings
Mon Mar 30 09:49:22 2015

[This table uses the rating equation (6A.4.2.1-1) of the 2011 edition of the Manual for Bridge Evaluation.]

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Strength I

Span 1

Location	Compct Mom Cap/Noncmpt Allow Stress	Shear Capacity	Rating Factors Bending Inv.	Bending Oper.	Shear Inv.	Shear Oper.
0.00	36000. B	347.57	>999.00 B	>999.00	1.15	1.49
18.33	36000. B	461.91	2.88 B	3.74	2.56	3.32
36.67	36000. B	476.29	1.57 B	2.04	3.29	4.27
38.00L	36000. B	477.22	1.53 B	1.98	3.36	4.35
38.00R	36000. B	477.34	1.84 B	2.38	3.36	4.36
55.00	36000. B	435.91	1.48 B	1.92	4.01	5.20
73.33	36000. B	447.75	1.50 B	1.94	4.67	6.06
91.67	36000. B	514.98	1.77 B	2.30	4.11	5.33
94.00L	36000. B	520.37	1.85 B	2.40	4.04	5.23
94.00R	36000. B	520.76	1.73 B	2.24	4.04	5.24
110.00	36000. B	559.21	2.45 B	3.18	3.66	4.74
128.33	35178. B	695.47	2.75 B	3.57	3.66	4.75
146.67	30325. B	842.04	1.88 B	2.44	4.00	5.19
155.33L	28997. B	928.08	1.58 B	2.04	4.04	5.23
155.33R	28970. B	929.75	2.39 B	3.10	4.05	5.24
165.00	30888. B	1380.66	2.57 B	3.33	5.70	7.38
183.33	35100. B	1263.48	1.34 B	1.74	3.94	5.11

Span 2

Location	Compct Mom Cap/Noncmpt Allow Stress	Shear Capacity	Rating Factors Bending Inv.	Bending Oper.	Shear Inv.	Shear Oper.
0.00	35100. B	1274.84	1.34 B	1.74	3.88	5.03
21.00L	35318. B	923.38	2.32 B	3.00	2.80	3.63
21.00R	35318. B	922.51	1.45 B	1.89	2.79	3.62
25.00	35201. B	902.13	1.66 B	2.15	3.34	4.32
50.00	35252. B	789.55	3.44 B	4.46	3.64	4.71
75.00	36000. B	588.76	2.71 B	3.51	3.04	3.94
76.00L	36000. B	587.44	2.64 B	3.42	3.07	3.98
76.00R	36000. B	587.20	2.81 B	3.64	3.07	3.98
99.50L	36000. B	506.39	1.71 B	2.21	3.82	4.95
99.50R	36000. B	506.31	1.97 B	2.56	3.82	4.95
100.00	36000. B	506.10	1.96 B	2.54	3.86	5.01
125.00L	36000. B	502.51	1.68 B	2.17	5.00	6.49
125.00R	36000. B	502.55	1.68 B	2.17	5.00	6.49
150.00	36000. B	521.48	1.99 B	2.58	4.30	5.57
174.00L	36000. B	626.29	2.85 B	3.70	3.49	4.53
174.00R	36000. B	626.70	2.68 B	3.48	3.50	4.53
150.50L	36000. B	522.06	2.00 B	2.60	4.29	5.57
150.50R	36000. B	522.30	1.74 B	2.25	4.30	5.57
175.00	36000. B	628.95	2.75 B	3.57	3.46	4.49

200.00	35218.	B	865.31	3.48	B	4.51	4.54	5.88
225.00	30827.	B	1008.02	1.64	B	2.12	4.25	5.50
229.00L	30520.	B	1033.20	1.41	B	1.83	4.15	5.38
229.00R	30506.	B	1034.27	2.24	B	2.90	4.16	5.39
250.00	30888.	B	1415.29	1.36	B	1.76	4.52	5.86

Span 3

Location	Compct Mom Cap/Noncmpt Allow Stress		Shear Capacity	Rating Factors Bending			Shear	
				Inv.		Oper.	Inv.	Oper.
0.00	30888.	B	1416.13	1.36	B	1.76	4.28	5.55
18.33	32862.	B	1199.86	2.07	B	2.68	4.37	5.67
28.00L	32494.	B	765.29	2.23	B	2.89	2.44	3.17
28.00R	32508.	B	763.96	1.40	B	1.82	2.44	3.16
36.67	32339.	B	695.47	1.65	B	2.14	2.28	2.95
55.00	35223.	B	600.54	2.58	B	3.35	2.59	3.36
73.33	36000.	B	514.98	2.44	B	3.16	2.34	3.03
89.33L	36000.	B	504.07	1.76	B	2.28	3.06	3.97
89.33R	36000.	B	503.96	1.89	B	2.44	3.06	3.97
91.67	36000.	B	502.42	1.82	B	2.36	3.15	4.08
110.00	36000.	B	435.91	1.51	B	1.96	2.96	3.83
128.33	36000.	B	476.29	1.47	B	1.90	3.90	5.05
145.33L	36000.	B	463.01	1.80	B	2.34	3.08	3.99
145.33R	36000.	B	462.88	1.49	B	1.94	3.08	3.99
146.67	36000.	B	461.91	1.54	B	1.99	3.03	3.93
165.00	36000.	B	484.57	2.80	B	3.63	2.79	3.61
183.33	36000.	B	338.37	>999.00	B	>999.00	1.12	1.45

Service II

Span 1

Location	Allowable Stress		Rating Factors Bending			
			Inv.		Oper.	
0.00	34200.	S	> 999.00	B	>999.00	
18.33	34200.	S	3.87	B	5.03	
36.67	34200.	S	2.20	B	2.86	
38.00L	34200.	S	2.14	B	2.78	
38.00R	34200.	S	2.54	B	3.30	
55.00	34200.	S	2.07	B	2.70	
73.33	34200.	S	2.07	B	2.70	
91.67	34200.	S	2.38	B	3.10	
94.00L	34200.	S	2.47	B	3.22	
94.00R	34200.	S	2.31	B	3.01	
110.00	34200.	S	3.18	B	4.14	
128.33	34200.	S	4.15	B	5.40	
146.67	34200.	S	3.68	B	4.79	
155.33L	34200.	S	3.49	B	4.53	
155.33R	34200.	S	4.83	B	6.28	
165.00	34200.	S	4.92	B	6.39	
183.33	34200.	S	2.38	B	3.09	

Span 2

Location	Allowable Stress		Rating Factors Bending			
			Inv.		Oper.	
0.00	34200.	S	2.38	B	3.09	
21.00L	34200.	S	3.71	B	4.82	
21.00R	34200.	S	2.53	B	3.29	

25.00	34200. S	2.84 B	3.69	
50.00	34200. S	5.29 B	6.88	
75.00	34200. S	3.54 B	4.60	
76.00L	34200. S	3.46 B	4.49	
76.00R	34200. S	3.67 B	4.78	
99.50L	34200. S	2.33 B	3.03	
99.50R	34200. S	2.67 B	3.48	
100.00	34200. S	2.66 B	3.45	
125.00L	34200. S	2.31 B	3.01	
125.00R	34200. S	2.31 B	3.01	
150.00	34200. S	2.69 B	3.50	
174.00L	34200. S	3.72 B	4.84	
174.00R	34200. S	3.51 B	4.56	
150.50L	34200. S	2.71 B	3.52	
150.50R	34200. S	2.36 B	3.07	
175.00	34200. S	3.59 B	4.67	
200.00	34200. S	5.34 B	6.94	
225.00	34200. S	3.42 B	4.45	
229.00L	34200. S	3.12 B	4.05	
229.00R	34200. S	4.41 B	5.73	
250.00	34200. S	2.98 B	3.87	

Span 3

Location	Allowable Stress	Rating Factors Bending	
		Inv.	Oper.
0.00	34200. S	2.98 B	3.87
18.33	34200. S	3.76 B	4.88
28.00L	34200. S	3.94 B	5.12
28.00R	34200. S	2.72 B	3.54
36.67	34200. S	3.05 B	3.96
55.00	34200. S	3.91 B	5.08
73.33	34200. S	3.17 B	4.12
89.33L	34200. S	2.36 B	3.07
89.33R	34200. S	2.53 B	3.28
91.67	34200. S	2.45 B	3.18
110.00	34200. S	2.09 B	2.72
128.33	34200. S	2.06 B	2.67
145.33L	34200. S	2.50 B	3.24
145.33R	34200. S	2.10 B	2.73
146.67	34200. S	2.16 B	2.80
165.00	34200. S	3.76 B	4.89
183.33	34200. S	> 999.00 B	>999.00

****
Minimum rating is 1.12 at location 183.33 in span 3.
****

Permit

Strength II

Span 1

Location	Allowable	Shear	Rating Factors Bending		Shear	
			Inv.	Oper.	Inv.	Oper.
0.00	36000. B	347.57	>999.00			1.16
18.33	36000. B	461.91	3.35			2.88
36.67	36000. B	476.29	1.87			4.10
38.00L	36000. B	477.22	1.82			4.19
38.00R	36000. B	477.34	2.19			4.19

55.00	36000. B	435.91	1.80	4.73
73.33	36000. B	447.75	1.85	3.86
91.67	36000. B	514.98	2.21	3.44
94.00L	36000. B	520.37	2.31	3.39
94.00R	36000. B	520.76	2.15	3.40
110.00	36000. B	559.21	3.07	3.27
128.33	35178. B	695.47	4.47	3.39
146.67	30325. B	842.04	3.12	3.85
155.33L	28997. B	928.08	2.67	4.21
155.33R	28970. B	929.75	4.06	4.22
165.00	30888. B	1380.66	4.47	6.76
183.33	35100. B	1263.48	2.69	4.66

Span 2

Location	Allowable	Shear	Rating Factors Bending		Shear	
			Inv.	Oper.	Inv.	Oper.
0.00	35100. B	1274.84	2.69		4.74	
21.00L	35318. B	923.38	4.24		4.08	
21.00R	35318. B	922.51	2.66		4.08	
25.00	35201. B	902.13	2.97		4.15	
50.00	35252. B	789.55	5.08		4.47	
75.00	36000. B	588.76	3.24		3.36	
76.00L	36000. B	587.44	3.16		3.38	
76.00R	36000. B	587.20	3.36		3.38	
99.50L	36000. B	506.39	2.12		4.15	
99.50R	36000. B	506.31	2.45		4.15	
100.00	36000. B	506.10	2.44		4.20	
125.00L	36000. B	502.51	2.10		6.03	
125.00R	36000. B	502.55	2.10		6.03	
150.00	36000. B	521.48	2.47		5.31	
174.00L	36000. B	626.29	3.43		4.25	
174.00R	36000. B	626.70	3.23		4.25	
150.50L	36000. B	522.06	2.49		5.24	
150.50R	36000. B	522.30	2.16		5.24	
175.00	36000. B	628.95	3.30		4.23	
200.00	35218. B	865.31	5.11		5.80	
225.00	30827. B	1008.02	2.68		5.50	
229.00L	30520. B	1033.20	2.39		5.33	
229.00R	30506. B	1034.27	3.78		5.34	
250.00	30888. B	1415.29	2.72		5.45	

Span 3

Location	Allowable	Shear	Rating Factors Bending		Shear	
			Inv.	Oper.	Inv.	Oper.
0.00	30888. B	1416.13	2.72		5.36	
18.33	32862. B	1199.86	3.82		5.32	
28.00L	32494. B	765.29	3.88		3.07	
28.00R	32508. B	763.96	2.44		3.07	
36.67	32339. B	695.47	2.75		2.89	
55.00	35223. B	600.54	4.17		3.08	
73.33	36000. B	514.98	3.02		2.93	
89.33L	36000. B	504.07	2.17		3.68	
89.33R	36000. B	503.96	2.33		3.68	
91.67	36000. B	502.42	2.25		3.77	
110.00	36000. B	435.91	1.85		3.58	
128.33	36000. B	476.29	1.77		4.10	
145.33L	36000. B	463.01	2.13		3.31	
145.33R	36000. B	462.88	1.77		3.31	
146.67	36000. B	461.91	1.82		3.26	
165.00	36000. B	484.57	3.23		2.99	
183.33	36000. B	338.37	>999.00		1.11	

Service II

Span 1

Location	Allowable Stress	Rating Factors Bending Inv.		Oper.	
0.00	34200. S	> 999.00	B	>999.00	
18.33	34200. S	4.50	B	4.50	
36.67	34200. S	2.63	B	2.63	
38.00L	34200. S	2.56	B	2.56	
38.00R	34200. S	3.04	B	3.04	
55.00	34200. S	2.52	B	2.52	
73.33	34200. S	2.57	B	2.57	
91.67	34200. S	2.98	B	2.98	
94.00L	34200. S	3.10	B	3.10	
94.00R	34200. S	2.90	B	2.90	
110.00	34200. S	3.99	B	3.99	
128.33	34200. S	6.58	B	6.76	
146.67	34200. S	6.12	B	6.12	
155.33L	34200. S	5.92	B	5.92	
155.33R	34200. S	8.20	B	8.20	
165.00	34200. S	8.59	B	8.59	
183.33	34200. S	4.78	B	4.78	

Span 2

Location	Allowable Stress	Rating Factors Bending Inv.		Oper.	
0.00	34200. S	4.78	B	4.78	
21.00L	34200. S	6.81	B	6.81	
21.00R	34200. S	4.65	B	4.65	
25.00	34200. S	5.09	B	5.09	
50.00	34200. S	7.83	B	7.83	
75.00	34200. S	4.24	B	4.24	
76.00L	34200. S	4.15	B	4.15	
76.00R	34200. S	4.41	B	4.41	
99.50L	34200. S	2.90	B	2.90	
99.50R	34200. S	3.33	B	3.33	
100.00	34200. S	3.31	B	3.31	
125.00L	34200. S	2.91	B	2.91	
125.00R	34200. S	2.91	B	2.91	
150.00	34200. S	3.36	B	3.36	
174.00L	34200. S	4.49	B	4.49	
174.00R	34200. S	4.23	B	4.23	
150.50L	34200. S	3.37	B	3.37	
150.50R	34200. S	2.95	B	2.95	
175.00	34200. S	4.32	B	4.32	
200.00	34200. S	7.86	B	7.86	
225.00	34200. S	5.62	B	5.62	
229.00L	34200. S	5.29	B	5.29	
229.00R	34200. S	7.47	B	7.47	
250.00	34200. S	5.98	B	5.98	

Span 3

Location	Allowable Stress	Rating Factors Bending Inv.		Oper.	
0.00	34200. S	5.98	B	5.98	
18.33	34200. S	6.94	B	6.94	

28.00L	34200.	S	6.87	B	6.87
28.00R	34200.	S	4.75	B	4.75
36.67	34200.	S	5.10	B	5.10
55.00	34200.	S	6.33	B	6.33
73.33	34200.	S	3.93	B	3.93
89.33L	34200.	S	2.93	B	2.93
89.33R	34200.	S	3.13	B	3.13
91.67	34200.	S	3.03	B	3.03
110.00	34200.	S	2.57	B	2.57
128.33	34200.	S	2.48	B	2.48
145.33L	34200.	S	2.96	B	2.96
145.33R	34200.	S	2.49	B	2.49
146.67	34200.	S	2.56	B	2.56
165.00	34200.	S	4.35	B	4.35
183.33	34200.	S	> 999.00	B	>999.00

****
Minimum rating is 1.11 at location 183.33 in span 3.
****

Rating Codes:
T - Top steel governs
B - Bottom steel governs
C - Concrete governs
R - Rebar governs
V - Shear governs
S - Serviceability governs

Mom Strength Codes:
C - Compact
B - Braced non-compact
U - Unbraced non-compact
T - Transition between compact and braced non-compact
S - Serviceability

Noncompact shapes ratings based on stress, as

$$IR = \frac{Fb - \text{factored dead load stress}}{\text{factored LL+I stress}}$$

Operating rating for Strength II is

$$OR = \frac{Fb - \text{factored dead load stress}}{\text{factored LL+I stress}}$$

Inventory rating for Strength II is

$$IR = OR/(LL+I \text{ factor})$$

I-295 HH BUCKMAN BRIDGE -720249
Girder 8 : Rating Output : Lrfd Ratings
Mon Mar 30 09:49:37 2015

[This table uses the rating equation (6A.4.2.1-1)
of the 2011 edition of the Manual for Bridge
Evaluation.]

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Strength I

Span 1

Location	Compct Mom Cap/Noncmpt Allow Stress	Shear Capacity	Rating Factors Bending Inv.	Bending Oper.	Shear Inv.	Shear Oper.
0.00	36000. B	347.57	>999.00 B	>999.00	1.51	1.96
18.33	36000. B	461.91	3.13 B	4.05	2.94	3.81
36.67	36000. B	476.29	1.60 B	2.07	4.24	5.50
38.00L	36000. B	477.22	1.55 B	2.01	4.35	5.63
38.00R	36000. B	477.34	1.85 B	2.40	4.35	5.64
55.00	36000. B	435.91	1.49 B	1.93	5.21	6.75
73.33	36000. B	447.75	1.45 B	1.88	5.33	6.91
91.67	36000. B	514.98	1.70 B	2.21	4.63	6.00
94.00L	36000. B	520.37	1.77 B	2.30	4.52	5.86
94.00R	36000. B	520.76	1.66 B	2.15	4.53	5.87
110.00	36000. B	559.21	2.29 B	2.97	3.89	5.05
128.33	35184. B	695.47	2.47 B	3.20	4.07	5.27
146.67	30537. B	842.04	1.77 B	2.30	4.11	5.32
155.33L	29239. B	928.08	1.52 B	1.97	4.22	5.47
155.33R	29213. B	929.75	2.26 B	2.93	4.23	5.48
165.00	35058. B	1380.66	2.88 B	3.73	6.21	8.05
183.33	35105. B	1263.48	1.34 B	1.74	4.97	6.45

Span 2

Location	Compct Mom Cap/Noncmpt Allow Stress	Shear Capacity	Rating Factors Bending Inv.	Bending Oper.	Shear Inv.	Shear Oper.
0.00	35105. B	1274.84	1.34 B	1.74	4.68	6.06
21.00L	35322. B	923.38	2.20 B	2.85	3.54	4.58
21.00R	35322. B	922.51	1.42 B	1.84	3.53	4.58
25.00	35208. B	902.13	1.60 B	2.07	3.66	4.74
50.00	35258. B	789.55	3.03 B	3.92	3.93	5.10
75.00	36000. B	588.76	2.63 B	3.40	3.92	5.08
76.00L	36000. B	587.44	2.56 B	3.32	3.96	5.14
76.00R	36000. B	587.20	2.72 B	3.53	3.96	5.14
99.50L	36000. B	506.39	1.72 B	2.22	4.44	5.76
99.50R	36000. B	506.31	1.97 B	2.56	4.44	5.76
100.00	36000. B	506.10	1.96 B	2.54	4.46	5.79
125.00L	36000. B	502.51	1.68 B	2.17	6.36	8.24
125.00R	36000. B	502.55	1.68 B	2.17	6.36	8.24
150.00	36000. B	521.48	1.97 B	2.55	4.78	6.20
174.00L	36000. B	626.29	2.72 B	3.53	4.40	5.71
174.00R	36000. B	626.70	2.57 B	3.33	4.41	5.71
150.50L	36000. B	522.06	1.98 B	2.57	4.76	6.17
150.50R	36000. B	522.30	1.73 B	2.24	4.76	6.17
175.00	36000. B	628.95	2.63 B	3.41	4.37	5.66

200.00	35224.	B	865.31	3.07	B	3.97	4.62	5.99
225.00	31022.	B	1008.02	1.59	B	2.06	4.38	5.67
229.00L	30721.	B	1033.20	1.40	B	1.81	4.35	5.64
229.00R	30708.	B	1034.27	2.15	B	2.79	4.35	5.64
250.00	31030.	B	1415.29	1.37	B	1.78	5.32	6.90

Span 3

Location	Compct Mom Cap/Noncmpt Allow Stress		Shear Capacity	Rating Factors Bending			Shear	
				Inv.		Oper.	Inv.	Oper.
0.00	31030.	B	1416.13	1.37	B	1.78	5.52	7.15
18.33	32968.	B	1199.86	1.97	B	2.56	5.18	6.72
28.00L	32611.	B	765.29	2.11	B	2.73	3.10	4.01
28.00R	32624.	B	763.96	1.37	B	1.77	3.09	4.00
36.67	32498.	B	695.47	1.57	B	2.04	2.95	3.83
55.00	35228.	B	600.54	2.32	B	3.01	3.20	4.14
73.33	36000.	B	514.98	2.30	B	2.99	3.11	4.04
89.33L	36000.	B	504.07	1.70	B	2.21	3.97	5.15
89.33R	36000.	B	503.96	1.82	B	2.36	3.97	5.14
91.67	36000.	B	502.42	1.76	B	2.29	4.09	5.31
110.00	36000.	B	435.91	1.47	B	1.90	4.37	5.66
128.33	36000.	B	476.29	1.47	B	1.91	5.24	6.79
145.33L	36000.	B	463.01	1.81	B	2.35	3.73	4.83
145.33R	36000.	B	462.88	1.51	B	1.96	3.73	4.83
146.67	36000.	B	461.91	1.56	B	2.02	3.64	4.72
165.00	36000.	B	484.57	3.04	B	3.94	3.01	3.91
183.33	36000.	B	338.37	>999.00	B	>999.00	1.47	1.91

Service II

Span 1

Location	Allowable Stress		Rating Factors Bending			
			Inv.		Oper.	
0.00	34200.	S	> 999.00	B	>999.00	
18.33	34200.	S	4.17	B	5.42	
36.67	34200.	S	2.20	B	2.87	
38.00L	34200.	S	2.14	B	2.79	
38.00R	34200.	S	2.52	B	3.28	
55.00	34200.	S	2.05	B	2.67	
73.33	34200.	S	1.99	B	2.58	
91.67	34200.	S	2.28	B	2.96	
94.00L	34200.	S	2.36	B	3.07	
94.00R	34200.	S	2.21	B	2.88	
110.00	34200.	S	2.98	B	3.87	
128.33	34200.	S	3.69	B	4.80	
146.67	34200.	S	3.34	B	4.34	
155.33L	34200.	S	3.20	B	4.16	
155.33R	34200.	S	4.39	B	5.70	
165.00	34200.	S	4.49	B	5.83	
183.33	34200.	S	2.28	B	2.97	

Span 2

Location	Allowable Stress		Rating Factors Bending			
			Inv.		Oper.	
0.00	34200.	S	2.28	B	2.97	
21.00L	34200.	S	3.44	B	4.48	
21.00R	34200.	S	2.39	B	3.11	

25.00	34200. S	2.66 B	3.45	
50.00	34200. S	4.60 B	5.98	
75.00	34200. S	3.42 B	4.44	
76.00L	34200. S	3.34 B	4.34	
76.00R	34200. S	3.55 B	4.61	
99.50L	34200. S	2.32 B	3.02	
99.50R	34200. S	2.65 B	3.44	
100.00	34200. S	2.63 B	3.42	
125.00L	34200. S	2.29 B	2.97	
125.00R	34200. S	2.29 B	2.97	
150.00	34200. S	2.64 B	3.44	
174.00L	34200. S	3.55 B	4.61	
174.00R	34200. S	3.35 B	4.35	
150.50L	34200. S	2.66 B	3.46	
150.50R	34200. S	2.33 B	3.03	
175.00	34200. S	3.42 B	4.45	
200.00	34200. S	4.65 B	6.04	
225.00	34200. S	3.17 B	4.12	
229.00L	34200. S	2.91 B	3.79	
229.00R	34200. S	4.07 B	5.29	
250.00	34200. S	2.83 B	3.68	

Span 3

Location	Allowable Stress	Rating Factors Bending	
		Inv.	Oper.
0.00	34200. S	2.83 B	3.68
18.33	34200. S	3.46 B	4.50
28.00L	34200. S	3.62 B	4.70
28.00R	34200. S	2.53 B	3.30
36.67	34200. S	2.81 B	3.65
55.00	34200. S	3.48 B	4.52
73.33	34200. S	2.99 B	3.88
89.33L	34200. S	2.28 B	2.96
89.33R	34200. S	2.43 B	3.16
91.67	34200. S	2.36 B	3.07
110.00	34200. S	2.01 B	2.62
128.33	34200. S	2.04 B	2.65
145.33L	34200. S	2.48 B	3.23
145.33R	34200. S	2.10 B	2.73
146.67	34200. S	2.16 B	2.81
165.00	34200. S	4.06 B	5.28
183.33	34200. S	> 999.00 B	>999.00

****
Minimum rating is 1.34 at location 183.33 in span 1.
****

Permit

Strength II

Span 1

Location	Allowable	Shear	Rating Factors Bending		Shear	
			Inv.	Oper.	Inv.	Oper.
0.00	36000. B	347.57	>999.00			1.66
18.33	36000. B	461.91	3.83			3.34
36.67	36000. B	476.29	1.95			4.99
38.00L	36000. B	477.22	1.89			5.12
38.00R	36000. B	477.34	2.26			5.12

55.00	36000. B	435.91	1.84	5.95
73.33	36000. B	447.75	1.82	4.96
91.67	36000. B	514.98	2.16	4.57
94.00L	36000. B	520.37	2.26	4.50
94.00R	36000. B	520.76	2.11	4.50
110.00	36000. B	559.21	2.93	4.09
128.33	35184. B	695.47	3.98	4.45
146.67	30537. B	842.04	2.90	4.62
155.33L	29239. B	928.08	2.54	4.93
155.33R	29213. B	929.75	3.77	4.94
165.00	35058. B	1380.66	4.94	7.71
183.33	35105. B	1263.48	2.64	6.27

Span 2

Location	Allowable	Shear	Rating Factors Bending		Shear	
			Inv.	Oper.	Inv.	Oper.
0.00	35105. B	1274.84	2.64			6.09
21.00L	35322. B	923.38	3.98			4.68
21.00R	35322. B	922.51	2.57			4.67
25.00	35208. B	902.13	2.83			4.69
50.00	35258. B	789.55	4.45			4.97
75.00	36000. B	588.76	3.21			4.68
76.00L	36000. B	587.44	3.14			4.72
76.00R	36000. B	587.20	3.33			4.72
99.50L	36000. B	506.39	2.18			5.22
99.50R	36000. B	506.31	2.50			5.22
100.00	36000. B	506.10	2.49			5.24
125.00L	36000. B	502.51	2.15			7.82
125.00R	36000. B	502.55	2.15			7.82
150.00	36000. B	521.48	2.50			5.93
174.00L	36000. B	626.29	3.34			5.47
174.00R	36000. B	626.70	3.15			5.48
150.50L	36000. B	522.06	2.52			5.90
150.50R	36000. B	522.30	2.19			5.91
175.00	36000. B	628.95	3.22			5.43
200.00	35224. B	865.31	4.49			5.84
225.00	31022. B	1008.02	2.58			5.59
229.00L	30721. B	1033.20	2.33			5.57
229.00R	30708. B	1034.27	3.59			5.58
250.00	31030. B	1415.29	2.67			6.95

Span 3

Location	Allowable	Shear	Rating Factors Bending		Shear	
			Inv.	Oper.	Inv.	Oper.
0.00	31030. B	1416.13	2.67			7.12
18.33	32968. B	1199.86	3.59			6.37
28.00L	32611. B	765.29	3.61			3.80
28.00R	32624. B	763.96	2.34			3.80
36.67	32498. B	695.47	2.58			3.61
55.00	35228. B	600.54	3.72			3.82
73.33	36000. B	514.98	2.92			3.77
89.33L	36000. B	504.07	2.15			4.69
89.33R	36000. B	503.96	2.30			4.69
91.67	36000. B	502.42	2.22			4.83
110.00	36000. B	435.91	1.83			5.19
128.33	36000. B	476.29	1.81			5.37
145.33L	36000. B	463.01	2.19			3.84
145.33R	36000. B	462.88	1.83			3.84
146.67	36000. B	461.91	1.89			3.77
165.00	36000. B	484.57	3.70			3.43
183.33	36000. B	338.37	>999.00			1.60

Service II

Span 1

Location	Allowable Stress	Rating Factors Bending Inv.		Oper.	
0.00	34200. S	> 999.00	B	>999.00	
18.33	34200. S	5.12	B	5.12	
36.67	34200. S	2.70	B	2.70	
38.00L	34200. S	2.62	B	2.62	
38.00R	34200. S	3.09	B	3.09	
55.00	34200. S	2.55	B	2.55	
73.33	34200. S	2.50	B	2.50	
91.67	34200. S	2.90	B	2.90	
94.00L	34200. S	3.01	B	3.01	
94.00R	34200. S	2.82	B	2.82	
110.00	34200. S	3.81	B	3.81	
128.33	34200. S	5.96	B	5.96	
146.67	34200. S	5.48	B	5.48	
155.33L	34200. S	5.35	B	5.35	
155.33R	34200. S	7.34	B	7.34	
165.00	34200. S	7.72	B	7.72	
183.33	34200. S	4.50	B	4.50	

Span 2

Location	Allowable Stress	Rating Factors Bending Inv.		Oper.	
0.00	34200. S	4.50	B	4.50	
21.00L	34200. S	6.25	B	6.25	
21.00R	34200. S	4.34	B	4.34	
25.00	34200. S	4.71	B	4.71	
50.00	34200. S	6.79	B	6.79	
75.00	34200. S	4.19	B	4.19	
76.00L	34200. S	4.10	B	4.10	
76.00R	34200. S	4.35	B	4.35	
99.50L	34200. S	2.95	B	2.95	
99.50R	34200. S	3.37	B	3.37	
100.00	34200. S	3.35	B	3.35	
125.00L	34200. S	2.94	B	2.94	
125.00R	34200. S	2.94	B	2.94	
150.00	34200. S	3.37	B	3.37	
174.00L	34200. S	4.37	B	4.37	
174.00R	34200. S	4.12	B	4.12	
150.50L	34200. S	3.38	B	3.38	
150.50R	34200. S	2.97	B	2.97	
175.00	34200. S	4.21	B	4.21	
200.00	34200. S	6.83	B	6.83	
225.00	34200. S	5.15	B	5.15	
229.00L	34200. S	4.87	B	4.87	
229.00R	34200. S	6.81	B	6.81	
250.00	34200. S	5.52	B	5.52	

Span 3

Location	Allowable Stress	Rating Factors Bending Inv.		Oper.	
0.00	34200. S	5.52	B	5.52	
18.33	34200. S	6.31	B	6.31	

28.00L	34200.	S	6.22	B	6.22
28.00R	34200.	S	4.36	B	4.36
36.67	34200.	S	4.63	B	4.63
55.00	34200.	S	5.60	B	5.60
73.33	34200.	S	3.79	B	3.79
89.33L	34200.	S	2.88	B	2.88
89.33R	34200.	S	3.08	B	3.08
91.67	34200.	S	2.98	B	2.98
110.00	34200.	S	2.52	B	2.52
128.33	34200.	S	2.51	B	2.51
145.33L	34200.	S	3.01	B	3.01
145.33R	34200.	S	2.55	B	2.55
146.67	34200.	S	2.62	B	2.62
165.00	34200.	S	4.95	B	4.95
183.33	34200.	S	> 999.00	B	>999.00

****
Minimum rating is 1.60 at location 183.33 in span 3.
****

Rating Codes:
T - Top steel governs
B - Bottom steel governs
C - Concrete governs
R - Rebar governs
V - Shear governs
S - Serviceability governs

Mom Strength Codes:
C - Compact
B - Braced non-compact
U - Unbraced non-compact
T - Transition between compact and braced non-compact
S - Serviceability

Noncompact shapes ratings based on stress, as

$$IR = \frac{Fb \text{ - factored dead load stress}}{\text{factored LL+I stress}}$$

Operating rating for Strength II is

$$OR = \frac{Fb \text{ - factored dead load stress}}{\text{factored LL+I stress}}$$

Inventory rating for Strength II is

$$IR = OR/(LL+I \text{ factor})$$

2.2.2. HL-93 (42” Barrier)

I-295 HH BUCKMAN BRIDGE -720249
Girder System : Input File : Layout/Slab/Loading Definition
Thu Mar 26 23:19:34 2015

```
ID: I-295 HH BUCKMAN BRIDGE -720249
CONDITIONS
  ALL LANES
  ENGLISH INPUT
  ENGLISH OUTPUT
  FLOAT LANES
  GRID MODEL
  LRFD METHOD
  MEDIUM RESOLUTION MESH
  OVERLAY PERMIT TRUCK WITH LANE LOADING
  PERMIT TRUCK IN ALL LANES
  RATE MODE
  RATING PROJECT
  SELF WEIGHT FOR DEAD LOAD 1
DATA
  BR-1 18.3333 18.3333 18.3333 18.3333 18.3333 18.3333 18.3333 18.3333
  18.3333 36.1875 17.8542 17.8542 17.8542 17.8542 17.8542 17.875 17.875
  17.8542 17.8542 17.8542 17.8542 17.8542 36.1875 18.3333 18.3333
  18.3333 18.3333 18.3333 18.3333 18.3333 18.3333
  CURB -2.
  FPC 4.5
  GDSPC 9.3073 9.3073 9.3073 9.3073 9.3333 9.3333 9.3333
  LANES 12. 12. 12. 12. 12.
  PRLANE  0.2
  PRMITP 13.33 53.33 53.33
  PRMITSP 14. 14.
  ROADWP 68.
  SKEW-1 90. 90. 90. 90.
  SLABEXT 3.5417 2.3125
  SLABT 8.
  SLABWEAR  0.
  SPEED 65
  SPN-1 183.3333 250. 183.3333
  SUPER  0.01563
  WAC-1  0.164
  WAC-2  0.19
  WAC-3  0.19
  WAC-4  0.19
  WAC-5  0.19
  WAC-6  0.19
  WAC-7  0.19
  WAC-8  0.14
  WAS-1  0.
  WAS-2  0.
  WAS-3  0.
  WAS-4  0.
  WAS-5  0.0115
  WAS-6  0.0115
  WAS-7  0.0115
  WAS-8  0.0115
  WCONC 150.
  WHLSPC 6.
  WR-1  0.123
  WR-2  0.14
  WR-3  0.14
  WR-4  0.14
  WR-5  0.14
  WR-6  0.14
  WR-7  0.14
  WR-8  0.105
  WS-1  0.156
  WS-2  0.156
  WS-3  0.156
  WS-4  0.156
  WS-5  0.156
  WS-6  0.156
  WS-7  0.156
  WS-8  0.156
GO
```

I-295 HH BUCKMAN BRIDGE -720249
Girder 1 : Rating Output : Lrfd Ratings
Thu Mar 26 23:20:27 2015

[This table uses the rating equation (6A.4.2.1-1) of the 2011 edition of the Manual for Bridge Evaluation.]

HL93

Strength I

Span 1

Location	Compct Mom Cap/Noncmpt Allow Stress	Shear Capacity	Rating Factors Bending Inv.	Bending Oper.	Shear Inv.	Shear Oper.
0.00	9253. B	488.42	>999.00 T	>999.00	1.92	2.49
18.33	36000. B	769.69	1.68 B	2.18	4.51	5.84
22.00L	36000. B	773.47	1.34 B	1.74	4.78	6.20
22.00R	36000. B	773.65	2.47 B	3.20	4.79	6.20
36.67	36000. B	617.31	1.53 B	1.98	4.67	6.05
55.00	36000. B	623.62	1.19 B	1.55	6.24	8.08
73.33	36000. B	632.76	1.23 B	1.60	7.12	9.22
91.67	36000. B	644.47	1.55 B	2.00	5.43	7.04
110.00	36000. B	658.50	2.25 B	2.92	4.17	5.40
122.00L	10852. C	918.49	2.22 B	2.87	5.26	6.82
122.00R	19671. C	918.79	4.02 B	5.22	5.27	6.83
124.00L	19779. C	922.00	4.13 B	5.36	5.16	6.69
124.00R	23042. C	1326.20	4.82 B	6.25	7.85	10.17
128.33	23135. B	1332.57	5.38 T	6.98	7.53	9.76
146.67	13919. C	1361.56	1.99 B	2.58	6.45	8.37
154.00L	45765. B	1373.66	1.56 B	2.02	6.02	7.81
154.00R	45762. B	1638.91	1.78 B	2.31	7.40	9.60
156.00L	44053. B	1644.31	1.60 B	2.07	7.22	9.36
156.00R	23727. C	1644.80	3.25 B	4.22	7.23	9.37
165.00	46619. B	1671.34	2.53 B	3.27	6.72	8.71
183.33	46375. B	1757.69	1.30 B	1.69	6.05	7.84

Span 2

Location	Compct Mom Cap/Noncmpt Allow Stress	Shear Capacity	Rating Factors Bending Inv.	Bending Oper.	Shear Inv.	Shear Oper.
0.00	46375. B	1778.71	1.30 B	1.69	5.90	7.65
25.00	46605. B	1747.50	3.54 B	4.59	7.25	9.39
28.00L	46984. B	1747.50	3.93 B	5.10	7.43	9.63
28.00R	21517. C	1747.50	3.19 B	4.13	7.43	9.63
30.00L	21583. C	1747.50	3.41 B	4.43	7.54	9.78
30.00R	45403. B	1450.84	2.08 B	2.70	6.07	7.87
50.00	48073. B	1450.84	3.86 B	5.01	7.00	9.07
55.33L	20854. B	1450.84	4.57 B	5.92	7.36	9.54
55.33R	20831. B	1450.84	4.56 B	5.92	7.36	9.54
57.33L	20831. B	1450.84	4.30 B	5.57	7.51	9.74
57.33R	25286. B	1450.84	5.25 B	6.80	7.51	9.74
75.00	27861. C	974.23	3.94 B	5.10	5.98	7.76
100.00	27861. C	974.23	2.93 B	3.80	7.98	10.35
125.00	27861. C	973.68	2.67 B	3.47	10.43	13.52
150.00	27861. C	974.23	2.93 B	3.80	8.06	10.45

175.00	27861.	C	921.46	3.94	B	5.11	5.65	7.33
190.67L	25286.	B	1450.84	4.98	B	6.45	7.92	10.27
190.67R	20071.	B	1450.84	3.93	T	5.09	7.92	10.27
192.67L	25314.	B	1450.84	5.27	B	6.83	7.77	10.08
192.67R	16744.	B	1450.84	3.46	B	4.49	7.77	10.08
200.00	48073.	B	1450.84	3.85	B	4.99	7.27	9.42
218.00L	45403.	B	1450.84	2.24	B	2.91	6.40	8.30
218.00R	45403.	B	1747.50	2.51	B	3.25	7.95	10.30
220.00L	43617.	B	1747.50	2.20	B	2.85	7.82	10.13
220.00R	43617.	B	1747.50	3.79	B	4.92	7.82	10.13
225.00	45403.	B	1747.50	3.41	B	4.42	7.47	9.69
250.00	46375.	B	2011.94	1.30	B	1.69	6.78	8.79

Span 3

Location	Compct Mom Cap/Noncmpt Allow Stress		Shear Capacity	Rating Factors Bending			Shear	
				Inv.		Oper.	Inv.	Oper.
0.00	46375.	B	1584.21	1.30	B	1.69	5.23	6.78
18.33	46620.	B	1671.32	2.53	B	3.28	6.65	8.63
25.33L	23797.	C	1650.72	3.10	B	4.02	6.95	9.01
25.33R	20549.	C	1650.22	2.52	B	3.27	6.95	9.01
27.33L	20554.	C	1644.80	2.68	B	3.47	7.03	9.12
27.33R	45724.	B	1377.06	1.49	B	1.93	5.71	7.41
36.67	13920.	C	1361.55	2.00	B	2.60	6.04	7.83
55.00	23151.	B	1332.56	5.40	T	7.00	7.68	9.95
57.33L	23133.	C	1329.18	5.60	B	7.26	7.89	10.22
57.33R	22483.	C	1328.93	5.44	B	7.05	7.89	10.22
59.33L	22383.	C	1326.20	4.69	B	6.08	8.06	10.45
59.33R	19759.	C	922.00	4.14	B	5.36	5.31	6.88
73.33	36000.	B	898.00	2.24	B	2.91	6.01	7.79
91.67	36000.	B	644.47	1.54	B	2.00	5.23	6.78
110.00	36000.	B	632.76	1.23	B	1.60	6.66	8.63
128.33	36000.	B	623.62	1.20	B	1.55	6.31	8.18
146.67	36000.	B	617.31	1.53	B	1.98	4.60	5.96
161.33L	36000.	B	773.65	2.47	B	3.20	4.60	5.96
161.33R	36000.	B	773.47	1.35	B	1.74	4.60	5.96
165.00	36000.	B	769.68	1.68	B	2.18	4.33	5.62
183.33	9253.	B	740.77	>999.00	T	>999.00	3.29	4.27

Service II

Span 1

Location	Allowable Stress		Rating Factors Bending			
			Inv.		Oper.	
0.00	34200.	S	> 999.00	B	>999.00	
18.33	34200.	S	2.35	B	3.06	
22.00L	34200.	S	1.92	B	2.50	
22.00R	34200.	S	3.36	B	4.36	
36.67	34200.	S	2.15	B	2.80	
55.00	34200.	S	1.72	B	2.23	
73.33	34200.	S	1.75	B	2.27	
91.67	34200.	S	2.12	B	2.75	
110.00	34200.	S	2.95	B	3.84	
122.00L	34200.	S	4.00	B	5.20	
122.00R	34200.	S	4.00	B	5.20	
124.00L	34200.	S	4.08	B	5.31	
124.00R	34200.	S	3.40	B	4.42	
128.33	47500.	S	5.29	B	6.87	
146.67	47500.	S	3.79	B	4.92	
154.00L	47500.	S	3.16	B	4.10	
154.00R	47500.	S	3.30	B	4.29	
156.00L	47500.	S	3.21	B	4.17	
156.00R	47500.	S	5.48	B	7.13	
165.00	47500.	S	4.45	B	5.78	

183.33	47500. S	2.58 B	3.35

Span 2

Location	Allowable Stress	Rating Factors Bending Inv.	Oper.
0.00	34200. S	2.58 B	3.35
25.00	34200. S	6.00 B	7.80
28.00L	34200. S	6.52 B	8.48
28.00R	34200. S	6.36 B	8.27
30.00L	34200. S	6.72 B	8.74
30.00R	34200. S	4.09 B	5.31
50.00	34200. S	6.47 B	8.41
55.33L	34200. S	5.85 B	7.61
55.33R	34200. S	5.85 B	7.60
57.33L	34200. S	5.52 B	7.18
57.33R	34200. S	6.74 B	8.76
75.00	34200. S	4.47 B	5.80
100.00	34200. S	3.25 B	4.23
125.00	47500. S	2.94 B	3.82
150.00	47500. S	3.25 B	4.23
175.00	47500. S	4.47 B	5.82
190.67L	47500. S	6.41 B	8.33
190.67R	47500. S	6.42 B	8.35
192.67L	47500. S	6.76 B	8.79
192.67R	47500. S	5.55 B	7.21
200.00	47500. S	6.45 B	8.38
218.00L	47500. S	4.35 B	5.65
218.00R	47500. S	4.49 B	5.84
220.00L	47500. S	4.22 B	5.49
220.00R	47500. S	6.87 B	8.93
225.00	47500. S	5.99 B	7.78
250.00	47500. S	2.58 B	3.35

Span 3

Location	Allowable Stress	Rating Factors Bending Inv.	Oper.
0.00	34200. S	2.58 B	3.35
18.33	34200. S	4.45 B	5.79
25.33L	34200. S	5.26 B	6.84
25.33R	34200. S	5.11 B	6.64
27.33L	34200. S	5.34 B	6.94
27.33R	34200. S	3.06 B	3.98
36.67	34200. S	3.80 B	4.94
55.00	34200. S	5.31 B	6.90
57.33L	34200. S	5.18 B	7.16
57.33R	34200. S	5.18 B	7.15
59.33L	34200. S	4.76 B	6.19
59.33R	34200. S	5.71 B	7.42
73.33	34200. S	2.94 B	3.83
91.67	34200. S	2.11 B	2.75
110.00	34200. S	1.75 B	2.27
128.33	34200. S	1.72 B	2.23
146.67	34200. S	2.15 B	2.80
161.33L	34200. S	3.36 B	4.36
161.33R	34200. S	1.92 B	2.50
165.00	34200. S	2.36 B	3.06
183.33	34200. S	> 999.00 B	>999.00

****
Minimum rating is 1.19 at location 55.00 in span 1.
****

Strength II

Span 1

Location	Allowable	Shear	Rating Factors Bending Inv.	Bending Oper.	Shear Inv.	Shear Oper.
0.00	9253. C	488.42		>999.00		2.04
18.33	36000. B	769.69		2.03		5.08
22.00L	36000. B	773.47		1.62		5.44
22.00R	36000. B	773.65		2.98		5.44
36.67	36000. B	617.31		1.84		5.30
55.00	36000. B	623.62		1.46		7.08
73.33	36000. B	632.76		1.52		6.12
91.67	36000. B	644.47		1.92		5.06
110.00	36000. B	658.50		2.80		4.16
122.00L	10852. C	918.49		2.74		5.40
122.00R	19671. C	918.79		4.97		5.40
124.00L	19779. C	922.00		5.10		5.32
124.00R	23042. C	1326.20		5.95		8.08
128.33	23135. C	1332.57		8.79		7.81
146.67	13919. C	1361.56		3.29		6.83
154.00L	45765. B	1373.66		2.64		6.66
154.00R	45762. B	1638.91		3.01		8.18
156.00L	44053. B	1644.31		5.73		8.33
156.00R	23727. C	1644.80		11.66		8.33
165.00	46619. B	1671.34		4.45		8.17
183.33	46375. B	1757.69		2.60		7.57

Span 2

Location	Allowable	Shear	Rating Factors Bending Inv.	Bending Oper.	Shear Inv.	Shear Oper.
0.00	46375. B	1778.71		2.60		7.48
25.00	46605. B	1747.50		5.57		8.81
28.00L	46984. B	1747.50		6.04		9.02
28.00R	21517. C	1747.50		4.90		9.02
30.00L	21583. C	1747.50		8.74		9.16
30.00R	45403. B	1450.84		5.32		7.37
50.00	48073. B	1450.84		5.68		8.76
55.33L	20854. B	1450.84		5.39		9.18
55.33R	20831. B	1450.84		5.39		9.18
57.33L	20831. B	1450.84		5.10		9.34
57.33R	25286. B	1450.84		6.22		9.34
75.00	27861. C	974.23		4.90		7.01
100.00	27861. C	974.23		3.74		9.18
125.00	27861. C	973.68		3.44		12.90
150.00	27861. C	974.23		3.74		9.89
175.00	27861. C	921.46		4.91		6.98
190.67L	25286. B	1450.84		5.94		10.00
190.67R	20071. B	1450.84		4.69		10.00
192.67L	25314. B	1450.84		6.25		9.82
192.67R	16744. B	1450.84		4.11		9.82
200.00	48073. B	1450.84		5.66		9.19
218.00L	45403. B	1450.84		3.35		7.89
218.00R	45403. B	1747.50		3.75		9.80
220.00L	43617. B	1747.50		5.63		9.64
220.00R	43617. B	1747.50		9.71		9.64
225.00	45403. B	1747.50		5.37		9.22
250.00	46375. B	2011.94		2.60		8.65

Span 3

Location	Allowable	Shear	Rating Factors Bending		Shear	
			Inv.	Oper.	Inv.	Oper.
0.00	46375. B	1584.21	2.60			6.69
18.33	46620. B	1671.32	4.46			8.07
25.33L	23797. C	1650.72	5.26			8.35
25.33R	20549. C	1650.22	4.27			8.35
27.33L	20554. C	1644.80	9.59			8.44
27.33R	45724. B	1377.06	5.33			6.85
36.67	13920. C	1361.55	3.31			7.27
55.00	23151. C	1332.56	8.81			9.18
57.33L	23133. C	1329.18	6.11			9.42
57.33R	22483. C	1328.93	5.93			9.42
59.33L	22383. C	1326.20	5.79			9.63
59.33R	19759. C	922.00	5.11			6.34
73.33	36000. B	898.00	2.79			7.18
91.67	36000. B	644.47	1.92			6.11
110.00	36000. B	632.76	1.52			7.75
128.33	36000. B	623.62	1.46			5.64
146.67	36000. B	617.31	1.84			4.23
161.33L	36000. B	773.65	2.98			5.08
161.33R	36000. B	773.47	1.62			5.07
165.00	36000. B	769.68	2.03			4.86
183.33	9253. C	740.77	>999.00			3.50

Service II

Span 1

Location	Allowable Stress	Rating Factors Bending		
		Inv.	Oper.	
0.00	34200. S	> 999.00	B	>999.00
18.33	34200. S	2.85	B	2.85
22.00L	34200. S	2.33	B	2.33
22.00R	34200. S	4.06	B	4.06
36.67	34200. S	2.60	B	2.60
55.00	34200. S	2.10	B	2.10
73.33	34200. S	2.16	B	2.16
91.67	34200. S	2.64	B	2.64
110.00	34200. S	3.68	B	3.68
122.00L	34200. S	4.96	B	4.96
122.00R	34200. S	4.96	B	4.96
124.00L	34200. S	5.06	B	5.06
124.00R	34200. S	4.21	B	4.21
128.33	47500. S	6.86	B	8.66
146.67	47500. S	6.27	B	6.27
154.00L	47500. S	5.34	B	5.34
154.00R	47500. S	5.58	B	5.58
156.00L	47500. S	11.52	B	11.52
156.00R	47500. S	19.70	B	19.70
165.00	47500. S	7.85	B	7.85
183.33	47500. S	5.16	B	5.16

Span 2

Location	Allowable Stress	Rating Factors Bending	
		Inv.	Oper.

0.00	34200.	S	5.16	B	5.16
25.00	34200.	S	9.46	B	9.46
28.00L	34200.	S	10.05	B	10.05
28.00R	34200.	S	9.80	B	9.80
30.00L	34200.	S	17.27	B	17.27
30.00R	34200.	S	10.49	B	10.49
50.00	34200.	S	8.02	B	9.53
55.33L	34200.	S	6.93	B	6.93
55.33R	34200.	S	6.92	B	6.92
57.33L	34200.	S	6.57	B	6.57
57.33R	34200.	S	8.02	B	8.02
75.00	34200.	S	5.58	B	5.58
100.00	34200.	S	4.16	B	4.16
125.00	47500.	S	3.79	B	3.79
150.00	47500.	S	4.17	B	4.17
175.00	47500.	S	5.59	B	5.59
190.67L	47500.	S	7.66	B	7.66
190.67R	47500.	S	7.68	B	7.68
192.67L	47500.	S	8.04	B	8.04
192.67R	47500.	S	6.60	B	6.60
200.00	47500.	S	8.03	B	9.50
218.00L	47500.	S	6.52	B	6.52
218.00R	47500.	S	6.73	B	6.73
220.00L	47500.	S	10.85	B	10.85
220.00R	47500.	S	17.65	B	17.65
225.00	47500.	S	9.44	B	9.44
250.00	47500.	S	5.16	B	5.16

Span 3

Location	Allowable Stress		Rating Factors Bending Inv.		Oper.
0.00	34200.	S	5.16	B	5.16
18.33	34200.	S	7.86	B	7.86
25.33L	34200.	S	8.95	B	8.95
25.33R	34200.	S	8.68	B	8.68
27.33L	34200.	S	19.16	B	19.16
27.33R	34200.	S	11.00	B	11.00
36.67	34200.	S	6.29	B	6.29
55.00	34200.	S	6.84	B	8.69
57.33L	34200.	S	6.02	B	6.02
57.33R	34200.	S	6.01	B	6.01
59.33L	34200.	S	5.89	B	5.89
59.33R	34200.	S	7.07	B	7.07
73.33	34200.	S	3.67	B	3.67
91.67	34200.	S	2.63	B	2.63
110.00	34200.	S	2.16	B	2.16
128.33	34200.	S	2.10	B	2.10
146.67	34200.	S	2.60	B	2.60
161.33L	34200.	S	4.06	B	4.06
161.33R	34200.	S	2.33	B	2.33
165.00	34200.	S	2.85	B	2.85
183.33	34200.	S	> 999.00	B	>999.00

****
Minimum rating is 1.46 at location 55.00 in span 1.
****

Rating Codes:
T - Top steel governs
B - Bottom steel governs
C - Concrete governs
R - Rebar governs
V - Shear governs
S - Serviceability governs

Mom Strength Codes:
C - Compact
B - Braced non-compact
U - Unbraced non-compact
T - Transition between compact and braced non-compact
S - Serviceability

Noncompact shapes ratings based on stress, as

$$IR = \frac{Fb - \text{factored dead load stress}}{\text{factored LL+I stress}}$$

Operating rating for Strength II is

$$OR = \frac{Fb - \text{factored dead load stress}}{\text{factored LL+I stress}}$$

Inventory rating for Strength II is

$$IR = OR/(LL+I \text{ factor})$$

I-295 HH BUCKMAN BRIDGE -720249
Girder 2 : Rating Output : Lrfd Ratings
Thu Mar 26 23:20:51 2015

[This table uses the rating equation (6A.4.2.1-1)
of the 2011 edition of the Manual for Bridge
Evaluation.]

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Strength I

Span 1

Location	Compct Mom Cap/Noncmpt Allow Stress	Shear Capacity	Rating Factors Bending Inv.		Bending Oper.		Shear Inv.	Shear Oper.
0.00	9331. B	488.42	>999.00	T	>999.00		1.88	2.44
18.33	36000. B	769.69	1.85	B	2.40		4.54	5.88
22.00L	36000. B	773.47	1.49	B	1.93		4.81	6.24
22.00R	36000. B	773.65	2.74	B	3.55		4.81	6.24
36.67	36000. B	617.31	1.74	B	2.26		4.53	5.87
55.00	36000. B	623.62	1.39	B	1.80		5.77	7.48
73.33	36000. B	632.76	1.44	B	1.87		7.33	9.50
91.67	36000. B	644.47	1.80	B	2.34		5.80	7.52
110.00	36000. B	658.50	2.59	B	3.36		4.63	6.00
122.00L	36000. B	918.49	3.55	B	4.60		5.94	7.70
122.00R	36000. B	918.79	2.84	T	3.68		5.94	7.71
124.00L	20036. C	922.00	4.77	B	6.18		5.83	7.56
124.00R	23356. C	1326.20	5.56	B	7.21		8.86	11.49
128.33	23407. B	1332.57	6.42	T	8.33		8.52	11.05
146.67	13950. C	1361.56	2.39	B	3.10		7.27	9.42
154.00L	45675. B	1373.66	1.89	B	2.44		6.68	8.66
154.00R	45672. B	1638.91	2.14	B	2.77		8.21	10.64
156.00L	43981. B	1644.31	1.93	B	2.51		7.97	10.33
156.00R	23743. C	1644.80	3.91	B	5.06		7.97	10.33
165.00	46576. B	1671.34	3.05	B	3.95		7.21	9.35
183.33	46329. B	1757.69	1.55	B	2.01		6.07	7.86

Span 2

Location	Compct Mom Cap/Noncmpt Allow Stress	Shear Capacity	Rating Factors Bending Inv.		Bending Oper.		Shear Inv.	Shear Oper.
0.00	46329. B	1778.71	1.55	B	2.01		5.87	7.61
25.00	46559. B	1747.50	4.27	B	5.53		7.36	9.54
28.00L	46976. B	1747.50	4.75	B	6.16		7.58	9.83
28.00R	21778. C	1747.50	3.90	B	5.06		7.58	9.83
30.00L	21853. C	1747.50	4.18	B	5.42		7.74	10.03
30.00R	45307. B	1450.84	2.52	B	3.27		6.22	8.07
50.00	47985. B	1450.84	4.70	B	6.09		7.63	9.89
55.33L	21076. B	1450.84	5.11	B	6.63		8.02	10.40
55.33R	21060. B	1450.84	5.11	B	6.62		8.02	10.40
57.33L	21060. B	1450.84	4.83	B	6.26		8.17	10.59
57.33R	25555. B	1450.84	5.89	B	7.63		8.17	10.59
75.00	29713. C	974.23	4.82	B	6.24		6.09	7.89
100.00	29713. C	974.23	3.65	B	4.73		8.17	10.59
125.00	29713. C	973.68	3.37	B	4.36		10.07	13.05
150.00	29713. C	974.23	3.65	B	4.73		8.55	11.09

175.00	29713.	C	974.23	4.81	B	6.23	6.30	8.17
190.67L	25555.	B	1450.84	5.59	B	7.25	8.89	11.53
190.67R	20533.	B	1450.84	4.47	T	5.79	8.89	11.53
192.67L	25575.	B	1450.84	5.89	B	7.64	8.76	11.35
192.67R	16852.	B	1450.84	3.86	B	5.00	8.76	11.35
200.00	47985.	B	1450.84	4.69	B	6.08	8.24	10.68
218.00L	45307.	B	1450.84	2.72	B	3.53	6.96	9.03
218.00R	45307.	B	1747.50	3.03	B	3.93	8.65	11.21
220.00L	43540.	B	1747.50	2.66	B	3.45	8.46	10.97
220.00R	43540.	B	1747.50	4.57	B	5.93	8.46	10.97
225.00	45307.	B	1747.50	4.11	B	5.32	7.99	10.35
250.00	46330.	B	1778.84	1.55	B	2.01	5.88	7.62

Span 3

Location	Compct Mom Cap/Noncmpt Allow Stress		Shear Capacity	Rating Factors Bending			Shear	
				Inv.		Oper.	Inv.	Oper.
0.00	46330.	B	1757.54	1.55	B	2.01	5.67	7.35
18.33	46576.	B	1671.32	3.05	B	3.96	6.60	8.55
25.33L	23811.	C	1650.72	3.73	B	4.83	6.90	8.94
25.33R	20777.	C	1650.22	3.08	B	3.99	6.89	8.93
27.33L	20790.	C	1644.80	3.27	B	4.24	6.96	9.03
27.33R	45634.	B	1377.06	1.81	B	2.34	5.65	7.33
36.67	13952.	C	1361.55	2.40	B	3.11	5.87	7.61
55.00	23415.	B	1332.56	6.44	T	8.35	6.62	8.58
57.33L	23395.	C	1329.18	6.68	B	8.65	6.72	8.72
57.33R	23364.	C	1328.93	6.67	B	8.64	6.72	8.71
59.33L	23343.	C	1326.20	5.57	B	7.22	6.82	8.84
59.33R	20022.	C	922.00	4.77	B	6.19	4.49	5.82
73.33	36000.	B	658.50	2.59	B	3.36	3.46	4.49
91.67	36000.	B	644.47	1.81	B	2.34	4.09	5.30
110.00	36000.	B	632.76	1.44	B	1.87	4.92	6.38
128.33	36000.	B	623.62	1.39	B	1.80	4.70	6.09
146.67	36000.	B	617.31	1.74	B	2.25	4.30	5.57
161.33L	36000.	B	773.65	2.73	B	3.54	4.99	6.46
161.33R	36000.	B	773.47	1.48	B	1.92	4.99	6.46
165.00	36000.	B	769.68	1.85	B	2.40	4.73	6.13
183.33	9331.	B	488.42	>999.00	T	>999.00	1.88	2.44

Service II

Span 1

Location	Allowable Stress		Rating Factors Bending			
			Inv.		Oper.	
0.00	34200.	S	> 999.00	B	>999.00	
18.33	34200.	S	2.60	B	3.38	
22.00L	34200.	S	2.14	B	2.78	
22.00R	34200.	S	3.73	B	4.85	
36.67	34200.	S	2.46	B	3.20	
55.00	34200.	S	2.00	B	2.60	
73.33	34200.	S	2.04	B	2.66	
91.67	34200.	S	2.47	B	3.21	
110.00	34200.	S	3.41	B	4.43	
122.00L	34200.	S	4.55	B	5.92	
122.00R	34200.	S	4.55	B	5.92	
124.00L	34200.	S	4.70	B	6.11	
124.00R	34200.	S	3.93	B	5.11	
128.33	47500.	S	6.27	B	8.21	
146.67	47500.	S	4.56	B	5.93	
154.00L	47500.	S	3.82	B	4.97	
154.00R	47500.	S	3.98	B	5.18	
156.00L	47500.	S	3.89	B	5.05	
156.00R	47500.	S	6.62	B	8.61	
165.00	47500.	S	5.39	B	7.00	

183.33	47500. S	3.10 B	4.03

Span 2

Location	Allowable Stress	Rating Factors Bending Inv.	Oper.
0.00	34200. S	3.10 B	4.03
25.00	34200. S	7.27 B	9.45
28.00L	34200. S	7.91 B	10.29
28.00R	34200. S	7.74 B	10.06
30.00L	34200. S	8.18 B	10.63
30.00R	34200. S	4.99 B	6.48
50.00	34200. S	7.58 B	10.28
55.33L	34200. S	6.55 B	8.51
55.33R	34200. S	6.54 B	8.50
57.33L	34200. S	6.20 B	8.07
57.33R	34200. S	7.56 B	9.83
75.00	34200. S	5.15 B	6.69
100.00	34200. S	3.80 B	4.94
125.00	47500. S	3.46 B	4.50
150.00	47500. S	3.79 B	4.93
175.00	47500. S	5.14 B	6.68
190.67L	47500. S	7.20 B	9.36
190.67R	47500. S	7.21 B	9.38
192.67L	47500. S	7.57 B	9.84
192.67R	47500. S	6.21 B	8.07
200.00	47500. S	7.58 B	10.26
218.00L	47500. S	5.31 B	6.90
218.00R	47500. S	5.46 B	7.10
220.00L	47500. S	5.14 B	6.68
220.00R	47500. S	8.34 B	10.84
225.00	47500. S	7.25 B	9.43
250.00	47500. S	3.09 B	4.02

Span 3

Location	Allowable Stress	Rating Factors Bending Inv.	Oper.
0.00	34200. S	3.09 B	4.02
18.33	34200. S	5.39 B	7.01
25.33L	34200. S	6.37 B	8.28
25.33R	34200. S	6.19 B	8.05
27.33L	34200. S	6.47 B	8.40
27.33R	34200. S	3.73 B	4.85
36.67	34200. S	4.58 B	5.95
55.00	34200. S	6.26 B	8.23
57.33L	34200. S	5.88 B	8.53
57.33R	34200. S	5.88 B	8.52
59.33L	34200. S	5.48 B	7.12
59.33R	34200. S	6.56 B	8.52
73.33	34200. S	3.41 B	4.43
91.67	34200. S	2.47 B	3.21
110.00	34200. S	2.04 B	2.66
128.33	34200. S	2.00 B	2.60
146.67	34200. S	2.45 B	3.19
161.33L	34200. S	3.72 B	4.84
161.33R	34200. S	2.13 B	2.77
165.00	34200. S	2.59 B	3.37
183.33	34200. S	> 999.00 B	>999.00

****
Minimum rating is 1.39 at location 128.33 in span 3.
****

Strength II

Span 1

Location	Allowable	Shear	Rating Factors Bending Inv.	Bending Oper.	Shear Inv.	Shear Oper.
0.00	9331. C	488.42		>999.00		1.89
18.33	36000. B	769.69		2.18		5.40
22.00L	36000. B	773.47		1.76		5.85
22.00R	36000. B	773.65		3.24		5.85
36.67	36000. B	617.31		2.08		5.48
55.00	36000. B	623.62		1.68		7.09
73.33	36000. B	632.76		1.76		5.73
91.67	36000. B	644.47		2.21		4.80
110.00	36000. B	658.50		3.18		4.08
122.00L	36000. B	918.49		4.34		5.45
122.00R	36000. B	918.79		3.47		5.45
124.00L	20036. C	922.00		5.82		5.38
124.00R	23356. C	1326.20		6.80		8.17
128.33	23407. C	1332.57		10.54		7.94
146.67	13950. C	1361.56		3.98		7.00
154.00L	45675. B	1373.66		3.20		6.90
154.00R	45672. B	1638.91		3.63		8.48
156.00L	43981. B	1644.31		6.00		8.87
156.00R	23743. C	1644.80		12.12		8.87
165.00	46576. B	1671.34		5.37		8.66
183.33	46329. B	1757.69		3.19		7.21

Span 2

Location	Allowable	Shear	Rating Factors Bending Inv.	Bending Oper.	Shear Inv.	Shear Oper.
0.00	46329. B	1778.71		3.19		7.18
25.00	46559. B	1747.50		6.79		9.21
28.00L	46976. B	1747.50		7.36		9.50
28.00R	21778. C	1747.50		6.05		9.50
30.00L	21853. C	1747.50		8.64		9.69
30.00R	45307. B	1450.84		5.21		7.80
50.00	47985. B	1450.84		6.91		9.48
55.33L	21076. B	1450.84		5.93		9.82
55.33R	21060. B	1450.84		5.93		9.82
57.33L	21060. B	1450.84		5.63		9.93
57.33R	25555. B	1450.84		6.88		9.93
75.00	29713. C	974.23		5.93		6.71
100.00	29713. C	974.23		4.60		8.83
125.00	29713. C	973.68		4.27		13.33
150.00	29713. C	974.23		4.59		10.46
175.00	29713. C	974.23		5.92		7.72
190.67L	25555. B	1450.84		6.56		11.19
190.67R	20533. B	1450.84		5.24		11.19
192.67L	25575. B	1450.84		6.88		11.05
192.67R	16852. B	1450.84		4.50		11.05
200.00	47985. B	1450.84		6.90		10.49
218.00L	45307. B	1450.84		4.10		9.04
218.00R	45307. B	1747.50		4.57		11.23
220.00L	43540. B	1747.50		5.50		10.97
220.00R	43540. B	1747.50		9.46		10.97
225.00	45307. B	1747.50		6.54		10.30
250.00	46330. B	1778.84		3.19		7.18

Span 3

Location	Allowable	Shear	Rating Factors Bending		Shear	
			Inv.	Oper.	Inv.	Oper.
0.00	46330. B	1757.54	3.19			7.17
18.33	46576. B	1671.32	5.38			8.05
25.33L	23811. C	1650.72	6.30			8.42
25.33R	20777. C	1650.22	5.21			8.41
27.33L	20790. C	1644.80	10.13			8.52
27.33R	45634. B	1377.06	5.61			6.92
36.67	13952. C	1361.55	4.00			7.33
55.00	23415. C	1332.56	10.57			8.26
57.33L	23395. C	1329.18	6.93			8.39
57.33R	23364. C	1328.93	6.92			8.39
59.33L	23343. C	1326.20	6.80			8.50
59.33R	20022. C	922.00	5.83			5.60
73.33	36000. B	658.50	3.18			4.29
91.67	36000. B	644.47	2.22			5.08
110.00	36000. B	632.76	1.76			5.78
128.33	36000. B	623.62	1.68			5.62
146.67	36000. B	617.31	2.07			4.42
161.33L	36000. B	773.65	3.23			5.52
161.33R	36000. B	773.47	1.75			5.52
165.00	36000. B	769.68	2.18			5.22
183.33	9331. C	488.42	>999.00			1.89

Service II

Span 1

Location	Allowable Stress	Rating Factors Bending		
		Inv.	Oper.	
0.00	34200. S	> 999.00	B	>999.00
18.33	34200. S	3.08	B	3.08
22.00L	34200. S	2.53	B	2.53
22.00R	34200. S	4.42	B	4.42
36.67	34200. S	2.94	B	2.94
55.00	34200. S	2.42	B	2.42
73.33	34200. S	2.50	B	2.50
91.67	34200. S	3.04	B	3.04
110.00	34200. S	4.20	B	4.20
122.00L	34200. S	5.58	B	5.58
122.00R	34200. S	5.58	B	5.58
124.00L	34200. S	5.76	B	5.76
124.00R	34200. S	4.81	B	4.81
128.33	47500. S	7.65	B	10.39
146.67	47500. S	7.61	B	7.61
154.00L	47500. S	6.51	B	6.51
154.00R	47500. S	6.78	B	6.78
156.00L	47500. S	12.10	B	12.10
156.00R	47500. S	20.61	B	20.61
165.00	47500. S	9.52	B	9.52
183.33	47500. S	6.39	B	6.39

Span 2

Location	Allowable Stress	Rating Factors Bending	
		Inv.	Oper.

0.00	34200.	S	6.39	B	6.39
25.00	34200.	S	11.60	B	11.60
28.00L	34200.	S	12.31	B	12.31
28.00R	34200.	S	12.03	B	12.03
30.00L	34200.	S	16.94	B	16.94
30.00R	34200.	S	10.33	B	10.33
50.00	34200.	S	8.71	B	11.67
55.33L	34200.	S	7.62	B	7.62
55.33R	34200.	S	7.62	B	7.62
57.33L	34200.	S	7.26	B	7.26
57.33R	34200.	S	8.86	B	8.86
75.00	34200.	S	6.35	B	6.35
100.00	34200.	S	4.80	B	4.80
125.00	47500.	S	4.40	B	4.40
150.00	47500.	S	4.79	B	4.79
175.00	47500.	S	6.34	B	6.34
190.67L	47500.	S	8.48	B	8.48
190.67R	47500.	S	8.49	B	8.49
192.67L	47500.	S	8.86	B	8.86
192.67R	47500.	S	7.27	B	7.27
200.00	47500.	S	8.71	B	11.65
218.00L	47500.	S	8.01	B	8.01
218.00R	47500.	S	8.25	B	8.25
220.00L	47500.	S	10.65	B	10.65
220.00R	47500.	S	17.28	B	17.28
225.00	47500.	S	11.58	B	11.58
250.00	47500.	S	6.38	B	6.38

Span 3

Location	Allowable Stress		Rating Factors Bending Inv.		Oper.
0.00	34200.	S	6.38	B	6.38
18.33	34200.	S	9.53	B	9.53
25.33L	34200.	S	10.81	B	10.81
25.33R	34200.	S	10.51	B	10.51
27.33L	34200.	S	20.10	B	20.10
27.33R	34200.	S	11.59	B	11.59
36.67	34200.	S	7.65	B	7.65
55.00	34200.	S	7.64	B	10.42
57.33L	34200.	S	6.83	B	6.83
57.33R	34200.	S	6.82	B	6.82
59.33L	34200.	S	6.71	B	6.71
59.33R	34200.	S	8.03	B	8.03
73.33	34200.	S	4.20	B	4.20
91.67	34200.	S	3.04	B	3.04
110.00	34200.	S	2.50	B	2.50
128.33	34200.	S	2.42	B	2.42
146.67	34200.	S	2.93	B	2.93
161.33L	34200.	S	4.41	B	4.41
161.33R	34200.	S	2.52	B	2.52
165.00	34200.	S	3.07	B	3.07
183.33	34200.	S	> 999.00	B	>999.00

****
Minimum rating is 1.68 at location 128.33 in span 3.
****

Rating Codes:
T - Top steel governs
B - Bottom steel governs
C - Concrete governs
R - Rebar governs
V - Shear governs
S - Serviceability governs

Mom Strength Codes:
C - Compact
B - Braced non-compact
U - Unbraced non-compact
T - Transition between compact and braced non-compact
S - Serviceability

Noncompact shapes ratings based on stress, as

$$IR = \frac{Fb - \text{factored dead load stress}}{\text{factored LL+I stress}}$$

Operating rating for Strength II is

$$OR = \frac{Fb - \text{factored dead load stress}}{\text{factored LL+I stress}}$$

Inventory rating for Strength II is

$$IR = OR/(LL+I \text{ factor})$$

I-295 HH BUCKMAN BRIDGE -720249
Girder 3 : Rating Output : Lrfd Ratings
Thu Mar 26 23:21:08 2015

[This table uses the rating equation (6A.4.2.1-1)
of the 2011 edition of the Manual for Bridge
Evaluation.]

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Strength I

Span 1

Location	Compct Mom Cap/Noncmpt Allow Stress	Shear Capacity	Rating Factors Bending Inv.		Bending Oper.		Shear Inv.	Shear Oper.
0.00	9331. B	488.42	>999.00	T	>999.00		2.02	2.62
18.33	36000. B	769.69	1.96	B	2.55		4.96	6.43
22.00L	36000. B	773.47	1.58	B	2.05		5.27	6.84
22.00R	36000. B	773.65	2.91	B	3.77		5.28	6.84
36.67	36000. B	617.31	1.87	B	2.43		5.03	6.52
55.00	36000. B	623.62	1.53	B	1.98		6.36	8.24
73.33	36000. B	632.76	1.61	B	2.08		7.73	10.02
91.67	36000. B	644.47	2.01	B	2.61		6.35	8.23
110.00	36000. B	658.50	2.87	B	3.72		5.10	6.61
122.00L	36000. B	918.49	3.90	B	5.05		6.51	8.44
122.00R	36000. B	918.79	3.11	T	4.03		6.51	8.44
124.00L	20036. C	922.00	5.29	B	6.85		6.39	8.28
124.00R	23388. C	1326.20	6.17	B	8.00		9.68	12.55
128.33	23450. B	1332.57	7.62	T	9.88		9.27	12.02
146.67	13959. C	1361.56	2.80	B	3.63		7.72	10.00
154.00L	45675. B	1373.66	2.19	B	2.84		7.10	9.21
154.00R	45672. B	1638.91	2.48	B	3.21		8.73	11.31
156.00L	43981. B	1644.31	2.23	B	2.89		8.55	11.08
156.00R	23749. C	1644.80	4.44	B	5.75		8.55	11.09
165.00	46576. B	1671.34	3.41	B	4.43		7.75	10.05
183.33	46329. B	1757.69	1.73	B	2.24		6.42	8.32

Span 2

Location	Compct Mom Cap/Noncmpt Allow Stress	Shear Capacity	Rating Factors Bending Inv.		Bending Oper.		Shear Inv.	Shear Oper.
0.00	46329. B	1778.71	1.73	B	2.24		6.28	8.14
25.00	46559. B	1747.50	4.72	B	6.11		8.01	10.38
28.00L	46976. B	1747.50	5.25	B	6.81		8.26	10.71
28.00R	21796. C	1747.50	4.32	B	5.61		8.26	10.71
30.00L	21867. C	1747.50	4.63	B	6.01		8.44	10.94
30.00R	45307. B	1450.84	2.80	B	3.64		6.80	8.82
50.00	47985. B	1450.84	5.23	B	6.78		8.45	10.95
55.33L	45690. B	1450.84	5.17	B	6.70		8.87	11.50
55.33R	45690. B	1450.84	5.16	B	6.69		8.87	11.50
57.33L	21060. B	1450.84	5.36	B	6.95		9.03	11.71
57.33R	25555. B	1450.84	6.53	B	8.46		9.03	11.71
75.00	29713. C	974.23	5.44	B	7.05		6.57	8.52
100.00	29713. C	974.23	4.16	B	5.39		8.75	11.34
125.00	29713. C	973.68	3.84	B	4.98		10.58	13.71
150.00	29713. C	974.23	4.15	B	5.38		9.33	12.09

175.00	29713.	C	974.23	5.41	B	7.02	6.95	9.01
190.67L	25555.	B	1450.84	6.18	B	8.01	9.82	12.72
190.67R	20533.	B	1450.84	4.94	T	6.40	9.82	12.72
192.67L	25575.	B	1450.84	6.49	B	8.42	9.66	12.53
192.67R	16852.	B	1450.84	4.26	B	5.52	9.66	12.53
200.00	47985.	B	1450.84	5.26	B	6.82	9.07	11.76
218.00L	45307.	B	1450.84	3.04	B	3.94	7.56	9.80
218.00R	45307.	B	1747.50	3.38	B	4.39	9.38	12.16
220.00L	43540.	B	1747.50	2.97	B	3.85	9.16	11.88
220.00R	43540.	B	1747.50	5.08	B	6.59	9.16	11.88
225.00	45307.	B	1747.50	4.55	B	5.90	8.63	11.19
250.00	46330.	B	1778.84	1.73	B	2.24	6.30	8.17

Span 3

Location	Compct Mom Cap/Noncmpt Allow Stress		Shear Capacity	Rating Factors Bending			Shear	
				Inv.		Oper.	Inv.	Oper.
0.00	46330.	B	1757.54	1.73	B	2.24	5.99	7.77
18.33	46576.	B	1671.32	3.43	B	4.44	7.00	9.08
25.33L	23817.	C	1650.72	4.22	B	5.47	7.36	9.54
25.33R	20819.	C	1650.22	3.50	B	4.54	7.36	9.54
27.33L	20829.	C	1644.80	3.73	B	4.83	7.45	9.66
27.33R	45634.	B	1377.06	2.08	B	2.70	6.05	7.85
36.67	13958.	C	1361.55	2.79	B	3.62	6.37	8.25
55.00	23420.	B	1332.56	7.54	T	9.78	7.26	9.41
57.33L	23396.	C	1329.18	7.82	B	10.14	7.38	9.56
57.33R	23364.	C	1328.93	7.81	B	10.13	7.37	9.56
59.33L	23341.	C	1326.20	6.14	B	7.96	7.47	9.69
59.33R	20022.	C	922.00	5.26	B	6.82	4.93	6.39
73.33	36000.	B	658.50	2.89	B	3.74	3.73	4.83
91.67	36000.	B	644.47	2.01	B	2.61	4.29	5.56
110.00	36000.	B	632.76	1.60	B	2.07	5.10	6.61
128.33	36000.	B	623.62	1.52	B	1.97	5.09	6.60
146.67	36000.	B	617.31	1.86	B	2.41	4.72	6.11
161.33L	36000.	B	773.65	2.89	B	3.75	5.32	6.90
161.33R	36000.	B	773.47	1.57	B	2.03	5.32	6.90
165.00	36000.	B	769.68	1.95	B	2.53	5.03	6.52
183.33	9331.	B	488.42	>999.00	T	>999.00	2.01	2.61

Service II

Span 1

Location	Allowable Stress		Rating Factors Bending			
			Inv.		Oper.	
0.00	34200.	S	> 999.00	B	>999.00	
18.33	34200.	S	2.75	B	3.58	
22.00L	34200.	S	2.27	B	2.95	
22.00R	34200.	S	3.96	B	5.15	
36.67	34200.	S	2.64	B	3.43	
55.00	34200.	S	2.19	B	2.85	
73.33	34200.	S	2.27	B	2.95	
91.67	34200.	S	2.75	B	3.58	
110.00	34200.	S	3.77	B	4.91	
122.00L	34200.	S	5.00	B	6.50	
122.00R	34200.	S	5.00	B	6.50	
124.00L	34200.	S	5.22	B	6.79	
124.00R	34200.	S	4.37	B	5.68	
128.33	47500.	S	6.86	B	9.74	
146.67	47500.	S	5.31	B	6.90	
154.00L	47500.	S	4.40	B	5.72	
154.00R	47500.	S	4.57	B	5.94	
156.00L	47500.	S	4.43	B	5.76	
156.00R	47500.	S	7.50	B	9.75	
165.00	47500.	S	6.01	B	7.81	

183.33	47500. S	3.41 B	4.44

Span 2

Location	Allowable Stress	Rating Factors Bending Inv.	Oper.
0.00	34200. S	3.41 B	4.44
25.00	34200. S	8.02 B	10.42
28.00L	34200. S	8.74 B	11.36
28.00R	34200. S	8.55 B	11.11
30.00L	34200. S	9.04 B	11.76
30.00R	34200. S	5.52 B	7.18
50.00	34200. S	8.32 B	11.47
55.33L	34200. S	7.23 B	9.40
55.33R	34200. S	7.22 B	9.39
57.33L	34200. S	6.88 B	8.94
57.33R	34200. S	8.37 B	10.89
75.00	34200. S	5.82 B	7.57
100.00	34200. S	4.33 B	5.63
125.00	47500. S	3.95 B	5.14
150.00	47500. S	4.32 B	5.62
175.00	47500. S	5.79 B	7.53
190.67L	47500. S	7.95 B	10.33
190.67R	47500. S	7.96 B	10.35
192.67L	47500. S	8.33 B	10.83
192.67R	47500. S	6.84 B	8.89
200.00	47500. S	8.27 B	11.53
218.00L	47500. S	5.91 B	7.68
218.00R	47500. S	6.08 B	7.90
220.00L	47500. S	5.71 B	7.42
220.00R	47500. S	9.24 B	12.01
225.00	47500. S	8.02 B	10.42
250.00	47500. S	3.41 B	4.43

Span 3

Location	Allowable Stress	Rating Factors Bending Inv.	Oper.
0.00	34200. S	3.41 B	4.43
18.33	34200. S	6.03 B	7.83
25.33L	34200. S	7.19 B	9.35
25.33R	34200. S	7.00 B	9.10
27.33L	34200. S	7.33 B	9.53
27.33R	34200. S	4.26 B	5.53
36.67	34200. S	5.30 B	6.89
55.00	34200. S	6.89 B	9.64
57.33L	34200. S	6.48 B	10.00
57.33R	34200. S	6.48 B	9.99
59.33L	34200. S	6.04 B	7.85
59.33R	34200. S	7.23 B	9.40
73.33	34200. S	3.79 B	4.93
91.67	34200. S	2.75 B	3.58
110.00	34200. S	2.26 B	2.94
128.33	34200. S	2.18 B	2.83
146.67	34200. S	2.62 B	3.41
161.33L	34200. S	3.94 B	5.12
161.33R	34200. S	2.25 B	2.93
165.00	34200. S	2.74 B	3.56
183.33	34200. S	> 999.00 B	>999.00

****
Minimum rating is 1.52 at location 128.33 in span 3.
****

Strength II

Span 1

Location	Allowable	Shear	Rating Factors Bending Inv.	Bending Oper.	Shear Inv.	Shear Oper.
0.00	9331. C	488.42		>999.00		2.02
18.33	36000. B	769.69		2.27		5.85
22.00L	36000. B	773.47		1.84		6.36
22.00R	36000. B	773.65		3.37		6.36
36.67	36000. B	617.31		2.20		6.03
55.00	36000. B	623.62		1.83		7.77
73.33	36000. B	632.76		1.94		6.03
91.67	36000. B	644.47		2.44		5.30
110.00	36000. B	658.50		3.47		4.53
122.00L	36000. B	918.49		4.67		5.98
122.00R	36000. B	918.79		3.73		5.98
124.00L	20036. C	922.00		6.32		5.89
124.00R	23388. C	1326.20		7.38		8.93
128.33	23450. C	1332.57		7.67		8.64
146.67	13959. C	1361.56		4.66		7.42
154.00L	45675. B	1373.66		3.74		7.24
154.00R	45672. B	1638.91		4.23		8.89
156.00L	43981. B	1644.31		6.43		9.25
156.00R	23749. C	1644.80		12.81		9.25
165.00	46576. B	1671.34		6.12		8.95
183.33	46329. B	1757.69		3.45		7.46

Span 2

Location	Allowable	Shear	Rating Factors Bending Inv.	Bending Oper.	Shear Inv.	Shear Oper.
0.00	46329. B	1778.71		3.45		7.54
25.00	46559. B	1747.50		7.46		9.82
28.00L	46976. B	1747.50		8.12		10.15
28.00R	21796. C	1747.50		6.68		10.15
30.00L	21867. C	1747.50		9.28		10.37
30.00R	45307. B	1450.84		5.62		8.36
50.00	47985. B	1450.84		7.73		10.31
55.33L	45690. B	1450.84		5.93		10.69
55.33R	45690. B	1450.84		5.92		10.69
57.33L	21060. B	1450.84		6.18		10.82
57.33R	25555. B	1450.84		7.53		10.82
75.00	29713. C	974.23		6.58		7.30
100.00	29713. C	974.23		5.16		9.58
125.00	29713. C	973.68		4.80		13.51
150.00	29713. C	974.23		5.15		11.39
175.00	29713. C	974.23		6.55		8.53
190.67L	25555. B	1450.84		7.16		12.32
190.67R	20533. B	1450.84		5.73		12.32
192.67L	25575. B	1450.84		7.49		12.15
192.67R	16852. B	1450.84		4.91		12.15
200.00	47985. B	1450.84		7.77		11.48
218.00L	45307. B	1450.84		4.57		9.71
218.00R	45307. B	1747.50		5.09		12.04
220.00L	43540. B	1747.50		5.95		11.75
220.00R	43540. B	1747.50		10.18		11.75
225.00	45307. B	1747.50		7.20		10.99
250.00	46330. B	1778.84		3.44		7.54

Span 3

Location	Allowable	Shear	Rating Factors Bending		Shear	
			Inv.	Oper.	Inv.	Oper.
0.00	46330. B	1757.54	3.44			7.44
18.33	46576. B	1671.32	6.14			8.49
25.33L	23817. C	1650.72	7.29			8.93
25.33R	20819. C	1650.22	6.06			8.93
27.33L	20829. C	1644.80	10.70			9.06
27.33R	45634. B	1377.06	5.98			7.36
36.67	13958. C	1361.55	4.65			7.87
55.00	23420. C	1332.56	12.33			9.02
57.33L	23396. C	1329.18	7.47			9.17
57.33R	23364. C	1328.93	7.46			9.17
59.33L	23341. C	1326.20	7.34			9.30
59.33R	20022. C	922.00	6.29			6.13
73.33	36000. B	658.50	3.49			4.69
91.67	36000. B	644.47	2.44			5.49
110.00	36000. B	632.76	1.93			6.22
128.33	36000. B	623.62	1.81			6.20
146.67	36000. B	617.31	2.19			4.77
161.33L	36000. B	773.65	3.35			5.71
161.33R	36000. B	773.47	1.82			5.71
165.00	36000. B	769.68	2.25			5.39
183.33	9331. C	488.42	>999.00			2.01

Service II

Span 1

Location	Allowable Stress	Rating Factors Bending		
		Inv.	Oper.	
0.00	34200. S	> 999.00	B	>999.00
18.33	34200. S	3.19	B	3.19
22.00L	34200. S	2.64	B	2.64
22.00R	34200. S	4.60	B	4.60
36.67	34200. S	3.11	B	3.11
55.00	34200. S	2.63	B	2.63
73.33	34200. S	2.75	B	2.75
91.67	34200. S	3.35	B	3.35
110.00	34200. S	4.58	B	4.58
122.00L	34200. S	6.01	B	6.01
122.00R	34200. S	6.01	B	6.01
124.00L	34200. S	6.26	B	6.26
124.00R	34200. S	5.24	B	5.24
128.33	47500. S	7.56	B	7.56
146.67	47500. S	8.87	B	8.87
154.00L	47500. S	7.54	B	7.54
154.00R	47500. S	7.84	B	7.84
156.00L	47500. S	12.83	B	12.83
156.00R	47500. S	21.71	B	21.71
165.00	47500. S	10.81	B	10.81
183.33	47500. S	6.83	B	6.83

Span 2

Location	Allowable Stress	Rating Factors Bending	
		Inv.	Oper.

0.00	34200.	S	6.83	B	6.83
25.00	34200.	S	12.72	B	12.72
28.00L	34200.	S	13.55	B	13.55
28.00R	34200.	S	13.25	B	13.25
30.00L	34200.	S	18.17	B	18.17
30.00R	34200.	S	11.10	B	11.10
50.00	34200.	S	9.47	B	13.08
55.33L	34200.	S	8.32	B	8.32
55.33R	34200.	S	8.31	B	8.31
57.33L	34200.	S	7.96	B	7.96
57.33R	34200.	S	9.69	B	9.69
75.00	34200.	S	7.06	B	7.06
100.00	34200.	S	5.39	B	5.39
125.00	47500.	S	4.96	B	4.96
150.00	47500.	S	5.38	B	5.38
175.00	47500.	S	7.03	B	7.03
190.67L	47500.	S	9.25	B	9.25
190.67R	47500.	S	9.26	B	9.26
192.67L	47500.	S	9.64	B	9.64
192.67R	47500.	S	7.92	B	7.92
200.00	47500.	S	9.41	B	13.13
218.00L	47500.	S	8.90	B	8.90
218.00R	47500.	S	9.16	B	9.16
220.00L	47500.	S	11.47	B	11.47
220.00R	47500.	S	18.56	B	18.56
225.00	47500.	S	12.71	B	12.71
250.00	47500.	S	6.82	B	6.82

Span 3

Location	Allowable Stress		Rating Factors Bending Inv.		Oper.
0.00	34200.	S	6.82	B	6.82
18.33	34200.	S	10.84	B	10.84
25.33L	34200.	S	12.46	B	12.46
25.33R	34200.	S	12.12	B	12.12
27.33L	34200.	S	21.09	B	21.09
27.33R	34200.	S	12.26	B	12.26
36.67	34200.	S	8.86	B	8.86
55.00	34200.	S	8.23	B	12.16
57.33L	34200.	S	7.37	B	7.37
57.33R	34200.	S	7.36	B	7.36
59.33L	34200.	S	7.25	B	7.25
59.33R	34200.	S	8.67	B	8.67
73.33	34200.	S	4.60	B	4.60
91.67	34200.	S	3.35	B	3.35
110.00	34200.	S	2.74	B	2.74
128.33	34200.	S	2.61	B	2.61
146.67	34200.	S	3.09	B	3.09
161.33L	34200.	S	4.58	B	4.58
161.33R	34200.	S	2.62	B	2.62
165.00	34200.	S	3.17	B	3.17
183.33	34200.	S	> 999.00	B	>999.00

****
Minimum rating is 1.81 at location 128.33 in span 3.
****

Rating Codes:
T - Top steel governs
B - Bottom steel governs
C - Concrete governs
R - Rebar governs
V - Shear governs
S - Serviceability governs

Mom Strength Codes:
C - Compact
B - Braced non-compact
U - Unbraced non-compact
T - Transition between compact and braced non-compact
S - Serviceability

Noncompact shapes ratings based on stress, as

$$IR = \frac{Fb - \text{factored dead load stress}}{\text{factored LL+I stress}}$$

Operating rating for Strength II is

$$OR = \frac{Fb - \text{factored dead load stress}}{\text{factored LL+I stress}}$$

Inventory rating for Strength II is

$$IR = OR/(LL+I \text{ factor})$$

I-295 HH BUCKMAN BRIDGE -720249
Girder 4 : Rating Output : Lrfd Ratings
Thu Mar 26 23:21:20 2015

[This table uses the rating equation (6A.4.2.1-1)
of the 2011 edition of the Manual for Bridge
Evaluation.]

HL93

Strength I

Span 1

Location	Compct Mom Cap/Noncmpt Allow Stress	Shear Capacity	Rating Factors Bending Inv.	Bending Oper.	Shear Inv.	Shear Oper.
0.00	9331. B	488.42	>999.00 T	>999.00	2.03	2.63
18.33	36000. B	769.69	2.11 B	2.73	4.78	6.20
22.00L	36000. B	773.47	1.70 B	2.20	5.00	6.48
22.00R	36000. B	773.65	3.07 B	3.98	5.00	6.49
36.67	36000. B	617.31	1.95 B	2.53	4.85	6.29
55.00	36000. B	623.62	1.58 B	2.04	5.96	7.72
73.33	36000. B	632.76	1.63 B	2.12	7.29	9.45
91.67	36000. B	644.47	2.09 B	2.71	6.09	7.89
110.00	36000. B	658.50	3.03 B	3.93	5.06	6.56
122.00L	36000. B	918.49	4.22 B	5.48	6.87	8.91
122.00R	36000. B	918.79	3.38 T	4.38	6.88	8.91
124.00L	20036. C	922.00	5.64 B	7.31	6.80	8.82
124.00R	23347. C	1326.20	6.58 B	8.53	10.23	13.26
128.33	23420. B	1332.57	7.97 T	10.33	9.97	12.92
146.67	13973. C	1361.56	3.24 B	4.20	8.76	11.36
154.00L	45675. B	1373.66	2.63 B	3.41	7.97	10.34
154.00R	45672. B	1638.91	2.95 B	3.82	9.75	12.64
156.00L	43981. B	1644.31	2.70 B	3.50	9.42	12.22
156.00R	23766. C	1644.80	5.20 B	6.75	9.43	12.22
165.00	46576. B	1671.34	4.07 B	5.28	8.32	10.78
183.33	46329. B	1757.69	2.11 B	2.74	6.52	8.45

Span 2

Location	Compct Mom Cap/Noncmpt Allow Stress	Shear Capacity	Rating Factors Bending Inv.	Bending Oper.	Shear Inv.	Shear Oper.
0.00	46329. B	1778.71	2.11 B	2.74	7.00	9.07
25.00	46559. B	1747.50	4.65 B	6.03	8.60	11.15
28.00L	46976. B	1747.50	5.10 B	6.61	9.99	12.95
28.00R	21738. C	1747.50	4.17 B	5.41	9.99	12.95
30.00L	21800. C	1747.50	4.42 B	5.74	11.66	15.11
30.00R	45307. B	1450.84	2.65 B	3.43	9.49	12.30
50.00	47985. B	1450.84	4.92 B	6.38	8.41	10.91
55.33L	45690. B	1450.84	5.25 B	6.80	8.74	11.33
55.33R	45690. B	1450.84	6.55 B	8.49	8.74	11.33
57.33L	45690. B	1450.84	5.23 B	6.78	8.86	11.49
57.33R	29713. C	1450.84	8.12 B	10.52	8.86	11.49
75.00	29713. C	974.23	5.71 B	7.40	6.35	8.24
100.00	29713. C	974.23	4.27 B	5.53	7.91	10.25
125.00	29713. C	973.68	3.90 B	5.06	10.73	13.91
150.00	29713. C	974.23	4.29 B	5.56	8.17	10.59

175.00	29713.	C	974.23	5.76	B	7.47	6.65	8.62
190.67L	25555.	B	1450.84	6.72	B	8.71	10.07	13.05
190.67R	20533.	B	1450.84	5.39	T	6.98	10.07	13.05
192.67L	30626.	C	1450.84	8.43	B	10.93	9.99	12.95
192.67R	45936.	B	1450.84	4.26	B	5.52	9.99	12.95
200.00	47985.	B	1450.84	5.10	B	6.60	9.63	12.48
218.00L	45307.	B	1450.84	3.07	B	3.98	8.59	11.13
218.00R	45307.	B	1747.50	3.42	B	4.43	10.60	13.74
220.00L	43540.	B	1747.50	3.03	B	3.93	10.39	13.46
220.00R	43540.	B	1747.50	5.19	B	6.72	10.39	13.46
225.00	45307.	B	1747.50	4.77	B	6.18	9.80	12.71
250.00	46330.	B	1778.84	2.18	B	2.82	6.89	8.93

Span 3

Location	Compct Mom Cap/Noncmpt Allow Stress		Shear Capacity	Rating Factors Bending			Shear	
				Inv.		Oper.	Inv.	Oper.
0.00	46330.	B	1757.54	2.18	B	2.82	6.35	8.23
18.33	46576.	B	1671.32	3.88	B	5.03	7.45	9.66
25.33L	23824.	C	1650.72	4.63	B	6.00	7.70	9.99
25.33R	20868.	C	1650.22	3.87	B	5.01	7.70	9.98
27.33L	20868.	C	1644.80	4.07	B	5.28	7.74	10.04
27.33R	45634.	B	1377.06	2.29	B	2.97	6.32	8.19
36.67	13955.	C	1361.55	2.91	B	3.77	6.33	8.20
55.00	23339.	B	1332.56	7.48	T	9.69	6.99	9.06
57.33L	23316.	C	1329.18	7.72	B	10.00	7.07	9.17
57.33R	23274.	C	1328.93	7.70	B	9.98	7.07	9.17
59.33L	23262.	C	1326.20	7.91	B	10.25	7.14	9.26
59.33R	20001.	C	922.00	6.78	B	8.79	4.70	6.09
73.33	36000.	B	658.50	3.00	B	3.88	3.46	4.48
91.67	36000.	B	644.47	2.05	B	2.66	4.10	5.31
110.00	36000.	B	632.76	1.60	B	2.08	4.81	6.24
128.33	36000.	B	623.62	1.54	B	2.00	4.90	6.35
146.67	36000.	B	617.31	1.90	B	2.46	4.46	5.78
161.33L	36000.	B	773.65	3.02	B	3.91	5.46	7.08
161.33R	36000.	B	773.47	1.66	B	2.15	5.46	7.08
165.00	36000.	B	769.68	2.06	B	2.67	5.19	6.73
183.33	9331.	B	488.42	>999.00	T	>999.00	2.00	2.59

Service II

Span 1

Location	Allowable Stress		Rating Factors Bending			
			Inv.		Oper.	
0.00	34200.	S	> 999.00	B	>999.00	
18.33	34200.	S	2.93	B	3.81	
22.00L	34200.	S	2.42	B	3.14	
22.00R	34200.	S	4.16	B	5.41	
36.67	34200.	S	2.73	B	3.55	
55.00	34200.	S	2.26	B	2.93	
73.33	34200.	S	2.30	B	3.00	
91.67	34200.	S	2.84	B	3.70	
110.00	34200.	S	3.97	B	5.17	
122.00L	34200.	S	5.41	B	7.03	
122.00R	34200.	S	5.41	B	7.03	
124.00L	34200.	S	5.56	B	7.22	
124.00R	34200.	S	4.64	B	6.03	
128.33	47500.	S	7.48	B	10.18	
146.67	47500.	S	6.09	B	7.91	
154.00L	47500.	S	5.18	B	6.73	
154.00R	47500.	S	5.36	B	6.96	
156.00L	47500.	S	5.24	B	6.81	
156.00R	47500.	S	8.71	B	11.32	
165.00	47500.	S	7.06	B	9.18	

183.33	47500. S	4.03 B	5.24

Span 2

Location	Allowable Stress	Rating Factors Bending Inv.	Oper.
0.00	34200. S	4.03 B	5.24
25.00	34200. S	7.93 B	10.31
28.00L	34200. S	8.52 B	11.08
28.00R	34200. S	8.32 B	10.82
30.00L	34200. S	8.73 B	11.35
30.00R	34200. S	5.28 B	6.86
50.00	34200. S	8.36 B	10.87
55.33L	34200. S	7.85 B	12.04
55.33R	34200. S	7.85 B	12.02
57.33L	34200. S	7.33 B	9.53
57.33R	34200. S	8.91 B	11.59
75.00	34200. S	6.13 B	7.97
100.00	34200. S	4.44 B	5.78
125.00	47500. S	4.02 B	5.22
150.00	47500. S	4.47 B	5.81
175.00	47500. S	6.18 B	8.04
190.67L	47500. S	8.61 B	11.19
190.67R	47500. S	8.62 B	11.21
192.67L	47500. S	9.00 B	11.70
192.67R	47500. S	7.41 B	9.64
200.00	47500. S	8.63 B	11.22
218.00L	47500. S	5.97 B	7.76
218.00R	47500. S	6.15 B	7.99
220.00L	47500. S	5.83 B	7.58
220.00R	47500. S	9.43 B	12.26
225.00	47500. S	8.37 B	10.89
250.00	47500. S	4.13 B	5.36

Span 3

Location	Allowable Stress	Rating Factors Bending Inv.	Oper.
0.00	34200. S	4.13 B	5.36
18.33	34200. S	6.76 B	8.79
25.33L	34200. S	7.85 B	10.21
25.33R	34200. S	7.65 B	9.95
27.33L	34200. S	7.95 B	10.33
27.33R	34200. S	4.65 B	6.04
36.67	34200. S	5.54 B	7.20
55.00	34200. S	7.35 B	9.56
57.33L	34200. S	6.96 B	9.86
57.33R	34200. S	6.96 B	9.85
59.33L	34200. S	6.59 B	10.11
59.33R	34200. S	7.84 B	12.13
73.33	34200. S	3.92 B	5.10
91.67	34200. S	2.80 B	3.65
110.00	34200. S	2.27 B	2.95
128.33	34200. S	2.21 B	2.88
146.67	34200. S	2.67 B	3.47
161.33L	34200. S	4.10 B	5.33
161.33R	34200. S	2.36 B	3.07
165.00	34200. S	2.88 B	3.74
183.33	34200. S	> 999.00 B	>999.00

****
Minimum rating is 1.54 at location 128.33 in span 3.
****

Strength II

Span 1

Location	Allowable	Shear	Rating Factors Bending Inv.	Bending Oper.	Shear Inv.	Shear Oper.
0.00	9331. C	488.42		>999.00		1.98
18.33	36000. B	769.69		2.42		5.70
22.00L	36000. B	773.47		1.96		5.81
22.00R	36000. B	773.65		3.54		5.81
36.67	36000. B	617.31		2.28		5.97
55.00	36000. B	623.62		1.88		7.34
73.33	36000. B	632.76		1.97		5.56
91.67	36000. B	644.47		2.55		4.91
110.00	36000. B	658.50		3.69		4.25
122.00L	36000. B	918.49		5.09		5.92
122.00R	36000. B	918.79		4.07		5.92
124.00L	20036. C	922.00		6.78		5.88
124.00R	23347. C	1326.20		7.91		8.84
128.33	23420. C	1332.57		12.92		8.69
146.67	13973. C	1361.56		5.32		7.86
154.00L	45675. B	1373.66		4.46		7.78
154.00R	45672. B	1638.91		5.00		9.51
156.00L	43981. B	1644.31		7.65		10.10
156.00R	23766. C	1644.80		14.75		10.10
165.00	46576. B	1671.34		7.36		9.79
183.33	46329. B	1757.69		4.21		7.57

Span 2

Location	Allowable	Shear	Rating Factors Bending Inv.	Bending Oper.	Shear Inv.	Shear Oper.
0.00	46329. B	1778.71		4.21		7.94
25.00	46559. B	1747.50		7.44		10.41
28.00L	46976. B	1747.50		7.99		12.14
28.00R	21738. C	1747.50		6.53		12.14
30.00L	21800. C	1747.50		9.02		14.21
30.00R	45307. B	1450.84		5.39		11.56
50.00	47985. B	1450.84		7.26		10.29
55.33L	45690. B	1450.84		6.05		10.57
55.33R	45690. B	1450.84		6.04		10.57
57.33L	45690. B	1450.84		6.00		10.66
57.33R	29713. C	1450.84		9.32		10.66
75.00	29713. C	974.23		6.87		7.02
100.00	29713. C	974.23		5.35		8.67
125.00	29713. C	973.68		4.96		9.58
150.00	29713. C	974.23		5.38		10.04
175.00	29713. C	974.23		6.94		8.23
190.67L	25555. B	1450.84		7.76		12.62
190.67R	20533. B	1450.84		6.22		12.62
192.67L	30626. C	1450.84		9.69		12.53
192.67R	45936. B	1450.84		4.90		12.53
200.00	47985. B	1450.84		7.50		12.12
218.00L	45307. B	1450.84		4.63		10.93
218.00R	45307. B	1747.50		5.16		13.49
220.00L	43540. B	1747.50		5.91		13.16
220.00R	43540. B	1747.50		10.12		13.16
225.00	45307. B	1747.50		7.53		12.28
250.00	46330. B	1778.84		4.30		7.88

Span 3

Location	Allowable	Shear	Rating Factors Bending		Shear	
			Inv.	Oper.	Inv.	Oper.
0.00	46330. B	1757.54	4.30			7.77
18.33	46576. B	1671.32	7.05			9.01
25.33L	23824. C	1650.72	8.08			9.40
25.33R	20868. C	1650.22	6.75			9.40
27.33L	20868. C	1644.80	11.81			9.49
27.33R	45634. B	1377.06	6.65			7.74
36.67	13955. C	1361.55	4.78			7.99
55.00	23339. C	1332.56	12.12			8.73
57.33L	23316. C	1329.18	7.87			8.82
57.33R	23274. C	1328.93	7.85			8.82
59.33L	23262. C	1326.20	7.70			8.90
59.33R	20001. C	922.00	6.60			5.86
73.33	36000. B	658.50	3.64			4.32
91.67	36000. B	644.47	2.51			5.11
110.00	36000. B	632.76	1.93			5.79
128.33	36000. B	623.62	1.83			5.98
146.67	36000. B	617.31	2.21			4.63
161.33L	36000. B	773.65	3.46			5.88
161.33R	36000. B	773.47	1.90			5.88
165.00	36000. B	769.68	2.36			5.55
183.33	9331. C	488.42	>999.00			1.96

Service II

Span 1

Location	Allowable Stress	Rating Factors Bending		
		Inv.	Oper.	
0.00	34200. S	> 999.00	B	>999.00
18.33	34200. S	3.38	B	3.38
22.00L	34200. S	2.79	B	2.79
22.00R	34200. S	4.81	B	4.81
36.67	34200. S	3.20	B	3.20
55.00	34200. S	2.69	B	2.69
73.33	34200. S	2.79	B	2.79
91.67	34200. S	3.49	B	3.49
110.00	34200. S	4.85	B	4.85
122.00L	34200. S	6.53	B	6.53
122.00R	34200. S	6.53	B	6.53
124.00L	34200. S	6.70	B	6.70
124.00R	34200. S	5.59	B	5.59
128.33	47500. S	8.97	B	12.74
146.67	47500. S	10.02	B	10.02
154.00L	47500. S	8.80	B	8.80
154.00R	47500. S	9.11	B	9.11
156.00L	47500. S	14.89	B	14.89
156.00R	47500. S	24.75	B	24.75
165.00	47500. S	12.80	B	12.80
183.33	47500. S	8.04	B	8.04

Span 2

Location	Allowable Stress	Rating Factors Bending	
		Inv.	Oper.

0.00	34200.	S	8.04	B	8.04
25.00	34200.	S	12.73	B	12.73
28.00L	34200.	S	13.39	B	13.39
28.00R	34200.	S	13.08	B	13.08
30.00L	34200.	S	17.85	B	17.85
30.00R	34200.	S	10.79	B	10.79
50.00	34200.	S	10.21	B	12.37
55.33L	34200.	S	8.56	B	8.56
55.33R	34200.	S	8.55	B	8.55
57.33L	34200.	S	8.44	B	8.44
57.33R	34200.	S	10.26	B	10.26
75.00	34200.	S	7.40	B	7.40
100.00	34200.	S	5.59	B	5.59
125.00	47500.	S	5.11	B	5.11
150.00	47500.	S	5.62	B	5.62
175.00	47500.	S	7.47	B	7.47
190.67L	47500.	S	9.98	B	9.98
190.67R	47500.	S	9.99	B	9.99
192.67L	47500.	S	10.38	B	10.38
192.67R	47500.	S	8.55	B	8.55
200.00	47500.	S	10.15	B	12.74
218.00L	47500.	S	9.03	B	9.03
218.00R	47500.	S	9.30	B	9.30
220.00L	47500.	S	11.40	B	11.40
220.00R	47500.	S	18.45	B	18.45
225.00	47500.	S	13.27	B	13.27
250.00	47500.	S	8.17	B	8.17

Span 3

Location	Allowable Stress		Rating Factors Bending Inv.		Oper.
0.00	34200.	S	8.17	B	8.17
18.33	34200.	S	12.32	B	12.32
25.33L	34200.	S	13.75	B	13.75
25.33R	34200.	S	13.40	B	13.40
27.33L	34200.	S	23.14	B	23.14
27.33R	34200.	S	13.53	B	13.53
36.67	34200.	S	9.13	B	9.13
55.00	34200.	S	8.93	B	11.94
57.33L	34200.	S	7.76	B	7.76
57.33R	34200.	S	7.75	B	7.75
59.33L	34200.	S	7.59	B	7.59
59.33R	34200.	S	9.11	B	9.11
73.33	34200.	S	4.78	B	4.78
91.67	34200.	S	3.43	B	3.43
110.00	34200.	S	2.74	B	2.74
128.33	34200.	S	2.63	B	2.63
146.67	34200.	S	3.12	B	3.12
161.33L	34200.	S	4.72	B	4.72
161.33R	34200.	S	2.72	B	2.72
165.00	34200.	S	3.30	B	3.30
183.33	34200.	S	> 999.00	B	>999.00

****
Minimum rating is 1.83 at location 128.33 in span 3.
****

Rating Codes:
T - Top steel governs
B - Bottom steel governs
C - Concrete governs
R - Rebar governs
V - Shear governs
S - Serviceability governs

Mom Strength Codes:
C - Compact
B - Braced non-compact
U - Unbraced non-compact
T - Transition between compact and braced non-compact
S - Serviceability

Noncompact shapes ratings based on stress, as

$$IR = \frac{Fb - \text{factored dead load stress}}{\text{factored LL+I stress}}$$

Operating rating for Strength II is

$$OR = \frac{Fb - \text{factored dead load stress}}{\text{factored LL+I stress}}$$

Inventory rating for Strength II is

$$IR = OR/(LL+I \text{ factor})$$

I-295 HH BUCKMAN BRIDGE -720249
Girder 5 : Rating Output : Lrfd Ratings
Thu Mar 26 23:21:35 2015

[This table uses the rating equation (6A.4.2.1-1) of the 2011 edition of the Manual for Bridge Evaluation.]

HL93

Strength I

Span 1

Location	Compct Mom Cap/Noncmpt Allow Stress	Shear Capacity	Rating Factors Bending Inv.	Bending Oper.	Shear Inv.	Shear Oper.
0.00	36000. B	347.57	>999.00 B	>999.00	1.13	1.46
18.33	36000. B	461.91	2.98 B	3.86	2.73	3.53
36.67	36000. B	476.29	1.58 B	2.05	3.75	4.86
38.00L	36000. B	477.22	1.54 B	1.99	3.83	4.97
38.00R	36000. B	477.34	1.88 B	2.44	3.83	4.97
55.00	36000. B	435.91	1.56 B	2.02	4.45	5.77
73.33	36000. B	447.75	1.62 B	2.10	4.97	6.44
91.67	36000. B	514.98	1.97 B	2.56	4.33	5.61
94.00L	36000. B	520.37	2.07 B	2.68	4.22	5.47
94.00R	36000. B	520.76	1.93 B	2.50	4.22	5.47
110.00	36000. B	559.21	2.80 B	3.62	3.54	4.59
128.33	35223. B	695.47	3.20 B	4.15	3.35	4.34
146.67	35178. B	842.04	2.28 B	2.96	3.42	4.44
155.33L	28998. B	928.08	1.32 B	1.71	3.49	4.53
155.33R	28971. B	929.75	2.19 B	2.84	3.50	4.54
165.00	30326. B	1380.66	2.12 B	2.75	5.21	6.76
183.33	35100. B	1263.48	0.91 B	1.17	3.78	4.90

Span 2

Location	Compct Mom Cap/Noncmpt Allow Stress	Shear Capacity	Rating Factors Bending Inv.	Bending Oper.	Shear Inv.	Shear Oper.
0.00	35100. B	1274.84	0.91 B	1.17	3.45	4.47
21.00L	35318. B	923.38	2.19 B	2.84	2.51	3.26
21.00R	35318. B	922.51	1.29 B	1.67	2.51	3.25
25.00	35313. B	902.13	1.59 B	2.06	2.98	3.87
50.00	35226. B	789.55	4.14 B	5.37	3.86	5.00
75.00	36000. B	588.76	3.03 B	3.92	3.52	4.57
76.00L	36000. B	587.44	2.95 B	3.83	3.57	4.62
76.00R	36000. B	587.20	3.15 B	4.08	3.56	4.62
99.50L	36000. B	506.39	1.98 B	2.57	4.58	5.94
99.50R	36000. B	506.31	2.31 B	3.00	4.58	5.94
100.00	36000. B	506.10	2.30 B	2.98	4.64	6.01
125.00L	36000. B	502.51	1.99 B	2.58	5.25	6.81
125.00R	36000. B	502.55	1.99 B	2.58	5.25	6.81
150.00	36000. B	521.48	2.30 B	2.99	5.09	6.60
174.00L	36000. B	626.29	3.17 B	4.10	3.98	5.16
174.00R	36000. B	626.70	2.97 B	3.86	3.98	5.16
150.50L	36000. B	522.06	2.32 B	3.01	5.09	6.59
150.50R	36000. B	522.30	1.99 B	2.58	5.09	6.60
175.00	36000. B	628.95	3.05 B	3.95	3.94	5.11

200.00	35218.	B	865.31	4.02	B	5.21	4.56	5.92
225.00	30828.	B	1008.02	1.40	B	1.81	3.75	4.86
229.00L	30521.	B	1033.20	1.12	B	1.45	3.64	4.71
229.00R	30507.	B	1034.27	1.94	B	2.52	3.64	4.72
250.00	30889.	B	1415.29	0.88	B	1.14	4.06	5.27

Span 3

Location	Compct Mom Cap/Noncmpt Allow Stress		Shear Capacity	Rating Factors Bending			Shear	
				Inv.		Oper.	Inv.	Oper.
0.00	30889.	B	1416.13	0.88	B	1.14	3.93	5.09
18.33	32863.	B	1199.86	1.75	B	2.27	3.79	4.91
28.00L	32495.	B	765.29	2.16	B	2.80	2.11	2.73
28.00R	32509.	B	763.96	1.26	B	1.63	2.10	2.73
36.67	32340.	B	695.47	1.73	B	2.24	2.03	2.63
55.00	35223.	B	600.54	3.24	B	4.20	2.40	3.11
73.33	36000.	B	514.98	2.80	B	3.63	2.41	3.12
89.33L	36000.	B	504.07	1.98	B	2.57	3.11	4.04
89.33R	36000.	B	503.96	2.13	B	2.76	3.11	4.04
91.67	36000.	B	502.42	2.04	B	2.65	3.20	4.15
110.00	36000.	B	435.91	1.64	B	2.13	3.14	4.07
128.33	36000.	B	476.29	1.56	B	2.03	4.14	5.37
145.33L	36000.	B	463.01	1.87	B	2.42	3.39	4.40
145.33R	36000.	B	462.88	1.53	B	1.98	3.39	4.40
146.67	36000.	B	461.91	1.57	B	2.03	3.34	4.33
165.00	36000.	B	484.57	2.92	B	3.79	2.92	3.79
183.33	36000.	B	338.37	>999.00	B	>999.00	1.11	1.44

Service II

Span 1

Location	Allowable Stress		Rating Factors Bending			
			Inv.		Oper.	
0.00	34200.	S	> 999.00	B	>999.00	
18.33	34200.	S	4.04	B	5.25	
36.67	34200.	S	2.26	B	2.94	
38.00L	34200.	S	2.21	B	2.87	
38.00R	34200.	S	2.65	B	3.44	
55.00	34200.	S	2.23	B	2.90	
73.33	34200.	S	2.28	B	2.96	
91.67	34200.	S	2.68	B	3.49	
94.00L	34200.	S	2.80	B	3.64	
94.00R	34200.	S	2.61	B	3.40	
110.00	34200.	S	3.64	B	4.74	
128.33	34200.	S	4.85	B	6.30	
146.67	34200.	S	3.73	B	4.84	
155.33L	34200.	S	3.27	B	4.25	
155.33R	34200.	S	4.70	B	6.11	
165.00	34200.	S	4.48	B	5.83	
183.33	34200.	S	1.83	B	2.38	

Span 2

Location	Allowable Stress		Rating Factors Bending			
			Inv.		Oper.	
0.00	34200.	S	1.83	B	2.38	
21.00L	34200.	S	3.60	B	4.68	
21.00R	34200.	S	2.37	B	3.08	

25.00	34200. S	2.79 B	3.63	
50.00	34200. S	6.34 B	8.25	
75.00	34200. S	3.99 B	5.19	
76.00L	34200. S	3.90 B	5.07	
76.00R	34200. S	4.15 B	5.40	
99.50L	34200. S	2.74 B	3.57	
99.50R	34200. S	3.16 B	4.11	
100.00	34200. S	3.15 B	4.09	
125.00L	34200. S	2.78 B	3.61	
125.00R	34200. S	2.78 B	3.61	
150.00	34200. S	3.15 B	4.10	
174.00L	34200. S	4.17 B	5.43	
174.00R	34200. S	3.93 B	5.11	
150.50L	34200. S	3.17 B	4.12	
150.50R	34200. S	2.75 B	3.58	
175.00	34200. S	4.02 B	5.22	
200.00	34200. S	6.16 B	8.01	
225.00	34200. S	3.15 B	4.09	
229.00L	34200. S	2.76 B	3.59	
229.00R	34200. S	4.06 B	5.28	
250.00	34200. S	2.34 B	3.04	

Span 3

Location	Allowable Stress	Rating Factors Bending	
		Inv.	Oper.
0.00	34200. S	2.34 B	3.04
18.33	34200. S	3.38 B	4.40
28.00L	34200. S	3.97 B	5.16
28.00R	34200. S	2.64 B	3.43
36.67	34200. S	3.32 B	4.32
55.00	34200. S	4.91 B	6.38
73.33	34200. S	3.65 B	4.75
89.33L	34200. S	2.69 B	3.50
89.33R	34200. S	2.88 B	3.75
91.67	34200. S	2.78 B	3.62
110.00	34200. S	2.32 B	3.02
128.33	34200. S	2.24 B	2.91
145.33L	34200. S	2.63 B	3.42
145.33R	34200. S	2.19 B	2.85
146.67	34200. S	2.25 B	2.92
165.00	34200. S	3.97 B	5.16
183.33	34200. S	> 999.00 B	>999.00

****
Minimum rating is 0.88 at location 250.00 in span 2.
****

Permit

Strength II

Span 1

Location	Allowable	Shear	Rating Factors Bending		Shear	
			Inv.	Oper.	Inv.	Oper.
0.00	36000. B	347.57	>999.00			1.11
18.33	36000. B	461.91	3.41			3.14
36.67	36000. B	476.29	1.85			4.73
38.00L	36000. B	477.22	1.80			4.85
38.00R	36000. B	477.34	2.20			4.85

55.00	36000. B	435.91	1.85	5.42
73.33	36000. B	447.75	1.96	3.95
91.67	36000. B	514.98	2.40	3.63
94.00L	36000. B	520.37	2.52	3.57
94.00R	36000. B	520.76	2.35	3.58
110.00	36000. B	559.21	3.41	3.26
128.33	35223. B	695.47	5.18	3.29
146.67	35178. B	842.04	3.78	3.49
155.33L	28998. B	928.08	2.27	3.81
155.33R	28971. B	929.75	3.77	3.82
165.00	30326. B	1380.66	3.87	6.35
183.33	35100. B	1263.48	1.84	4.55

Span 2

Location	Allowable	Shear	Rating Factors Bending		Shear	
			Inv.	Oper.	Inv.	Oper.
0.00	35100. B	1274.84	1.84		4.31	
21.00L	35318. B	923.38	3.88		3.73	
21.00R	35318. B	922.51	2.28		3.72	
25.00	35313. B	902.13	2.73		3.85	
50.00	35226. B	789.55	6.19		4.85	
75.00	36000. B	588.76	3.56		3.85	
76.00L	36000. B	587.44	3.48		3.88	
76.00R	36000. B	587.20	3.71		3.88	
99.50L	36000. B	506.39	2.42		4.76	
99.50R	36000. B	506.31	2.82		4.76	
100.00	36000. B	506.10	2.81		4.81	
125.00L	36000. B	502.51	2.47		6.82	
125.00R	36000. B	502.55	2.47		6.82	
150.00	36000. B	521.48	2.82		5.71	
174.00L	36000. B	626.29	3.75		4.99	
174.00R	36000. B	626.70	3.52		4.99	
150.50L	36000. B	522.06	2.84		5.66	
150.50R	36000. B	522.30	2.44		5.66	
175.00	36000. B	628.95	3.60		4.96	
200.00	35218. B	865.31	5.98		6.01	
225.00	30828. B	1008.02	2.29		4.95	
229.00L	30521. B	1033.20	1.89		4.77	
229.00R	30507. B	1034.27	3.27		4.77	
250.00	30889. B	1415.29	1.71		5.06	

Span 3

Location	Allowable	Shear	Rating Factors Bending		Shear	
			Inv.	Oper.	Inv.	Oper.
0.00	30889. B	1416.13	1.71		5.09	
18.33	32863. B	1199.86	3.40		4.78	
28.00L	32495. B	765.29	3.84		2.73	
28.00R	32509. B	763.96	2.24		2.72	
36.67	32340. B	695.47	2.88		2.66	
55.00	35223. B	600.54	5.25		3.03	
73.33	36000. B	514.98	3.38		3.11	
89.33L	36000. B	504.07	2.39		3.84	
89.33R	36000. B	503.96	2.57		3.84	
91.67	36000. B	502.42	2.47		3.93	
110.00	36000. B	435.91	1.97		3.92	
128.33	36000. B	476.29	1.85		4.75	
145.33L	36000. B	463.01	2.18		3.69	
145.33R	36000. B	462.88	1.77		3.69	
146.67	36000. B	461.91	1.82		3.62	
165.00	36000. B	484.57	3.32		3.11	
183.33	36000. B	338.37	>999.00		1.08	

Service II

Span 1

Location	Allowable Stress	Rating Factors Bending Inv.		Oper.	
0.00	34200. S	> 999.00	B	>999.00	
18.33	34200. S	4.64	B	4.64	
36.67	34200. S	2.65	B	2.65	
38.00L	34200. S	2.59	B	2.59	
38.00R	34200. S	3.10	B	3.10	
55.00	34200. S	2.65	B	2.65	
73.33	34200. S	2.76	B	2.76	
91.67	34200. S	3.28	B	3.28	
94.00L	34200. S	3.42	B	3.42	
94.00R	34200. S	3.19	B	3.19	
110.00	34200. S	4.46	B	4.46	
128.33	34200. S	7.50	B	7.87	
146.67	34200. S	6.18	B	6.18	
155.33L	34200. S	5.65	B	5.65	
155.33R	34200. S	8.12	B	8.12	
165.00	34200. S	8.20	B	8.20	
183.33	34200. S	3.73	B	3.73	

Span 2

Location	Allowable Stress	Rating Factors Bending Inv.		Oper.	
0.00	34200. S	3.73	B	3.73	
21.00L	34200. S	6.40	B	6.40	
21.00R	34200. S	4.21	B	4.21	
25.00	34200. S	4.82	B	4.82	
50.00	34200. S	9.26	B	9.50	
75.00	34200. S	4.71	B	4.71	
76.00L	34200. S	4.62	B	4.62	
76.00R	34200. S	4.91	B	4.91	
99.50L	34200. S	3.36	B	3.36	
99.50R	34200. S	3.88	B	3.88	
100.00	34200. S	3.86	B	3.86	
125.00L	34200. S	3.46	B	3.46	
125.00R	34200. S	3.46	B	3.46	
150.00	34200. S	3.87	B	3.87	
174.00L	34200. S	4.96	B	4.96	
174.00R	34200. S	4.66	B	4.66	
150.50L	34200. S	3.89	B	3.89	
150.50R	34200. S	3.38	B	3.38	
175.00	34200. S	4.76	B	4.76	
200.00	34200. S	9.18	B	9.18	
225.00	34200. S	5.18	B	5.18	
229.00L	34200. S	4.66	B	4.66	
229.00R	34200. S	6.86	B	6.86	
250.00	34200. S	4.55	B	4.55	

Span 3

Location	Allowable Stress	Rating Factors Bending Inv.		Oper.	
0.00	34200. S	4.55	B	4.55	
18.33	34200. S	6.60	B	6.60	

28.00L	34200.	S	7.09	B	7.09
28.00R	34200.	S	4.71	B	4.71
36.67	34200.	S	5.54	B	5.54
55.00	34200.	S	7.30	B	7.97
73.33	34200.	S	4.43	B	4.43
89.33L	34200.	S	3.26	B	3.26
89.33R	34200.	S	3.49	B	3.49
91.67	34200.	S	3.37	B	3.37
110.00	34200.	S	2.79	B	2.79
128.33	34200.	S	2.65	B	2.65
145.33L	34200.	S	3.07	B	3.07
145.33R	34200.	S	2.56	B	2.56
146.67	34200.	S	2.62	B	2.62
165.00	34200.	S	4.53	B	4.53
183.33	34200.	S	> 999.00	B	>999.00

****
Minimum rating is 1.08 at location 183.33 in span 3.
****

Rating Codes:
T - Top steel governs
B - Bottom steel governs
C - Concrete governs
R - Rebar governs
V - Shear governs
S - Serviceability governs

Mom Strength Codes:
C - Compact
B - Braced non-compact
U - Unbraced non-compact
T - Transition between compact and braced non-compact
S - Serviceability

Noncompact shapes ratings based on stress, as

$$IR = \frac{Fb - \text{factored dead load stress}}{\text{factored LL+I stress}}$$

Operating rating for Strength II is

$$OR = \frac{Fb - \text{factored dead load stress}}{\text{factored LL+I stress}}$$

Inventory rating for Strength II is

$$IR = OR/(LL+I \text{ factor})$$

I-295 HH BUCKMAN BRIDGE -720249
Girder 6 : Rating Output : Lrfd Ratings
Thu Mar 26 23:21:53 2015

[This table uses the rating equation (6A.4.2.1-1)
of the 2011 edition of the Manual for Bridge
Evaluation.]

HL93

Strength I

Span 1

Location	Compct Mom Cap/Noncmpt Allow Stress	Shear Capacity	Rating Factors Bending Inv.	Bending Oper.	Shear Inv.	Shear Oper.
0.00	36000. B	347.57	>999.00 B	>999.00	1.18	1.53
18.33	36000. B	461.91	3.05 B	3.95	2.72	3.53
36.67	36000. B	476.29	1.63 B	2.11	3.52	4.56
38.00L	36000. B	477.22	1.58 B	2.05	3.59	4.66
38.00R	36000. B	477.34	1.92 B	2.49	3.59	4.66
55.00	36000. B	435.91	1.54 B	2.00	4.40	5.71
73.33	36000. B	447.75	1.59 B	2.07	4.76	6.17
91.67	36000. B	514.98	1.94 B	2.51	4.14	5.37
94.00L	36000. B	520.37	2.03 B	2.63	4.07	5.27
94.00R	36000. B	520.76	1.90 B	2.46	4.07	5.28
110.00	36000. B	559.21	2.81 B	3.64	3.71	4.81
128.33	35178. B	695.47	3.28 B	4.25	3.70	4.80
146.67	30325. B	842.04	2.07 B	2.69	4.08	5.30
155.33L	28997. B	928.08	1.63 B	2.11	4.11	5.33
155.33R	28970. B	929.75	2.56 B	3.32	4.12	5.34
165.00	30888. B	1380.66	2.62 B	3.39	5.83	7.56
183.33	35100. B	1263.48	1.23 B	1.59	4.00	5.19

Span 2

Location	Compct Mom Cap/Noncmpt Allow Stress	Shear Capacity	Rating Factors Bending Inv.	Bending Oper.	Shear Inv.	Shear Oper.
0.00	35100. B	1274.84	1.23 B	1.59	4.05	5.25
21.00L	35318. B	923.38	2.28 B	2.95	2.78	3.61
21.00R	35318. B	922.51	1.37 B	1.78	2.78	3.60
25.00	35201. B	902.13	1.60 B	2.08	3.36	4.36
50.00	35252. B	789.55	3.88 B	5.03	3.75	4.86
75.00	36000. B	588.76	3.09 B	4.00	3.20	4.14
76.00L	36000. B	587.44	3.01 B	3.90	3.23	4.19
76.00R	36000. B	587.20	3.20 B	4.15	3.23	4.18
99.50L	36000. B	506.39	1.89 B	2.45	4.23	5.49
99.50R	36000. B	506.31	2.20 B	2.86	4.23	5.49
100.00	36000. B	506.10	2.19 B	2.84	4.29	5.56
125.00L	36000. B	502.51	1.84 B	2.39	5.40	7.00
125.00R	36000. B	502.55	1.84 B	2.39	5.40	7.01
150.00	36000. B	521.48	2.23 B	2.89	4.61	5.98
174.00L	36000. B	626.29	3.29 B	4.26	3.63	4.70
174.00R	36000. B	626.70	3.09 B	4.01	3.63	4.70
150.50L	36000. B	522.06	2.24 B	2.91	4.61	5.97
150.50R	36000. B	522.30	1.93 B	2.51	4.61	5.98
175.00	36000. B	628.95	3.17 B	4.11	3.59	4.66

200.00	35218.	B	865.31	3.90	B	5.05	4.69	6.08
225.00	30827.	B	1008.02	1.56	B	2.02	4.41	5.72
229.00L	30520.	B	1033.20	1.31	B	1.70	4.30	5.58
229.00R	30506.	B	1034.27	2.17	B	2.82	4.31	5.59
250.00	30888.	B	1415.29	1.24	B	1.61	4.66	6.04

Span 3

Location	Compct Mom Cap/Noncmpt Allow Stress		Shear Capacity	Rating Factors Bending			Shear	
				Inv.		Oper.	Inv.	Oper.
0.00	30888.	B	1416.13	1.24	B	1.61	4.41	5.72
18.33	32862.	B	1199.86	2.01	B	2.61	4.41	5.72
28.00L	32494.	B	765.29	2.32	B	3.01	2.42	3.14
28.00R	32508.	B	763.96	1.40	B	1.82	2.41	3.13
36.67	32339.	B	695.47	1.79	B	2.31	2.25	2.92
55.00	35223.	B	600.54	3.10	B	4.01	2.55	3.31
73.33	36000.	B	514.98	2.77	B	3.59	2.32	3.01
89.33L	36000.	B	504.07	1.92	B	2.49	3.09	4.01
89.33R	36000.	B	503.96	2.06	B	2.67	3.09	4.01
91.67	36000.	B	502.42	1.98	B	2.56	3.18	4.12
110.00	36000.	B	435.91	1.60	B	2.08	3.00	3.89
128.33	36000.	B	476.29	1.53	B	1.98	4.10	5.32
145.33L	36000.	B	463.01	1.89	B	2.44	3.16	4.09
145.33R	36000.	B	462.88	1.55	B	2.01	3.16	4.09
146.67	36000.	B	461.91	1.59	B	2.06	3.11	4.03
165.00	36000.	B	484.57	2.96	B	3.84	2.95	3.83
183.33	36000.	B	338.37	>999.00	B	>999.00	1.14	1.48

Service II

Span 1

Location	Allowable Stress		Rating Factors Bending			
			Inv.		Oper.	
0.00	34200.	S	> 999.00	B	>999.00	
18.33	34200.	S	4.11	B	5.35	
36.67	34200.	S	2.31	B	3.00	
38.00L	34200.	S	2.24	B	2.92	
38.00R	34200.	S	2.68	B	3.48	
55.00	34200.	S	2.19	B	2.84	
73.33	34200.	S	2.23	B	2.90	
91.67	34200.	S	2.62	B	3.41	
94.00L	34200.	S	2.73	B	3.55	
94.00R	34200.	S	2.56	B	3.32	
110.00	34200.	S	3.65	B	4.74	
128.33	34200.	S	4.97	B	6.46	
146.67	34200.	S	4.16	B	5.41	
155.33L	34200.	S	3.77	B	4.89	
155.33R	34200.	S	5.29	B	6.88	
165.00	34200.	S	5.13	B	6.67	
183.33	34200.	S	2.28	B	2.96	

Span 2

Location	Allowable Stress		Rating Factors Bending			
			Inv.		Oper.	
0.00	34200.	S	2.28	B	2.96	
21.00L	34200.	S	3.72	B	4.83	
21.00R	34200.	S	2.47	B	3.22	

25.00	34200. S	2.82 B	3.66	
50.00	34200. S	5.98 B	7.77	
75.00	34200. S	4.05 B	5.27	
76.00L	34200. S	3.96 B	5.14	
76.00R	34200. S	4.21 B	5.47	
99.50L	34200. S	2.61 B	3.40	
99.50R	34200. S	3.01 B	3.91	
100.00	34200. S	2.99 B	3.89	
125.00L	34200. S	2.57 B	3.34	
125.00R	34200. S	2.57 B	3.34	
150.00	34200. S	3.04 B	3.95	
174.00L	34200. S	4.31 B	5.60	
174.00R	34200. S	4.05 B	5.27	
150.50L	34200. S	3.06 B	3.97	
150.50R	34200. S	2.66 B	3.46	
175.00	34200. S	4.15 B	5.40	
200.00	34200. S	6.00 B	7.80	
225.00	34200. S	3.39 B	4.41	
229.00L	34200. S	3.06 B	3.97	
229.00R	34200. S	4.41 B	5.73	
250.00	34200. S	2.90 B	3.77	

Span 3

Location	Allowable Stress	Rating Factors Bending	
		Inv.	Oper.
0.00	34200. S	2.90 B	3.77
18.33	34200. S	3.76 B	4.89
28.00L	34200. S	4.20 B	5.46
28.00R	34200. S	2.84 B	3.69
36.67	34200. S	3.39 B	4.41
55.00	34200. S	4.71 B	6.12
73.33	34200. S	3.60 B	4.68
89.33L	34200. S	2.59 B	3.37
89.33R	34200. S	2.78 B	3.61
91.67	34200. S	2.68 B	3.49
110.00	34200. S	2.25 B	2.93
128.33	34200. S	2.17 B	2.82
145.33L	34200. S	2.64 B	3.43
145.33R	34200. S	2.21 B	2.87
146.67	34200. S	2.27 B	2.94
165.00	34200. S	4.00 B	5.20
183.33	34200. S	> 999.00 B	>999.00

****
Minimum rating is 1.14 at location 183.33 in span 3.
****

Permit

Strength II

Span 1

Location	Allowable	Shear	Rating Factors Bending		Shear	
			Inv.	Oper.	Inv.	Oper.
0.00	36000. B	347.57	>999.00			1.16
18.33	36000. B	461.91	3.50			3.10
36.67	36000. B	476.29	1.91			4.53
38.00L	36000. B	477.22	1.85			4.64
38.00R	36000. B	477.34	2.25			4.64

55.00	36000. B	435.91	1.84	5.23
73.33	36000. B	447.75	1.93	3.96
91.67	36000. B	514.98	2.37	3.48
94.00L	36000. B	520.37	2.48	3.43
94.00R	36000. B	520.76	2.32	3.44
110.00	36000. B	559.21	3.41	3.34
128.33	35178. B	695.47	5.34	3.44
146.67	30325. B	842.04	3.48	3.93
155.33L	28997. B	928.08	2.84	4.33
155.33R	28970. B	929.75	4.46	4.34
165.00	30888. B	1380.66	4.79	7.07
183.33	35100. B	1263.48	2.51	4.77

Span 2

Location	Allowable	Shear	Rating Factors Bending		Shear	
			Inv.	Oper.	Inv.	Oper.
0.00	35100. B	1274.84	2.51		4.85	
21.00L	35318. B	923.38	4.16		4.17	
21.00R	35318. B	922.51	2.50		4.17	
25.00	35201. B	902.13	2.85		4.26	
50.00	35252. B	789.55	5.84		4.64	
75.00	36000. B	588.76	3.59		3.50	
76.00L	36000. B	587.44	3.51		3.53	
76.00R	36000. B	587.20	3.73		3.52	
99.50L	36000. B	506.39	2.30		4.49	
99.50R	36000. B	506.31	2.68		4.49	
100.00	36000. B	506.10	2.66		4.55	
125.00L	36000. B	502.51	2.27		6.72	
125.00R	36000. B	502.55	2.27		6.73	
150.00	36000. B	521.48	2.71		5.76	
174.00L	36000. B	626.29	3.84		4.42	
174.00R	36000. B	626.70	3.61		4.42	
150.50L	36000. B	522.06	2.73		5.67	
150.50R	36000. B	522.30	2.35		5.67	
175.00	36000. B	628.95	3.70		4.40	
200.00	35218. B	865.31	5.82		6.00	
225.00	30827. B	1008.02	2.59		5.76	
229.00L	30520. B	1033.20	2.23		5.56	
229.00R	30506. B	1034.27	3.70		5.57	
250.00	30888. B	1415.29	2.40		5.57	

Span 3

Location	Allowable	Shear	Rating Factors Bending		Shear	
			Inv.	Oper.	Inv.	Oper.
0.00	30888. B	1416.13	2.40		5.55	
18.33	32862. B	1199.86	3.96		5.43	
28.00L	32494. B	765.29	4.21		3.11	
28.00R	32508. B	763.96	2.54		3.10	
36.67	32339. B	695.47	3.03		2.93	
55.00	35223. B	600.54	5.03		3.12	
73.33	36000. B	514.98	3.34		3.00	
89.33L	36000. B	504.07	2.33		3.76	
89.33R	36000. B	503.96	2.50		3.76	
91.67	36000. B	502.42	2.40		3.85	
110.00	36000. B	435.91	1.93		3.69	
128.33	36000. B	476.29	1.81		4.40	
145.33L	36000. B	463.01	2.20		3.57	
145.33R	36000. B	462.88	1.80		3.57	
146.67	36000. B	461.91	1.85		3.51	
165.00	36000. B	484.57	3.37		3.14	
183.33	36000. B	338.37	>999.00		1.12	

Service II

Span 1

Location	Allowable Stress	Rating Factors Bending Inv.		Oper.	
0.00	34200. S	> 999.00	B	>999.00	
18.33	34200. S	4.73	B	4.73	
36.67	34200. S	2.71	B	2.71	
38.00L	34200. S	2.64	B	2.64	
38.00R	34200. S	3.15	B	3.15	
55.00	34200. S	2.62	B	2.62	
73.33	34200. S	2.72	B	2.72	
91.67	34200. S	3.21	B	3.21	
94.00L	34200. S	3.35	B	3.35	
94.00R	34200. S	3.13	B	3.13	
110.00	34200. S	4.44	B	4.44	
128.33	34200. S	7.56	B	8.12	
146.67	34200. S	7.01	B	7.01	
155.33L	34200. S	6.58	B	6.58	
155.33R	34200. S	9.25	B	9.25	
165.00	34200. S	9.42	B	9.42	
183.33	34200. S	4.68	B	4.68	

Span 2

Location	Allowable Stress	Rating Factors Bending Inv.		Oper.	
0.00	34200. S	4.68	B	4.68	
21.00L	34200. S	6.80	B	6.80	
21.00R	34200. S	4.53	B	4.53	
25.00	34200. S	5.02	B	5.02	
50.00	34200. S	9.02	B	9.02	
75.00	34200. S	4.73	B	4.73	
76.00L	34200. S	4.62	B	4.62	
76.00R	34200. S	4.92	B	4.92	
99.50L	34200. S	3.19	B	3.19	
99.50R	34200. S	3.67	B	3.67	
100.00	34200. S	3.65	B	3.65	
125.00L	34200. S	3.18	B	3.18	
125.00R	34200. S	3.18	B	3.18	
150.00	34200. S	3.71	B	3.71	
174.00L	34200. S	5.05	B	5.05	
174.00R	34200. S	4.75	B	4.75	
150.50L	34200. S	3.73	B	3.73	
150.50R	34200. S	3.25	B	3.25	
175.00	34200. S	4.86	B	4.86	
200.00	34200. S	8.98	B	8.98	
225.00	34200. S	5.65	B	5.65	
229.00L	34200. S	5.22	B	5.22	
229.00R	34200. S	7.52	B	7.52	
250.00	34200. S	5.60	B	5.60	

Span 3

Location	Allowable Stress	Rating Factors Bending Inv.		Oper.	
0.00	34200. S	5.60	B	5.60	
18.33	34200. S	7.42	B	7.42	

28.00L	34200.	S	7.63	B	7.63
28.00R	34200.	S	5.16	B	5.16
36.67	34200.	S	5.78	B	5.78
55.00	34200.	S	7.29	B	7.67
73.33	34200.	S	4.35	B	4.35
89.33L	34200.	S	3.15	B	3.15
89.33R	34200.	S	3.38	B	3.38
91.67	34200.	S	3.26	B	3.26
110.00	34200.	S	2.72	B	2.72
128.33	34200.	S	2.58	B	2.58
145.33L	34200.	S	3.08	B	3.08
145.33R	34200.	S	2.58	B	2.58
146.67	34200.	S	2.64	B	2.64
165.00	34200.	S	4.57	B	4.57
183.33	34200.	S	> 999.00	B	>999.00

****
Minimum rating is 1.12 at location 183.33 in span 3.
****

Rating Codes:
T - Top steel governs
B - Bottom steel governs
C - Concrete governs
R - Rebar governs
V - Shear governs
S - Serviceability governs

Mom Strength Codes:
C - Compact
B - Braced non-compact
U - Unbraced non-compact
T - Transition between compact and braced non-compact
S - Serviceability

Noncompact shapes ratings based on stress, as

$$IR = \frac{Fb \text{ - factored dead load stress}}{\text{factored LL+I stress}}$$

Operating rating for Strength II is

$$OR = \frac{Fb \text{ - factored dead load stress}}{\text{factored LL+I stress}}$$

Inventory rating for Strength II is

$$IR = OR/(LL+I \text{ factor})$$

I-295 HH BUCKMAN BRIDGE -720249
Girder 7 : Rating Output : Lrfd Ratings
Thu Mar 26 23:22:09 2015

[This table uses the rating equation (6A.4.2.1-1)
of the 2011 edition of the Manual for Bridge
Evaluation.]

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Strength I

Span 1

Location	Compct Mom Cap/Noncmpt Allow Stress	Shear Capacity	Rating Factors Bending Inv.	Bending Oper.	Shear Inv.	Shear Oper.
0.00	36000. B	347.57	>999.00 B	>999.00	1.13	1.47
18.33	36000. B	461.91	2.86 B	3.71	2.55	3.30
36.67	36000. B	476.29	1.55 B	2.01	3.28	4.25
38.00L	36000. B	477.22	1.50 B	1.95	3.35	4.34
38.00R	36000. B	477.34	1.81 B	2.35	3.35	4.34
55.00	36000. B	435.91	1.46 B	1.89	4.01	5.20
73.33	36000. B	447.75	1.48 B	1.92	4.66	6.04
91.67	36000. B	514.98	1.76 B	2.28	4.09	5.31
94.00L	36000. B	520.37	1.83 B	2.38	4.02	5.21
94.00R	36000. B	520.76	1.71 B	2.22	4.02	5.21
110.00	36000. B	559.21	2.45 B	3.17	3.63	4.71
128.33	35178. B	695.47	2.75 B	3.56	3.63	4.71
146.67	30325. B	842.04	1.86 B	2.41	3.97	5.14
155.33L	28997. B	928.08	1.55 B	2.01	4.00	5.19
155.33R	28970. B	929.75	2.36 B	3.07	4.01	5.20
165.00	30888. B	1380.66	2.53 B	3.28	5.66	7.34
183.33	35100. B	1263.48	1.30 B	1.68	3.91	5.07

Span 2

Location	Compct Mom Cap/Noncmpt Allow Stress	Shear Capacity	Rating Factors Bending Inv.	Bending Oper.	Shear Inv.	Shear Oper.
0.00	35100. B	1274.84	1.30 B	1.68	3.85	4.99
21.00L	35318. B	923.38	2.28 B	2.95	2.77	3.59
21.00R	35318. B	922.51	1.42 B	1.84	2.77	3.59
25.00	35201. B	902.13	1.63 B	2.11	3.30	4.28
50.00	35252. B	789.55	3.43 B	4.44	3.61	4.68
75.00	36000. B	588.76	2.70 B	3.50	3.02	3.92
76.00L	36000. B	587.44	2.63 B	3.41	3.05	3.95
76.00R	36000. B	587.20	2.80 B	3.63	3.05	3.95
99.50L	36000. B	506.39	1.69 B	2.19	3.81	4.94
99.50R	36000. B	506.31	1.95 B	2.53	3.81	4.94
100.00	36000. B	506.10	1.94 B	2.52	3.85	4.99
125.00L	36000. B	502.51	1.65 B	2.14	5.00	6.49
125.00R	36000. B	502.55	1.65 B	2.14	5.00	6.49
150.00	36000. B	521.48	1.97 B	2.55	4.28	5.55
174.00L	36000. B	626.29	2.84 B	3.68	3.47	4.50
174.00R	36000. B	626.70	2.67 B	3.47	3.47	4.50
150.50L	36000. B	522.06	1.98 B	2.57	4.28	5.54
150.50R	36000. B	522.30	1.72 B	2.22	4.28	5.55
175.00	36000. B	628.95	2.74 B	3.55	3.44	4.46

200.00	35218.	B	865.31	3.47	B	4.49	4.50	5.84
225.00	30827.	B	1008.02	1.60	B	2.08	4.21	5.46
229.00L	30520.	B	1033.20	1.38	B	1.79	4.12	5.34
229.00R	30506.	B	1034.27	2.20	B	2.85	4.12	5.34
250.00	30888.	B	1415.29	1.32	B	1.71	4.49	5.82

Span 3

Location	Compct Mom Cap/Noncmpt Allow Stress		Shear Capacity	Rating Factors Bending			Shear	
				Inv.		Oper.	Inv.	Oper.
0.00	30888.	B	1416.13	1.32	B	1.71	4.25	5.51
18.33	32862.	B	1199.86	2.03	B	2.63	4.34	5.63
28.00L	32494.	B	765.29	2.20	B	2.85	2.42	3.13
28.00R	32508.	B	763.96	1.37	B	1.78	2.41	3.13
36.67	32339.	B	695.47	1.62	B	2.10	2.25	2.92
55.00	35223.	B	600.54	2.57	B	3.33	2.56	3.32
73.33	36000.	B	514.98	2.43	B	3.15	2.32	3.01
89.33L	36000.	B	504.07	1.74	B	2.26	3.05	3.95
89.33R	36000.	B	503.96	1.87	B	2.42	3.05	3.95
91.67	36000.	B	502.42	1.80	B	2.34	3.13	4.06
110.00	36000.	B	435.91	1.49	B	1.93	2.95	3.82
128.33	36000.	B	476.29	1.44	B	1.87	3.90	5.05
145.33L	36000.	B	463.01	1.78	B	2.30	3.07	3.98
145.33R	36000.	B	462.88	1.47	B	1.90	3.07	3.98
146.67	36000.	B	461.91	1.51	B	1.96	3.02	3.91
165.00	36000.	B	484.57	2.77	B	3.60	2.77	3.59
183.33	36000.	B	338.37	>999.00	B	>999.00	1.10	1.43

Service II

Span 1

Location	Allowable Stress		Rating Factors Bending			
			Inv.		Oper.	
0.00	34200.	S	> 999.00	B	>999.00	
18.33	34200.	S	3.84	B	4.99	
36.67	34200.	S	2.17	B	2.82	
38.00L	34200.	S	2.11	B	2.75	
38.00R	34200.	S	2.51	B	3.26	
55.00	34200.	S	2.05	B	2.66	
73.33	34200.	S	2.05	B	2.67	
91.67	34200.	S	2.36	B	3.07	
94.00L	34200.	S	2.46	B	3.19	
94.00R	34200.	S	2.30	B	2.99	
110.00	34200.	S	3.17	B	4.13	
128.33	34200.	S	4.14	B	5.39	
146.67	34200.	S	3.65	B	4.75	
155.33L	34200.	S	3.45	B	4.49	
155.33R	34200.	S	4.79	B	6.23	
165.00	34200.	S	4.87	B	6.34	
183.33	34200.	S	2.33	B	3.03	

Span 2

Location	Allowable Stress		Rating Factors Bending			
			Inv.		Oper.	
0.00	34200.	S	2.33	B	3.03	
21.00L	34200.	S	3.66	B	4.76	
21.00R	34200.	S	2.49	B	3.24	

25.00	34200. S	2.80 B	3.64	
50.00	34200. S	5.27 B	6.85	
75.00	34200. S	3.53 B	4.59	
76.00L	34200. S	3.44 B	4.48	
76.00R	34200. S	3.66 B	4.76	
99.50L	34200. S	2.31 B	3.00	
99.50R	34200. S	2.65 B	3.45	
100.00	34200. S	2.64 B	3.43	
125.00L	34200. S	2.29 B	2.97	
125.00R	34200. S	2.29 B	2.97	
150.00	34200. S	2.67 B	3.47	
174.00L	34200. S	3.71 B	4.82	
174.00R	34200. S	3.50 B	4.54	
150.50L	34200. S	2.69 B	3.49	
150.50R	34200. S	2.34 B	3.05	
175.00	34200. S	3.58 B	4.65	
200.00	34200. S	5.32 B	6.92	
225.00	34200. S	3.38 B	4.39	
229.00L	34200. S	3.07 B	4.00	
229.00R	34200. S	4.37 B	5.68	
250.00	34200. S	2.93 B	3.81	

Span 3

Location	Allowable Stress	Rating Factors Bending Inv.	Oper.
0.00	34200. S	2.93 B	3.81
18.33	34200. S	3.71 B	4.82
28.00L	34200. S	3.90 B	5.07
28.00R	34200. S	2.68 B	3.49
36.67	34200. S	3.02 B	3.92
55.00	34200. S	3.90 B	5.07
73.33	34200. S	3.16 B	4.11
89.33L	34200. S	2.35 B	3.05
89.33R	34200. S	2.51 B	3.26
91.67	34200. S	2.43 B	3.16
110.00	34200. S	2.07 B	2.69
128.33	34200. S	2.03 B	2.64
145.33L	34200. S	2.47 B	3.21
145.33R	34200. S	2.07 B	2.70
146.67	34200. S	2.13 B	2.77
165.00	34200. S	3.74 B	4.86
183.33	34200. S	> 999.00 B	>999.00

****
Minimum rating is 1.10 at location 183.33 in span 3.
****

Permit

Strength II

Span 1

Location	Allowable	Shear	Rating Factors Bending Inv.	Oper.	Shear Inv.	Oper.
0.00	36000. B	347.57	>999.00		1.14	
18.33	36000. B	461.91	3.32		2.86	
36.67	36000. B	476.29	1.85		4.09	
38.00L	36000. B	477.22	1.80		4.18	
38.00R	36000. B	477.34	2.16		4.18	

55.00	36000. B	435.91	1.77	4.72
73.33	36000. B	447.75	1.83	3.85
91.67	36000. B	514.98	2.19	3.42
94.00L	36000. B	520.37	2.29	3.38
94.00R	36000. B	520.76	2.14	3.38
110.00	36000. B	559.21	3.06	3.24
128.33	35178. B	695.47	4.46	3.36
146.67	30325. B	842.04	3.08	3.82
155.33L	28997. B	928.08	2.62	4.18
155.33R	28970. B	929.75	4.00	4.19
165.00	30888. B	1380.66	4.41	6.72
183.33	35100. B	1263.48	2.61	4.62

Span 2

Location	Allowable	Shear	Rating Factors Bending		Shear	
			Inv.	Oper.	Inv.	Oper.
0.00	35100. B	1274.84		2.61		4.70
21.00L	35318. B	923.38		4.17		4.05
21.00R	35318. B	922.51		2.60		4.04
25.00	35201. B	902.13		2.91		4.12
50.00	35252. B	789.55		5.05		4.43
75.00	36000. B	588.76		3.23		3.33
76.00L	36000. B	587.44		3.15		3.35
76.00R	36000. B	587.20		3.35		3.35
99.50L	36000. B	506.39		2.10		4.14
99.50R	36000. B	506.31		2.43		4.13
100.00	36000. B	506.10		2.41		4.19
125.00L	36000. B	502.51		2.08		6.03
125.00R	36000. B	502.55		2.08		6.03
150.00	36000. B	521.48		2.45		5.29
174.00L	36000. B	626.29		3.42		4.22
174.00R	36000. B	626.70		3.21		4.23
150.50L	36000. B	522.06		2.47		5.22
150.50R	36000. B	522.30		2.13		5.22
175.00	36000. B	628.95		3.29		4.20
200.00	35218. B	865.31		5.09		5.76
225.00	30827. B	1008.02		2.63		5.46
229.00L	30520. B	1033.20		2.33		5.29
229.00R	30506. B	1034.27		3.72		5.29
250.00	30888. B	1415.29		2.64		5.41

Span 3

Location	Allowable	Shear	Rating Factors Bending		Shear	
			Inv.	Oper.	Inv.	Oper.
0.00	30888. B	1416.13		2.64		5.32
18.33	32862. B	1199.86		3.75		5.28
28.00L	32494. B	765.29		3.82		3.04
28.00R	32508. B	763.96		2.39		3.03
36.67	32339. B	695.47		2.71		2.85
55.00	35223. B	600.54		4.16		3.05
73.33	36000. B	514.98		3.01		2.90
89.33L	36000. B	504.07		2.16		3.66
89.33R	36000. B	503.96		2.31		3.66
91.67	36000. B	502.42		2.23		3.75
110.00	36000. B	435.91		1.82		3.57
128.33	36000. B	476.29		1.74		4.09
145.33L	36000. B	463.01		2.10		3.30
145.33R	36000. B	462.88		1.74		3.30
146.67	36000. B	461.91		1.79		3.25
165.00	36000. B	484.57		3.20		2.97
183.33	36000. B	338.37		>999.00		1.09

Service II

Span 1

Location	Allowable Stress	Rating Factors Bending Inv.		Oper.
0.00	34200. S	> 999.00	B	>999.00
18.33	34200. S	4.47	B	4.47
36.67	34200. S	2.59	B	2.59
38.00L	34200. S	2.53	B	2.53
38.00R	34200. S	3.00	B	3.00
55.00	34200. S	2.49	B	2.49
73.33	34200. S	2.54	B	2.54
91.67	34200. S	2.96	B	2.96
94.00L	34200. S	3.08	B	3.08
94.00R	34200. S	2.88	B	2.88
110.00	34200. S	3.99	B	3.99
128.33	34200. S	6.59	B	6.74
146.67	34200. S	6.08	B	6.08
155.33L	34200. S	5.86	B	5.86
155.33R	34200. S	8.14	B	8.14
165.00	34200. S	8.51	B	8.51
183.33	34200. S	4.69	B	4.69

Span 2

Location	Allowable Stress	Rating Factors Bending Inv.		Oper.
0.00	34200. S	4.69	B	4.69
21.00L	34200. S	6.73	B	6.73
21.00R	34200. S	4.57	B	4.57
25.00	34200. S	5.01	B	5.01
50.00	34200. S	7.80	B	7.80
75.00	34200. S	4.23	B	4.23
76.00L	34200. S	4.14	B	4.14
76.00R	34200. S	4.40	B	4.40
99.50L	34200. S	2.88	B	2.88
99.50R	34200. S	3.30	B	3.30
100.00	34200. S	3.29	B	3.29
125.00L	34200. S	2.88	B	2.88
125.00R	34200. S	2.88	B	2.88
150.00	34200. S	3.33	B	3.33
174.00L	34200. S	4.47	B	4.47
174.00R	34200. S	4.21	B	4.21
150.50L	34200. S	3.35	B	3.35
150.50R	34200. S	2.92	B	2.92
175.00	34200. S	4.31	B	4.31
200.00	34200. S	7.84	B	7.84
225.00	34200. S	5.55	B	5.55
229.00L	34200. S	5.21	B	5.21
229.00R	34200. S	7.40	B	7.40
250.00	34200. S	5.88	B	5.88

Span 3

Location	Allowable Stress	Rating Factors Bending Inv.		Oper.
0.00	34200. S	5.88	B	5.88
18.33	34200. S	6.86	B	6.86

28.00L	34200.	S	6.80	B	6.80
28.00R	34200.	S	4.68	B	4.68
36.67	34200.	S	5.05	B	5.05
55.00	34200.	S	6.31	B	6.31
73.33	34200.	S	3.92	B	3.92
89.33L	34200.	S	2.91	B	2.91
89.33R	34200.	S	3.11	B	3.11
91.67	34200.	S	3.01	B	3.01
110.00	34200.	S	2.54	B	2.54
128.33	34200.	S	2.45	B	2.45
145.33L	34200.	S	2.93	B	2.93
145.33R	34200.	S	2.46	B	2.46
146.67	34200.	S	2.52	B	2.52
165.00	34200.	S	4.32	B	4.32
183.33	34200.	S	> 999.00	B	>999.00

****
Minimum rating is 1.09 at location 183.33 in span 3.
****

Rating Codes:
T - Top steel governs
B - Bottom steel governs
C - Concrete governs
R - Rebar governs
V - Shear governs
S - Serviceability governs

Mom Strength Codes:
C - Compact
B - Braced non-compact
U - Unbraced non-compact
T - Transition between compact and braced non-compact
S - Serviceability

Noncompact shapes ratings based on stress, as

$$IR = \frac{Fb - \text{factored dead load stress}}{\text{factored LL+I stress}}$$

Operating rating for Strength II is

$$OR = \frac{Fb - \text{factored dead load stress}}{\text{factored LL+I stress}}$$

Inventory rating for Strength II is

$$IR = OR/(LL+I \text{ factor})$$

I-295 HH BUCKMAN BRIDGE -720249
Girder 8 : Rating Output : Lrfd Ratings
Thu Mar 26 23:22:22 2015

[This table uses the rating equation (6A.4.2.1-1) of the 2011 edition of the Manual for Bridge Evaluation.]

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Strength I

Span 1

Location	Compct Mom Cap/Noncmpt Allow Stress	Shear Capacity	Rating Factors Bending Inv.	Bending Oper.	Shear Inv.	Shear Oper.
0.00	36000. B	347.57	>999.00 B	>999.00	1.49	1.93
18.33	36000. B	461.91	3.10 B	4.02	2.92	3.79
36.67	36000. B	476.29	1.57 B	2.04	4.23	5.48
38.00L	36000. B	477.22	1.53 B	1.98	4.33	5.62
38.00R	36000. B	477.34	1.83 B	2.37	4.33	5.62
55.00	36000. B	435.91	1.46 B	1.90	5.20	6.74
73.33	36000. B	447.75	1.43 B	1.86	5.32	6.90
91.67	36000. B	514.98	1.69 B	2.19	4.61	5.98
94.00L	36000. B	520.37	1.76 B	2.28	4.50	5.83
94.00R	36000. B	520.76	1.64 B	2.13	4.50	5.84
110.00	36000. B	559.21	2.29 B	2.97	3.87	5.01
128.33	35184. B	695.47	2.47 B	3.20	4.04	5.23
146.67	30537. B	842.04	1.75 B	2.27	4.07	5.28
155.33L	29239. B	928.08	1.50 B	1.94	4.18	5.42
155.33R	29213. B	929.75	2.24 B	2.90	4.19	5.43
165.00	35058. B	1380.66	2.85 B	3.69	6.17	8.00
183.33	35105. B	1263.48	1.31 B	1.69	4.94	6.40

Span 2

Location	Compct Mom Cap/Noncmpt Allow Stress	Shear Capacity	Rating Factors Bending Inv.	Bending Oper.	Shear Inv.	Shear Oper.
0.00	35105. B	1274.84	1.31 B	1.69	4.64	6.02
21.00L	35322. B	923.38	2.17 B	2.81	3.51	4.54
21.00R	35322. B	922.51	1.39 B	1.80	3.50	4.54
25.00	35208. B	902.13	1.57 B	2.03	3.63	4.70
50.00	35258. B	789.55	3.01 B	3.91	3.90	5.06
75.00	36000. B	588.76	2.62 B	3.39	3.90	5.05
76.00L	36000. B	587.44	2.55 B	3.31	3.94	5.11
76.00R	36000. B	587.20	2.71 B	3.51	3.94	5.10
99.50L	36000. B	506.39	1.70 B	2.20	4.43	5.74
99.50R	36000. B	506.31	1.95 B	2.53	4.43	5.74
100.00	36000. B	506.10	1.94 B	2.52	4.45	5.77
125.00L	36000. B	502.51	1.66 B	2.15	6.36	8.24
125.00R	36000. B	502.55	1.66 B	2.15	6.36	8.24
150.00	36000. B	521.48	1.95 B	2.53	4.76	6.18
174.00L	36000. B	626.29	2.71 B	3.52	4.38	5.67
174.00R	36000. B	626.70	2.56 B	3.31	4.38	5.68
150.50L	36000. B	522.06	1.96 B	2.55	4.74	6.15
150.50R	36000. B	522.30	1.71 B	2.22	4.75	6.15
175.00	36000. B	628.95	2.62 B	3.40	4.34	5.63

200.00	35224.	B	865.31	3.05	B	3.96	4.59	5.96
225.00	31022.	B	1008.02	1.56	B	2.02	4.34	5.63
229.00L	30721.	B	1033.20	1.37	B	1.77	4.31	5.59
229.00R	30708.	B	1034.27	2.12	B	2.75	4.32	5.60
250.00	31030.	B	1415.29	1.34	B	1.73	5.28	6.85

Span 3

Location	Compct Mom Cap/Noncmpt Allow Stress		Shear Capacity	Rating Factors Bending			Shear	
				Inv.		Oper.	Inv.	Oper.
0.00	31030.	B	1416.13	1.34	B	1.73	5.48	7.10
18.33	32968.	B	1199.86	1.94	B	2.52	5.15	6.67
28.00L	32611.	B	765.29	2.08	B	2.70	3.06	3.97
28.00R	32624.	B	763.96	1.34	B	1.73	3.06	3.96
36.67	32498.	B	695.47	1.55	B	2.01	2.92	3.79
55.00	35228.	B	600.54	2.31	B	3.00	3.17	4.11
73.33	36000.	B	514.98	2.30	B	2.98	3.09	4.01
89.33L	36000.	B	504.07	1.69	B	2.19	3.95	5.12
89.33R	36000.	B	503.96	1.81	B	2.35	3.95	5.12
91.67	36000.	B	502.42	1.75	B	2.27	4.08	5.28
110.00	36000.	B	435.91	1.45	B	1.88	4.36	5.65
128.33	36000.	B	476.29	1.45	B	1.88	5.23	6.78
145.33L	36000.	B	463.01	1.79	B	2.32	3.72	4.82
145.33R	36000.	B	462.88	1.49	B	1.93	3.72	4.82
146.67	36000.	B	461.91	1.54	B	1.99	3.63	4.71
165.00	36000.	B	484.57	3.02	B	3.91	3.00	3.88
183.33	36000.	B	338.37	>999.00	B	>999.00	1.45	1.88

Service II

Span 1

Location	Allowable Stress		Rating Factors Bending			
			Inv.		Oper.	
0.00	34200.	S	> 999.00	B	>999.00	
18.33	34200.	S	4.14	B	5.39	
36.67	34200.	S	2.18	B	2.83	
38.00L	34200.	S	2.12	B	2.76	
38.00R	34200.	S	2.50	B	3.25	
55.00	34200.	S	2.03	B	2.64	
73.33	34200.	S	1.97	B	2.56	
91.67	34200.	S	2.26	B	2.94	
94.00L	34200.	S	2.35	B	3.05	
94.00R	34200.	S	2.20	B	2.86	
110.00	34200.	S	2.97	B	3.86	
128.33	34200.	S	3.68	B	4.79	
146.67	34200.	S	3.32	B	4.31	
155.33L	34200.	S	3.17	B	4.12	
155.33R	34200.	S	4.36	B	5.66	
165.00	34200.	S	4.45	B	5.79	
183.33	34200.	S	2.24	B	2.91	

Span 2

Location	Allowable Stress		Rating Factors Bending			
			Inv.		Oper.	
0.00	34200.	S	2.24	B	2.91	
21.00L	34200.	S	3.41	B	4.43	
21.00R	34200.	S	2.36	B	3.06	

25.00	34200. S	2.62 B	3.40	
50.00	34200. S	4.59 B	5.96	
75.00	34200. S	3.41 B	4.43	
76.00L	34200. S	3.33 B	4.33	
76.00R	34200. S	3.54 B	4.60	
99.50L	34200. S	2.30 B	2.99	
99.50R	34200. S	2.63 B	3.42	
100.00	34200. S	2.61 B	3.40	
125.00L	34200. S	2.26 B	2.94	
125.00R	34200. S	2.26 B	2.94	
150.00	34200. S	2.62 B	3.41	
174.00L	34200. S	3.54 B	4.60	
174.00R	34200. S	3.34 B	4.34	
150.50L	34200. S	2.64 B	3.43	
150.50R	34200. S	2.31 B	3.01	
175.00	34200. S	3.41 B	4.44	
200.00	34200. S	4.63 B	6.02	
225.00	34200. S	3.13 B	4.07	
229.00L	34200. S	2.88 B	3.74	
229.00R	34200. S	4.03 B	5.24	
250.00	34200. S	2.79 B	3.63	

Span 3

Location	Allowable Stress	Rating Factors Bending Inv.	Oper.
0.00	34200. S	2.79 B	3.63
18.33	34200. S	3.42 B	4.44
28.00L	34200. S	3.58 B	4.66
28.00R	34200. S	2.50 B	3.25
36.67	34200. S	2.78 B	3.61
55.00	34200. S	3.47 B	4.51
73.33	34200. S	2.98 B	3.87
89.33L	34200. S	2.26 B	2.94
89.33R	34200. S	2.42 B	3.14
91.67	34200. S	2.34 B	3.05
110.00	34200. S	1.99 B	2.59
128.33	34200. S	2.02 B	2.62
145.33L	34200. S	2.46 B	3.20
145.33R	34200. S	2.08 B	2.70
146.67	34200. S	2.14 B	2.78
165.00	34200. S	4.04 B	5.25
183.33	34200. S	> 999.00 B	>999.00

****
Minimum rating is 1.31 at location 183.33 in span 1.
****

Permit

Strength II

Span 1

Location	Allowable	Shear	Rating Factors Bending Inv.	Oper.	Shear Inv.	Oper.
0.00	36000. B	347.57	>999.00			1.63
18.33	36000. B	461.91	3.80			3.31
36.67	36000. B	476.29	1.92			4.97
38.00L	36000. B	477.22	1.86			5.10
38.00R	36000. B	477.34	2.23			5.10

55.00	36000. B	435.91	1.81	5.94
73.33	36000. B	447.75	1.80	4.95
91.67	36000. B	514.98	2.15	4.55
94.00L	36000. B	520.37	2.24	4.48
94.00R	36000. B	520.76	2.09	4.48
110.00	36000. B	559.21	2.92	4.06
128.33	35184. B	695.47	3.97	4.42
146.67	30537. B	842.04	2.86	4.58
155.33L	29239. B	928.08	2.50	4.89
155.33R	29213. B	929.75	3.73	4.90
165.00	35058. B	1380.66	4.89	7.67
183.33	35105. B	1263.48	2.57	6.22

Span 2

Location	Allowable	Shear	Rating Factors Bending		Shear	
			Inv.	Oper.	Inv.	Oper.
0.00	35105. B	1274.84		2.57		6.05
21.00L	35322. B	923.38		3.92		4.64
21.00R	35322. B	922.51		2.51		4.63
25.00	35208. B	902.13		2.77		4.64
50.00	35258. B	789.55		4.43		4.94
75.00	36000. B	588.76		3.20		4.65
76.00L	36000. B	587.44		3.12		4.69
76.00R	36000. B	587.20		3.32		4.69
99.50L	36000. B	506.39		2.15		5.20
99.50R	36000. B	506.31		2.48		5.20
100.00	36000. B	506.10		2.47		5.23
125.00L	36000. B	502.51		2.12		7.82
125.00R	36000. B	502.55		2.12		7.82
150.00	36000. B	521.48		2.48		5.91
174.00L	36000. B	626.29		3.33		5.44
174.00R	36000. B	626.70		3.14		5.45
150.50L	36000. B	522.06		2.49		5.88
150.50R	36000. B	522.30		2.17		5.89
175.00	36000. B	628.95		3.21		5.40
200.00	35224. B	865.31		4.48		5.81
225.00	31022. B	1008.02		2.53		5.55
229.00L	30721. B	1033.20		2.28		5.53
229.00R	30708. B	1034.27		3.53		5.54
250.00	31030. B	1415.29		2.60		6.91

Span 3

Location	Allowable	Shear	Rating Factors Bending		Shear	
			Inv.	Oper.	Inv.	Oper.
0.00	31030. B	1416.13		2.60		7.07
18.33	32968. B	1199.86		3.53		6.33
28.00L	32611. B	765.29		3.57		3.77
28.00R	32624. B	763.96		2.29		3.76
36.67	32498. B	695.47		2.55		3.58
55.00	35228. B	600.54		3.71		3.79
73.33	36000. B	514.98		2.91		3.74
89.33L	36000. B	504.07		2.13		4.67
89.33R	36000. B	503.96		2.28		4.67
91.67	36000. B	502.42		2.20		4.81
110.00	36000. B	435.91		1.81		5.18
128.33	36000. B	476.29		1.78		5.36
145.33L	36000. B	463.01		2.17		3.83
145.33R	36000. B	462.88		1.81		3.83
146.67	36000. B	461.91		1.86		3.75
165.00	36000. B	484.57		3.67		3.41
183.33	36000. B	338.37		>999.00		1.58

Service II

Span 1

Location	Allowable Stress	Rating Factors Bending Inv.		Oper.	
0.00	34200. S	> 999.00	B	>999.00	
18.33	34200. S	5.09	B	5.09	
36.67	34200. S	2.67	B	2.67	
38.00L	34200. S	2.59	B	2.59	
38.00R	34200. S	3.06	B	3.06	
55.00	34200. S	2.52	B	2.52	
73.33	34200. S	2.48	B	2.48	
91.67	34200. S	2.88	B	2.88	
94.00L	34200. S	2.99	B	2.99	
94.00R	34200. S	2.80	B	2.80	
110.00	34200. S	3.80	B	3.80	
128.33	34200. S	5.95	B	5.95	
146.67	34200. S	5.44	B	5.44	
155.33L	34200. S	5.30	B	5.30	
155.33R	34200. S	7.29	B	7.29	
165.00	34200. S	7.66	B	7.66	
183.33	34200. S	4.41	B	4.41	

Span 2

Location	Allowable Stress	Rating Factors Bending Inv.		Oper.	
0.00	34200. S	4.41	B	4.41	
21.00L	34200. S	6.18	B	6.18	
21.00R	34200. S	4.27	B	4.27	
25.00	34200. S	4.64	B	4.64	
50.00	34200. S	6.77	B	6.77	
75.00	34200. S	4.18	B	4.18	
76.00L	34200. S	4.09	B	4.09	
76.00R	34200. S	4.34	B	4.34	
99.50L	34200. S	2.93	B	2.93	
99.50R	34200. S	3.35	B	3.35	
100.00	34200. S	3.33	B	3.33	
125.00L	34200. S	2.91	B	2.91	
125.00R	34200. S	2.91	B	2.91	
150.00	34200. S	3.34	B	3.34	
174.00L	34200. S	4.36	B	4.36	
174.00R	34200. S	4.11	B	4.11	
150.50L	34200. S	3.36	B	3.36	
150.50R	34200. S	2.94	B	2.94	
175.00	34200. S	4.20	B	4.20	
200.00	34200. S	6.81	B	6.81	
225.00	34200. S	5.09	B	5.09	
229.00L	34200. S	4.81	B	4.81	
229.00R	34200. S	6.74	B	6.74	
250.00	34200. S	5.44	B	5.44	

Span 3

Location	Allowable Stress	Rating Factors Bending Inv.		Oper.	
0.00	34200. S	5.44	B	5.44	
18.33	34200. S	6.24	B	6.24	

28.00L	34200.	S	6.16	B	6.16
28.00R	34200.	S	4.30	B	4.30
36.67	34200.	S	4.58	B	4.58
55.00	34200.	S	5.58	B	5.58
73.33	34200.	S	3.78	B	3.78
89.33L	34200.	S	2.86	B	2.86
89.33R	34200.	S	3.06	B	3.06
91.67	34200.	S	2.96	B	2.96
110.00	34200.	S	2.49	B	2.49
128.33	34200.	S	2.48	B	2.48
145.33L	34200.	S	2.98	B	2.98
145.33R	34200.	S	2.52	B	2.52
146.67	34200.	S	2.59	B	2.59
165.00	34200.	S	4.92	B	4.92
183.33	34200.	S	> 999.00	B	>999.00

****
Minimum rating is 1.58 at location 183.33 in span 3.
****

Rating Codes:
T - Top steel governs
B - Bottom steel governs
C - Concrete governs
R - Rebar governs
V - Shear governs
S - Serviceability governs

Mom Strength Codes:
C - Compact
B - Braced non-compact
U - Unbraced non-compact
T - Transition between compact and braced non-compact
S - Serviceability

Noncompact shapes ratings based on stress, as

$$IR = \frac{Fb - \text{factored dead load stress}}{\text{factored LL+I stress}}$$

Operating rating for Strength II is

$$OR = \frac{Fb - \text{factored dead load stress}}{\text{factored LL+I stress}}$$

Inventory rating for Strength II is

$$IR = OR/(LL+I \text{ factor})$$

2.2.3. C5 (32” Barrier)

I-295 HH BUCKMAN BRIDGE -720249
Girder System : Input File : Layout/Slab/Loading Definition
Mon Mar 30 10:09:27 2015

```
ID: I-295 HH BUCKMAN BRIDGE -720249
CONDITIONS
  ALL LANES
  ENGLISH INPUT
  ENGLISH OUTPUT
  FLOAT LANES
  GRID MODEL
  LRFD METHOD
  MEDIUM RESOLUTION MESH
  OVERLAY PERMIT TRUCK WITH LANE LOADING
  PERMIT TRUCK IN ALL LANES
  PERMIT TRUCK IS ONLY LOADING IN PERMIT LANE
  RATE MODE
  RATING PROJECT
  SELF WEIGHT FOR DEAD LOAD 1
DATA
  BR-1 18.3333 18.3333 18.3333 18.3333 18.3333 18.3333 18.3333 18.3333
  18.3333 36.1875 17.8542 17.8542 17.8542 17.8542 17.8542 17.875 17.875
  17.8542 17.8542 17.8542 17.8542 17.8542 36.1875 18.3333 18.3333
  18.3333 18.3333 18.3333 18.3333 18.3333 18.3333
  CURB -2.
  FPC 4.5
  GDSPC 9.3073 9.3073 9.3073 9.3073 9.3333 9.3333 9.3333
  LANES 12. 12. 12. 12. 12.
  PRLANE  0.2
  PRMITP 7.5 15. 15. 11.25 11.25 7.5 15. 15. 11.25 11.25
  PRMITSP 10. 4.167 17.667 4.167 30. 10. 4.167 17.667 4.167
  ROADWP 68.
  SKEW-1 90. 90. 90. 90.
  SLABEXT 3.5417 2.3125
  SLABT 8.
  SLABWEAR  0.
  SPEED 65
  SPN-1 183.3333 250. 183.3333
  SUPER  0.01563
  WAC-1  0.164
  WAC-2  0.19
  WAC-3  0.19
  WAC-4  0.19
  WAC-5  0.19
  WAC-6  0.19
  WAC-7  0.19
  WAC-8  0.14
  WAS-1  0.
  WAS-2  0.
  WAS-3  0.
  WAS-4  0.
  WAS-5  0.0115
  WAS-6  0.0115
  WAS-7  0.0115
  WAS-8  0.0115
  WCONC 150.
  WEAR  0.
  WHLSPC 6.
  WR-1  0.123
  WR-2  0.14
  WR-3  0.14
  WR-4  0.14
  WR-5  0.14
  WR-6  0.14
  WR-7  0.14
  WR-8  0.105
  WS-1  0.105
  WS-2  0.105
  WS-3  0.105
  WS-4  0.105
  WS-5  0.105
  WS-6  0.105
  WS-7  0.105
  WS-8  0.105
GO
```

I-295 HH BUCKMAN BRIDGE -720249
Girder 1 : Rating Output : Lrfd Ratings
Mon Mar 30 10:04:32 2015

[This table uses the rating equation (6A.4.2.1-1)
of the 2011 edition of the Manual for Bridge
Evaluation.]

Permit

Strength II
(Assumes permit truck is only loading)

Span 1

Location	Allowable	Shear	Rating Factors Bending		Shear	
			Inv.	Oper.	Inv.	Oper.
0.00	9253. C	488.42	>999.00B	>999.00	3.02	3.02
18.33	36000. B	769.69	2.76B	2.76	7.02	7.02
22.00L	36000. B	773.47	2.22B	2.22	7.48	7.48
22.00R	36000. B	773.65	4.04B	4.04	7.49	7.49
36.67	36000. B	617.31	2.56B	2.56	7.60	7.60
55.00	36000. B	623.62	1.97B	1.97	11.17	11.17
73.33	36000. B	632.76	2.04B	2.04	13.03	13.03
91.67	36000. B	644.47	2.60B	2.60	9.03	9.03
110.00	36000. B	658.50	3.79B	3.79	6.46	6.46
122.00L	11921. C	918.49	4.19B	4.19	7.96	7.96
122.00R	12402. C	918.79	4.36B	4.36	7.96	7.96
124.00L	12435. C	922.00	4.46B	4.46	7.77	7.77
124.00R	13473. C	1326.20	4.83B	4.83	11.80	11.80
128.33	23137. C	1332.57	9.28B	9.28	11.24	11.24
146.67	13919. C	1361.56	3.52B	3.52	9.38	9.38
154.00L	45765. B	1373.66	2.83B	2.83	8.88	8.88
154.00R	45762. B	1638.91	3.22B	3.22	10.90	10.90
156.00L	44053. B	1644.31	9.40B	9.40	10.87	10.87
156.00R	23727. C	1644.80	18.97B	18.97	10.88	10.88
165.00	46619. B	1671.34	4.76B	4.76	10.30	10.30
183.33	46375. B	1757.69	2.90B	2.90	9.26	9.26

Span 2

Location	Allowable	Shear	Rating Factors Bending		Shear	
			Inv.	Oper.	Inv.	Oper.
0.00	46375. B	1778.71	2.90B	2.90	9.05	9.05
25.00	46605. B	1747.50	6.24B	6.24	10.89	10.89
28.00L	46984. B	1747.50	6.77B	6.77	11.18	11.18
28.00R	21517. C	1747.50	5.50B	5.50	11.18	11.18
30.00L	21583. C	1747.50	22.05B	22.05	11.38	11.38
30.00R	45403. B	1450.84	13.48B	13.48	9.16	9.16
50.00	48073. B	1450.84	6.33B	6.33	11.07	11.07
55.33L	26462. C	1450.84	9.73B	9.73	11.68	11.68
55.33R	25672. C	1450.84	9.44B	9.44	11.68	11.68
57.33L	25672. C	1450.84	8.90B	8.90	11.92	11.92
57.33R	27861. C	1450.84	9.67B	9.67	11.92	11.92
75.00	27861. C	974.23	6.39B	6.39	9.26	9.26

100.00	27861.	C	974.23	4.73B	4.73	12.72	12.72
125.00	27861.	C	973.68	4.35B	4.35	19.26	19.26
150.00	27861.	C	974.23	4.74B	4.74	13.67	13.67
175.00	27861.	C	921.46	6.40B	6.40	9.23	9.23
190.67L	27861.	C	1450.84	9.17B	9.17	12.78	12.78
190.67R	28843.	C	1450.84	9.50B	9.50	12.78	12.78
192.67L	28843.	C	1450.84	10.04B	10.04	12.51	12.51
192.67R	26462.	C	1450.84	9.19B	9.19	12.51	12.51
200.00	48073.	B	1450.84	6.31B	6.31	11.59	11.59
218.00L	45403.	B	1450.84	3.78B	3.78	9.83	9.83
218.00R	45403.	B	1747.50	4.22B	4.22	12.20	12.20
220.00L	43617.	B	1747.50	14.25B	14.25	11.97	11.97
220.00R	43617.	B	1747.50	24.47B	24.47	11.97	11.97
225.00	45403.	B	1747.50	6.02B	6.02	11.41	11.41
250.00	46375.	B	2011.94	2.90B	2.90	10.45	10.45

Span 3

Location	Allowable		Shear	Rating Factors Bending		Shear	
				Inv.	Oper.	Inv.	Oper.
0.00	46375.	B	1584.21	2.90B	2.90	8.18	8.18
18.33	46620.	B	1671.32	4.77B	4.77	10.24	10.24
25.33L	23797.	C	1650.72	5.58B	5.58	10.74	10.74
25.33R	20549.	C	1650.22	4.55B	4.55	10.74	10.74
27.33L	20554.	C	1644.80	15.63B	15.63	10.89	10.89
27.33R	45724.	B	1377.06	8.75B	8.75	8.86	8.86
36.67	13920.	C	1361.55	3.53B	3.53	9.54	9.54
55.00	23153.	C	1332.56	9.31B	9.31	12.60	12.60
57.33L	13516.	C	1329.18	5.55B	5.55	13.05	13.05
57.33R	13403.	C	1328.93	5.50B	5.50	13.05	13.05
59.33L	13365.	C	1326.20	4.81B	4.81	13.45	13.45
59.33R	11917.	C	922.00	4.28B	4.28	8.87	8.87
73.33	36000.	B	898.00	3.78B	3.78	10.86	10.86
91.67	36000.	B	644.47	2.60B	2.60	10.64	10.64
110.00	36000.	B	632.76	2.04B	2.04	14.69	14.69
128.33	36000.	B	623.62	1.97B	1.97	9.25	9.25
146.67	36000.	B	617.31	2.57B	2.57	6.64	6.64
161.33L	36000.	B	773.65	4.04B	4.04	6.97	6.97
161.33R	36000.	B	773.47	2.22B	2.22	6.97	6.97
165.00	36000.	B	769.68	2.76B	2.76	6.67	6.67
183.33	9253.	C	740.77	>999.00B	>999.00	5.51	5.51

Service II
(Assumes permit truck is only loading in all lanes)

Span 1

Location	Allowable Stress		Rating Factors Bending		
			Inv.	Oper.	
0.00	34200.	S	> 999.00	B	>999.00
18.33	34200.	S	3.86	B	3.86
22.00L	34200.	S	3.17	B	3.17
22.00R	34200.	S	5.51	B	5.51
36.67	34200.	S	3.61	B	3.61
55.00	34200.	S	2.83	B	2.83
73.33	34200.	S	2.89	B	2.89
91.67	34200.	S	3.56	B	3.56
110.00	34200.	S	4.99	B	4.99
122.00L	34200.	S	6.90	B	6.90
122.00R	34200.	S	6.90	B	6.90
124.00L	34200.	S	7.08	B	7.08
124.00R	34200.	S	5.89	B	5.89
128.33	47500.	S	9.15	B	9.15
146.67	47500.	S	6.67	B	6.67
154.00L	47500.	S	5.70	B	5.70

154.00R	47500. S	5.96 B	5.96
156.00L	47500. S	18.77 B	18.77
156.00R	47500. S	31.97 B	31.97
165.00	47500. S	8.37 B	8.37
183.33	47500. S	5.70 B	5.70

Span 2

Location	Allowable Stress	Rating Factors Bending Inv.	Oper.
0.00	34200. S	5.70 B	5.70
25.00	34200. S	10.58 B	10.58
28.00L	34200. S	11.24 B	11.24
28.00R	34200. S	10.97 B	10.97
30.00L	34200. S	43.43 B	43.43
30.00R	34200. S	26.47 B	26.47
50.00	34200. S	10.62 B	10.62
55.33L	34200. S	9.82 B	9.82
55.33R	34200. S	9.81 B	9.81
57.33L	34200. S	9.20 B	9.20
57.33R	34200. S	11.22 B	11.22
75.00	34200. S	7.27 B	7.27
100.00	34200. S	5.27 B	5.27
125.00	47500. S	4.80 B	4.80
150.00	47500. S	5.27 B	5.27
175.00	47500. S	7.29 B	7.29
190.67L	47500. S	10.62 B	10.62
190.67R	47500. S	10.64 B	10.64
192.67L	47500. S	11.26 B	11.26
192.67R	47500. S	9.24 B	9.24
200.00	47500. S	10.59 B	10.59
218.00L	47500. S	7.32 B	7.32
218.00R	47500. S	7.56 B	7.56
220.00L	47500. S	27.35 B	27.35
220.00R	47500. S	44.36 B	44.36
225.00	47500. S	10.56 B	10.56
250.00	47500. S	5.70 B	5.70

Span 3

Location	Allowable Stress	Rating Factors Bending Inv.	Oper.
0.00	34200. S	5.70 B	5.70
18.33	34200. S	8.38 B	8.38
25.33L	34200. S	9.48 B	9.48
25.33R	34200. S	9.20 B	9.20
27.33L	34200. S	31.12 B	31.12
27.33R	34200. S	17.95 B	17.95
36.67	34200. S	6.69 B	6.69
55.00	34200. S	9.18 B	9.18
57.33L	34200. S	9.05 B	9.51
57.33R	34200. S	9.06 B	9.50
59.33L	34200. S	8.25 B	8.25
59.33R	34200. S	9.90 B	9.90
73.33	34200. S	4.97 B	4.97
91.67	34200. S	3.55 B	3.55
110.00	34200. S	2.89 B	2.89
128.33	34200. S	2.83 B	2.83
146.67	34200. S	3.61 B	3.61
161.33L	34200. S	5.50 B	5.50
161.33R	34200. S	3.18 B	3.18
165.00	34200. S	3.86 B	3.86
183.33	34200. S	> 999.00 B	>999.00

****
Minimum rating is 1.97 at location 55.00 in span 1.
****

Classified at Strength II because of description
in 3.4.1 for other than HL93 vehicle.

Rating Codes:
T - Top steel governs
B - Bottom steel governs
C - Concrete governs
R - Rebar governs
V - Shear governs
S - Serviceability governs

Mom Strength Codes:
C - Compact
B - Braced non-compact
U - Unbraced non-compact
T - Transition between compact and braced non-compact
S - Serviceability

Noncompact shapes ratings based on stress, as

$$IR = \frac{Fb - \text{factored dead load stress}}{\text{factored LL+I stress}}$$

Inventory rating for Strength II if only permit
loading on the system uses PBETA. Operating rating
uses IR(PBETA/1.35).

I-295 HH BUCKMAN BRIDGE -720249
Girder 2 : Rating Output : Lrfd Ratings
Mon Mar 30 10:07:09 2015

[This table uses the rating equation (6A.4.2.1-1)
of the 2011 edition of the Manual for Bridge
Evaluation.]

Permit

Strength II
(Assumes permit truck is only loading)

Span 1

Location	Allowable	Shear	Rating Factors Bending		Shear	
			Inv.	Oper.	Inv.	Oper.
0.00	9331. C	488.42	>999.00B	>999.00	3.09	3.09
18.33	36000. B	769.69	3.12B	3.12	7.90	7.90
22.00L	36000. B	773.47	2.52B	2.52	8.49	8.49
22.00R	36000. B	773.65	4.61B	4.61	8.49	8.49
36.67	36000. B	617.31	2.99B	2.99	8.41	8.41
55.00	36000. B	623.62	2.34B	2.34	11.55	11.55
73.33	36000. B	632.76	2.44B	2.44	12.86	12.86
91.67	36000. B	644.47	3.11B	3.11	9.40	9.40
110.00	36000. B	658.50	4.46B	4.46	7.15	7.15
122.00L	36000. B	918.49	6.26B	6.26	8.97	8.97
122.00R	36000. B	918.79	5.00T	5.00	8.97	8.97
124.00L	12522. C	922.00	5.26B	5.26	8.78	8.78
124.00R	13524. C	1326.20	5.69B	5.69	13.31	13.31
128.33	23408. C	1332.57	11.14B	11.14	12.72	12.72
146.67	13950. C	1361.56	4.23B	4.23	10.64	10.64
154.00L	45675. B	1373.66	3.42B	3.42	10.00	10.00
154.00R	45672. B	1638.91	3.87B	3.87	12.28	12.28
156.00L	43981. B	1644.31	10.73B	10.73	12.30	12.30
156.00R	23743. C	1644.80	21.52B	21.52	12.30	12.30
165.00	46576. B	1671.34	5.70B	5.70	11.41	11.41
183.33	46329. B	1757.69	3.54B	3.54	9.49	9.49

Span 2

Location	Allowable	Shear	Rating Factors Bending		Shear	
			Inv.	Oper.	Inv.	Oper.
0.00	46329. B	1778.71	3.54B	3.54	9.38	9.38
25.00	46559. B	1747.50	7.56B	7.56	12.07	12.07
28.00L	46976. B	1747.50	8.20B	8.20	12.46	12.46
28.00R	21778. C	1747.50	6.75B	6.75	12.46	12.46
30.00L	21853. C	1747.50	26.44B	26.44	12.72	12.72
30.00R	45307. B	1450.84	16.02B	16.02	10.24	10.24
50.00	47985. B	1450.84	7.67B	7.67	12.55	12.55
55.33L	27352. C	1450.84	11.41B	11.41	13.13	13.13
55.33R	27199. C	1450.84	11.34B	11.34	13.13	13.13
57.33L	27190. C	1450.84	10.71B	10.71	13.33	13.33
57.33R	29713. C	1450.84	11.72B	11.72	13.33	13.33
75.00	29713. C	974.23	7.95B	7.95	9.58	9.58

100.00	29713. C	974.23	5.98B	5.98	13.21	13.21
125.00	29713. C	973.68	5.57B	5.57	20.40	20.40
150.00	29713. C	974.23	5.97B	5.97	15.21	15.21
175.00	29713. C	974.23	7.94B	7.94	10.76	10.76
190.67L	29713. C	1450.84	11.11B	11.11	14.64	14.64
190.67R	30626. C	1450.84	11.46B	11.46	14.64	14.64
192.67L	30626. C	1450.84	12.08B	12.08	14.38	14.38
192.67R	27230. C	1450.84	10.72B	10.72	14.38	14.38
200.00	47985. B	1450.84	7.66B	7.66	13.42	13.42
218.00L	45307. B	1450.84	4.59B	4.59	11.35	11.35
218.00R	45307. B	1747.50	5.11B	5.11	14.09	14.09
220.00L	43540. B	1747.50	16.89B	16.89	13.77	13.77
220.00R	43540. B	1747.50	28.91B	28.91	13.77	13.77
225.00	45307. B	1747.50	7.28B	7.28	12.97	12.97
250.00	46330. B	1778.84	3.54B	3.54	9.38	9.38

Span 3

Location	Allowable	Shear	Rating Factors Bending		Shear	
			Inv.	Oper.	Inv.	Oper.
0.00	46330. B	1757.54	3.54B	3.54	9.42	9.42
18.33	46576. B	1671.32	5.71B	5.71	11.01	11.01
25.33L	23811. C	1650.72	6.66B	6.66	11.72	11.72
25.33R	20777. C	1650.22	5.51B	5.51	11.72	11.72
27.33L	20790. C	1644.80	18.03B	18.03	11.92	11.92
27.33R	45634. B	1377.06	10.03B	10.03	9.69	9.69
36.67	13952. C	1361.55	4.26B	4.26	10.54	10.54
55.00	23416. C	1332.56	11.18B	11.18	12.60	12.60
57.33L	13565. C	1329.18	6.62B	6.62	12.91	12.91
57.33R	13466. C	1328.93	6.57B	6.57	12.90	12.90
59.33L	13429. C	1326.20	5.65B	5.65	13.18	13.18
59.33R	12175. C	922.00	5.12B	5.12	8.69	8.69
73.33	36000. B	658.50	4.46B	4.46	7.06	7.06
91.67	36000. B	644.47	3.11B	3.11	9.26	9.26
110.00	36000. B	632.76	2.44B	2.44	13.03	13.03
128.33	36000. B	623.62	2.34B	2.34	8.77	8.77
146.67	36000. B	617.31	2.98B	2.98	6.68	6.68
161.33L	36000. B	773.65	4.59B	4.59	7.82	7.82
161.33R	36000. B	773.47	2.51B	2.51	7.82	7.82
165.00	36000. B	769.68	3.11B	3.11	7.52	7.52
183.33	9331. C	488.42	>999.00B	>999.00	3.37	3.37

Service II
(Assumes permit truck is only loading in all lanes)

Span 1

Location	Allowable Stress	Rating Factors Bending	
		Inv.	Oper.
0.00	34200. S	> 999.00 B	>999.00
18.33	34200. S	4.38 B	4.38
22.00L	34200. S	3.61 B	3.61
22.00R	34200. S	6.28 B	6.28
36.67	34200. S	4.21 B	4.21
55.00	34200. S	3.36 B	3.36
73.33	34200. S	3.46 B	3.46
91.67	34200. S	4.26 B	4.26
110.00	34200. S	5.88 B	5.88
122.00L	34200. S	8.04 B	8.04
122.00R	34200. S	8.04 B	8.04
124.00L	34200. S	8.36 B	8.36
124.00R	34200. S	6.98 B	6.98
128.33	47500. S	10.98 B	10.98
146.67	47500. S	8.07 B	8.07
154.00L	47500. S	6.91 B	6.91

154.00R	47500. S	7.20 B	7.20
156.00L	47500. S	21.51 B	21.51
156.00R	47500. S	36.49 B	36.49
165.00	47500. S	10.08 B	10.08
183.33	47500. S	7.02 B	7.02

Span 2

Location	Allowable Stress	Rating Factors Bending Inv.	Oper.
0.00	34200. S	7.02 B	7.02
25.00	34200. S	12.88 B	12.88
28.00L	34200. S	13.68 B	13.68
28.00R	34200. S	13.38 B	13.38
30.00L	34200. S	51.73 B	51.73
30.00R	34200. S	31.62 B	31.62
50.00	34200. S	12.95 B	12.95
55.33L	34200. S	11.25 B	11.25
55.33R	34200. S	11.24 B	11.24
57.33L	34200. S	10.56 B	10.56
57.33R	34200. S	12.88 B	12.88
75.00	34200. S	8.52 B	8.52
100.00	34200. S	6.24 B	6.24
125.00	47500. S	5.75 B	5.75
150.00	47500. S	6.23 B	6.23
175.00	47500. S	8.51 B	8.51
190.67L	47500. S	12.17 B	12.17
190.67R	47500. S	12.19 B	12.19
192.67L	47500. S	12.88 B	12.88
192.67R	47500. S	10.57 B	10.57
200.00	47500. S	12.93 B	12.93
218.00L	47500. S	8.94 B	8.94
218.00R	47500. S	9.20 B	9.20
220.00L	47500. S	32.58 B	32.58
220.00R	47500. S	52.72 B	52.72
225.00	47500. S	12.86 B	12.86
250.00	47500. S	7.01 B	7.01

Span 3

Location	Allowable Stress	Rating Factors Bending Inv.	Oper.
0.00	34200. S	7.01 B	7.01
18.33	34200. S	10.10 B	10.10
25.33L	34200. S	11.38 B	11.38
25.33R	34200. S	11.07 B	11.07
27.33L	34200. S	35.62 B	35.62
27.33R	34200. S	20.64 B	20.64
36.67	34200. S	8.11 B	8.11
55.00	34200. S	11.02 B	11.02
57.33L	34200. S	10.55 B	11.40
57.33R	34200. S	10.55 B	11.39
59.33L	34200. S	9.74 B	9.74
59.33R	34200. S	11.65 B	11.65
73.33	34200. S	5.87 B	5.87
91.67	34200. S	4.26 B	4.26
110.00	34200. S	3.46 B	3.46
128.33	34200. S	3.35 B	3.35
146.67	34200. S	4.20 B	4.20
161.33L	34200. S	6.27 B	6.27
161.33R	34200. S	3.60 B	3.60
165.00	34200. S	4.37 B	4.37
183.33	34200. S	> 999.00 B	>999.00

****
Minimum rating is 2.34 at location 128.33 in span 3.
****

Classified at Strength II because of description
in 3.4.1 for other than HL93 vehicle.

Rating Codes:
T - Top steel governs
B - Bottom steel governs
C - Concrete governs
R - Rebar governs
V - Shear governs
S - Serviceability governs

Mom Strength Codes:
C - Compact
B - Braced non-compact
U - Unbraced non-compact
T - Transition between compact and braced non-compact
S - Serviceability

Noncompact shapes ratings based on stress, as

$$IR = \frac{Fb - \text{factored dead load stress}}{\text{factored LL+I stress}}$$

Inventory rating for Strength II if only permit
loading on the system uses PBETA. Operating rating
uses IR(PBETA/1.35).

I-295 HH BUCKMAN BRIDGE -720249
Girder 3 : Rating Output : Lrfd Ratings
Mon Mar 30 10:07:23 2015

[This table uses the rating equation (6A.4.2.1-1)
of the 2011 edition of the Manual for Bridge
Evaluation.]

Permit

Strength II
(Assumes permit truck is only loading)

Span 1

Location	Allowable	Shear	Rating Factors Bending		Shear	
			Inv.	Oper.	Inv.	Oper.
0.00	9331. C	488.42	>999.00B	>999.00	3.37	3.37
18.33	36000. B	769.69	3.34B	3.34	8.74	8.74
22.00L	36000. B	773.47	2.71B	2.71	9.42	9.42
22.00R	36000. B	773.65	4.94B	4.94	9.42	9.42
36.67	36000. B	617.31	3.28B	3.28	9.50	9.50
55.00	36000. B	623.62	2.60B	2.60	13.22	13.22
73.33	36000. B	632.76	2.75B	2.75	13.73	13.73
91.67	36000. B	644.47	3.50B	3.50	10.41	10.41
110.00	36000. B	658.50	5.03B	5.03	7.93	7.93
122.00L	36000. B	918.49	6.98B	6.98	9.93	9.93
122.00R	36000. B	918.79	5.57T	5.57	9.93	9.93
124.00L	12527. C	922.00	5.95B	5.95	9.71	9.71
124.00R	13527. C	1326.20	6.42B	6.42	14.69	14.69
128.33	23451. C	1332.57	13.17B	13.17	13.98	13.98
146.67	13959. C	1361.56	4.97B	4.97	11.34	11.34
154.00L	45675. B	1373.66	4.00B	4.00	10.65	10.65
154.00R	45672. B	1638.91	4.52B	4.52	13.07	13.07
156.00L	43981. B	1644.31	12.54B	12.54	13.15	13.15
156.00R	23749. C	1644.80	24.83B	24.83	13.16	13.16
165.00	46576. B	1671.34	6.55B	6.55	12.24	12.24
183.33	46329. B	1757.69	3.86B	3.86	10.22	10.22

Span 2

Location	Allowable	Shear	Rating Factors Bending		Shear	
			Inv.	Oper.	Inv.	Oper.
0.00	46329. B	1778.71	3.86B	3.86	10.16	10.16
25.00	46559. B	1747.50	8.34B	8.34	13.18	13.18
28.00L	46976. B	1747.50	9.07B	9.07	13.63	13.63
28.00R	21796. C	1747.50	7.49B	7.49	13.63	13.63
30.00L	21867. C	1747.50	26.63B	26.63	13.94	13.94
30.00R	45307. B	1450.84	16.17B	16.17	11.24	11.24
50.00	47985. B	1450.84	8.60B	8.60	14.05	14.05
55.33L	45690. B	1450.84	8.95B	8.95	14.72	14.72
55.33R	45690. B	1450.84	8.95B	8.95	14.72	14.72
57.33L	27199. C	1450.84	12.01B	12.01	14.96	14.96
57.33R	29713. C	1450.84	13.13B	13.13	14.96	14.96
75.00	29713. C	974.23	9.12B	9.12	10.65	10.65

100.00	29713. C	974.23	6.91B	6.91	14.58	14.58
125.00	29713. C	973.68	6.44B	6.44	21.72	21.72
150.00	29713. C	974.23	6.90B	6.90	16.73	16.73
175.00	29713. C	974.23	9.08B	9.08	12.02	12.02
190.67L	29713. C	1450.84	12.41B	12.41	16.60	16.60
190.67R	30626. C	1450.84	12.80B	12.80	16.60	16.60
192.67L	30626. C	1450.84	13.45B	13.45	16.31	16.31
192.67R	27270. C	1450.84	11.96B	11.96	16.31	16.31
200.00	47985. B	1450.84	8.64B	8.64	15.21	15.21
218.00L	45307. B	1450.84	5.13B	5.13	12.65	12.65
218.00R	45307. B	1747.50	5.71B	5.71	15.67	15.67
220.00L	43540. B	1747.50	17.12B	17.12	15.29	15.29
220.00R	43540. B	1747.50	29.16B	29.16	15.29	15.29
225.00	45307. B	1747.50	8.05B	8.05	14.34	14.34
250.00	46330. B	1778.84	3.86B	3.86	10.17	10.17

Span 3

Location	Allowable	Shear	Rating Factors Bending		Shear	
			Inv.	Oper.	Inv.	Oper.
0.00	46330. B	1757.54	3.86B	3.86	10.18	10.18
18.33	46576. B	1671.32	6.57B	6.57	11.73	11.73
25.33L	23817. C	1650.72	7.73B	7.73	12.48	12.48
25.33R	20819. C	1650.22	6.43B	6.43	12.48	12.48
27.33L	20829. C	1644.80	20.98B	20.98	12.71	12.71
27.33R	45634. B	1377.06	11.78B	11.78	10.34	10.34
36.67	13958. C	1361.55	4.95B	4.95	11.33	11.33
55.00	23421. C	1332.56	13.05B	13.05	13.65	13.65
57.33L	13565. C	1329.18	7.73B	7.73	13.98	13.98
57.33R	13466. C	1328.93	7.67B	7.67	13.97	13.97
59.33L	13429. C	1326.20	6.34B	6.34	14.26	14.26
59.33R	12173. C	922.00	5.74B	5.74	9.42	9.42
73.33	36000. B	658.50	5.06B	5.06	7.57	7.57
91.67	36000. B	644.47	3.50B	3.50	9.89	9.89
110.00	36000. B	632.76	2.73B	2.73	13.07	13.07
128.33	36000. B	623.62	2.58B	2.58	9.63	9.63
146.67	36000. B	617.31	3.25B	3.25	7.27	7.27
161.33L	36000. B	773.65	4.91B	4.91	8.38	8.38
161.33R	36000. B	773.47	2.69B	2.69	8.38	8.38
165.00	36000. B	769.68	3.31B	3.31	8.02	8.02
183.33	9331. C	488.42	>999.00B	>999.00	3.52	3.52

Service II
(Assumes permit truck is only loading in all lanes)

Span 1

Location	Allowable Stress	Rating Factors Bending	
		Inv.	Oper.
0.00	34200. S	> 999.00 B	>999.00
18.33	34200. S	4.68 B	4.68
22.00L	34200. S	3.88 B	3.88
22.00R	34200. S	6.74 B	6.74
36.67	34200. S	4.61 B	4.61
55.00	34200. S	3.73 B	3.73
73.33	34200. S	3.88 B	3.88
91.67	34200. S	4.79 B	4.79
110.00	34200. S	6.63 B	6.63
122.00L	34200. S	8.98 B	8.98
122.00R	34200. S	8.99 B	8.99
124.00L	34200. S	9.44 B	9.44
124.00R	34200. S	7.89 B	7.89
128.33	47500. S	12.67 B	12.99
146.67	47500. S	9.42 B	9.42
154.00L	47500. S	8.03 B	8.03

154.00R	47500. S	8.34	B	8.34
156.00L	47500. S	24.90	B	24.90
156.00R	47500. S	41.98	B	41.98
165.00	47500. S	11.52	B	11.52
183.33	47500. S	7.58	B	7.58

Span 2

Location	Allowable Stress	Rating Factors Bending Inv.		Oper.
0.00	34200. S	7.58	B	7.58
25.00	34200. S	14.19	B	14.19
28.00L	34200. S	15.12	B	15.12
28.00R	34200. S	14.79	B	14.79
30.00L	34200. S	51.99	B	51.99
30.00R	34200. S	31.84	B	31.84
50.00	34200. S	14.54	B	14.54
55.33L	34200. S	12.57	B	12.57
55.33R	34200. S	12.56	B	12.56
57.33L	34200. S	11.87	B	11.87
57.33R	34200. S	14.45	B	14.45
75.00	34200. S	9.80	B	9.80
100.00	34200. S	7.23	B	7.23
125.00	47500. S	6.66	B	6.66
150.00	47500. S	7.21	B	7.21
175.00	47500. S	9.74	B	9.74
190.67L	47500. S	13.61	B	13.61
190.67R	47500. S	13.63	B	13.63
192.67L	47500. S	14.36	B	14.36
192.67R	47500. S	11.79	B	11.79
200.00	47500. S	14.60	B	14.60
218.00L	47500. S	9.97	B	9.97
218.00R	47500. S	10.25	B	10.25
220.00L	47500. S	32.89	B	32.89
220.00R	47500. S	53.07	B	53.07
225.00	47500. S	14.19	B	14.19
250.00	47500. S	7.57	B	7.57

Span 3

Location	Allowable Stress	Rating Factors Bending Inv.		Oper.
0.00	34200. S	7.57	B	7.57
18.33	34200. S	11.55	B	11.55
25.33L	34200. S	13.17	B	13.17
25.33R	34200. S	12.82	B	12.82
27.33L	34200. S	41.19	B	41.19
27.33R	34200. S	24.03	B	24.03
36.67	34200. S	9.40	B	9.40
55.00	34200. S	12.73	B	12.86
57.33L	34200. S	11.82	B	13.31
57.33R	34200. S	11.83	B	13.30
59.33L	34200. S	10.93	B	10.93
59.33R	34200. S	13.08	B	13.08
73.33	34200. S	6.66	B	6.66
91.67	34200. S	4.79	B	4.79
110.00	34200. S	3.86	B	3.86
128.33	34200. S	3.70	B	3.70
146.67	34200. S	4.58	B	4.58
161.33L	34200. S	6.70	B	6.70
161.33R	34200. S	3.85	B	3.85
165.00	34200. S	4.65	B	4.65
183.33	34200. S	> 999.00	B	>999.00

****
Minimum rating is 2.58 at location 128.33 in span 3.
****

Classified at Strength II because of description
in 3.4.1 for other than HL93 vehicle.

Rating Codes:
T - Top steel governs
B - Bottom steel governs
C - Concrete governs
R - Rebar governs
V - Shear governs
S - Serviceability governs

Mom Strength Codes:
C - Compact
B - Braced non-compact
U - Unbraced non-compact
T - Transition between compact and braced non-compact
S - Serviceability

Noncompact shapes ratings based on stress, as

$$IR = \frac{Fb - \text{factored dead load stress}}{\text{factored LL+I stress}}$$

Inventory rating for Strength II if only permit
loading on the system uses PBETA. Operating rating
uses IR(PBETA/1.35).

I-295 HH BUCKMAN BRIDGE -720249
Girder 4 : Rating Output : Lrfd Ratings
Mon Mar 30 10:07:35 2015

[This table uses the rating equation (6A.4.2.1-1)
of the 2011 edition of the Manual for Bridge
Evaluation.]

Permit

Strength II
(Assumes permit truck is only loading)

Span 1

Location	Allowable	Shear	Rating Factors Bending		Shear	
			Inv.	Oper.	Inv.	Oper.
0.00	9331. C	488.42	>999.00B	>999.00	3.47	3.47
18.33	36000. B	769.69	3.61B	3.61	8.55	8.55
22.00L	36000. B	773.47	2.93B	2.93	9.21	9.21
22.00R	36000. B	773.65	5.26B	5.26	9.21	9.21
36.67	36000. B	617.31	3.42B	3.42	9.59	9.59
55.00	36000. B	623.62	2.69B	2.69	12.16	12.16
73.33	36000. B	632.76	2.80B	2.80	12.56	12.56
91.67	36000. B	644.47	3.65B	3.65	9.87	9.87
110.00	36000. B	658.50	5.40B	5.40	7.72	7.72
122.00L	36000. B	918.49	7.75B	7.75	10.32	10.32
122.00R	36000. B	918.79	6.20T	6.20	10.33	10.33
124.00L	12519. C	922.00	6.48B	6.48	10.20	10.20
124.00R	13522. C	1326.20	7.01B	7.01	15.31	15.31
128.33	23422. C	1332.57	13.72B	13.72	14.87	14.87
146.67	13973. C	1361.56	5.71B	5.71	12.93	12.93
154.00L	45675. B	1373.66	4.80B	4.80	12.15	12.15
154.00R	45672. B	1638.91	5.38B	5.38	14.84	14.84
156.00L	43981. B	1644.31	15.62B	15.62	14.87	14.87
156.00R	23766. C	1644.80	29.95B	29.95	14.88	14.88
165.00	46576. B	1671.34	7.92B	7.92	13.58	13.58
183.33	46329. B	1757.69	4.69B	4.69	10.67	10.67

Span 2

Location	Allowable	Shear	Rating Factors Bending		Shear	
			Inv.	Oper.	Inv.	Oper.
0.00	46329. B	1778.71	4.69B	4.69	11.47	11.47
25.00	46559. B	1747.50	8.33B	8.33	14.69	14.69
28.00L	46976. B	1747.50	8.95B	8.95	15.10	15.10
28.00R	21738. C	1747.50	7.33B	7.33	15.10	15.10
30.00L	21800. C	1747.50	30.74B	30.74	15.38	15.38
30.00R	45307. B	1450.84	18.45B	18.45	12.45	12.45
50.00	47985. B	1450.84	8.14B	8.14	14.41	14.41
55.33L	45690. B	1450.84	8.59B	8.59	14.89	14.89
55.33R	45690. B	1450.84	10.73B	10.73	14.89	14.89
57.33L	45690. B	1450.84	9.31B	9.31	15.06	15.06
57.33R	19118. C	1450.84	9.28B	9.28	15.06	15.06
75.00	29713. C	974.23	9.77B	9.77	10.40	10.40

100.00	29713. C	974.23	7.09B	7.09	13.17	13.17
125.00	29713. C	973.68	6.48B	6.48	14.90	14.90
150.00	29713. C	974.23	7.14B	7.14	14.82	14.82
175.00	29713. C	974.23	9.83B	9.83	11.79	11.79
190.67L	29713. C	1450.84	13.77B	13.77	17.54	17.54
190.67R	30626. C	1450.84	14.19B	14.19	17.54	17.54
192.67L	19343. C	1450.84	9.42B	9.42	17.38	17.38
192.67R	45936. B	1450.84	7.54B	7.54	17.38	17.38
200.00	47985. B	1450.84	8.39B	8.39	16.67	16.67
218.00L	45307. B	1450.84	5.21B	5.21	14.84	14.84
218.00R	45307. B	1747.50	5.80B	5.80	18.30	18.30
220.00L	43540. B	1747.50	19.67B	19.67	17.89	17.89
220.00R	43540. B	1747.50	33.53B	33.53	17.89	17.89
225.00	45307. B	1747.50	8.44B	8.44	16.79	16.79
250.00	46330. B	1778.84	4.80B	4.80	11.35	11.35

Span 3

Location	Allowable	Shear	Rating Factors Bending		Shear	
			Inv.	Oper.	Inv.	Oper.
0.00	46330. B	1757.54	4.80B	4.80	11.03	11.03
18.33	46576. B	1671.32	7.58B	7.58	13.12	13.12
25.33L	23824. C	1650.72	8.63B	8.63	13.81	13.81
25.33R	20868. C	1650.22	7.22B	7.22	13.80	13.80
27.33L	20868. C	1644.80	24.41B	24.41	13.97	13.97
27.33R	45634. B	1377.06	13.82B	13.82	11.41	11.41
36.67	13955. C	1361.55	5.14B	5.14	11.89	11.89
55.00	23342. C	1332.56	12.87B	12.87	13.27	13.27
57.33L	13556. C	1329.18	7.55B	7.55	13.50	13.50
57.33R	13456. C	1328.93	7.50B	7.50	13.50	13.50
59.33L	13420. C	1326.20	6.77B	6.77	13.72	13.72
59.33R	12127. C	922.00	6.10B	6.10	9.05	9.05
73.33	36000. B	658.50	5.34B	5.34	7.14	7.14
91.67	36000. B	644.47	3.60B	3.60	9.34	9.34
110.00	36000. B	632.76	2.75B	2.75	12.21	12.21
128.33	36000. B	623.62	2.63B	2.63	9.43	9.43
146.67	36000. B	617.31	3.34B	3.34	7.12	7.12
161.33L	36000. B	773.65	5.16B	5.16	8.67	8.67
161.33R	36000. B	773.47	2.85B	2.85	8.66	8.66
165.00	36000. B	769.68	3.52B	3.52	8.36	8.36
183.33	9331. C	488.42	>999.00B	>999.00	3.70	3.70

Service II
(Assumes permit truck is only loading in all lanes)

Span 1

Location	Allowable Stress	Rating Factors Bending	
		Inv.	Oper.
0.00	34200. S	> 999.00 B	>999.00
18.33	34200. S	5.02 B	5.02
22.00L	34200. S	4.16 B	4.16
22.00R	34200. S	7.14 B	7.14
36.67	34200. S	4.79 B	4.79
55.00	34200. S	3.84 B	3.84
73.33	34200. S	3.95 B	3.95
91.67	34200. S	4.98 B	4.98
110.00	34200. S	7.09 B	7.09
122.00L	34200. S	9.95 B	9.95
122.00R	34200. S	9.95 B	9.95
124.00L	34200. S	10.31 B	10.31
124.00R	34200. S	8.60 B	8.60
128.33	47500. S	13.53 B	13.53
146.67	47500. S	10.72 B	10.72
154.00L	47500. S	9.44 B	9.44

154.00R	47500. S	9.77 B	9.77
156.00L	47500. S	30.28 B	30.28
156.00R	47500. S	50.17 B	50.17
165.00	47500. S	13.73 B	13.73
183.33	47500. S	8.92 B	8.92

Span 2

Location	Allowable Stress	Rating Factors Bending Inv.	Oper.
0.00	34200. S	8.92 B	8.92
25.00	34200. S	14.22 B	14.22
28.00L	34200. S	14.97 B	14.97
28.00R	34200. S	14.62 B	14.62
30.00L	34200. S	60.64 B	60.64
30.00R	34200. S	36.77 B	36.77
50.00	34200. S	13.86 B	13.86
55.33L	34200. S	14.18 B	15.20
55.33R	34200. S	14.18 B	15.17
57.33L	34200. S	13.10 B	13.10
57.33R	34200. S	15.92 B	15.92
75.00	34200. S	10.52 B	10.52
100.00	34200. S	7.41 B	7.41
125.00	47500. S	6.69 B	6.69
150.00	47500. S	7.46 B	7.46
175.00	47500. S	10.59 B	10.59
190.67L	47500. S	15.15 B	15.15
190.67R	47500. S	15.17 B	15.17
192.67L	47500. S	15.97 B	15.97
192.67R	47500. S	13.16 B	13.16
200.00	47500. S	14.25 B	14.25
218.00L	47500. S	10.14 B	10.14
218.00R	47500. S	10.44 B	10.44
220.00L	47500. S	37.82 B	37.82
220.00R	47500. S	61.03 B	61.03
225.00	47500. S	14.84 B	14.84
250.00	47500. S	9.07 B	9.07

Span 3

Location	Allowable Stress	Rating Factors Bending Inv.	Oper.
0.00	34200. S	9.07 B	9.07
18.33	34200. S	13.21 B	13.21
25.33L	34200. S	14.65 B	14.65
25.33R	34200. S	14.28 B	14.28
27.33L	34200. S	47.64 B	47.64
27.33R	34200. S	27.98 B	27.98
36.67	34200. S	9.77 B	9.77
55.00	34200. S	12.69 B	12.69
57.33L	34200. S	13.07 B	13.07
57.33R	34200. S	13.05 B	13.05
59.33L	34200. S	11.70 B	11.70
59.33R	34200. S	14.04 B	14.04
73.33	34200. S	7.00 B	7.00
91.67	34200. S	4.92 B	4.92
110.00	34200. S	3.89 B	3.89
128.33	34200. S	3.77 B	3.77
146.67	34200. S	4.70 B	4.70
161.33L	34200. S	7.01 B	7.01
161.33R	34200. S	4.06 B	4.06
165.00	34200. S	4.92 B	4.92
183.33	34200. S	> 999.00 B	>999.00

****
Minimum rating is 2.63 at location 128.33 in span 3.
****

Classified at Strength II because of description
in 3.4.1 for other than HL93 vehicle.

Rating Codes:
T - Top steel governs
B - Bottom steel governs
C - Concrete governs
R - Rebar governs
V - Shear governs
S - Serviceability governs

Mom Strength Codes:
C - Compact
B - Braced non-compact
U - Unbraced non-compact
T - Transition between compact and braced non-compact
S - Serviceability

Noncompact shapes ratings based on stress, as

$$IR = \frac{Fb - \text{factored dead load stress}}{\text{factored LL+I stress}}$$

Inventory rating for Strength II if only permit
loading on the system uses PBETA. Operating rating
uses IR(PBETA/1.35).

I-295 HH BUCKMAN BRIDGE -720249
Girder 5 : Rating Output : Lrfd Ratings
Mon Mar 30 10:07:45 2015

[This table uses the rating equation (6A.4.2.1-1)
of the 2011 edition of the Manual for Bridge
Evaluation.]

Permit

Strength II
(Assumes permit truck is only loading)

Span 1

Location	Allowable	Shear	Rating Factors Bending		Shear	
			Inv.	Oper.	Inv.	Oper.
0.00	36000. B	347.57	>999.00B	>999.00	1.94	1.94
18.33	36000. B	461.91	5.10B	5.10	4.81	4.81
36.67	36000. B	476.29	2.81B	2.81	7.65	7.65
38.00L	36000. B	477.22	2.73B	2.73	7.87	7.87
38.00R	36000. B	477.34	3.33B	3.33	7.87	7.87
55.00	36000. B	435.91	2.66B	2.66	9.09	9.09
73.33	36000. B	447.75	2.78B	2.78	8.95	8.95
91.67	36000. B	514.98	3.44B	3.44	7.20	7.20
94.00L	36000. B	520.37	3.62B	3.62	6.98	6.98
94.00R	36000. B	520.76	3.37B	3.37	6.99	6.99
110.00	36000. B	559.21	5.04B	5.04	5.73	5.73
128.33	35223. B	695.47	5.52B	5.52	5.23	5.23
146.67	35178. B	842.04	4.06B	4.06	5.25	5.25
155.33L	28998. B	928.08	2.48B	2.48	5.48	5.48
155.33R	28971. B	929.75	4.07B	4.07	5.50	5.50
165.00	30326. B	1380.66	4.20B	4.20	8.54	8.54
183.33	35100. B	1263.48	2.11B	2.11	6.06	6.06

Span 2

Location	Allowable	Shear	Rating Factors Bending		Shear	
			Inv.	Oper.	Inv.	Oper.
0.00	35100. B	1274.84	2.11B	2.11	5.75	5.75
21.00L	35318. B	923.38	4.38B	4.38	5.03	5.03
21.00R	35318. B	922.51	2.61B	2.61	5.02	5.02
25.00	35313. B	902.13	3.11B	3.11	5.21	5.21
50.00	35226. B	789.55	6.95B	6.95	6.79	6.79
75.00	36000. B	588.76	5.34B	5.34	5.91	5.91
76.00L	36000. B	587.44	5.20B	5.20	5.97	5.97
76.00R	36000. B	587.20	5.54B	5.54	5.97	5.97
99.50L	36000. B	506.39	3.44B	3.44	7.59	7.59
99.50R	36000. B	506.31	4.00B	4.00	7.59	7.59
100.00	36000. B	506.10	3.98B	3.98	7.68	7.68
125.00L	36000. B	502.51	3.43B	3.43	10.54	10.54
125.00R	36000. B	502.55	3.43B	3.43	10.54	10.54
150.00	36000. B	521.48	3.98B	3.98	9.72	9.72
174.00L	36000. B	626.29	5.54B	5.54	7.48	7.48
174.00R	36000. B	626.70	5.21B	5.21	7.49	7.49

150.50L	36000. B	522.06	4.01B	4.01	9.61	9.61
150.50R	36000. B	522.30	3.45B	3.45	9.61	9.61
175.00	36000. B	628.95	5.35B	5.35	7.40	7.40
200.00	35218. B	865.31	6.71B	6.71	8.12	8.12
225.00	30828. B	1008.02	2.62B	2.62	6.56	6.56
229.00L	30521. B	1033.20	2.17B	2.17	6.32	6.32
229.00R	30507. B	1034.27	3.71B	3.71	6.33	6.33
250.00	30889. B	1415.29	1.99B	1.99	6.80	6.80

Span 3

Location	Allowable	Shear	Rating Factors Bending		Shear	
			Inv.	Oper.	Inv.	Oper.
0.00	30889. B	1416.13	1.99B	1.99	6.66	6.66
18.33	32863. B	1199.86	3.70B	3.70	6.53	6.53
28.00L	32495. B	765.29	4.15B	4.15	3.87	3.87
28.00R	32509. B	763.96	2.45B	2.45	3.86	3.86
36.67	32340. B	695.47	3.11B	3.11	3.85	3.85
55.00	35223. B	600.54	5.59B	5.59	4.57	4.57
73.33	36000. B	514.98	5.05B	5.05	5.26	5.26
89.33L	36000. B	504.07	3.49B	3.49	6.91	6.91
89.33R	36000. B	503.96	3.75B	3.75	6.90	6.90
91.67	36000. B	502.42	3.59B	3.59	7.17	7.17
110.00	36000. B	435.91	2.84B	2.84	8.24	8.24
128.33	36000. B	476.29	2.68B	2.68	7.91	7.91
145.33L	36000. B	463.01	3.33B	3.33	5.76	5.76
145.33R	36000. B	462.88	2.72B	2.72	5.76	5.76
146.67	36000. B	461.91	2.80B	2.80	5.63	5.63
165.00	36000. B	484.57	5.03B	5.03	4.78	4.78
183.33	36000. B	338.37	>999.00B	>999.00	2.08	2.08

Service II
(Assumes permit truck is only loading in all lanes)

Span 1

Location	Allowable Stress	Rating Factors Bending	
		Inv.	Oper.
0.00	34200. S	> 999.00 B	>999.00
18.33	34200. S	6.93 B	6.93
36.67	34200. S	4.01 B	4.01
38.00L	34200. S	3.91 B	3.91
38.00R	34200. S	4.67 B	4.67
55.00	34200. S	3.80 B	3.80
73.33	34200. S	3.91 B	3.91
91.67	34200. S	4.69 B	4.69
94.00L	34200. S	4.90 B	4.90
94.00R	34200. S	4.58 B	4.58
110.00	34200. S	6.58 B	6.58
128.33	34200. S	8.38 B	8.38
146.67	34200. S	6.63 B	6.63
155.33L	34200. S	6.08 B	6.08
155.33R	34200. S	8.71 B	8.71
165.00	34200. S	8.82 B	8.82
183.33	34200. S	4.20 B	4.20

Span 2

Location	Allowable Stress	Rating Factors Bending	
		Inv.	Oper.

0.00	34200. S	4.20	B	4.20
21.00L	34200. S	7.20	B	7.20
21.00R	34200. S	4.76	B	4.76
25.00	34200. S	5.44	B	5.44
50.00	34200. S	10.66	B	10.66
75.00	34200. S	7.06	B	7.06
76.00L	34200. S	6.89	B	6.89
76.00R	34200. S	7.33	B	7.33
99.50L	34200. S	4.76	B	4.76
99.50R	34200. S	5.49	B	5.49
100.00	34200. S	5.46	B	5.46
125.00L	34200. S	4.78	B	4.78
125.00R	34200. S	4.78	B	4.78
150.00	34200. S	5.46	B	5.46
174.00L	34200. S	7.32	B	7.32
174.00R	34200. S	6.89	B	6.89
150.50L	34200. S	5.49	B	5.49
150.50R	34200. S	4.77	B	4.77
175.00	34200. S	7.06	B	7.06
200.00	34200. S	10.30	B	10.30
225.00	34200. S	5.84	B	5.84
229.00L	34200. S	5.27	B	5.27
229.00R	34200. S	7.71	B	7.71
250.00	34200. S	5.17	B	5.17

Span 3

Location	Allowable Stress	Rating Factors Bending Inv.	Oper.
0.00	34200. S	5.17 B	5.17
18.33	34200. S	7.12 B	7.12
28.00L	34200. S	7.62 B	7.62
28.00R	34200. S	5.09 B	5.09
36.67	34200. S	5.96 B	5.96
55.00	34200. S	8.48 B	8.48
73.33	34200. S	6.60 B	6.60
89.33L	34200. S	4.75 B	4.75
89.33R	34200. S	5.08 B	5.08
91.67	34200. S	4.90 B	4.90
110.00	34200. S	4.01 B	4.01
128.33	34200. S	3.83 B	3.83
145.33L	34200. S	4.68 B	4.68
145.33R	34200. S	3.91 B	3.91
146.67	34200. S	4.01 B	4.01
165.00	34200. S	6.84 B	6.84
183.33	34200. S	> 999.00 B	>999.00

****
Minimum rating is 1.94 at location 0.00 in span 1.
****

Classified at Strength II because of description
in 3.4.1 for other than HL93 vehicle.

Rating Codes:
T - Top steel governs
B - Bottom steel governs
C - Concrete governs
R - Rebar governs
V - Shear governs
S - Serviceability governs

Mom Strength Codes:
C - Compact
B - Braced non-compact
U - Unbraced non-compact
T - Transition between compact and braced non-compact
S - Serviceability

Noncompact shapes ratings based on stress, as

Fb - factored dead load stress

$$IR = \frac{\text{PBETA}}{\text{factored LL+I stress}}$$

Inventory rating for Strength II if only permit loading on the system uses PBETA. Operating rating uses IR(PBETA/1.35).

I-295 HH BUCKMAN BRIDGE -720249
Girder 6 : Rating Output : Lrfd Ratings
Mon Mar 30 10:07:57 2015

[This table uses the rating equation (6A.4.2.1-1)
of the 2011 edition of the Manual for Bridge
Evaluation.]

Permit

Strength II
(Assumes permit truck is only loading)

Span 1

Location	Allowable	Shear	Rating Factors Bending		Shear	
			Inv.	Oper.	Inv.	Oper.
0.00	36000. B	347.57	>999.00B	>999.00	2.03	2.03
18.33	36000. B	461.91	5.29B	5.29	4.72	4.72
36.67	36000. B	476.29	2.89B	2.89	7.15	7.15
38.00L	36000. B	477.22	2.80B	2.80	7.34	7.34
38.00R	36000. B	477.34	3.40B	3.40	7.35	7.35
55.00	36000. B	435.91	2.64B	2.64	8.66	8.66
73.33	36000. B	447.75	2.73B	2.73	8.84	8.84
91.67	36000. B	514.98	3.37B	3.37	6.83	6.83
94.00L	36000. B	520.37	3.54B	3.54	6.65	6.65
94.00R	36000. B	520.76	3.31B	3.31	6.66	6.66
110.00	36000. B	559.21	5.04B	5.04	5.87	5.87
128.33	35178. B	695.47	5.68B	5.68	5.69	5.69
146.67	30325. B	842.04	3.74B	3.74	6.22	6.22
155.33L	28997. B	928.08	3.08B	3.08	6.47	6.47
155.33R	28970. B	929.75	4.79B	4.79	6.48	6.48
165.00	30888. B	1380.66	5.15B	5.15	9.65	9.65
183.33	35100. B	1263.48	2.81B	2.81	6.54	6.54

Span 2

Location	Allowable	Shear	Rating Factors Bending		Shear	
			Inv.	Oper.	Inv.	Oper.
0.00	35100. B	1274.84	2.81B	2.81	6.78	6.78
21.00L	35318. B	923.38	4.70B	4.70	5.79	5.79
21.00R	35318. B	922.51	2.86B	2.86	5.78	5.78
25.00	35201. B	902.13	3.26B	3.26	5.90	5.90
50.00	35252. B	789.55	6.57B	6.57	6.47	6.47
75.00	36000. B	588.76	5.42B	5.42	5.23	5.23
76.00L	36000. B	587.44	5.26B	5.26	5.28	5.28
76.00R	36000. B	587.20	5.60B	5.60	5.28	5.28
99.50L	36000. B	506.39	3.23B	3.23	7.01	7.01
99.50R	36000. B	506.31	3.76B	3.76	7.01	7.01
100.00	36000. B	506.10	3.73B	3.73	7.11	7.11
125.00L	36000. B	502.51	3.14B	3.14	10.35	10.35
125.00R	36000. B	502.55	3.14B	3.14	10.35	10.35
150.00	36000. B	521.48	3.80B	3.80	8.66	8.66
174.00L	36000. B	626.29	5.71B	5.71	6.56	6.56
174.00R	36000. B	626.70	5.38B	5.38	6.56	6.56

150.50L	36000. B	522.06	3.83B	3.83	8.54	8.54
150.50R	36000. B	522.30	3.30B	3.30	8.54	8.54
175.00	36000. B	628.95	5.53B	5.53	6.51	6.51
200.00	35218. B	865.31	6.54B	6.54	8.20	8.20
225.00	30827. B	1008.02	2.96B	2.96	7.80	7.80
229.00L	30520. B	1033.20	2.57B	2.57	7.57	7.57
229.00R	30506. B	1034.27	4.20B	4.20	7.58	7.58
250.00	30888. B	1415.29	2.78B	2.78	7.83	7.83

Span 3

Location	Allowable	Shear	Rating Factors Bending		Shear	
			Inv.	Oper.	Inv.	Oper.
0.00	30888. B	1416.13	2.78B	2.78	7.55	7.55
18.33	32862. B	1199.86	4.28B	4.28	7.67	7.67
28.00L	32494. B	765.29	4.53B	4.53	4.53	4.53
28.00R	32508. B	763.96	2.76B	2.76	4.52	4.52
36.67	32339. B	695.47	3.27B	3.27	4.34	4.34
55.00	35223. B	600.54	5.36B	5.36	4.69	4.69
73.33	36000. B	514.98	4.98B	4.98	4.97	4.97
89.33L	36000. B	504.07	3.37B	3.37	6.65	6.65
89.33R	36000. B	503.96	3.62B	3.62	6.65	6.65
91.67	36000. B	502.42	3.47B	3.47	6.92	6.92
110.00	36000. B	435.91	2.77B	2.77	7.98	7.98
128.33	36000. B	476.29	2.63B	2.63	7.52	7.52
145.33L	36000. B	463.01	3.37B	3.37	5.47	5.47
145.33R	36000. B	462.88	2.77B	2.77	5.47	5.47
146.67	36000. B	461.91	2.86B	2.86	5.37	5.37
165.00	36000. B	484.57	5.15B	5.15	4.87	4.87
183.33	36000. B	338.37	>999.00B	>999.00	2.14	2.14

Service II
(Assumes permit truck is only loading in all lanes)

Span 1

Location	Allowable Stress	Rating Factors Bending	
		Inv.	Oper.
0.00	34200. S	> 999.00 B	>999.00
18.33	34200. S	7.15 B	7.15
36.67	34200. S	4.09 B	4.09
38.00L	34200. S	3.98 B	3.98
38.00R	34200. S	4.74 B	4.74
55.00	34200. S	3.73 B	3.73
73.33	34200. S	3.82 B	3.82
91.67	34200. S	4.56 B	4.56
94.00L	34200. S	4.77 B	4.77
94.00R	34200. S	4.46 B	4.46
110.00	34200. S	6.56 B	6.56
128.33	34200. S	8.63 B	8.63
146.67	34200. S	7.49 B	7.49
155.33L	34200. S	7.05 B	7.05
155.33R	34200. S	9.88 B	9.88
165.00	34200. S	10.08 B	10.08
183.33	34200. S	5.18 B	5.18

Span 2

Location	Allowable Stress	Rating Factors Bending	
		Inv.	Oper.

0.00	34200.	S	5.18	B	5.18
21.00L	34200.	S	7.65	B	7.65
21.00R	34200.	S	5.13	B	5.13
25.00	34200.	S	5.70	B	5.70
50.00	34200.	S	10.14	B	10.14
75.00	34200.	S	7.12	B	7.12
76.00L	34200.	S	6.93	B	6.93
76.00R	34200.	S	7.37	B	7.37
99.50L	34200.	S	4.46	B	4.46
99.50R	34200.	S	5.14	B	5.14
100.00	34200.	S	5.10	B	5.10
125.00L	34200.	S	4.37	B	4.37
125.00R	34200.	S	4.37	B	4.37
150.00	34200.	S	5.18	B	5.18
174.00L	34200.	S	7.51	B	7.51
174.00R	34200.	S	7.07	B	7.07
150.50L	34200.	S	5.22	B	5.22
150.50R	34200.	S	4.55	B	4.55
175.00	34200.	S	7.26	B	7.26
200.00	34200.	S	10.08	B	10.08
225.00	34200.	S	6.39	B	6.39
229.00L	34200.	S	5.91	B	5.91
229.00R	34200.	S	8.49	B	8.49
250.00	34200.	S	6.40	B	6.40

Span 3

Location	Allowable Stress		Rating Factors Bending Inv.		Oper.
0.00	34200.	S	6.40	B	6.40
18.33	34200.	S	7.96	B	7.96
28.00L	34200.	S	8.17	B	8.17
28.00R	34200.	S	5.55	B	5.55
36.67	34200.	S	6.19	B	6.19
55.00	34200.	S	8.17	B	8.17
73.33	34200.	S	6.49	B	6.49
89.33L	34200.	S	4.57	B	4.57
89.33R	34200.	S	4.89	B	4.89
91.67	34200.	S	4.71	B	4.71
110.00	34200.	S	3.88	B	3.88
128.33	34200.	S	3.73	B	3.73
145.33L	34200.	S	4.71	B	4.71
145.33R	34200.	S	3.94	B	3.94
146.67	34200.	S	4.05	B	4.05
165.00	34200.	S	6.97	B	6.97
183.33	34200.	S	> 999.00	B	>999.00

****
Minimum rating is 2.03 at location 0.00 in span 1.
****

Classified at Strength II because of description
in 3.4.1 for other than HL93 vehicle.

Rating Codes:
T - Top steel governs
B - Bottom steel governs
C - Concrete governs
R - Rebar governs
V - Shear governs
S - Serviceability governs

Mom Strength Codes:
C - Compact
B - Braced non-compact
U - Unbraced non-compact
T - Transition between compact and braced non-compact
S - Serviceability

Noncompact shapes ratings based on stress, as

Fb - factored dead load stress

$$IR = \frac{\text{PBETA}}{\text{factored LL+I stress}}$$

Inventory rating for Strength II if only permit loading on the system uses PBETA. Operating rating uses IR(PBETA/1.35).

I-295 HH BUCKMAN BRIDGE -720249
Girder 7 : Rating Output : Lrfd Ratings
Mon Mar 30 10:08:19 2015

[This table uses the rating equation (6A.4.2.1-1)
of the 2011 edition of the Manual for Bridge
Evaluation.]

Permit

Strength II
(Assumes permit truck is only loading)

Span 1

Location	Allowable	Shear	Rating Factors Bending		Shear	
			Inv.	Oper.	Inv.	Oper.
0.00	36000. B	347.57	>999.00B	>999.00	1.90	1.90
18.33	36000. B	461.91	4.89B	4.89	4.25	4.25
36.67	36000. B	476.29	2.72B	2.72	6.44	6.44
38.00L	36000. B	477.22	2.64B	2.64	6.61	6.61
38.00R	36000. B	477.34	3.17B	3.17	6.61	6.61
55.00	36000. B	435.91	2.50B	2.50	7.60	7.60
73.33	36000. B	447.75	2.52B	2.52	8.58	8.58
91.67	36000. B	514.98	3.08B	3.08	6.70	6.70
94.00L	36000. B	520.37	3.22B	3.22	6.51	6.51
94.00R	36000. B	520.76	3.01B	3.01	6.52	6.52
110.00	36000. B	559.21	4.33B	4.33	5.68	5.68
128.33	35178. B	695.47	4.74B	4.74	5.48	5.48
146.67	30325. B	842.04	3.30B	3.30	5.91	5.91
155.33L	28997. B	928.08	2.82B	2.82	6.14	6.14
155.33R	28970. B	929.75	4.28B	4.28	6.16	6.16
165.00	30888. B	1380.66	4.71B	4.71	9.14	9.14
183.33	35100. B	1263.48	2.82B	2.82	6.27	6.27

Span 2

Location	Allowable	Shear	Rating Factors Bending		Shear	
			Inv.	Oper.	Inv.	Oper.
0.00	35100. B	1274.84	2.82B	2.82	6.31	6.31
21.00L	35318. B	923.38	4.68B	4.68	5.42	5.42
21.00R	35318. B	922.51	2.94B	2.94	5.41	5.41
25.00	35201. B	902.13	3.30B	3.30	5.52	5.52
50.00	35252. B	789.55	5.72B	5.72	6.07	6.07
75.00	36000. B	588.76	4.65B	4.65	4.85	4.85
76.00L	36000. B	587.44	4.52B	4.52	4.89	4.89
76.00R	36000. B	587.20	4.81B	4.81	4.89	4.89
99.50L	36000. B	506.39	2.85B	2.85	6.22	6.22
99.50R	36000. B	506.31	3.29B	3.29	6.22	6.22
100.00	36000. B	506.10	3.27B	3.27	6.30	6.30
125.00L	36000. B	502.51	2.79B	2.79	9.47	9.47
125.00R	36000. B	502.55	2.79B	2.79	9.47	9.47
150.00	36000. B	521.48	3.31B	3.31	7.80	7.80
174.00L	36000. B	626.29	4.84B	4.84	6.11	6.11
174.00R	36000. B	626.70	4.56B	4.56	6.12	6.12

150.50L	36000. B	522.06	3.34B	3.34	7.70	7.70
150.50R	36000. B	522.30	2.89B	2.89	7.71	7.71
175.00	36000. B	628.95	4.68B	4.68	6.07	6.07
200.00	35218. B	865.31	5.73B	5.73	7.66	7.66
225.00	30827. B	1008.02	2.98B	2.98	7.14	7.14
229.00L	30520. B	1033.20	2.65B	2.65	6.95	6.95
229.00R	30506. B	1034.27	4.19B	4.19	6.96	6.96
250.00	30888. B	1415.29	2.96B	2.96	7.30	7.30

Span 3

Location	Allowable	Shear	Rating Factors Bending		Shear	
			Inv.	Oper.	Inv.	Oper.
0.00	30888. B	1416.13	2.96B	2.96	7.16	7.16
18.33	32862. B	1199.86	4.02B	4.02	7.27	7.27
28.00L	32494. B	765.29	4.10B	4.10	4.38	4.38
28.00R	32508. B	763.96	2.58B	2.58	4.37	4.37
36.67	32339. B	695.47	2.91B	2.91	4.22	4.22
55.00	35223. B	600.54	4.43B	4.43	4.59	4.59
73.33	36000. B	514.98	4.33B	4.33	4.83	4.83
89.33L	36000. B	504.07	3.09B	3.09	6.41	6.41
89.33R	36000. B	503.96	3.31B	3.31	6.41	6.41
91.67	36000. B	502.42	3.18B	3.18	6.66	6.66
110.00	36000. B	435.91	2.55B	2.55	7.71	7.71
128.33	36000. B	476.29	2.48B	2.48	6.90	6.90
145.33L	36000. B	463.01	3.14B	3.14	5.04	5.04
145.33R	36000. B	462.88	2.60B	2.60	5.04	5.04
146.67	36000. B	461.91	2.67B	2.67	4.94	4.94
165.00	36000. B	484.57	4.76B	4.76	4.48	4.48
183.33	36000. B	338.37	>999.00B	>999.00	2.01	2.01

Service II
(Assumes permit truck is only loading in all lanes)

Span 1

Location	Allowable Stress	Rating Factors Bending		
		Inv.	Oper.	
0.00	34200. S	> 999.00	B>999.00	
18.33	34200. S	6.57	B	6.57
36.67	34200. S	3.81	B	3.81
38.00L	34200. S	3.71	B	3.71
38.00R	34200. S	4.39	B	4.39
55.00	34200. S	3.50	B	3.50
73.33	34200. S	3.50	B	3.50
91.67	34200. S	4.15	B	4.15
94.00L	34200. S	4.32	B	4.32
94.00R	34200. S	4.05	B	4.05
110.00	34200. S	5.63	B	5.63
128.33	34200. S	7.17	B	7.17
146.67	34200. S	6.48	B	6.48
155.33L	34200. S	6.25	B	6.25
155.33R	34200. S	8.65	B	8.65
165.00	34200. S	9.04	B	9.04
183.33	34200. S	5.02	B	5.02

Span 2

Location	Allowable Stress	Rating Factors Bending		
		Inv.	Oper.	

0.00	34200. S	5.02	B	5.02
21.00L	34200. S	7.51	B	7.51
21.00R	34200. S	5.13	B	5.13
25.00	34200. S	5.66	B	5.66
50.00	34200. S	8.82	B	8.82
75.00	34200. S	6.09	B	6.09
76.00L	34200. S	5.93	B	5.93
76.00R	34200. S	6.30	B	6.30
99.50L	34200. S	3.90	B	3.90
99.50R	34200. S	4.47	B	4.47
100.00	34200. S	4.45	B	4.45
125.00L	34200. S	3.85	B	3.85
125.00R	34200. S	3.85	B	3.85
150.00	34200. S	4.50	B	4.50
174.00L	34200. S	6.34	B	6.34
174.00R	34200. S	5.97	B	5.97
150.50L	34200. S	4.53	B	4.53
150.50R	34200. S	3.95	B	3.95
175.00	34200. S	6.13	B	6.13
200.00	34200. S	8.81	B	8.81
225.00	34200. S	6.25	B	6.25
229.00L	34200. S	5.86	B	5.86
229.00R	34200. S	8.29	B	8.29
250.00	34200. S	6.52	B	6.52

Span 3

Location	Allowable Stress	Rating Factors Bending Inv.	Oper.
0.00	34200. S	6.52 B	6.52
18.33	34200. S	7.32 B	7.32
28.00L	34200. S	7.27 B	7.27
28.00R	34200. S	5.02 B	5.02
36.67	34200. S	5.40 B	5.40
55.00	34200. S	6.72 B	6.72
73.33	34200. S	5.64 B	5.64
89.33L	34200. S	4.15 B	4.15
89.33R	34200. S	4.44 B	4.44
91.67	34200. S	4.29 B	4.29
110.00	34200. S	3.55 B	3.55
128.33	34200. S	3.49 B	3.49
145.33L	34200. S	4.35 B	4.35
145.33R	34200. S	3.66 B	3.66
146.67	34200. S	3.76 B	3.76
165.00	34200. S	6.42 B	6.42
183.33	34200. S	> 999.00 B	>999.00

****
Minimum rating is 1.90 at location 0.00 in span 1.
****

Classified at Strength II because of description
in 3.4.1 for other than HL93 vehicle.

Rating Codes:
T - Top steel governs
B - Bottom steel governs
C - Concrete governs
R - Rebar governs
V - Shear governs
S - Serviceability governs

Mom Strength Codes:
C - Compact
B - Braced non-compact
U - Unbraced non-compact
T - Transition between compact and braced non-compact
S - Serviceability

Noncompact shapes ratings based on stress, as

Fb - factored dead load stress

$$IR = \frac{\text{PBETA}}{\text{factored LL+I stress}}$$

Inventory rating for Strength II if only permit loading on the system uses PBETA. Operating rating uses IR(PBETA/1.35).

I-295 HH BUCKMAN BRIDGE -720249
Girder 8 : Rating Output : Lrfd Ratings
Mon Mar 30 10:08:39 2015

[This table uses the rating equation (6A.4.2.1-1)
of the 2011 edition of the Manual for Bridge
Evaluation.]

Permit

Strength II
(Assumes permit truck is only loading)

Span 1

Location	Allowable	Shear	Rating Factors Bending		Shear	
			Inv.	Oper.	Inv.	Oper.
0.00	36000. B	347.57	>999.00B	>999.00	2.32	2.32
18.33	36000. B	461.91	5.05B	5.05	4.51	4.51
36.67	36000. B	476.29	2.64B	2.64	6.97	6.97
38.00L	36000. B	477.22	2.56B	2.56	7.18	7.18
38.00R	36000. B	477.34	3.05B	3.05	7.18	7.18
55.00	36000. B	435.91	2.41B	2.41	9.02	9.02
73.33	36000. B	447.75	2.37B	2.37	9.82	9.82
91.67	36000. B	514.98	2.86B	2.86	8.08	8.08
94.00L	36000. B	520.37	2.98B	2.98	7.80	7.80
94.00R	36000. B	520.76	2.79B	2.79	7.80	7.80
110.00	36000. B	559.21	3.90B	3.90	6.09	6.09
128.33	35184. B	695.47	4.23B	4.23	6.10	6.10
146.67	30537. B	842.04	3.08B	3.08	6.04	6.04
155.33L	29239. B	928.08	2.70B	2.70	6.27	6.27
155.33R	29213. B	929.75	4.01B	4.01	6.29	6.29
165.00	35058. B	1380.66	5.25B	5.25	9.47	9.47
183.33	35105. B	1263.48	2.80B	2.80	7.40	7.40

Span 2

Location	Allowable	Shear	Rating Factors Bending		Shear	
			Inv.	Oper.	Inv.	Oper.
0.00	35105. B	1274.84	2.80B	2.80	7.10	7.10
21.00L	35322. B	923.38	4.44B	4.44	5.60	5.60
21.00R	35322. B	922.51	2.86B	2.86	5.59	5.59
25.00	35208. B	902.13	3.17B	3.17	5.63	5.63
50.00	35258. B	789.55	5.02B	5.02	6.13	6.13
75.00	36000. B	588.76	4.30B	4.30	5.98	5.98
76.00L	36000. B	587.44	4.19B	4.19	6.05	6.05
76.00R	36000. B	587.20	4.45B	4.45	6.04	6.04
99.50L	36000. B	506.39	2.77B	2.77	7.02	7.02
99.50R	36000. B	506.31	3.18B	3.18	7.02	7.02
100.00	36000. B	506.10	3.16B	3.16	7.06	7.06
125.00L	36000. B	502.51	2.71B	2.71	11.35	11.35
125.00R	36000. B	502.55	2.71B	2.71	11.35	11.35
150.00	36000. B	521.48	3.17B	3.17	8.16	8.16
174.00L	36000. B	626.29	4.43B	4.43	7.17	7.17
174.00R	36000. B	626.70	4.17B	4.17	7.18	7.18

150.50L	36000. B	522.06	3.20B	3.20	8.12	8.12
150.50R	36000. B	522.30	2.78B	2.78	8.12	8.12
175.00	36000. B	628.95	4.28B	4.28	7.11	7.11
200.00	35224. B	865.31	5.05B	5.05	7.33	7.33
225.00	31022. B	1008.02	2.89B	2.89	6.84	6.84
229.00L	30721. B	1033.20	2.61B	2.61	6.77	6.77
229.00R	30708. B	1034.27	4.01B	4.01	6.78	6.78
250.00	31030. B	1415.29	2.94B	2.94	8.15	8.15

Span 3

Location	Allowable	Shear	Rating Factors Bending		Shear	
			Inv.	Oper.	Inv.	Oper.
0.00	31030. B	1416.13	2.94B	2.94	8.37	8.37
18.33	32968. B	1199.86	3.82B	3.82	7.85	7.85
28.00L	32611. B	765.29	3.85B	3.85	4.79	4.79
28.00R	32624. B	763.96	2.49B	2.49	4.78	4.78
36.67	32498. B	695.47	2.75B	2.75	4.63	4.63
55.00	35228. B	600.54	3.97B	3.97	5.11	5.11
73.33	36000. B	514.98	3.93B	3.93	5.42	5.42
89.33L	36000. B	504.07	2.87B	2.87	7.77	7.77
89.33R	36000. B	503.96	3.07B	3.07	7.77	7.77
91.67	36000. B	502.42	2.96B	2.96	8.16	8.16
110.00	36000. B	435.91	2.41B	2.41	9.78	9.78
128.33	36000. B	476.29	2.40B	2.40	8.28	8.28
145.33L	36000. B	463.01	3.01B	3.01	5.51	5.51
145.33R	36000. B	462.88	2.52B	2.52	5.51	5.51
146.67	36000. B	461.91	2.59B	2.59	5.38	5.38
165.00	36000. B	484.57	4.93B	4.93	4.68	4.68
183.33	36000. B	338.37	>999.00B	>999.00	2.42	2.42

Service II
(Assumes permit truck is only loading in all lanes)

Span 1

Location	Allowable Stress	Rating Factors Bending	
		Inv.	Oper.
0.00	34200. S	> 999.00 B	>999.00
18.33	34200. S	6.76 B	6.76
36.67	34200. S	3.65 B	3.65
38.00L	34200. S	3.55 B	3.55
38.00R	34200. S	4.18 B	4.18
55.00	34200. S	3.34 B	3.34
73.33	34200. S	3.26 B	3.26
91.67	34200. S	3.84 B	3.84
94.00L	34200. S	3.99 B	3.99
94.00R	34200. S	3.74 B	3.74
110.00	34200. S	5.08 B	5.08
128.33	34200. S	6.33 B	6.33
146.67	34200. S	5.83 B	5.83
155.33L	34200. S	5.68 B	5.68
155.33R	34200. S	7.80 B	7.80
165.00	34200. S	8.20 B	8.20
183.33	34200. S	4.78 B	4.78

Span 2

Location	Allowable Stress	Rating Factors Bending	
		Inv.	Oper.

0.00	34200. S	4.78	B	4.78
21.00L	34200. S	6.96	B	6.96
21.00R	34200. S	4.84	B	4.84
25.00	34200. S	5.29	B	5.29
50.00	34200. S	7.65	B	7.65
75.00	34200. S	5.62	B	5.62
76.00L	34200. S	5.48	B	5.48
76.00R	34200. S	5.81	B	5.81
99.50L	34200. S	3.75	B	3.75
99.50R	34200. S	4.28	B	4.28
100.00	34200. S	4.26	B	4.26
125.00L	34200. S	3.70	B	3.70
125.00R	34200. S	3.70	B	3.70
150.00	34200. S	4.27	B	4.27
174.00L	34200. S	5.79	B	5.79
174.00R	34200. S	5.46	B	5.46
150.50L	34200. S	4.30	B	4.30
150.50R	34200. S	3.77	B	3.77
175.00	34200. S	5.59	B	5.59
200.00	34200. S	7.67	B	7.67
225.00	34200. S	5.77	B	5.77
229.00L	34200. S	5.45	B	5.45
229.00R	34200. S	7.62	B	7.62
250.00	34200. S	6.09	B	6.09

Span 3

Location	Allowable Stress	Rating Factors Bending Inv.	Oper.
0.00	34200. S	6.09 B	6.09
18.33	34200. S	6.72 B	6.72
28.00L	34200. S	6.62 B	6.62
28.00R	34200. S	4.64 B	4.64
36.67	34200. S	4.93 B	4.93
55.00	34200. S	5.96 B	5.96
73.33	34200. S	5.11 B	5.11
89.33L	34200. S	3.84 B	3.84
89.33R	34200. S	4.10 B	4.10
91.67	34200. S	3.97 B	3.97
110.00	34200. S	3.32 B	3.32
128.33	34200. S	3.33 B	3.33
145.33L	34200. S	4.14 B	4.14
145.33R	34200. S	3.51 B	3.51
146.67	34200. S	3.61 B	3.61
165.00	34200. S	6.61 B	6.61
183.33	34200. S	> 999.00 B	>999.00

****
Minimum rating is 2.32 at location 0.00 in span 1.
****

Classified at Strength II because of description
in 3.4.1 for other than HL93 vehicle.

Rating Codes:
T - Top steel governs
B - Bottom steel governs
C - Concrete governs
R - Rebar governs
V - Shear governs
S - Serviceability governs

Mom Strength Codes:
C - Compact
B - Braced non-compact
U - Unbraced non-compact
T - Transition between compact and braced non-compact
S - Serviceability

Noncompact shapes ratings based on stress, as

Fb - factored dead load stress

$$IR = \frac{\text{PBETA}}{\text{factored LL+I stress}}$$

Inventory rating for Strength II if only permit loading on the system uses PBETA. Operating rating uses IR(PBETA/1.35).

2.2.4. C5 (42” Barrier)

I-295 HH BUCKMAN BRIDGE -720249
Girder System : Input File : Layout/Slab/Loading Definition
Thu Mar 26 16:32:17 2015

```
ID: I-295 HH BUCKMAN BRIDGE -720249
CONDITIONS
  ALL LANES
  ENGLISH INPUT
  ENGLISH OUTPUT
  FLOAT LANES
  GRID MODEL
  LRFD METHOD
  MEDIUM RESOLUTION MESH
  OVERLAY PERMIT TRUCK WITH LANE LOADING
  PERMIT TRUCK IN ALL LANES
  PERMIT TRUCK IS ONLY LOADING IN PERMIT LANE
  RATE MODE
  RATING PROJECT
  SELF WEIGHT FOR DEAD LOAD 1
DATA
  BR-1 18.3333 18.3333 18.3333 18.3333 18.3333 18.3333 18.3333 18.3333
  18.3333 36.1875 17.8542 17.8542 17.8542 17.8542 17.8542 17.875 17.875
  17.8542 17.8542 17.8542 17.8542 17.8542 36.1875 18.3333 18.3333
  18.3333 18.3333 18.3333 18.3333 18.3333 18.3333
  CURB -2.
  FPC 4.5
  GDSPC 9.3073 9.3073 9.3073 9.3073 9.3333 9.3333 9.3333
  LANES 12. 12. 12. 12. 12.
  PRLANE  0.2
  PRMITP 7.5 15. 15. 11.25 11.25 7.5 15. 15. 11.25 11.25
  PRMITSP 10. 4.167 17.667 4.167 30. 10. 4.167 17.667 4.167
  ROADWP 68.
  SKEW-1 90. 90. 90. 90.
  SLABEXT 3.5417 2.3125
  SLABT 8.
  SLABWEAR  0.
  SPEED 65
  SPN-1 183.3333 250. 183.3333
  SUPER  0.01563
  WAC-1  0.164
  WAC-2  0.19
  WAC-3  0.19
  WAC-4  0.19
  WAC-5  0.19
  WAC-6  0.19
  WAC-7  0.19
  WAC-8  0.14
  WAS-1  0.
  WAS-2  0.
  WAS-3  0.
  WAS-4  0.
  WAS-5  0.0115
  WAS-6  0.0115
  WAS-7  0.0115
  WAS-8  0.0115
  WCONC 150.
  WHLSPC 6.
  WR-1  0.123
  WR-2  0.14
  WR-3  0.14
  WR-4  0.14
  WR-5  0.14
  WR-6  0.14
  WR-7  0.14
  WR-8  0.105
  WS-1  0.156
  WS-2  0.156
  WS-3  0.156
  WS-4  0.156
  WS-5  0.156
  WS-6  0.156
  WS-7  0.156
  WS-8  0.156
GO
```

I-295 HH BUCKMAN BRIDGE -720249
Girder 1 : Rating Output : Lrfd Ratings
Thu Mar 26 16:22:46 2015

[This table uses the rating equation (6A.4.2.1-1)
of the 2011 edition of the Manual for Bridge
Evaluation.]

Permit

Strength II
(Assumes permit truck is only loading)

Span 1

Location	Allowable	Shear	Rating Factors Bending		Shear	
			Inv.	Oper.	Inv.	Oper.
0.00	9253. C	488.42	>999.00B	>999.00	2.98	2.98
18.33	36000. B	769.69	2.72B	2.72	6.99	6.99
22.00L	36000. B	773.47	2.18B	2.18	7.45	7.45
22.00R	36000. B	773.65	4.00B	4.00	7.46	7.46
36.67	36000. B	617.31	2.52B	2.52	7.58	7.58
55.00	36000. B	623.62	1.93B	1.93	11.16	11.16
73.33	36000. B	632.76	2.01B	2.01	13.02	13.02
91.67	36000. B	644.47	2.57B	2.57	9.00	9.00
110.00	36000. B	658.50	3.77B	3.77	6.42	6.42
122.00L	10852. C	918.49	3.81B	3.81	7.92	7.92
122.00R	12402. C	918.79	4.35B	4.35	7.92	7.92
124.00L	12435. C	922.00	4.46B	4.46	7.73	7.73
124.00R	13473. C	1326.20	4.84B	4.84	11.76	11.76
128.33	23135. C	1332.57	9.28B	9.28	11.20	11.20
146.67	13919. C	1361.56	3.48B	3.48	9.33	9.33
154.00L	45765. B	1373.66	2.79B	2.79	8.83	8.83
154.00R	45762. B	1638.91	3.18B	3.18	10.85	10.85
156.00L	44053. B	1644.31	9.25B	9.25	10.83	10.83
156.00R	23727. C	1644.80	18.81B	18.81	10.83	10.83
165.00	46619. B	1671.34	4.70B	4.70	10.25	10.25
183.33	46375. B	1757.69	2.83B	2.83	9.21	9.21

Span 2

Location	Allowable	Shear	Rating Factors Bending		Shear	
			Inv.	Oper.	Inv.	Oper.
0.00	46375. B	1778.71	2.83B	2.83	9.00	9.00
25.00	46605. B	1747.50	6.19B	6.19	10.85	10.85
28.00L	46984. B	1747.50	6.73B	6.73	11.13	11.13
28.00R	21517. C	1747.50	5.46B	5.46	11.13	11.13
30.00L	21583. C	1747.50	21.89B	21.89	11.33	11.33
30.00R	45403. B	1450.84	13.33B	13.33	9.12	9.12
50.00	48073. B	1450.84	6.32B	6.32	11.03	11.03
55.33L	26462. C	1450.84	9.73B	9.73	11.64	11.64
55.33R	25672. C	1450.84	9.44B	9.44	11.64	11.64
57.33L	25672. C	1450.84	8.89B	8.89	11.88	11.88
57.33R	27861. C	1450.84	9.67B	9.67	11.88	11.88
75.00	27861. C	974.23	6.37B	6.37	9.22	9.22

100.00	27861. C	974.23	4.70B	4.70	12.69	12.69
125.00	27861. C	973.68	4.31B	4.31	19.26	19.26
150.00	27861. C	974.23	4.71B	4.71	13.65	13.65
175.00	27861. C	921.46	6.38B	6.38	9.19	9.19
190.67L	27861. C	1450.84	9.16B	9.16	12.74	12.74
190.67R	28843. C	1450.84	9.49B	9.49	12.74	12.74
192.67L	28843. C	1450.84	10.03B	10.03	12.47	12.47
192.67R	26462. C	1450.84	9.19B	9.19	12.47	12.47
200.00	48073. B	1450.84	6.30B	6.30	11.55	11.55
218.00L	45403. B	1450.84	3.74B	3.74	9.79	9.79
218.00R	45403. B	1747.50	4.18B	4.18	12.15	12.15
220.00L	43617. B	1747.50	14.10B	14.10	11.92	11.92
220.00R	43617. B	1747.50	24.32B	24.32	11.92	11.92
225.00	45403. B	1747.50	5.97B	5.97	11.36	11.36
250.00	46375. B	2011.94	2.82B	2.82	10.40	10.40

Span 3

Location	Allowable	Shear	Rating Factors Bending		Shear	
			Inv.	Oper.	Inv.	Oper.
0.00	46375. B	1584.21	2.82B	2.82	8.14	8.14
18.33	46620. B	1671.32	4.71B	4.71	10.20	10.20
25.33L	23797. C	1650.72	5.53B	5.53	10.70	10.70
25.33R	20549. C	1650.22	4.50B	4.50	10.69	10.69
27.33L	20554. C	1644.80	15.47B	15.47	10.85	10.85
27.33R	45724. B	1377.06	8.61B	8.61	8.81	8.81
36.67	13920. C	1361.55	3.50B	3.50	9.49	9.49
55.00	23151. C	1332.56	9.31B	9.31	12.56	12.56
57.33L	13516. C	1329.18	5.55B	5.55	13.01	13.01
57.33R	13403. C	1328.93	5.50B	5.50	13.01	13.01
59.33L	13365. C	1326.20	4.81B	4.81	13.41	13.41
59.33R	11917. C	922.00	4.28B	4.28	8.83	8.83
73.33	36000. B	898.00	3.76B	3.76	10.82	10.82
91.67	36000. B	644.47	2.57B	2.57	10.61	10.61
110.00	36000. B	632.76	2.01B	2.01	14.67	14.67
128.33	36000. B	623.62	1.94B	1.94	9.24	9.24
146.67	36000. B	617.31	2.53B	2.53	6.62	6.62
161.33L	36000. B	773.65	4.00B	4.00	6.94	6.94
161.33R	36000. B	773.47	2.18B	2.18	6.94	6.94
165.00	36000. B	769.68	2.72B	2.72	6.64	6.64
183.33	9253. C	740.77	>999.00B	>999.00	5.48	5.48

Service II
(Assumes permit truck is only loading in all lanes)

Span 1

Location	Allowable Stress	Rating Factors Bending	
		Inv.	Oper.
0.00	34200. S	> 999.00 B	>999.00
18.33	34200. S	3.82 B	3.82
22.00L	34200. S	3.13 B	3.13
22.00R	34200. S	5.46 B	5.46
36.67	34200. S	3.57 B	3.57
55.00	34200. S	2.79 B	2.79
73.33	34200. S	2.86 B	2.86
91.67	34200. S	3.53 B	3.53
110.00	34200. S	4.97 B	4.97
122.00L	34200. S	6.89 B	6.89
122.00R	34200. S	6.89 B	6.89
124.00L	34200. S	7.08 B	7.08
124.00R	34200. S	5.90 B	5.90
128.33	47500. S	9.14 B	9.14
146.67	47500. S	6.63 B	6.63
154.00L	47500. S	5.65 B	5.65

154.00R	47500. S	5.90 B	5.90
156.00L	47500. S	18.59 B	18.59
156.00R	47500. S	31.79 B	31.79
165.00	47500. S	8.30 B	8.30
183.33	47500. S	5.61 B	5.61

Span 2

Location	Allowable Stress	Rating Factors Bending Inv.	Oper.
0.00	34200. S	5.61 B	5.61
25.00	34200. S	10.52 B	10.52
28.00L	34200. S	11.19 B	11.19
28.00R	34200. S	10.92 B	10.92
30.00L	34200. S	43.23 B	43.23
30.00R	34200. S	26.27 B	26.27
50.00	34200. S	10.61 B	10.61
55.33L	34200. S	9.82 B	9.82
55.33R	34200. S	9.80 B	9.80
57.33L	34200. S	9.20 B	9.20
57.33R	34200. S	11.21 B	11.21
75.00	34200. S	7.24 B	7.24
100.00	34200. S	5.23 B	5.23
125.00	47500. S	4.76 B	4.76
150.00	47500. S	5.24 B	5.24
175.00	47500. S	7.26 B	7.26
190.67L	47500. S	10.61 B	10.61
190.67R	47500. S	10.63 B	10.63
192.67L	47500. S	11.26 B	11.26
192.67R	47500. S	9.23 B	9.23
200.00	47500. S	10.58 B	10.58
218.00L	47500. S	7.27 B	7.27
218.00R	47500. S	7.51 B	7.51
220.00L	47500. S	27.16 B	27.16
220.00R	47500. S	44.17 B	44.17
225.00	47500. S	10.50 B	10.50
250.00	47500. S	5.61 B	5.61

Span 3

Location	Allowable Stress	Rating Factors Bending Inv.	Oper.
0.00	34200. S	5.61 B	5.61
18.33	34200. S	8.31 B	8.31
25.33L	34200. S	9.42 B	9.42
25.33R	34200. S	9.14 B	9.14
27.33L	34200. S	30.93 B	30.93
27.33R	34200. S	17.76 B	17.76
36.67	34200. S	6.65 B	6.65
55.00	34200. S	9.17 B	9.17
57.33L	34200. S	9.05 B	9.51
57.33R	34200. S	9.06 B	9.50
59.33L	34200. S	8.25 B	8.25
59.33R	34200. S	9.90 B	9.90
73.33	34200. S	4.95 B	4.95
91.67	34200. S	3.52 B	3.52
110.00	34200. S	2.86 B	2.86
128.33	34200. S	2.79 B	2.79
146.67	34200. S	3.57 B	3.57
161.33L	34200. S	5.46 B	5.46
161.33R	34200. S	3.13 B	3.13
165.00	34200. S	3.82 B	3.82
183.33	34200. S	> 999.00 B	>999.00

****
Minimum rating is 1.93 at location 55.00 in span 1.
****

Classified at Strength II because of description
in 3.4.1 for other than HL93 vehicle.

Rating Codes:
T - Top steel governs
B - Bottom steel governs
C - Concrete governs
R - Rebar governs
V - Shear governs
S - Serviceability governs

Mom Strength Codes:
C - Compact
B - Braced non-compact
U - Unbraced non-compact
T - Transition between compact and braced non-compact
S - Serviceability

Noncompact shapes ratings based on stress, as

$$IR = \frac{Fb - \text{factored dead load stress}}{\text{factored LL+I stress}}$$

Inventory rating for Strength II if only permit
loading on the system uses PBETA. Operating rating
uses IR(PBETA/1.35).

I-295 HH BUCKMAN BRIDGE -720249
Girder 2 : Rating Output : Lrfd Ratings
Thu Mar 26 16:24:21 2015

[This table uses the rating equation (6A.4.2.1-1)
of the 2011 edition of the Manual for Bridge
Evaluation.]

Permit

Strength II
(Assumes permit truck is only loading)

Span 1

Location	Allowable	Shear	Rating Factors Bending		Shear	
			Inv.	Oper.	Inv.	Oper.
0.00	9331. C	488.42	>999.00B	>999.00	3.05	3.05
18.33	36000. B	769.69	3.08B	3.08	7.86	7.86
22.00L	36000. B	773.47	2.48B	2.48	8.45	8.45
22.00R	36000. B	773.65	4.56B	4.56	8.46	8.46
36.67	36000. B	617.31	2.94B	2.94	8.39	8.39
55.00	36000. B	623.62	2.30B	2.30	11.54	11.54
73.33	36000. B	632.76	2.40B	2.40	12.84	12.84
91.67	36000. B	644.47	3.07B	3.07	9.37	9.37
110.00	36000. B	658.50	4.44B	4.44	7.11	7.11
122.00L	36000. B	918.49	6.25B	6.25	8.92	8.92
122.00R	36000. B	918.79	4.99T	4.99	8.93	8.93
124.00L	12522. C	922.00	5.26B	5.26	8.73	8.73
124.00R	13524. C	1326.20	5.69B	5.69	13.27	13.27
128.33	23407. C	1332.57	11.14B	11.14	12.68	12.68
146.67	13950. C	1361.56	4.19B	4.19	10.59	10.59
154.00L	45675. B	1373.66	3.37B	3.37	9.95	9.95
154.00R	45672. B	1638.91	3.82B	3.82	12.23	12.23
156.00L	43981. B	1644.31	10.57B	10.57	12.24	12.24
156.00R	23743. C	1644.80	21.34B	21.34	12.25	12.25
165.00	46576. B	1671.34	5.64B	5.64	11.36	11.36
183.33	46329. B	1757.69	3.45B	3.45	9.44	9.44

Span 2

Location	Allowable	Shear	Rating Factors Bending		Shear	
			Inv.	Oper.	Inv.	Oper.
0.00	46329. B	1778.71	3.45B	3.45	9.33	9.33
25.00	46559. B	1747.50	7.50B	7.50	12.02	12.02
28.00L	46976. B	1747.50	8.15B	8.15	12.41	12.41
28.00R	21778. C	1747.50	6.70B	6.70	12.41	12.41
30.00L	21853. C	1747.50	26.25B	26.25	12.67	12.67
30.00R	45307. B	1450.84	15.85B	15.85	10.19	10.19
50.00	47985. B	1450.84	7.67B	7.67	12.50	12.50
55.33L	27351. C	1450.84	11.40B	11.40	13.08	13.08
55.33R	27199. C	1450.84	11.34B	11.34	13.08	13.08
57.33L	27187. C	1450.84	10.70B	10.70	13.29	13.29
57.33R	29713. C	1450.84	11.72B	11.72	13.29	13.29
75.00	29713. C	974.23	7.93B	7.93	9.54	9.54

100.00	29713. C	974.23	5.95B	5.95	13.19	13.19
125.00	29713. C	973.68	5.53B	5.53	20.40	20.40
150.00	29713. C	974.23	5.94B	5.94	15.19	15.19
175.00	29713. C	974.23	7.91B	7.91	10.72	10.72
190.67L	29713. C	1450.84	11.10B	11.10	14.60	14.60
190.67R	30626. C	1450.84	11.45B	11.45	14.60	14.60
192.67L	30626. C	1450.84	12.07B	12.07	14.33	14.33
192.67R	27228. C	1450.84	10.71B	10.71	14.33	14.33
200.00	47985. B	1450.84	7.65B	7.65	13.37	13.37
218.00L	45307. B	1450.84	4.55B	4.55	11.30	11.30
218.00R	45307. B	1747.50	5.07B	5.07	14.03	14.03
220.00L	43540. B	1747.50	16.71B	16.71	13.72	13.72
220.00R	43540. B	1747.50	28.73B	28.73	13.72	13.72
225.00	45307. B	1747.50	7.22B	7.22	12.92	12.92
250.00	46330. B	1778.84	3.44B	3.44	9.33	9.33

Span 3

Location	Allowable	Shear	Rating Factors Bending		Shear	
			Inv.	Oper.	Inv.	Oper.
0.00	46330. B	1757.54	3.44B	3.44	9.37	9.37
18.33	46576. B	1671.32	5.65B	5.65	10.96	10.96
25.33L	23811. C	1650.72	6.60B	6.60	11.67	11.67
25.33R	20777. C	1650.22	5.45B	5.45	11.67	11.67
27.33L	20790. C	1644.80	17.84B	17.84	11.87	11.87
27.33R	45634. B	1377.06	9.87B	9.87	9.64	9.64
36.67	13952. C	1361.55	4.21B	4.21	10.49	10.49
55.00	23415. C	1332.56	11.17B	11.17	12.55	12.55
57.33L	13565. C	1329.18	6.62B	6.62	12.86	12.86
57.33R	13466. C	1328.93	6.57B	6.57	12.86	12.86
59.33L	13429. C	1326.20	5.66B	5.66	13.13	13.13
59.33R	12175. C	922.00	5.12B	5.12	8.65	8.65
73.33	36000. B	658.50	4.44B	4.44	7.02	7.02
91.67	36000. B	644.47	3.08B	3.08	9.23	9.23
110.00	36000. B	632.76	2.40B	2.40	13.02	13.02
128.33	36000. B	623.62	2.29B	2.29	8.76	8.76
146.67	36000. B	617.31	2.94B	2.94	6.66	6.66
161.33L	36000. B	773.65	4.55B	4.55	7.79	7.79
161.33R	36000. B	773.47	2.47B	2.47	7.79	7.79
165.00	36000. B	769.68	3.07B	3.07	7.49	7.49
183.33	9331. C	488.42	>999.00B	>999.00	3.33	3.33

Service II
(Assumes permit truck is only loading in all lanes)

Span 1

Location	Allowable Stress	Rating Factors Bending	
		Inv.	Oper.
0.00	34200. S	> 999.00 B	>999.00
18.33	34200. S	4.33 B	4.33
22.00L	34200. S	3.57 B	3.57
22.00R	34200. S	6.23 B	6.23
36.67	34200. S	4.16 B	4.16
55.00	34200. S	3.31 B	3.31
73.33	34200. S	3.41 B	3.41
91.67	34200. S	4.22 B	4.22
110.00	34200. S	5.85 B	5.85
122.00L	34200. S	8.03 B	8.03
122.00R	34200. S	8.03 B	8.03
124.00L	34200. S	8.36 B	8.36
124.00R	34200. S	6.99 B	6.99
128.33	47500. S	10.98 B	10.98
146.67	47500. S	8.02 B	8.02
154.00L	47500. S	6.85 B	6.85

154.00R	47500. S	7.13 B	7.13
156.00L	47500. S	21.30 B	21.30
156.00R	47500. S	36.28 B	36.28
165.00	47500. S	10.00 B	10.00
183.33	47500. S	6.91 B	6.91

Span 2

Location	Allowable Stress	Rating Factors Bending Inv.	Oper.
0.00	34200. S	6.91 B	6.91
25.00	34200. S	12.81 B	12.81
28.00L	34200. S	13.62 B	13.62
28.00R	34200. S	13.31 B	13.31
30.00L	34200. S	51.50 B	51.50
30.00R	34200. S	31.39 B	31.39
50.00	34200. S	12.94 B	12.94
55.33L	34200. S	11.25 B	11.25
55.33R	34200. S	11.23 B	11.23
57.33L	34200. S	10.56 B	10.56
57.33R	34200. S	12.87 B	12.87
75.00	34200. S	8.49 B	8.49
100.00	34200. S	6.20 B	6.20
125.00	47500. S	5.70 B	5.70
150.00	47500. S	6.19 B	6.19
175.00	47500. S	8.48 B	8.48
190.67L	47500. S	12.16 B	12.16
190.67R	47500. S	12.18 B	12.18
192.67L	47500. S	12.88 B	12.88
192.67R	47500. S	10.56 B	10.56
200.00	47500. S	12.92 B	12.92
218.00L	47500. S	8.88 B	8.88
218.00R	47500. S	9.15 B	9.15
220.00L	47500. S	32.36 B	32.36
220.00R	47500. S	52.49 B	52.49
225.00	47500. S	12.79 B	12.79
250.00	47500. S	6.90 B	6.90

Span 3

Location	Allowable Stress	Rating Factors Bending Inv.	Oper.
0.00	34200. S	6.90 B	6.90
18.33	34200. S	10.01 B	10.01
25.33L	34200. S	11.31 B	11.31
25.33R	34200. S	10.99 B	10.99
27.33L	34200. S	35.40 B	35.40
27.33R	34200. S	20.42 B	20.42
36.67	34200. S	8.06 B	8.06
55.00	34200. S	11.01 B	11.01
57.33L	34200. S	10.54 B	11.40
57.33R	34200. S	10.55 B	11.39
59.33L	34200. S	9.74 B	9.74
59.33R	34200. S	11.66 B	11.66
73.33	34200. S	5.85 B	5.85
91.67	34200. S	4.22 B	4.22
110.00	34200. S	3.41 B	3.41
128.33	34200. S	3.31 B	3.31
146.67	34200. S	4.15 B	4.15
161.33L	34200. S	6.22 B	6.22
161.33R	34200. S	3.56 B	3.56
165.00	34200. S	4.32 B	4.32
183.33	34200. S	> 999.00 B	>999.00

****
Minimum rating is 2.29 at location 128.33 in span 3.
****

Classified at Strength II because of description
in 3.4.1 for other than HL93 vehicle.

Rating Codes:
T - Top steel governs
B - Bottom steel governs
C - Concrete governs
R - Rebar governs
V - Shear governs
S - Serviceability governs

Mom Strength Codes:
C - Compact
B - Braced non-compact
U - Unbraced non-compact
T - Transition between compact and braced non-compact
S - Serviceability

Noncompact shapes ratings based on stress, as

$$IR = \frac{Fb - \text{factored dead load stress}}{\text{factored LL+I stress}}$$

Inventory rating for Strength II if only permit
loading on the system uses PBETA. Operating rating
uses IR(PBETA/1.35).

I-295 HH BUCKMAN BRIDGE -720249
Girder 3 : Rating Output : Lrfd Ratings
Thu Mar 26 16:24:39 2015

[This table uses the rating equation (6A.4.2.1-1)
of the 2011 edition of the Manual for Bridge
Evaluation.]

Permit

Strength II
(Assumes permit truck is only loading)

Span 1

Location	Allowable	Shear	Rating Factors Bending		Shear	
			Inv.	Oper.	Inv.	Oper.
0.00	9331. C	488.42	>999.00B	>999.00	3.34	3.34
18.33	36000. B	769.69	3.29B	3.29	8.70	8.70
22.00L	36000. B	773.47	2.67B	2.67	9.39	9.39
22.00R	36000. B	773.65	4.90B	4.90	9.39	9.39
36.67	36000. B	617.31	3.23B	3.23	9.47	9.47
55.00	36000. B	623.62	2.56B	2.56	13.21	13.21
73.33	36000. B	632.76	2.70B	2.70	13.72	13.72
91.67	36000. B	644.47	3.46B	3.46	10.38	10.38
110.00	36000. B	658.50	5.01B	5.01	7.89	7.89
122.00L	36000. B	918.49	6.97B	6.97	9.88	9.88
122.00R	36000. B	918.79	5.57T	5.57	9.89	9.89
124.00L	12527. C	922.00	5.95B	5.95	9.66	9.66
124.00R	13527. C	1326.20	6.43B	6.43	14.64	14.64
128.33	23450. C	1332.57	13.17B	13.17	13.93	13.93
146.67	13959. C	1361.56	4.92B	4.92	11.29	11.29
154.00L	45675. B	1373.66	3.95B	3.95	10.60	10.60
154.00R	45672. B	1638.91	4.47B	4.47	13.02	13.02
156.00L	43981. B	1644.31	12.36B	12.36	13.10	13.10
156.00R	23749. C	1644.80	24.64B	24.64	13.11	13.11
165.00	46576. B	1671.34	6.47B	6.47	12.19	12.19
183.33	46329. B	1757.69	3.77B	3.77	10.17	10.17

Span 2

Location	Allowable	Shear	Rating Factors Bending		Shear	
			Inv.	Oper.	Inv.	Oper.
0.00	46329. B	1778.71	3.77B	3.77	10.11	10.11
25.00	46559. B	1747.50	8.28B	8.28	13.13	13.13
28.00L	46976. B	1747.50	9.02B	9.02	13.58	13.58
28.00R	21796. C	1747.50	7.43B	7.43	13.58	13.58
30.00L	21867. C	1747.50	26.44B	26.44	13.88	13.88
30.00R	45307. B	1450.84	16.00B	16.00	11.19	11.19
50.00	47985. B	1450.84	8.59B	8.59	14.00	14.00
55.33L	45690. B	1450.84	8.96B	8.96	14.68	14.68
55.33R	45690. B	1450.84	8.95B	8.95	14.68	14.68
57.33L	27199. C	1450.84	12.00B	12.00	14.92	14.92
57.33R	29713. C	1450.84	13.12B	13.12	14.92	14.92
75.00	29713. C	974.23	9.10B	9.10	10.61	10.61

100.00	29713. C	974.23	6.88B	6.88	14.56	14.56
125.00	29713. C	973.68	6.40B	6.40	21.72	21.72
150.00	29713. C	974.23	6.86B	6.86	16.71	16.71
175.00	29713. C	974.23	9.05B	9.05	11.97	11.97
190.67L	29713. C	1450.84	12.40B	12.40	16.55	16.55
190.67R	30626. C	1450.84	12.79B	12.79	16.55	16.55
192.67L	30626. C	1450.84	13.44B	13.44	16.26	16.26
192.67R	27268. C	1450.84	11.95B	11.95	16.26	16.26
200.00	47985. B	1450.84	8.63B	8.63	15.16	15.16
218.00L	45307. B	1450.84	5.09B	5.09	12.59	12.59
218.00R	45307. B	1747.50	5.66B	5.66	15.61	15.61
220.00L	43540. B	1747.50	16.94B	16.94	15.23	15.23
220.00R	43540. B	1747.50	28.99B	28.99	15.23	15.23
225.00	45307. B	1747.50	7.99B	7.99	14.28	14.28
250.00	46330. B	1778.84	3.76B	3.76	10.11	10.11

Span 3

Location	Allowable	Shear	Rating Factors Bending		Shear	
			Inv.	Oper.	Inv.	Oper.
0.00	46330. B	1757.54	3.76B	3.76	10.13	10.13
18.33	46576. B	1671.32	6.49B	6.49	11.68	11.68
25.33L	23817. C	1650.72	7.66B	7.66	12.43	12.43
25.33R	20819. C	1650.22	6.36B	6.36	12.43	12.43
27.33L	20829. C	1644.80	20.78B	20.78	12.66	12.66
27.33R	45634. B	1377.06	11.61B	11.61	10.28	10.28
36.67	13958. C	1361.55	4.91B	4.91	11.28	11.28
55.00	23420. C	1332.56	13.04B	13.04	13.60	13.60
57.33L	13565. C	1329.18	7.73B	7.73	13.93	13.93
57.33R	13466. C	1328.93	7.67B	7.67	13.93	13.93
59.33L	13429. C	1326.20	6.35B	6.35	14.22	14.22
59.33R	12173. C	922.00	5.75B	5.75	9.38	9.38
73.33	36000. B	658.50	5.04B	5.04	7.53	7.53
91.67	36000. B	644.47	3.46B	3.46	9.86	9.86
110.00	36000. B	632.76	2.69B	2.69	13.06	13.06
128.33	36000. B	623.62	2.53B	2.53	9.62	9.62
146.67	36000. B	617.31	3.20B	3.20	7.25	7.25
161.33L	36000. B	773.65	4.87B	4.87	8.35	8.35
161.33R	36000. B	773.47	2.64B	2.64	8.34	8.34
165.00	36000. B	769.68	3.27B	3.27	7.99	7.99
183.33	9331. C	488.42	>999.00B	>999.00	3.48	3.48

Service II
(Assumes permit truck is only loading in all lanes)

Span 1

Location	Allowable Stress	Rating Factors Bending	
		Inv.	Oper.
0.00	34200. S	> 999.00 B	>999.00
18.33	34200. S	4.63 B	4.63
22.00L	34200. S	3.83 B	3.83
22.00R	34200. S	6.69 B	6.69
36.67	34200. S	4.56 B	4.56
55.00	34200. S	3.68 B	3.68
73.33	34200. S	3.83 B	3.83
91.67	34200. S	4.75 B	4.75
110.00	34200. S	6.61 B	6.61
122.00L	34200. S	8.97 B	8.97
122.00R	34200. S	8.98 B	8.98
124.00L	34200. S	9.44 B	9.44
124.00R	34200. S	7.90 B	7.90
128.33	47500. S	12.68 B	12.98
146.67	47500. S	9.36 B	9.36
154.00L	47500. S	7.96 B	7.96

154.00R	47500. S	8.27 B	8.27
156.00L	47500. S	24.67 B	24.67
156.00R	47500. S	41.75 B	41.75
165.00	47500. S	11.43 B	11.43
183.33	47500. S	7.46 B	7.46

Span 2

Location	Allowable Stress	Rating Factors Bending Inv.	Oper.
0.00	34200. S	7.46 B	7.46
25.00	34200. S	14.12 B	14.12
28.00L	34200. S	15.05 B	15.05
28.00R	34200. S	14.72 B	14.72
30.00L	34200. S	51.76 B	51.76
30.00R	34200. S	31.62 B	31.62
50.00	34200. S	14.52 B	14.52
55.33L	34200. S	12.57 B	12.57
55.33R	34200. S	12.56 B	12.56
57.33L	34200. S	11.86 B	11.86
57.33R	34200. S	14.44 B	14.44
75.00	34200. S	9.77 B	9.77
100.00	34200. S	7.18 B	7.18
125.00	47500. S	6.61 B	6.61
150.00	47500. S	7.16 B	7.16
175.00	47500. S	9.71 B	9.71
190.67L	47500. S	13.60 B	13.60
190.67R	47500. S	13.62 B	13.62
192.67L	47500. S	14.35 B	14.35
192.67R	47500. S	11.79 B	11.79
200.00	47500. S	14.58 B	14.58
218.00L	47500. S	9.90 B	9.90
218.00R	47500. S	10.19 B	10.19
220.00L	47500. S	32.67 B	32.67
220.00R	47500. S	52.85 B	52.85
225.00	47500. S	14.11 B	14.11
250.00	47500. S	7.46 B	7.46

Span 3

Location	Allowable Stress	Rating Factors Bending Inv.	Oper.
0.00	34200. S	7.46 B	7.46
18.33	34200. S	11.46 B	11.46
25.33L	34200. S	13.09 B	13.09
25.33R	34200. S	12.74 B	12.74
27.33L	34200. S	40.95 B	40.95
27.33R	34200. S	23.79 B	23.79
36.67	34200. S	9.35 B	9.35
55.00	34200. S	12.74 B	12.86
57.33L	34200. S	11.82 B	13.31
57.33R	34200. S	11.83 B	13.30
59.33L	34200. S	10.93 B	10.93
59.33R	34200. S	13.08 B	13.08
73.33	34200. S	6.64 B	6.64
91.67	34200. S	4.75 B	4.75
110.00	34200. S	3.81 B	3.81
128.33	34200. S	3.65 B	3.65
146.67	34200. S	4.53 B	4.53
161.33L	34200. S	6.65 B	6.65
161.33R	34200. S	3.80 B	3.80
165.00	34200. S	4.60 B	4.60
183.33	34200. S	> 999.00 B	>999.00

****
Minimum rating is 2.53 at location 128.33 in span 3.
****

Classified at Strength II because of description
in 3.4.1 for other than HL93 vehicle.

Rating Codes:
T - Top steel governs
B - Bottom steel governs
C - Concrete governs
R - Rebar governs
V - Shear governs
S - Serviceability governs

Mom Strength Codes:
C - Compact
B - Braced non-compact
U - Unbraced non-compact
T - Transition between compact and braced non-compact
S - Serviceability

Noncompact shapes ratings based on stress, as

$$IR = \frac{Fb - \text{factored dead load stress}}{\text{factored LL+I stress}}$$

Inventory rating for Strength II if only permit
loading on the system uses PBETA. Operating rating
uses IR(PBETA/1.35).

I-295 HH BUCKMAN BRIDGE -720249
Girder 4 : Rating Output : Lrfd Ratings
Thu Mar 26 16:24:51 2015

[This table uses the rating equation (6A.4.2.1-1)
of the 2011 edition of the Manual for Bridge
Evaluation.]

Permit

Strength II
(Assumes permit truck is only loading)

Span 1

Location	Allowable	Shear	Rating Factors Bending		Shear	
			Inv.	Oper.	Inv.	Oper.
0.00	9331. C	488.42	>999.00B	>999.00	3.44	3.44
18.33	36000. B	769.69	3.56B	3.56	8.51	8.51
22.00L	36000. B	773.47	2.89B	2.89	9.17	9.17
22.00R	36000. B	773.65	5.21B	5.21	9.17	9.17
36.67	36000. B	617.31	3.37B	3.37	9.56	9.56
55.00	36000. B	623.62	2.64B	2.64	12.15	12.15
73.33	36000. B	632.76	2.76B	2.76	12.55	12.55
91.67	36000. B	644.47	3.62B	3.62	9.84	9.84
110.00	36000. B	658.50	5.38B	5.38	7.68	7.68
122.00L	36000. B	918.49	7.74B	7.74	10.28	10.28
122.00R	36000. B	918.79	6.20T	6.20	10.29	10.29
124.00L	12519. C	922.00	6.48B	6.48	10.16	10.16
124.00R	13522. C	1326.20	7.01B	7.01	15.27	15.27
128.33	23420. C	1332.57	13.71B	13.71	14.83	14.83
146.67	13973. C	1361.56	5.66B	5.66	12.88	12.88
154.00L	45675. B	1373.66	4.75B	4.75	12.09	12.09
154.00R	45672. B	1638.91	5.32B	5.32	14.79	14.79
156.00L	43981. B	1644.31	15.42B	15.42	14.82	14.82
156.00R	23766. C	1644.80	29.75B	29.75	14.82	14.82
165.00	46576. B	1671.34	7.84B	7.84	13.53	13.53
183.33	46329. B	1757.69	4.60B	4.60	10.62	10.62

Span 2

Location	Allowable	Shear	Rating Factors Bending		Shear	
			Inv.	Oper.	Inv.	Oper.
0.00	46329. B	1778.71	4.60B	4.60	11.42	11.42
25.00	46559. B	1747.50	8.27B	8.27	14.64	14.64
28.00L	46976. B	1747.50	8.89B	8.89	15.05	15.05
28.00R	21738. C	1747.50	7.27B	7.27	15.05	15.05
30.00L	21800. C	1747.50	30.50B	30.50	15.33	15.33
30.00R	45307. B	1450.84	18.24B	18.24	12.40	12.40
50.00	47985. B	1450.84	8.12B	8.12	14.36	14.36
55.33L	45690. B	1450.84	8.59B	8.59	14.84	14.84
55.33R	45690. B	1450.84	10.72B	10.72	14.84	14.84
57.33L	45690. B	1450.84	9.31B	9.31	15.01	15.01
57.33R	19118. C	1450.84	9.28B	9.28	15.01	15.01
75.00	29713. C	974.23	9.74B	9.74	10.36	10.36

100.00	29713. C	974.23	7.05B	7.05	13.14	13.14
125.00	29713. C	973.68	6.43B	6.43	14.90	14.90
150.00	29713. C	974.23	7.10B	7.10	14.79	14.79
175.00	29713. C	974.23	9.80B	9.80	11.74	11.74
190.67L	29713. C	1450.84	13.76B	13.76	17.49	17.49
190.67R	30626. C	1450.84	14.19B	14.19	17.49	17.49
192.67L	19343. C	1450.84	9.42B	9.42	17.32	17.32
192.67R	45936. B	1450.84	7.54B	7.54	17.32	17.32
200.00	47985. B	1450.84	8.38B	8.38	16.61	16.61
218.00L	45307. B	1450.84	5.16B	5.16	14.78	14.78
218.00R	45307. B	1747.50	5.75B	5.75	18.25	18.25
220.00L	43540. B	1747.50	19.47B	19.47	17.84	17.84
220.00R	43540. B	1747.50	33.33B	33.33	17.84	17.84
225.00	45307. B	1747.50	8.38B	8.38	16.74	16.74
250.00	46330. B	1778.84	4.71B	4.71	11.30	11.30

Span 3

Location	Allowable	Shear	Rating Factors Bending		Shear	
			Inv.	Oper.	Inv.	Oper.
0.00	46330. B	1757.54	4.71B	4.71	10.99	10.99
18.33	46576. B	1671.32	7.50B	7.50	13.07	13.07
25.33L	23824. C	1650.72	8.56B	8.56	13.76	13.76
25.33R	20868. C	1650.22	7.15B	7.15	13.75	13.75
27.33L	20868. C	1644.80	24.19B	24.19	13.92	13.92
27.33R	45634. B	1377.06	13.63B	13.63	11.36	11.36
36.67	13955. C	1361.55	5.09B	5.09	11.84	11.84
55.00	23339. C	1332.56	12.86B	12.86	13.22	13.22
57.33L	13556. C	1329.18	7.55B	7.55	13.46	13.46
57.33R	13456. C	1328.93	7.49B	7.49	13.46	13.46
59.33L	13420. C	1326.20	6.77B	6.77	13.67	13.67
59.33R	12127. C	922.00	6.10B	6.10	9.00	9.00
73.33	36000. B	658.50	5.32B	5.32	7.10	7.10
91.67	36000. B	644.47	3.56B	3.56	9.31	9.31
110.00	36000. B	632.76	2.71B	2.71	12.20	12.20
128.33	36000. B	623.62	2.58B	2.58	9.42	9.42
146.67	36000. B	617.31	3.29B	3.29	7.10	7.10
161.33L	36000. B	773.65	5.11B	5.11	8.63	8.63
161.33R	36000. B	773.47	2.81B	2.81	8.63	8.63
165.00	36000. B	769.68	3.47B	3.47	8.33	8.33
183.33	9331. C	488.42	>999.00B	>999.00	3.66	3.66

Service II
(Assumes permit truck is only loading in all lanes)

Span 1

Location	Allowable Stress	Rating Factors Bending	
		Inv.	Oper.
0.00	34200. S	> 999.00 B	>999.00
18.33	34200. S	4.97 B	4.97
22.00L	34200. S	4.11 B	4.11
22.00R	34200. S	7.09 B	7.09
36.67	34200. S	4.74 B	4.74
55.00	34200. S	3.79 B	3.79
73.33	34200. S	3.90 B	3.90
91.67	34200. S	4.94 B	4.94
110.00	34200. S	7.06 B	7.06
122.00L	34200. S	9.94 B	9.94
122.00R	34200. S	9.94 B	9.94
124.00L	34200. S	10.31 B	10.31
124.00R	34200. S	8.61 B	8.61
128.33	47500. S	13.52 B	13.52
146.67	47500. S	10.66 B	10.66
154.00L	47500. S	9.37 B	9.37

154.00R	47500. S	9.70 B	9.70
156.00L	47500. S	30.04 B	30.04
156.00R	47500. S	49.93 B	49.93
165.00	47500. S	13.64 B	13.64
183.33	47500. S	8.80 B	8.80

Span 2

Location	Allowable Stress	Rating Factors Bending Inv.	Oper.
0.00	34200. S	8.80 B	8.80
25.00	34200. S	14.14 B	14.14
28.00L	34200. S	14.90 B	14.90
28.00R	34200. S	14.55 B	14.55
30.00L	34200. S	60.36 B	60.36
30.00R	34200. S	36.49 B	36.49
50.00	34200. S	13.84 B	13.84
55.33L	34200. S	14.18 B	15.19
55.33R	34200. S	14.18 B	15.17
57.33L	34200. S	13.10 B	13.10
57.33R	34200. S	15.93 B	15.93
75.00	34200. S	10.49 B	10.49
100.00	34200. S	7.36 B	7.36
125.00	47500. S	6.64 B	6.64
150.00	47500. S	7.41 B	7.41
175.00	47500. S	10.56 B	10.56
190.67L	47500. S	15.15 B	15.15
190.67R	47500. S	15.16 B	15.16
192.67L	47500. S	15.98 B	15.98
192.67R	47500. S	13.16 B	13.16
200.00	47500. S	14.23 B	14.23
218.00L	47500. S	10.08 B	10.08
218.00R	47500. S	10.38 B	10.38
220.00L	47500. S	37.57 B	37.57
220.00R	47500. S	60.78 B	60.78
225.00	47500. S	14.76 B	14.76
250.00	47500. S	8.95 B	8.95

Span 3

Location	Allowable Stress	Rating Factors Bending Inv.	Oper.
0.00	34200. S	8.95 B	8.95
18.33	34200. S	13.12 B	13.12
25.33L	34200. S	14.57 B	14.57
25.33R	34200. S	14.19 B	14.19
27.33L	34200. S	47.38 B	47.38
27.33R	34200. S	27.71 B	27.71
36.67	34200. S	9.71 B	9.71
55.00	34200. S	12.67 B	12.67
57.33L	34200. S	13.06 B	13.06
57.33R	34200. S	13.04 B	13.04
59.33L	34200. S	11.70 B	11.70
59.33R	34200. S	14.04 B	14.04
73.33	34200. S	6.98 B	6.98
91.67	34200. S	4.88 B	4.88
110.00	34200. S	3.84 B	3.84
128.33	34200. S	3.72 B	3.72
146.67	34200. S	4.64 B	4.64
161.33L	34200. S	6.96 B	6.96
161.33R	34200. S	4.01 B	4.01
165.00	34200. S	4.87 B	4.87
183.33	34200. S	> 999.00 B	>999.00

****
Minimum rating is 2.58 at location 128.33 in span 3.
****

Classified at Strength II because of description
in 3.4.1 for other than HL93 vehicle.

Rating Codes:
T - Top steel governs
B - Bottom steel governs
C - Concrete governs
R - Rebar governs
V - Shear governs
S - Serviceability governs

Mom Strength Codes:
C - Compact
B - Braced non-compact
U - Unbraced non-compact
T - Transition between compact and braced non-compact
S - Serviceability

Noncompact shapes ratings based on stress, as

$$IR = \frac{Fb - \text{factored dead load stress}}{\text{factored LL+I stress}}$$

Inventory rating for Strength II if only permit
loading on the system uses PBETA. Operating rating
uses IR(PBETA/1.35).

I-295 HH BUCKMAN BRIDGE -720249
Girder 5 : Rating Output : Lrfd Ratings
Thu Mar 26 16:25:04 2015

[This table uses the rating equation (6A.4.2.1-1) of the 2011 edition of the Manual for Bridge Evaluation.]

Permit

Strength II
(Assumes permit truck is only loading)

Span 1

Location	Allowable	Shear	Rating Factors Bending		Shear	
			Inv.	Oper.	Inv.	Oper.
0.00	36000. B	347.57	>999.00B	>999.00	1.91	1.91
18.33	36000. B	461.91	5.06B	5.06	4.78	4.78
36.67	36000. B	476.29	2.76B	2.76	7.62	7.62
38.00L	36000. B	477.22	2.68B	2.68	7.84	7.84
38.00R	36000. B	477.34	3.28B	3.28	7.84	7.84
55.00	36000. B	435.91	2.62B	2.62	9.08	9.08
73.33	36000. B	447.75	2.74B	2.74	8.93	8.93
91.67	36000. B	514.98	3.41B	3.41	7.17	7.17
94.00L	36000. B	520.37	3.59B	3.59	6.94	6.94
94.00R	36000. B	520.76	3.34B	3.34	6.95	6.95
110.00	36000. B	559.21	5.02B	5.02	5.69	5.69
128.33	35223. B	695.47	5.50B	5.50	5.18	5.18
146.67	35178. B	842.04	4.01B	4.01	5.19	5.19
155.33L	28998. B	928.08	2.42B	2.42	5.43	5.43
155.33R	28971. B	929.75	4.01B	4.01	5.44	5.44
165.00	30326. B	1380.66	4.12B	4.12	8.48	8.48
183.33	35100. B	1263.48	2.01B	2.01	6.01	6.01

Span 2

Location	Allowable	Shear	Rating Factors Bending		Shear	
			Inv.	Oper.	Inv.	Oper.
0.00	35100. B	1274.84	2.01B	2.01	5.69	5.69
21.00L	35318. B	923.38	4.30B	4.30	4.97	4.97
21.00R	35318. B	922.51	2.53B	2.53	4.96	4.96
25.00	35313. B	902.13	3.04B	3.04	5.15	5.15
50.00	35226. B	789.55	6.93B	6.93	6.73	6.73
75.00	36000. B	588.76	5.31B	5.31	5.87	5.87
76.00L	36000. B	587.44	5.17B	5.17	5.94	5.94
76.00R	36000. B	587.20	5.51B	5.51	5.93	5.93
99.50L	36000. B	506.39	3.40B	3.40	7.57	7.57
99.50R	36000. B	506.31	3.96B	3.96	7.57	7.57
100.00	36000. B	506.10	3.94B	3.94	7.65	7.65
125.00L	36000. B	502.51	3.38B	3.38	10.54	10.54
125.00R	36000. B	502.55	3.38B	3.38	10.54	10.54
150.00	36000. B	521.48	3.94B	3.94	9.69	9.69
174.00L	36000. B	626.29	5.51B	5.51	7.44	7.44
174.00R	36000. B	626.70	5.18B	5.18	7.44	7.44

150.50L	36000. B	522.06	3.97B	3.97	9.58	9.58
150.50R	36000. B	522.30	3.41B	3.41	9.58	9.58
175.00	36000. B	628.95	5.32B	5.32	7.36	7.36
200.00	35218. B	865.31	6.69B	6.69	8.05	8.05
225.00	30828. B	1008.02	2.55B	2.55	6.49	6.49
229.00L	30521. B	1033.20	2.10B	2.10	6.26	6.26
229.00R	30507. B	1034.27	3.64B	3.64	6.26	6.26
250.00	30889. B	1415.29	1.90B	1.90	6.73	6.73

Span 3

Location	Allowable	Shear	Rating Factors Bending		Shear	
			Inv.	Oper.	Inv.	Oper.
0.00	30889. B	1416.13	1.90B	1.90	6.60	6.60
18.33	32863. B	1199.86	3.62B	3.62	6.47	6.47
28.00L	32495. B	765.29	4.08B	4.08	3.81	3.81
28.00R	32509. B	763.96	2.38B	2.38	3.80	3.80
36.67	32340. B	695.47	3.06B	3.06	3.80	3.80
55.00	35223. B	600.54	5.57B	5.57	4.52	4.52
73.33	36000. B	514.98	5.03B	5.03	5.22	5.22
89.33L	36000. B	504.07	3.46B	3.46	6.87	6.87
89.33R	36000. B	503.96	3.71B	3.71	6.87	6.87
91.67	36000. B	502.42	3.56B	3.56	7.13	7.13
110.00	36000. B	435.91	2.80B	2.80	8.22	8.22
128.33	36000. B	476.29	2.64B	2.64	7.90	7.90
145.33L	36000. B	463.01	3.28B	3.28	5.74	5.74
145.33R	36000. B	462.88	2.68B	2.68	5.74	5.74
146.67	36000. B	461.91	2.76B	2.76	5.61	5.61
165.00	36000. B	484.57	4.99B	4.99	4.74	4.74
183.33	36000. B	338.37	>999.00B	>999.00	2.04	2.04

Service II
(Assumes permit truck is only loading in all lanes)

Span 1

Location	Allowable Stress	Rating Factors Bending	
		Inv.	Oper.
0.00	34200. S	> 999.00 B	>999.00
18.33	34200. S	6.88 B	6.88
36.67	34200. S	3.96 B	3.96
38.00L	34200. S	3.86 B	3.86
38.00R	34200. S	4.62 B	4.62
55.00	34200. S	3.75 B	3.75
73.33	34200. S	3.87 B	3.87
91.67	34200. S	4.65 B	4.65
94.00L	34200. S	4.87 B	4.87
94.00R	34200. S	4.55 B	4.55
110.00	34200. S	6.56 B	6.56
128.33	34200. S	8.36 B	8.36
146.67	34200. S	6.57 B	6.57
155.33L	34200. S	6.00 B	6.00
155.33R	34200. S	8.64 B	8.64
165.00	34200. S	8.72 B	8.72
183.33	34200. S	4.08 B	4.08

Span 2

Location	Allowable Stress	Rating Factors Bending	
		Inv.	Oper.

0.00	34200.	S	4.08	B	4.08
21.00L	34200.	S	7.10	B	7.10
21.00R	34200.	S	4.67	B	4.67
25.00	34200.	S	5.36	B	5.36
50.00	34200.	S	10.63	B	10.63
75.00	34200.	S	7.03	B	7.03
76.00L	34200.	S	6.86	B	6.86
76.00R	34200.	S	7.30	B	7.30
99.50L	34200.	S	4.72	B	4.72
99.50R	34200.	S	5.44	B	5.44
100.00	34200.	S	5.41	B	5.41
125.00L	34200.	S	4.73	B	4.73
125.00R	34200.	S	4.73	B	4.73
150.00	34200.	S	5.41	B	5.41
174.00L	34200.	S	7.29	B	7.29
174.00R	34200.	S	6.86	B	6.86
150.50L	34200.	S	5.45	B	5.45
150.50R	34200.	S	4.73	B	4.73
175.00	34200.	S	7.03	B	7.03
200.00	34200.	S	10.27	B	10.27
225.00	34200.	S	5.76	B	5.76
229.00L	34200.	S	5.18	B	5.18
229.00R	34200.	S	7.62	B	7.62
250.00	34200.	S	5.06	B	5.06

Span 3

Location	Allowable Stress		Rating Factors Bending Inv.		Oper.
0.00	34200.	S	5.06	B	5.06
18.33	34200.	S	7.02	B	7.02
28.00L	34200.	S	7.54	B	7.54
28.00R	34200.	S	5.00	B	5.00
36.67	34200.	S	5.89	B	5.89
55.00	34200.	S	8.46	B	8.46
73.33	34200.	S	6.58	B	6.58
89.33L	34200.	S	4.71	B	4.71
89.33R	34200.	S	5.05	B	5.05
91.67	34200.	S	4.86	B	4.86
110.00	34200.	S	3.96	B	3.96
128.33	34200.	S	3.78	B	3.78
145.33L	34200.	S	4.63	B	4.63
145.33R	34200.	S	3.86	B	3.86
146.67	34200.	S	3.96	B	3.96
165.00	34200.	S	6.79	B	6.79
183.33	34200.	S	> 999.00	B	>999.00

****
Minimum rating is 1.90 at location 250.00 in span 2.
****

Classified at Strength II because of description
in 3.4.1 for other than HL93 vehicle.

Rating Codes:
T - Top steel governs
B - Bottom steel governs
C - Concrete governs
R - Rebar governs
V - Shear governs
S - Serviceability governs

Mom Strength Codes:
C - Compact
B - Braced non-compact
U - Unbraced non-compact
T - Transition between compact and braced non-compact
S - Serviceability

Noncompact shapes ratings based on stress, as

Fb - factored dead load stress

$$IR = \frac{\text{PBETA}}{\text{factored LL+I stress}}$$

Inventory rating for Strength II if only permit loading on the system uses PBETA. Operating rating uses IR(PBETA/1.35).

I-295 HH BUCKMAN BRIDGE -720249
Girder 6 : Rating Output : Lrfd Ratings
Thu Mar 26 16:25:18 2015

[This table uses the rating equation (6A.4.2.1-1) of the 2011 edition of the Manual for Bridge Evaluation.]

Permit

Strength II
(Assumes permit truck is only loading)

Span 1

Location	Allowable	Shear	Rating Factors Bending		Shear	
			Inv.	Oper.	Inv.	Oper.
0.00	36000. B	347.57	>999.00B	>999.00	1.99	1.99
18.33	36000. B	461.91	5.25B	5.25	4.69	4.69
36.67	36000. B	476.29	2.85B	2.85	7.12	7.12
38.00L	36000. B	477.22	2.76B	2.76	7.32	7.32
38.00R	36000. B	477.34	3.35B	3.35	7.32	7.32
55.00	36000. B	435.91	2.59B	2.59	8.66	8.66
73.33	36000. B	447.75	2.69B	2.69	8.82	8.82
91.67	36000. B	514.98	3.34B	3.34	6.80	6.80
94.00L	36000. B	520.37	3.51B	3.51	6.61	6.61
94.00R	36000. B	520.76	3.28B	3.28	6.62	6.62
110.00	36000. B	559.21	5.03B	5.03	5.82	5.82
128.33	35178. B	695.47	5.66B	5.66	5.64	5.64
146.67	30325. B	842.04	3.69B	3.69	6.17	6.17
155.33L	28997. B	928.08	3.01B	3.01	6.41	6.41
155.33R	28970. B	929.75	4.73B	4.73	6.43	6.43
165.00	30888. B	1380.66	5.08B	5.08	9.59	9.59
183.33	35100. B	1263.48	2.72B	2.72	6.49	6.49

Span 2

Location	Allowable	Shear	Rating Factors Bending		Shear	
			Inv.	Oper.	Inv.	Oper.
0.00	35100. B	1274.84	2.72B	2.72	6.73	6.73
21.00L	35318. B	923.38	4.62B	4.62	5.73	5.73
21.00R	35318. B	922.51	2.78B	2.78	5.73	5.73
25.00	35201. B	902.13	3.18B	3.18	5.84	5.84
50.00	35252. B	789.55	6.54B	6.54	6.42	6.42
75.00	36000. B	588.76	5.39B	5.39	5.20	5.20
76.00L	36000. B	587.44	5.23B	5.23	5.25	5.25
76.00R	36000. B	587.20	5.57B	5.57	5.25	5.25
99.50L	36000. B	506.39	3.19B	3.19	6.99	6.99
99.50R	36000. B	506.31	3.72B	3.72	6.99	6.99
100.00	36000. B	506.10	3.69B	3.69	7.09	7.09
125.00L	36000. B	502.51	3.09B	3.09	10.35	10.35
125.00R	36000. B	502.55	3.09B	3.09	10.35	10.35
150.00	36000. B	521.48	3.76B	3.76	8.63	8.63
174.00L	36000. B	626.29	5.69B	5.69	6.52	6.52
174.00R	36000. B	626.70	5.35B	5.35	6.52	6.52

150.50L	36000. B	522.06	3.79B	3.79	8.50	8.50
150.50R	36000. B	522.30	3.26B	3.26	8.51	8.51
175.00	36000. B	628.95	5.51B	5.51	6.47	6.47
200.00	35218. B	865.31	6.51B	6.51	8.14	8.14
225.00	30827. B	1008.02	2.89B	2.89	7.74	7.74
229.00L	30520. B	1033.20	2.49B	2.49	7.51	7.51
229.00R	30506. B	1034.27	4.13B	4.13	7.52	7.52
250.00	30888. B	1415.29	2.69B	2.69	7.78	7.78

Span 3

Location	Allowable	Shear	Rating Factors Bending		Shear	
			Inv.	Oper.	Inv.	Oper.
0.00	30888. B	1416.13	2.69B	2.69	7.50	7.50
18.33	32862. B	1199.86	4.19B	4.19	7.62	7.62
28.00L	32494. B	765.29	4.46B	4.46	4.48	4.48
28.00R	32508. B	763.96	2.69B	2.69	4.47	4.47
36.67	32339. B	695.47	3.21B	3.21	4.29	4.29
55.00	35223. B	600.54	5.34B	5.34	4.64	4.64
73.33	36000. B	514.98	4.96B	4.96	4.93	4.93
89.33L	36000. B	504.07	3.34B	3.34	6.61	6.61
89.33R	36000. B	503.96	3.59B	3.59	6.61	6.61
91.67	36000. B	502.42	3.44B	3.44	6.88	6.88
110.00	36000. B	435.91	2.73B	2.73	7.96	7.96
128.33	36000. B	476.29	2.58B	2.58	7.51	7.51
145.33L	36000. B	463.01	3.32B	3.32	5.45	5.45
145.33R	36000. B	462.88	2.72B	2.72	5.45	5.45
146.67	36000. B	461.91	2.81B	2.81	5.35	5.35
165.00	36000. B	484.57	5.11B	5.11	4.84	4.84
183.33	36000. B	338.37	>999.00B	>999.00	2.10	2.10

Service II
(Assumes permit truck is only loading in all lanes)

Span 1

Location	Allowable Stress	Rating Factors Bending	
		Inv.	Oper.
0.00	34200. S	> 999.00 B	>999.00
18.33	34200. S	7.10 B	7.10
36.67	34200. S	4.04 B	4.04
38.00L	34200. S	3.93 B	3.93
38.00R	34200. S	4.69 B	4.69
55.00	34200. S	3.68 B	3.68
73.33	34200. S	3.77 B	3.77
91.67	34200. S	4.53 B	4.53
94.00L	34200. S	4.74 B	4.74
94.00R	34200. S	4.43 B	4.43
110.00	34200. S	6.55 B	6.55
128.33	34200. S	8.61 B	8.61
146.67	34200. S	7.43 B	7.43
155.33L	34200. S	6.97 B	6.97
155.33R	34200. S	9.80 B	9.80
165.00	34200. S	9.99 B	9.99
183.33	34200. S	5.07 B	5.07

Span 2

Location	Allowable Stress	Rating Factors Bending	
		Inv.	Oper.

0.00	34200. S	5.07	B	5.07
21.00L	34200. S	7.56	B	7.56
21.00R	34200. S	5.03	B	5.03
25.00	34200. S	5.61	B	5.61
50.00	34200. S	10.10	B	10.10
75.00	34200. S	7.10	B	7.10
76.00L	34200. S	6.90	B	6.90
76.00R	34200. S	7.34	B	7.34
99.50L	34200. S	4.42	B	4.42
99.50R	34200. S	5.09	B	5.09
100.00	34200. S	5.06	B	5.06
125.00L	34200. S	4.33	B	4.33
125.00R	34200. S	4.33	B	4.33
150.00	34200. S	5.14	B	5.14
174.00L	34200. S	7.48	B	7.48
174.00R	34200. S	7.04	B	7.04
150.50L	34200. S	5.18	B	5.18
150.50R	34200. S	4.50	B	4.50
175.00	34200. S	7.23	B	7.23
200.00	34200. S	10.05	B	10.05
225.00	34200. S	6.31	B	6.31
229.00L	34200. S	5.82	B	5.82
229.00R	34200. S	8.40	B	8.40
250.00	34200. S	6.28	B	6.28

Span 3

Location	Allowable Stress	Rating Factors Bending Inv.	Oper.
0.00	34200. S	6.28 B	6.28
18.33	34200. S	7.86 B	7.86
28.00L	34200. S	8.08 B	8.08
28.00R	34200. S	5.46 B	5.46
36.67	34200. S	6.12 B	6.12
55.00	34200. S	8.15 B	8.15
73.33	34200. S	6.47 B	6.47
89.33L	34200. S	4.53 B	4.53
89.33R	34200. S	4.85 B	4.85
91.67	34200. S	4.67 B	4.67
110.00	34200. S	3.84 B	3.84
128.33	34200. S	3.68 B	3.68
145.33L	34200. S	4.66 B	4.66
145.33R	34200. S	3.89 B	3.89
146.67	34200. S	4.00 B	4.00
165.00	34200. S	6.93 B	6.93
183.33	34200. S	> 999.00 B	>999.00

****
Minimum rating is 1.99 at location 0.00 in span 1.
****

Classified at Strength II because of description
in 3.4.1 for other than HL93 vehicle.

Rating Codes:
T - Top steel governs
B - Bottom steel governs
C - Concrete governs
R - Rebar governs
V - Shear governs
S - Serviceability governs

Mom Strength Codes:
C - Compact
B - Braced non-compact
U - Unbraced non-compact
T - Transition between compact and braced non-compact
S - Serviceability

Noncompact shapes ratings based on stress, as

Fb - factored dead load stress

$$IR = \frac{\text{PBETA}}{\text{factored LL+I stress}}$$

Inventory rating for Strength II if only permit loading on the system uses PBETA. Operating rating uses IR(PBETA/1.35).

I-295 HH BUCKMAN BRIDGE -720249
Girder 7 : Rating Output : Lrfd Ratings
Thu Mar 26 16:25:33 2015

[This table uses the rating equation (6A.4.2.1-1) of the 2011 edition of the Manual for Bridge Evaluation.]

Permit

Strength II
(Assumes permit truck is only loading)

Span 1

Location	Allowable	Shear	Rating Factors Bending		Shear	
			Inv.	Oper.	Inv.	Oper.
0.00	36000. B	347.57	>999.00B	>999.00	1.87	1.87
18.33	36000. B	461.91	4.85B	4.85	4.22	4.22
36.67	36000. B	476.29	2.68B	2.68	6.41	6.41
38.00L	36000. B	477.22	2.60B	2.60	6.58	6.58
38.00R	36000. B	477.34	3.13B	3.13	6.59	6.59
55.00	36000. B	435.91	2.46B	2.46	7.59	7.59
73.33	36000. B	447.75	2.49B	2.49	8.57	8.57
91.67	36000. B	514.98	3.05B	3.05	6.66	6.66
94.00L	36000. B	520.37	3.20B	3.20	6.48	6.48
94.00R	36000. B	520.76	2.98B	2.98	6.49	6.49
110.00	36000. B	559.21	4.32B	4.32	5.64	5.64
128.33	35178. B	695.47	4.72B	4.72	5.44	5.44
146.67	30325. B	842.04	3.26B	3.26	5.86	5.86
155.33L	28997. B	928.08	2.77B	2.77	6.09	6.09
155.33R	28970. B	929.75	4.23B	4.23	6.11	6.11
165.00	30888. B	1380.66	4.64B	4.64	9.09	9.09
183.33	35100. B	1263.48	2.73B	2.73	6.22	6.22

Span 2

Location	Allowable	Shear	Rating Factors Bending		Shear	
			Inv.	Oper.	Inv.	Oper.
0.00	35100. B	1274.84	2.73B	2.73	6.26	6.26
21.00L	35318. B	923.38	4.60B	4.60	5.37	5.37
21.00R	35318. B	922.51	2.86B	2.86	5.36	5.36
25.00	35201. B	902.13	3.23B	3.23	5.47	5.47
50.00	35252. B	789.55	5.69B	5.69	6.02	6.02
75.00	36000. B	588.76	4.63B	4.63	4.82	4.82
76.00L	36000. B	587.44	4.50B	4.50	4.86	4.86
76.00R	36000. B	587.20	4.79B	4.79	4.86	4.86
99.50L	36000. B	506.39	2.81B	2.81	6.20	6.20
99.50R	36000. B	506.31	3.26B	3.26	6.20	6.20
100.00	36000. B	506.10	3.24B	3.24	6.28	6.28
125.00L	36000. B	502.51	2.75B	2.75	9.47	9.47
125.00R	36000. B	502.55	2.75B	2.75	9.47	9.47
150.00	36000. B	521.48	3.28B	3.28	7.78	7.78
174.00L	36000. B	626.29	4.82B	4.82	6.08	6.08
174.00R	36000. B	626.70	4.54B	4.54	6.08	6.08

150.50L	36000. B	522.06	3.31B	3.31	7.68	7.68
150.50R	36000. B	522.30	2.86B	2.86	7.68	7.68
175.00	36000. B	628.95	4.67B	4.67	6.04	6.04
200.00	35218. B	865.31	5.70B	5.70	7.61	7.61
225.00	30827. B	1008.02	2.92B	2.92	7.09	7.09
229.00L	30520. B	1033.20	2.58B	2.58	6.89	6.89
229.00R	30506. B	1034.27	4.13B	4.13	6.90	6.90
250.00	30888. B	1415.29	2.88B	2.88	7.25	7.25

Span 3

Location	Allowable	Shear	Rating Factors Bending		Shear	
			Inv.	Oper.	Inv.	Oper.
0.00	30888. B	1416.13	2.88B	2.88	7.11	7.11
18.33	32862. B	1199.86	3.95B	3.95	7.22	7.22
28.00L	32494. B	765.29	4.04B	4.04	4.33	4.33
28.00R	32508. B	763.96	2.52B	2.52	4.32	4.32
36.67	32339. B	695.47	2.87B	2.87	4.17	4.17
55.00	35223. B	600.54	4.41B	4.41	4.54	4.54
73.33	36000. B	514.98	4.32B	4.32	4.79	4.79
89.33L	36000. B	504.07	3.06B	3.06	6.37	6.37
89.33R	36000. B	503.96	3.28B	3.28	6.37	6.37
91.67	36000. B	502.42	3.15B	3.15	6.63	6.63
110.00	36000. B	435.91	2.52B	2.52	7.70	7.70
128.33	36000. B	476.29	2.44B	2.44	6.90	6.90
145.33L	36000. B	463.01	3.09B	3.09	5.02	5.02
145.33R	36000. B	462.88	2.55B	2.55	5.02	5.02
146.67	36000. B	461.91	2.63B	2.63	4.92	4.92
165.00	36000. B	484.57	4.72B	4.72	4.45	4.45
183.33	36000. B	338.37	>999.00B	>999.00	1.97	1.97

Service II
(Assumes permit truck is only loading in all lanes)

Span 1

Location	Allowable Stress	Rating Factors Bending	
		Inv.	Oper.
0.00	34200. S	> 999.00 B	>999.00
18.33	34200. S	6.53 B	6.53
36.67	34200. S	3.76 B	3.76
38.00L	34200. S	3.66 B	3.66
38.00R	34200. S	4.35 B	4.35
55.00	34200. S	3.46 B	3.46
73.33	34200. S	3.46 B	3.46
91.67	34200. S	4.12 B	4.12
94.00L	34200. S	4.30 B	4.30
94.00R	34200. S	4.02 B	4.02
110.00	34200. S	5.62 B	5.62
128.33	34200. S	7.15 B	7.15
146.67	34200. S	6.43 B	6.43
155.33L	34200. S	6.19 B	6.19
155.33R	34200. S	8.59 B	8.59
165.00	34200. S	8.96 B	8.96
183.33	34200. S	4.91 B	4.91

Span 2

Location	Allowable Stress	Rating Factors Bending	
		Inv.	Oper.

0.00	34200. S	4.91	B	4.91
21.00L	34200. S	7.42	B	7.42
21.00R	34200. S	5.04	B	5.04
25.00	34200. S	5.58	B	5.58
50.00	34200. S	8.78	B	8.78
75.00	34200. S	6.07	B	6.07
76.00L	34200. S	5.91	B	5.91
76.00R	34200. S	6.28	B	6.28
99.50L	34200. S	3.87	B	3.87
99.50R	34200. S	4.44	B	4.44
100.00	34200. S	4.41	B	4.41
125.00L	34200. S	3.81	B	3.81
125.00R	34200. S	3.81	B	3.81
150.00	34200. S	4.46	B	4.46
174.00L	34200. S	6.32	B	6.32
174.00R	34200. S	5.95	B	5.95
150.50L	34200. S	4.49	B	4.49
150.50R	34200. S	3.92	B	3.92
175.00	34200. S	6.11	B	6.11
200.00	34200. S	8.78	B	8.78
225.00	34200. S	6.17	B	6.17
229.00L	34200. S	5.78	B	5.78
229.00R	34200. S	8.20	B	8.20
250.00	34200. S	6.42	B	6.42

Span 3

Location	Allowable Stress	Rating Factors Bending Inv.	Oper.
0.00	34200. S	6.42 B	6.42
18.33	34200. S	7.23 B	7.23
28.00L	34200. S	7.19 B	7.19
28.00R	34200. S	4.95 B	4.95
36.67	34200. S	5.35 B	5.35
55.00	34200. S	6.70 B	6.70
73.33	34200. S	5.62 B	5.62
89.33L	34200. S	4.12 B	4.12
89.33R	34200. S	4.41 B	4.41
91.67	34200. S	4.26 B	4.26
110.00	34200. S	3.51 B	3.51
128.33	34200. S	3.44 B	3.44
145.33L	34200. S	4.31 B	4.31
145.33R	34200. S	3.62 B	3.62
146.67	34200. S	3.72 B	3.72
165.00	34200. S	6.38 B	6.38
183.33	34200. S	> 999.00 B	>999.00

****
Minimum rating is 1.87 at location 0.00 in span 1.
****

Classified at Strength II because of description
in 3.4.1 for other than HL93 vehicle.

Rating Codes:
T - Top steel governs
B - Bottom steel governs
C - Concrete governs
R - Rebar governs
V - Shear governs
S - Serviceability governs

Mom Strength Codes:
C - Compact
B - Braced non-compact
U - Unbraced non-compact
T - Transition between compact and braced non-compact
S - Serviceability

Noncompact shapes ratings based on stress, as

Fb - factored dead load stress

$$IR = \frac{\text{PBETA}}{\text{factored LL+I stress}}$$

Inventory rating for Strength II if only permit loading on the system uses PBETA. Operating rating uses IR(PBETA/1.35).

I-295 HH BUCKMAN BRIDGE -720249
Girder 8 : Rating Output : Lrfd Ratings
Thu Mar 26 16:25:49 2015

[This table uses the rating equation (6A.4.2.1-1) of the 2011 edition of the Manual for Bridge Evaluation.]

Permit

Strength II
(Assumes permit truck is only loading)

Span 1

Location	Allowable	Shear	Rating Factors Bending		Shear	
			Inv.	Oper.	Inv.	Oper.
0.00	36000. B	347.57	>999.00B	>999.00	2.29	2.29
18.33	36000. B	461.91	5.02B	5.02	4.48	4.48
36.67	36000. B	476.29	2.60B	2.60	6.94	6.94
38.00L	36000. B	477.22	2.52B	2.52	7.16	7.16
38.00R	36000. B	477.34	3.02B	3.02	7.16	7.16
55.00	36000. B	435.91	2.37B	2.37	9.01	9.01
73.33	36000. B	447.75	2.34B	2.34	9.80	9.80
91.67	36000. B	514.98	2.84B	2.84	8.05	8.05
94.00L	36000. B	520.37	2.96B	2.96	7.76	7.76
94.00R	36000. B	520.76	2.77B	2.77	7.77	7.77
110.00	36000. B	559.21	3.89B	3.89	6.05	6.05
128.33	35184. B	695.47	4.22B	4.22	6.05	6.05
146.67	30537. B	842.04	3.05B	3.05	5.99	5.99
155.33L	29239. B	928.08	2.65B	2.65	6.22	6.22
155.33R	29213. B	929.75	3.96B	3.96	6.24	6.24
165.00	35058. B	1380.66	5.19B	5.19	9.42	9.42
183.33	35105. B	1263.48	2.73B	2.73	7.34	7.34

Span 2

Location	Allowable	Shear	Rating Factors Bending		Shear	
			Inv.	Oper.	Inv.	Oper.
0.00	35105. B	1274.84	2.73B	2.73	7.04	7.04
21.00L	35322. B	923.38	4.37B	4.37	5.55	5.55
21.00R	35322. B	922.51	2.80B	2.80	5.54	5.54
25.00	35208. B	902.13	3.11B	3.11	5.58	5.58
50.00	35258. B	789.55	5.00B	5.00	6.09	6.09
75.00	36000. B	588.76	4.29B	4.29	5.94	5.94
76.00L	36000. B	587.44	4.17B	4.17	6.01	6.01
76.00R	36000. B	587.20	4.43B	4.43	6.01	6.01
99.50L	36000. B	506.39	2.74B	2.74	6.99	6.99
99.50R	36000. B	506.31	3.15B	3.15	6.99	6.99
100.00	36000. B	506.10	3.13B	3.13	7.04	7.04
125.00L	36000. B	502.51	2.68B	2.68	11.35	11.35
125.00R	36000. B	502.55	2.68B	2.68	11.35	11.35
150.00	36000. B	521.48	3.15B	3.15	8.14	8.14
174.00L	36000. B	626.29	4.41B	4.41	7.13	7.13
174.00R	36000. B	626.70	4.16B	4.16	7.14	7.14

150.50L	36000. B	522.06	3.17B	3.17	8.09	8.09
150.50R	36000. B	522.30	2.76B	2.76	8.09	8.09
175.00	36000. B	628.95	4.27B	4.27	7.07	7.07
200.00	35224. B	865.31	5.03B	5.03	7.28	7.28
225.00	31022. B	1008.02	2.84B	2.84	6.79	6.79
229.00L	30721. B	1033.20	2.55B	2.55	6.72	6.72
229.00R	30708. B	1034.27	3.95B	3.95	6.73	6.73
250.00	31030. B	1415.29	2.86B	2.86	8.10	8.10

Span 3

Location	Allowable	Shear	Rating Factors Bending		Shear	
			Inv.	Oper.	Inv.	Oper.
0.00	31030. B	1416.13	2.86B	2.86	8.31	8.31
18.33	32968. B	1199.86	3.76B	3.76	7.79	7.79
28.00L	32611. B	765.29	3.80B	3.80	4.74	4.74
28.00R	32624. B	763.96	2.44B	2.44	4.73	4.73
36.67	32498. B	695.47	2.71B	2.71	4.59	4.59
55.00	35228. B	600.54	3.95B	3.95	5.06	5.06
73.33	36000. B	514.98	3.92B	3.92	5.38	5.38
89.33L	36000. B	504.07	2.84B	2.84	7.73	7.73
89.33R	36000. B	503.96	3.04B	3.04	7.73	7.73
91.67	36000. B	502.42	2.93B	2.93	8.12	8.12
110.00	36000. B	435.91	2.38B	2.38	9.76	9.76
128.33	36000. B	476.29	2.36B	2.36	8.28	8.28
145.33L	36000. B	463.01	2.98B	2.98	5.49	5.49
145.33R	36000. B	462.88	2.48B	2.48	5.49	5.49
146.67	36000. B	461.91	2.56B	2.56	5.36	5.36
165.00	36000. B	484.57	4.89B	4.89	4.65	4.65
183.33	36000. B	338.37	>999.00B	>999.00	2.38	2.38

Service II
(Assumes permit truck is only loading in all lanes)

Span 1

Location	Allowable Stress	Rating Factors Bending	
		Inv.	Oper.
0.00	34200. S	> 999.00 B	>999.00
18.33	34200. S	6.71 B	6.71
36.67	34200. S	3.61 B	3.61
38.00L	34200. S	3.51 B	3.51
38.00R	34200. S	4.14 B	4.14
55.00	34200. S	3.30 B	3.30
73.33	34200. S	3.22 B	3.22
91.67	34200. S	3.81 B	3.81
94.00L	34200. S	3.96 B	3.96
94.00R	34200. S	3.71 B	3.71
110.00	34200. S	5.06 B	5.06
128.33	34200. S	6.32 B	6.32
146.67	34200. S	5.79 B	5.79
155.33L	34200. S	5.63 B	5.63
155.33R	34200. S	7.75 B	7.75
165.00	34200. S	8.14 B	8.14
183.33	34200. S	4.69 B	4.69

Span 2

Location	Allowable Stress	Rating Factors Bending	
		Inv.	Oper.

0.00	34200. S	4.69	B	4.69
21.00L	34200. S	6.89	B	6.89
21.00R	34200. S	4.76	B	4.76
25.00	34200. S	5.21	B	5.21
50.00	34200. S	7.63	B	7.63
75.00	34200. S	5.60	B	5.60
76.00L	34200. S	5.46	B	5.46
76.00R	34200. S	5.80	B	5.80
99.50L	34200. S	3.72	B	3.72
99.50R	34200. S	4.25	B	4.25
100.00	34200. S	4.23	B	4.23
125.00L	34200. S	3.67	B	3.67
125.00R	34200. S	3.67	B	3.67
150.00	34200. S	4.24	B	4.24
174.00L	34200. S	5.77	B	5.77
174.00R	34200. S	5.44	B	5.44
150.50L	34200. S	4.27	B	4.27
150.50R	34200. S	3.74	B	3.74
175.00	34200. S	5.58	B	5.58
200.00	34200. S	7.65	B	7.65
225.00	34200. S	5.71	B	5.71
229.00L	34200. S	5.38	B	5.38
229.00R	34200. S	7.55	B	7.55
250.00	34200. S	5.99	B	5.99

Span 3

Location	Allowable Stress	Rating Factors Bending Inv.	Oper.
0.00	34200. S	5.99 B	5.99
18.33	34200. S	6.64 B	6.64
28.00L	34200. S	6.56 B	6.56
28.00R	34200. S	4.58 B	4.58
36.67	34200. S	4.88 B	4.88
55.00	34200. S	5.95 B	5.95
73.33	34200. S	5.10 B	5.10
89.33L	34200. S	3.82 B	3.82
89.33R	34200. S	4.08 B	4.08
91.67	34200. S	3.94 B	3.94
110.00	34200. S	3.28 B	3.28
128.33	34200. S	3.29 B	3.29
145.33L	34200. S	4.10 B	4.10
145.33R	34200. S	3.47 B	3.47
146.67	34200. S	3.56 B	3.56
165.00	34200. S	6.56 B	6.56
183.33	34200. S	> 999.00 B	>999.00

****
Minimum rating is 2.29 at location 0.00 in span 1.
****

Classified at Strength II because of description
in 3.4.1 for other than HL93 vehicle.

Rating Codes:
T - Top steel governs
B - Bottom steel governs
C - Concrete governs
R - Rebar governs
V - Shear governs
S - Serviceability governs

Mom Strength Codes:
C - Compact
B - Braced non-compact
U - Unbraced non-compact
T - Transition between compact and braced non-compact
S - Serviceability

Noncompact shapes ratings based on stress, as

Fb - factored dead load stress

$$IR = \frac{\text{PBETA}}{\text{factored LL+I stress}}$$

Inventory rating for Strength II if only permit loading on the system uses PBETA. Operating rating uses IR(PBETA/1.35).

2.2.5. ST5 (32” Barrier)

I-295 HH BUCKMAN BRIDGE -720249
Girder System : Input File : Layout/Slab/Loading Definition
Mon Mar 30 10:42:29 2015

```
ID: I-295 HH BUCKMAN BRIDGE -720249
CONDITIONS
  ALL LANES
  ENGLISH INPUT
  ENGLISH OUTPUT
  FLOAT LANES
  GRID MODEL
  LRFD METHOD
  MEDIUM RESOLUTION MESH
  OVERLAY PERMIT TRUCK WITH LANE LOADING
  PERMIT TRUCK IN ALL LANES
  PERMIT TRUCK IS ONLY LOADING IN PERMIT LANE
  RATE MODE
  RATING PROJECT
  SELF WEIGHT FOR DEAD LOAD 1
DATA
  BR-1 18.3333 18.3333 18.3333 18.3333 18.3333 18.3333 18.3333 18.3333
  18.3333 36.1875 17.8542 17.8542 17.8542 17.8542 17.8542 17.875 17.875
  17.8542 17.8542 17.8542 17.8542 17.8542 36.1875 18.3333 18.3333
  18.3333 18.3333 18.3333 18.3333 18.3333 18.3333
  CURB -2.
  FPC 4.5
  GDSPC 9.3073 9.3073 9.3073 9.3073 9.3333 9.3333 9.3333
  LANES 12. 12. 12. 12. 12.
  PRLANE  0.2
  PRMITP 6. 13.5 13.5 13.5 13.5 6. 13.5 13.5 13.5 13.5
  PRMITSP 27. 4. 12. 24. 30. 27. 4. 12. 24.
  ROADWP 68.
  SKEW-1 90. 90. 90. 90.
  SLABEXT 3.5417 2.3125
  SLABT 8.
  SLABWEAR  0.
  SPEED 65
  SPN-1 183.3333 250. 183.3333
  SUPER  0.01563
  WAC-1  0.164
  WAC-2  0.19
  WAC-3  0.19
  WAC-4  0.19
  WAC-5  0.19
  WAC-6  0.19
  WAC-7  0.19
  WAC-8  0.14
  WAS-1  0.
  WAS-2  0.
  WAS-3  0.
  WAS-4  0.
  WAS-5  0.0115
  WAS-6  0.0115
  WAS-7  0.0115
  WAS-8  0.0115
  WCONC 150.
  WEAR  0.
  WHLSPC 6.
  WR-1  0.123
  WR-2  0.14
  WR-3  0.14
  WR-4  0.14
  WR-5  0.14
  WR-6  0.14
  WR-7  0.14
  WR-8  0.105
  WS-1  0.105
  WS-2  0.105
  WS-3  0.105
  WS-4  0.105
  WS-5  0.105
  WS-6  0.105
  WS-7  0.105
  WS-8  0.105
GO
```

I-295 HH BUCKMAN BRIDGE -720249
Girder 1 : Rating Output : Lrfd Ratings
Mon Mar 30 10:43:10 2015

[This table uses the rating equation (6A.4.2.1-1)
of the 2011 edition of the Manual for Bridge
Evaluation.]

Permit

Strength II
(Assumes permit truck is only loading)

Span 1

Location	Allowable	Shear	Rating Factors Bending		Shear	
			Inv.	Oper.	Inv.	Oper.
0.00	9253. C	488.42	>999.00B	>999.00	3.72	3.72
18.33	36000. B	769.69	3.54B	3.54	8.56	8.56
22.00L	36000. B	773.47	2.85B	2.85	9.14	9.14
22.00R	36000. B	773.65	5.19B	5.19	9.14	9.14
36.67	36000. B	617.31	3.29B	3.29	9.44	9.44
55.00	36000. B	623.62	2.43B	2.43	14.46	14.46
73.33	36000. B	632.76	2.53B	2.53	15.02	15.02
91.67	36000. B	644.47	3.54B	3.54	11.35	11.35
110.00	36000. B	658.50	4.64B	4.64	8.10	8.10
122.00L	11921. C	918.49	5.07B	5.07	9.86	9.86
122.00R	12402. C	918.79	5.28B	5.28	9.86	9.86
124.00L	12435. C	922.00	5.40B	5.40	9.60	9.60
124.00R	13473. C	1326.20	5.86B	5.86	14.58	14.58
128.33	13561. C	1332.57	6.07B	6.07	13.80	13.80
146.67	13919. C	1361.56	4.04B	4.04	11.19	11.19
154.00L	45765. B	1373.66	3.25B	3.25	10.56	10.56
154.00R	45762. B	1638.91	3.70B	3.70	12.97	12.97
156.00L	44053. B	1644.31	12.47B	12.47	12.99	12.99
156.00R	23727. C	1644.80	25.16B	25.16	12.99	12.99
165.00	46619. B	1671.34	5.46B	5.46	12.28	12.28
183.33	46375. B	1757.69	3.26B	3.26	10.93	10.93

Span 2

Location	Allowable	Shear	Rating Factors Bending		Shear	
			Inv.	Oper.	Inv.	Oper.
0.00	46375. B	1778.71	3.26B	3.26	10.29	10.29
25.00	46605. B	1747.50	7.76B	7.76	12.63	12.63
28.00L	46984. B	1747.50	8.49B	8.49	12.99	12.99
28.00R	21517. C	1747.50	6.90B	6.90	12.99	12.99
30.00L	21583. C	1747.50	26.85B	26.85	13.24	13.24
30.00R	45403. B	1450.84	16.41B	16.41	10.66	10.66
50.00	48073. B	1450.84	7.95B	7.95	13.06	13.06
55.33L	26462. C	1450.84	11.75B	11.75	13.85	13.85
55.33R	25672. C	1450.84	11.40B	11.40	13.85	13.85
57.33L	25672. C	1450.84	10.73B	10.73	14.17	14.17
57.33R	27861. C	1450.84	11.66B	11.66	14.17	14.17
75.00	27861. C	974.23	7.56B	7.56	11.29	11.29

100.00	27861.	C	974.23	5.56B	5.56	16.09	16.09
125.00	27861.	C	973.68	5.14B	5.14	25.56	25.56
150.00	27861.	C	974.23	5.56B	5.56	17.25	17.25
175.00	27861.	C	921.46	7.58B	7.58	11.25	11.25
190.67L	27861.	C	1450.84	11.03B	11.03	15.23	15.23
190.67R	28843.	C	1450.84	11.43B	11.43	15.23	15.23
192.67L	28843.	C	1450.84	12.10B	12.10	14.88	14.88
192.67R	26462.	C	1450.84	11.08B	11.08	14.88	14.88
200.00	48073.	B	1450.84	7.93B	7.93	13.69	13.69
218.00L	45403.	B	1450.84	4.78B	4.78	11.51	11.51
218.00R	45403.	B	1747.50	5.34B	5.34	14.28	14.28
220.00L	43617.	B	1747.50	17.35B	17.35	13.99	13.99
220.00R	43617.	B	1747.50	29.80B	29.80	13.99	13.99
225.00	45403.	B	1747.50	7.48B	7.48	13.28	13.28
250.00	46375.	B	2011.94	3.26B	3.26	11.87	11.87

Span 3

Location	Allowable		Shear	Rating Factors Bending		Shear	
				Inv.	Oper.	Inv.	Oper.
0.00	46375.	B	1584.21	3.26B	3.26	9.66	9.66
18.33	46620.	B	1671.32	5.47B	5.47	12.23	12.23
25.33L	23797.	C	1650.72	6.43B	6.43	12.92	12.92
25.33R	20549.	C	1650.22	5.24B	5.24	12.91	12.91
27.33L	20554.	C	1644.80	20.72B	20.72	13.13	13.13
27.33R	45724.	B	1377.06	11.60B	11.60	10.68	10.68
36.67	13920.	C	1361.55	4.05B	4.05	11.66	11.66
55.00	13562.	C	1332.56	6.10B	6.10	16.02	16.02
57.33L	13516.	C	1329.18	6.37B	6.37	16.67	16.67
57.33R	13403.	C	1328.93	6.32B	6.32	16.66	16.66
59.33L	13365.	C	1326.20	5.84B	5.84	17.23	17.23
59.33R	11917.	C	922.00	5.19B	5.19	11.37	11.37
73.33	36000.	B	898.00	4.63B	4.63	14.13	14.13
91.67	36000.	B	644.47	3.53B	3.53	13.24	13.24
110.00	36000.	B	632.76	2.53B	2.53	17.27	17.27
128.33	36000.	B	623.62	2.43B	2.43	11.25	11.25
146.67	36000.	B	617.31	3.30B	3.30	7.89	7.89
161.33L	36000.	B	773.65	5.19B	5.19	8.48	8.48
161.33R	36000.	B	773.47	2.86B	2.86	8.48	8.48
165.00	36000.	B	769.68	3.55B	3.55	8.09	8.09
183.33	9253.	C	740.77	>999.00B	>999.00	6.40	6.40

Service II
(Assumes permit truck is only loading in all lanes)

Span 1

Location	Allowable Stress		Rating Factors Bending		
			Inv.	Oper.	
0.00	34200.	S	> 999.00	B>999.00	
18.33	34200.	S	4.96	B 4.96	
22.00L	34200.	S	4.08	B 4.08	
22.00R	34200.	S	7.07	B 7.07	
36.67	34200.	S	4.64	B 4.64	
55.00	34200.	S	3.48	B 3.48	
73.33	34200.	S	3.58	B 3.58	
91.67	34200.	S	4.85	B 4.85	
110.00	34200.	S	6.10	B 6.10	
122.00L	34200.	S	8.35	B 8.35	
122.00R	34200.	S	8.36	B 8.36	
124.00L	34200.	S	8.59	B 8.59	
124.00R	34200.	S	7.15	B 7.15	
128.33	47500.	S	10.51	B 10.51	
146.67	47500.	S	7.66	B 7.66	
154.00L	47500.	S	6.55	B 6.55	

154.00R	47500. S	6.84 B	6.84
156.00L	47500. S	24.89 B	24.89
156.00R	47500. S	42.40 B	42.40
165.00	47500. S	9.61 B	9.61
183.33	47500. S	6.42 B	6.42

Span 2

Location	Allowable Stress	Rating Factors Bending Inv.	Oper.
0.00	34200. S	6.42 B	6.42
25.00	34200. S	13.15 B	13.15
28.00L	34200. S	14.10 B	14.10
28.00R	34200. S	13.76 B	13.76
30.00L	34200. S	52.88 B	52.88
30.00R	34200. S	32.23 B	32.23
50.00	34200. S	13.34 B	13.34
55.33L	34200. S	11.86 B	11.86
55.33R	34200. S	11.85 B	11.85
57.33L	34200. S	11.09 B	11.09
57.33R	34200. S	13.53 B	13.53
75.00	34200. S	8.60 B	8.60
100.00	34200. S	6.19 B	6.19
125.00	47500. S	5.67 B	5.67
150.00	47500. S	6.19 B	6.19
175.00	47500. S	8.62 B	8.62
190.67L	47500. S	12.77 B	12.77
190.67R	47500. S	12.80 B	12.80
192.67L	47500. S	13.58 B	13.58
192.67R	47500. S	11.14 B	11.14
200.00	47500. S	13.31 B	13.31
218.00L	47500. S	9.27 B	9.27
218.00R	47500. S	9.56 B	9.56
220.00L	47500. S	33.30 B	33.30
220.00R	47500. S	54.02 B	54.02
225.00	47500. S	13.13 B	13.13
250.00	47500. S	6.41 B	6.41

Span 3

Location	Allowable Stress	Rating Factors Bending Inv.	Oper.
0.00	34200. S	6.41 B	6.41
18.33	34200. S	9.62 B	9.62
25.33L	34200. S	10.92 B	10.92
25.33R	34200. S	10.59 B	10.59
27.33L	34200. S	41.26 B	41.26
27.33R	34200. S	23.80 B	23.80
36.67	34200. S	7.69 B	7.69
55.00	34200. S	10.54 B	10.54
57.33L	34200. S	10.92 B	10.92
57.33R	34200. S	10.91 B	10.91
59.33L	34200. S	10.01 B	10.01
59.33R	34200. S	12.01 B	12.01
73.33	34200. S	6.09 B	6.09
91.67	34200. S	4.84 B	4.84
110.00	34200. S	3.58 B	3.58
128.33	34200. S	3.49 B	3.49
146.67	34200. S	4.64 B	4.64
161.33L	34200. S	7.07 B	7.07
161.33R	34200. S	4.08 B	4.08
165.00	34200. S	4.96 B	4.96
183.33	34200. S	> 999.00 B	>999.00

****
Minimum rating is 2.43 at location 55.00 in span 1.
****

Classified at Strength II because of description
in 3.4.1 for other than HL93 vehicle.

Rating Codes:
T - Top steel governs
B - Bottom steel governs
C - Concrete governs
R - Rebar governs
V - Shear governs
S - Serviceability governs

Mom Strength Codes:
C - Compact
B - Braced non-compact
U - Unbraced non-compact
T - Transition between compact and braced non-compact
S - Serviceability

Noncompact shapes ratings based on stress, as

$$IR = \frac{Fb - \text{factored dead load stress}}{\text{factored LL+I stress}}$$

Inventory rating for Strength II if only permit
loading on the system uses PBETA. Operating rating
uses IR(PBETA/1.35).

I-295 HH BUCKMAN BRIDGE -720249
Girder 2 : Rating Output : Lrfd Ratings
Mon Mar 30 10:57:26 2015

[This table uses the rating equation (6A.4.2.1-1)
of the 2011 edition of the Manual for Bridge
Evaluation.]

Permit

Strength II
(Assumes permit truck is only loading)

Span 1

Location	Allowable	Shear	Rating Factors Bending		Shear	
			Inv.	Oper.	Inv.	Oper.
0.00	9331. C	488.42	>999.00B	>999.00	3.72	3.72
18.33	36000. B	769.69	3.99B	3.99	9.51	9.51
22.00L	36000. B	773.47	3.23B	3.23	10.24	10.24
22.00R	36000. B	773.65	5.89B	5.89	10.25	10.25
36.67	36000. B	617.31	3.82B	3.82	10.38	10.38
55.00	36000. B	623.62	2.84B	2.84	14.86	14.86
73.33	36000. B	632.76	3.00B	3.00	14.55	14.55
91.67	36000. B	644.47	4.34B	4.34	11.38	11.38
110.00	36000. B	658.50	5.41B	5.41	8.68	8.68
122.00L	36000. B	918.49	7.47B	7.47	10.79	10.79
122.00R	36000. B	918.79	5.97T	5.97	10.80	10.80
124.00L	12522. C	922.00	6.28B	6.28	10.54	10.54
124.00R	13524. C	1326.20	6.79B	6.79	15.99	15.99
128.33	23408. C	1332.57	12.72B	12.72	15.19	15.19
146.67	13950. C	1361.56	4.83B	4.83	12.30	12.30
154.00L	45675. B	1373.66	3.90B	3.90	11.56	11.56
154.00R	45672. B	1638.91	4.42B	4.42	14.19	14.19
156.00L	43981. B	1644.31	14.11B	14.11	14.31	14.31
156.00R	23743. C	1644.80	28.28B	28.28	14.32	14.32
165.00	46576. B	1671.34	6.48B	6.48	13.31	13.31
183.33	46329. B	1757.69	3.88B	3.88	11.02	11.02

Span 2

Location	Allowable	Shear	Rating Factors Bending		Shear	
			Inv.	Oper.	Inv.	Oper.
0.00	46329. B	1778.71	3.88B	3.88	10.55	10.55
25.00	46559. B	1747.50	9.36B	9.36	13.86	13.86
28.00L	46976. B	1747.50	10.27B	10.27	14.35	14.35
28.00R	21778. C	1747.50	8.45B	8.45	14.35	14.35
30.00L	21853. C	1747.50	32.44B	32.44	14.68	14.68
30.00R	45307. B	1450.84	19.65B	19.65	11.82	11.82
50.00	47985. B	1450.84	9.65B	9.65	14.73	14.73
55.33L	27352. C	1450.84	13.49B	13.49	15.50	15.50
55.33R	27199. C	1450.84	13.42B	13.42	15.50	15.50
57.33L	27190. C	1450.84	12.66B	12.66	15.78	15.78
57.33R	29713. C	1450.84	13.85B	13.85	15.78	15.78
75.00	29713. C	974.23	9.30B	9.30	11.57	11.57

100.00	29713. C	974.23	6.99B	6.99	16.51	16.51
125.00	29713. C	973.68	6.59B	6.59	27.05	27.05
150.00	29713. C	974.23	6.98B	6.98	19.12	19.12
175.00	29713. C	974.23	9.28B	9.28	13.11	13.11
190.67L	29713. C	1450.84	13.11B	13.11	17.45	17.45
190.67R	30626. C	1450.84	13.52B	13.52	17.45	17.45
192.67L	30626. C	1450.84	14.27B	14.27	17.09	17.09
192.67R	27230. C	1450.84	12.67B	12.67	17.09	17.09
200.00	47985. B	1450.84	9.63B	9.63	15.83	15.83
218.00L	45307. B	1450.84	5.81B	5.81	13.24	13.24
218.00R	45307. B	1747.50	6.47B	6.47	16.43	16.43
220.00L	43540. B	1747.50	20.69B	20.69	16.03	16.03
220.00R	43540. B	1747.50	35.42B	35.42	16.03	16.03
225.00	45307. B	1747.50	9.01B	9.01	15.02	15.02
250.00	46330. B	1778.84	3.87B	3.87	10.55	10.55

Span 3

Location	Allowable	Shear	Rating Factors Bending		Shear	
			Inv.	Oper.	Inv.	Oper.
0.00	46330. B	1757.54	3.87B	3.87	10.93	10.93
18.33	46576. B	1671.32	6.49B	6.49	12.89	12.89
25.33L	23811. C	1650.72	7.62B	7.62	13.84	13.84
25.33R	20777. C	1650.22	6.31B	6.31	13.83	13.83
27.33L	20790. C	1644.80	23.70B	23.70	14.12	14.12
27.33R	45634. B	1377.06	13.19B	13.19	11.48	11.48
36.67	13952. C	1361.55	4.86B	4.86	12.70	12.70
55.00	23416. C	1332.56	12.75B	12.75	15.69	15.69
57.33L	13565. C	1329.18	7.55B	7.55	16.13	16.13
57.33R	13466. C	1328.93	7.50B	7.50	16.13	16.13
59.33L	13429. C	1326.20	6.76B	6.76	16.52	16.52
59.33R	12175. C	922.00	6.12B	6.12	10.90	10.90
73.33	36000. B	658.50	5.41B	5.41	9.01	9.01
91.67	36000. B	644.47	4.35B	4.35	11.53	11.53
110.00	36000. B	632.76	3.00B	3.00	15.78	15.78
128.33	36000. B	623.62	2.84B	2.84	10.43	10.43
146.67	36000. B	617.31	3.81B	3.81	7.85	7.85
161.33L	36000. B	773.65	5.88B	5.88	9.37	9.37
161.33R	36000. B	773.47	3.22B	3.22	9.37	9.37
165.00	36000. B	769.68	3.98B	3.98	8.98	8.98
183.33	9331. C	488.42	>999.00B	>999.00	3.82	3.82

Service II
(Assumes permit truck is only loading in all lanes)

Span 1

Location	Allowable Stress	Rating Factors Bending	
		Inv.	Oper.
0.00	34200. S	> 999.00 B	>999.00
18.33	34200. S	5.60 B	5.60
22.00L	34200. S	4.62 B	4.62
22.00R	34200. S	8.03 B	8.03
36.67	34200. S	5.38 B	5.38
55.00	34200. S	4.08 B	4.08
73.33	34200. S	4.24 B	4.24
91.67	34200. S	5.95 B	5.95
110.00	34200. S	7.13 B	7.13
122.00L	34200. S	9.60 B	9.60
122.00R	34200. S	9.60 B	9.60
124.00L	34200. S	9.99 B	9.99
124.00R	34200. S	8.34 B	8.34
128.33	47500. S	12.54 B	12.54
146.67	47500. S	9.22 B	9.22
154.00L	47500. S	7.88 B	7.88

154.00R	47500. S	8.21 B	8.21
156.00L	47500. S	28.27 B	28.27
156.00R	47500. S	47.96 B	47.96
165.00	47500. S	11.46 B	11.46
183.33	47500. S	7.69 B	7.69

Span 2

Location	Allowable Stress	Rating Factors Bending Inv.	Oper.
0.00	34200. S	7.69 B	7.69
25.00	34200. S	15.96 B	15.96
28.00L	34200. S	17.13 B	17.13
28.00R	34200. S	16.75 B	16.75
30.00L	34200. S	63.45 B	63.45
30.00R	34200. S	38.78 B	38.78
50.00	34200. S	16.00 B	16.29
55.33L	34200. S	13.31 B	13.31
55.33R	34200. S	13.30 B	13.30
57.33L	34200. S	12.48 B	12.48
57.33R	34200. S	15.22 B	15.22
75.00	34200. S	9.96 B	9.96
100.00	34200. S	7.29 B	7.29
125.00	47500. S	6.80 B	6.80
150.00	47500. S	7.28 B	7.28
175.00	47500. S	9.94 B	9.94
190.67L	47500. S	14.36 B	14.36
190.67R	47500. S	14.38 B	14.38
192.67L	47500. S	15.22 B	15.22
192.67R	47500. S	12.49 B	12.49
200.00	47500. S	16.00 B	16.25
218.00L	47500. S	11.32 B	11.32
218.00R	47500. S	11.65 B	11.65
220.00L	47500. S	39.92 B	39.92
220.00R	47500. S	64.59 B	64.59
225.00	47500. S	15.92 B	15.92
250.00	47500. S	7.68 B	7.68

Span 3

Location	Allowable Stress	Rating Factors Bending Inv.	Oper.
0.00	34200. S	7.68 B	7.68
18.33	34200. S	11.48 B	11.48
25.33L	34200. S	13.03 B	13.03
25.33R	34200. S	12.67 B	12.67
27.33L	34200. S	46.83 B	46.83
27.33R	34200. S	27.13 B	27.13
36.67	34200. S	9.26 B	9.26
55.00	34200. S	12.57 B	12.57
57.33L	34200. S	12.62 B	13.01
57.33R	34200. S	12.62 B	13.00
59.33L	34200. S	11.64 B	11.64
59.33R	34200. S	13.92 B	13.92
73.33	34200. S	7.13 B	7.13
91.67	34200. S	5.95 B	5.95
110.00	34200. S	4.24 B	4.24
128.33	34200. S	4.08 B	4.08
146.67	34200. S	5.37 B	5.37
161.33L	34200. S	8.02 B	8.02
161.33R	34200. S	4.61 B	4.61
165.00	34200. S	5.59 B	5.59
183.33	34200. S	> 999.00 B	>999.00

****
Minimum rating is 2.84 at location 128.33 in span 3.
****

Classified at Strength II because of description
in 3.4.1 for other than HL93 vehicle.

Rating Codes:
T - Top steel governs
B - Bottom steel governs
C - Concrete governs
R - Rebar governs
V - Shear governs
S - Serviceability governs

Mom Strength Codes:
C - Compact
B - Braced non-compact
U - Unbraced non-compact
T - Transition between compact and braced non-compact
S - Serviceability

Noncompact shapes ratings based on stress, as

$$IR = \frac{Fb - \text{factored dead load stress}}{\text{factored LL+I stress}}$$

Inventory rating for Strength II if only permit
loading on the system uses PBETA. Operating rating
uses IR(PBETA/1.35).

I-295 HH BUCKMAN BRIDGE -720249
Girder 3 : Rating Output : Lrfd Ratings
Mon Mar 30 10:57:41 2015

[This table uses the rating equation (6A.4.2.1-1)
of the 2011 edition of the Manual for Bridge
Evaluation.]

Permit

Strength II
(Assumes permit truck is only loading)

Span 1

Location	Allowable	Shear	Rating Factors Bending		Shear	
			Inv.	Oper.	Inv.	Oper.
0.00	9331. C	488.42	>999.00B	>999.00	4.08	4.08
18.33	36000. B	769.69	4.29B	4.29	10.65	10.65
22.00L	36000. B	773.47	3.48B	3.48	11.52	11.52
22.00R	36000. B	773.65	6.35B	6.35	11.53	11.53
36.67	36000. B	617.31	4.18B	4.18	11.86	11.86
55.00	36000. B	623.62	3.13B	3.13	16.88	16.88
73.33	36000. B	632.76	3.35B	3.35	15.52	15.52
91.67	36000. B	644.47	4.78B	4.78	12.58	12.58
110.00	36000. B	658.50	6.06B	6.06	9.75	9.75
122.00L	36000. B	918.49	8.30B	8.30	12.00	12.00
122.00R	36000. B	918.79	6.63T	6.63	12.01	12.01
124.00L	12527. C	922.00	7.07B	7.07	11.70	11.70
124.00R	13527. C	1326.20	7.64B	7.64	17.71	17.71
128.33	23451. C	1332.57	15.13B	15.13	16.78	16.78
146.67	13959. C	1361.56	5.67B	5.67	13.38	13.38
154.00L	45675. B	1373.66	4.56B	4.56	12.58	12.58
154.00R	45672. B	1638.91	5.15B	5.15	15.44	15.44
156.00L	43981. B	1644.31	16.02B	16.02	15.61	15.61
156.00R	23749. C	1644.80	31.71B	31.71	15.61	15.61
165.00	46576. B	1671.34	7.42B	7.42	14.56	14.56
183.33	46329. B	1757.69	4.19B	4.19	12.12	12.12

Span 2

Location	Allowable	Shear	Rating Factors Bending		Shear	
			Inv.	Oper.	Inv.	Oper.
0.00	46329. B	1778.71	4.19B	4.19	11.62	11.62
25.00	46559. B	1747.50	10.19B	10.19	15.36	15.36
28.00L	46976. B	1747.50	11.21B	11.21	15.92	15.92
28.00R	21796. C	1747.50	9.25B	9.25	15.92	15.92
30.00L	21867. C	1747.50	34.86B	34.86	16.30	16.30
30.00R	45307. B	1450.84	21.17B	21.17	13.15	13.15
50.00	47985. B	1450.84	10.81B	10.81	16.66	16.66
55.33L	45690. B	1450.84	10.63B	10.63	17.56	17.56
55.33R	45690. B	1450.84	10.63B	10.63	17.56	17.56
57.33L	27199. C	1450.84	14.23B	14.23	17.89	17.89
57.33R	29713. C	1450.84	15.56B	15.56	17.89	17.89
75.00	29713. C	974.23	10.65B	10.65	13.03	13.03

100.00	29713.	C	974.23	8.14B	8.14	18.37	18.37
125.00	29713.	C	973.68	7.58B	7.58	28.38	28.38
150.00	29713.	C	974.23	8.13B	8.13	21.01	21.01
175.00	29713.	C	974.23	10.59B	10.59	14.74	14.74
190.67L	29713.	C	1450.84	14.67B	14.67	19.87	19.87
190.67R	30626.	C	1450.84	15.13B	15.13	19.87	19.87
192.67L	30626.	C	1450.84	15.93B	15.93	19.48	19.48
192.67R	27270.	C	1450.84	14.16B	14.16	19.48	19.48
200.00	47985.	B	1450.84	10.87B	10.87	18.04	18.04
218.00L	45307.	B	1450.84	6.43B	6.43	14.89	14.89
218.00R	45307.	B	1747.50	7.15B	7.15	18.45	18.45
220.00L	43540.	B	1747.50	22.38B	22.38	17.98	17.98
220.00R	43540.	B	1747.50	38.13B	38.13	17.98	17.98
225.00	45307.	B	1747.50	9.84B	9.84	16.79	16.79
250.00	46330.	B	1778.84	4.18B	4.18	11.63	11.63

Span 3

Location	Allowable		Shear	Rating Factors Bending		Shear	
				Inv.	Oper.	Inv.	Oper.
0.00	46330.	B	1757.54	4.18B	4.18	12.07	12.07
18.33	46576.	B	1671.32	7.44B	7.44	13.99	13.99
25.33L	23817.	C	1650.72	8.84B	8.84	14.97	14.97
25.33R	20819.	C	1650.22	7.36B	7.36	14.97	14.97
27.33L	20829.	C	1644.80	26.80B	26.80	15.27	15.27
27.33R	45634.	B	1377.06	15.05B	15.05	12.42	12.42
36.67	13958.	C	1361.55	5.66B	5.66	13.80	13.80
55.00	23421.	C	1332.56	14.98B	14.98	17.22	17.22
57.33L	13565.	C	1329.18	8.87B	8.87	17.70	17.70
57.33R	13466.	C	1328.93	8.81B	8.81	17.70	17.70
59.33L	13429.	C	1326.20	7.54B	7.54	18.12	18.12
59.33R	12173.	C	922.00	6.83B	6.83	11.98	11.98
73.33	36000.	B	658.50	6.09B	6.09	9.80	9.80
91.67	36000.	B	644.47	4.77B	4.77	12.36	12.36
110.00	36000.	B	632.76	3.33B	3.33	15.60	15.60
128.33	36000.	B	623.62	3.10B	3.10	11.61	11.61
146.67	36000.	B	617.31	4.15B	4.15	8.63	8.63
161.33L	36000.	B	773.65	6.31B	6.31	10.09	10.09
161.33R	36000.	B	773.47	3.45B	3.45	10.09	10.09
165.00	36000.	B	769.68	4.26B	4.26	9.67	9.67
183.33	9331.	C	488.42	>999.00B	>999.00	4.19	4.19

Service II
(Assumes permit truck is only loading in all lanes)

Span 1

Location	Allowable Stress		Rating Factors Bending		
			Inv.	Oper.	
0.00	34200.	S	> 999.00	B	>999.00
18.33	34200.	S	6.02	B	6.02
22.00L	34200.	S	4.98	B	4.98
22.00R	34200.	S	8.65	B	8.65
36.67	34200.	S	5.89	B	5.89
55.00	34200.	S	4.48	B	4.48
73.33	34200.	S	4.73	B	4.73
91.67	34200.	S	6.53	B	6.53
110.00	34200.	S	7.98	B	7.98
122.00L	34200.	S	10.68	B	10.68
122.00R	34200.	S	10.69	B	10.69
124.00L	34200.	S	11.22	B	11.22
124.00R	34200.	S	9.38	B	9.38
128.33	47500.	S	14.92	B	14.92
146.67	47500.	S	10.76	B	10.76
154.00L	47500.	S	9.14	B	9.14

154.00R	47500. S	9.50 B	9.50
156.00L	47500. S	31.80 B	31.80
156.00R	47500. S	53.61 B	53.61
165.00	47500. S	13.05 B	13.05
183.33	47500. S	8.22 B	8.22

Span 2

Location	Allowable Stress	Rating Factors Bending Inv.	Oper.
0.00	34200. S	8.22 B	8.22
25.00	34200. S	17.34 B	17.34
28.00L	34200. S	18.69 B	18.69
28.00R	34200. S	18.28 B	18.28
30.00L	34200. S	68.06 B	68.06
30.00R	34200. S	41.69 B	41.69
50.00	34200. S	17.85 B	18.28
55.33L	34200. S	14.93 B	14.93
55.33R	34200. S	14.92 B	14.92
57.33L	34200. S	14.07 B	14.07
57.33R	34200. S	17.12 B	17.12
75.00	34200. S	11.44 B	11.44
100.00	34200. S	8.51 B	8.51
125.00	47500. S	7.84 B	7.84
150.00	47500. S	8.50 B	8.50
175.00	47500. S	11.37 B	11.37
190.67L	47500. S	16.09 B	16.09
190.67R	47500. S	16.11 B	16.11
192.67L	47500. S	17.01 B	17.01
192.67R	47500. S	13.97 B	13.97
200.00	47500. S	17.71 B	18.36
218.00L	47500. S	12.48 B	12.48
218.00R	47500. S	12.84 B	12.84
220.00L	47500. S	43.02 B	43.02
220.00R	47500. S	69.40 B	69.40
225.00	47500. S	17.35 B	17.35
250.00	47500. S	8.22 B	8.22

Span 3

Location	Allowable Stress	Rating Factors Bending Inv.	Oper.
0.00	34200. S	8.22 B	8.22
18.33	34200. S	13.09 B	13.09
25.33L	34200. S	15.07 B	15.07
25.33R	34200. S	14.67 B	14.67
27.33L	34200. S	52.61 B	52.61
27.33R	34200. S	30.69 B	30.69
36.67	34200. S	10.74 B	10.74
55.00	34200. S	14.77 B	14.77
57.33L	34200. S	14.08 B	15.29
57.33R	34200. S	14.08 B	15.27
59.33L	34200. S	13.00 B	13.00
59.33R	34200. S	15.55 B	15.55
73.33	34200. S	8.02 B	8.02
91.67	34200. S	6.53 B	6.53
110.00	34200. S	4.70 B	4.70
128.33	34200. S	4.45 B	4.45
146.67	34200. S	5.85 B	5.85
161.33L	34200. S	8.61 B	8.61
161.33R	34200. S	4.95 B	4.95
165.00	34200. S	5.98 B	5.98
183.33	34200. S	> 999.00 B	>999.00

****
Minimum rating is 3.10 at location 128.33 in span 3.
****

Classified at Strength II because of description
in 3.4.1 for other than HL93 vehicle.

Rating Codes:
T - Top steel governs
B - Bottom steel governs
C - Concrete governs
R - Rebar governs
V - Shear governs
S - Serviceability governs

Mom Strength Codes:
C - Compact
B - Braced non-compact
U - Unbraced non-compact
T - Transition between compact and braced non-compact
S - Serviceability

Noncompact shapes ratings based on stress, as

$$IR = \frac{Fb - \text{factored dead load stress}}{\text{factored LL+I stress}}$$

Inventory rating for Strength II if only permit
loading on the system uses PBETA. Operating rating
uses IR(PBETA/1.35).

I-295 HH BUCKMAN BRIDGE -720249
Girder 4 : Rating Output : Lrfd Ratings
Mon Mar 30 10:57:52 2015

[This table uses the rating equation (6A.4.2.1-1)
of the 2011 edition of the Manual for Bridge
Evaluation.]

Permit

Strength II
(Assumes permit truck is only loading)

Span 1

Location	Allowable	Shear	Rating Factors Bending		Shear	
			Inv.	Oper.	Inv.	Oper.
0.00	9331. C	488.42	>999.00B	>999.00	4.19	4.19
18.33	36000. B	769.69	4.65B	4.65	10.39	10.39
22.00L	36000. B	773.47	3.78B	3.78	11.21	11.21
22.00R	36000. B	773.65	6.77B	6.77	11.22	11.22
36.67	36000. B	617.31	4.37B	4.37	11.81	11.81
55.00	36000. B	623.62	3.27B	3.27	15.72	15.72
73.33	36000. B	632.76	3.42B	3.42	14.20	14.20
91.67	36000. B	644.47	4.94B	4.94	11.87	11.87
110.00	36000. B	658.50	6.52B	6.52	9.40	9.40
122.00L	36000. B	918.49	9.27B	9.27	12.46	12.46
122.00R	36000. B	918.79	7.41T	7.41	12.46	12.46
124.00L	12519. C	922.00	7.76B	7.76	12.28	12.28
124.00R	13522. C	1326.20	8.39B	8.39	18.44	18.44
128.33	13611. C	1332.57	8.98B	8.98	17.82	17.82
146.67	13973. C	1361.56	6.53B	6.53	15.06	15.06
154.00L	45675. B	1373.66	5.47B	5.47	14.18	14.18
154.00R	45672. B	1638.91	6.13B	6.13	17.33	17.33
156.00L	43981. B	1644.31	20.90B	20.90	17.54	17.54
156.00R	23766. C	1644.80	40.08B	40.08	17.55	17.55
165.00	46576. B	1671.34	9.00B	9.00	16.10	16.10
183.33	46329. B	1757.69	5.09B	5.09	12.54	12.54

Span 2

Location	Allowable	Shear	Rating Factors Bending		Shear	
			Inv.	Oper.	Inv.	Oper.
0.00	46329. B	1778.71	5.09B	5.09	13.37	13.37
25.00	46559. B	1747.50	10.19B	10.19	17.41	17.41
28.00L	46976. B	1747.50	11.06B	11.06	17.94	17.94
28.00R	21738. C	1747.50	9.07B	9.07	17.94	17.94
30.00L	21800. C	1747.50	36.41B	36.41	18.28	18.28
30.00R	45307. B	1450.84	21.85B	21.85	14.80	14.80
50.00	47985. B	1450.84	10.24B	10.24	17.29	17.29
55.33L	45690. B	1450.84	10.84B	10.84	17.94	17.94
55.33R	45690. B	1450.84	13.53B	13.53	17.94	17.94
57.33L	45690. B	1450.84	11.34B	11.34	18.17	18.17
57.33R	19118. C	1450.84	11.30B	11.30	18.17	18.17
75.00	29713. C	974.23	11.70B	11.70	12.77	12.77

100.00	29713. C	974.23	8.36B	8.36	16.61	16.61
125.00	29713. C	973.68	7.64B	7.64	18.93	18.93
150.00	29713. C	974.23	8.41B	8.41	18.65	18.65
175.00	29713. C	974.23	11.71B	11.71	14.47	14.47
190.67L	29713. C	1450.84	16.61B	16.61	21.15	21.15
190.67R	30626. C	1450.84	17.13B	17.13	21.15	21.15
192.67L	19343. C	1450.84	11.39B	11.39	20.92	20.92
192.67R	45936. B	1450.84	9.11B	9.11	20.92	20.92
200.00	47985. B	1450.84	10.56B	10.56	19.97	19.97
218.00L	45307. B	1450.84	6.62B	6.62	17.80	17.80
218.00R	45307. B	1747.50	7.37B	7.37	21.96	21.96
220.00L	43540. B	1747.50	25.24B	25.24	21.44	21.44
220.00R	43540. B	1747.50	43.02B	43.02	21.44	21.44
225.00	45307. B	1747.50	10.49B	10.49	20.04	20.04
250.00	46330. B	1778.84	5.23B	5.23	13.16	13.16

Span 3

Location	Allowable	Shear	Rating Factors Bending		Shear	
			Inv.	Oper.	Inv.	Oper.
0.00	46330. B	1757.54	5.23B	5.23	13.07	13.07
18.33	46576. B	1671.32	8.61B	8.61	15.63	15.63
25.33L	23824. C	1650.72	9.89B	9.89	16.57	16.57
25.33R	20868. C	1650.22	8.28B	8.28	16.56	16.56
27.33L	20868. C	1644.80	32.71B	32.71	16.80	16.80
27.33R	45634. B	1377.06	18.52B	18.52	13.72	13.72
36.67	13955. C	1361.55	5.88B	5.88	14.52	14.52
55.00	13602. C	1332.56	8.39B	8.39	16.71	16.71
57.33L	13556. C	1329.18	8.72B	8.72	17.06	17.06
57.33R	13456. C	1328.93	8.66B	8.66	17.05	17.05
59.33L	13420. C	1326.20	8.12B	8.12	17.37	17.37
59.33R	12127. C	922.00	7.32B	7.32	11.46	11.46
73.33	36000. B	658.50	6.45B	6.45	9.19	9.19
91.67	36000. B	644.47	4.87B	4.87	11.68	11.68
110.00	36000. B	632.76	3.37B	3.37	14.48	14.48
128.33	36000. B	623.62	3.20B	3.20	11.21	11.21
146.67	36000. B	617.31	4.27B	4.27	8.44	8.44
161.33L	36000. B	773.65	6.66B	6.66	10.47	10.47
161.33R	36000. B	773.47	3.69B	3.69	10.47	10.47
165.00	36000. B	769.68	4.56B	4.56	10.08	10.08
183.33	9331. C	488.42	>999.00B	>999.00	4.29	4.29

Service II
(Assumes permit truck is only loading in all lanes)

Span 1

Location	Allowable Stress	Rating Factors Bending	
		Inv.	Oper.
0.00	34200. S	> 999.00 B	>999.00
18.33	34200. S	6.48 B	6.48
22.00L	34200. S	5.36 B	5.36
22.00R	34200. S	9.19 B	9.19
36.67	34200. S	6.12 B	6.12
55.00	34200. S	4.66 B	4.66
73.33	34200. S	4.83 B	4.83
91.67	34200. S	6.73 B	6.73
110.00	34200. S	8.56 B	8.56
122.00L	34200. S	11.90 B	11.90
122.00R	34200. S	11.90 B	11.90
124.00L	34200. S	12.34 B	12.34
124.00R	34200. S	10.30 B	10.30
128.33	47500. S	15.61 B	15.61
146.67	47500. S	12.26 B	12.26
154.00L	47500. S	10.77 B	10.77

154.00R	47500. S	11.14	B	11.14
156.00L	47500. S	40.52	B	40.52
156.00R	47500. S	67.14	B	67.14
165.00	47500. S	15.59	B	15.59
183.33	47500. S	9.67	B	9.67

Span 2

Location	Allowable Stress	Rating Factors Bending Inv.		Oper.
0.00	34200. S	9.67	B	9.67
25.00	34200. S	17.40	B	17.40
28.00L	34200. S	18.51	B	18.51
28.00R	34200. S	18.08	B	18.08
30.00L	34200. S	71.84	B	71.84
30.00R	34200. S	43.56	B	43.56
50.00	34200. S	17.44	B	17.44
55.33L	34200. S	17.29	B	19.17
55.33R	34200. S	17.29	B	19.15
57.33L	34200. S	15.96	B	15.96
57.33R	34200. S	19.39	B	19.39
75.00	34200. S	12.60	B	12.60
100.00	34200. S	8.73	B	8.73
125.00	47500. S	7.89	B	7.89
150.00	47500. S	8.80	B	8.80
175.00	47500. S	12.62	B	12.62
190.67L	47500. S	18.28	B	18.28
190.67R	47500. S	18.30	B	18.30
192.67L	47500. S	19.31	B	19.31
192.67R	47500. S	15.91	B	15.91
200.00	47500. S	17.94	B	17.94
218.00L	47500. S	12.89	B	12.89
218.00R	47500. S	13.26	B	13.26
220.00L	47500. S	48.53	B	48.53
220.00R	47500. S	78.31	B	78.31
225.00	47500. S	18.44	B	18.44
250.00	47500. S	9.89	B	9.89

Span 3

Location	Allowable Stress	Rating Factors Bending Inv.		Oper.
0.00	34200. S	9.89	B	9.89
18.33	34200. S	15.01	B	15.01
25.33L	34200. S	16.79	B	16.79
25.33R	34200. S	16.37	B	16.37
27.33L	34200. S	63.83	B	63.83
27.33R	34200. S	37.48	B	37.48
36.67	34200. S	11.19	B	11.19
55.00	34200. S	14.64	B	14.64
57.33L	34200. S	15.09	B	15.09
57.33R	34200. S	15.07	B	15.07
59.33L	34200. S	14.04	B	14.04
59.33R	34200. S	16.85	B	16.85
73.33	34200. S	8.47	B	8.47
91.67	34200. S	6.64	B	6.64
110.00	34200. S	4.77	B	4.77
128.33	34200. S	4.59	B	4.59
146.67	34200. S	6.01	B	6.01
161.33L	34200. S	9.06	B	9.06
161.33R	34200. S	5.25	B	5.25
165.00	34200. S	6.37	B	6.37
183.33	34200. S	> 999.00	B	>999.00

****
Minimum rating is 3.20 at location 128.33 in span 3.
****

Classified at Strength II because of description
in 3.4.1 for other than HL93 vehicle.

Rating Codes:
T - Top steel governs
B - Bottom steel governs
C - Concrete governs
R - Rebar governs
V - Shear governs
S - Serviceability governs

Mom Strength Codes:
C - Compact
B - Braced non-compact
U - Unbraced non-compact
T - Transition between compact and braced non-compact
S - Serviceability

Noncompact shapes ratings based on stress, as

$$IR = \frac{Fb - \text{factored dead load stress}}{\text{factored LL+I stress}}$$

Inventory rating for Strength II if only permit
loading on the system uses PBETA. Operating rating
uses IR(PBETA/1.35).

I-295 HH BUCKMAN BRIDGE -720249
Girder 5 : Rating Output : Lrfd Ratings
Mon Mar 30 10:58:04 2015

[This table uses the rating equation (6A.4.2.1-1)
of the 2011 edition of the Manual for Bridge
Evaluation.]

Permit

Strength II
(Assumes permit truck is only loading)

Span 1

Location	Allowable	Shear	Rating Factors Bending		Shear	
			Inv.	Oper.	Inv.	Oper.
0.00	36000. B	347.57	>999.00B	>999.00	2.35	2.35
18.33	36000. B	461.91	6.59B	6.59	5.82	5.82
36.67	36000. B	476.29	3.58B	3.58	9.52	9.52
38.00L	36000. B	477.22	3.47B	3.47	9.82	9.82
38.00R	36000. B	477.34	4.23B	4.23	9.82	9.82
55.00	36000. B	435.91	3.22B	3.22	11.61	11.61
73.33	36000. B	447.75	3.39B	3.39	10.13	10.13
91.67	36000. B	514.98	4.72B	4.72	8.69	8.69
94.00L	36000. B	520.37	4.96B	4.96	8.46	8.46
94.00R	36000. B	520.76	4.62B	4.62	8.46	8.46
110.00	36000. B	559.21	6.04B	6.04	7.03	7.03
128.33	35223. B	695.47	6.39B	6.39	6.33	6.33
146.67	35178. B	842.04	4.65B	4.65	6.15	6.15
155.33L	28998. B	928.08	2.83B	2.83	6.43	6.43
155.33R	28971. B	929.75	4.64B	4.64	6.45	6.45
165.00	30326. B	1380.66	4.77B	4.77	10.10	10.10
183.33	35100. B	1263.48	2.31B	2.31	7.12	7.12

Span 2

Location	Allowable	Shear	Rating Factors Bending		Shear	
			Inv.	Oper.	Inv.	Oper.
0.00	35100. B	1274.84	2.31B	2.31	6.55	6.55
21.00L	35318. B	923.38	5.32B	5.32	5.82	5.82
21.00R	35318. B	922.51	3.17B	3.17	5.82	5.82
25.00	35313. B	902.13	3.84B	3.84	6.05	6.05
50.00	35226. B	789.55	8.71B	8.71	8.04	8.04
75.00	36000. B	588.76	6.31B	6.31	7.19	7.19
76.00L	36000. B	587.44	6.14B	6.14	7.27	7.27
76.00R	36000. B	587.20	6.54B	6.54	7.27	7.27
99.50L	36000. B	506.39	4.01B	4.01	9.47	9.47
99.50R	36000. B	506.31	4.67B	4.67	9.47	9.47
100.00	36000. B	506.10	4.64B	4.64	9.58	9.58
125.00L	36000. B	502.51	4.03B	4.03	14.01	14.01
125.00R	36000. B	502.55	4.03B	4.03	14.01	14.01
150.00	36000. B	521.48	4.66B	4.66	12.15	12.15
174.00L	36000. B	626.29	6.58B	6.58	9.17	9.17
174.00R	36000. B	626.70	6.18B	6.18	9.18	9.18

150.50L	36000. B	522.06	4.70B	4.70	12.01	12.01
150.50R	36000. B	522.30	4.04B	4.04	12.02	12.02
175.00	36000. B	628.95	6.35B	6.35	9.07	9.07
200.00	35218. B	865.31	8.43B	8.43	9.64	9.64
225.00	30828. B	1008.02	3.24B	3.24	7.70	7.70
229.00L	30521. B	1033.20	2.66B	2.66	7.39	7.39
229.00R	30507. B	1034.27	4.55B	4.55	7.41	7.41
250.00	30889. B	1415.29	2.27B	2.27	7.78	7.78

Span 3

Location	Allowable	Shear	Rating Factors Bending		Shear	
			Inv.	Oper.	Inv.	Oper.
0.00	30889. B	1416.13	2.27B	2.27	7.76	7.76
18.33	32863. B	1199.86	4.20B	4.20	7.70	7.70
28.00L	32495. B	765.29	4.75B	4.75	4.62	4.62
28.00R	32509. B	763.96	2.80B	2.80	4.61	4.61
36.67	32340. B	695.47	3.58B	3.58	4.66	4.66
55.00	35223. B	600.54	6.46B	6.46	5.71	5.71
73.33	36000. B	514.98	6.04B	6.04	6.70	6.70
89.33L	36000. B	504.07	4.76B	4.76	8.61	8.61
89.33R	36000. B	503.96	5.11B	5.11	8.61	8.61
91.67	36000. B	502.42	4.90B	4.90	8.90	8.90
110.00	36000. B	435.91	3.46B	3.46	9.79	9.79
128.33	36000. B	476.29	3.25B	3.25	9.28	9.28
145.33L	36000. B	463.01	4.24B	4.24	6.79	6.79
145.33R	36000. B	462.88	3.47B	3.47	6.79	6.79
146.67	36000. B	461.91	3.58B	3.58	6.65	6.65
165.00	36000. B	484.57	6.51B	6.51	5.75	5.75
183.33	36000. B	338.37	>999.00B	>999.00	2.39	2.39

Service II
(Assumes permit truck is only loading in all lanes)

Span 1

Location	Allowable Stress	Rating Factors Bending	
		Inv.	Oper.
0.00	34200. S	> 999.00 B	>999.00
18.33	34200. S	8.94 B	8.94
36.67	34200. S	5.12 B	5.12
38.00L	34200. S	4.97 B	4.97
38.00R	34200. S	5.95 B	5.95
55.00	34200. S	4.60 B	4.60
73.33	34200. S	4.77 B	4.77
91.67	34200. S	6.43 B	6.43
94.00L	34200. S	6.71 B	6.71
94.00R	34200. S	6.27 B	6.27
110.00	34200. S	7.89 B	7.89
128.33	34200. S	9.70 B	9.70
146.67	34200. S	7.58 B	7.58
155.33L	34200. S	6.93 B	6.93
155.33R	34200. S	9.92 B	9.92
165.00	34200. S	10.02 B	10.02
183.33	34200. S	4.61 B	4.61

Span 2

Location	Allowable Stress	Rating Factors Bending	
		Inv.	Oper.

0.00	34200.	S	4.61	B	4.61
21.00L	34200.	S	8.74	B	8.74
21.00R	34200.	S	5.78	B	5.78
25.00	34200.	S	6.73	B	6.73
50.00	34200.	S	13.37	B	13.37
75.00	34200.	S	8.34	B	8.34
76.00L	34200.	S	8.13	B	8.13
76.00R	34200.	S	8.66	B	8.66
99.50L	34200.	S	5.55	B	5.55
99.50R	34200.	S	6.40	B	6.40
100.00	34200.	S	6.36	B	6.36
125.00L	34200.	S	5.62	B	5.62
125.00R	34200.	S	5.62	B	5.62
150.00	34200.	S	6.39	B	6.39
174.00L	34200.	S	8.69	B	8.69
174.00R	34200.	S	8.18	B	8.18
150.50L	34200.	S	6.43	B	6.43
150.50R	34200.	S	5.59	B	5.59
175.00	34200.	S	8.38	B	8.38
200.00	34200.	S	12.93	B	12.93
225.00	34200.	S	7.24	B	7.24
229.00L	34200.	S	6.45	B	6.45
229.00R	34200.	S	9.45	B	9.45
250.00	34200.	S	5.89	B	5.89

Span 3

Location	Allowable Stress		Rating Factors Bending Inv.		Oper.
0.00	34200.	S	5.89	B	5.89
18.33	34200.	S	8.09	B	8.09
28.00L	34200.	S	8.72	B	8.72
28.00R	34200.	S	5.82	B	5.82
36.67	34200.	S	6.85	B	6.85
55.00	34200.	S	9.81	B	9.81
73.33	34200.	S	7.90	B	7.90
89.33L	34200.	S	6.47	B	6.47
89.33R	34200.	S	6.93	B	6.93
91.67	34200.	S	6.68	B	6.68
110.00	34200.	S	4.88	B	4.88
128.33	34200.	S	4.64	B	4.64
145.33L	34200.	S	5.97	B	5.97
145.33R	34200.	S	4.98	B	4.98
146.67	34200.	S	5.13	B	5.13
165.00	34200.	S	8.85	B	8.85
183.33	34200.	S	> 999.00	B	>999.00

****
Minimum rating is 2.27 at location 250.00 in span 2.
****

Classified at Strength II because of description
in 3.4.1 for other than HL93 vehicle.

Rating Codes:
T - Top steel governs
B - Bottom steel governs
C - Concrete governs
R - Rebar governs
V - Shear governs
S - Serviceability governs

Mom Strength Codes:
C - Compact
B - Braced non-compact
U - Unbraced non-compact
T - Transition between compact and braced non-compact
S - Serviceability

Noncompact shapes ratings based on stress, as

Fb - factored dead load stress

$$IR = \frac{\text{PBETA}}{\text{factored LL+I stress}}$$

Inventory rating for Strength II if only permit loading on the system uses PBETA. Operating rating uses IR(PBETA/1.35).

I-295 HH BUCKMAN BRIDGE -720249
Girder 6 : Rating Output : Lrfd Ratings
Mon Mar 30 10:58:52 2015

[This table uses the rating equation (6A.4.2.1-1) of the 2011 edition of the Manual for Bridge Evaluation.]

Permit

Strength II
(Assumes permit truck is only loading)

Span 1

Location	Allowable	Shear	Rating Factors Bending		Shear	
			Inv.	Oper.	Inv.	Oper.
0.00	36000. B	347.57	>999.00B	>999.00	2.46	2.46
18.33	36000. B	461.91	6.80B	6.80	5.70	5.70
36.67	36000. B	476.29	3.68B	3.68	8.99	8.99
38.00L	36000. B	477.22	3.56B	3.56	9.26	9.26
38.00R	36000. B	477.34	4.31B	4.31	9.26	9.26
55.00	36000. B	435.91	3.19B	3.19	10.96	10.96
73.33	36000. B	447.75	3.33B	3.33	10.07	10.07
91.67	36000. B	514.98	4.67B	4.67	8.26	8.26
94.00L	36000. B	520.37	4.90B	4.90	8.07	8.07
94.00R	36000. B	520.76	4.57B	4.57	8.08	8.08
110.00	36000. B	559.21	6.03B	6.03	7.20	7.20
128.33	35178. B	695.47	6.56B	6.56	6.86	6.86
146.67	30325. B	842.04	4.31B	4.31	7.28	7.28
155.33L	28997. B	928.08	3.52B	3.52	7.59	7.59
155.33R	28970. B	929.75	5.49B	5.49	7.61	7.61
165.00	30888. B	1380.66	5.83B	5.83	11.47	11.47
183.33	35100. B	1263.48	3.07B	3.07	7.71	7.71

Span 2

Location	Allowable	Shear	Rating Factors Bending		Shear	
			Inv.	Oper.	Inv.	Oper.
0.00	35100. B	1274.84	3.07B	3.07	7.78	7.78
21.00L	35318. B	923.38	5.71B	5.71	6.74	6.74
21.00R	35318. B	922.51	3.47B	3.47	6.73	6.73
25.00	35201. B	902.13	4.02B	4.02	6.88	6.88
50.00	35252. B	789.55	8.22B	8.22	7.68	7.68
75.00	36000. B	588.76	6.35B	6.35	6.40	6.40
76.00L	36000. B	587.44	6.16B	6.16	6.47	6.47
76.00R	36000. B	587.20	6.56B	6.56	6.46	6.46
99.50L	36000. B	506.39	3.77B	3.77	8.78	8.78
99.50R	36000. B	506.31	4.38B	4.38	8.78	8.78
100.00	36000. B	506.10	4.35B	4.35	8.91	8.91
125.00L	36000. B	502.51	3.70B	3.70	13.75	13.75
125.00R	36000. B	502.55	3.70B	3.70	13.76	13.76
150.00	36000. B	521.48	4.44B	4.44	10.83	10.83
174.00L	36000. B	626.29	6.72B	6.72	8.09	8.09
174.00R	36000. B	626.70	6.32B	6.32	8.10	8.10

150.50L	36000. B	522.06	4.48B	4.48	10.68	10.68
150.50R	36000. B	522.30	3.86B	3.86	10.68	10.68
175.00	36000. B	628.95	6.51B	6.51	8.02	8.02
200.00	35218. B	865.31	8.21B	8.21	9.77	9.77
225.00	30827. B	1008.02	3.67B	3.67	9.19	9.19
229.00L	30520. B	1033.20	3.15B	3.15	8.88	8.88
229.00R	30506. B	1034.27	5.16B	5.16	8.89	8.89
250.00	30888. B	1415.29	3.15B	3.15	9.01	9.01

Span 3

Location	Allowable	Shear	Rating Factors Bending		Shear	
			Inv.	Oper.	Inv.	Oper.
0.00	30888. B	1416.13	3.15B	3.15	8.90	8.90
18.33	32862. B	1199.86	4.84B	4.84	9.13	9.13
28.00L	32494. B	765.29	5.18B	5.18	5.46	5.46
28.00R	32508. B	763.96	3.16B	3.16	5.45	5.45
36.67	32339. B	695.47	3.76B	3.76	5.29	5.29
55.00	35223. B	600.54	6.19B	6.19	5.87	5.87
73.33	36000. B	514.98	5.95B	5.95	6.41	6.41
89.33L	36000. B	504.07	4.63B	4.63	8.30	8.30
89.33R	36000. B	503.96	4.96B	4.96	8.30	8.30
91.67	36000. B	502.42	4.76B	4.76	8.60	8.60
110.00	36000. B	435.91	3.37B	3.37	9.56	9.56
128.33	36000. B	476.29	3.18B	3.18	8.83	8.83
145.33L	36000. B	463.01	4.28B	4.28	6.49	6.49
145.33R	36000. B	462.88	3.52B	3.52	6.49	6.49
146.67	36000. B	461.91	3.64B	3.64	6.37	6.37
165.00	36000. B	484.57	6.66B	6.66	5.86	5.86
183.33	36000. B	338.37	>999.00B	>999.00	2.48	2.48

Service II
(Assumes permit truck is only loading in all lanes)

Span 1

Location	Allowable Stress	Rating Factors Bending	
		Inv.	Oper.
0.00	34200. S	> 999.00 B	>999.00
18.33	34200. S	9.17 B	9.17
36.67	34200. S	5.21 B	5.21
38.00L	34200. S	5.05 B	5.05
38.00R	34200. S	6.01 B	6.01
55.00	34200. S	4.51 B	4.51
73.33	34200. S	4.65 B	4.65
91.67	34200. S	6.32 B	6.32
94.00L	34200. S	6.60 B	6.60
94.00R	34200. S	6.18 B	6.18
110.00	34200. S	7.84 B	7.84
128.33	34200. S	9.97 B	9.97
146.67	34200. S	8.63 B	8.63
155.33L	34200. S	8.07 B	8.07
155.33R	34200. S	11.31 B	11.31
165.00	34200. S	11.40 B	11.40
183.33	34200. S	5.66 B	5.66

Span 2

Location	Allowable Stress	Rating Factors Bending	
		Inv.	Oper.

0.00	34200. S	5.66	B	5.66
21.00L	34200. S	9.29	B	9.29
21.00R	34200. S	6.22	B	6.22
25.00	34200. S	7.04	B	7.04
50.00	34200. S	12.69	B	12.69
75.00	34200. S	8.35	B	8.35
76.00L	34200. S	8.12	B	8.12
76.00R	34200. S	8.63	B	8.63
99.50L	34200. S	5.21	B	5.21
99.50R	34200. S	5.99	B	5.99
100.00	34200. S	5.96	B	5.96
125.00L	34200. S	5.16	B	5.16
125.00R	34200. S	5.16	B	5.16
150.00	34200. S	6.06	B	6.06
174.00L	34200. S	8.82	B	8.82
174.00R	34200. S	8.31	B	8.31
150.50L	34200. S	6.11	B	6.11
150.50R	34200. S	5.32	B	5.32
175.00	34200. S	8.53	B	8.53
200.00	34200. S	12.65	B	12.65
225.00	34200. S	7.94	B	7.94
229.00L	34200. S	7.25	B	7.25
229.00R	34200. S	10.41	B	10.41
250.00	34200. S	7.25	B	7.25

Span 3

Location	Allowable Stress	Rating Factors Bending Inv.		Oper.
0.00	34200. S	7.25	B	7.25
18.33	34200. S	9.00	B	9.00
28.00L	34200. S	9.34	B	9.34
28.00R	34200. S	6.34	B	6.34
36.67	34200. S	7.12	B	7.12
55.00	34200. S	9.43	B	9.43
73.33	34200. S	7.76	B	7.76
89.33L	34200. S	6.26	B	6.26
89.33R	34200. S	6.70	B	6.70
91.67	34200. S	6.46	B	6.46
110.00	34200. S	4.73	B	4.73
128.33	34200. S	4.52	B	4.52
145.33L	34200. S	5.99	B	5.99
145.33R	34200. S	5.02	B	5.02
146.67	34200. S	5.17	B	5.17
165.00	34200. S	9.02	B	9.02
183.33	34200. S	> 999.00	B	>999.00

****
Minimum rating is 2.46 at location 0.00 in span 1.
****

Classified at Strength II because of description
in 3.4.1 for other than HL93 vehicle.

Rating Codes:
T - Top steel governs
B - Bottom steel governs
C - Concrete governs
R - Rebar governs
V - Shear governs
S - Serviceability governs

Mom Strength Codes:
C - Compact
B - Braced non-compact
U - Unbraced non-compact
T - Transition between compact and braced non-compact
S - Serviceability

Noncompact shapes ratings based on stress, as

Fb - factored dead load stress

$$IR = \frac{\text{PBETA}}{\text{factored LL+I stress}}$$

Inventory rating for Strength II if only permit loading on the system uses PBETA. Operating rating uses IR(PBETA/1.35).

I-295 HH BUCKMAN BRIDGE -720249
Girder 7 : Rating Output : Lrfd Ratings
Mon Mar 30 10:59:04 2015

[This table uses the rating equation (6A.4.2.1-1)
of the 2011 edition of the Manual for Bridge
Evaluation.]

Permit

Strength II
(Assumes permit truck is only loading)

Span 1

Location	Allowable	Shear	Rating Factors Bending		Shear	
			Inv.	Oper.	Inv.	Oper.
0.00	36000. B	347.57	>999.00B	>999.00	2.29	2.29
18.33	36000. B	461.91	6.20B	6.20	5.07	5.07
36.67	36000. B	476.29	3.45B	3.45	7.97	7.97
38.00L	36000. B	477.22	3.34B	3.34	8.20	8.20
38.00R	36000. B	477.34	4.02B	4.02	8.20	8.20
55.00	36000. B	435.91	3.01B	3.01	9.67	9.67
73.33	36000. B	447.75	3.08B	3.08	9.74	9.74
91.67	36000. B	514.98	4.25B	4.25	8.07	8.07
94.00L	36000. B	520.37	4.44B	4.44	7.88	7.88
94.00R	36000. B	520.76	4.15B	4.15	7.88	7.88
110.00	36000. B	559.21	5.19B	5.19	6.89	6.89
128.33	35178. B	695.47	5.44B	5.44	6.51	6.51
146.67	30325. B	842.04	3.79B	3.79	6.81	6.81
155.33L	28997. B	928.08	3.23B	3.23	7.08	7.08
155.33R	28970. B	929.75	4.90B	4.90	7.10	7.10
165.00	30888. B	1380.66	5.38B	5.38	10.64	10.64
183.33	35100. B	1263.48	3.18B	3.18	7.28	7.28

Span 2

Location	Allowable	Shear	Rating Factors Bending		Shear	
			Inv.	Oper.	Inv.	Oper.
0.00	35100. B	1274.84	3.18B	3.18	7.09	7.09
21.00L	35318. B	923.38	5.68B	5.68	6.20	6.20
21.00R	35318. B	922.51	3.57B	3.57	6.19	6.19
25.00	35201. B	902.13	4.07B	4.07	6.34	6.34
50.00	35252. B	789.55	7.16B	7.16	7.13	7.13
75.00	36000. B	588.76	5.45B	5.45	5.87	5.87
76.00L	36000. B	587.44	5.29B	5.29	5.92	5.92
76.00R	36000. B	587.20	5.63B	5.63	5.92	5.92
99.50L	36000. B	506.39	3.31B	3.31	7.74	7.74
99.50R	36000. B	506.31	3.83B	3.83	7.74	7.74
100.00	36000. B	506.10	3.80B	3.80	7.85	7.85
125.00L	36000. B	502.51	3.28B	3.28	12.44	12.44
125.00R	36000. B	502.55	3.28B	3.28	12.44	12.44
150.00	36000. B	521.48	3.87B	3.87	9.76	9.76
174.00L	36000. B	626.29	5.66B	5.66	7.48	7.48
174.00R	36000. B	626.70	5.33B	5.33	7.49	7.49

150.50L	36000. B	522.06	3.90B	3.90	9.63	9.63
150.50R	36000. B	522.30	3.38B	3.38	9.63	9.63
175.00	36000. B	628.95	5.48B	5.48	7.42	7.42
200.00	35218. B	865.31	7.20B	7.20	9.09	9.09
225.00	30827. B	1008.02	3.70B	3.70	8.30	8.30
229.00L	30520. B	1033.20	3.24B	3.24	8.04	8.04
229.00R	30506. B	1034.27	5.13B	5.13	8.05	8.05
250.00	30888. B	1415.29	3.32B	3.32	8.24	8.24

Span 3

Location	Allowable	Shear	Rating Factors Bending		Shear	
			Inv.	Oper.	Inv.	Oper.
0.00	30888. B	1416.13	3.32B	3.32	8.30	8.30
18.33	32862. B	1199.86	4.59B	4.59	8.52	8.52
28.00L	32494. B	765.29	4.69B	4.69	5.22	5.22
28.00R	32508. B	763.96	2.95B	2.95	5.21	5.21
36.67	32339. B	695.47	3.34B	3.34	5.10	5.10
55.00	35223. B	600.54	5.09B	5.09	5.71	5.71
73.33	36000. B	514.98	5.20B	5.20	6.15	6.15
89.33L	36000. B	504.07	4.23B	4.23	7.98	7.98
89.33R	36000. B	503.96	4.54B	4.54	7.98	7.98
91.67	36000. B	502.42	4.37B	4.37	8.27	8.27
110.00	36000. B	435.91	3.11B	3.11	9.21	9.21
128.33	36000. B	476.29	3.00B	3.00	8.15	8.15
145.33L	36000. B	463.01	3.99B	3.99	5.91	5.91
145.33R	36000. B	462.88	3.30B	3.30	5.91	5.91
146.67	36000. B	461.91	3.41B	3.41	5.80	5.80
165.00	36000. B	484.57	6.07B	6.07	5.34	5.34
183.33	36000. B	338.37	>999.00B	>999.00	2.30	2.30

Service II
(Assumes permit truck is only loading in all lanes)

Span 1

Location	Allowable Stress	Rating Factors Bending	
		Inv.	Oper.
0.00	34200. S	> 999.00 B	>999.00
18.33	34200. S	8.34 B	8.34
36.67	34200. S	4.84 B	4.84
38.00L	34200. S	4.70 B	4.70
38.00R	34200. S	5.56 B	5.56
55.00	34200. S	4.22 B	4.22
73.33	34200. S	4.27 B	4.27
91.67	34200. S	5.73 B	5.73
94.00L	34200. S	5.96 B	5.96
94.00R	34200. S	5.58 B	5.58
110.00	34200. S	6.76 B	6.76
128.33	34200. S	8.23 B	8.23
146.67	34200. S	7.42 B	7.42
155.33L	34200. S	7.15 B	7.15
155.33R	34200. S	9.91 B	9.91
165.00	34200. S	10.34 B	10.34
183.33	34200. S	5.66 B	5.66

Span 2

Location	Allowable Stress	Rating Factors Bending	
		Inv.	Oper.

0.00	34200.	S	5.66 B	5.66
21.00L	34200.	S	9.13 B	9.13
21.00R	34200.	S	6.24 B	6.24
25.00	34200.	S	6.97 B	6.97
50.00	34200.	S	11.04 B	11.04
75.00	34200.	S	7.14 B	7.14
76.00L	34200.	S	6.95 B	6.95
76.00R	34200.	S	7.38 B	7.38
99.50L	34200.	S	4.54 B	4.54
99.50R	34200.	S	5.20 B	5.20
100.00	34200.	S	5.17 B	5.17
125.00L	34200.	S	4.54 B	4.54
125.00R	34200.	S	4.54 B	4.54
150.00	34200.	S	5.25 B	5.25
174.00L	34200.	S	7.41 B	7.41
174.00R	34200.	S	6.98 B	6.98
150.50L	34200.	S	5.28 B	5.28
150.50R	34200.	S	4.61 B	4.61
175.00	34200.	S	7.17 B	7.17
200.00	34200.	S	11.07 B	11.07
225.00	34200.	S	7.75 B	7.75
229.00L	34200.	S	7.17 B	7.17
229.00R	34200.	S	10.14 B	10.14
250.00	34200.	S	7.31 B	7.31

Span 3

Location	Allowable Stress		Rating Factors Bending Inv.	Oper.
0.00	34200.	S	7.31 B	7.31
18.33	34200.	S	8.34 B	8.34
28.00L	34200.	S	8.30 B	8.30
28.00R	34200.	S	5.74 B	5.74
36.67	34200.	S	6.19 B	6.19
55.00	34200.	S	7.73 B	7.73
73.33	34200.	S	6.76 B	6.76
89.33L	34200.	S	5.70 B	5.70
89.33R	34200.	S	6.09 B	6.09
91.67	34200.	S	5.90 B	5.90
110.00	34200.	S	4.33 B	4.33
128.33	34200.	S	4.21 B	4.21
145.33L	34200.	S	5.53 B	5.53
145.33R	34200.	S	4.66 B	4.66
146.67	34200.	S	4.80 B	4.80
165.00	34200.	S	8.19 B	8.19
183.33	34200.	S	> 999.00 B	>999.00

****
Minimum rating is 2.29 at location 0.00 in span 1.
****

Classified at Strength II because of description
in 3.4.1 for other than HL93 vehicle.

Rating Codes:
T - Top steel governs
B - Bottom steel governs
C - Concrete governs
R - Rebar governs
V - Shear governs
S - Serviceability governs

Mom Strength Codes:
C - Compact
B - Braced non-compact
U - Unbraced non-compact
T - Transition between compact and braced non-compact
S - Serviceability

Noncompact shapes ratings based on stress, as

Fb - factored dead load stress

$$IR = \frac{\text{PBETA}}{\text{factored LL+I stress}}$$

Inventory rating for Strength II if only permit loading on the system uses PBETA. Operating rating uses IR(PBETA/1.35).

I-295 HH BUCKMAN BRIDGE -720249
Girder 8 : Rating Output : Lrfd Ratings
Mon Mar 30 10:59:15 2015

[This table uses the rating equation (6A.4.2.1-1)
of the 2011 edition of the Manual for Bridge
Evaluation.]

Permit

Strength II
(Assumes permit truck is only loading)

Span 1

Location	Allowable	Shear	Rating Factors Bending		Shear	
			Inv.	Oper.	Inv.	Oper.
0.00	36000. B	347.57	>999.00B	>999.00	2.87	2.87
18.33	36000. B	461.91	6.45B	6.45	5.47	5.47
36.67	36000. B	476.29	3.37B	3.37	8.60	8.60
38.00L	36000. B	477.22	3.27B	3.27	8.88	8.88
38.00R	36000. B	477.34	3.89B	3.89	8.88	8.88
55.00	36000. B	435.91	2.95B	2.95	11.56	11.56
73.33	36000. B	447.75	2.93B	2.93	11.38	11.38
91.67	36000. B	514.98	3.64B	3.64	10.02	10.02
94.00L	36000. B	520.37	3.79B	3.79	9.71	9.71
94.00R	36000. B	520.76	3.55B	3.55	9.72	9.72
110.00	36000. B	559.21	4.75B	4.75	7.64	7.64
128.33	35184. B	695.47	4.88B	4.88	7.50	7.50
146.67	30537. B	842.04	3.55B	3.55	7.25	7.25
155.33L	29239. B	928.08	3.11B	3.11	7.49	7.49
155.33R	29213. B	929.75	4.63B	4.63	7.51	7.51
165.00	35058. B	1380.66	6.05B	6.05	11.30	11.30
183.33	35105. B	1263.48	3.21B	3.21	8.72	8.72

Span 2

Location	Allowable	Shear	Rating Factors Bending		Shear	
			Inv.	Oper.	Inv.	Oper.
0.00	35105. B	1274.84	3.21B	3.21	8.07	8.07
21.00L	35322. B	923.38	5.43B	5.43	6.47	6.47
21.00R	35322. B	922.51	3.50B	3.50	6.47	6.47
25.00	35208. B	902.13	3.93B	3.93	6.53	6.53
50.00	35258. B	789.55	6.29B	6.29	7.24	7.24
75.00	36000. B	588.76	5.15B	5.15	7.30	7.30
76.00L	36000. B	587.44	5.00B	5.00	7.39	7.39
76.00R	36000. B	587.20	5.32B	5.32	7.39	7.39
99.50L	36000. B	506.39	3.25B	3.25	8.84	8.84
99.50R	36000. B	506.31	3.74B	3.74	8.84	8.84
100.00	36000. B	506.10	3.71B	3.71	8.90	8.90
125.00L	36000. B	502.51	3.20B	3.20	15.08	15.08
125.00R	36000. B	502.55	3.20B	3.20	15.08	15.08
150.00	36000. B	521.48	3.74B	3.74	10.28	10.28
174.00L	36000. B	626.29	5.31B	5.31	8.81	8.81
174.00R	36000. B	626.70	5.01B	5.01	8.81	8.81

150.50L	36000. B	522.06	3.77B	3.77	10.22	10.22
150.50R	36000. B	522.30	3.28B	3.28	10.23	10.23
175.00	36000. B	628.95	5.14B	5.14	8.71	8.71
200.00	35224. B	865.31	6.34B	6.34	8.71	8.71
225.00	31022. B	1008.02	3.61B	3.61	7.99	7.99
229.00L	30721. B	1033.20	3.23B	3.23	7.89	7.89
229.00R	30708. B	1034.27	4.97B	4.97	7.90	7.90
250.00	31030. B	1415.29	3.48B	3.48	9.29	9.29

Span 3

Location	Allowable	Shear	Rating Factors Bending		Shear	
			Inv.	Oper.	Inv.	Oper.
0.00	31030. B	1416.13	3.48B	3.48	9.86	9.86
18.33	32968. B	1199.86	4.40B	4.40	9.38	9.38
28.00L	32611. B	765.29	4.43B	4.43	5.80	5.80
28.00R	32624. B	763.96	2.87B	2.87	5.79	5.79
36.67	32498. B	695.47	3.17B	3.17	5.68	5.68
55.00	35228. B	600.54	4.57B	4.57	6.47	6.47
73.33	36000. B	514.98	4.79B	4.79	7.10	7.10
89.33L	36000. B	504.07	3.89B	3.89	9.80	9.80
89.33R	36000. B	503.96	4.17B	4.17	9.79	9.79
91.67	36000. B	502.42	4.02B	4.02	10.21	10.21
110.00	36000. B	435.91	2.98B	2.98	11.51	11.51
128.33	36000. B	476.29	2.94B	2.94	10.16	10.16
145.33L	36000. B	463.01	3.86B	3.86	6.63	6.63
145.33R	36000. B	462.88	3.22B	3.22	6.62	6.62
146.67	36000. B	461.91	3.33B	3.33	6.47	6.47
165.00	36000. B	484.57	6.33B	6.33	5.69	5.69
183.33	36000. B	338.37	>999.00B	>999.00	2.84	2.84

Service II
(Assumes permit truck is only loading in all lanes)

Span 1

Location	Allowable Stress	Rating Factors Bending	
		Inv.	Oper.
0.00	34200. S	> 999.00 B	>999.00
18.33	34200. S	8.62 B	8.62
36.67	34200. S	4.67 B	4.67
38.00L	34200. S	4.53 B	4.53
38.00R	34200. S	5.33 B	5.33
55.00	34200. S	4.08 B	4.08
73.33	34200. S	4.02 B	4.02
91.67	34200. S	4.88 B	4.88
94.00L	34200. S	5.07 B	5.07
94.00R	34200. S	4.75 B	4.75
110.00	34200. S	6.18 B	6.18
128.33	34200. S	7.30 B	7.30
146.67	34200. S	6.72 B	6.72
155.33L	34200. S	6.56 B	6.56
155.33R	34200. S	9.00 B	9.00
165.00	34200. S	9.46 B	9.46
183.33	34200. S	5.47 B	5.47

Span 2

Location	Allowable Stress	Rating Factors Bending	
		Inv.	Oper.

0.00	34200. S	5.47	B	5.47
21.00L	34200. S	8.52	B	8.52
21.00R	34200. S	5.92	B	5.92
25.00	34200. S	6.55	B	6.55
50.00	34200. S	9.59	B	9.59
75.00	34200. S	6.72	B	6.72
76.00L	34200. S	6.54	B	6.54
76.00R	34200. S	6.95	B	6.95
99.50L	34200. S	4.41	B	4.41
99.50R	34200. S	5.03	B	5.03
100.00	34200. S	5.00	B	5.00
125.00L	34200. S	4.38	B	4.38
125.00R	34200. S	4.38	B	4.38
150.00	34200. S	5.04	B	5.04
174.00L	34200. S	6.94	B	6.94
174.00R	34200. S	6.55	B	6.55
150.50L	34200. S	5.07	B	5.07
150.50R	34200. S	4.45	B	4.45
175.00	34200. S	6.71	B	6.71
200.00	34200. S	9.64	B	9.64
225.00	34200. S	7.20	B	7.20
229.00L	34200. S	6.76	B	6.76
229.00R	34200. S	9.44	B	9.44
250.00	34200. S	7.21	B	7.21

Span 3

Location	Allowable Stress	Rating Factors Bending Inv.		Oper.
0.00	34200. S	7.21	B	7.21
18.33	34200. S	7.72	B	7.72
28.00L	34200. S	7.62	B	7.62
28.00R	34200. S	5.34	B	5.34
36.67	34200. S	5.68	B	5.68
55.00	34200. S	6.87	B	6.87
73.33	34200. S	6.23	B	6.23
89.33L	34200. S	5.21	B	5.21
89.33R	34200. S	5.57	B	5.57
91.67	34200. S	5.40	B	5.40
110.00	34200. S	4.10	B	4.10
128.33	34200. S	4.09	B	4.09
145.33L	34200. S	5.30	B	5.30
145.33R	34200. S	4.49	B	4.49
146.67	34200. S	4.63	B	4.63
165.00	34200. S	8.49	B	8.49
183.33	34200. S	> 999.00	B	>999.00

****
Minimum rating is 2.84 at location 183.33 in span 3.
****

Classified at Strength II because of description
in 3.4.1 for other than HL93 vehicle.

Rating Codes:
T - Top steel governs
B - Bottom steel governs
C - Concrete governs
R - Rebar governs
V - Shear governs
S - Serviceability governs

Mom Strength Codes:
C - Compact
B - Braced non-compact
U - Unbraced non-compact
T - Transition between compact and braced non-compact
S - Serviceability

Noncompact shapes ratings based on stress, as

Fb - factored dead load stress

$$IR = \frac{\text{PBETA}}{\text{factored LL+I stress}}$$

Inventory rating for Strength II if only permit loading on the system uses PBETA. Operating rating uses IR(PBETA/1.35).

2.2.6. ST5 (42” Barrier)

I-295 HH BUCKMAN BRIDGE -720249
Girder System : Input File : Layout/Slab/Loading Definition
Thu Mar 26 21:29:28 2015

```
ID: I-295 HH BUCKMAN BRIDGE -720249
CONDITIONS
  ALL LANES
  ENGLISH INPUT
  ENGLISH OUTPUT
  FLOAT LANES
  GRID MODEL
  LRFD METHOD
  MEDIUM RESOLUTION MESH
  OVERLAY PERMIT TRUCK WITH LANE LOADING
  PERMIT TRUCK IN ALL LANES
  PERMIT TRUCK IS ONLY LOADING IN PERMIT LANE
  RATE MODE
  RATING PROJECT
  SELF WEIGHT FOR DEAD LOAD 1
DATA
  BR-1 18.3333 18.3333 18.3333 18.3333 18.3333 18.3333 18.3333 18.3333
  18.3333 36.1875 17.8542 17.8542 17.8542 17.8542 17.8542 17.875 17.875
  17.8542 17.8542 17.8542 17.8542 17.8542 36.1875 18.3333 18.3333
  18.3333 18.3333 18.3333 18.3333 18.3333 18.3333
  CURB -2.
  FPC 4.5
  GDSPC 9.3073 9.3073 9.3073 9.3073 9.3333 9.3333 9.3333
  LANES 12. 12. 12. 12. 12.
  PRLANE  0.2
  PRMITP 6. 13.5 13.5 13.5 13.5 6. 13.5 13.5 13.5 13.5
  PRMITSP 27. 4. 12. 24. 30. 27. 4. 12. 24.
  ROADWP 68.
  SKEW-1 90. 90. 90. 90.
  SLABEXT 3.5417 2.3125
  SLABT 8.
  SLABWEAR  0.
  SPEED 65
  SPN-1 183.3333 250. 183.3333
  SUPER  0.01563
  WAC-1  0.164
  WAC-2  0.19
  WAC-3  0.19
  WAC-4  0.19
  WAC-5  0.19
  WAC-6  0.19
  WAC-7  0.19
  WAC-8  0.14
  WAS-1  0.
  WAS-2  0.
  WAS-3  0.
  WAS-4  0.
  WAS-5  0.0115
  WAS-6  0.0115
  WAS-7  0.0115
  WAS-8  0.0115
  WCONC 150.
  WHLSPC 6.
  WR-1  0.123
  WR-2  0.14
  WR-3  0.14
  WR-4  0.14
  WR-5  0.14
  WR-6  0.14
  WR-7  0.14
  WR-8  0.105
  WS-1  0.156
  WS-2  0.156
  WS-3  0.156
  WS-4  0.156
  WS-5  0.156
  WS-6  0.156
  WS-7  0.156
  WS-8  0.156
GO
```

I-295 HH BUCKMAN BRIDGE -720249
Girder 1 : Rating Output : Lrfd Ratings
Thu Mar 26 21:31:25 2015

[This table uses the rating equation (6A.4.2.1-1)
of the 2011 edition of the Manual for Bridge
Evaluation.]

Permit

Strength II
(Assumes permit truck is only loading)

Span 1

Location	Allowable	Shear	Rating Factors Bending		Shear	
			Inv.	Oper.	Inv.	Oper.
0.00	9253. C	488.42	>999.00B	>999.00	3.67	3.67
18.33	36000. B	769.69	3.49B	3.49	8.53	8.53
22.00L	36000. B	773.47	2.80B	2.80	9.10	9.10
22.00R	36000. B	773.65	5.14B	5.14	9.10	9.10
36.67	36000. B	617.31	3.24B	3.24	9.41	9.41
55.00	36000. B	623.62	2.38B	2.38	14.45	14.45
73.33	36000. B	632.76	2.49B	2.49	15.00	15.00
91.67	36000. B	644.47	3.50B	3.50	11.31	11.31
110.00	36000. B	658.50	4.62B	4.62	8.06	8.06
122.00L	10852. C	918.49	4.61B	4.61	9.81	9.81
122.00R	12402. C	918.79	5.27B	5.27	9.81	9.81
124.00L	12435. C	922.00	5.41B	5.41	9.56	9.56
124.00R	13473. C	1326.20	5.87B	5.87	14.53	14.53
128.33	13561. C	1332.57	6.07B	6.07	13.75	13.75
146.67	13919. C	1361.56	4.00B	4.00	11.14	11.14
154.00L	45765. B	1373.66	3.20B	3.20	10.51	10.51
154.00R	45762. B	1638.91	3.65B	3.65	12.91	12.91
156.00L	44053. B	1644.31	12.27B	12.27	12.93	12.93
156.00R	23727. C	1644.80	24.95B	24.95	12.94	12.94
165.00	46619. B	1671.34	5.40B	5.40	12.22	12.22
183.33	46375. B	1757.69	3.18B	3.18	10.88	10.88

Span 2

Location	Allowable	Shear	Rating Factors Bending		Shear	
			Inv.	Oper.	Inv.	Oper.
0.00	46375. B	1778.71	3.18B	3.18	10.23	10.23
25.00	46605. B	1747.50	7.70B	7.70	12.57	12.57
28.00L	46984. B	1747.50	8.43B	8.43	12.93	12.93
28.00R	21517. C	1747.50	6.84B	6.84	12.93	12.93
30.00L	21583. C	1747.50	26.65B	26.65	13.18	13.18
30.00R	45403. B	1450.84	16.23B	16.23	10.61	10.61
50.00	48073. B	1450.84	7.94B	7.94	13.01	13.01
55.33L	26462. C	1450.84	11.75B	11.75	13.80	13.80
55.33R	25672. C	1450.84	11.40B	11.40	13.80	13.80
57.33L	25672. C	1450.84	10.72B	10.72	14.12	14.12
57.33R	27861. C	1450.84	11.65B	11.65	14.12	14.12
75.00	27861. C	974.23	7.54B	7.54	11.25	11.25

100.00	27861. C	974.23	5.52B	5.52	16.06	16.06
125.00	27861. C	973.68	5.10B	5.10	25.56	25.56
150.00	27861. C	974.23	5.53B	5.53	17.22	17.22
175.00	27861. C	921.46	7.55B	7.55	11.21	11.21
190.67L	27861. C	1450.84	11.02B	11.02	15.18	15.18
190.67R	28843. C	1450.84	11.42B	11.42	15.18	15.18
192.67L	28843. C	1450.84	12.09B	12.09	14.83	14.83
192.67R	26462. C	1450.84	11.08B	11.08	14.83	14.83
200.00	48073. B	1450.84	7.92B	7.92	13.64	13.64
218.00L	45403. B	1450.84	4.73B	4.73	11.45	11.45
218.00R	45403. B	1747.50	5.29B	5.29	14.22	14.22
220.00L	43617. B	1747.50	17.17B	17.17	13.93	13.93
220.00R	43617. B	1747.50	29.61B	29.61	13.93	13.93
225.00	45403. B	1747.50	7.42B	7.42	13.22	13.22
250.00	46375. B	2011.94	3.18B	3.18	11.82	11.82

Span 3

Location	Allowable	Shear	Rating Factors Bending		Shear	
			Inv.	Oper.	Inv.	Oper.
0.00	46375. B	1584.21	3.18B	3.18	9.61	9.61
18.33	46620. B	1671.32	5.41B	5.41	12.17	12.17
25.33L	23797. C	1650.72	6.37B	6.37	12.86	12.86
25.33R	20549. C	1650.22	5.18B	5.18	12.86	12.86
27.33L	20554. C	1644.80	20.51B	20.51	13.08	13.08
27.33R	45724. B	1377.06	11.41B	11.41	10.62	10.62
36.67	13920. C	1361.55	4.01B	4.01	11.61	11.61
55.00	13562. C	1332.56	6.09B	6.09	15.96	15.96
57.33L	13516. C	1329.18	6.37B	6.37	16.61	16.61
57.33R	13403. C	1328.93	6.32B	6.32	16.60	16.60
59.33L	13365. C	1326.20	5.84B	5.84	17.18	17.18
59.33R	11917. C	922.00	5.20B	5.20	11.31	11.31
73.33	36000. B	898.00	4.60B	4.60	14.08	14.08
91.67	36000. B	644.47	3.49B	3.49	13.20	13.20
110.00	36000. B	632.76	2.49B	2.49	17.25	17.25
128.33	36000. B	623.62	2.39B	2.39	11.24	11.24
146.67	36000. B	617.31	3.25B	3.25	7.87	7.87
161.33L	36000. B	773.65	5.15B	5.15	8.45	8.45
161.33R	36000. B	773.47	2.81B	2.81	8.44	8.44
165.00	36000. B	769.68	3.50B	3.50	8.06	8.06
183.33	9253. C	740.77	>999.00B	>999.00	6.36	6.36

Service II
(Assumes permit truck is only loading in all lanes)

Span 1

Location	Allowable Stress	Rating Factors Bending	
		Inv.	Oper.
0.00	34200. S	> 999.00 B	>999.00
18.33	34200. S	4.91 B	4.91
22.00L	34200. S	4.02 B	4.02
22.00R	34200. S	7.02 B	7.02
36.67	34200. S	4.58 B	4.58
55.00	34200. S	3.43 B	3.43
73.33	34200. S	3.54 B	3.54
91.67	34200. S	4.80 B	4.80
110.00	34200. S	6.08 B	6.08
122.00L	34200. S	8.35 B	8.35
122.00R	34200. S	8.35 B	8.35
124.00L	34200. S	8.59 B	8.59
124.00R	34200. S	7.15 B	7.15
128.33	47500. S	10.50 B	10.50
146.67	47500. S	7.61 B	7.61
154.00L	47500. S	6.49 B	6.49

154.00R	47500. S	6.78 B	6.78
156.00L	47500. S	24.65 B	24.65
156.00R	47500. S	42.15 B	42.15
165.00	47500. S	9.53 B	9.53
183.33	47500. S	6.31 B	6.31

Span 2

Location	Allowable Stress	Rating Factors Bending Inv.	Oper.
0.00	34200. S	6.31 B	6.31
25.00	34200. S	13.08 B	13.08
28.00L	34200. S	14.03 B	14.03
28.00R	34200. S	13.69 B	13.69
30.00L	34200. S	52.64 B	52.64
30.00R	34200. S	31.99 B	31.99
50.00	34200. S	13.33 B	13.33
55.33L	34200. S	11.86 B	11.86
55.33R	34200. S	11.84 B	11.84
57.33L	34200. S	11.08 B	11.08
57.33R	34200. S	13.52 B	13.52
75.00	34200. S	8.57 B	8.57
100.00	34200. S	6.15 B	6.15
125.00	47500. S	5.63 B	5.63
150.00	47500. S	6.15 B	6.15
175.00	47500. S	8.59 B	8.59
190.67L	47500. S	12.76 B	12.76
190.67R	47500. S	12.78 B	12.78
192.67L	47500. S	13.57 B	13.57
192.67R	47500. S	11.13 B	11.13
200.00	47500. S	13.30 B	13.30
218.00L	47500. S	9.21 B	9.21
218.00R	47500. S	9.50 B	9.50
220.00L	47500. S	33.07 B	33.07
220.00R	47500. S	53.79 B	53.79
225.00	47500. S	13.06 B	13.06
250.00	47500. S	6.31 B	6.31

Span 3

Location	Allowable Stress	Rating Factors Bending Inv.	Oper.
0.00	34200. S	6.31 B	6.31
18.33	34200. S	9.54 B	9.54
25.33L	34200. S	10.85 B	10.85
25.33R	34200. S	10.52 B	10.52
27.33L	34200. S	41.00 B	41.00
27.33R	34200. S	23.54 B	23.54
36.67	34200. S	7.64 B	7.64
55.00	34200. S	10.53 B	10.53
57.33L	34200. S	10.92 B	10.92
57.33R	34200. S	10.91 B	10.91
59.33L	34200. S	10.01 B	10.01
59.33R	34200. S	12.01 B	12.01
73.33	34200. S	6.06 B	6.06
91.67	34200. S	4.80 B	4.80
110.00	34200. S	3.54 B	3.54
128.33	34200. S	3.44 B	3.44
146.67	34200. S	4.59 B	4.59
161.33L	34200. S	7.02 B	7.02
161.33R	34200. S	4.03 B	4.03
165.00	34200. S	4.91 B	4.91
183.33	34200. S	> 999.00 B	>999.00

****
Minimum rating is 2.38 at location 55.00 in span 1.
****

Classified at Strength II because of description
in 3.4.1 for other than HL93 vehicle.

Rating Codes:
T - Top steel governs
B - Bottom steel governs
C - Concrete governs
R - Rebar governs
V - Shear governs
S - Serviceability governs

Mom Strength Codes:
C - Compact
B - Braced non-compact
U - Unbraced non-compact
T - Transition between compact and braced non-compact
S - Serviceability

Noncompact shapes ratings based on stress, as

$$IR = \frac{Fb - \text{factored dead load stress}}{\text{factored LL+I stress}}$$

Inventory rating for Strength II if only permit
loading on the system uses PBETA. Operating rating
uses IR(PBETA/1.35).

I-295 HH BUCKMAN BRIDGE -720249
Girder 2 : Rating Output : Lrfd Ratings
Thu Mar 26 21:31:40 2015

[This table uses the rating equation (6A.4.2.1-1)
of the 2011 edition of the Manual for Bridge
Evaluation.]

Permit

Strength II
(Assumes permit truck is only loading)

Span 1

Location	Allowable	Shear	Rating Factors Bending		Shear	
			Inv.	Oper.	Inv.	Oper.
0.00	9331. C	488.42	>999.00B	>999.00	3.68	3.68
18.33	36000. B	769.69	3.94B	3.94	9.47	9.47
22.00L	36000. B	773.47	3.17B	3.17	10.20	10.20
22.00R	36000. B	773.65	5.83B	5.83	10.21	10.21
36.67	36000. B	617.31	3.76B	3.76	10.34	10.34
55.00	36000. B	623.62	2.79B	2.79	14.85	14.85
73.33	36000. B	632.76	2.95B	2.95	14.53	14.53
91.67	36000. B	644.47	4.29B	4.29	11.34	11.34
110.00	36000. B	658.50	5.39B	5.39	8.63	8.63
122.00L	36000. B	918.49	7.46B	7.46	10.74	10.74
122.00R	36000. B	918.79	5.96T	5.96	10.75	10.75
124.00L	12522. C	922.00	6.29B	6.29	10.49	10.49
124.00R	13524. C	1326.20	6.80B	6.80	15.94	15.94
128.33	23407. C	1332.57	12.71B	12.71	15.14	15.14
146.67	13950. C	1361.56	4.79B	4.79	12.25	12.25
154.00L	45675. B	1373.66	3.84B	3.84	11.50	11.50
154.00R	45672. B	1638.91	4.36B	4.36	14.14	14.14
156.00L	43981. B	1644.31	13.89B	13.89	14.25	14.25
156.00R	23743. C	1644.80	28.04B	28.04	14.26	14.26
165.00	46576. B	1671.34	6.41B	6.41	13.25	13.25
183.33	46329. B	1757.69	3.78B	3.78	10.96	10.96

Span 2

Location	Allowable	Shear	Rating Factors Bending		Shear	
			Inv.	Oper.	Inv.	Oper.
0.00	46329. B	1778.71	3.78B	3.78	10.49	10.49
25.00	46559. B	1747.50	9.29B	9.29	13.80	13.80
28.00L	46976. B	1747.50	10.20B	10.20	14.29	14.29
28.00R	21778. C	1747.50	8.38B	8.38	14.29	14.29
30.00L	21853. C	1747.50	32.20B	32.20	14.62	14.62
30.00R	45307. B	1450.84	19.44B	19.44	11.76	11.76
50.00	47985. B	1450.84	9.64B	9.64	14.68	14.68
55.33L	27351. C	1450.84	13.49B	13.49	15.45	15.45
55.33R	27199. C	1450.84	13.41B	13.41	15.45	15.45
57.33L	27187. C	1450.84	12.65B	12.65	15.73	15.73
57.33R	29713. C	1450.84	13.84B	13.84	15.73	15.73
75.00	29713. C	974.23	9.27B	9.27	11.53	11.53

100.00	29713. C	974.23	6.95B	6.95	16.48	16.48
125.00	29713. C	973.68	6.54B	6.54	27.05	27.05
150.00	29713. C	974.23	6.94B	6.94	19.09	19.09
175.00	29713. C	974.23	9.25B	9.25	13.06	13.06
190.67L	29713. C	1450.84	13.10B	13.10	17.39	17.39
190.67R	30626. C	1450.84	13.51B	13.51	17.39	17.39
192.67L	30626. C	1450.84	14.26B	14.26	17.04	17.04
192.67R	27228. C	1450.84	12.66B	12.66	17.04	17.04
200.00	47985. B	1450.84	9.62B	9.62	15.77	15.77
218.00L	45307. B	1450.84	5.76B	5.76	13.18	13.18
218.00R	45307. B	1747.50	6.41B	6.41	16.36	16.36
220.00L	43540. B	1747.50	20.47B	20.47	15.96	15.96
220.00R	43540. B	1747.50	35.20B	35.20	15.96	15.96
225.00	45307. B	1747.50	8.94B	8.94	14.95	14.95
250.00	46330. B	1778.84	3.77B	3.77	10.49	10.49

Span 3

Location	Allowable	Shear	Rating Factors Bending		Shear	
			Inv.	Oper.	Inv.	Oper.
0.00	46330. B	1757.54	3.77B	3.77	10.87	10.87
18.33	46576. B	1671.32	6.42B	6.42	12.83	12.83
25.33L	23811. C	1650.72	7.55B	7.55	13.78	13.78
25.33R	20777. C	1650.22	6.24B	6.24	13.77	13.77
27.33L	20790. C	1644.80	23.46B	23.46	14.06	14.06
27.33R	45634. B	1377.06	12.98B	12.98	11.42	11.42
36.67	13952. C	1361.55	4.81B	4.81	12.65	12.65
55.00	23415. C	1332.56	12.75B	12.75	15.63	15.63
57.33L	13565. C	1329.18	7.55B	7.55	16.07	16.07
57.33R	13466. C	1328.93	7.50B	7.50	16.07	16.07
59.33L	13429. C	1326.20	6.76B	6.76	16.46	16.46
59.33R	12175. C	922.00	6.12B	6.12	10.84	10.84
73.33	36000. B	658.50	5.39B	5.39	8.96	8.96
91.67	36000. B	644.47	4.30B	4.30	11.50	11.50
110.00	36000. B	632.76	2.95B	2.95	15.76	15.76
128.33	36000. B	623.62	2.79B	2.79	10.42	10.42
146.67	36000. B	617.31	3.75B	3.75	7.83	7.83
161.33L	36000. B	773.65	5.82B	5.82	9.33	9.33
161.33R	36000. B	773.47	3.16B	3.16	9.33	9.33
165.00	36000. B	769.68	3.93B	3.93	8.94	8.94
183.33	9331. C	488.42	>999.00B	>999.00	3.78	3.78

Service II
(Assumes permit truck is only loading in all lanes)

Span 1

Location	Allowable Stress	Rating Factors Bending	
		Inv.	Oper.
0.00	34200. S	> 999.00 B	>999.00
18.33	34200. S	5.54 B	5.54
22.00L	34200. S	4.56 B	4.56
22.00R	34200. S	7.97 B	7.97
36.67	34200. S	5.32 B	5.32
55.00	34200. S	4.03 B	4.03
73.33	34200. S	4.19 B	4.19
91.67	34200. S	5.90 B	5.90
110.00	34200. S	7.10 B	7.10
122.00L	34200. S	9.59 B	9.59
122.00R	34200. S	9.59 B	9.59
124.00L	34200. S	9.99 B	9.99
124.00R	34200. S	8.35 B	8.35
128.33	47500. S	12.53 B	12.53
146.67	47500. S	9.16 B	9.16
154.00L	47500. S	7.81 B	7.81

154.00R	47500. S	8.13 B	8.13
156.00L	47500. S	27.99 B	27.99
156.00R	47500. S	47.69 B	47.69
165.00	47500. S	11.36 B	11.36
183.33	47500. S	7.57 B	7.57

Span 2

Location	Allowable Stress	Rating Factors Bending Inv.	Oper.
0.00	34200. S	7.57 B	7.57
25.00	34200. S	15.87 B	15.87
28.00L	34200. S	17.05 B	17.05
28.00R	34200. S	16.66 B	16.66
30.00L	34200. S	63.17 B	63.17
30.00R	34200. S	38.50 B	38.50
50.00	34200. S	16.01 B	16.27
55.33L	34200. S	13.30 B	13.30
55.33R	34200. S	13.29 B	13.29
57.33L	34200. S	12.47 B	12.47
57.33R	34200. S	15.21 B	15.21
75.00	34200. S	9.93 B	9.93
100.00	34200. S	7.25 B	7.25
125.00	47500. S	6.75 B	6.75
150.00	47500. S	7.23 B	7.23
175.00	47500. S	9.91 B	9.91
190.67L	47500. S	14.34 B	14.34
190.67R	47500. S	14.37 B	14.37
192.67L	47500. S	15.21 B	15.21
192.67R	47500. S	12.48 B	12.48
200.00	47500. S	16.01 B	16.24
218.00L	47500. S	11.24 B	11.24
218.00R	47500. S	11.58 B	11.58
220.00L	47500. S	39.64 B	39.64
220.00R	47500. S	64.31 B	64.31
225.00	47500. S	15.84 B	15.84
250.00	47500. S	7.56 B	7.56

Span 3

Location	Allowable Stress	Rating Factors Bending Inv.	Oper.
0.00	34200. S	7.56 B	7.56
18.33	34200. S	11.38 B	11.38
25.33L	34200. S	12.94 B	12.94
25.33R	34200. S	12.58 B	12.58
27.33L	34200. S	46.55 B	46.55
27.33R	34200. S	26.85 B	26.85
36.67	34200. S	9.20 B	9.20
55.00	34200. S	12.57 B	12.57
57.33L	34200. S	12.61 B	13.01
57.33R	34200. S	12.62 B	13.00
59.33L	34200. S	11.64 B	11.64
59.33R	34200. S	13.93 B	13.93
73.33	34200. S	7.10 B	7.10
91.67	34200. S	5.90 B	5.90
110.00	34200. S	4.19 B	4.19
128.33	34200. S	4.02 B	4.02
146.67	34200. S	5.31 B	5.31
161.33L	34200. S	7.95 B	7.95
161.33R	34200. S	4.55 B	4.55
165.00	34200. S	5.53 B	5.53
183.33	34200. S	> 999.00 B	>999.00

****
Minimum rating is 2.79 at location 128.33 in span 3.
****

Classified at Strength II because of description
in 3.4.1 for other than HL93 vehicle.

Rating Codes:
T - Top steel governs
B - Bottom steel governs
C - Concrete governs
R - Rebar governs
V - Shear governs
S - Serviceability governs

Mom Strength Codes:
C - Compact
B - Braced non-compact
U - Unbraced non-compact
T - Transition between compact and braced non-compact
S - Serviceability

Noncompact shapes ratings based on stress, as

$$IR = \frac{Fb - \text{factored dead load stress}}{\text{factored LL+I stress}}$$

Inventory rating for Strength II if only permit
loading on the system uses PBETA. Operating rating
uses IR(PBETA/1.35).

I-295 HH BUCKMAN BRIDGE -720249
Girder 3 : Rating Output : Lrfd Ratings
Thu Mar 26 21:31:58 2015

[This table uses the rating equation (6A.4.2.1-1)
of the 2011 edition of the Manual for Bridge
Evaluation.]

Permit

Strength II
(Assumes permit truck is only loading)

Span 1

Location	Allowable	Shear	Rating Factors Bending		Shear	
			Inv.	Oper.	Inv.	Oper.
0.00	9331. C	488.42	>999.00B	>999.00	4.04	4.04
18.33	36000. B	769.69	4.23B	4.23	10.61	10.61
22.00L	36000. B	773.47	3.42B	3.42	11.48	11.48
22.00R	36000. B	773.65	6.29B	6.29	11.48	11.48
36.67	36000. B	617.31	4.12B	4.12	11.83	11.83
55.00	36000. B	623.62	3.08B	3.08	16.87	16.87
73.33	36000. B	632.76	3.29B	3.29	15.50	15.50
91.67	36000. B	644.47	4.73B	4.73	12.54	12.54
110.00	36000. B	658.50	6.03B	6.03	9.70	9.70
122.00L	36000. B	918.49	8.29B	8.29	11.95	11.95
122.00R	36000. B	918.79	6.62T	6.62	11.95	11.95
124.00L	12527. C	922.00	7.08B	7.08	11.65	11.65
124.00R	13527. C	1326.20	7.64B	7.64	17.66	17.66
128.33	23450. C	1332.57	15.12B	15.12	16.72	16.72
146.67	13959. C	1361.56	5.62B	5.62	13.32	13.32
154.00L	45675. B	1373.66	4.50B	4.50	12.52	12.52
154.00R	45672. B	1638.91	5.09B	5.09	15.38	15.38
156.00L	43981. B	1644.31	15.78B	15.78	15.54	15.54
156.00R	23749. C	1644.80	31.46B	31.46	15.55	15.55
165.00	46576. B	1671.34	7.33B	7.33	14.49	14.49
183.33	46329. B	1757.69	4.09B	4.09	12.06	12.06

Span 2

Location	Allowable	Shear	Rating Factors Bending		Shear	
			Inv.	Oper.	Inv.	Oper.
0.00	46329. B	1778.71	4.09B	4.09	11.56	11.56
25.00	46559. B	1747.50	10.12B	10.12	15.30	15.30
28.00L	46976. B	1747.50	11.14B	11.14	15.85	15.85
28.00R	21796. C	1747.50	9.18B	9.18	15.85	15.85
30.00L	21867. C	1747.50	34.62B	34.62	16.23	16.23
30.00R	45307. B	1450.84	20.95B	20.95	13.09	13.09
50.00	47985. B	1450.84	10.80B	10.80	16.61	16.61
55.33L	45690. B	1450.84	10.64B	10.64	17.50	17.50
55.33R	45690. B	1450.84	10.63B	10.63	17.50	17.50
57.33L	27199. C	1450.84	14.22B	14.22	17.83	17.83
57.33R	29713. C	1450.84	15.55B	15.55	17.83	17.83
75.00	29713. C	974.23	10.62B	10.62	12.98	12.98

100.00	29713.	C	974.23	8.10B	8.10	18.33	18.33
125.00	29713.	C	973.68	7.53B	7.53	28.38	28.38
150.00	29713.	C	974.23	8.09B	8.09	20.97	20.97
175.00	29713.	C	974.23	10.56B	10.56	14.68	14.68
190.67L	29713.	C	1450.84	14.66B	14.66	19.81	19.81
190.67R	30626.	C	1450.84	15.12B	15.12	19.81	19.81
192.67L	30626.	C	1450.84	15.92B	15.92	19.42	19.42
192.67R	27268.	C	1450.84	14.15B	14.15	19.42	19.42
200.00	47985.	B	1450.84	10.86B	10.86	17.97	17.97
218.00L	45307.	B	1450.84	6.37B	6.37	14.82	14.82
218.00R	45307.	B	1747.50	7.09B	7.09	18.38	18.38
220.00L	43540.	B	1747.50	22.16B	22.16	17.91	17.91
220.00R	43540.	B	1747.50	37.91B	37.91	17.91	17.91
225.00	45307.	B	1747.50	9.77B	9.77	16.72	16.72
250.00	46330.	B	1778.84	4.08B	4.08	11.57	11.57

Span 3

Location	Allowable		Shear	Rating Factors Bending		Shear	
				Inv.	Oper.	Inv.	Oper.
0.00	46330.	B	1757.54	4.08B	4.08	12.01	12.01
18.33	46576.	B	1671.32	7.36B	7.36	13.92	13.92
25.33L	23817.	C	1650.72	8.77B	8.77	14.91	14.91
25.33R	20819.	C	1650.22	7.28B	7.28	14.91	14.91
27.33L	20829.	C	1644.80	26.54B	26.54	15.21	15.21
27.33R	45634.	B	1377.06	14.83B	14.83	12.36	12.36
36.67	13958.	C	1361.55	5.61B	5.61	13.74	13.74
55.00	23420.	C	1332.56	14.97B	14.97	17.16	17.16
57.33L	13565.	C	1329.18	8.87B	8.87	17.64	17.64
57.33R	13466.	C	1328.93	8.81B	8.81	17.64	17.64
59.33L	13429.	C	1326.20	7.55B	7.55	18.07	18.07
59.33R	12173.	C	922.00	6.84B	6.84	11.92	11.92
73.33	36000.	B	658.50	6.06B	6.06	9.74	9.74
91.67	36000.	B	644.47	4.72B	4.72	12.32	12.32
110.00	36000.	B	632.76	3.27B	3.27	15.58	15.58
128.33	36000.	B	623.62	3.05B	3.05	11.60	11.60
146.67	36000.	B	617.31	4.09B	4.09	8.60	8.60
161.33L	36000.	B	773.65	6.25B	6.25	10.05	10.05
161.33R	36000.	B	773.47	3.39B	3.39	10.05	10.05
165.00	36000.	B	769.68	4.20B	4.20	9.63	9.63
183.33	9331.	C	488.42	>999.00B	>999.00	4.14	4.14

Service II
(Assumes permit truck is only loading in all lanes)

Span 1

Location	Allowable Stress		Rating Factors Bending		
			Inv.	Oper.	
0.00	34200.	S	> 999.00	B	>999.00
18.33	34200.	S	5.95	B	5.95
22.00L	34200.	S	4.92	B	4.92
22.00R	34200.	S	8.58	B	8.58
36.67	34200.	S	5.82	B	5.82
55.00	34200.	S	4.42	B	4.42
73.33	34200.	S	4.67	B	4.67
91.67	34200.	S	6.48	B	6.48
110.00	34200.	S	7.95	B	7.95
122.00L	34200.	S	10.67	B	10.67
122.00R	34200.	S	10.68	B	10.68
124.00L	34200.	S	11.23	B	11.23
124.00R	34200.	S	9.39	B	9.39
128.33	47500.	S	14.91	B	14.91
146.67	47500.	S	10.70	B	10.70
154.00L	47500.	S	9.06	B	9.06

154.00R	47500. S	9.42 B	9.42
156.00L	47500. S	31.51 B	31.51
156.00R	47500. S	53.31 B	53.31
165.00	47500. S	12.95 B	12.95
183.33	47500. S	8.09 B	8.09

Span 2

Location	Allowable Stress	Rating Factors Bending Inv.	Oper.
0.00	34200. S	8.09 B	8.09
25.00	34200. S	17.25 B	17.25
28.00L	34200. S	18.60 B	18.60
28.00R	34200. S	18.19 B	18.19
30.00L	34200. S	67.77 B	67.77
30.00R	34200. S	41.40 B	41.40
50.00	34200. S	17.87 B	18.26
55.33L	34200. S	14.93 B	14.93
55.33R	34200. S	14.92 B	14.92
57.33L	34200. S	14.06 B	14.06
57.33R	34200. S	17.11 B	17.11
75.00	34200. S	11.40 B	11.40
100.00	34200. S	8.46 B	8.46
125.00	47500. S	7.78 B	7.78
150.00	47500. S	8.44 B	8.44
175.00	47500. S	11.33 B	11.33
190.67L	47500. S	16.07 B	16.07
190.67R	47500. S	16.10 B	16.10
192.67L	47500. S	17.00 B	17.00
192.67R	47500. S	13.96 B	13.96
200.00	47500. S	17.72 B	18.34
218.00L	47500. S	12.41 B	12.41
218.00R	47500. S	12.77 B	12.77
220.00L	47500. S	42.73 B	42.73
220.00R	47500. S	69.12 B	69.12
225.00	47500. S	17.25 B	17.25
250.00	47500. S	8.09 B	8.09

Span 3

Location	Allowable Stress	Rating Factors Bending Inv.	Oper.
0.00	34200. S	8.09 B	8.09
18.33	34200. S	12.98 B	12.98
25.33L	34200. S	14.98 B	14.98
25.33R	34200. S	14.57 B	14.57
27.33L	34200. S	52.31 B	52.31
27.33R	34200. S	30.39 B	30.39
36.67	34200. S	10.68 B	10.68
55.00	34200. S	14.76 B	14.76
57.33L	34200. S	14.07 B	15.29
57.33R	34200. S	14.08 B	15.27
59.33L	34200. S	13.00 B	13.00
59.33R	34200. S	15.56 B	15.56
73.33	34200. S	7.99 B	7.99
91.67	34200. S	6.48 B	6.48
110.00	34200. S	4.65 B	4.65
128.33	34200. S	4.39 B	4.39
146.67	34200. S	5.79 B	5.79
161.33L	34200. S	8.54 B	8.54
161.33R	34200. S	4.88 B	4.88
165.00	34200. S	5.92 B	5.92
183.33	34200. S	> 999.00 B	>999.00

****
Minimum rating is 3.05 at location 128.33 in span 3.
****

Classified at Strength II because of description
in 3.4.1 for other than HL93 vehicle.

Rating Codes:
T - Top steel governs
B - Bottom steel governs
C - Concrete governs
R - Rebar governs
V - Shear governs
S - Serviceability governs

Mom Strength Codes:
C - Compact
B - Braced non-compact
U - Unbraced non-compact
T - Transition between compact and braced non-compact
S - Serviceability

Noncompact shapes ratings based on stress, as

$$IR = \frac{Fb - \text{factored dead load stress}}{\text{factored LL+I stress}}$$

Inventory rating for Strength II if only permit
loading on the system uses PBETA. Operating rating
uses IR(PBETA/1.35).

I-295 HH BUCKMAN BRIDGE -720249
Girder 4 : Rating Output : Lrfd Ratings
Thu Mar 26 21:32:32 2015

[This table uses the rating equation (6A.4.2.1-1)
of the 2011 edition of the Manual for Bridge
Evaluation.]

Permit

Strength II
(Assumes permit truck is only loading)

Span 1

Location	Allowable	Shear	Rating Factors Bending		Shear	
			Inv.	Oper.	Inv.	Oper.
0.00	9331. C	488.42	>999.00B	>999.00	4.14	4.14
18.33	36000. B	769.69	4.59B	4.59	10.35	10.35
22.00L	36000. B	773.47	3.72B	3.72	11.17	11.17
22.00R	36000. B	773.65	6.71B	6.71	11.17	11.17
36.67	36000. B	617.31	4.30B	4.30	11.78	11.78
55.00	36000. B	623.62	3.21B	3.21	15.71	15.71
73.33	36000. B	632.76	3.37B	3.37	14.19	14.19
91.67	36000. B	644.47	4.89B	4.89	11.83	11.83
110.00	36000. B	658.50	6.50B	6.50	9.36	9.36
122.00L	36000. B	918.49	9.26B	9.26	12.41	12.41
122.00R	36000. B	918.79	7.41T	7.41	12.41	12.41
124.00L	12519. C	922.00	7.76B	7.76	12.23	12.23
124.00R	13522. C	1326.20	8.39B	8.39	18.39	18.39
128.33	13611. C	1332.57	8.98B	8.98	17.76	17.76
146.67	13973. C	1361.56	6.47B	6.47	15.00	15.00
154.00L	45675. B	1373.66	5.41B	5.41	14.12	14.12
154.00R	45672. B	1638.91	6.07B	6.07	17.27	17.27
156.00L	43981. B	1644.31	20.64B	20.64	17.48	17.48
156.00R	23766. C	1644.80	39.80B	39.80	17.49	17.49
165.00	46576. B	1671.34	8.91B	8.91	16.04	16.04
183.33	46329. B	1757.69	4.99B	4.99	12.48	12.48

Span 2

Location	Allowable	Shear	Rating Factors Bending		Shear	
			Inv.	Oper.	Inv.	Oper.
0.00	46329. B	1778.71	4.99B	4.99	13.31	13.31
25.00	46559. B	1747.50	10.12B	10.12	17.35	17.35
28.00L	46976. B	1747.50	10.99B	10.99	17.87	17.87
28.00R	21738. C	1747.50	8.99B	8.99	17.87	17.87
30.00L	21800. C	1747.50	36.13B	36.13	18.22	18.22
30.00R	45307. B	1450.84	21.61B	21.61	14.74	14.74
50.00	47985. B	1450.84	10.22B	10.22	17.23	17.23
55.33L	45690. B	1450.84	10.84B	10.84	17.88	17.88
55.33R	45690. B	1450.84	13.53B	13.53	17.88	17.88
57.33L	45690. B	1450.84	11.34B	11.34	18.11	18.11
57.33R	19118. C	1450.84	11.30B	11.30	18.11	18.11
75.00	29713. C	974.23	11.67B	11.67	12.72	12.72

100.00	29713. C	974.23	8.31B	8.31	16.57	16.57
125.00	29713. C	973.68	7.59B	7.59	18.93	18.93
150.00	29713. C	974.23	8.37B	8.37	18.61	18.61
175.00	29713. C	974.23	11.68B	11.68	14.41	14.41
190.67L	29713. C	1450.84	16.60B	16.60	21.09	21.09
190.67R	30626. C	1450.84	17.12B	17.12	21.09	21.09
192.67L	19343. C	1450.84	11.39B	11.39	20.85	20.85
192.67R	45936. B	1450.84	9.11B	9.11	20.85	20.85
200.00	47985. B	1450.84	10.55B	10.55	19.90	19.90
218.00L	45307. B	1450.84	6.56B	6.56	17.73	17.73
218.00R	45307. B	1747.50	7.31B	7.31	21.89	21.89
220.00L	43540. B	1747.50	24.99B	24.99	21.37	21.37
220.00R	43540. B	1747.50	42.76B	42.76	21.37	21.37
225.00	45307. B	1747.50	10.41B	10.41	19.97	19.97
250.00	46330. B	1778.84	5.13B	5.13	13.11	13.11

Span 3

Location	Allowable	Shear	Rating Factors Bending		Shear	
			Inv.	Oper.	Inv.	Oper.
0.00	46330. B	1757.54	5.13B	5.13	13.02	13.02
18.33	46576. B	1671.32	8.52B	8.52	15.57	15.57
25.33L	23824. C	1650.72	9.81B	9.81	16.51	16.51
25.33R	20868. C	1650.22	8.20B	8.20	16.50	16.50
27.33L	20868. C	1644.80	32.41B	32.41	16.74	16.74
27.33R	45634. B	1377.06	18.26B	18.26	13.66	13.66
36.67	13955. C	1361.55	5.82B	5.82	14.46	14.46
55.00	13602. C	1332.56	8.38B	8.38	16.65	16.65
57.33L	13556. C	1329.18	8.72B	8.72	17.00	17.00
57.33R	13456. C	1328.93	8.65B	8.65	16.99	16.99
59.33L	13420. C	1326.20	8.12B	8.12	17.31	17.31
59.33R	12127. C	922.00	7.32B	7.32	11.40	11.40
73.33	36000. B	658.50	6.43B	6.43	9.14	9.14
91.67	36000. B	644.47	4.82B	4.82	11.64	11.64
110.00	36000. B	632.76	3.32B	3.32	14.46	14.46
128.33	36000. B	623.62	3.14B	3.14	11.20	11.20
146.67	36000. B	617.31	4.21B	4.21	8.42	8.42
161.33L	36000. B	773.65	6.60B	6.60	10.43	10.43
161.33R	36000. B	773.47	3.62B	3.62	10.43	10.43
165.00	36000. B	769.68	4.50B	4.50	10.04	10.04
183.33	9331. C	488.42	>999.00B	>999.00	4.24	4.24

Service II
(Assumes permit truck is only loading in all lanes)

Span 1

Location	Allowable Stress	Rating Factors Bending	
		Inv.	Oper.
0.00	34200. S	> 999.00 B	>999.00
18.33	34200. S	6.41 B	6.41
22.00L	34200. S	5.29 B	5.29
22.00R	34200. S	9.13 B	9.13
36.67	34200. S	6.05 B	6.05
55.00	34200. S	4.60 B	4.60
73.33	34200. S	4.77 B	4.77
91.67	34200. S	6.68 B	6.68
110.00	34200. S	8.53 B	8.53
122.00L	34200. S	11.89 B	11.89
122.00R	34200. S	11.89 B	11.89
124.00L	34200. S	12.34 B	12.34
124.00R	34200. S	10.30 B	10.30
128.33	47500. S	15.60 B	15.60
146.67	47500. S	12.20 B	12.20
154.00L	47500. S	10.68 B	10.68

154.00R	47500. S	11.06 B	11.06
156.00L	47500. S	40.19 B	40.19
156.00R	47500. S	66.81 B	66.81
165.00	47500. S	15.48 B	15.48
183.33	47500. S	9.54 B	9.54

Span 2

Location	Allowable Stress	Rating Factors Bending Inv.	Oper.
0.00	34200. S	9.54 B	9.54
25.00	34200. S	17.30 B	17.30
28.00L	34200. S	18.42 B	18.42
28.00R	34200. S	17.99 B	17.99
30.00L	34200. S	71.50 B	71.50
30.00R	34200. S	43.23 B	43.23
50.00	34200. S	17.41 B	17.41
55.33L	34200. S	17.30 B	19.17
55.33R	34200. S	17.29 B	19.14
57.33L	34200. S	15.96 B	15.96
57.33R	34200. S	19.39 B	19.39
75.00	34200. S	12.56 B	12.56
100.00	34200. S	8.68 B	8.68
125.00	47500. S	7.83 B	7.83
150.00	47500. S	8.74 B	8.74
175.00	47500. S	12.58 B	12.58
190.67L	47500. S	18.28 B	18.28
190.67R	47500. S	18.29 B	18.29
192.67L	47500. S	19.31 B	19.31
192.67R	47500. S	15.91 B	15.91
200.00	47500. S	17.92 B	17.92
218.00L	47500. S	12.81 B	12.81
218.00R	47500. S	13.19 B	13.19
220.00L	47500. S	48.21 B	48.21
220.00R	47500. S	77.99 B	77.99
225.00	47500. S	18.35 B	18.35
250.00	47500. S	9.76 B	9.76

Span 3

Location	Allowable Stress	Rating Factors Bending Inv.	Oper.
0.00	34200. S	9.76 B	9.76
18.33	34200. S	14.90 B	14.90
25.33L	34200. S	16.70 B	16.70
25.33R	34200. S	16.27 B	16.27
27.33L	34200. S	63.48 B	63.48
27.33R	34200. S	37.13 B	37.13
36.67	34200. S	11.12 B	11.12
55.00	34200. S	14.63 B	14.63
57.33L	34200. S	15.09 B	15.09
57.33R	34200. S	15.06 B	15.06
59.33L	34200. S	14.04 B	14.04
59.33R	34200. S	16.85 B	16.85
73.33	34200. S	8.44 B	8.44
91.67	34200. S	6.59 B	6.59
110.00	34200. S	4.71 B	4.71
128.33	34200. S	4.53 B	4.53
146.67	34200. S	5.94 B	5.94
161.33L	34200. S	8.99 B	8.99
161.33R	34200. S	5.18 B	5.18
165.00	34200. S	6.30 B	6.30
183.33	34200. S	> 999.00 B	>999.00

****
Minimum rating is 3.14 at location 128.33 in span 3.
****

Classified at Strength II because of description
in 3.4.1 for other than HL93 vehicle.

Rating Codes:
T - Top steel governs
B - Bottom steel governs
C - Concrete governs
R - Rebar governs
V - Shear governs
S - Serviceability governs

Mom Strength Codes:
C - Compact
B - Braced non-compact
U - Unbraced non-compact
T - Transition between compact and braced non-compact
S - Serviceability

Noncompact shapes ratings based on stress, as

$$IR = \frac{Fb - \text{factored dead load stress}}{\text{factored LL+I stress}}$$

Inventory rating for Strength II if only permit
loading on the system uses PBETA. Operating rating
uses IR(PBETA/1.35).

I-295 HH BUCKMAN BRIDGE -720249
Girder 5 : Rating Output : Lrfd Ratings
Thu Mar 26 21:32:51 2015

[This table uses the rating equation (6A.4.2.1-1)
of the 2011 edition of the Manual for Bridge
Evaluation.]

Permit

Strength II
(Assumes permit truck is only loading)

Span 1

Location	Allowable	Shear	Rating Factors Bending		Shear	
			Inv.	Oper.	Inv.	Oper.
0.00	36000. B	347.57	>999.00B	>999.00	2.31	2.31
18.33	36000. B	461.91	6.53B	6.53	5.77	5.77
36.67	36000. B	476.29	3.52B	3.52	9.49	9.49
38.00L	36000. B	477.22	3.41B	3.41	9.79	9.79
38.00R	36000. B	477.34	4.17B	4.17	9.79	9.79
55.00	36000. B	435.91	3.17B	3.17	11.60	11.60
73.33	36000. B	447.75	3.34B	3.34	10.11	10.11
91.67	36000. B	514.98	4.68B	4.68	8.65	8.65
94.00L	36000. B	520.37	4.91B	4.91	8.41	8.41
94.00R	36000. B	520.76	4.58B	4.58	8.42	8.42
110.00	36000. B	559.21	6.02B	6.02	6.97	6.97
128.33	35223. B	695.47	6.37B	6.37	6.26	6.26
146.67	35178. B	842.04	4.59B	4.59	6.09	6.09
155.33L	28998. B	928.08	2.75B	2.75	6.37	6.37
155.33R	28971. B	929.75	4.56B	4.56	6.38	6.38
165.00	30326. B	1380.66	4.68B	4.68	10.03	10.03
183.33	35100. B	1263.48	2.21B	2.21	7.05	7.05

Span 2

Location	Allowable	Shear	Rating Factors Bending		Shear	
			Inv.	Oper.	Inv.	Oper.
0.00	35100. B	1274.84	2.21B	2.21	6.48	6.48
21.00L	35318. B	923.38	5.23B	5.23	5.75	5.75
21.00R	35318. B	922.51	3.07B	3.07	5.74	5.74
25.00	35313. B	902.13	3.75B	3.75	5.98	5.98
50.00	35226. B	789.55	8.68B	8.68	7.98	7.98
75.00	36000. B	588.76	6.28B	6.28	7.15	7.15
76.00L	36000. B	587.44	6.11B	6.11	7.23	7.23
76.00R	36000. B	587.20	6.51B	6.51	7.23	7.23
99.50L	36000. B	506.39	3.96B	3.96	9.44	9.44
99.50R	36000. B	506.31	4.62B	4.62	9.44	9.44
100.00	36000. B	506.10	4.59B	4.59	9.55	9.55
125.00L	36000. B	502.51	3.98B	3.98	14.01	14.01
125.00R	36000. B	502.55	3.98B	3.98	14.01	14.01
150.00	36000. B	521.48	4.62B	4.62	12.12	12.12
174.00L	36000. B	626.29	6.55B	6.55	9.12	9.12
174.00R	36000. B	626.70	6.15B	6.15	9.13	9.13

150.50L	36000. B	522.06	4.65B	4.65	11.97	11.97
150.50R	36000. B	522.30	3.99B	3.99	11.98	11.98
175.00	36000. B	628.95	6.32B	6.32	9.02	9.02
200.00	35218. B	865.31	8.40B	8.40	9.56	9.56
225.00	30828. B	1008.02	3.16B	3.16	7.62	7.62
229.00L	30521. B	1033.20	2.57B	2.57	7.31	7.31
229.00R	30507. B	1034.27	4.46B	4.46	7.33	7.33
250.00	30889. B	1415.29	2.16B	2.16	7.71	7.71

Span 3

Location	Allowable	Shear	Rating Factors Bending		Shear	
			Inv.	Oper.	Inv.	Oper.
0.00	30889. B	1416.13	2.16B	2.16	7.69	7.69
18.33	32863. B	1199.86	4.11B	4.11	7.63	7.63
28.00L	32495. B	765.29	4.67B	4.67	4.55	4.55
28.00R	32509. B	763.96	2.72B	2.72	4.54	4.54
36.67	32340. B	695.47	3.52B	3.52	4.59	4.59
55.00	35223. B	600.54	6.44B	6.44	5.64	5.64
73.33	36000. B	514.98	6.02B	6.02	6.64	6.64
89.33L	36000. B	504.07	4.71B	4.71	8.57	8.57
89.33R	36000. B	503.96	5.06B	5.06	8.56	8.56
91.67	36000. B	502.42	4.86B	4.86	8.86	8.86
110.00	36000. B	435.91	3.41B	3.41	9.77	9.77
128.33	36000. B	476.29	3.19B	3.19	9.27	9.27
145.33L	36000. B	463.01	4.18B	4.18	6.77	6.77
145.33R	36000. B	462.88	3.41B	3.41	6.77	6.77
146.67	36000. B	461.91	3.52B	3.52	6.63	6.63
165.00	36000. B	484.57	6.45B	6.45	5.71	5.71
183.33	36000. B	338.37	>999.00B	>999.00	2.35	2.35

Service II
(Assumes permit truck is only loading in all lanes)

Span 1

Location	Allowable Stress	Rating Factors Bending	
		Inv.	Oper.
0.00	34200. S	> 999.00 B	>999.00
18.33	34200. S	8.88 B	8.88
36.67	34200. S	5.06 B	5.06
38.00L	34200. S	4.91 B	4.91
38.00R	34200. S	5.88 B	5.88
55.00	34200. S	4.54 B	4.54
73.33	34200. S	4.72 B	4.72
91.67	34200. S	6.38 B	6.38
94.00L	34200. S	6.66 B	6.66
94.00R	34200. S	6.22 B	6.22
110.00	34200. S	7.87 B	7.87
128.33	34200. S	9.68 B	9.68
146.67	34200. S	7.51 B	7.51
155.33L	34200. S	6.84 B	6.84
155.33R	34200. S	9.84 B	9.84
165.00	34200. S	9.91 B	9.91
183.33	34200. S	4.48 B	4.48

Span 2

Location	Allowable Stress	Rating Factors Bending	
		Inv.	Oper.

0.00	34200.	S	4.48	B	4.48
21.00L	34200.	S	8.62	B	8.62
21.00R	34200.	S	5.66	B	5.66
25.00	34200.	S	6.62	B	6.62
50.00	34200.	S	13.33	B	13.33
75.00	34200.	S	8.31	B	8.31
76.00L	34200.	S	8.10	B	8.10
76.00R	34200.	S	8.62	B	8.62
99.50L	34200.	S	5.50	B	5.50
99.50R	34200.	S	6.34	B	6.34
100.00	34200.	S	6.31	B	6.31
125.00L	34200.	S	5.57	B	5.57
125.00R	34200.	S	5.57	B	5.57
150.00	34200.	S	6.34	B	6.34
174.00L	34200.	S	8.66	B	8.66
174.00R	34200.	S	8.14	B	8.14
150.50L	34200.	S	6.38	B	6.38
150.50R	34200.	S	5.54	B	5.54
175.00	34200.	S	8.35	B	8.35
200.00	34200.	S	12.90	B	12.90
225.00	34200.	S	7.14	B	7.14
229.00L	34200.	S	6.34	B	6.34
229.00R	34200.	S	9.34	B	9.34
250.00	34200.	S	5.76	B	5.76

Span 3

Location	Allowable Stress		Rating Factors Bending Inv.		Oper.
0.00	34200.	S	5.76	B	5.76
18.33	34200.	S	7.98	B	7.98
28.00L	34200.	S	8.62	B	8.62
28.00R	34200.	S	5.72	B	5.72
36.67	34200.	S	6.77	B	6.77
55.00	34200.	S	9.79	B	9.79
73.33	34200.	S	7.88	B	7.88
89.33L	34200.	S	6.42	B	6.42
89.33R	34200.	S	6.88	B	6.88
91.67	34200.	S	6.63	B	6.63
110.00	34200.	S	4.82	B	4.82
128.33	34200.	S	4.58	B	4.58
145.33L	34200.	S	5.90	B	5.90
145.33R	34200.	S	4.91	B	4.91
146.67	34200.	S	5.06	B	5.06
165.00	34200.	S	8.79	B	8.79
183.33	34200.	S	> 999.00	B	>999.00

****
Minimum rating is 2.16 at location 250.00 in span 2.
****

Classified at Strength II because of description
in 3.4.1 for other than HL93 vehicle.

Rating Codes:
T - Top steel governs
B - Bottom steel governs
C - Concrete governs
R - Rebar governs
V - Shear governs
S - Serviceability governs

Mom Strength Codes:
C - Compact
B - Braced non-compact
U - Unbraced non-compact
T - Transition between compact and braced non-compact
S - Serviceability

Noncompact shapes ratings based on stress, as

Fb - factored dead load stress

$$IR = \frac{\text{PBETA}}{\text{factored LL+I stress}}$$

Inventory rating for Strength II if only permit loading on the system uses PBETA. Operating rating uses IR(PBETA/1.35).

I-295 HH BUCKMAN BRIDGE -720249
Girder 6 : Rating Output : Lrfd Ratings
Thu Mar 26 21:33:07 2015

[This table uses the rating equation (6A.4.2.1-1)
of the 2011 edition of the Manual for Bridge
Evaluation.]

Permit

Strength II
(Assumes permit truck is only loading)

Span 1

Location	Allowable	Shear	Rating Factors Bending		Shear	
			Inv.	Oper.	Inv.	Oper.
0.00	36000. B	347.57	>999.00B	>999.00	2.42	2.42
18.33	36000. B	461.91	6.74B	6.74	5.66	5.66
36.67	36000. B	476.29	3.62B	3.62	8.96	8.96
38.00L	36000. B	477.22	3.50B	3.50	9.23	9.23
38.00R	36000. B	477.34	4.25B	4.25	9.23	9.23
55.00	36000. B	435.91	3.13B	3.13	10.95	10.95
73.33	36000. B	447.75	3.28B	3.28	10.04	10.04
91.67	36000. B	514.98	4.63B	4.63	8.22	8.22
94.00L	36000. B	520.37	4.86B	4.86	8.03	8.03
94.00R	36000. B	520.76	4.53B	4.53	8.03	8.03
110.00	36000. B	559.21	6.01B	6.01	7.15	7.15
128.33	35178. B	695.47	6.54B	6.54	6.81	6.81
146.67	30325. B	842.04	4.26B	4.26	7.22	7.22
155.33L	28997. B	928.08	3.45B	3.45	7.52	7.52
155.33R	28970. B	929.75	5.41B	5.41	7.54	7.54
165.00	30888. B	1380.66	5.74B	5.74	11.40	11.40
183.33	35100. B	1263.48	2.97B	2.97	7.65	7.65

Span 2

Location	Allowable	Shear	Rating Factors Bending		Shear	
			Inv.	Oper.	Inv.	Oper.
0.00	35100. B	1274.84	2.97B	2.97	7.72	7.72
21.00L	35318. B	923.38	5.61B	5.61	6.67	6.67
21.00R	35318. B	922.51	3.38B	3.38	6.66	6.66
25.00	35201. B	902.13	3.93B	3.93	6.82	6.82
50.00	35252. B	789.55	8.19B	8.19	7.61	7.61
75.00	36000. B	588.76	6.32B	6.32	6.36	6.36
76.00L	36000. B	587.44	6.13B	6.13	6.42	6.42
76.00R	36000. B	587.20	6.53B	6.53	6.42	6.42
99.50L	36000. B	506.39	3.73B	3.73	8.75	8.75
99.50R	36000. B	506.31	4.34B	4.34	8.75	8.75
100.00	36000. B	506.10	4.31B	4.31	8.88	8.88
125.00L	36000. B	502.51	3.65B	3.65	13.75	13.75
125.00R	36000. B	502.55	3.65B	3.65	13.76	13.76
150.00	36000. B	521.48	4.40B	4.40	10.79	10.79
174.00L	36000. B	626.29	6.69B	6.69	8.04	8.04
174.00R	36000. B	626.70	6.29B	6.29	8.05	8.05

150.50L	36000. B	522.06	4.43B	4.43	10.64	10.64
150.50R	36000. B	522.30	3.82B	3.82	10.64	10.64
175.00	36000. B	628.95	6.48B	6.48	7.97	7.97
200.00	35218. B	865.31	8.17B	8.17	9.70	9.70
225.00	30827. B	1008.02	3.59B	3.59	9.11	9.11
229.00L	30520. B	1033.20	3.06B	3.06	8.81	8.81
229.00R	30506. B	1034.27	5.07B	5.07	8.82	8.82
250.00	30888. B	1415.29	3.04B	3.04	8.95	8.95

Span 3

Location	Allowable	Shear	Rating Factors Bending		Shear	
			Inv.	Oper.	Inv.	Oper.
0.00	30888. B	1416.13	3.04B	3.04	8.84	8.84
18.33	32862. B	1199.86	4.75B	4.75	9.07	9.07
28.00L	32494. B	765.29	5.10B	5.10	5.40	5.40
28.00R	32508. B	763.96	3.08B	3.08	5.39	5.39
36.67	32339. B	695.47	3.70B	3.70	5.23	5.23
55.00	35223. B	600.54	6.17B	6.17	5.81	5.81
73.33	36000. B	514.98	5.94B	5.94	6.35	6.35
89.33L	36000. B	504.07	4.58B	4.58	8.26	8.26
89.33R	36000. B	503.96	4.92B	4.92	8.26	8.26
91.67	36000. B	502.42	4.72B	4.72	8.55	8.55
110.00	36000. B	435.91	3.32B	3.32	9.54	9.54
128.33	36000. B	476.29	3.13B	3.13	8.82	8.82
145.33L	36000. B	463.01	4.22B	4.22	6.46	6.46
145.33R	36000. B	462.88	3.46B	3.46	6.46	6.46
146.67	36000. B	461.91	3.58B	3.58	6.35	6.35
165.00	36000. B	484.57	6.61B	6.61	5.82	5.82
183.33	36000. B	338.37	>999.00B	>999.00	2.43	2.43

Service II
(Assumes permit truck is only loading in all lanes)

Span 1

Location	Allowable Stress	Rating Factors Bending	
		Inv.	Oper.
0.00	34200. S	> 999.00 B	>999.00
18.33	34200. S	9.11 B	9.11
36.67	34200. S	5.15 B	5.15
38.00L	34200. S	4.99 B	4.99
38.00R	34200. S	5.95 B	5.95
55.00	34200. S	4.45 B	4.45
73.33	34200. S	4.60 B	4.60
91.67	34200. S	6.28 B	6.28
94.00L	34200. S	6.56 B	6.56
94.00R	34200. S	6.13 B	6.13
110.00	34200. S	7.83 B	7.83
128.33	34200. S	9.94 B	9.94
146.67	34200. S	8.56 B	8.56
155.33L	34200. S	7.98 B	7.98
155.33R	34200. S	11.22 B	11.22
165.00	34200. S	11.30 B	11.30
183.33	34200. S	5.53 B	5.53

Span 2

Location	Allowable Stress	Rating Factors Bending	
		Inv.	Oper.

0.00	34200. S	5.53	B	5.53
21.00L	34200. S	9.17	B	9.17
21.00R	34200. S	6.11	B	6.11
25.00	34200. S	6.93	B	6.93
50.00	34200. S	12.64	B	12.64
75.00	34200. S	8.32	B	8.32
76.00L	34200. S	8.09	B	8.09
76.00R	34200. S	8.60	B	8.60
99.50L	34200. S	5.16	B	5.16
99.50R	34200. S	5.94	B	5.94
100.00	34200. S	5.91	B	5.91
125.00L	34200. S	5.10	B	5.10
125.00R	34200. S	5.10	B	5.10
150.00	34200. S	6.02	B	6.02
174.00L	34200. S	8.79	B	8.79
174.00R	34200. S	8.28	B	8.28
150.50L	34200. S	6.06	B	6.06
150.50R	34200. S	5.27	B	5.27
175.00	34200. S	8.51	B	8.51
200.00	34200. S	12.61	B	12.61
225.00	34200. S	7.83	B	7.83
229.00L	34200. S	7.14	B	7.14
229.00R	34200. S	10.30	B	10.30
250.00	34200. S	7.12	B	7.12

Span 3

Location	Allowable Stress	Rating Factors Bending Inv.		Oper.
0.00	34200. S	7.12	B	7.12
18.33	34200. S	8.89	B	8.89
28.00L	34200. S	9.24	B	9.24
28.00R	34200. S	6.24	B	6.24
36.67	34200. S	7.04	B	7.04
55.00	34200. S	9.40	B	9.40
73.33	34200. S	7.74	B	7.74
89.33L	34200. S	6.21	B	6.21
89.33R	34200. S	6.65	B	6.65
91.67	34200. S	6.41	B	6.41
110.00	34200. S	4.67	B	4.67
128.33	34200. S	4.46	B	4.46
145.33L	34200. S	5.92	B	5.92
145.33R	34200. S	4.95	B	4.95
146.67	34200. S	5.11	B	5.11
165.00	34200. S	8.96	B	8.96
183.33	34200. S	> 999.00	B	>999.00

****
Minimum rating is 2.42 at location 0.00 in span 1.
****

Classified at Strength II because of description
in 3.4.1 for other than HL93 vehicle.

Rating Codes:
T - Top steel governs
B - Bottom steel governs
C - Concrete governs
R - Rebar governs
V - Shear governs
S - Serviceability governs

Mom Strength Codes:
C - Compact
B - Braced non-compact
U - Unbraced non-compact
T - Transition between compact and braced non-compact
S - Serviceability

Noncompact shapes ratings based on stress, as

Fb - factored dead load stress

$$IR = \frac{\text{PBETA}}{\text{factored LL+I stress}}$$

Inventory rating for Strength II if only permit loading on the system uses PBETA. Operating rating uses IR(PBETA/1.35).

I-295 HH BUCKMAN BRIDGE -720249
Girder 7 : Rating Output : Lrfd Ratings
Thu Mar 26 21:33:22 2015

[This table uses the rating equation (6A.4.2.1-1)
of the 2011 edition of the Manual for Bridge
Evaluation.]

Permit

Strength II
(Assumes permit truck is only loading)

Span 1

Location	Allowable	Shear	Rating Factors Bending		Shear	
			Inv.	Oper.	Inv.	Oper.
0.00	36000. B	347.57	>999.00B	>999.00	2.25	2.25
18.33	36000. B	461.91	6.15B	6.15	5.04	5.04
36.67	36000. B	476.29	3.40B	3.40	7.94	7.94
38.00L	36000. B	477.22	3.29B	3.29	8.17	8.17
38.00R	36000. B	477.34	3.97B	3.97	8.17	8.17
55.00	36000. B	435.91	2.96B	2.96	9.66	9.66
73.33	36000. B	447.75	3.04B	3.04	9.72	9.72
91.67	36000. B	514.98	4.21B	4.21	8.03	8.03
94.00L	36000. B	520.37	4.40B	4.40	7.84	7.84
94.00R	36000. B	520.76	4.11B	4.11	7.84	7.84
110.00	36000. B	559.21	5.18B	5.18	6.84	6.84
128.33	35178. B	695.47	5.43B	5.43	6.45	6.45
146.67	30325. B	842.04	3.74B	3.74	6.75	6.75
155.33L	28997. B	928.08	3.17B	3.17	7.02	7.02
155.33R	28970. B	929.75	4.84B	4.84	7.04	7.04
165.00	30888. B	1380.66	5.31B	5.31	10.57	10.57
183.33	35100. B	1263.48	3.09B	3.09	7.22	7.22

Span 2

Location	Allowable	Shear	Rating Factors Bending		Shear	
			Inv.	Oper.	Inv.	Oper.
0.00	35100. B	1274.84	3.09B	3.09	7.04	7.04
21.00L	35318. B	923.38	5.59B	5.59	6.14	6.14
21.00R	35318. B	922.51	3.48B	3.48	6.13	6.13
25.00	35201. B	902.13	3.98B	3.98	6.28	6.28
50.00	35252. B	789.55	7.13B	7.13	7.07	7.07
75.00	36000. B	588.76	5.43B	5.43	5.83	5.83
76.00L	36000. B	587.44	5.27B	5.27	5.88	5.88
76.00R	36000. B	587.20	5.61B	5.61	5.88	5.88
99.50L	36000. B	506.39	3.27B	3.27	7.71	7.71
99.50R	36000. B	506.31	3.79B	3.79	7.71	7.71
100.00	36000. B	506.10	3.77B	3.77	7.82	7.82
125.00L	36000. B	502.51	3.24B	3.24	12.44	12.44
125.00R	36000. B	502.55	3.24B	3.24	12.44	12.44
150.00	36000. B	521.48	3.83B	3.83	9.72	9.72
174.00L	36000. B	626.29	5.64B	5.64	7.43	7.43
174.00R	36000. B	626.70	5.31B	5.31	7.44	7.44

150.50L	36000. B	522.06	3.86B	3.86	9.59	9.59
150.50R	36000. B	522.30	3.34B	3.34	9.60	9.60
175.00	36000. B	628.95	5.46B	5.46	7.38	7.38
200.00	35218. B	865.31	7.17B	7.17	9.03	9.03
225.00	30827. B	1008.02	3.62B	3.62	8.24	8.24
229.00L	30520. B	1033.20	3.16B	3.16	7.97	7.97
229.00R	30506. B	1034.27	5.05B	5.05	7.98	7.98
250.00	30888. B	1415.29	3.22B	3.22	8.18	8.18

Span 3

Location	Allowable	Shear	Rating Factors Bending		Shear	
			Inv.	Oper.	Inv.	Oper.
0.00	30888. B	1416.13	3.22B	3.22	8.24	8.24
18.33	32862. B	1199.86	4.50B	4.50	8.46	8.46
28.00L	32494. B	765.29	4.62B	4.62	5.17	5.17
28.00R	32508. B	763.96	2.88B	2.88	5.15	5.15
36.67	32339. B	695.47	3.28B	3.28	5.05	5.05
55.00	35223. B	600.54	5.07B	5.07	5.65	5.65
73.33	36000. B	514.98	5.18B	5.18	6.10	6.10
89.33L	36000. B	504.07	4.19B	4.19	7.94	7.94
89.33R	36000. B	503.96	4.50B	4.50	7.94	7.94
91.67	36000. B	502.42	4.33B	4.33	8.23	8.23
110.00	36000. B	435.91	3.07B	3.07	9.19	9.19
128.33	36000. B	476.29	2.95B	2.95	8.14	8.14
145.33L	36000. B	463.01	3.93B	3.93	5.89	5.89
145.33R	36000. B	462.88	3.25B	3.25	5.89	5.89
146.67	36000. B	461.91	3.35B	3.35	5.78	5.78
165.00	36000. B	484.57	6.02B	6.02	5.30	5.30
183.33	36000. B	338.37	>999.00B	>999.00	2.26	2.26

Service II
(Assumes permit truck is only loading in all lanes)

Span 1

Location	Allowable Stress	Rating Factors Bending	
		Inv.	Oper.
0.00	34200. S	> 999.00 B	>999.00
18.33	34200. S	8.29 B	8.29
36.67	34200. S	4.78 B	4.78
38.00L	34200. S	4.64 B	4.64
38.00R	34200. S	5.51 B	5.51
55.00	34200. S	4.17 B	4.17
73.33	34200. S	4.22 B	4.22
91.67	34200. S	5.69 B	5.69
94.00L	34200. S	5.92 B	5.92
94.00R	34200. S	5.54 B	5.54
110.00	34200. S	6.74 B	6.74
128.33	34200. S	8.21 B	8.21
146.67	34200. S	7.37 B	7.37
155.33L	34200. S	7.08 B	7.08
155.33R	34200. S	9.83 B	9.83
165.00	34200. S	10.25 B	10.25
183.33	34200. S	5.55 B	5.55

Span 2

Location	Allowable Stress	Rating Factors Bending	
		Inv.	Oper.

0.00	34200. S	5.55	B	5.55
21.00L	34200. S	9.02	B	9.02
21.00R	34200. S	6.13	B	6.13
25.00	34200. S	6.87	B	6.87
50.00	34200. S	11.00	B	11.00
75.00	34200. S	7.12	B	7.12
76.00L	34200. S	6.92	B	6.92
76.00R	34200. S	7.36	B	7.36
99.50L	34200. S	4.50	B	4.50
99.50R	34200. S	5.16	B	5.16
100.00	34200. S	5.13	B	5.13
125.00L	34200. S	4.49	B	4.49
125.00R	34200. S	4.49	B	4.49
150.00	34200. S	5.21	B	5.21
174.00L	34200. S	7.39	B	7.39
174.00R	34200. S	6.96	B	6.96
150.50L	34200. S	5.24	B	5.24
150.50R	34200. S	4.57	B	4.57
175.00	34200. S	7.15	B	7.15
200.00	34200. S	11.04	B	11.04
225.00	34200. S	7.65	B	7.65
229.00L	34200. S	7.07	B	7.07
229.00R	34200. S	10.04	B	10.04
250.00	34200. S	7.18	B	7.18

Span 3

Location	Allowable Stress	Rating Factors Bending Inv.		Oper.
0.00	34200. S	7.18	B	7.18
18.33	34200. S	8.24	B	8.24
28.00L	34200. S	8.22	B	8.22
28.00R	34200. S	5.65	B	5.65
36.67	34200. S	6.12	B	6.12
55.00	34200. S	7.71	B	7.71
73.33	34200. S	6.75	B	6.75
89.33L	34200. S	5.66	B	5.66
89.33R	34200. S	6.05	B	6.05
91.67	34200. S	5.85	B	5.85
110.00	34200. S	4.28	B	4.28
128.33	34200. S	4.16	B	4.16
145.33L	34200. S	5.47	B	5.47
145.33R	34200. S	4.60	B	4.60
146.67	34200. S	4.74	B	4.74
165.00	34200. S	8.14	B	8.14
183.33	34200. S	> 999.00	B	>999.00

****
Minimum rating is 2.25 at location 0.00 in span 1.
****

Classified at Strength II because of description
in 3.4.1 for other than HL93 vehicle.

Rating Codes:
T - Top steel governs
B - Bottom steel governs
C - Concrete governs
R - Rebar governs
V - Shear governs
S - Serviceability governs

Mom Strength Codes:
C - Compact
B - Braced non-compact
U - Unbraced non-compact
T - Transition between compact and braced non-compact
S - Serviceability

Noncompact shapes ratings based on stress, as

Fb - factored dead load stress

$$IR = \frac{\text{PBETA}}{\text{factored LL+I stress}}$$

Inventory rating for Strength II if only permit loading on the system uses PBETA. Operating rating uses IR(PBETA/1.35).

I-295 HH BUCKMAN BRIDGE -720249
Girder 8 : Rating Output : Lrfd Ratings
Thu Mar 26 21:33:38 2015

[This table uses the rating equation (6A.4.2.1-1)
of the 2011 edition of the Manual for Bridge
Evaluation.]

Permit

Strength II
(Assumes permit truck is only loading)

Span 1

Location	Allowable	Shear	Rating Factors Bending		Shear	
			Inv.	Oper.	Inv.	Oper.
0.00	36000. B	347.57	>999.00B	>999.00	2.83	2.83
18.33	36000. B	461.91	6.40B	6.40	5.44	5.44
36.67	36000. B	476.29	3.32B	3.32	8.58	8.58
38.00L	36000. B	477.22	3.22B	3.22	8.85	8.85
38.00R	36000. B	477.34	3.84B	3.84	8.86	8.86
55.00	36000. B	435.91	2.91B	2.91	11.55	11.55
73.33	36000. B	447.75	2.89B	2.89	11.36	11.36
91.67	36000. B	514.98	3.61B	3.61	9.98	9.98
94.00L	36000. B	520.37	3.76B	3.76	9.67	9.67
94.00R	36000. B	520.76	3.52B	3.52	9.68	9.68
110.00	36000. B	559.21	4.74B	4.74	7.59	7.59
128.33	35184. B	695.47	4.87B	4.87	7.45	7.45
146.67	30537. B	842.04	3.51B	3.51	7.19	7.19
155.33L	29239. B	928.08	3.06B	3.06	7.43	7.43
155.33R	29213. B	929.75	4.57B	4.57	7.45	7.45
165.00	35058. B	1380.66	5.99B	5.99	11.23	11.23
183.33	35105. B	1263.48	3.12B	3.12	8.66	8.66

Span 2

Location	Allowable	Shear	Rating Factors Bending		Shear	
			Inv.	Oper.	Inv.	Oper.
0.00	35105. B	1274.84	3.12B	3.12	8.01	8.01
21.00L	35322. B	923.38	5.35B	5.35	6.42	6.42
21.00R	35322. B	922.51	3.43B	3.43	6.41	6.41
25.00	35208. B	902.13	3.85B	3.85	6.48	6.48
50.00	35258. B	789.55	6.27B	6.27	7.19	7.19
75.00	36000. B	588.76	5.13B	5.13	7.25	7.25
76.00L	36000. B	587.44	4.98B	4.98	7.34	7.34
76.00R	36000. B	587.20	5.30B	5.30	7.34	7.34
99.50L	36000. B	506.39	3.22B	3.22	8.81	8.81
99.50R	36000. B	506.31	3.70B	3.70	8.81	8.81
100.00	36000. B	506.10	3.68B	3.68	8.87	8.87
125.00L	36000. B	502.51	3.17B	3.17	15.08	15.08
125.00R	36000. B	502.55	3.17B	3.17	15.08	15.08
150.00	36000. B	521.48	3.71B	3.71	10.25	10.25
174.00L	36000. B	626.29	5.29B	5.29	8.76	8.76
174.00R	36000. B	626.70	4.99B	4.99	8.76	8.76

150.50L	36000. B	522.06	3.73B	3.73	10.19	10.19
150.50R	36000. B	522.30	3.25B	3.25	10.19	10.19
175.00	36000. B	628.95	5.12B	5.12	8.66	8.66
200.00	35224. B	865.31	6.32B	6.32	8.65	8.65
225.00	31022. B	1008.02	3.54B	3.54	7.93	7.93
229.00L	30721. B	1033.20	3.16B	3.16	7.83	7.83
229.00R	30708. B	1034.27	4.90B	4.90	7.84	7.84
250.00	31030. B	1415.29	3.39B	3.39	9.23	9.23

Span 3

Location	Allowable	Shear	Rating Factors Bending		Shear	
			Inv.	Oper.	Inv.	Oper.
0.00	31030. B	1416.13	3.39B	3.39	9.80	9.80
18.33	32968. B	1199.86	4.33B	4.33	9.31	9.31
28.00L	32611. B	765.29	4.37B	4.37	5.74	5.74
28.00R	32624. B	763.96	2.81B	2.81	5.73	5.73
36.67	32498. B	695.47	3.13B	3.13	5.62	5.62
55.00	35228. B	600.54	4.56B	4.56	6.41	6.41
73.33	36000. B	514.98	4.77B	4.77	7.04	7.04
89.33L	36000. B	504.07	3.86B	3.86	9.75	9.75
89.33R	36000. B	503.96	4.13B	4.13	9.75	9.75
91.67	36000. B	502.42	3.99B	3.99	10.17	10.17
110.00	36000. B	435.91	2.94B	2.94	11.49	11.49
128.33	36000. B	476.29	2.90B	2.90	10.15	10.15
145.33L	36000. B	463.01	3.81B	3.81	6.60	6.60
145.33R	36000. B	462.88	3.17B	3.17	6.60	6.60
146.67	36000. B	461.91	3.28B	3.28	6.45	6.45
165.00	36000. B	484.57	6.28B	6.28	5.66	5.66
183.33	36000. B	338.37	>999.00B	>999.00	2.79	2.79

Service II
(Assumes permit truck is only loading in all lanes)

Span 1

Location	Allowable Stress	Rating Factors Bending	
		Inv.	Oper.
0.00	34200. S	> 999.00 B	>999.00
18.33	34200. S	8.57 B	8.57
36.67	34200. S	4.62 B	4.62
38.00L	34200. S	4.48 B	4.48
38.00R	34200. S	5.28 B	5.28
55.00	34200. S	4.04 B	4.04
73.33	34200. S	3.98 B	3.98
91.67	34200. S	4.85 B	4.85
94.00L	34200. S	5.03 B	5.03
94.00R	34200. S	4.71 B	4.71
110.00	34200. S	6.17 B	6.17
128.33	34200. S	7.29 B	7.29
146.67	34200. S	6.67 B	6.67
155.33L	34200. S	6.49 B	6.49
155.33R	34200. S	8.93 B	8.93
165.00	34200. S	9.38 B	9.38
183.33	34200. S	5.37 B	5.37

Span 2

Location	Allowable Stress	Rating Factors Bending	
		Inv.	Oper.

0.00	34200. S	5.37	B	5.37
21.00L	34200. S	8.43	B	8.43
21.00R	34200. S	5.83	B	5.83
25.00	34200. S	6.46	B	6.46
50.00	34200. S	9.56	B	9.56
75.00	34200. S	6.70	B	6.70
76.00L	34200. S	6.52	B	6.52
76.00R	34200. S	6.93	B	6.93
99.50L	34200. S	4.37	B	4.37
99.50R	34200. S	4.99	B	4.99
100.00	34200. S	4.97	B	4.97
125.00L	34200. S	4.34	B	4.34
125.00R	34200. S	4.34	B	4.34
150.00	34200. S	5.00	B	5.00
174.00L	34200. S	6.92	B	6.92
174.00R	34200. S	6.53	B	6.53
150.50L	34200. S	5.03	B	5.03
150.50R	34200. S	4.41	B	4.41
175.00	34200. S	6.69	B	6.69
200.00	34200. S	9.61	B	9.61
225.00	34200. S	7.12	B	7.12
229.00L	34200. S	6.67	B	6.67
229.00R	34200. S	9.35	B	9.35
250.00	34200. S	7.10	B	7.10

Span 3

Location	Allowable Stress	Rating Factors Bending Inv.		Oper.
0.00	34200. S	7.10	B	7.10
18.33	34200. S	7.64	B	7.64
28.00L	34200. S	7.55	B	7.55
28.00R	34200. S	5.27	B	5.27
36.67	34200. S	5.62	B	5.62
55.00	34200. S	6.86	B	6.86
73.33	34200. S	6.21	B	6.21
89.33L	34200. S	5.18	B	5.18
89.33R	34200. S	5.53	B	5.53
91.67	34200. S	5.36	B	5.36
110.00	34200. S	4.05	B	4.05
128.33	34200. S	4.04	B	4.04
145.33L	34200. S	5.25	B	5.25
145.33R	34200. S	4.44	B	4.44
146.67	34200. S	4.57	B	4.57
165.00	34200. S	8.43	B	8.43
183.33	34200. S	> 999.00	B	>999.00

****
Minimum rating is 2.79 at location 183.33 in span 3.
****

Classified at Strength II because of description
in 3.4.1 for other than HL93 vehicle.

Rating Codes:
T - Top steel governs
B - Bottom steel governs
C - Concrete governs
R - Rebar governs
V - Shear governs
S - Serviceability governs

Mom Strength Codes:
C - Compact
B - Braced non-compact
U - Unbraced non-compact
T - Transition between compact and braced non-compact
S - Serviceability

Noncompact shapes ratings based on stress, as

Fb - factored dead load stress

$$IR = \frac{\text{PBETA}}{\text{factored LL+I stress}}$$

Inventory rating for Strength II if only permit loading on the system uses PBETA. Operating rating uses IR(PBETA/1.35).

2.2.7. SU4 (32” Barrier)

I-295 HH BUCKMAN BRIDGE -720249
Girder System : Input File : Layout/Slab/Loading Definition
Mon Mar 30 11:14:50 2015

```
ID: I-295 HH BUCKMAN BRIDGE -720249
CONDITIONS
  ALL LANES
  ENGLISH INPUT
  ENGLISH OUTPUT
  FLOAT LANES
  GRID MODEL
  LRFD METHOD
  MEDIUM RESOLUTION MESH
  OVERLAY PERMIT TRUCK WITH LANE LOADING
  PERMIT TRUCK IN ALL LANES
  PERMIT TRUCK IS ONLY LOADING IN PERMIT LANE
  RATE MODE
  RATING PROJECT
  SELF WEIGHT FOR DEAD LOAD 1
DATA
  BR-1 18.3333 18.3333 18.3333 18.3333 18.3333 18.3333 18.3333 18.3333
  18.3333 36.1875 17.8542 17.8542 17.8542 17.8542 17.8542 17.875 17.875
  17.8542 17.8542 17.8542 17.8542 17.8542 36.1875 18.3333 18.3333
  18.3333 18.3333 18.3333 18.3333 18.3333 18.3333
  CURB -2.
  FPC 4.5
  GDSPC 9.3073 9.3073 9.3073 9.3073 9.3333 9.3333 9.3333
  LANES 12. 12. 12. 12. 12.
  PRLANE  0.2
  PRMITP 10.425 14.025 14.025 14.025 10.425 14.025 14.025 14.025
  PRMITSP 9.167 4.167 4.167 30. 9.167 4.167 4.167
  ROADWP 68.
  SKEW-1 90. 90. 90. 90.
  SLABEXT 3.5417 2.3125
  SLABT 8.
  SLABWEAR  0.
  SPEED 65
  SPN-1 183.3333 250. 183.3333
  SUPER  0.01563
  WAC-1  0.164
  WAC-2  0.19
  WAC-3  0.19
  WAC-4  0.19
  WAC-5  0.19
  WAC-6  0.19
  WAC-7  0.19
  WAC-8  0.14
  WAS-1  0.
  WAS-2  0.
  WAS-3  0.
  WAS-4  0.
  WAS-5  0.0115
  WAS-6  0.0115
  WAS-7  0.0115
  WAS-8  0.0115
  WCONC 150.
  WEAR  0.
  WHLSPC 6.
  WR-1  0.123
  WR-2  0.14
  WR-3  0.14
  WR-4  0.14
  WR-5  0.14
  WR-6  0.14
  WR-7  0.14
  WR-8  0.105
  WS-1  0.105
  WS-2  0.105
  WS-3  0.105
  WS-4  0.105
  WS-5  0.105
  WS-6  0.105
  WS-7  0.105
  WS-8  0.105
GO
```

I-295 HH BUCKMAN BRIDGE -720249
Girder 1 : Rating Output : Lrfd Ratings
Mon Mar 30 11:15:20 2015

[This table uses the rating equation (6A.4.2.1-1)
of the 2011 edition of the Manual for Bridge
Evaluation.]

Permit

Strength II
(Assumes permit truck is only loading)

Span 1

Location	Allowable	Shear	Rating Factors Bending		Shear	
			Inv.	Oper.	Inv.	Oper.
0.00	9253. C	488.42	>999.00B	>999.00	2.83	2.83
18.33	36000. B	769.69	2.61B	2.61	6.78	6.78
22.00L	36000. B	773.47	2.11B	2.11	7.24	7.24
22.00R	36000. B	773.65	3.84B	3.84	7.24	7.24
36.67	36000. B	617.31	2.46B	2.46	7.20	7.20
55.00	36000. B	623.62	1.96B	1.96	10.21	10.21
73.33	36000. B	632.76	2.04B	2.04	10.57	10.57
91.67	36000. B	644.47	2.59B	2.59	7.67	7.67
110.00	36000. B	658.50	3.77B	3.77	5.87	5.87
122.00L	11921. C	918.49	4.13B	4.13	7.43	7.43
122.00R	12402. C	918.79	4.30B	4.30	7.43	7.43
124.00L	12435. C	922.00	4.39B	4.39	7.28	7.28
124.00R	13473. C	1326.20	4.76B	4.76	11.05	11.05
128.33	23137. C	1332.57	9.91B	9.91	10.60	10.60
146.67	13919. C	1361.56	3.75B	3.75	9.06	9.06
154.00L	45765. B	1373.66	3.01B	3.01	8.67	8.67
154.00R	45762. B	1638.91	3.43B	3.43	10.64	10.64
156.00L	44053. B	1644.31	9.03B	9.03	10.68	10.68
156.00R	23727. C	1644.80	18.22B	18.22	10.68	10.68
165.00	46619. B	1671.34	5.06B	5.06	10.24	10.24
183.33	46375. B	1757.69	3.02B	3.02	9.37	9.37

Span 2

Location	Allowable	Shear	Rating Factors Bending		Shear	
			Inv.	Oper.	Inv.	Oper.
0.00	46375. B	1778.71	3.02B	3.02	9.34	9.34
25.00	46605. B	1747.50	6.46B	6.46	11.11	11.11
28.00L	46984. B	1747.50	7.01B	7.01	11.39	11.39
28.00R	21517. C	1747.50	5.70B	5.70	11.39	11.39
30.00L	21583. C	1747.50	16.50B	16.50	11.58	11.58
30.00R	45403. B	1450.84	10.08B	10.08	9.33	9.33
50.00	48073. B	1450.84	6.58B	6.58	11.22	11.22
55.33L	26462. C	1450.84	9.39B	9.39	11.81	11.81
55.33R	25672. C	1450.84	9.11B	9.11	11.81	11.81
57.33L	25672. C	1450.84	8.63B	8.63	12.03	12.03
57.33R	27861. C	1450.84	9.38B	9.38	12.03	12.03
75.00	27861. C	974.23	6.41B	6.41	9.21	9.21

100.00	27861. C	974.23	4.85B	4.85	12.39	12.39
125.00	27861. C	973.68	4.45B	4.45	18.60	18.60
150.00	27861. C	974.23	4.86B	4.86	13.03	13.03
175.00	27861. C	921.46	6.43B	6.43	9.01	9.01
190.67L	27861. C	1450.84	8.93B	8.93	12.68	12.68
190.67R	28843. C	1450.84	9.25B	9.25	12.68	12.68
192.67L	28843. C	1450.84	9.73B	9.73	12.43	12.43
192.67R	26462. C	1450.84	8.91B	8.91	12.43	12.43
200.00	48073. B	1450.84	6.55B	6.55	11.57	11.57
218.00L	45403. B	1450.84	3.91B	3.91	9.85	9.85
218.00R	45403. B	1747.50	4.37B	4.37	12.22	12.22
220.00L	43617. B	1747.50	10.66B	10.66	12.00	12.00
220.00R	43617. B	1747.50	18.30B	18.30	12.00	12.00
225.00	45403. B	1747.50	6.23B	6.23	11.48	11.48
250.00	46375. B	2011.94	3.01B	3.01	10.78	10.78

Span 3

Location	Allowable	Shear	Rating Factors Bending		Shear	
			Inv.	Oper.	Inv.	Oper.
0.00	46375. B	1584.21	3.01B	3.01	8.28	8.28
18.33	46620. B	1671.32	5.06B	5.06	10.19	10.19
25.33L	23797. C	1650.72	5.96B	5.96	10.63	10.63
25.33R	20549. C	1650.22	4.85B	4.85	10.62	10.62
27.33L	20554. C	1644.80	15.02B	15.02	10.76	10.76
27.33R	45724. B	1377.06	8.40B	8.40	8.75	8.75
36.67	13920. C	1361.55	3.77B	3.77	9.36	9.36
55.00	23153. C	1332.56	9.94B	9.94	12.04	12.04
57.33L	13516. C	1329.18	5.92B	5.92	12.41	12.41
57.33R	13403. C	1328.93	5.87B	5.87	12.41	12.41
59.33L	13365. C	1326.20	4.74B	4.74	12.74	12.74
59.33R	11917. C	922.00	4.22B	4.22	8.40	8.40
73.33	36000. B	898.00	3.76B	3.76	9.94	9.94
91.67	36000. B	644.47	2.58B	2.58	9.37	9.37
110.00	36000. B	632.76	2.04B	2.04	12.55	12.55
128.33	36000. B	623.62	1.96B	1.96	8.34	8.34
146.67	36000. B	617.31	2.47B	2.47	6.12	6.12
161.33L	36000. B	773.65	3.84B	3.84	6.71	6.71
161.33R	36000. B	773.47	2.11B	2.11	6.71	6.71
165.00	36000. B	769.68	2.62B	2.62	6.44	6.44
183.33	9253. C	740.77	>999.00B	>999.00	5.17	5.17

Service II
(Assumes permit truck is only loading in all lanes)

Span 1

Location	Allowable Stress	Rating Factors Bending	
		Inv.	Oper.
0.00	34200. S	> 999.00 B	>999.00
18.33	34200. S	3.66 B	3.66
22.00L	34200. S	3.02 B	3.02
22.00R	34200. S	5.23 B	5.23
36.67	34200. S	3.47 B	3.47
55.00	34200. S	2.81 B	2.81
73.33	34200. S	2.89 B	2.89
91.67	34200. S	3.54 B	3.54
110.00	34200. S	4.96 B	4.96
122.00L	34200. S	6.81 B	6.81
122.00R	34200. S	6.81 B	6.81
124.00L	34200. S	6.97 B	6.97
124.00R	34200. S	5.80 B	5.80
128.33	47500. S	9.60 B	9.76
146.67	47500. S	7.12 B	7.12
154.00L	47500. S	6.08 B	6.08

154.00R	47500. S	6.35 B	6.35
156.00L	47500. S	18.03 B	18.03
156.00R	47500. S	30.71 B	30.71
165.00	47500. S	8.89 B	8.89
183.33	47500. S	5.93 B	5.93

Span 2

Location	Allowable Stress	Rating Factors Bending Inv.	Oper.
0.00	34200. S	5.93 B	5.93
25.00	34200. S	10.95 B	10.95
28.00L	34200. S	11.64 B	11.64
28.00R	34200. S	11.36 B	11.36
30.00L	34200. S	32.50 B	32.50
30.00R	34200. S	19.81 B	19.81
50.00	34200. S	11.04 B	11.04
55.33L	34200. S	9.47 B	9.47
55.33R	34200. S	9.46 B	9.46
57.33L	34200. S	8.92 B	8.92
57.33R	34200. S	10.88 B	10.88
75.00	34200. S	7.30 B	7.30
100.00	34200. S	5.40 B	5.40
125.00	47500. S	4.91 B	4.91
150.00	47500. S	5.41 B	5.41
175.00	47500. S	7.31 B	7.31
190.67L	47500. S	10.34 B	10.34
190.67R	47500. S	10.36 B	10.36
192.67L	47500. S	10.92 B	10.92
192.67R	47500. S	8.96 B	8.96
200.00	47500. S	11.01 B	11.01
218.00L	47500. S	7.58 B	7.58
218.00R	47500. S	7.82 B	7.82
220.00L	47500. S	20.46 B	20.46
220.00R	47500. S	33.18 B	33.18
225.00	47500. S	10.93 B	10.93
250.00	47500. S	5.93 B	5.93

Span 3

Location	Allowable Stress	Rating Factors Bending Inv.	Oper.
0.00	34200. S	5.93 B	5.93
18.33	34200. S	8.90 B	8.90
25.33L	34200. S	10.12 B	10.12
25.33R	34200. S	9.82 B	9.82
27.33L	34200. S	29.90 B	29.90
27.33R	34200. S	17.24 B	17.24
36.67	34200. S	7.14 B	7.14
55.00	34200. S	9.58 B	9.80
57.33L	34200. S	8.89 B	10.15
57.33R	34200. S	8.89 B	10.14
59.33L	34200. S	8.13 B	8.13
59.33R	34200. S	9.75 B	9.75
73.33	34200. S	4.95 B	4.95
91.67	34200. S	3.54 B	3.54
110.00	34200. S	2.89 B	2.89
128.33	34200. S	2.81 B	2.81
146.67	34200. S	3.47 B	3.47
161.33L	34200. S	5.23 B	5.23
161.33R	34200. S	3.02 B	3.02
165.00	34200. S	3.66 B	3.66
183.33	34200. S	> 999.00 B	>999.00

****
Minimum rating is 1.96 at location 55.00 in span 1.
****

Classified at Strength II because of description
in 3.4.1 for other than HL93 vehicle.

Rating Codes:
T - Top steel governs
B - Bottom steel governs
C - Concrete governs
R - Rebar governs
V - Shear governs
S - Serviceability governs

Mom Strength Codes:
C - Compact
B - Braced non-compact
U - Unbraced non-compact
T - Transition between compact and braced non-compact
S - Serviceability

Noncompact shapes ratings based on stress, as

$$IR = \frac{Fb - \text{factored dead load stress}}{\text{factored LL+I stress}}$$

Inventory rating for Strength II if only permit
loading on the system uses PBETA. Operating rating
uses IR(PBETA/1.35).

I-295 HH BUCKMAN BRIDGE -720249
Girder 2 : Rating Output : Lrfd Ratings
Mon Mar 30 11:15:41 2015

[This table uses the rating equation (6A.4.2.1-1)
of the 2011 edition of the Manual for Bridge
Evaluation.]

Permit

Strength II
(Assumes permit truck is only loading)

Span 1

Location	Allowable	Shear	Rating Factors Bending		Shear	
			Inv.	Oper.	Inv.	Oper.
0.00	9331. C	488.42	>999.00B	>999.00	2.81	2.81
18.33	36000. B	769.69	2.93B	2.93	7.59	7.59
22.00L	36000. B	773.47	2.37B	2.37	8.19	8.19
22.00R	36000. B	773.65	4.33B	4.33	8.20	8.20
36.67	36000. B	617.31	2.85B	2.85	7.91	7.91
55.00	36000. B	623.62	2.29B	2.29	10.60	10.60
73.33	36000. B	632.76	2.43B	2.43	9.95	9.95
91.67	36000. B	644.47	3.08B	3.08	7.76	7.76
110.00	36000. B	658.50	4.42B	4.42	6.26	6.26
122.00L	36000. B	918.49	6.09B	6.09	8.10	8.10
122.00R	36000. B	918.79	4.87T	4.87	8.10	8.10
124.00L	12522. C	922.00	5.10B	5.10	7.96	7.96
124.00R	13524. C	1326.20	5.52B	5.52	12.07	12.07
128.33	23408. C	1332.57	11.85B	11.85	11.64	11.64
146.67	13950. C	1361.56	4.51B	4.51	10.01	10.01
154.00L	45675. B	1373.66	3.64B	3.64	9.57	9.57
154.00R	45672. B	1638.91	4.13B	4.13	11.75	11.75
156.00L	43981. B	1644.31	10.18B	10.18	11.90	11.90
156.00R	23743. C	1644.80	20.41B	20.41	11.90	11.90
165.00	46576. B	1671.34	6.07B	6.07	11.24	11.24
183.33	46329. B	1757.69	3.69B	3.69	9.49	9.49

Span 2

Location	Allowable	Shear	Rating Factors Bending		Shear	
			Inv.	Oper.	Inv.	Oper.
0.00	46329. B	1778.71	3.69B	3.69	9.51	9.51
25.00	46559. B	1747.50	7.84B	7.84	12.19	12.19
28.00L	46976. B	1747.50	8.50B	8.50	12.57	12.57
28.00R	21778. C	1747.50	7.00B	7.00	12.57	12.57
30.00L	21853. C	1747.50	16.97B	16.97	12.83	12.83
30.00R	45307. B	1450.84	10.28B	10.28	10.34	10.34
50.00	47985. B	1450.84	7.98B	7.98	12.64	12.64
55.33L	27352. C	1450.84	10.89B	10.89	13.18	13.18
55.33R	27199. C	1450.84	10.83B	10.83	13.18	13.18
57.33L	27190. C	1450.84	10.29B	10.29	13.36	13.36
57.33R	29713. C	1450.84	11.26B	11.26	13.36	13.36
75.00	29713. C	974.23	7.88B	7.88	9.36	9.36

100.00	29713. C	974.23	6.07B	6.07	12.68	12.68
125.00	29713. C	973.68	5.67B	5.67	19.48	19.48
150.00	29713. C	974.23	6.06B	6.06	14.30	14.30
175.00	29713. C	974.23	7.86B	7.86	10.34	10.34
190.67L	29713. C	1450.84	10.73B	10.73	14.44	14.44
190.67R	30626. C	1450.84	11.07B	11.07	14.44	14.44
192.67L	30626. C	1450.84	11.61B	11.61	14.22	14.22
192.67R	27230. C	1450.84	10.30B	10.30	14.22	14.22
200.00	47985. B	1450.84	7.96B	7.96	13.37	13.37
218.00L	45307. B	1450.84	4.76B	4.76	11.39	11.39
218.00R	45307. B	1747.50	5.30B	5.30	14.14	14.14
220.00L	43540. B	1747.50	10.85B	10.85	13.83	13.83
220.00R	43540. B	1747.50	18.57B	18.57	13.83	13.83
225.00	45307. B	1747.50	7.55B	7.55	13.05	13.05
250.00	46330. B	1778.84	3.68B	3.68	9.51	9.51

Span 3

Location	Allowable	Shear	Rating Factors Bending		Shear	
			Inv.	Oper.	Inv.	Oper.
0.00	46330. B	1757.54	3.68B	3.68	9.42	9.42
18.33	46576. B	1671.32	6.08B	6.08	10.83	10.83
25.33L	23811. C	1650.72	7.11B	7.11	11.44	11.44
25.33R	20777. C	1650.22	5.89B	5.89	11.44	11.44
27.33L	20790. C	1644.80	17.11B	17.11	11.62	11.62
27.33R	45634. B	1377.06	9.52B	9.52	9.44	9.44
36.67	13952. C	1361.55	4.53B	4.53	10.17	10.17
55.00	23416. C	1332.56	11.89B	11.89	11.82	11.82
57.33L	13565. C	1329.18	7.04B	7.04	12.06	12.06
57.33R	13466. C	1328.93	6.99B	6.99	12.06	12.06
59.33L	13429. C	1326.20	5.48B	5.48	12.27	12.27
59.33R	12175. C	922.00	4.97B	4.97	8.09	8.09
73.33	36000. B	658.50	4.42B	4.42	6.39	6.39
91.67	36000. B	644.47	3.08B	3.08	7.93	7.93
110.00	36000. B	632.76	2.43B	2.43	10.57	10.57
128.33	36000. B	623.62	2.29B	2.29	8.21	8.21
146.67	36000. B	617.31	2.84B	2.84	6.31	6.31
161.33L	36000. B	773.65	4.33B	4.33	7.51	7.51
161.33R	36000. B	773.47	2.37B	2.37	7.51	7.51
165.00	36000. B	769.68	2.92B	2.92	7.22	7.22
183.33	9331. C	488.42	>999.00B	>999.00	3.14	3.14

Service II
(Assumes permit truck is only loading in all lanes)

Span 1

Location	Allowable Stress	Rating Factors Bending	
		Inv.	Oper.
0.00	34200. S	> 999.00 B	>999.00
18.33	34200. S	4.11 B	4.11
22.00L	34200. S	3.40 B	3.40
22.00R	34200. S	5.91 B	5.91
36.67	34200. S	4.02 B	4.02
55.00	34200. S	3.29 B	3.29
73.33	34200. S	3.44 B	3.44
91.67	34200. S	4.21 B	4.21
110.00	34200. S	5.82 B	5.82
122.00L	34200. S	7.83 B	7.83
122.00R	34200. S	7.83 B	7.83
124.00L	34200. S	8.11 B	8.11
124.00R	34200. S	6.77 B	6.77
128.33	47500. S	10.94 B	11.69
146.67	47500. S	8.60 B	8.60
154.00L	47500. S	7.36 B	7.36

154.00R	47500. S	7.67 B	7.67
156.00L	47500. S	20.40 B	20.40
156.00R	47500. S	34.61 B	34.61
165.00	47500. S	10.73 B	10.73
183.33	47500. S	7.32 B	7.32

Span 2

Location	Allowable Stress	Rating Factors Bending Inv.	Oper.
0.00	34200. S	7.32 B	7.32
25.00	34200. S	13.36 B	13.36
28.00L	34200. S	14.19 B	14.19
28.00R	34200. S	13.88 B	13.88
30.00L	34200. S	33.21 B	33.21
30.00R	34200. S	20.30 B	20.30
50.00	34200. S	12.60 B	13.47
55.33L	34200. S	10.74 B	10.74
55.33R	34200. S	10.73 B	10.73
57.33L	34200. S	10.15 B	10.15
57.33R	34200. S	12.37 B	12.37
75.00	34200. S	8.44 B	8.44
100.00	34200. S	6.34 B	6.34
125.00	47500. S	5.86 B	5.86
150.00	47500. S	6.32 B	6.32
175.00	47500. S	8.43 B	8.43
190.67L	47500. S	11.75 B	11.75
190.67R	47500. S	11.77 B	11.77
192.67L	47500. S	12.38 B	12.38
192.67R	47500. S	10.16 B	10.16
200.00	47500. S	12.59 B	13.44
218.00L	47500. S	9.27 B	9.27
218.00R	47500. S	9.54 B	9.54
220.00L	47500. S	20.93 B	20.93
220.00R	47500. S	33.86 B	33.86
225.00	47500. S	13.34 B	13.34
250.00	47500. S	7.31 B	7.31

Span 3

Location	Allowable Stress	Rating Factors Bending Inv.	Oper.
0.00	34200. S	7.31 B	7.31
18.33	34200. S	10.75 B	10.75
25.33L	34200. S	12.16 B	12.16
25.33R	34200. S	11.82 B	11.82
27.33L	34200. S	33.80 B	33.80
27.33R	34200. S	19.58 B	19.58
36.67	34200. S	8.64 B	8.64
55.00	34200. S	10.93 B	11.72
57.33L	34200. S	10.19 B	12.13
57.33R	34200. S	10.19 B	12.12
59.33L	34200. S	9.45 B	9.45
59.33R	34200. S	11.30 B	11.30
73.33	34200. S	5.82 B	5.82
91.67	34200. S	4.22 B	4.22
110.00	34200. S	3.44 B	3.44
128.33	34200. S	3.29 B	3.29
146.67	34200. S	4.01 B	4.01
161.33L	34200. S	5.90 B	5.90
161.33R	34200. S	3.39 B	3.39
165.00	34200. S	4.10 B	4.10
183.33	34200. S	> 999.00 B	>999.00

****
Minimum rating is 2.29 at location 128.33 in span 3.
****

Classified at Strength II because of description
in 3.4.1 for other than HL93 vehicle.

Rating Codes:
T - Top steel governs
B - Bottom steel governs
C - Concrete governs
R - Rebar governs
V - Shear governs
S - Serviceability governs

Mom Strength Codes:
C - Compact
B - Braced non-compact
U - Unbraced non-compact
T - Transition between compact and braced non-compact
S - Serviceability

Noncompact shapes ratings based on stress, as

$$IR = \frac{Fb - \text{factored dead load stress}}{\text{factored LL+I stress}}$$

Inventory rating for Strength II if only permit
loading on the system uses PBETA. Operating rating
uses IR(PBETA/1.35).

I-295 HH BUCKMAN BRIDGE -720249
Girder 3 : Rating Output : Lrfd Ratings
Mon Mar 30 11:17:52 2015

[This table uses the rating equation (6A.4.2.1-1)
of the 2011 edition of the Manual for Bridge
Evaluation.]

Permit

Strength II
(Assumes permit truck is only loading)

Span 1

Location	Allowable	Shear	Rating Factors Bending		Shear	
			Inv.	Oper.	Inv.	Oper.
0.00	9331. C	488.42	>999.00B	>999.00	3.04	3.04
18.33	36000. B	769.69	3.17B	3.17	8.33	8.33
22.00L	36000. B	773.47	2.57B	2.57	9.03	9.03
22.00R	36000. B	773.65	4.68B	4.68	9.03	9.03
36.67	36000. B	617.31	3.10B	3.10	8.86	8.86
55.00	36000. B	623.62	2.57B	2.57	11.97	11.97
73.33	36000. B	632.76	2.72B	2.72	10.58	10.58
91.67	36000. B	644.47	3.45B	3.45	8.62	8.62
110.00	36000. B	658.50	4.94B	4.94	6.96	6.96
122.00L	36000. B	918.49	6.80B	6.80	8.93	8.93
122.00R	36000. B	918.79	5.43T	5.43	8.94	8.94
124.00L	12527. C	922.00	5.78B	5.78	8.77	8.77
124.00R	13527. C	1326.20	6.24B	6.24	13.27	13.27
128.33	23451. C	1332.57	14.08B	14.08	12.74	12.74
146.67	13959. C	1361.56	5.30B	5.30	10.68	10.68
154.00L	45675. B	1373.66	4.26B	4.26	10.18	10.18
154.00R	45672. B	1638.91	4.82B	4.82	12.49	12.49
156.00L	43981. B	1644.31	11.72B	11.72	12.68	12.68
156.00R	23749. C	1644.80	23.22B	23.22	12.68	12.68
165.00	46576. B	1671.34	6.95B	6.95	11.97	11.97
183.33	46329. B	1757.69	3.99B	3.99	10.07	10.07

Span 2

Location	Allowable	Shear	Rating Factors Bending		Shear	
			Inv.	Oper.	Inv.	Oper.
0.00	46329. B	1778.71	3.99B	3.99	10.12	10.12
25.00	46559. B	1747.50	8.64B	8.64	13.14	13.14
28.00L	46976. B	1747.50	9.40B	9.40	13.58	13.58
28.00R	21796. C	1747.50	7.76B	7.76	13.58	13.58
30.00L	21867. C	1747.50	18.18B	18.18	13.88	13.88
30.00R	45307. B	1450.84	11.04B	11.04	11.20	11.20
50.00	47985. B	1450.84	8.95B	8.95	13.91	13.91
55.33L	45690. B	1450.84	8.54B	8.54	14.53	14.53
55.33R	45690. B	1450.84	8.53B	8.53	14.53	14.53
57.33L	27199. C	1450.84	11.51B	11.51	14.74	14.74
57.33R	29713. C	1450.84	12.58B	12.58	14.74	14.74
75.00	29713. C	974.23	8.98B	8.98	10.31	10.31

100.00	29713. C	974.23	6.91B	6.91	13.82	13.82
125.00	29713. C	973.68	6.41B	6.41	20.31	20.31
150.00	29713. C	974.23	6.90B	6.90	15.64	15.64
175.00	29713. C	974.23	8.94B	8.94	11.50	11.50
190.67L	29713. C	1450.84	11.90B	11.90	16.16	16.16
190.67R	30626. C	1450.84	12.27B	12.27	16.16	16.16
192.67L	30626. C	1450.84	12.83B	12.83	15.90	15.90
192.67R	27270. C	1450.84	11.40B	11.40	15.90	15.90
200.00	47985. B	1450.84	8.99B	8.99	14.92	14.92
218.00L	45307. B	1450.84	5.32B	5.32	12.50	12.50
218.00R	45307. B	1747.50	5.92B	5.92	15.49	15.49
220.00L	43540. B	1747.50	11.66B	11.66	15.13	15.13
220.00R	43540. B	1747.50	19.87B	19.87	15.13	15.13
225.00	45307. B	1747.50	8.34B	8.34	14.20	14.20
250.00	46330. B	1778.84	3.99B	3.99	10.12	10.12

Span 3

Location	Allowable	Shear	Rating Factors Bending		Shear	
			Inv.	Oper.	Inv.	Oper.
0.00	46330. B	1757.54	3.99B	3.99	10.05	10.05
18.33	46576. B	1671.32	6.97B	6.97	11.47	11.47
25.33L	23817. C	1650.72	8.25B	8.25	12.15	12.15
25.33R	20819. C	1650.22	6.86B	6.86	12.14	12.14
27.33L	20829. C	1644.80	19.59B	19.59	12.34	12.34
27.33R	45634. B	1377.06	11.00B	11.00	10.04	10.04
36.67	13958. C	1361.55	5.29B	5.29	10.92	10.92
55.00	23421. C	1332.56	13.91B	13.91	12.78	12.78
57.33L	13565. C	1329.18	8.24B	8.24	13.04	13.04
57.33R	13466. C	1328.93	8.18B	8.18	13.04	13.04
59.33L	13429. C	1326.20	6.16B	6.16	13.26	13.26
59.33R	12173. C	922.00	5.58B	5.58	8.76	8.76
73.33	36000. B	658.50	4.97B	4.97	6.85	6.85
91.67	36000. B	644.47	3.44B	3.44	8.45	8.45
110.00	36000. B	632.76	2.70B	2.70	10.87	10.87
128.33	36000. B	623.62	2.54B	2.54	9.10	9.10
146.67	36000. B	617.31	3.07B	3.07	6.90	6.90
161.33L	36000. B	773.65	4.66B	4.66	7.98	7.98
161.33R	36000. B	773.47	2.55B	2.55	7.98	7.98
165.00	36000. B	769.68	3.14B	3.14	7.65	7.65
183.33	9331. C	488.42	>999.00B	>999.00	3.37	3.37

Service II
(Assumes permit truck is only loading in all lanes)

Span 1

Location	Allowable Stress	Rating Factors Bending	
		Inv.	Oper.
0.00	34200. S	> 999.00 B	>999.00
18.33	34200. S	4.44 B	4.44
22.00L	34200. S	3.68 B	3.68
22.00R	34200. S	6.38 B	6.38
36.67	34200. S	4.36 B	4.36
55.00	34200. S	3.67 B	3.67
73.33	34200. S	3.84 B	3.84
91.67	34200. S	4.71 B	4.71
110.00	34200. S	6.50 B	6.50
122.00L	34200. S	8.75 B	8.75
122.00R	34200. S	8.76 B	8.76
124.00L	34200. S	9.17 B	9.17
124.00R	34200. S	7.67 B	7.67
128.33	47500. S	12.20 B	13.88
146.67	47500. S	10.05 B	10.05
154.00L	47500. S	8.55 B	8.55

154.00R	47500. S	8.89 B	8.89
156.00L	47500. S	23.28 B	23.28
156.00R	47500. S	39.24 B	39.24
165.00	47500. S	12.22 B	12.22
183.33	47500. S	7.84 B	7.84

Span 2

Location	Allowable Stress	Rating Factors Bending Inv.	Oper.
0.00	34200. S	7.84 B	7.84
25.00	34200. S	14.71 B	14.71
28.00L	34200. S	15.67 B	15.67
28.00R	34200. S	15.33 B	15.33
30.00L	34200. S	35.49 B	35.49
30.00R	34200. S	21.73 B	21.73
50.00	34200. S	13.97 B	15.13
55.33L	34200. S	11.98 B	11.98
55.33R	34200. S	11.97 B	11.97
57.33L	34200. S	11.38 B	11.38
57.33R	34200. S	13.85 B	13.85
75.00	34200. S	9.65 B	9.65
100.00	34200. S	7.22 B	7.22
125.00	47500. S	6.63 B	6.63
150.00	47500. S	7.21 B	7.21
175.00	47500. S	9.59 B	9.59
190.67L	47500. S	13.05 B	13.05
190.67R	47500. S	13.07 B	13.07
192.67L	47500. S	13.69 B	13.69
192.67R	47500. S	11.25 B	11.25
200.00	47500. S	13.78 B	15.19
218.00L	47500. S	10.34 B	10.34
218.00R	47500. S	10.63 B	10.63
220.00L	47500. S	22.41 B	22.41
220.00R	47500. S	36.16 B	36.16
225.00	47500. S	14.70 B	14.70
250.00	47500. S	7.84 B	7.84

Span 3

Location	Allowable Stress	Rating Factors Bending Inv.	Oper.
0.00	34200. S	7.84 B	7.84
18.33	34200. S	12.25 B	12.25
25.33L	34200. S	14.05 B	14.05
25.33R	34200. S	13.67 B	13.67
27.33L	34200. S	38.47 B	38.47
27.33R	34200. S	22.44 B	22.44
36.67	34200. S	10.03 B	10.03
55.00	34200. S	12.26 B	13.71
57.33L	34200. S	11.44 B	14.19
57.33R	34200. S	11.45 B	14.18
59.33L	34200. S	10.61 B	10.61
59.33R	34200. S	12.70 B	12.70
73.33	34200. S	6.53 B	6.53
91.67	34200. S	4.71 B	4.71
110.00	34200. S	3.82 B	3.82
128.33	34200. S	3.65 B	3.65
146.67	34200. S	4.33 B	4.33
161.33L	34200. S	6.35 B	6.35
161.33R	34200. S	3.65 B	3.65
165.00	34200. S	4.41 B	4.41
183.33	34200. S	> 999.00 B	>999.00

****
Minimum rating is 2.54 at location 128.33 in span 3.
****

Classified at Strength II because of description
in 3.4.1 for other than HL93 vehicle.

Rating Codes:
T - Top steel governs
B - Bottom steel governs
C - Concrete governs
R - Rebar governs
V - Shear governs
S - Serviceability governs

Mom Strength Codes:
C - Compact
B - Braced non-compact
U - Unbraced non-compact
T - Transition between compact and braced non-compact
S - Serviceability

Noncompact shapes ratings based on stress, as

$$IR = \frac{Fb - \text{factored dead load stress}}{\text{factored LL+I stress}}$$

Inventory rating for Strength II if only permit
loading on the system uses PBETA. Operating rating
uses IR(PBETA/1.35).

I-295 HH BUCKMAN BRIDGE -720249
Girder 4 : Rating Output : Lrfd Ratings
Mon Mar 30 11:18:04 2015

[This table uses the rating equation (6A.4.2.1-1)
of the 2011 edition of the Manual for Bridge
Evaluation.]

Permit

Strength II
(Assumes permit truck is only loading)

Span 1

Location	Allowable	Shear	Rating Factors Bending		Shear	
			Inv.	Oper.	Inv.	Oper.
0.00	9331. C	488.42	>999.00B	>999.00	3.06	3.06
18.33	36000. B	769.69	3.34B	3.34	8.15	8.15
22.00L	36000. B	773.47	2.72B	2.72	8.83	8.83
22.00R	36000. B	773.65	4.88B	4.88	8.84	8.84
36.67	36000. B	617.31	3.22B	3.22	8.91	8.91
55.00	36000. B	623.62	2.65B	2.65	11.15	11.15
73.33	36000. B	632.76	2.77B	2.77	9.70	9.70
91.67	36000. B	644.47	3.63B	3.63	8.10	8.10
110.00	36000. B	658.50	5.32B	5.32	6.75	6.75
122.00L	36000. B	918.49	7.57B	7.57	9.21	9.21
122.00R	36000. B	918.79	6.05T	6.05	9.21	9.21
124.00L	12519. C	922.00	6.31B	6.31	9.12	9.12
124.00R	13522. C	1326.20	6.82B	6.82	13.70	13.70
128.33	23422. C	1332.57	14.60B	14.60	13.39	13.39
146.67	13973. C	1361.56	6.06B	6.06	11.89	11.89
154.00L	45675. B	1373.66	5.09B	5.09	11.38	11.38
154.00R	45672. B	1638.91	5.70B	5.70	13.90	13.90
156.00L	43981. B	1644.31	14.69B	14.69	14.16	14.16
156.00R	23766. C	1644.80	28.18B	28.18	14.17	14.17
165.00	46576. B	1671.34	8.37B	8.37	13.20	13.20
183.33	46329. B	1757.69	4.86B	4.86	10.43	10.43

Span 2

Location	Allowable	Shear	Rating Factors Bending		Shear	
			Inv.	Oper.	Inv.	Oper.
0.00	46329. B	1778.71	4.86B	4.86	11.15	11.15
25.00	46559. B	1747.50	8.61B	8.61	14.36	14.36
28.00L	46976. B	1747.50	9.25B	9.25	14.77	14.77
28.00R	21738. C	1747.50	7.58B	7.58	14.77	14.77
30.00L	21800. C	1747.50	18.72B	18.72	15.05	15.05
30.00R	45307. B	1450.84	11.23B	11.23	12.18	12.18
50.00	47985. B	1450.84	8.43B	8.43	14.11	14.11
55.33L	45690. B	1450.84	8.91B	8.91	14.56	14.56
55.33R	45690. B	1450.84	11.12B	11.12	14.56	14.56
57.33L	45690. B	1450.84	8.81B	8.81	14.71	14.71
57.33R	19118. C	1450.84	8.78B	8.78	14.71	14.71
75.00	29713. C	974.23	9.61B	9.61	10.02	10.02

100.00	29713. C	974.23	7.23B	7.23	12.56	12.56
125.00	29713. C	973.68	6.59B	6.59	13.64	13.64
150.00	29713. C	974.23	7.27B	7.27	13.81	13.81
175.00	29713. C	974.23	9.69B	9.69	11.17	11.17
190.67L	29713. C	1450.84	13.14B	13.14	16.85	16.85
190.67R	30626. C	1450.84	13.55B	13.55	16.85	16.85
192.67L	19343. C	1450.84	8.93B	8.93	16.71	16.71
192.67R	45936. B	1450.84	7.15B	7.15	16.71	16.71
200.00	47985. B	1450.84	8.70B	8.70	16.09	16.09
218.00L	45307. B	1450.84	5.39B	5.39	14.38	14.38
218.00R	45307. B	1747.50	6.00B	6.00	17.74	17.74
220.00L	43540. B	1747.50	11.97B	11.97	17.35	17.35
220.00R	43540. B	1747.50	20.40B	20.40	17.35	17.35
225.00	45307. B	1747.50	8.72B	8.72	16.30	16.30
250.00	46330. B	1778.84	4.97B	4.97	11.06	11.06

Span 3

Location	Allowable	Shear	Rating Factors Bending		Shear	
			Inv.	Oper.	Inv.	Oper.
0.00	46330. B	1757.54	4.97B	4.97	10.71	10.71
18.33	46576. B	1671.32	8.01B	8.01	12.64	12.64
25.33L	23824. C	1650.72	9.16B	9.16	13.27	13.27
25.33R	20868. C	1650.22	7.67B	7.67	13.27	13.27
27.33L	20868. C	1644.80	22.81B	22.81	13.42	13.42
27.33R	45634. B	1377.06	12.92B	12.92	10.96	10.96
36.67	13955. C	1361.55	5.45B	5.45	11.39	11.39
55.00	23342. C	1332.56	13.69B	13.69	12.48	12.48
57.33L	13556. C	1329.18	8.04B	8.04	12.65	12.65
57.33R	13456. C	1328.93	7.97B	7.97	12.65	12.65
59.33L	13420. C	1326.20	6.58B	6.58	12.81	12.81
59.33R	12127. C	922.00	5.93B	5.93	8.45	8.45
73.33	36000. B	658.50	5.24B	5.24	6.48	6.48
91.67	36000. B	644.47	3.57B	3.57	7.99	7.99
110.00	36000. B	632.76	2.72B	2.72	10.16	10.16
128.33	36000. B	623.62	2.58B	2.58	8.83	8.83
146.67	36000. B	617.31	3.14B	3.14	6.72	6.72
161.33L	36000. B	773.65	4.78B	4.78	8.21	8.21
161.33R	36000. B	773.47	2.64B	2.64	8.21	8.21
165.00	36000. B	769.68	3.25B	3.25	7.92	7.92
183.33	9331. C	488.42	>999.00B	>999.00	3.45	3.45

Service II
(Assumes permit truck is only loading in all lanes)

Span 1

Location	Allowable Stress	Rating Factors Bending	
		Inv.	Oper.
0.00	34200. S	> 999.00 B	>999.00
18.33	34200. S	4.64 B	4.64
22.00L	34200. S	3.86 B	3.86
22.00R	34200. S	6.62 B	6.62
36.67	34200. S	4.51 B	4.51
55.00	34200. S	3.78 B	3.78
73.33	34200. S	3.91 B	3.91
91.67	34200. S	4.95 B	4.95
110.00	34200. S	6.98 B	6.98
122.00L	34200. S	9.71 B	9.71
122.00R	34200. S	9.71 B	9.71
124.00L	34200. S	10.03 B	10.03
124.00R	34200. S	8.37 B	8.37
128.33	47500. S	13.73 B	14.39
146.67	47500. S	11.38 B	11.38
154.00L	47500. S	10.01 B	10.01

154.00R	47500. S	10.35 B	10.35
156.00L	47500. S	28.49 B	28.49
156.00R	47500. S	47.21 B	47.21
165.00	47500. S	14.51 B	14.51
183.33	47500. S	9.24 B	9.24

Span 2

Location	Allowable Stress	Rating Factors Bending Inv.	Oper.
0.00	34200. S	9.24 B	9.24
25.00	34200. S	14.70 B	14.70
28.00L	34200. S	15.47 B	15.47
28.00R	34200. S	15.12 B	15.12
30.00L	34200. S	36.92 B	36.92
30.00R	34200. S	22.39 B	22.39
50.00	34200. S	14.36 B	14.36
55.33L	34200. S	13.31 B	15.75
55.33R	34200. S	13.31 B	15.73
57.33L	34200. S	12.39 B	12.39
57.33R	34200. S	15.06 B	15.06
75.00	34200. S	10.35 B	10.35
100.00	34200. S	7.56 B	7.56
125.00	47500. S	6.81 B	6.81
150.00	47500. S	7.60 B	7.60
175.00	47500. S	10.44 B	10.44
190.67L	47500. S	14.47 B	14.47
190.67R	47500. S	14.48 B	14.48
192.67L	47500. S	15.14 B	15.14
192.67R	47500. S	12.48 B	12.48
200.00	47500. S	14.78 B	14.78
218.00L	47500. S	10.49 B	10.49
218.00R	47500. S	10.79 B	10.79
220.00L	47500. S	23.01 B	23.01
220.00R	47500. S	37.13 B	37.13
225.00	47500. S	15.34 B	15.34
250.00	47500. S	9.40 B	9.40

Span 3

Location	Allowable Stress	Rating Factors Bending Inv.	Oper.
0.00	34200. S	9.40 B	9.40
18.33	34200. S	13.96 B	13.96
25.33L	34200. S	15.55 B	15.55
25.33R	34200. S	15.16 B	15.16
27.33L	34200. S	44.52 B	44.52
27.33R	34200. S	26.14 B	26.14
36.67	34200. S	10.37 B	10.37
55.00	34200. S	13.49 B	13.49
57.33L	34200. S	12.67 B	13.90
57.33R	34200. S	12.68 B	13.88
59.33L	34200. S	11.38 B	11.38
59.33R	34200. S	13.66 B	13.66
73.33	34200. S	6.88 B	6.88
91.67	34200. S	4.87 B	4.87
110.00	34200. S	3.85 B	3.85
128.33	34200. S	3.70 B	3.70
146.67	34200. S	4.41 B	4.41
161.33L	34200. S	6.50 B	6.50
161.33R	34200. S	3.76 B	3.76
165.00	34200. S	4.54 B	4.54
183.33	34200. S	> 999.00 B	>999.00

****
Minimum rating is 2.58 at location 128.33 in span 3.
****

Classified at Strength II because of description
in 3.4.1 for other than HL93 vehicle.

Rating Codes:
T - Top steel governs
B - Bottom steel governs
C - Concrete governs
R - Rebar governs
V - Shear governs
S - Serviceability governs

Mom Strength Codes:
C - Compact
B - Braced non-compact
U - Unbraced non-compact
T - Transition between compact and braced non-compact
S - Serviceability

Noncompact shapes ratings based on stress, as

$$IR = \frac{Fb - \text{factored dead load stress}}{\text{factored LL+I stress}}$$

Inventory rating for Strength II if only permit
loading on the system uses PBETA. Operating rating
uses IR(PBETA/1.35).

I-295 HH BUCKMAN BRIDGE -720249
Girder 5 : Rating Output : Lrfd Ratings
Mon Mar 30 11:18:16 2015

[This table uses the rating equation (6A.4.2.1-1)
of the 2011 edition of the Manual for Bridge
Evaluation.]

Permit

Strength II
(Assumes permit truck is only loading)

Span 1

Location	Allowable	Shear	Rating Factors Bending		Shear	
			Inv.	Oper.	Inv.	Oper.
0.00	36000. B	347.57	>999.00B	>999.00	1.72	1.72
18.33	36000. B	461.91	4.72B	4.72	4.56	4.56
36.67	36000. B	476.29	2.64B	2.64	7.12	7.12
38.00L	36000. B	477.22	2.57B	2.57	7.31	7.31
38.00R	36000. B	477.34	3.13B	3.13	7.31	7.31
55.00	36000. B	435.91	2.62B	2.62	8.31	8.31
73.33	36000. B	447.75	2.76B	2.76	6.91	6.91
91.67	36000. B	514.98	3.40B	3.40	5.94	5.94
94.00L	36000. B	520.37	3.57B	3.57	5.80	5.80
94.00R	36000. B	520.76	3.33B	3.33	5.81	5.81
110.00	36000. B	559.21	4.96B	4.96	5.06	5.06
128.33	35223. B	695.47	5.87B	5.87	4.81	4.81
146.67	35178. B	842.04	4.31B	4.31	4.95	4.95
155.33L	28998. B	928.08	2.63B	2.63	5.25	5.25
155.33R	28971. B	929.75	4.31B	4.31	5.26	5.26
165.00	30326. B	1380.66	4.43B	4.43	8.35	8.35
183.33	35100. B	1263.48	2.18B	2.18	5.99	5.99

Span 2

Location	Allowable	Shear	Rating Factors Bending		Shear	
			Inv.	Oper.	Inv.	Oper.
0.00	35100. B	1274.84	2.18B	2.18	5.78	5.78
21.00L	35318. B	923.38	4.53B	4.53	5.02	5.02
21.00R	35318. B	922.51	2.69B	2.69	5.01	5.01
25.00	35313. B	902.13	3.21B	3.21	5.19	5.19
50.00	35226. B	789.55	7.19B	7.19	6.67	6.67
75.00	36000. B	588.76	5.16B	5.16	5.65	5.65
76.00L	36000. B	587.44	5.03B	5.03	5.71	5.71
76.00R	36000. B	587.20	5.36B	5.36	5.70	5.70
99.50L	36000. B	506.39	3.38B	3.38	7.13	7.13
99.50R	36000. B	506.31	3.94B	3.94	7.12	7.12
100.00	36000. B	506.10	3.92B	3.92	7.20	7.20
125.00L	36000. B	502.51	3.47B	3.47	10.10	10.10
125.00R	36000. B	502.55	3.47B	3.47	10.10	10.10
150.00	36000. B	521.48	3.95B	3.95	9.03	9.03
174.00L	36000. B	626.29	5.51B	5.51	7.01	7.01
174.00R	36000. B	626.70	5.18B	5.18	7.02	7.02

150.50L	36000. B	522.06	3.97B	3.97	8.93	8.93
150.50R	36000. B	522.30	3.42B	3.42	8.93	8.93
175.00	36000. B	628.95	5.32B	5.32	6.95	6.95
200.00	35218. B	865.31	6.95B	6.95	7.91	7.91
225.00	30828. B	1008.02	2.70B	2.70	6.46	6.46
229.00L	30521. B	1033.20	2.24B	2.24	6.24	6.24
229.00R	30507. B	1034.27	3.84B	3.84	6.25	6.25
250.00	30889. B	1415.29	2.05B	2.05	6.79	6.79

Span 3

Location	Allowable	Shear	Rating Factors Bending		Shear	
			Inv.	Oper.	Inv.	Oper.
0.00	30889. B	1416.13	2.05B	2.05	6.64	6.64
18.33	32863. B	1199.86	3.91B	3.91	6.41	6.41
28.00L	32495. B	765.29	4.40B	4.40	3.77	3.77
28.00R	32509. B	763.96	2.60B	2.60	3.76	3.76
36.67	32340. B	695.47	3.31B	3.31	3.73	3.73
55.00	35223. B	600.54	5.94B	5.94	4.30	4.30
73.33	36000. B	514.98	4.95B	4.95	4.76	4.76
89.33L	36000. B	504.07	3.44B	3.44	5.97	5.97
89.33R	36000. B	503.96	3.70B	3.70	5.97	5.97
91.67	36000. B	502.42	3.55B	3.55	6.16	6.16
110.00	36000. B	435.91	2.81B	2.81	6.84	6.84
128.33	36000. B	476.29	2.63B	2.63	7.27	7.27
145.33L	36000. B	463.01	3.12B	3.12	5.49	5.49
145.33R	36000. B	462.88	2.55B	2.55	5.48	5.48
146.67	36000. B	461.91	2.62B	2.62	5.37	5.37
165.00	36000. B	484.57	4.63B	4.63	4.52	4.52
183.33	36000. B	338.37	>999.00B	>999.00	1.92	1.92

Service II
(Assumes permit truck is only loading in all lanes)

Span 1

Location	Allowable Stress	Rating Factors Bending	
		Inv.	Oper.
0.00	34200. S	> 999.00 B	>999.00
18.33	34200. S	6.40 B	6.40
36.67	34200. S	3.77 B	3.77
38.00L	34200. S	3.68 B	3.68
38.00R	34200. S	4.41 B	4.41
55.00	34200. S	3.74 B	3.74
73.33	34200. S	3.88 B	3.88
91.67	34200. S	4.63 B	4.63
94.00L	34200. S	4.84 B	4.84
94.00R	34200. S	4.52 B	4.52
110.00	34200. S	6.47 B	6.47
128.33	34200. S	8.92 B	8.92
146.67	34200. S	7.04 B	7.04
155.33L	34200. S	6.44 B	6.44
155.33R	34200. S	9.23 B	9.23
165.00	34200. S	9.32 B	9.32
183.33	34200. S	4.35 B	4.35

Span 2

Location	Allowable Stress	Rating Factors Bending	
		Inv.	Oper.

0.00	34200. S	4.35	B	4.35
21.00L	34200. S	7.43	B	7.43
21.00R	34200. S	4.92	B	4.92
25.00	34200. S	5.62	B	5.62
50.00	34200. S	11.03	B	11.03
75.00	34200. S	6.82	B	6.82
76.00L	34200. S	6.66	B	6.66
76.00R	34200. S	7.09	B	7.09
99.50L	34200. S	4.69	B	4.69
99.50R	34200. S	5.40	B	5.40
100.00	34200. S	5.37	B	5.37
125.00L	34200. S	4.85	B	4.85
125.00R	34200. S	4.85	B	4.85
150.00	34200. S	5.41	B	5.41
174.00L	34200. S	7.29	B	7.29
174.00R	34200. S	6.85	B	6.85
150.50L	34200. S	5.44	B	5.44
150.50R	34200. S	4.73	B	4.73
175.00	34200. S	7.02	B	7.02
200.00	34200. S	10.67	B	10.67
225.00	34200. S	6.04	B	6.04
229.00L	34200. S	5.44	B	5.44
229.00R	34200. S	7.97	B	7.97
250.00	34200. S	5.31	B	5.31

Span 3

Location	Allowable Stress	Rating Factors Bending Inv.	Oper.
0.00	34200. S	5.31 B	5.31
18.33	34200. S	7.52 B	7.52
28.00L	34200. S	8.07 B	8.07
28.00R	34200. S	5.39 B	5.39
36.67	34200. S	6.32 B	6.32
55.00	34200. S	9.02 B	9.02
73.33	34200. S	6.48 B	6.48
89.33L	34200. S	4.68 B	4.68
89.33R	34200. S	5.01 B	5.01
91.67	34200. S	4.83 B	4.83
110.00	34200. S	3.96 B	3.96
128.33	34200. S	3.76 B	3.76
145.33L	34200. S	4.39 B	4.39
145.33R	34200. S	3.67 B	3.67
146.67	34200. S	3.75 B	3.75
165.00	34200. S	6.30 B	6.30
183.33	34200. S	> 999.00 B	>999.00

****
Minimum rating is 1.72 at location 0.00 in span 1.
****

Classified at Strength II because of description
in 3.4.1 for other than HL93 vehicle.

Rating Codes:
T - Top steel governs
B - Bottom steel governs
C - Concrete governs
R - Rebar governs
V - Shear governs
S - Serviceability governs

Mom Strength Codes:
C - Compact
B - Braced non-compact
U - Unbraced non-compact
T - Transition between compact and braced non-compact
S - Serviceability

Noncompact shapes ratings based on stress, as

Fb - factored dead load stress

$$IR = \frac{\text{PBETA}}{\text{factored LL+I stress}}$$

Inventory rating for Strength II if only permit loading on the system uses PBETA. Operating rating uses IR(PBETA/1.35).

I-295 HH BUCKMAN BRIDGE -720249
Girder 6 : Rating Output : Lrfd Ratings
Mon Mar 30 11:18:38 2015

[This table uses the rating equation (6A.4.2.1-1) of the 2011 edition of the Manual for Bridge Evaluation.]

Permit

Strength II
(Assumes permit truck is only loading)

Span 1

Location	Allowable	Shear	Rating Factors Bending		Shear	
			Inv.	Oper.	Inv.	Oper.
0.00	36000. B	347.57	>999.00B	>999.00	1.79	1.79
18.33	36000. B	461.91	4.86B	4.86	4.48	4.48
36.67	36000. B	476.29	2.72B	2.72	6.69	6.69
38.00L	36000. B	477.22	2.65B	2.65	6.86	6.86
38.00R	36000. B	477.34	3.20B	3.20	6.86	6.86
55.00	36000. B	435.91	2.60B	2.60	7.87	7.87
73.33	36000. B	447.75	2.71B	2.71	6.84	6.84
91.67	36000. B	514.98	3.33B	3.33	5.64	5.64
94.00L	36000. B	520.37	3.50B	3.50	5.54	5.54
94.00R	36000. B	520.76	3.26B	3.26	5.54	5.54
110.00	36000. B	559.21	4.94B	4.94	5.19	5.19
128.33	35178. B	695.47	6.04B	6.04	5.18	5.18
146.67	30325. B	842.04	3.98B	3.98	5.78	5.78
155.33L	28997. B	928.08	3.27B	3.27	6.12	6.12
155.33R	28970. B	929.75	5.09B	5.09	6.13	6.13
165.00	30888. B	1380.66	5.46B	5.46	9.36	9.36
183.33	35100. B	1263.48	2.94B	2.94	6.41	6.41

Span 2

Location	Allowable	Shear	Rating Factors Bending		Shear	
			Inv.	Oper.	Inv.	Oper.
0.00	35100. B	1274.84	2.94B	2.94	6.67	6.67
21.00L	35318. B	923.38	4.85B	4.85	5.72	5.72
21.00R	35318. B	922.51	2.95B	2.95	5.71	5.71
25.00	35201. B	902.13	3.36B	3.36	5.83	5.83
50.00	35252. B	789.55	6.79B	6.79	6.36	6.36
75.00	36000. B	588.76	5.22B	5.22	5.02	5.02
76.00L	36000. B	587.44	5.08B	5.08	5.07	5.07
76.00R	36000. B	587.20	5.41B	5.41	5.06	5.06
99.50L	36000. B	506.39	3.20B	3.20	6.61	6.61
99.50R	36000. B	506.31	3.71B	3.71	6.61	6.61
100.00	36000. B	506.10	3.69B	3.69	6.70	6.70
125.00L	36000. B	502.51	3.17B	3.17	9.85	9.85
125.00R	36000. B	502.55	3.17B	3.17	9.85	9.85
150.00	36000. B	521.48	3.84B	3.84	8.04	8.04
174.00L	36000. B	626.29	5.66B	5.66	6.15	6.15
174.00R	36000. B	626.70	5.32B	5.32	6.15	6.15

150.50L	36000. B	522.06	3.87B	3.87	7.93	7.93
150.50R	36000. B	522.30	3.34B	3.34	7.93	7.93
175.00	36000. B	628.95	5.47B	5.47	6.11	6.11
200.00	35218. B	865.31	6.77B	6.77	7.95	7.95
225.00	30827. B	1008.02	3.05B	3.05	7.61	7.61
229.00L	30520. B	1033.20	2.65B	2.65	7.39	7.39
229.00R	30506. B	1034.27	4.33B	4.33	7.40	7.40
250.00	30888. B	1415.29	2.85B	2.85	7.67	7.67

Span 3

Location	Allowable	Shear	Rating Factors Bending		Shear	
			Inv.	Oper.	Inv.	Oper.
0.00	30888. B	1416.13	2.85B	2.85	7.42	7.42
18.33	32862. B	1199.86	4.53B	4.53	7.47	7.47
28.00L	32494. B	765.29	4.80B	4.80	4.39	4.39
28.00R	32508. B	763.96	2.93B	2.93	4.38	4.38
36.67	32339. B	695.47	3.47B	3.47	4.18	4.18
55.00	35223. B	600.54	5.69B	5.69	4.41	4.41
73.33	36000. B	514.98	4.88B	4.88	4.53	4.53
89.33L	36000. B	504.07	3.33B	3.33	5.76	5.76
89.33R	36000. B	503.96	3.57B	3.57	5.76	5.76
91.67	36000. B	502.42	3.42B	3.42	5.95	5.95
110.00	36000. B	435.91	2.74B	2.74	6.65	6.65
128.33	36000. B	476.29	2.58B	2.58	6.82	6.82
145.33L	36000. B	463.01	3.15B	3.15	5.29	5.29
145.33R	36000. B	462.88	2.59B	2.59	5.29	5.29
146.67	36000. B	461.91	2.67B	2.67	5.20	5.20
165.00	36000. B	484.57	4.73B	4.73	4.59	4.59
183.33	36000. B	338.37	>999.00B	>999.00	1.98	1.98

Service II
(Assumes permit truck is only loading in all lanes)

Span 1

Location	Allowable Stress	Rating Factors Bending	
		Inv.	Oper.
0.00	34200. S	> 999.00 B	>999.00
18.33	34200. S	6.56 B	6.56
36.67	34200. S	3.85 B	3.85
38.00L	34200. S	3.75 B	3.75
38.00R	34200. S	4.47 B	4.47
55.00	34200. S	3.68 B	3.68
73.33	34200. S	3.79 B	3.79
91.67	34200. S	4.51 B	4.51
94.00L	34200. S	4.71 B	4.71
94.00R	34200. S	4.41 B	4.41
110.00	34200. S	6.42 B	6.42
128.33	34200. S	9.18 B	9.18
146.67	34200. S	7.96 B	7.96
155.33L	34200. S	7.48 B	7.48
155.33R	34200. S	10.49 B	10.49
165.00	34200. S	10.67 B	10.67
183.33	34200. S	5.41 B	5.41

Span 2

Location	Allowable Stress	Rating Factors Bending	
		Inv.	Oper.

0.00	34200.	S	5.41	B	5.41
21.00L	34200.	S	7.90	B	7.90
21.00R	34200.	S	5.29	B	5.29
25.00	34200.	S	5.87	B	5.87
50.00	34200.	S	10.48	B	10.48
75.00	34200.	S	6.87	B	6.87
76.00L	34200.	S	6.69	B	6.69
76.00R	34200.	S	7.12	B	7.12
99.50L	34200.	S	4.41	B	4.41
99.50R	34200.	S	5.08	B	5.08
100.00	34200.	S	5.04	B	5.04
125.00L	34200.	S	4.41	B	4.41
125.00R	34200.	S	4.41	B	4.41
150.00	34200.	S	5.24	B	5.24
174.00L	34200.	S	7.43	B	7.43
174.00R	34200.	S	7.00	B	7.00
150.50L	34200.	S	5.27	B	5.27
150.50R	34200.	S	4.59	B	4.59
175.00	34200.	S	7.17	B	7.17
200.00	34200.	S	10.43	B	10.43
225.00	34200.	S	6.60	B	6.60
229.00L	34200.	S	6.10	B	6.10
229.00R	34200.	S	8.75	B	8.75
250.00	34200.	S	6.55	B	6.55

Span 3

Location	Allowable Stress		Rating Factors Bending Inv.		Oper.
0.00	34200.	S	6.55	B	6.55
18.33	34200.	S	8.42	B	8.42
28.00L	34200.	S	8.66	B	8.66
28.00R	34200.	S	5.88	B	5.88
36.67	34200.	S	6.56	B	6.56
55.00	34200.	S	8.67	B	8.67
73.33	34200.	S	6.36	B	6.36
89.33L	34200.	S	4.51	B	4.51
89.33R	34200.	S	4.82	B	4.82
91.67	34200.	S	4.65	B	4.65
110.00	34200.	S	3.84	B	3.84
128.33	34200.	S	3.66	B	3.66
145.33L	34200.	S	4.41	B	4.41
145.33R	34200.	S	3.70	B	3.70
146.67	34200.	S	3.79	B	3.79
165.00	34200.	S	6.40	B	6.40
183.33	34200.	S	> 999.00	B	>999.00

****
Minimum rating is 1.79 at location 0.00 in span 1.
****

Classified at Strength II because of description
in 3.4.1 for other than HL93 vehicle.

Rating Codes:
T - Top steel governs
B - Bottom steel governs
C - Concrete governs
R - Rebar governs
V - Shear governs
S - Serviceability governs

Mom Strength Codes:
C - Compact
B - Braced non-compact
U - Unbraced non-compact
T - Transition between compact and braced non-compact
S - Serviceability

Noncompact shapes ratings based on stress, as

Fb - factored dead load stress

$$IR = \frac{\text{PBETA}}{\text{factored LL+I stress}}$$

Inventory rating for Strength II if only permit loading on the system uses PBETA. Operating rating uses IR(PBETA/1.35).

I-295 HH BUCKMAN BRIDGE -720249
Girder 7 : Rating Output : Lrfd Ratings
Mon Mar 30 11:18:52 2015

[This table uses the rating equation (6A.4.2.1-1) of the 2011 edition of the Manual for Bridge Evaluation.]

Permit

Strength II
(Assumes permit truck is only loading)

Span 1

Location	Allowable	Shear	Rating Factors Bending		Shear	
			Inv.	Oper.	Inv.	Oper.
0.00	36000. B	347.57	>999.00B	>999.00	1.72	1.72
18.33	36000. B	461.91	4.53B	4.53	4.05	4.05
36.67	36000. B	476.29	2.60B	2.60	6.07	6.07
38.00L	36000. B	477.22	2.53B	2.53	6.22	6.22
38.00R	36000. B	477.34	3.04B	3.04	6.22	6.22
55.00	36000. B	435.91	2.48B	2.48	6.98	6.98
73.33	36000. B	447.75	2.52B	2.52	6.66	6.66
91.67	36000. B	514.98	3.05B	3.05	5.54	5.54
94.00L	36000. B	520.37	3.20B	3.20	5.43	5.43
94.00R	36000. B	520.76	2.98B	2.98	5.43	5.43
110.00	36000. B	559.21	4.30B	4.30	4.97	4.97
128.33	35178. B	695.47	5.03B	5.03	4.98	4.98
146.67	30325. B	842.04	3.51B	3.51	5.53	5.53
155.33L	28997. B	928.08	2.99B	2.99	5.87	5.87
155.33R	28970. B	929.75	4.55B	4.55	5.88	5.88
165.00	30888. B	1380.66	5.01B	5.01	8.97	8.97
183.33	35100. B	1263.48	2.99B	2.99	6.20	6.20

Span 2

Location	Allowable	Shear	Rating Factors Bending		Shear	
			Inv.	Oper.	Inv.	Oper.
0.00	35100. B	1274.84	2.99B	2.99	6.36	6.36
21.00L	35318. B	923.38	4.84B	4.84	5.44	5.44
21.00R	35318. B	922.51	3.04B	3.04	5.44	5.44
25.00	35201. B	902.13	3.40B	3.40	5.54	5.54
50.00	35252. B	789.55	5.90B	5.90	6.04	6.04
75.00	36000. B	588.76	4.57B	4.57	4.71	4.71
76.00L	36000. B	587.44	4.44B	4.44	4.75	4.75
76.00R	36000. B	587.20	4.73B	4.73	4.74	4.74
99.50L	36000. B	506.39	2.85B	2.85	5.95	5.95
99.50R	36000. B	506.31	3.30B	3.30	5.95	5.95
100.00	36000. B	506.10	3.28B	3.28	6.03	6.03
125.00L	36000. B	502.51	2.83B	2.83	8.96	8.96
125.00R	36000. B	502.55	2.83B	2.83	8.96	8.96
150.00	36000. B	521.48	3.33B	3.33	7.29	7.29
174.00L	36000. B	626.29	4.78B	4.78	5.79	5.79
174.00R	36000. B	626.70	4.50B	4.50	5.79	5.79

150.50L	36000. B	522.06	3.35B	3.35	7.20	7.20
150.50R	36000. B	522.30	2.91B	2.91	7.20	7.20
175.00	36000. B	628.95	4.62B	4.62	5.76	5.76
200.00	35218. B	865.31	5.93B	5.93	7.56	7.56
225.00	30827. B	1008.02	3.08B	3.08	7.09	7.09
229.00L	30520. B	1033.20	2.74B	2.74	6.90	6.90
229.00R	30506. B	1034.27	4.34B	4.34	6.91	6.91
250.00	30888. B	1415.29	3.08B	3.08	7.32	7.32

Span 3

Location	Allowable	Shear	Rating Factors Bending		Shear	
			Inv.	Oper.	Inv.	Oper.
0.00	30888. B	1416.13	3.08B	3.08	7.11	7.11
18.33	32862. B	1199.86	4.26B	4.26	7.13	7.13
28.00L	32494. B	765.29	4.34B	4.34	4.25	4.25
28.00R	32508. B	763.96	2.74B	2.74	4.24	4.24
36.67	32339. B	695.47	3.09B	3.09	4.06	4.06
55.00	35223. B	600.54	4.70B	4.70	4.31	4.31
73.33	36000. B	514.98	4.29B	4.29	4.37	4.37
89.33L	36000. B	504.07	3.05B	3.05	5.55	5.55
89.33R	36000. B	503.96	3.27B	3.27	5.54	5.54
91.67	36000. B	502.42	3.15B	3.15	5.73	5.73
110.00	36000. B	435.91	2.54B	2.54	6.43	6.43
128.33	36000. B	476.29	2.46B	2.46	6.27	6.27
145.33L	36000. B	463.01	2.98B	2.98	4.85	4.85
145.33R	36000. B	462.88	2.47B	2.47	4.85	4.85
146.67	36000. B	461.91	2.54B	2.54	4.76	4.76
165.00	36000. B	484.57	4.39B	4.39	4.26	4.26
183.33	36000. B	338.37	>999.00B	>999.00	1.87	1.87

Service II
(Assumes permit truck is only loading in all lanes)

Span 1

Location	Allowable Stress	Rating Factors Bending	
		Inv.	Oper.
0.00	34200. S	> 999.00 B	>999.00
18.33	34200. S	6.09 B	6.09
36.67	34200. S	3.64 B	3.64
38.00L	34200. S	3.55 B	3.55
38.00R	34200. S	4.20 B	4.20
55.00	34200. S	3.48 B	3.48
73.33	34200. S	3.49 B	3.49
91.67	34200. S	4.12 B	4.12
94.00L	34200. S	4.29 B	4.29
94.00R	34200. S	4.01 B	4.01
110.00	34200. S	5.60 B	5.60
128.33	34200. S	7.60 B	7.60
146.67	34200. S	6.88 B	6.88
155.33L	34200. S	6.64 B	6.64
155.33R	34200. S	9.20 B	9.20
165.00	34200. S	9.61 B	9.61
183.33	34200. S	5.32 B	5.32

Span 2

Location	Allowable Stress	Rating Factors Bending	
		Inv.	Oper.

0.00	34200. S	5.32	B	5.32
21.00L	34200. S	7.77	B	7.77
21.00R	34200. S	5.31	B	5.31
25.00	34200. S	5.84	B	5.84
50.00	34200. S	9.10	B	9.10
75.00	34200. S	5.98	B	5.98
76.00L	34200. S	5.83	B	5.83
76.00R	34200. S	6.20	B	6.20
99.50L	34200. S	3.91	B	3.91
99.50R	34200. S	4.48	B	4.48
100.00	34200. S	4.46	B	4.46
125.00L	34200. S	3.92	B	3.92
125.00R	34200. S	3.92	B	3.92
150.00	34200. S	4.52	B	4.52
174.00L	34200. S	6.26	B	6.26
174.00R	34200. S	5.90	B	5.90
150.50L	34200. S	4.55	B	4.55
150.50R	34200. S	3.97	B	3.97
175.00	34200. S	6.04	B	6.04
200.00	34200. S	9.12	B	9.12
225.00	34200. S	6.46	B	6.46
229.00L	34200. S	6.06	B	6.06
229.00R	34200. S	8.57	B	8.57
250.00	34200. S	6.77	B	6.77

Span 3

Location	Allowable Stress	Rating Factors Bending Inv.		Oper.
0.00	34200. S	6.77	B	6.77
18.33	34200. S	7.75	B	7.75
28.00L	34200. S	7.70	B	7.70
28.00R	34200. S	5.32	B	5.32
36.67	34200. S	5.73	B	5.73
55.00	34200. S	7.13	B	7.13
73.33	34200. S	5.58	B	5.58
89.33L	34200. S	4.11	B	4.11
89.33R	34200. S	4.39	B	4.39
91.67	34200. S	4.25	B	4.25
110.00	34200. S	3.53	B	3.53
128.33	34200. S	3.46	B	3.46
145.33L	34200. S	4.14	B	4.14
145.33R	34200. S	3.48	B	3.48
146.67	34200. S	3.57	B	3.57
165.00	34200. S	5.92	B	5.92
183.33	34200. S	> 999.00	B	>999.00

****
Minimum rating is 1.72 at location 0.00 in span 1.
****

Classified at Strength II because of description
in 3.4.1 for other than HL93 vehicle.

Rating Codes:
T - Top steel governs
B - Bottom steel governs
C - Concrete governs
R - Rebar governs
V - Shear governs
S - Serviceability governs

Mom Strength Codes:
C - Compact
B - Braced non-compact
U - Unbraced non-compact
T - Transition between compact and braced non-compact
S - Serviceability

Noncompact shapes ratings based on stress, as

Fb - factored dead load stress

$$IR = \frac{\text{PBETA}}{\text{factored LL+I stress}}$$

Inventory rating for Strength II if only permit loading on the system uses PBETA. Operating rating uses IR(PBETA/1.35).

I-295 HH BUCKMAN BRIDGE -720249
Girder 8 : Rating Output : Lrfd Ratings
Mon Mar 30 11:19:03 2015

[This table uses the rating equation (6A.4.2.1-1) of the 2011 edition of the Manual for Bridge Evaluation.]

Permit

Strength II
(Assumes permit truck is only loading)

Span 1

Location	Allowable	Shear	Rating Factors Bending		Shear	
			Inv.	Oper.	Inv.	Oper.
0.00	36000. B	347.57	>999.00B	>999.00	2.21	2.21
18.33	36000. B	461.91	4.82B	4.82	4.37	4.37
36.67	36000. B	476.29	2.55B	2.55	6.67	6.67
38.00L	36000. B	477.22	2.48B	2.48	6.86	6.86
38.00R	36000. B	477.34	2.96B	2.96	6.86	6.86
55.00	36000. B	435.91	2.40B	2.40	8.36	8.36
73.33	36000. B	447.75	2.38B	2.38	8.07	8.07
91.67	36000. B	514.98	2.86B	2.86	6.94	6.94
94.00L	36000. B	520.37	2.98B	2.98	6.75	6.75
94.00R	36000. B	520.76	2.79B	2.79	6.76	6.76
110.00	36000. B	559.21	3.90B	3.90	5.59	5.59
128.33	35184. B	695.47	4.49B	4.49	5.82	5.82
146.67	30537. B	842.04	3.27B	3.27	5.90	5.90
155.33L	29239. B	928.08	2.86B	2.86	6.20	6.20
155.33R	29213. B	929.75	4.25B	4.25	6.21	6.21
165.00	35058. B	1380.66	5.56B	5.56	9.47	9.47
183.33	35105. B	1263.48	2.95B	2.95	7.55	7.55

Span 2

Location	Allowable	Shear	Rating Factors Bending		Shear	
			Inv.	Oper.	Inv.	Oper.
0.00	35105. B	1274.84	2.95B	2.95	7.38	7.38
21.00L	35322. B	923.38	4.57B	4.57	5.75	5.75
21.00R	35322. B	922.51	2.95B	2.95	5.74	5.74
25.00	35208. B	902.13	3.26B	3.26	5.77	5.77
50.00	35258. B	789.55	5.18B	5.18	6.24	6.24
75.00	36000. B	588.76	4.34B	4.34	5.98	5.98
76.00L	36000. B	587.44	4.23B	4.23	6.04	6.04
76.00R	36000. B	587.20	4.49B	4.49	6.04	6.04
99.50L	36000. B	506.39	2.83B	2.83	6.88	6.88
99.50R	36000. B	506.31	3.25B	3.25	6.88	6.88
100.00	36000. B	506.10	3.23B	3.23	6.92	6.92
125.00L	36000. B	502.51	2.77B	2.77	11.03	11.03
125.00R	36000. B	502.55	2.77B	2.77	11.03	11.03
150.00	36000. B	521.48	3.25B	3.25	7.76	7.76
174.00L	36000. B	626.29	4.48B	4.48	6.96	6.96
174.00R	36000. B	626.70	4.22B	4.22	6.97	6.97

150.50L	36000. B	522.06	3.27B	3.27	7.72	7.72
150.50R	36000. B	522.30	2.85B	2.85	7.72	7.72
175.00	36000. B	628.95	4.33B	4.33	6.90	6.90
200.00	35224. B	865.31	5.21B	5.21	7.30	7.30
225.00	31022. B	1008.02	2.97B	2.97	6.87	6.87
229.00L	30721. B	1033.20	2.69B	2.69	6.84	6.84
229.00R	30708. B	1034.27	4.13B	4.13	6.84	6.84
250.00	31030. B	1415.29	3.04B	3.04	8.44	8.44

Span 3

Location	Allowable	Shear	Rating Factors Bending		Shear	
			Inv.	Oper.	Inv.	Oper.
0.00	31030. B	1416.13	3.04B	3.04	8.55	8.55
18.33	32968. B	1199.86	4.03B	4.03	7.85	7.85
28.00L	32611. B	765.29	4.07B	4.07	4.76	4.76
28.00R	32624. B	763.96	2.64B	2.64	4.75	4.75
36.67	32498. B	695.47	2.91B	2.91	4.57	4.57
55.00	35228. B	600.54	4.21B	4.21	4.92	4.92
73.33	36000. B	514.98	3.91B	3.91	5.04	5.04
89.33L	36000. B	504.07	2.86B	2.86	6.74	6.74
89.33R	36000. B	503.96	3.06B	3.06	6.73	6.73
91.67	36000. B	502.42	2.95B	2.95	7.02	7.02
110.00	36000. B	435.91	2.41B	2.41	8.35	8.35
128.33	36000. B	476.29	2.38B	2.38	7.62	7.62
145.33L	36000. B	463.01	2.90B	2.90	5.20	5.20
145.33R	36000. B	462.88	2.42B	2.42	5.20	5.20
146.67	36000. B	461.91	2.49B	2.49	5.09	5.09
165.00	36000. B	484.57	4.68B	4.68	4.52	4.52
183.33	36000. B	338.37	>999.00B	>999.00	2.28	2.28

Service II
(Assumes permit truck is only loading in all lanes)

Span 1

Location	Allowable Stress	Rating Factors Bending	
		Inv.	Oper.
0.00	34200. S	> 999.00 B	>999.00
18.33	34200. S	6.45 B	6.45
36.67	34200. S	3.53 B	3.53
38.00L	34200. S	3.44 B	3.44
38.00R	34200. S	4.05 B	4.05
55.00	34200. S	3.33 B	3.33
73.33	34200. S	3.27 B	3.27
91.67	34200. S	3.83 B	3.83
94.00L	34200. S	3.98 B	3.98
94.00R	34200. S	3.73 B	3.73
110.00	34200. S	5.07 B	5.07
128.33	34200. S	6.73 B	6.73
146.67	34200. S	6.18 B	6.18
155.33L	34200. S	6.03 B	6.03
155.33R	34200. S	8.27 B	8.27
165.00	34200. S	8.69 B	8.69
183.33	34200. S	5.04 B	5.04

Span 2

Location	Allowable Stress	Rating Factors Bending	
		Inv.	Oper.

0.00	34200. S	5.04	B	5.04
21.00L	34200. S	7.17	B	7.17
21.00R	34200. S	4.99	B	4.99
25.00	34200. S	5.43	B	5.43
50.00	34200. S	7.89	B	7.89
75.00	34200. S	5.67	B	5.67
76.00L	34200. S	5.53	B	5.53
76.00R	34200. S	5.87	B	5.87
99.50L	34200. S	3.84	B	3.84
99.50R	34200. S	4.38	B	4.38
100.00	34200. S	4.36	B	4.36
125.00L	34200. S	3.78	B	3.78
125.00R	34200. S	3.78	B	3.78
150.00	34200. S	4.37	B	4.37
174.00L	34200. S	5.85	B	5.85
174.00R	34200. S	5.52	B	5.52
150.50L	34200. S	4.40	B	4.40
150.50R	34200. S	3.86	B	3.86
175.00	34200. S	5.65	B	5.65
200.00	34200. S	7.92	B	7.92
225.00	34200. S	5.94	B	5.94
229.00L	34200. S	5.61	B	5.61
229.00R	34200. S	7.84	B	7.84
250.00	34200. S	6.29	B	6.29

Span 3

Location	Allowable Stress	Rating Factors Bending Inv.	Oper.
0.00	34200. S	6.29 B	6.29
18.33	34200. S	7.09 B	7.09
28.00L	34200. S	7.00 B	7.00
28.00R	34200. S	4.91 B	4.91
36.67	34200. S	5.21 B	5.21
55.00	34200. S	6.32 B	6.32
73.33	34200. S	5.09 B	5.09
89.33L	34200. S	3.83 B	3.83
89.33R	34200. S	4.09 B	4.09
91.67	34200. S	3.96 B	3.96
110.00	34200. S	3.32 B	3.32
128.33	34200. S	3.31 B	3.31
145.33L	34200. S	3.98 B	3.98
145.33R	34200. S	3.37 B	3.37
146.67	34200. S	3.46 B	3.46
165.00	34200. S	6.27 B	6.27
183.33	34200. S	> 999.00 B	>999.00

****
Minimum rating is 2.21 at location 0.00 in span 1.
****

Classified at Strength II because of description
in 3.4.1 for other than HL93 vehicle.

Rating Codes:
T - Top steel governs
B - Bottom steel governs
C - Concrete governs
R - Rebar governs
V - Shear governs
S - Serviceability governs

Mom Strength Codes:
C - Compact
B - Braced non-compact
U - Unbraced non-compact
T - Transition between compact and braced non-compact
S - Serviceability

Noncompact shapes ratings based on stress, as

Fb - factored dead load stress

$$IR = \frac{\text{PBETA}}{\text{factored LL+I stress}}$$

Inventory rating for Strength II if only permit loading on the system uses PBETA. Operating rating uses IR(PBETA/1.35).

2.2.8. SU4 (42” Barrier)

I-295 HH BUCKMAN BRIDGE -720249
Girder System : Input File : Layout/Slab/Loading Definition
Thu Mar 26 22:14:19 2015

```
ID: I-295 HH BUCKMAN BRIDGE -720249
CONDITIONS
  ALL LANES
  ENGLISH INPUT
  ENGLISH OUTPUT
  FLOAT LANES
  GRID MODEL
  LRFD METHOD
  MEDIUM RESOLUTION MESH
  OVERLAY PERMIT TRUCK WITH LANE LOADING
  PERMIT TRUCK IN ALL LANES
  PERMIT TRUCK IS ONLY LOADING IN PERMIT LANE
  RATE MODE
  RATING PROJECT
  SELF WEIGHT FOR DEAD LOAD 1
DATA
  BR-1 18.3333 18.3333 18.3333 18.3333 18.3333 18.3333 18.3333 18.3333
  18.3333 36.1875 17.8542 17.8542 17.8542 17.8542 17.8542 17.875 17.875
  17.8542 17.8542 17.8542 17.8542 17.8542 36.1875 18.3333 18.3333
  18.3333 18.3333 18.3333 18.3333 18.3333 18.3333
  CURB -2.
  FPC 4.5
  GDSPC 9.3073 9.3073 9.3073 9.3073 9.3333 9.3333 9.3333
  LANES 12. 12. 12. 12. 12.
  PRLANE  0.2
  PRMITP 10.425 14.025 14.025 14.025 10.425 14.025 14.025 14.025
  PRMITSP 9.167 4.167 4.167 30. 9.167 4.167 4.167
  ROADWP 68.
  SKEW-1 90. 90. 90. 90.
  SLABEXT 3.5417 2.3125
  SLABT 8.
  SLABWEAR  0.
  SPEED 65
  SPN-1 183.3333 250. 183.3333
  SUPER  0.01563
  WAC-1  0.164
  WAC-2  0.19
  WAC-3  0.19
  WAC-4  0.19
  WAC-5  0.19
  WAC-6  0.19
  WAC-7  0.19
  WAC-8  0.14
  WAS-1  0.
  WAS-2  0.
  WAS-3  0.
  WAS-4  0.
  WAS-5  0.0115
  WAS-6  0.0115
  WAS-7  0.0115
  WAS-8  0.0115
  WCONC 150.
  WHLSPC 6.
  WR-1  0.123
  WR-2  0.14
  WR-3  0.14
  WR-4  0.14
  WR-5  0.14
  WR-6  0.14
  WR-7  0.14
  WR-8  0.105
  WS-1  0.156
  WS-2  0.156
  WS-3  0.156
  WS-4  0.156
  WS-5  0.156
  WS-6  0.156
  WS-7  0.156
  WS-8  0.156
GO
```

I-295 HH BUCKMAN BRIDGE -720249
Girder 1 : Rating Output : Lrfd Ratings
Thu Mar 26 22:15:47 2015

[This table uses the rating equation (6A.4.2.1-1)
of the 2011 edition of the Manual for Bridge
Evaluation.]

Permit

Strength II
(Assumes permit truck is only loading)

Span 1

Location	Allowable	Shear	Rating Factors Bending		Shear	
			Inv.	Oper.	Inv.	Oper.
0.00	9253. C	488.42	>999.00B	>999.00	2.80	2.80
18.33	36000. B	769.69	2.58B	2.58	6.75	6.75
22.00L	36000. B	773.47	2.07B	2.07	7.21	7.21
22.00R	36000. B	773.65	3.80B	3.80	7.21	7.21
36.67	36000. B	617.31	2.43B	2.43	7.18	7.18
55.00	36000. B	623.62	1.92B	1.92	10.20	10.20
73.33	36000. B	632.76	2.01B	2.01	10.56	10.56
91.67	36000. B	644.47	2.56B	2.56	7.65	7.65
110.00	36000. B	658.50	3.76B	3.76	5.83	5.83
122.00L	10852. C	918.49	3.76B	3.76	7.39	7.39
122.00R	12402. C	918.79	4.30B	4.30	7.39	7.39
124.00L	12435. C	922.00	4.39B	4.39	7.24	7.24
124.00R	13473. C	1326.20	4.76B	4.76	11.02	11.02
128.33	23135. C	1332.57	9.90B	9.90	10.57	10.57
146.67	13919. C	1361.56	3.71B	3.71	9.02	9.02
154.00L	45765. B	1373.66	2.97B	2.97	8.63	8.63
154.00R	45762. B	1638.91	3.39B	3.39	10.60	10.60
156.00L	44053. B	1644.31	8.88B	8.88	10.64	10.64
156.00R	23727. C	1644.80	18.07B	18.07	10.64	10.64
165.00	46619. B	1671.34	4.99B	4.99	10.20	10.20
183.33	46375. B	1757.69	2.94B	2.94	9.32	9.32

Span 2

Location	Allowable	Shear	Rating Factors Bending		Shear	
			Inv.	Oper.	Inv.	Oper.
0.00	46375. B	1778.71	2.94B	2.94	9.29	9.29
25.00	46605. B	1747.50	6.41B	6.41	11.06	11.06
28.00L	46984. B	1747.50	6.96B	6.96	11.34	11.34
28.00R	21517. C	1747.50	5.65B	5.65	11.34	11.34
30.00L	21583. C	1747.50	16.38B	16.38	11.54	11.54
30.00R	45403. B	1450.84	9.97B	9.97	9.28	9.28
50.00	48073. B	1450.84	6.57B	6.57	11.18	11.18
55.33L	26462. C	1450.84	9.38B	9.38	11.76	11.76
55.33R	25672. C	1450.84	9.10B	9.10	11.76	11.76
57.33L	25672. C	1450.84	8.62B	8.62	11.99	11.99
57.33R	27861. C	1450.84	9.37B	9.37	11.99	11.99
75.00	27861. C	974.23	6.39B	6.39	9.18	9.18

100.00	27861. C	974.23	4.82B	4.82	12.37	12.37
125.00	27861. C	973.68	4.41B	4.41	18.60	18.60
150.00	27861. C	974.23	4.83B	4.83	13.00	13.00
175.00	27861. C	921.46	6.40B	6.40	8.97	8.97
190.67L	27861. C	1450.84	8.92B	8.92	12.64	12.64
190.67R	28843. C	1450.84	9.25B	9.25	12.64	12.64
192.67L	28843. C	1450.84	9.72B	9.72	12.38	12.38
192.67R	26462. C	1450.84	8.91B	8.91	12.38	12.38
200.00	48073. B	1450.84	6.55B	6.55	11.53	11.53
218.00L	45403. B	1450.84	3.87B	3.87	9.80	9.80
218.00R	45403. B	1747.50	4.33B	4.33	12.17	12.17
220.00L	43617. B	1747.50	10.54B	10.54	11.95	11.95
220.00R	43617. B	1747.50	18.19B	18.19	11.95	11.95
225.00	45403. B	1747.50	6.18B	6.18	11.43	11.43
250.00	46375. B	2011.94	2.94B	2.94	10.73	10.73

Span 3

Location	Allowable	Shear	Rating Factors Bending		Shear	
			Inv.	Oper.	Inv.	Oper.
0.00	46375. B	1584.21	2.94B	2.94	8.23	8.23
18.33	46620. B	1671.32	5.00B	5.00	10.14	10.14
25.33L	23797. C	1650.72	5.90B	5.90	10.58	10.58
25.33R	20549. C	1650.22	4.80B	4.80	10.58	10.58
27.33L	20554. C	1644.80	14.86B	14.86	10.71	10.71
27.33R	45724. B	1377.06	8.27B	8.27	8.70	8.70
36.67	13920. C	1361.55	3.73B	3.73	9.31	9.31
55.00	23151. C	1332.56	9.93B	9.93	12.00	12.00
57.33L	13516. C	1329.18	5.92B	5.92	12.37	12.37
57.33R	13403. C	1328.93	5.87B	5.87	12.37	12.37
59.33L	13365. C	1326.20	4.74B	4.74	12.70	12.70
59.33R	11917. C	922.00	4.22B	4.22	8.36	8.36
73.33	36000. B	898.00	3.74B	3.74	9.90	9.90
91.67	36000. B	644.47	2.56B	2.56	9.34	9.34
110.00	36000. B	632.76	2.01B	2.01	12.54	12.54
128.33	36000. B	623.62	1.92B	1.92	8.33	8.33
146.67	36000. B	617.31	2.43B	2.43	6.10	6.10
161.33L	36000. B	773.65	3.81B	3.81	6.69	6.69
161.33R	36000. B	773.47	2.08B	2.08	6.69	6.69
165.00	36000. B	769.68	2.58B	2.58	6.41	6.41
183.33	9253. C	740.77	>999.00B	>999.00	5.14	5.14

Service II
(Assumes permit truck is only loading in all lanes)

Span 1

Location	Allowable Stress	Rating Factors Bending	
		Inv.	Oper.
0.00	34200. S	> 999.00 B	>999.00
18.33	34200. S	3.62 B	3.62
22.00L	34200. S	2.98 B	2.98
22.00R	34200. S	5.19 B	5.19
36.67	34200. S	3.43 B	3.43
55.00	34200. S	2.77 B	2.77
73.33	34200. S	2.86 B	2.86
91.67	34200. S	3.51 B	3.51
110.00	34200. S	4.94 B	4.94
122.00L	34200. S	6.80 B	6.80
122.00R	34200. S	6.80 B	6.80
124.00L	34200. S	6.97 B	6.97
124.00R	34200. S	5.81 B	5.81
128.33	47500. S	9.61 B	9.76
146.67	47500. S	7.07 B	7.07
154.00L	47500. S	6.02 B	6.02

154.00R	47500. S	6.29 B	6.29
156.00L	47500. S	17.85 B	17.85
156.00R	47500. S	30.53 B	30.53
165.00	47500. S	8.82 B	8.82
183.33	47500. S	5.84 B	5.84

Span 2

Location	Allowable Stress	Rating Factors Bending Inv.	Oper.
0.00	34200. S	5.84 B	5.84
25.00	34200. S	10.89 B	10.89
28.00L	34200. S	11.58 B	11.58
28.00R	34200. S	11.30 B	11.30
30.00L	34200. S	32.35 B	32.35
30.00R	34200. S	19.66 B	19.66
50.00	34200. S	11.03 B	11.03
55.33L	34200. S	9.47 B	9.47
55.33R	34200. S	9.46 B	9.46
57.33L	34200. S	8.92 B	8.92
57.33R	34200. S	10.87 B	10.87
75.00	34200. S	7.27 B	7.27
100.00	34200. S	5.36 B	5.36
125.00	47500. S	4.87 B	4.87
150.00	47500. S	5.37 B	5.37
175.00	47500. S	7.29 B	7.29
190.67L	47500. S	10.33 B	10.33
190.67R	47500. S	10.35 B	10.35
192.67L	47500. S	10.91 B	10.91
192.67R	47500. S	8.95 B	8.95
200.00	47500. S	11.00 B	11.00
218.00L	47500. S	7.53 B	7.53
218.00R	47500. S	7.77 B	7.77
220.00L	47500. S	20.31 B	20.31
220.00R	47500. S	33.04 B	33.04
225.00	47500. S	10.87 B	10.87
250.00	47500. S	5.83 B	5.83

Span 3

Location	Allowable Stress	Rating Factors Bending Inv.	Oper.
0.00	34200. S	5.83 B	5.83
18.33	34200. S	8.83 B	8.83
25.33L	34200. S	10.05 B	10.05
25.33R	34200. S	9.75 B	9.75
27.33L	34200. S	29.71 B	29.71
27.33R	34200. S	17.06 B	17.06
36.67	34200. S	7.10 B	7.10
55.00	34200. S	9.58 B	9.79
57.33L	34200. S	8.89 B	10.15
57.33R	34200. S	8.89 B	10.14
59.33L	34200. S	8.13 B	8.13
59.33R	34200. S	9.75 B	9.75
73.33	34200. S	4.93 B	4.93
91.67	34200. S	3.51 B	3.51
110.00	34200. S	2.86 B	2.86
128.33	34200. S	2.77 B	2.77
146.67	34200. S	3.43 B	3.43
161.33L	34200. S	5.19 B	5.19
161.33R	34200. S	2.98 B	2.98
165.00	34200. S	3.62 B	3.62
183.33	34200. S	> 999.00 B	>999.00

****
Minimum rating is 1.92 at location 55.00 in span 1.
****

Classified at Strength II because of description
in 3.4.1 for other than HL93 vehicle.

Rating Codes:
T - Top steel governs
B - Bottom steel governs
C - Concrete governs
R - Rebar governs
V - Shear governs
S - Serviceability governs

Mom Strength Codes:
C - Compact
B - Braced non-compact
U - Unbraced non-compact
T - Transition between compact and braced non-compact
S - Serviceability

Noncompact shapes ratings based on stress, as

$$IR = \frac{Fb - \text{factored dead load stress}}{\text{factored LL+I stress}}$$

Inventory rating for Strength II if only permit
loading on the system uses PBETA. Operating rating
uses IR(PBETA/1.35).

I-295 HH BUCKMAN BRIDGE -720249
Girder 2 : Rating Output : Lrfd Ratings
Thu Mar 26 22:18:52 2015

[This table uses the rating equation (6A.4.2.1-1)
of the 2011 edition of the Manual for Bridge
Evaluation.]

Permit

Strength II
(Assumes permit truck is only loading)

Span 1

Location	Allowable	Shear	Rating Factors Bending		Shear	
			Inv.	Oper.	Inv.	Oper.
0.00	9331. C	488.42	>999.00B	>999.00	2.77	2.77
18.33	36000. B	769.69	2.89B	2.89	7.56	7.56
22.00L	36000. B	773.47	2.33B	2.33	8.16	8.16
22.00R	36000. B	773.65	4.29B	4.29	8.16	8.16
36.67	36000. B	617.31	2.81B	2.81	7.89	7.89
55.00	36000. B	623.62	2.25B	2.25	10.59	10.59
73.33	36000. B	632.76	2.39B	2.39	9.94	9.94
91.67	36000. B	644.47	3.04B	3.04	7.74	7.74
110.00	36000. B	658.50	4.40B	4.40	6.23	6.23
122.00L	36000. B	918.49	6.08B	6.08	8.06	8.06
122.00R	36000. B	918.79	4.86T	4.86	8.06	8.06
124.00L	12522. C	922.00	5.11B	5.11	7.92	7.92
124.00R	13524. C	1326.20	5.52B	5.52	12.03	12.03
128.33	23407. C	1332.57	11.85B	11.85	11.60	11.60
146.67	13950. C	1361.56	4.47B	4.47	9.97	9.97
154.00L	45675. B	1373.66	3.59B	3.59	9.52	9.52
154.00R	45672. B	1638.91	4.07B	4.07	11.70	11.70
156.00L	43981. B	1644.31	10.02B	10.02	11.85	11.85
156.00R	23743. C	1644.80	20.24B	20.24	11.85	11.85
165.00	46576. B	1671.34	6.00B	6.00	11.19	11.19
183.33	46329. B	1757.69	3.60B	3.60	9.44	9.44

Span 2

Location	Allowable	Shear	Rating Factors Bending		Shear	
			Inv.	Oper.	Inv.	Oper.
0.00	46329. B	1778.71	3.60B	3.60	9.46	9.46
25.00	46559. B	1747.50	7.78B	7.78	12.13	12.13
28.00L	46976. B	1747.50	8.45B	8.45	12.52	12.52
28.00R	21778. C	1747.50	6.95B	6.95	12.52	12.52
30.00L	21853. C	1747.50	16.85B	16.85	12.78	12.78
30.00R	45307. B	1450.84	10.17B	10.17	10.28	10.28
50.00	47985. B	1450.84	7.98B	7.98	12.60	12.60
55.33L	27351. C	1450.84	10.89B	10.89	13.13	13.13
55.33R	27199. C	1450.84	10.83B	10.83	13.13	13.13
57.33L	27187. C	1450.84	10.28B	10.28	13.32	13.32
57.33R	29713. C	1450.84	11.26B	11.26	13.32	13.32
75.00	29713. C	974.23	7.85B	7.85	9.33	9.33

100.00	29713. C	974.23	6.04B	6.04	12.66	12.66
125.00	29713. C	973.68	5.64B	5.64	19.48	19.48
150.00	29713. C	974.23	6.03B	6.03	14.28	14.28
175.00	29713. C	974.23	7.84B	7.84	10.31	10.31
190.67L	29713. C	1450.84	10.72B	10.72	14.40	14.40
190.67R	30626. C	1450.84	11.06B	11.06	14.40	14.40
192.67L	30626. C	1450.84	11.60B	11.60	14.17	14.17
192.67R	27228. C	1450.84	10.29B	10.29	14.17	14.17
200.00	47985. B	1450.84	7.96B	7.96	13.32	13.32
218.00L	45307. B	1450.84	4.71B	4.71	11.34	11.34
218.00R	45307. B	1747.50	5.25B	5.25	14.08	14.08
220.00L	43540. B	1747.50	10.73B	10.73	13.78	13.78
220.00R	43540. B	1747.50	18.45B	18.45	13.78	13.78
225.00	45307. B	1747.50	7.49B	7.49	13.00	13.00
250.00	46330. B	1778.84	3.59B	3.59	9.46	9.46

Span 3

Location	Allowable	Shear	Rating Factors Bending		Shear	
			Inv.	Oper.	Inv.	Oper.
0.00	46330. B	1757.54	3.59B	3.59	9.37	9.37
18.33	46576. B	1671.32	6.01B	6.01	10.77	10.77
25.33L	23811. C	1650.72	7.05B	7.05	11.39	11.39
25.33R	20777. C	1650.22	5.82B	5.82	11.39	11.39
27.33L	20790. C	1644.80	16.93B	16.93	11.57	11.57
27.33R	45634. B	1377.06	9.37B	9.37	9.39	9.39
36.67	13952. C	1361.55	4.49B	4.49	10.13	10.13
55.00	23415. C	1332.56	11.89B	11.89	11.78	11.78
57.33L	13565. C	1329.18	7.04B	7.04	12.02	12.02
57.33R	13466. C	1328.93	6.99B	6.99	12.02	12.02
59.33L	13429. C	1326.20	5.49B	5.49	12.23	12.23
59.33R	12175. C	922.00	4.97B	4.97	8.05	8.05
73.33	36000. B	658.50	4.40B	4.40	6.36	6.36
91.67	36000. B	644.47	3.05B	3.05	7.91	7.91
110.00	36000. B	632.76	2.39B	2.39	10.56	10.56
128.33	36000. B	623.62	2.25B	2.25	8.20	8.20
146.67	36000. B	617.31	2.80B	2.80	6.30	6.30
161.33L	36000. B	773.65	4.28B	4.28	7.48	7.48
161.33R	36000. B	773.47	2.33B	2.33	7.48	7.48
165.00	36000. B	769.68	2.88B	2.88	7.19	7.19
183.33	9331. C	488.42	>999.00B	>999.00	3.11	3.11

Service II
(Assumes permit truck is only loading in all lanes)

Span 1

Location	Allowable Stress	Rating Factors Bending	
		Inv.	Oper.
0.00	34200. S	> 999.00 B	>999.00
18.33	34200. S	4.06 B	4.06
22.00L	34200. S	3.36 B	3.36
22.00R	34200. S	5.86 B	5.86
36.67	34200. S	3.97 B	3.97
55.00	34200. S	3.25 B	3.25
73.33	34200. S	3.40 B	3.40
91.67	34200. S	4.18 B	4.18
110.00	34200. S	5.80 B	5.80
122.00L	34200. S	7.82 B	7.82
122.00R	34200. S	7.82 B	7.82
124.00L	34200. S	8.11 B	8.11
124.00R	34200. S	6.78 B	6.78
128.33	47500. S	10.95 B	11.68
146.67	47500. S	8.55 B	8.55
154.00L	47500. S	7.29 B	7.29

154.00R	47500. S	7.60 B	7.60
156.00L	47500. S	20.20 B	20.20
156.00R	47500. S	34.41 B	34.41
165.00	47500. S	10.64 B	10.64
183.33	47500. S	7.20 B	7.20

Span 2

Location	Allowable Stress	Rating Factors Bending Inv.	Oper.
0.00	34200. S	7.20 B	7.20
25.00	34200. S	13.29 B	13.29
28.00L	34200. S	14.12 B	14.12
28.00R	34200. S	13.81 B	13.81
30.00L	34200. S	33.06 B	33.06
30.00R	34200. S	20.15 B	20.15
50.00	34200. S	12.61 B	13.46
55.33L	34200. S	10.74 B	10.74
55.33R	34200. S	10.73 B	10.73
57.33L	34200. S	10.14 B	10.14
57.33R	34200. S	12.37 B	12.37
75.00	34200. S	8.41 B	8.41
100.00	34200. S	6.29 B	6.29
125.00	47500. S	5.81 B	5.81
150.00	47500. S	6.28 B	6.28
175.00	47500. S	8.40 B	8.40
190.67L	47500. S	11.74 B	11.74
190.67R	47500. S	11.76 B	11.76
192.67L	47500. S	12.37 B	12.37
192.67R	47500. S	10.15 B	10.15
200.00	47500. S	12.60 B	13.43
218.00L	47500. S	9.21 B	9.21
218.00R	47500. S	9.49 B	9.49
220.00L	47500. S	20.78 B	20.78
220.00R	47500. S	33.72 B	33.72
225.00	47500. S	13.26 B	13.26
250.00	47500. S	7.19 B	7.19

Span 3

Location	Allowable Stress	Rating Factors Bending Inv.	Oper.
0.00	34200. S	7.19 B	7.19
18.33	34200. S	10.66 B	10.66
25.33L	34200. S	12.08 B	12.08
25.33R	34200. S	11.74 B	11.74
27.33L	34200. S	33.60 B	33.60
27.33R	34200. S	19.38 B	19.38
36.67	34200. S	8.59 B	8.59
55.00	34200. S	10.93 B	11.72
57.33L	34200. S	10.19 B	12.13
57.33R	34200. S	10.19 B	12.12
59.33L	34200. S	9.45 B	9.45
59.33R	34200. S	11.31 B	11.31
73.33	34200. S	5.79 B	5.79
91.67	34200. S	4.18 B	4.18
110.00	34200. S	3.40 B	3.40
128.33	34200. S	3.24 B	3.24
146.67	34200. S	3.96 B	3.96
161.33L	34200. S	5.85 B	5.85
161.33R	34200. S	3.35 B	3.35
165.00	34200. S	4.06 B	4.06
183.33	34200. S	> 999.00 B	>999.00

****
Minimum rating is 2.25 at location 128.33 in span 3.
****

Classified at Strength II because of description
in 3.4.1 for other than HL93 vehicle.

Rating Codes:
T - Top steel governs
B - Bottom steel governs
C - Concrete governs
R - Rebar governs
V - Shear governs
S - Serviceability governs

Mom Strength Codes:
C - Compact
B - Braced non-compact
U - Unbraced non-compact
T - Transition between compact and braced non-compact
S - Serviceability

Noncompact shapes ratings based on stress, as

$$IR = \frac{Fb - \text{factored dead load stress}}{\text{factored LL+I stress}}$$

Inventory rating for Strength II if only permit
loading on the system uses PBETA. Operating rating
uses IR(PBETA/1.35).

I-295 HH BUCKMAN BRIDGE -720249
Girder 3 : Rating Output : Lrfd Ratings
Thu Mar 26 22:19:09 2015

[This table uses the rating equation (6A.4.2.1-1)
of the 2011 edition of the Manual for Bridge
Evaluation.]

Permit

Strength II
(Assumes permit truck is only loading)

Span 1

Location	Allowable	Shear	Rating Factors Bending		Shear	
			Inv.	Oper.	Inv.	Oper.
0.00	9331. C	488.42	>999.00B	>999.00	3.01	3.01
18.33	36000. B	769.69	3.12B	3.12	8.30	8.30
22.00L	36000. B	773.47	2.53B	2.53	8.99	8.99
22.00R	36000. B	773.65	4.64B	4.64	9.00	9.00
36.67	36000. B	617.31	3.05B	3.05	8.84	8.84
55.00	36000. B	623.62	2.52B	2.52	11.96	11.96
73.33	36000. B	632.76	2.68B	2.68	10.57	10.57
91.67	36000. B	644.47	3.41B	3.41	8.60	8.60
110.00	36000. B	658.50	4.91B	4.91	6.93	6.93
122.00L	36000. B	918.49	6.79B	6.79	8.89	8.89
122.00R	36000. B	918.79	5.42T	5.42	8.89	8.89
124.00L	12527. C	922.00	5.78B	5.78	8.73	8.73
124.00R	13527. C	1326.20	6.24B	6.24	13.23	13.23
128.33	23450. C	1332.57	14.07B	14.07	12.69	12.69
146.67	13959. C	1361.56	5.25B	5.25	10.63	10.63
154.00L	45675. B	1373.66	4.21B	4.21	10.13	10.13
154.00R	45672. B	1638.91	4.76B	4.76	12.44	12.44
156.00L	43981. B	1644.31	11.55B	11.55	12.63	12.63
156.00R	23749. C	1644.80	23.03B	23.03	12.63	12.63
165.00	46576. B	1671.34	6.87B	6.87	11.92	11.92
183.33	46329. B	1757.69	3.90B	3.90	10.02	10.02

Span 2

Location	Allowable	Shear	Rating Factors Bending		Shear	
			Inv.	Oper.	Inv.	Oper.
0.00	46329. B	1778.71	3.90B	3.90	10.07	10.07
25.00	46559. B	1747.50	8.58B	8.58	13.09	13.09
28.00L	46976. B	1747.50	9.35B	9.35	13.53	13.53
28.00R	21796. C	1747.50	7.70B	7.70	13.53	13.53
30.00L	21867. C	1747.50	18.05B	18.05	13.83	13.83
30.00R	45307. B	1450.84	10.92B	10.92	11.15	11.15
50.00	47985. B	1450.84	8.94B	8.94	13.86	13.86
55.33L	45690. B	1450.84	8.54B	8.54	14.48	14.48
55.33R	45690. B	1450.84	8.53B	8.53	14.48	14.48
57.33L	27199. C	1450.84	11.50B	11.50	14.69	14.69
57.33R	29713. C	1450.84	12.58B	12.58	14.69	14.69
75.00	29713. C	974.23	8.96B	8.96	10.27	10.27

100.00	29713. C	974.23	6.87B	6.87	13.80	13.80
125.00	29713. C	973.68	6.37B	6.37	20.31	20.31
150.00	29713. C	974.23	6.86B	6.86	15.61	15.61
175.00	29713. C	974.23	8.91B	8.91	11.46	11.46
190.67L	29713. C	1450.84	11.89B	11.89	16.11	16.11
190.67R	30626. C	1450.84	12.26B	12.26	16.11	16.11
192.67L	30626. C	1450.84	12.82B	12.82	15.85	15.85
192.67R	27268. C	1450.84	11.40B	11.40	15.85	15.85
200.00	47985. B	1450.84	8.99B	8.99	14.87	14.87
218.00L	45307. B	1450.84	5.27B	5.27	12.44	12.44
218.00R	45307. B	1747.50	5.87B	5.87	15.43	15.43
220.00L	43540. B	1747.50	11.54B	11.54	15.07	15.07
220.00R	43540. B	1747.50	19.75B	19.75	15.07	15.07
225.00	45307. B	1747.50	8.28B	8.28	14.15	14.15
250.00	46330. B	1778.84	3.89B	3.89	10.07	10.07

Span 3

Location	Allowable	Shear	Rating Factors Bending		Shear	
			Inv.	Oper.	Inv.	Oper.
0.00	46330. B	1757.54	3.89B	3.89	9.99	9.99
18.33	46576. B	1671.32	6.89B	6.89	11.41	11.41
25.33L	23817. C	1650.72	8.17B	8.17	12.09	12.09
25.33R	20819. C	1650.22	6.79B	6.79	12.09	12.09
27.33L	20829. C	1644.80	19.41B	19.41	12.29	12.29
27.33R	45634. B	1377.06	10.84B	10.84	9.99	9.99
36.67	13958. C	1361.55	5.24B	5.24	10.87	10.87
55.00	23420. C	1332.56	13.91B	13.91	12.74	12.74
57.33L	13565. C	1329.18	8.24B	8.24	13.00	13.00
57.33R	13466. C	1328.93	8.18B	8.18	12.99	12.99
59.33L	13429. C	1326.20	6.16B	6.16	13.22	13.22
59.33R	12173. C	922.00	5.58B	5.58	8.72	8.72
73.33	36000. B	658.50	4.94B	4.94	6.81	6.81
91.67	36000. B	644.47	3.41B	3.41	8.42	8.42
110.00	36000. B	632.76	2.66B	2.66	10.86	10.86
128.33	36000. B	623.62	2.50B	2.50	9.09	9.09
146.67	36000. B	617.31	3.02B	3.02	6.88	6.88
161.33L	36000. B	773.65	4.61B	4.61	7.95	7.95
161.33R	36000. B	773.47	2.50B	2.50	7.95	7.95
165.00	36000. B	769.68	3.10B	3.10	7.62	7.62
183.33	9331. C	488.42	>999.00B	>999.00	3.34	3.34

Service II
(Assumes permit truck is only loading in all lanes)

Span 1

Location	Allowable Stress	Rating Factors Bending	
		Inv.	Oper.
0.00	34200. S	> 999.00 B	>999.00
18.33	34200. S	4.39 B	4.39
22.00L	34200. S	3.63 B	3.63
22.00R	34200. S	6.34 B	6.34
36.67	34200. S	4.31 B	4.31
55.00	34200. S	3.62 B	3.62
73.33	34200. S	3.79 B	3.79
91.67	34200. S	4.67 B	4.67
110.00	34200. S	6.48 B	6.48
122.00L	34200. S	8.74 B	8.74
122.00R	34200. S	8.75 B	8.75
124.00L	34200. S	9.17 B	9.17
124.00R	34200. S	7.67 B	7.67
128.33	47500. S	12.21 B	13.87
146.67	47500. S	9.99 B	9.99
154.00L	47500. S	8.47 B	8.47

154.00R	47500. S	8.81 B	8.81
156.00L	47500. S	23.06 B	23.06
156.00R	47500. S	39.03 B	39.03
165.00	47500. S	12.13 B	12.13
183.33	47500. S	7.72 B	7.72

Span 2

Location	Allowable Stress	Rating Factors Bending Inv.	Oper.
0.00	34200. S	7.72 B	7.72
25.00	34200. S	14.63 B	14.63
28.00L	34200. S	15.60 B	15.60
28.00R	34200. S	15.26 B	15.26
30.00L	34200. S	35.33 B	35.33
30.00R	34200. S	21.58 B	21.58
50.00	34200. S	13.98 B	15.12
55.33L	34200. S	11.99 B	11.99
55.33R	34200. S	11.98 B	11.98
57.33L	34200. S	11.37 B	11.37
57.33R	34200. S	13.84 B	13.84
75.00	34200. S	9.62 B	9.62
100.00	34200. S	7.18 B	7.18
125.00	47500. S	6.58 B	6.58
150.00	47500. S	7.16 B	7.16
175.00	47500. S	9.56 B	9.56
190.67L	47500. S	13.03 B	13.03
190.67R	47500. S	13.05 B	13.05
192.67L	47500. S	13.69 B	13.69
192.67R	47500. S	11.24 B	11.24
200.00	47500. S	13.79 B	15.18
218.00L	47500. S	10.27 B	10.27
218.00R	47500. S	10.57 B	10.57
220.00L	47500. S	22.26 B	22.26
220.00R	47500. S	36.01 B	36.01
225.00	47500. S	14.62 B	14.62
250.00	47500. S	7.72 B	7.72

Span 3

Location	Allowable Stress	Rating Factors Bending Inv.	Oper.
0.00	34200. S	7.72 B	7.72
18.33	34200. S	12.15 B	12.15
25.33L	34200. S	13.96 B	13.96
25.33R	34200. S	13.59 B	13.59
27.33L	34200. S	38.25 B	38.25
27.33R	34200. S	22.22 B	22.22
36.67	34200. S	9.97 B	9.97
55.00	34200. S	12.26 B	13.71
57.33L	34200. S	11.44 B	14.19
57.33R	34200. S	11.45 B	14.18
59.33L	34200. S	10.62 B	10.62
59.33R	34200. S	12.70 B	12.70
73.33	34200. S	6.51 B	6.51
91.67	34200. S	4.67 B	4.67
110.00	34200. S	3.77 B	3.77
128.33	34200. S	3.60 B	3.60
146.67	34200. S	4.28 B	4.28
161.33L	34200. S	6.30 B	6.30
161.33R	34200. S	3.60 B	3.60
165.00	34200. S	4.36 B	4.36
183.33	34200. S	> 999.00 B	>999.00

****
Minimum rating is 2.50 at location 128.33 in span 3.
****

Classified at Strength II because of description
in 3.4.1 for other than HL93 vehicle.

Rating Codes:
T - Top steel governs
B - Bottom steel governs
C - Concrete governs
R - Rebar governs
V - Shear governs
S - Serviceability governs

Mom Strength Codes:
C - Compact
B - Braced non-compact
U - Unbraced non-compact
T - Transition between compact and braced non-compact
S - Serviceability

Noncompact shapes ratings based on stress, as

$$IR = \frac{Fb - \text{factored dead load stress}}{\text{factored LL+I stress}}$$

Inventory rating for Strength II if only permit
loading on the system uses PBETA. Operating rating
uses IR(PBETA/1.35).

I-295 HH BUCKMAN BRIDGE -720249
Girder 4 : Rating Output : Lrfd Ratings
Thu Mar 26 22:19:23 2015

[This table uses the rating equation (6A.4.2.1-1)
of the 2011 edition of the Manual for Bridge
Evaluation.]

Permit

Strength II
(Assumes permit truck is only loading)

Span 1

Location	Allowable	Shear	Rating Factors Bending		Shear	
			Inv.	Oper.	Inv.	Oper.
0.00	9331. C	488.42	>999.00B	>999.00	3.02	3.02
18.33	36000. B	769.69	3.29B	3.29	8.11	8.11
22.00L	36000. B	773.47	2.68B	2.68	8.80	8.80
22.00R	36000. B	773.65	4.83B	4.83	8.80	8.80
36.67	36000. B	617.31	3.18B	3.18	8.89	8.89
55.00	36000. B	623.62	2.60B	2.60	11.14	11.14
73.33	36000. B	632.76	2.73B	2.73	9.69	9.69
91.67	36000. B	644.47	3.60B	3.60	8.08	8.08
110.00	36000. B	658.50	5.29B	5.29	6.72	6.72
122.00L	36000. B	918.49	7.56B	7.56	9.17	9.17
122.00R	36000. B	918.79	6.05T	6.05	9.17	9.17
124.00L	12519. C	922.00	6.31B	6.31	9.08	9.08
124.00R	13522. C	1326.20	6.82B	6.82	13.66	13.66
128.33	23420. C	1332.57	14.59B	14.59	13.35	13.35
146.67	13973. C	1361.56	6.01B	6.01	11.84	11.84
154.00L	45675. B	1373.66	5.03B	5.03	11.33	11.33
154.00R	45672. B	1638.91	5.64B	5.64	13.86	13.86
156.00L	43981. B	1644.31	14.51B	14.51	14.11	14.11
156.00R	23766. C	1644.80	27.99B	27.99	14.11	14.11
165.00	46576. B	1671.34	8.29B	8.29	13.15	13.15
183.33	46329. B	1757.69	4.77B	4.77	10.38	10.38

Span 2

Location	Allowable	Shear	Rating Factors Bending		Shear	
			Inv.	Oper.	Inv.	Oper.
0.00	46329. B	1778.71	4.77B	4.77	11.10	11.10
25.00	46559. B	1747.50	8.55B	8.55	14.31	14.31
28.00L	46976. B	1747.50	9.19B	9.19	14.72	14.72
28.00R	21738. C	1747.50	7.51B	7.51	14.72	14.72
30.00L	21800. C	1747.50	18.57B	18.57	15.00	15.00
30.00R	45307. B	1450.84	11.11B	11.11	12.13	12.13
50.00	47985. B	1450.84	8.42B	8.42	14.06	14.06
55.33L	45690. B	1450.84	8.90B	8.90	14.51	14.51
55.33R	45690. B	1450.84	11.12B	11.12	14.51	14.51
57.33L	45690. B	1450.84	8.81B	8.81	14.66	14.66
57.33R	19118. C	1450.84	8.78B	8.78	14.66	14.66
75.00	29713. C	974.23	9.59B	9.59	9.98	9.98

100.00	29713.	C	974.23	7.19B	7.19	12.53	12.53
125.00	29713.	C	973.68	6.55B	6.55	13.63	13.63
150.00	29713.	C	974.23	7.23B	7.23	13.79	13.79
175.00	29713.	C	974.23	9.66B	9.66	11.13	11.13
190.67L	29713.	C	1450.84	13.14B	13.14	16.80	16.80
190.67R	30626.	C	1450.84	13.54B	13.54	16.80	16.80
192.67L	19343.	C	1450.84	8.93B	8.93	16.66	16.66
192.67R	45936.	B	1450.84	7.15B	7.15	16.66	16.66
200.00	47985.	B	1450.84	8.69B	8.69	16.04	16.04
218.00L	45307.	B	1450.84	5.34B	5.34	14.32	14.32
218.00R	45307.	B	1747.50	5.95B	5.95	17.68	17.68
220.00L	43540.	B	1747.50	11.85B	11.85	17.29	17.29
220.00R	43540.	B	1747.50	20.28B	20.28	17.29	17.29
225.00	45307.	B	1747.50	8.66B	8.66	16.24	16.24
250.00	46330.	B	1778.84	4.88B	4.88	11.01	11.01

Span 3

Location	Allowable		Shear	Rating Factors Bending		Shear	
				Inv.	Oper.	Inv.	Oper.
0.00	46330.	B	1757.54	4.88B	4.88	10.66	10.66
18.33	46576.	B	1671.32	7.93B	7.93	12.59	12.59
25.33L	23824.	C	1650.72	9.09B	9.09	13.22	13.22
25.33R	20868.	C	1650.22	7.59B	7.59	13.22	13.22
27.33L	20868.	C	1644.80	22.60B	22.60	13.37	13.37
27.33R	45634.	B	1377.06	12.73B	12.73	10.91	10.91
36.67	13955.	C	1361.55	5.40B	5.40	11.34	11.34
55.00	23339.	C	1332.56	13.68B	13.68	12.43	12.43
57.33L	13556.	C	1329.18	8.03B	8.03	12.61	12.61
57.33R	13456.	C	1328.93	7.97B	7.97	12.61	12.61
59.33L	13420.	C	1326.20	6.58B	6.58	12.77	12.77
59.33R	12127.	C	922.00	5.93B	5.93	8.41	8.41
73.33	36000.	B	658.50	5.22B	5.22	6.44	6.44
91.67	36000.	B	644.47	3.53B	3.53	7.96	7.96
110.00	36000.	B	632.76	2.68B	2.68	10.15	10.15
128.33	36000.	B	623.62	2.54B	2.54	8.82	8.82
146.67	36000.	B	617.31	3.09B	3.09	6.70	6.70
161.33L	36000.	B	773.65	4.73B	4.73	8.19	8.19
161.33R	36000.	B	773.47	2.60B	2.60	8.18	8.18
165.00	36000.	B	769.68	3.21B	3.21	7.89	7.89
183.33	9331.	C	488.42	>999.00B	>999.00	3.41	3.41

Service II
(Assumes permit truck is only loading in all lanes)

Span 1

Location	Allowable Stress		Rating Factors Bending		
			Inv.	Oper.	
0.00	34200.	S	> 999.00	B	>999.00
18.33	34200.	S	4.60	B	4.60
22.00L	34200.	S	3.81	B	3.81
22.00R	34200.	S	6.57	B	6.57
36.67	34200.	S	4.47	B	4.47
55.00	34200.	S	3.73	B	3.73
73.33	34200.	S	3.87	B	3.87
91.67	34200.	S	4.91	B	4.91
110.00	34200.	S	6.95	B	6.95
122.00L	34200.	S	9.71	B	9.71
122.00R	34200.	S	9.71	B	9.71
124.00L	34200.	S	10.04	B	10.04
124.00R	34200.	S	8.38	B	8.38
128.33	47500.	S	13.74	B	14.38
146.67	47500.	S	11.32	B	11.32
154.00L	47500.	S	9.93	B	9.93

154.00R	47500. S	10.28 B	10.28
156.00L	47500. S	28.26 B	28.26
156.00R	47500. S	46.98 B	46.98
165.00	47500. S	14.41 B	14.41
183.33	47500. S	9.12 B	9.12

Span 2

Location	Allowable Stress	Rating Factors Bending Inv.	Oper.
0.00	34200. S	9.12 B	9.12
25.00	34200. S	14.62 B	14.62
28.00L	34200. S	15.40 B	15.40
28.00R	34200. S	15.04 B	15.04
30.00L	34200. S	36.75 B	36.75
30.00R	34200. S	22.22 B	22.22
50.00	34200. S	14.34 B	14.34
55.33L	34200. S	13.32 B	15.75
55.33R	34200. S	13.31 B	15.73
57.33L	34200. S	12.40 B	12.40
57.33R	34200. S	15.07 B	15.07
75.00	34200. S	10.32 B	10.32
100.00	34200. S	7.51 B	7.51
125.00	47500. S	6.76 B	6.76
150.00	47500. S	7.56 B	7.56
175.00	47500. S	10.41 B	10.41
190.67L	47500. S	14.46 B	14.46
190.67R	47500. S	14.47 B	14.47
192.67L	47500. S	15.15 B	15.15
192.67R	47500. S	12.48 B	12.48
200.00	47500. S	14.76 B	14.76
218.00L	47500. S	10.42 B	10.42
218.00R	47500. S	10.73 B	10.73
220.00L	47500. S	22.86 B	22.86
220.00R	47500. S	36.98 B	36.98
225.00	47500. S	15.26 B	15.26
250.00	47500. S	9.28 B	9.28

Span 3

Location	Allowable Stress	Rating Factors Bending Inv.	Oper.
0.00	34200. S	9.28 B	9.28
18.33	34200. S	13.86 B	13.86
25.33L	34200. S	15.46 B	15.46
25.33R	34200. S	15.07 B	15.07
27.33L	34200. S	44.27 B	44.27
27.33R	34200. S	25.89 B	25.89
36.67	34200. S	10.31 B	10.31
55.00	34200. S	13.48 B	13.48
57.33L	34200. S	12.68 B	13.90
57.33R	34200. S	12.69 B	13.88
59.33L	34200. S	11.38 B	11.38
59.33R	34200. S	13.66 B	13.66
73.33	34200. S	6.86 B	6.86
91.67	34200. S	4.84 B	4.84
110.00	34200. S	3.80 B	3.80
128.33	34200. S	3.65 B	3.65
146.67	34200. S	4.36 B	4.36
161.33L	34200. S	6.45 B	6.45
161.33R	34200. S	3.72 B	3.72
165.00	34200. S	4.50 B	4.50
183.33	34200. S	> 999.00 B	>999.00

****
Minimum rating is 2.54 at location 128.33 in span 3.
****

Classified at Strength II because of description
in 3.4.1 for other than HL93 vehicle.

Rating Codes:
T - Top steel governs
B - Bottom steel governs
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V - Shear governs
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Mom Strength Codes:
C - Compact
B - Braced non-compact
U - Unbraced non-compact
T - Transition between compact and braced non-compact
S - Serviceability

Noncompact shapes ratings based on stress, as

$$IR = \frac{Fb - \text{factored dead load stress}}{\text{factored LL+I stress}}$$

Inventory rating for Strength II if only permit
loading on the system uses PBETA. Operating rating
uses IR(PBETA/1.35).

I-295 HH BUCKMAN BRIDGE -720249
Girder 5 : Rating Output : Lrfd Ratings
Thu Mar 26 22:19:43 2015

[This table uses the rating equation (6A.4.2.1-1) of the 2011 edition of the Manual for Bridge Evaluation.]

Permit

Strength II
(Assumes permit truck is only loading)

Span 1

Location	Allowable	Shear	Rating Factors Bending		Shear	
			Inv.	Oper.	Inv.	Oper.
0.00	36000. B	347.57	>999.00B	>999.00	1.69	1.69
18.33	36000. B	461.91	4.67B	4.67	4.53	4.53
36.67	36000. B	476.29	2.60B	2.60	7.10	7.10
38.00L	36000. B	477.22	2.53B	2.53	7.29	7.29
38.00R	36000. B	477.34	3.09B	3.09	7.29	7.29
55.00	36000. B	435.91	2.58B	2.58	8.31	8.31
73.33	36000. B	447.75	2.71B	2.71	6.90	6.90
91.67	36000. B	514.98	3.37B	3.37	5.91	5.91
94.00L	36000. B	520.37	3.54B	3.54	5.77	5.77
94.00R	36000. B	520.76	3.30B	3.30	5.78	5.78
110.00	36000. B	559.21	4.94B	4.94	5.02	5.02
128.33	35223. B	695.47	5.85B	5.85	4.77	4.77
146.67	35178. B	842.04	4.26B	4.26	4.89	4.89
155.33L	28998. B	928.08	2.56B	2.56	5.20	5.20
155.33R	28971. B	929.75	4.25B	4.25	5.21	5.21
165.00	30326. B	1380.66	4.35B	4.35	8.29	8.29
183.33	35100. B	1263.48	2.08B	2.08	5.93	5.93

Span 2

Location	Allowable	Shear	Rating Factors Bending		Shear	
			Inv.	Oper.	Inv.	Oper.
0.00	35100. B	1274.84	2.08B	2.08	5.72	5.72
21.00L	35318. B	923.38	4.45B	4.45	4.95	4.95
21.00R	35318. B	922.51	2.62B	2.62	4.95	4.95
25.00	35313. B	902.13	3.13B	3.13	5.12	5.12
50.00	35226. B	789.55	7.16B	7.16	6.62	6.62
75.00	36000. B	588.76	5.14B	5.14	5.62	5.62
76.00L	36000. B	587.44	5.00B	5.00	5.67	5.67
76.00R	36000. B	587.20	5.33B	5.33	5.67	5.67
99.50L	36000. B	506.39	3.34B	3.34	7.10	7.10
99.50R	36000. B	506.31	3.90B	3.90	7.10	7.10
100.00	36000. B	506.10	3.88B	3.88	7.18	7.18
125.00L	36000. B	502.51	3.43B	3.43	10.10	10.10
125.00R	36000. B	502.55	3.43B	3.43	10.10	10.10
150.00	36000. B	521.48	3.91B	3.91	9.00	9.00
174.00L	36000. B	626.29	5.49B	5.49	6.97	6.97
174.00R	36000. B	626.70	5.16B	5.16	6.98	6.98

150.50L	36000. B	522.06	3.93B	3.93	8.90	8.90
150.50R	36000. B	522.30	3.38B	3.38	8.90	8.90
175.00	36000. B	628.95	5.29B	5.29	6.91	6.91
200.00	35218. B	865.31	6.93B	6.93	7.85	7.85
225.00	30828. B	1008.02	2.64B	2.64	6.39	6.39
229.00L	30521. B	1033.20	2.16B	2.16	6.17	6.17
229.00R	30507. B	1034.27	3.76B	3.76	6.18	6.18
250.00	30889. B	1415.29	1.95B	1.95	6.73	6.73

Span 3

Location	Allowable	Shear	Rating Factors Bending		Shear	
			Inv.	Oper.	Inv.	Oper.
0.00	30889. B	1416.13	1.95B	1.95	6.58	6.58
18.33	32863. B	1199.86	3.82B	3.82	6.35	6.35
28.00L	32495. B	765.29	4.32B	4.32	3.71	3.71
28.00R	32509. B	763.96	2.52B	2.52	3.70	3.70
36.67	32340. B	695.47	3.25B	3.25	3.67	3.67
55.00	35223. B	600.54	5.92B	5.92	4.25	4.25
73.33	36000. B	514.98	4.93B	4.93	4.72	4.72
89.33L	36000. B	504.07	3.41B	3.41	5.94	5.94
89.33R	36000. B	503.96	3.66B	3.66	5.94	5.94
91.67	36000. B	502.42	3.51B	3.51	6.13	6.13
110.00	36000. B	435.91	2.77B	2.77	6.82	6.82
128.33	36000. B	476.29	2.59B	2.59	7.27	7.27
145.33L	36000. B	463.01	3.08B	3.08	5.47	5.47
145.33R	36000. B	462.88	2.51B	2.51	5.47	5.47
146.67	36000. B	461.91	2.58B	2.58	5.35	5.35
165.00	36000. B	484.57	4.59B	4.59	4.48	4.48
183.33	36000. B	338.37	>999.00B	>999.00	1.88	1.88

Service II
(Assumes permit truck is only loading in all lanes)

Span 1

Location	Allowable Stress	Rating Factors Bending	
		Inv.	Oper.
0.00	34200. S	> 999.00 B	>999.00
18.33	34200. S	6.36 B	6.36
36.67	34200. S	3.72 B	3.72
38.00L	34200. S	3.63 B	3.63
38.00R	34200. S	4.36 B	4.36
55.00	34200. S	3.69 B	3.69
73.33	34200. S	3.84 B	3.84
91.67	34200. S	4.59 B	4.59
94.00L	34200. S	4.80 B	4.80
94.00R	34200. S	4.48 B	4.48
110.00	34200. S	6.45 B	6.45
128.33	34200. S	8.89 B	8.89
146.67	34200. S	6.97 B	6.97
155.33L	34200. S	6.36 B	6.36
155.33R	34200. S	9.15 B	9.15
165.00	34200. S	9.22 B	9.22
183.33	34200. S	4.23 B	4.23

Span 2

Location	Allowable Stress	Rating Factors Bending	
		Inv.	Oper.

0.00	34200. S	4.23	B	4.23
21.00L	34200. S	7.34	B	7.34
21.00R	34200. S	4.82	B	4.82
25.00	34200. S	5.53	B	5.53
50.00	34200. S	11.00	B	11.00
75.00	34200. S	6.79	B	6.79
76.00L	34200. S	6.64	B	6.64
76.00R	34200. S	7.06	B	7.06
99.50L	34200. S	4.64	B	4.64
99.50R	34200. S	5.35	B	5.35
100.00	34200. S	5.33	B	5.33
125.00L	34200. S	4.80	B	4.80
125.00R	34200. S	4.80	B	4.80
150.00	34200. S	5.36	B	5.36
174.00L	34200. S	7.26	B	7.26
174.00R	34200. S	6.83	B	6.83
150.50L	34200. S	5.39	B	5.39
150.50R	34200. S	4.68	B	4.68
175.00	34200. S	6.99	B	6.99
200.00	34200. S	10.64	B	10.64
225.00	34200. S	5.95	B	5.95
229.00L	34200. S	5.35	B	5.35
229.00R	34200. S	7.87	B	7.87
250.00	34200. S	5.20	B	5.20

Span 3

Location	Allowable Stress	Rating Factors Bending Inv.	Oper.
0.00	34200. S	5.20 B	5.20
18.33	34200. S	7.42 B	7.42
28.00L	34200. S	7.98 B	7.98
28.00R	34200. S	5.30 B	5.30
36.67	34200. S	6.25 B	6.25
55.00	34200. S	9.00 B	9.00
73.33	34200. S	6.46 B	6.46
89.33L	34200. S	4.65 B	4.65
89.33R	34200. S	4.98 B	4.98
91.67	34200. S	4.80 B	4.80
110.00	34200. S	3.92 B	3.92
128.33	34200. S	3.71 B	3.71
145.33L	34200. S	4.34 B	4.34
145.33R	34200. S	3.62 B	3.62
146.67	34200. S	3.70 B	3.70
165.00	34200. S	6.25 B	6.25
183.33	34200. S	> 999.00 B	>999.00

****
Minimum rating is 1.69 at location 0.00 in span 1.
****

Classified at Strength II because of description
in 3.4.1 for other than HL93 vehicle.

Rating Codes:
T - Top steel governs
B - Bottom steel governs
C - Concrete governs
R - Rebar governs
V - Shear governs
S - Serviceability governs

Mom Strength Codes:
C - Compact
B - Braced non-compact
U - Unbraced non-compact
T - Transition between compact and braced non-compact
S - Serviceability

Noncompact shapes ratings based on stress, as

Fb - factored dead load stress

$$IR = \frac{\text{PBETA}}{\text{factored LL+I stress}}$$

Inventory rating for Strength II if only permit loading on the system uses PBETA. Operating rating uses IR(PBETA/1.35).

I-295 HH BUCKMAN BRIDGE -720249
Girder 6 : Rating Output : Lrfd Ratings
Thu Mar 26 22:19:59 2015

[This table uses the rating equation (6A.4.2.1-1)
of the 2011 edition of the Manual for Bridge
Evaluation.]

Permit

Strength II
(Assumes permit truck is only loading)

Span 1

Location	Allowable	Shear	Rating Factors Bending		Shear	
			Inv.	Oper.	Inv.	Oper.
0.00	36000. B	347.57	>999.00B	>999.00	1.76	1.76
18.33	36000. B	461.91	4.82B	4.82	4.44	4.44
36.67	36000. B	476.29	2.68B	2.68	6.67	6.67
38.00L	36000. B	477.22	2.60B	2.60	6.84	6.84
38.00R	36000. B	477.34	3.16B	3.16	6.84	6.84
55.00	36000. B	435.91	2.56B	2.56	7.86	7.86
73.33	36000. B	447.75	2.67B	2.67	6.83	6.83
91.67	36000. B	514.98	3.30B	3.30	5.61	5.61
94.00L	36000. B	520.37	3.47B	3.47	5.51	5.51
94.00R	36000. B	520.76	3.24B	3.24	5.51	5.51
110.00	36000. B	559.21	4.92B	4.92	5.15	5.15
128.33	35178. B	695.47	6.02B	6.02	5.14	5.14
146.67	30325. B	842.04	3.92B	3.92	5.73	5.73
155.33L	28997. B	928.08	3.20B	3.20	6.06	6.06
155.33R	28970. B	929.75	5.02B	5.02	6.08	6.08
165.00	30888. B	1380.66	5.38B	5.38	9.31	9.31
183.33	35100. B	1263.48	2.84B	2.84	6.35	6.35

Span 2

Location	Allowable	Shear	Rating Factors Bending		Shear	
			Inv.	Oper.	Inv.	Oper.
0.00	35100. B	1274.84	2.84B	2.84	6.62	6.62
21.00L	35318. B	923.38	4.77B	4.77	5.66	5.66
21.00R	35318. B	922.51	2.87B	2.87	5.65	5.65
25.00	35201. B	902.13	3.28B	3.28	5.77	5.77
50.00	35252. B	789.55	6.76B	6.76	6.31	6.31
75.00	36000. B	588.76	5.20B	5.20	4.99	4.99
76.00L	36000. B	587.44	5.05B	5.05	5.03	5.03
76.00R	36000. B	587.20	5.38B	5.38	5.03	5.03
99.50L	36000. B	506.39	3.16B	3.16	6.59	6.59
99.50R	36000. B	506.31	3.67B	3.67	6.59	6.59
100.00	36000. B	506.10	3.65B	3.65	6.68	6.68
125.00L	36000. B	502.51	3.12B	3.12	9.85	9.85
125.00R	36000. B	502.55	3.12B	3.12	9.85	9.85
150.00	36000. B	521.48	3.80B	3.80	8.01	8.01
174.00L	36000. B	626.29	5.63B	5.63	6.11	6.11
174.00R	36000. B	626.70	5.30B	5.30	6.11	6.11

150.50L	36000. B	522.06	3.83B	3.83	7.90	7.90
150.50R	36000. B	522.30	3.30B	3.30	7.90	7.90
175.00	36000. B	628.95	5.45B	5.45	6.07	6.07
200.00	35218. B	865.31	6.74B	6.74	7.89	7.89
225.00	30827. B	1008.02	2.98B	2.98	7.55	7.55
229.00L	30520. B	1033.20	2.57B	2.57	7.33	7.33
229.00R	30506. B	1034.27	4.26B	4.26	7.34	7.34
250.00	30888. B	1415.29	2.75B	2.75	7.62	7.62

Span 3

Location	Allowable	Shear	Rating Factors Bending		Shear	
			Inv.	Oper.	Inv.	Oper.
0.00	30888. B	1416.13	2.75B	2.75	7.37	7.37
18.33	32862. B	1199.86	4.44B	4.44	7.42	7.42
28.00L	32494. B	765.29	4.72B	4.72	4.34	4.34
28.00R	32508. B	763.96	2.85B	2.85	4.33	4.33
36.67	32339. B	695.47	3.41B	3.41	4.13	4.13
55.00	35223. B	600.54	5.67B	5.67	4.37	4.37
73.33	36000. B	514.98	4.86B	4.86	4.49	4.49
89.33L	36000. B	504.07	3.30B	3.30	5.73	5.73
89.33R	36000. B	503.96	3.54B	3.54	5.72	5.72
91.67	36000. B	502.42	3.39B	3.39	5.92	5.92
110.00	36000. B	435.91	2.70B	2.70	6.64	6.64
128.33	36000. B	476.29	2.53B	2.53	6.82	6.82
145.33L	36000. B	463.01	3.11B	3.11	5.28	5.28
145.33R	36000. B	462.88	2.55B	2.55	5.27	5.27
146.67	36000. B	461.91	2.62B	2.62	5.18	5.18
165.00	36000. B	484.57	4.69B	4.69	4.56	4.56
183.33	36000. B	338.37	>999.00B	>999.00	1.94	1.94

Service II
(Assumes permit truck is only loading in all lanes)

Span 1

Location	Allowable Stress	Rating Factors Bending	
		Inv.	Oper.
0.00	34200. S	> 999.00 B	>999.00
18.33	34200. S	6.52 B	6.52
36.67	34200. S	3.80 B	3.80
38.00L	34200. S	3.71 B	3.71
38.00R	34200. S	4.42 B	4.42
55.00	34200. S	3.63 B	3.63
73.33	34200. S	3.75 B	3.75
91.67	34200. S	4.48 B	4.48
94.00L	34200. S	4.68 B	4.68
94.00R	34200. S	4.38 B	4.38
110.00	34200. S	6.41 B	6.41
128.33	34200. S	9.16 B	9.16
146.67	34200. S	7.89 B	7.89
155.33L	34200. S	7.40 B	7.40
155.33R	34200. S	10.41 B	10.41
165.00	34200. S	10.57 B	10.57
183.33	34200. S	5.29 B	5.29

Span 2

Location	Allowable Stress	Rating Factors Bending	
		Inv.	Oper.

0.00	34200. S	5.29	B	5.29
21.00L	34200. S	7.80	B	7.80
21.00R	34200. S	5.19	B	5.19
25.00	34200. S	5.78	B	5.78
50.00	34200. S	10.44	B	10.44
75.00	34200. S	6.85	B	6.85
76.00L	34200. S	6.67	B	6.67
76.00R	34200. S	7.09	B	7.09
99.50L	34200. S	4.37	B	4.37
99.50R	34200. S	5.03	B	5.03
100.00	34200. S	5.00	B	5.00
125.00L	34200. S	4.37	B	4.37
125.00R	34200. S	4.37	B	4.37
150.00	34200. S	5.19	B	5.19
174.00L	34200. S	7.41	B	7.41
174.00R	34200. S	6.97	B	6.97
150.50L	34200. S	5.23	B	5.23
150.50R	34200. S	4.55	B	4.55
175.00	34200. S	7.15	B	7.15
200.00	34200. S	10.40	B	10.40
225.00	34200. S	6.51	B	6.51
229.00L	34200. S	6.00	B	6.00
229.00R	34200. S	8.66	B	8.66
250.00	34200. S	6.43	B	6.43

Span 3

Location	Allowable Stress	Rating Factors Bending Inv.	Oper.
0.00	34200. S	6.43 B	6.43
18.33	34200. S	8.31 B	8.31
28.00L	34200. S	8.57 B	8.57
28.00R	34200. S	5.79 B	5.79
36.67	34200. S	6.49 B	6.49
55.00	34200. S	8.64 B	8.64
73.33	34200. S	6.35 B	6.35
89.33L	34200. S	4.47 B	4.47
89.33R	34200. S	4.79 B	4.79
91.67	34200. S	4.61 B	4.61
110.00	34200. S	3.80 B	3.80
128.33	34200. S	3.62 B	3.62
145.33L	34200. S	4.36 B	4.36
145.33R	34200. S	3.65 B	3.65
146.67	34200. S	3.74 B	3.74
165.00	34200. S	6.35 B	6.35
183.33	34200. S	> 999.00 B	>999.00

****
Minimum rating is 1.76 at location 0.00 in span 1.
****

Classified at Strength II because of description
in 3.4.1 for other than HL93 vehicle.

Rating Codes:
T - Top steel governs
B - Bottom steel governs
C - Concrete governs
R - Rebar governs
V - Shear governs
S - Serviceability governs

Mom Strength Codes:
C - Compact
B - Braced non-compact
U - Unbraced non-compact
T - Transition between compact and braced non-compact
S - Serviceability

Noncompact shapes ratings based on stress, as

Fb - factored dead load stress

$$IR = \frac{\text{PBETA}}{\text{factored LL+I stress}}$$

Inventory rating for Strength II if only permit loading on the system uses PBETA. Operating rating uses IR(PBETA/1.35).

I-295 HH BUCKMAN BRIDGE -720249
Girder 7 : Rating Output : Lrfd Ratings
Thu Mar 26 22:20:17 2015

[This table uses the rating equation (6A.4.2.1-1)
of the 2011 edition of the Manual for Bridge
Evaluation.]

Permit

Strength II
(Assumes permit truck is only loading)

Span 1

Location	Allowable	Shear	Rating Factors Bending		Shear	
			Inv.	Oper.	Inv.	Oper.
0.00	36000. B	347.57	>999.00B	>999.00	1.69	1.69
18.33	36000. B	461.91	4.49B	4.49	4.02	4.02
36.67	36000. B	476.29	2.56B	2.56	6.05	6.05
38.00L	36000. B	477.22	2.49B	2.49	6.20	6.20
38.00R	36000. B	477.34	3.00B	3.00	6.20	6.20
55.00	36000. B	435.91	2.44B	2.44	6.97	6.97
73.33	36000. B	447.75	2.48B	2.48	6.65	6.65
91.67	36000. B	514.98	3.03B	3.03	5.51	5.51
94.00L	36000. B	520.37	3.17B	3.17	5.40	5.40
94.00R	36000. B	520.76	2.96B	2.96	5.40	5.40
110.00	36000. B	559.21	4.29B	4.29	4.94	4.94
128.33	35178. B	695.47	5.01B	5.01	4.94	4.94
146.67	30325. B	842.04	3.46B	3.46	5.49	5.49
155.33L	28997. B	928.08	2.94B	2.94	5.82	5.82
155.33R	28970. B	929.75	4.49B	4.49	5.83	5.83
165.00	30888. B	1380.66	4.94B	4.94	8.91	8.91
183.33	35100. B	1263.48	2.90B	2.90	6.15	6.15

Span 2

Location	Allowable	Shear	Rating Factors Bending		Shear	
			Inv.	Oper.	Inv.	Oper.
0.00	35100. B	1274.84	2.90B	2.90	6.31	6.31
21.00L	35318. B	923.38	4.76B	4.76	5.39	5.39
21.00R	35318. B	922.51	2.96B	2.96	5.39	5.39
25.00	35201. B	902.13	3.33B	3.33	5.49	5.49
50.00	35252. B	789.55	5.87B	5.87	6.00	6.00
75.00	36000. B	588.76	4.55B	4.55	4.68	4.68
76.00L	36000. B	587.44	4.43B	4.43	4.71	4.71
76.00R	36000. B	587.20	4.71B	4.71	4.71	4.71
99.50L	36000. B	506.39	2.82B	2.82	5.93	5.93
99.50R	36000. B	506.31	3.27B	3.27	5.93	5.93
100.00	36000. B	506.10	3.25B	3.25	6.00	6.00
125.00L	36000. B	502.51	2.79B	2.79	8.95	8.95
125.00R	36000. B	502.55	2.79B	2.79	8.96	8.96
150.00	36000. B	521.48	3.30B	3.30	7.26	7.26
174.00L	36000. B	626.29	4.76B	4.76	5.75	5.75
174.00R	36000. B	626.70	4.48B	4.48	5.76	5.76

150.50L	36000. B	522.06	3.32B	3.32	7.17	7.17
150.50R	36000. B	522.30	2.87B	2.87	7.17	7.17
175.00	36000. B	628.95	4.60B	4.60	5.72	5.72
200.00	35218. B	865.31	5.90B	5.90	7.51	7.51
225.00	30827. B	1008.02	3.02B	3.02	7.03	7.03
229.00L	30520. B	1033.20	2.67B	2.67	6.85	6.85
229.00R	30506. B	1034.27	4.27B	4.27	6.85	6.85
250.00	30888. B	1415.29	2.98B	2.98	7.27	7.27

Span 3

Location	Allowable	Shear	Rating Factors Bending		Shear	
			Inv.	Oper.	Inv.	Oper.
0.00	30888. B	1416.13	2.98B	2.98	7.07	7.07
18.33	32862. B	1199.86	4.18B	4.18	7.08	7.08
28.00L	32494. B	765.29	4.28B	4.28	4.20	4.20
28.00R	32508. B	763.96	2.67B	2.67	4.19	4.19
36.67	32339. B	695.47	3.04B	3.04	4.01	4.01
55.00	35223. B	600.54	4.68B	4.68	4.26	4.26
73.33	36000. B	514.98	4.27B	4.27	4.34	4.34
89.33L	36000. B	504.07	3.02B	3.02	5.52	5.52
89.33R	36000. B	503.96	3.24B	3.24	5.51	5.51
91.67	36000. B	502.42	3.12B	3.12	5.70	5.70
110.00	36000. B	435.91	2.50B	2.50	6.41	6.41
128.33	36000. B	476.29	2.42B	2.42	6.27	6.27
145.33L	36000. B	463.01	2.94B	2.94	4.83	4.83
145.33R	36000. B	462.88	2.43B	2.43	4.83	4.83
146.67	36000. B	461.91	2.49B	2.49	4.74	4.74
165.00	36000. B	484.57	4.35B	4.35	4.23	4.23
183.33	36000. B	338.37	>999.00B	>999.00	1.84	1.84

Service II
(Assumes permit truck is only loading in all lanes)

Span 1

Location	Allowable Stress	Rating Factors Bending	
		Inv.	Oper.
0.00	34200. S	> 999.00 B	>999.00
18.33	34200. S	6.05 B	6.05
36.67	34200. S	3.59 B	3.59
38.00L	34200. S	3.51 B	3.51
38.00R	34200. S	4.16 B	4.16
55.00	34200. S	3.43 B	3.43
73.33	34200. S	3.45 B	3.45
91.67	34200. S	4.09 B	4.09
94.00L	34200. S	4.26 B	4.26
94.00R	34200. S	3.98 B	3.98
110.00	34200. S	5.59 B	5.59
128.33	34200. S	7.59 B	7.59
146.67	34200. S	6.83 B	6.83
155.33L	34200. S	6.57 B	6.57
155.33R	34200. S	9.13 B	9.13
165.00	34200. S	9.53 B	9.53
183.33	34200. S	5.21 B	5.21

Span 2

Location	Allowable Stress	Rating Factors Bending	
		Inv.	Oper.

0.00	34200. S	5.21	B	5.21
21.00L	34200. S	7.68	B	7.68
21.00R	34200. S	5.22	B	5.22
25.00	34200. S	5.75	B	5.75
50.00	34200. S	9.06	B	9.06
75.00	34200. S	5.96	B	5.96
76.00L	34200. S	5.81	B	5.81
76.00R	34200. S	6.18	B	6.18
99.50L	34200. S	3.87	B	3.87
99.50R	34200. S	4.45	B	4.45
100.00	34200. S	4.42	B	4.42
125.00L	34200. S	3.88	B	3.88
125.00R	34200. S	3.88	B	3.88
150.00	34200. S	4.48	B	4.48
174.00L	34200. S	6.24	B	6.24
174.00R	34200. S	5.88	B	5.88
150.50L	34200. S	4.51	B	4.51
150.50R	34200. S	3.94	B	3.94
175.00	34200. S	6.03	B	6.03
200.00	34200. S	9.09	B	9.09
225.00	34200. S	6.38	B	6.38
229.00L	34200. S	5.97	B	5.97
229.00R	34200. S	8.48	B	8.48
250.00	34200. S	6.66	B	6.66

Span 3

Location	Allowable Stress	Rating Factors Bending Inv.	Oper.
0.00	34200. S	6.66 B	6.66
18.33	34200. S	7.66 B	7.66
28.00L	34200. S	7.62 B	7.62
28.00R	34200. S	5.24 B	5.24
36.67	34200. S	5.67 B	5.67
55.00	34200. S	7.11 B	7.11
73.33	34200. S	5.56 B	5.56
89.33L	34200. S	4.08 B	4.08
89.33R	34200. S	4.36 B	4.36
91.67	34200. S	4.22 B	4.22
110.00	34200. S	3.49 B	3.49
128.33	34200. S	3.41 B	3.41
145.33L	34200. S	4.09 B	4.09
145.33R	34200. S	3.44 B	3.44
146.67	34200. S	3.52 B	3.52
165.00	34200. S	5.88 B	5.88
183.33	34200. S	> 999.00 B	>999.00

****
Minimum rating is 1.69 at location 0.00 in span 1.
****

Classified at Strength II because of description
in 3.4.1 for other than HL93 vehicle.

Rating Codes:
T - Top steel governs
B - Bottom steel governs
C - Concrete governs
R - Rebar governs
V - Shear governs
S - Serviceability governs

Mom Strength Codes:
C - Compact
B - Braced non-compact
U - Unbraced non-compact
T - Transition between compact and braced non-compact
S - Serviceability

Noncompact shapes ratings based on stress, as

Fb - factored dead load stress

$$IR = \frac{\text{PBETA}}{\text{factored LL+I stress}}$$

Inventory rating for Strength II if only permit loading on the system uses PBETA. Operating rating uses IR(PBETA/1.35).

I-295 HH BUCKMAN BRIDGE -720249
Girder 8 : Rating Output : Lrfd Ratings
Thu Mar 26 22:20:32 2015

[This table uses the rating equation (6A.4.2.1-1) of the 2011 edition of the Manual for Bridge Evaluation.]

Permit

Strength II
(Assumes permit truck is only loading)

Span 1

Location	Allowable	Shear	Rating Factors Bending		Shear	
			Inv.	Oper.	Inv.	Oper.
0.00	36000. B	347.57	>999.00B	>999.00	2.17	2.17
18.33	36000. B	461.91	4.79B	4.79	4.34	4.34
36.67	36000. B	476.29	2.51B	2.51	6.65	6.65
38.00L	36000. B	477.22	2.44B	2.44	6.84	6.84
38.00R	36000. B	477.34	2.92B	2.92	6.84	6.84
55.00	36000. B	435.91	2.37B	2.37	8.35	8.35
73.33	36000. B	447.75	2.35B	2.35	8.05	8.05
91.67	36000. B	514.98	2.83B	2.83	6.92	6.92
94.00L	36000. B	520.37	2.96B	2.96	6.72	6.72
94.00R	36000. B	520.76	2.76B	2.76	6.73	6.73
110.00	36000. B	559.21	3.89B	3.89	5.55	5.55
128.33	35184. B	695.47	4.48B	4.48	5.77	5.77
146.67	30537. B	842.04	3.23B	3.23	5.86	5.86
155.33L	29239. B	928.08	2.81B	2.81	6.15	6.15
155.33R	29213. B	929.75	4.20B	4.20	6.16	6.16
165.00	35058. B	1380.66	5.50B	5.50	9.42	9.42
183.33	35105. B	1263.48	2.88B	2.88	7.49	7.49

Span 2

Location	Allowable	Shear	Rating Factors Bending		Shear	
			Inv.	Oper.	Inv.	Oper.
0.00	35105. B	1274.84	2.88B	2.88	7.32	7.32
21.00L	35322. B	923.38	4.50B	4.50	5.70	5.70
21.00R	35322. B	922.51	2.88B	2.88	5.69	5.69
25.00	35208. B	902.13	3.20B	3.20	5.72	5.72
50.00	35258. B	789.55	5.15B	5.15	6.20	6.20
75.00	36000. B	588.76	4.32B	4.32	5.94	5.94
76.00L	36000. B	587.44	4.21B	4.21	6.00	6.00
76.00R	36000. B	587.20	4.48B	4.48	6.00	6.00
99.50L	36000. B	506.39	2.80B	2.80	6.86	6.86
99.50R	36000. B	506.31	3.22B	3.22	6.86	6.86
100.00	36000. B	506.10	3.20B	3.20	6.90	6.90
125.00L	36000. B	502.51	2.74B	2.74	11.03	11.03
125.00R	36000. B	502.55	2.74B	2.74	11.03	11.03
150.00	36000. B	521.48	3.22B	3.22	7.74	7.74
174.00L	36000. B	626.29	4.46B	4.46	6.92	6.92
174.00R	36000. B	626.70	4.20B	4.20	6.93	6.93

150.50L	36000. B	522.06	3.24B	3.24	7.69	7.69
150.50R	36000. B	522.30	2.82B	2.82	7.70	7.70
175.00	36000. B	628.95	4.31B	4.31	6.86	6.86
200.00	35224. B	865.31	5.19B	5.19	7.25	7.25
225.00	31022. B	1008.02	2.92B	2.92	6.82	6.82
229.00L	30721. B	1033.20	2.63B	2.63	6.78	6.78
229.00R	30708. B	1034.27	4.07B	4.07	6.79	6.79
250.00	31030. B	1415.29	2.96B	2.96	8.39	8.39

Span 3

Location	Allowable	Shear	Rating Factors Bending		Shear	
			Inv.	Oper.	Inv.	Oper.
0.00	31030. B	1416.13	2.96B	2.96	8.49	8.49
18.33	32968. B	1199.86	3.97B	3.97	7.80	7.80
28.00L	32611. B	765.29	4.01B	4.01	4.71	4.71
28.00R	32624. B	763.96	2.58B	2.58	4.70	4.70
36.67	32498. B	695.47	2.87B	2.87	4.52	4.52
55.00	35228. B	600.54	4.19B	4.19	4.88	4.88
73.33	36000. B	514.98	3.90B	3.90	5.01	5.01
89.33L	36000. B	504.07	2.83B	2.83	6.70	6.70
89.33R	36000. B	503.96	3.03B	3.03	6.70	6.70
91.67	36000. B	502.42	2.92B	2.92	6.99	6.99
110.00	36000. B	435.91	2.38B	2.38	8.33	8.33
128.33	36000. B	476.29	2.35B	2.35	7.62	7.62
145.33L	36000. B	463.01	2.86B	2.86	5.18	5.18
145.33R	36000. B	462.88	2.38B	2.38	5.18	5.18
146.67	36000. B	461.91	2.45B	2.45	5.07	5.07
165.00	36000. B	484.57	4.64B	4.64	4.49	4.49
183.33	36000. B	338.37	>999.00B	>999.00	2.24	2.24

Service II
(Assumes permit truck is only loading in all lanes)

Span 1

Location	Allowable Stress	Rating Factors Bending	
		Inv.	Oper.
0.00	34200. S	> 999.00 B	>999.00
18.33	34200. S	6.41 B	6.41
36.67	34200. S	3.49 B	3.49
38.00L	34200. S	3.40 B	3.40
38.00R	34200. S	4.01 B	4.01
55.00	34200. S	3.29 B	3.29
73.33	34200. S	3.24 B	3.24
91.67	34200. S	3.81 B	3.81
94.00L	34200. S	3.96 B	3.96
94.00R	34200. S	3.71 B	3.71
110.00	34200. S	5.06 B	5.06
128.33	34200. S	6.71 B	6.71
146.67	34200. S	6.14 B	6.14
155.33L	34200. S	5.97 B	5.97
155.33R	34200. S	8.21 B	8.21
165.00	34200. S	8.61 B	8.61
183.33	34200. S	4.95 B	4.95

Span 2

Location	Allowable Stress	Rating Factors Bending	
		Inv.	Oper.

0.00	34200. S	4.95	B	4.95
21.00L	34200. S	7.09	B	7.09
21.00R	34200. S	4.91	B	4.91
25.00	34200. S	5.35	B	5.35
50.00	34200. S	7.86	B	7.86
75.00	34200. S	5.65	B	5.65
76.00L	34200. S	5.51	B	5.51
76.00R	34200. S	5.85	B	5.85
99.50L	34200. S	3.81	B	3.81
99.50R	34200. S	4.35	B	4.35
100.00	34200. S	4.32	B	4.32
125.00L	34200. S	3.75	B	3.75
125.00R	34200. S	3.75	B	3.75
150.00	34200. S	4.34	B	4.34
174.00L	34200. S	5.83	B	5.83
174.00R	34200. S	5.50	B	5.50
150.50L	34200. S	4.37	B	4.37
150.50R	34200. S	3.83	B	3.83
175.00	34200. S	5.63	B	5.63
200.00	34200. S	7.89	B	7.89
225.00	34200. S	5.87	B	5.87
229.00L	34200. S	5.54	B	5.54
229.00R	34200. S	7.76	B	7.76
250.00	34200. S	6.19	B	6.19

Span 3

Location	Allowable Stress	Rating Factors Bending Inv.	Oper.
0.00	34200. S	6.19 B	6.19
18.33	34200. S	7.01 B	7.01
28.00L	34200. S	6.93 B	6.93
28.00R	34200. S	4.84 B	4.84
36.67	34200. S	5.16 B	5.16
55.00	34200. S	6.30 B	6.30
73.33	34200. S	5.08 B	5.08
89.33L	34200. S	3.80 B	3.80
89.33R	34200. S	4.06 B	4.06
91.67	34200. S	3.93 B	3.93
110.00	34200. S	3.29 B	3.29
128.33	34200. S	3.27 B	3.27
145.33L	34200. S	3.94 B	3.94
145.33R	34200. S	3.33 B	3.33
146.67	34200. S	3.42 B	3.42
165.00	34200. S	6.23 B	6.23
183.33	34200. S	> 999.00 B	>999.00

****
Minimum rating is 2.17 at location 0.00 in span 1.
****

Classified at Strength II because of description
in 3.4.1 for other than HL93 vehicle.

Rating Codes:
T - Top steel governs
B - Bottom steel governs
C - Concrete governs
R - Rebar governs
V - Shear governs
S - Serviceability governs

Mom Strength Codes:
C - Compact
B - Braced non-compact
U - Unbraced non-compact
T - Transition between compact and braced non-compact
S - Serviceability

Noncompact shapes ratings based on stress, as

Fb - factored dead load stress

$$IR = \frac{\text{PBETA}}{\text{factored LL+I stress}}$$

Inventory rating for Strength II if only permit loading on the system uses PBETA. Operating rating uses IR(PBETA/1.35).

2.3. Load Rating Approach Spans (Conspan)

2.3.1. 70ft Span (42” Barrier)

PROJECT DATA

Project:	I-295 Over St. Johns River, 70' Span (NB Type P), Widened
Designer:	HL
Date:	Mar/27/2015
Checked By:	KZ
Date Checked:	Mar/27/2015
User job number:	
State:	FL, State Job #:
State Specification:	Florida
Design Code:	AASHTO LRFD - [6th Edition, 2012]
Units:	US
Span Type:	Simple Span
Flared Girder:	No
Comments:	LRFR Load rating of 70' span for Beams 1 & 2, Widened Bridge Revised run for 42" F-shape barriers
File Name:	C:\Users\21682\Desktop\Projects\Buckman Bridge\Load Rating\Concrete\Sp70 Wid_Rev1.csl

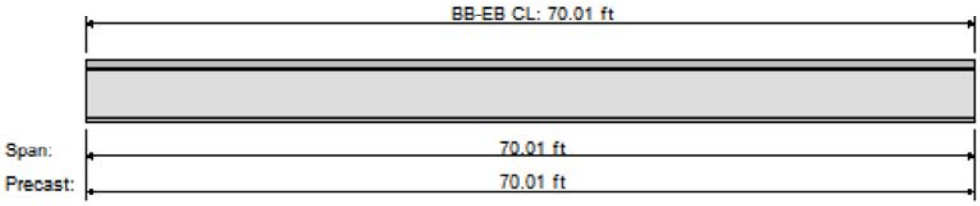
GEOMETRY DATA

BRIDGE LAYOUT

Overall Width (ft)	71.500
Left curb (ft)	1.750
Right curb (ft)	1.750
Curb-to-curb width (ft)	68.000
Number of spans	1
Number of lanes	5
Lane width (ft)	12.000
Eff Deck thick (in)	8.000
Sacrificial thick (in)	0.000
Haunch thickness (in)	2.000
Haunch width (in)	20.000
Bridge c/s,MI(Ixx) (in4)	4128988.25

SPAN DATA

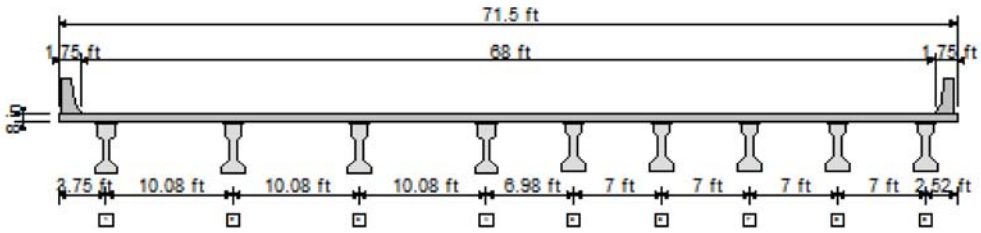
Precast length,	ft =	70.010
Bearing-to-bearing,	ft =	69.010
Release span,	ft =	70.010



BR01 - Bridge elevation

BEAM DATA

No	ID	Loc-prev ft	Area in2	MI(Ixx) in4	Height in	Yb in	B-topg in	B-trib ft
1	AASHTO-III (MOD)	3.750	607.5	155833.0	48.00	22.34	16.00	8.792
2	AASHTO-III (MOD)	10.083	607.5	155833.0	48.00	22.34	16.00	10.083
3	AASHTO-III (MOD)	10.083	607.5	155833.0	48.00	22.34	16.00	10.083
4	AASHTO-III (MOD)	10.083	607.5	155833.0	48.00	22.34	16.00	8.531
5	AASHTO-III (EXST)	6.979	560.0	125389.0	45.00	20.27	16.00	6.990
6	AASHTO-III (EXST)	7.000	560.0	125389.0	45.00	20.27	16.00	7.000
7	AASHTO-III (EXST)	7.000	560.0	125389.0	45.00	20.27	16.00	7.000
8	AASHTO-III (EXST)	7.000	560.0	125389.0	45.00	20.27	16.00	7.000
9	AASHTO-III (EXST)	7.000	560.0	125389.0	45.00	20.27	16.00	6.021



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)	5.000*	5.000	4.500
Wc (pcf)	150.000	150.000	150.000
Ec (ksi)	3858.140	3858.140	3660.160
K1	0.900	0.900	0.900
Thermal coeff.(1/°F)	0.00000600		

* FDOT section 4.3.1, C4 requires that concrete strength at release be lesser than 0.8 * f'c or 6.0 ksi.

STRAND AND REBAR PROPERTIES

PRESTRESSED STEEL:
1/2-270K-SP, Low relaxation strands
Straight Pattern
Strand Diameter = 0.500 in
Tensile Strength(fpu) = 270.0 ksi
Use transformed strand and rebar: Strand Only

REINFORCING STEEL:
Tension/Shear steel: fy = 60.0 ksi Es = 29000 ksi

LOADS DATA

Loads generated using Permanent Load Wizard: NO
DEAD LOADS ON PRECAST
UNITS: (Point: kips, Location: ft, Line: klf, Trapez: klf)

Span	Beam	DC/DW	Type	Mag.1	Loc.1	Mag.2	Loc.2	Description
1	1	DC	Line	0.202	0.000	0.202	69.010	Stay-in-Place Deck Forms
1	2	DC	Line	0.202	0.000	0.202	69.010	Stay-in-Place Deck Forms
1	3	DC	Line	0.202	0.000	0.202	69.010	Stay-in-Place Deck Forms
1	4	DC	Line	0.202	0.000	0.202	69.010	Stay-in-Place Deck Forms

DIAPHRAGM LOADS

Span	Beam	Load (kips)	Location (ft)
1	5	1.000	35.000
1	6	2.000	35.000
1	7	2.000	35.000
1	8	2.000	35.000
1	9	1.000	35.000

DEAD LOADS ON COMPOSITE
UNITS: (Point: kips, Location: ft, Line: klf, Trapez: klf, Area: ksf, Width: ft)

Span	DC/DW	Type	Mag.1	Loc.1/Width	Mag.2	Loc.2	Description
1	DC	Line	0.625	0.000	0.625	69.010	Left Curb Weight (42" F-Shape)
1	DC	Line	0.625	0.000	0.625	69.010	Right Curb Weight (42" F-Shape

TEMPERATURE LOADS - NONE

LIVE LOADS
Live load deflection: not included.

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

Pedestrian Load - NONE

LIVE LOADS USED

LIVE LOAD LIBRARY: default.cs3

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	-	-

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

1 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

2 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

Legal Rating Loads:

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

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

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

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

2 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

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
Include Rigid Cross Section Assumption (Art. 4.6.2.2.2d):	YES
ADTT (Average Daily Truck Traffic) :	10000
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	-
Service III:	0.80	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

PROJECT DESIGN PARAMETERS

MULTIPLIERS:

Trans len mult:	Bonded	1.00
	Debonded	1.00
Dev len mult:	Bonded	1.60
	Debonded	2.00

Camber & Deflection Multiplier (PCI ref.)

	Erection	Final
Prestress:	1.80	2.20
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, Mr-prvd computed:	AASHTO equations
Horizontal Shear, Beam and Slab effects in Vu:	INCLUDED

STRESS LIMITS (Art. 5.9.4):

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

		PRECAST	
Strength		5.00*	ksi
Elasticity		3858.1	ksi
Max comp		3.00	ksi
Outer	15.00 %		
Max tens		-0.21	ksi
Max tens,	w/reinf	-0.85	ksi
Center	70.00 %		
Max tens		-0.21	ksi
Max tens,	w/reinf	-0.42	ksi

* FDOT section 4.3.1, C4 requires that concrete strength at release be lesser than 0.8 * f'c or 6.0 ksi.

STRESS LIMITS AT FINAL AFTER LOSSES:

	PRECAST		DECK	
Strength	5.00	ksi	4.50	ksi
Elasticity	3858.14	ksi	3660.16	ksi

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

	PRECAST		DECK	
Max comp	3.00	ksi	2.70	ksi

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

	PRECAST		DECK	
Max comp	2.25	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	2.00	ksi	-	ksi

SERVICE III (Tension):

	PRECAST		DECK	
Max tens	-0.42	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.5.9.5.3)
Days to release = 0.75
Rel. Humid.(RH) = 75.0 %

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	10000
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	1.80
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	1.60

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 = 3.00	0.09 x sqrt(f'c) = 0.21	0.90 x f'y = 218.70
Design Operating	0.60 x f'c = 3.00	0.24 x sqrt(f'c) = 0.53	0.90 x f'y = 218.70
Legal	0.60 x f'c = 3.00	0.24 x sqrt(f'c) = 0.53	-
Permit	0.60 x f'c = 3.00	0.24 x sqrt(f'c) = 0.53	0.90 x f'y = 218.70

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

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	1/2-270K-SP	5.00	5.00	4.50
Span:1, Beam:2	1/2-270K-SP	5.00	5.00	4.50
Span:1, Beam:3	1/2-270K-SP	5.00	5.00	4.50
Span:1, Beam:4	1/2-270K-SP	5.00	5.00	4.50
Span:1, Beam:5	1/2-270K-SP	5.00	5.00	4.50
Span:1, Beam:6	1/2-270K-SP	5.00	5.00	4.50
Span:1, Beam:7	1/2-270K-SP	5.00	5.00	4.50
Span:1, Beam:8	1/2-270K-SP	5.00	5.00	4.50
Span:1, Beam:9	1/2-270K-SP	5.00	5.00	4.50

Span:1, Beam:1

PRESTRESSED STEEL:
26 strands, 1/2-270K-SP, Low relaxation strands
Straight Pattern

END PATTERN (Ycg = 5.15 in):

9 @ 3.000 in	9 @ 5.000 in	5 @ 7.000 in	3 @ 9.000 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	6.00	0.2083	7.2083	No
2	US#4[M13]	60.0	0.40	5.50	7.2083	15.0000	No
2	US#4[M13]	60.0	0.40	12.00	15.0000	34.0000	No
2	US#4[M13]	60.0	0.40	12.00	34.0000	36.0104	No
2	US#4[M13]	60.0	0.40	12.00	36.0104	55.0104	No
2	US#4[M13]	60.0	0.40	5.50	55.0104	62.8021	No
2	US#4[M13]	60.0	0.40	6.00	62.8021	69.8021	No

Span:1, Beam:2

PRESTRESSED STEEL:
26 strands, 1/2-270K-SP, Low relaxation strands
Straight Pattern

END PATTERN (Ycg = 5.15 in):

9 @ 3.000 in	9 @ 5.000 in	5 @ 7.000 in	3 @ 9.000 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	6.00	0.2083	7.2083	No
2	US#4[M13]	60.0	0.40	5.50	7.2083	15.0000	No
2	US#4[M13]	60.0	0.40	12.00	15.0000	34.0000	No
2	US#4[M13]	60.0	0.40	12.00	34.0000	36.0104	No
2	US#4[M13]	60.0	0.40	12.00	36.0104	55.0104	No
2	US#4[M13]	60.0	0.40	5.50	55.0104	62.8021	No
2	US#4[M13]	60.0	0.40	6.00	62.8021	69.8021	No

Span:1, Beam:3

PRESTRESSED STEEL:
0 strands, 1/2-270K-SP, Low relaxation strands
Straight Pattern

REINFORCING STEEL:

Tension	/Shear	steel:
fy	60.0	ksi
Es	29000	ksi

Span:1, Beam:4

PRESTRESSED STEEL:
26 strands, 1/2-270K-SP, Low relaxation strands
Straight Pattern

END PATTERN (Ycg = 5.15 in):

9 @ 3.000 in	9 @ 5.000 in	5 @ 7.000 in	3 @ 9.000 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	6.00	0.2083	7.2083	No
2	US#4[M13]	60.0	0.40	5.50	7.2083	15.0000	No
2	US#4[M13]	60.0	0.40	12.00	15.0000	34.0000	No
2	US#4[M13]	60.0	0.40	12.00	34.0000	36.0104	No
2	US#4[M13]	60.0	0.40	12.00	36.0104	55.0104	No
2	US#4[M13]	60.0	0.40	5.50	55.0104	62.8021	No
2	US#4[M13]	60.0	0.40	6.00	62.8021	69.8021	No

Span:1, Beam:5

PRESTRESSED STEEL:
0 strands, 1/2-270K-SP, Low relaxation strands
Straight Pattern

REINFORCING STEEL:

Tension	/Shear	steel:
fy	60.0	ksi
Es	29000	ksi

Span:1, Beam:6

PRESTRESSED STEEL:
0 strands, 1/2-270K-SP, Low relaxation strands

Straight Pattern

REINFORCING STEEL:

Tension	/Shear	steel:
fy	60.0	ksi
Es	29000	ksi

Span:1, Beam:7

PRESTRESSED STEEL:
0 strands, 1/2-270K-SP, Low relaxation strands
Straight Pattern

REINFORCING STEEL:

Tension	/Shear	steel:
fy	60.0	ksi
Es	29000	ksi

Span:1, Beam:8

PRESTRESSED STEEL:
0 strands, 1/2-270K-SP, Low relaxation strands
Straight Pattern

REINFORCING STEEL:

Tension	/Shear	steel:
fy	60.0	ksi
Es	29000	ksi

Span:1, Beam:9

PRESTRESSED STEEL:
0 strands, 1/2-270K-SP, Low relaxation strands
Straight Pattern

REINFORCING STEEL:

Tension	/Shear	steel:
fy	60.0	ksi
Es	29000	ksi

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	Shear Dim	Contro Span/E
Strength I (Inv)	HL93 Design Load	-	1.75	1.25	1.50	0.84	1.44	-	0.5L	34.51	1/1	0.97	1.75	-	0.3L	20.50	1/2
Strength I (Op)	HL93 Design Load	-	1.35	1.25	1.50	0.84	1.86	-	0.5L	34.51	1/1	0.97	2.65	-	Critical	4.34	1/2
Service III (Inv)	HL93 Design Load	-	0.80	1.00	1.00	0.83	1.34	-	0.5L	34.51	1/2	-	-	-	-	-	-
Service III (Op)	HL93 Design Load	-	0.80	1.00	1.00	0.83	1.67	-	0.5L	34.51	1/2	-	-	-	-	-	-

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 Location	Shear Dim
1	1	Strength I (Inv)	HL93 Design Load	-	1.75	1.25	1.50	0.84	1.44	-	0.5L	34.51	0.84	2.13	-	0.3L	20.50
1	1	Strength I (Op)	HL93 Design Load	-	1.35	1.25	1.50	0.84	1.86	-	0.5L	34.51	0.84	3.09	-	Critical	64.68
1	1	Service III (Inv)	HL93 Design Load	-	0.80	1.00	1.00	0.84	1.41	-	0.5L	34.51	-	-	-	-	-
1	1	Service III (Op)	HL93 Design Load	-	0.80	1.00	1.00	0.84	1.74	-	0.5L	34.51	-	-	-	-	-
1	2	Strength I (Inv)	HL93 Design Load	-	1.75	1.25	1.50	0.83	1.44	-	0.5L	34.51	0.97	1.75	-	0.3L	20.50
1	2	Strength I (Op)	HL93 Design Load	-	1.35	1.25	1.50	0.83	1.86	-	0.5L	34.51	0.97	2.65	-	Critical	4.34
1	2	Service III (Inv)	HL93 Design Load	-	0.80	1.00	1.00	0.83	1.34	-	0.5L	34.51	-	-	-	-	-
1	2	Service III (Op)	HL93 Design Load	-	0.80	1.00	1.00	0.83	1.67	-	0.5L	34.51	-	-	-	-	-
1	4	Strength I (Inv)	HL93 Design Load	-	1.75	1.25	1.50	0.73	1.66	-	0.5L	34.51	0.86	2.33	-	0.7L	48.51
1	4	Strength I (Op)	HL93 Design Load	-	1.35	1.25	1.50	0.73	2.15	-	0.5L	34.51	0.86	3.02	-	Critical	64.68
1	4	Service III (Inv)	HL93 Design Load	-	0.80	1.00	1.00	0.73	1.65	-	0.5L	34.51	-	-	-	-	-
1	4	Service III (Op)	HL93 Design Load	-	0.80	1.00	1.00	0.73	2.02	-	0.5L	34.51	-	-	-	-	-

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	Shear Dim	Con Spa
Strength I	C5 Truck	40.00	1.80	1.25	1.50	0.84	1.80	71.86	0.5L	34.51	1/1	0.97	2.62	104.69	0.7L	48.51	1/2
Strength I	ST5 Truck	40.00	1.80	1.25	1.50	0.84	2.18	87.08	0.5L	34.51	1/1	0.97	2.78	111.33	Critical	64.67	1/2
Strength I	SU4 Truck	35.00	1.80	1.25	1.50	0.84	1.68	58.90	0.5L	34.51	1/1	0.97	2.30	80.44	0.3L	20.50	1/2
Service III	C5 Truck	40.00	0.80	1.00	1.00	0.83	2.15	85.86	0.5L	34.51	1/2	-	-	-	-	-	-
Service III	ST5 Truck	40.00	0.80	1.00	1.00	0.83	2.60	104.04	0.5L	34.51	1/2	-	-	-	-	-	-
Service III	SU4 Truck	35.00	0.80	1.00	1.00	0.83	2.01	70.37	0.5L	34.51	1/2	-	-	-	-	-	-

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	Shear Location	Shear Dim
1	1	Strength I	C5 Truck	40.00	1.80	1.25	1.50	0.84	1.80	71.86	0.5L	34.51	0.84	3.05	122.03	0.7L	48.51
1	1	Strength I	ST5 Truck	40.00	1.80	1.25	1.50	0.84	2.18	87.08	0.5L	34.51	0.84	3.24	129.77	Critical	4.33
1	1	Strength I	SU4 Truck	35.00	1.80	1.25	1.50	0.84	1.68	58.90	0.5L	34.51	0.84	2.69	94.22	0.7L	48.51
1	1	Service III	C5 Truck	40.00	0.80	1.00	1.00	0.84	2.23	89.27	0.5L	34.51	-	-	-	-	-
1	1	Service III	ST5 Truck	40.00	0.80	1.00	1.00	0.84	2.70	108.18	0.5L	34.51	-	-	-	-	-
1	1	Service III	SU4 Truck	35.00	0.80	1.00	1.00	0.84	2.09	73.17	0.5L	34.51	-	-	-	-	-
1	2	Strength I	C5 Truck	40.00	1.80	1.25	1.50	0.83	1.80	71.89	0.5L	34.51	0.97	2.62	104.69	0.7L	48.51
1	2	Strength I	ST5 Truck	40.00	1.80	1.25	1.50	0.83	2.18	87.11	0.5L	34.51	0.97	2.78	111.33	Critical	64.67
1	2	Strength I	SU4 Truck	35.00	1.80	1.25	1.50	0.83	1.68	58.92	0.5L	34.51	0.97	2.30	80.44	0.3L	20.50
1	2	Service III	C5 Truck	40.00	0.80	1.00	1.00	0.83	2.15	85.86	0.5L	34.51	-	-	-	-	-
1	2	Service III	ST5 Truck	40.00	0.80	1.00	1.00	0.83	2.60	104.04	0.5L	34.51	-	-	-	-	-
1	2	Service III	SU4 Truck	35.00	0.80	1.00	1.00	0.83	2.01	70.37	0.5L	34.51	-	-	-	-	-
1	4	Strength I	C5 Truck	40.00	1.80	1.25	1.50	0.73	2.07	82.99	0.5L	34.51	0.86	2.99	119.73	Critical	64.68
1	4	Strength I	ST5 Truck	40.00	1.80	1.25	1.50	0.73	2.51	100.57	0.5L	34.51	0.86	3.18	127.00	Critical	64.68
1	4	Strength I	SU4 Truck	35.00	1.80	1.25	1.50	0.73	1.94	68.02	0.5L	34.51	0.86	2.65	92.81	0.7L	48.51
1	4	Service III	C5 Truck	40.00	0.80	1.00	1.00	0.73	2.60	103.84	0.5L	34.51	-	-	-	-	-
1	4	Service III	ST5 Truck	40.00	0.80	1.00	1.00	0.73	3.15	125.84	0.5L	34.51	-	-	-	-	-
1	4	Service III	SU4 Truck	35.00	0.80	1.00	1.00	0.73	2.43	85.11	0.5L	34.51	-	-	-	-	-

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	Shear Location	Shear Dim	Cont Span
Strength II	FL120	60.00	1.60	1.25	1.50	0.83	1.22	73.48	0.5L	34.51	1/2	0.97	1.14	68.50	0.6L	41.51	1/2
Service I	FL120	60.00	1.00	1.00	1.00	0.82	5.60	335.81	0.5L	34.51	1/1	-	-	-	-	-	-

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	Shear Location	Shear Dim
1	1	Strength II	FL120	60.00	1.60	1.25	1.50	0.82	1.26	75.84	0.5L	34.51	0.78	1.46	87.32	0.6L	41.51
1	1	Service I	FL120	60.00	1.00	1.00	1.00	0.82	5.60	335.81	0.5L	34.51	-	-	-	-	-
1	2	Strength II	FL120	60.00	1.60	1.25	1.50	0.83	1.22	73.48	0.5L	34.51	0.97	1.14	68.50	0.6L	41.51
1	2	Service I	FL120	60.00	1.00	1.00	1.00	0.83	6.26	375.86	0.5L	34.51	-	-	-	-	-
1	4	Strength II	FL120	60.00	1.60	1.25	1.50	0.73	1.41	84.83	0.5L	34.51	0.86	1.46	87.72	0.3L	20.50
1	4	Service I	FL120	60.00	1.00	1.00	1.00	0.73	6.31	378.44	0.5L	34.51	-	-	-	-	-

2.3.2. 92ft Span (42” Barrier)

PROJECT DATA

Project:	I-295 Over St. Johns River, 92' Span (Type H Units) Widening Bridge
Designer:	HL
Date:	Mar/27/2015
Checked By:	KZ
Date Checked:	Mar/27/2015
User job number:	
State:	FL, State Job #:
State Specification:	Florida
Design Code:	AASHTO LRFD - [6th Edition, 2012]
Units:	US
Span Type:	Simple Span
Flared Girder:	No
Comments:	LRFR Load rating of 92' span for Beams 10 & 11, Widened Bridge Revised run for 42" F-shape barriers
File Name:	C:\Users\21682\Desktop\Projects\Buckman Bridge\Load Rating\Concrete\Sp92 Wid_Rev1.csl

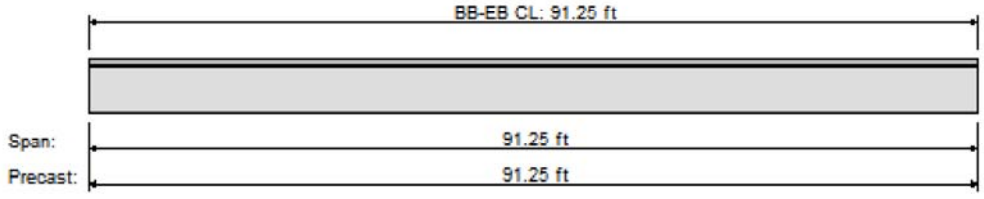
GEOMETRY DATA

BRIDGE LAYOUT

Overall Width (ft)	71.500
Left curb (ft)	1.750
Right curb (ft)	1.750
Curb-to-curb width (ft)	68.000
Number of spans	1
Number of lanes	5
Lane width (ft)	12.000
Eff Deck thick (in)	8.000
Sacrificial thick (in)	0.000
Haunch thickness (in)	2.000
Haunch width (in)	20.000
Bridge c/s,MI(Ixx) (in4)	7064670.00

SPAN DATA

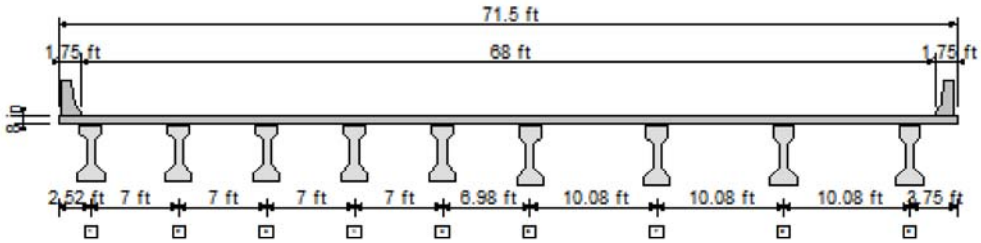
Precast length,	ft =	91.250
Bearing-to-bearing,	ft =	90.167
Release span,	ft =	91.250



BR01 - Bridge elevation

BEAM DATA

No	ID	Loc-prev ft	Area in2	MI(Ixx) in4	Height in	Yb in	B-topg in	B-trib ft
1	AASHTO-IV Exst	2.520	789.0	260740.0	54.00	24.73	20.00	6.020
2	AASHTO-IV Exst	7.000	789.0	260740.0	54.00	24.73	20.00	7.000
3	AASHTO-IV Exst	7.000	789.0	260740.0	54.00	24.73	20.00	7.000
4	AASHTO-IV Exst	7.000	789.0	260740.0	54.00	24.73	20.00	7.000
5	AASHTO-IV Exst	7.000	789.0	260740.0	54.00	24.73	20.00	6.990
6	AASHTO-IV (MOD)	6.979	869.0	331853.0	58.00	27.61	20.00	8.531
7	AASHTO-IV (MOD)	10.083	869.0	331853.0	58.00	27.61	20.00	10.083
8	AASHTO-IV (MOD)	10.083	869.0	331853.0	58.00	27.61	20.00	10.083
9	AASHTO-IV (MOD)	10.083	869.0	331853.0	58.00	27.61	20.00	8.793



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)	5.500*	5.500	4.500
Wc (pcf)	150.000	150.000	150.000
Ec (ksi)	4046.450	4046.450	3660.160
K1	0.900	0.900	0.900
Thermal coeff.(1/°F)	0.00000600		

* FDOT section 4.3.1, C4 requires that concrete strength at release be lesser than 0.8 * f'c or 6.0 ksi.

STRAND AND REBAR PROPERTIES

PRESTRESSED STEEL:
1/2-270K-SP, Low relaxation strands
Straight Pattern
Strand Diameter = 0.500 in
Tensile Strength(fpu) = 270.0 ksi
Use transformed strand and rebar: Strand Only

REINFORCING STEEL:
Tension/Shear steel: fy = 60.0 ksi Es = 29000 ksi

LOADS DATA

Loads generated using Permanent Load Wizard: NO
DEAD LOADS ON PRECAST
UNITS: (Point: kips, Location: ft, Line: klf, Trapez: klf)

Span	Beam	DC/DW	Type	Mag.1	Loc.1	Mag.2	Loc.2	Description
1	1	DC	Line	0.202	0.000	0.202	90.167	Stay-in-Place Deck Forms
1	2	DC	Line	0.202	0.000	0.202	90.167	Stay-in-Place Deck Forms
1	3	DC	Line	0.202	0.000	0.202	90.167	Stay-in-Place Deck Forms
1	4	DC	Line	0.202	0.000	0.202	90.167	Stay-in-Place Deck Forms
1	5	DC	Line	0.202	0.000	0.202	90.167	Stay-in-Place Deck Forms
1	6	DC	Line	0.202	0.000	0.202	90.167	Stay-in-Place Deck Forms
1	7	DC	Line	0.202	0.000	0.202	90.167	Stay-in-Place Deck Forms
1	8	DC	Line	0.202	0.000	0.202	90.167	Stay-in-Place Deck Forms
1	9	DC	Line	0.202	0.000	0.202	90.167	Stay-in-Place Deck Forms

DIAPHRAGM LOADS

Span	Beam	Load (kips)	Location (ft)
1	1	1.000	45.083
1	2	2.000	45.083
1	3	2.000	45.083
1	4	2.000	45.083
1	5	1.000	45.083

DEAD LOADS ON COMPOSITE
UNITS: (Point: kips, Location: ft, Line: klf, Trapez: klf, Area: ksf, Width: ft)

Span	DC/DW	Type	Mag.1	Loc.1/Width	Mag.2	Loc.2	Description
1	DC	Line	0.625	0.000	0.625	90.167	Left Curb Weight (42")
1	DC	Line	0.625	0.000	0.625	90.167	Right Curb Weight (42")

TEMPERATURE LOADS - NONE

LIVE LOADS
Live load deflection: not included.

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

Pedestrian Load - NONE

LIVE LOADS USED

LIVE LOAD LIBRARY: default.cs3

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	-	-

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

1 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

2 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

Legal Rating Loads:

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

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

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

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

2 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

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
Include Rigid Cross Section Assumption (Art. 4.6.2.2.2d):	YES
ADTT (Average Daily Truck Traffic) :	10000
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	-
Service III:	0.80	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

PROJECT DESIGN PARAMETERS

MULTIPLIERS:

Trans len mult:	Bonded	1.00
	Debonded	1.00
Dev len mult:	Bonded	1.60
	Debonded	2.00

Camber & Deflection Multiplier (PCI ref.)

	Erection	Final
Prestress:	1.80	2.20
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, Mr-prvd computed:	AASHTO equations
Horizontal Shear, Beam and Slab effects in Vu:	INCLUDED

STRESS LIMITS (Art. 5.9.4):

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

		PRECAST	
Strength		5.50*	ksi
Elasticity		4046.4	ksi
Max comp		3.30	ksi
Outer	15.00 %		
Max tens		-0.22	ksi
Max tens,	w/reinf	-0.89	ksi
Center	70.00 %		
Max tens		-0.22	ksi
Max tens,	w/reinf	-0.44	ksi

* FDOT section 4.3.1, C4 requires that concrete strength at release be lesser than 0.8 * f'c or 6.0 ksi.

STRESS LIMITS AT FINAL AFTER LOSSES:

	PRECAST		DECK	
Strength	5.50	ksi	4.50	ksi
Elasticity	4046.45	ksi	3660.16	ksi

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

	PRECAST		DECK	
Max comp	3.30	ksi	2.70	ksi

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

	PRECAST		DECK	
Max comp	2.47	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	2.20	ksi	-	ksi

SERVICE III (Tension):

	PRECAST		DECK	
Max tens	-0.45	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.5.9.5.3)
Days to release = 0.75
Rel. Humid.(RH) = 75.0 %

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	10000
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	1.80
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	1.60

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 = 3.30	0.09 x sqrt(f'c) = 0.22	0.90 x f'y = 218.70
Design Operating	0.60 x f'c = 3.30	0.24 x sqrt(f'c) = 0.56	0.90 x f'y = 218.70
Legal	0.60 x f'c = 3.30	0.24 x sqrt(f'c) = 0.56	-
Permit	0.60 x f'c = 3.30	0.24 x sqrt(f'c) = 0.56	0.90 x f'y = 218.70

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

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	1/2-270K-SP	5.50	5.50	4.50
Span:1, Beam:2	1/2-270K-SP	5.50	5.50	4.50
Span:1, Beam:3	1/2-270K-SP	5.50	5.50	4.50
Span:1, Beam:4	1/2-270K-SP	5.50	5.50	4.50
Span:1, Beam:5	1/2-270K-SP	5.50	5.50	4.50
Span:1, Beam:6	1/2-270K-SP	5.50	5.50	4.50
Span:1, Beam:7	1/2-270K-SP	5.50	5.50	4.50
Span:1, Beam:8	1/2-270K-SP	5.50	5.50	4.50
Span:1, Beam:9	1/2-270K-SP	5.50	5.50	4.50

Span:1, Beam:1

PRESTRESSED STEEL:
0 strands, 1/2-270K-SP, Low relaxation strands
Straight Pattern

REINFORCING STEEL:

Tension	/Shear	steel:
fy	60.0	ksi
Es	29000	ksi

Span:1, Beam:2

PRESTRESSED STEEL:
0 strands, 1/2-270K-SP, Low relaxation strands
Straight Pattern

REINFORCING STEEL:

Tension	/Shear	steel:
fy	60.0	ksi
Es	29000	ksi

Span:1, Beam:3

PRESTRESSED STEEL:
0 strands, 1/2-270K-SP, Low relaxation strands
Straight Pattern

REINFORCING STEEL:

Tension	/Shear	steel:
fy	60.0	ksi
Es	29000	ksi

Span:1, Beam:4

PRESTRESSED STEEL:
0 strands, 1/2-270K-SP, Low relaxation strands
Straight Pattern

REINFORCING STEEL:

Tension	/Shear	steel:
fy	60.0	ksi
Es	29000	ksi

Span:1, Beam:5

PRESTRESSED STEEL:
0 strands, 1/2-270K-SP, Low relaxation strands
Straight Pattern

REINFORCING STEEL:

Tension	/Shear	steel:
fy	60.0	ksi
Es	29000	ksi

Span:1, Beam:6

PRESTRESSED STEEL:
38 strands, 1/2-270K-SP, Low relaxation strands

Straight Pattern

END PATTERN (Ycg = 5.63 in):

11 @ 3.000 in	11 @ 5.000 in	9 @ 7.000 in	7 @ 9.000 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	6.00	0.2083	9.7083	No
2	US#4[M13]	60.0	0.40	7.50	9.7083	17.2083	No
2	US#4[M13]	60.0	0.40	12.00	17.2083	43.2083	No
2	US#4[M13]	60.0	0.40	8.50	43.2083	48.2500	No
2	US#4[M13]	60.0	0.40	12.00	48.2500	74.2500	No
2	US#4[M13]	60.0	0.40	7.50	74.2500	81.7500	No
2	US#4[M13]	60.0	0.40	6.00	81.7500	91.2500	No

Span:1, Beam:7

PRESTRESSED STEEL:
0 strands, 1/2-270K-SP, Low relaxation strands
Straight Pattern

REINFORCING STEEL:

Tension	/Shear	steel:
fy	60.0	ksi
Es	29000	ksi

Span:1, Beam:8

PRESTRESSED STEEL:
38 strands, 1/2-270K-SP, Low relaxation strands
Straight Pattern

END PATTERN (Ycg = 5.63 in):

11 @ 3.000 in	11 @ 5.000 in	9 @ 7.000 in	7 @ 9.000 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	6.00	0.2083	9.7083	No
2	US#4[M13]	60.0	0.40	7.50	9.7083	17.2083	No
2	US#4[M13]	60.0	0.40	12.00	17.2083	43.2083	No
2	US#4[M13]	60.0	0.40	8.50	43.2083	48.2500	No
2	US#4[M13]	60.0	0.40	12.00	48.2500	74.2500	No
2	US#4[M13]	60.0	0.40	7.50	74.2500	81.7500	No
2	US#4[M13]	60.0	0.40	6.00	81.7500	91.2500	No

Span:1, Beam:9

PRESTRESSED STEEL:
38 strands, 1/2-270K-SP, Low relaxation strands
Straight Pattern

END PATTERN (Ycg = 5.63 in):

11 @ 3.000 in	11 @ 5.000 in	9 @ 7.000 in	7 @ 9.000 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	6.00	0.2083	9.7083	No
2	US#4[M13]	60.0	0.40	7.50	9.7083	17.2083	No
2	US#4[M13]	60.0	0.40	12.00	17.2083	43.2083	No
2	US#4[M13]	60.0	0.40	8.50	43.2083	48.0417	No
2	US#4[M13]	60.0	0.40	12.00	48.0417	74.0417	No
2	US#4[M13]	60.0	0.40	7.50	74.0417	81.5417	No
2	US#4[M13]	60.0	0.40	6.00	81.5417	91.0417	No

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	Shear Dim	Contro Span/E
Strength I (Inv)	HL93 Design Load	-	1.75	1.25	1.50	0.84	1.58	-	0.5L	45.08	1/9	0.97	2.20	-	0.8L	72.46	1/8
Strength I (Op)	HL93 Design Load	-	1.35	1.25	1.50	0.84	2.04	-	0.5L	45.08	1/9	0.97	2.90	-	0.8L	72.46	1/8
Service III (Inv)	HL93 Design Load	-	0.80	1.00	1.00	0.82	1.40	-	0.5L	45.08	1/8	-	-	-	-	-	-
Service III (Op)	HL93 Design Load	-	0.80	1.00	1.00	0.82	1.78	-	0.5L	45.08	1/8	-	-	-	-	-	-

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 Location	Shear Dim
1	6	Strength I (Inv)	HL93 Design Load	-	1.75	1.25	1.50	0.73	1.83	-	0.5L	45.08	0.86	2.54	-	0.8L	72.46
1	6	Strength I (Op)	HL93 Design Load	-	1.35	1.25	1.50	0.73	2.38	-	0.5L	45.08	0.86	3.34	-	0.2L	17.71
1	6	Service III (Inv)	HL93 Design Load	-	0.80	1.00	1.00	0.73	1.73	-	0.5L	45.08	-	-	-	-	-
1	6	Service III (Op)	HL93 Design Load	-	0.80	1.00	1.00	0.73	2.15	-	0.5L	45.08	-	-	-	-	-
1	8	Strength I (Inv)	HL93 Design Load	-	1.75	1.25	1.50	0.82	1.59	-	0.5L	45.08	0.97	2.20	-	0.8L	72.46
1	8	Strength I (Op)	HL93 Design Load	-	1.35	1.25	1.50	0.82	2.06	-	0.5L	45.08	0.97	2.90	-	0.8L	72.46
1	8	Service III (Inv)	HL93 Design Load	-	0.80	1.00	1.00	0.82	1.40	-	0.5L	45.08	-	-	-	-	-
1	8	Service III (Op)	HL93 Design Load	-	0.80	1.00	1.00	0.82	1.78	-	0.5L	45.08	-	-	-	-	-
1	9	Strength I (Inv)	HL93 Design Load	-	1.75	1.25	1.50	0.84	1.58	-	0.5L	45.08	0.84	2.58	-	0.8L	72.46
1	9	Strength I (Op)	HL93 Design Load	-	1.35	1.25	1.50	0.84	2.04	-	0.5L	45.08	0.84	3.39	-	0.8L	72.46
1	9	Service III (Inv)	HL93 Design Load	-	0.80	1.00	1.00	0.84	1.47	-	0.5L	45.08	-	-	-	-	-
1	9	Service III (Op)	HL93 Design Load	-	0.80	1.00	1.00	0.84	1.83	-	0.5L	45.08	-	-	-	-	-

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	Shear Dim	Con Spa
Strength I	C5 Truck	40.00	1.80	1.25	1.50	0.84	2.01	80.47	0.5L	45.08	1/9	0.97	2.85	114.12	0.8L	72.46	1/8
Strength I	ST5 Truck	40.00	1.80	1.25	1.50	0.84	2.32	92.64	0.5L	45.08	1/9	0.97	3.05	122.19	0.8L	72.46	1/8
Strength I	SU4 Truck	35.00	1.80	1.25	1.50	0.84	1.99	69.77	0.5L	45.08	1/9	0.97	2.73	95.72	0.8L	72.46	1/8
Service III	C5 Truck	40.00	0.80	1.00	1.00	0.82	2.34	93.48	0.5L	45.08	1/8	-	-	-	-	-	-
Service III	ST5 Truck	40.00	0.80	1.00	1.00	0.82	2.69	107.63	0.5L	45.08	1/8	-	-	-	-	-	-
Service III	SU4 Truck	35.00	0.80	1.00	1.00	0.82	2.32	81.06	0.5L	45.08	1/8	-	-	-	-	-	-

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	Shear Location	Shear Dim
1	6	Strength I	C5 Truck	40.00	1.80	1.25	1.50	0.73	2.34	93.70	0.5L	45.08	0.86	3.29	131.60	0.2L	17.71
1	6	Strength I	ST5 Truck	40.00	1.80	1.25	1.50	0.73	2.70	107.87	0.5L	45.08	0.86	3.52	140.90	0.8L	72.46
1	6	Strength I	SU4 Truck	35.00	1.80	1.25	1.50	0.73	2.32	81.24	0.5L	45.08	0.86	3.15	110.38	0.2L	17.71
1	6	Service III	C5 Truck	40.00	0.80	1.00	1.00	0.73	2.82	112.72	0.5L	45.08	-	-	-	-	-
1	6	Service III	ST5 Truck	40.00	0.80	1.00	1.00	0.73	3.24	129.78	0.5L	45.08	-	-	-	-	-
1	6	Service III	SU4 Truck	35.00	0.80	1.00	1.00	0.73	2.79	97.74	0.5L	45.08	-	-	-	-	-
1	8	Strength I	C5 Truck	40.00	1.80	1.25	1.50	0.82	2.03	81.26	0.5L	45.08	0.97	2.85	114.12	0.8L	72.46
1	8	Strength I	ST5 Truck	40.00	1.80	1.25	1.50	0.82	2.34	93.56	0.5L	45.08	0.97	3.05	122.19	0.8L	72.46
1	8	Strength I	SU4 Truck	35.00	1.80	1.25	1.50	0.82	2.01	70.46	0.5L	45.08	0.97	2.73	95.72	0.8L	72.46
1	8	Service III	C5 Truck	40.00	0.80	1.00	1.00	0.82	2.34	93.48	0.5L	45.08	-	-	-	-	-
1	8	Service III	ST5 Truck	40.00	0.80	1.00	1.00	0.82	2.69	107.63	0.5L	45.08	-	-	-	-	-
1	8	Service III	SU4 Truck	35.00	0.80	1.00	1.00	0.82	2.32	81.06	0.5L	45.08	-	-	-	-	-
1	9	Strength I	C5 Truck	40.00	1.80	1.25	1.50	0.84	2.01	80.47	0.5L	45.08	0.84	3.34	133.62	0.8L	72.46
1	9	Strength I	ST5 Truck	40.00	1.80	1.25	1.50	0.84	2.32	92.64	0.5L	45.08	0.84	3.58	143.10	0.8L	72.46
1	9	Strength I	SU4 Truck	35.00	1.80	1.25	1.50	0.84	1.99	69.77	0.5L	45.08	0.84	3.20	112.07	0.8L	72.46
1	9	Service III	C5 Truck	40.00	0.80	1.00	1.00	0.84	2.40	96.13	0.5L	45.08	-	-	-	-	-
1	9	Service III	ST5 Truck	40.00	0.80	1.00	1.00	0.84	2.77	110.68	0.5L	45.08	-	-	-	-	-
1	9	Service III	SU4 Truck	35.00	0.80	1.00	1.00	0.84	2.38	83.35	0.5L	45.08	-	-	-	-	-

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	Shear Location	Shear Dim	Cont Span
Strength II	FL120	60.00	1.60	1.25	1.50	0.82	1.42	85.43	0.5L	45.08	1/8	0.97	1.46	87.89	0.7L	63.33	1/8
Service I	FL120	60.00	1.00	1.00	1.00	0.81	4.38	262.65	0.5L	45.08	1/9	-	-	-	-	-	-

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	Shear Location	Shear Dim
1	6	Strength II	FL120	60.00	1.60	1.25	1.50	0.73	1.64	98.51	0.5L	45.08	0.86	2.11	126.41	0.8L	72.46
1	6	Service I	FL120	60.00	1.00	1.00	1.00	0.73	5.01	300.32	0.5L	45.08	-	-	-	-	-
1	8	Strength II	FL120	60.00	1.60	1.25	1.50	0.82	1.42	85.43	0.5L	45.08	0.97	1.46	87.89	0.7L	63.33
1	8	Service I	FL120	60.00	1.00	1.00	1.00	0.82	4.80	287.85	0.5L	45.08	-	-	-	-	-
1	9	Strength II	FL120	60.00	1.60	1.25	1.50	0.81	1.47	88.09	0.5L	45.08	0.78	1.90	114.13	0.7L	63.33
1	9	Service I	FL120	60.00	1.00	1.00	1.00	0.81	4.38	262.65	0.5L	45.08	-	-	-	-	-

2.3.3. 95ft Span (42” Barrier)

PROJECT DATA

Project:	I-295 Over St. Johns River, 95'-3 1/4" Span (Type E and F Units), Widened
Designer:	HL
Date:	Mar/27/2015
Checked By:	KZ
Date Checked:	Mar/27/2015
User job number:	
State:	FL, State Job #:
State Specification:	Florida
Design Code:	AASHTO LRFD - [6th Edition, 2012]
Units:	US
Span Type:	Simple Span
Flared Girder:	No
Comments:	LRFR Load rating of 95'-3 1/4" span for Beams 10 & 11, Widened Bridge Revised run for 42" F-shape barriers
File Name:	C:\Users\21682\Desktop\Projects\Buckman Bridge\Load Rating\Concrete\Sp95_3 Wid_Rev1.csl

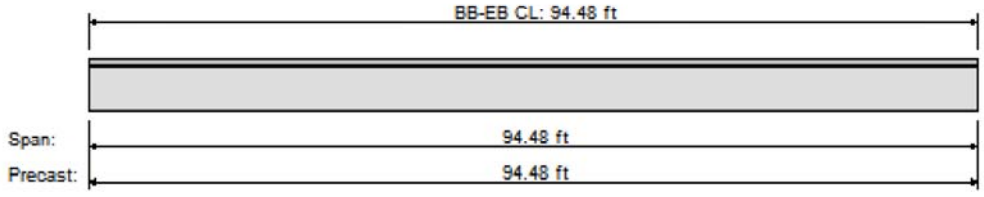
GEOMETRY DATA

BRIDGE LAYOUT

Overall Width (ft)	71.500
Left curb (ft)	1.750
Right curb (ft)	1.750
Curb-to-curb width (ft)	68.000
Number of spans	1
Number of lanes	5
Lane width (ft)	12.000
Eff Deck thick (in)	8.000
Sacrificial thick (in)	0.000
Haunch thickness (in)	2.000
Haunch width (in)	20.000
Bridge c/s,MI(Ixx) (in4)	8089665.50

SPAN DATA

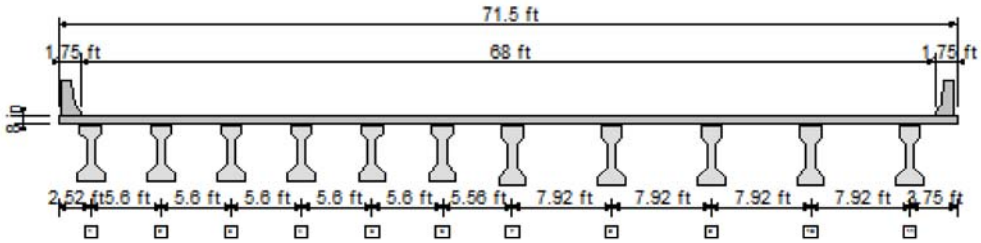
Precast length,	ft =	94.479
Bearing-to-bearing,	ft =	93.396
Release span,	ft =	94.479



BR01 - Bridge elevation

BEAM DATA

No	ID	Loc-prev ft	Area in2	MI(Ixx) in4	Height in	Yb in	B-topg in	B-trib ft
1	AASHTO-IV Exst	2.520	789.0	260740.0	54.00	24.73	20.00	5.319
2	AASHTO-IV Exst	5.599	789.0	260740.0	54.00	24.73	20.00	5.599
3	AASHTO-IV Exst	5.599	789.0	260740.0	54.00	24.73	20.00	5.602
4	AASHTO-IV Exst	5.604	789.0	260740.0	54.00	24.73	20.00	5.602
5	AASHTO-IV Exst	5.599	789.0	260740.0	54.00	24.73	20.00	5.599
6	AASHTO-IV Exst	5.599	789.0	260740.0	54.00	24.73	20.00	5.581
7	AASHTO-IV (MOD)	5.563	869.0	331853.0	58.00	27.61	20.00	6.740
8	AASHTO-IV (MOD)	7.917	869.0	331853.0	58.00	27.61	20.00	7.917
9	AASHTO-IV (MOD)	7.917	869.0	331853.0	58.00	27.61	20.00	7.917
10	AASHTO-IV (MOD)	7.917	869.0	331853.0	58.00	27.61	20.00	7.917
11	AASHTO-IV (MOD)	7.917	869.0	331853.0	58.00	27.61	20.00	7.709



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)	5.500*	5.500	4.500
Wc (pcf)	150.000	150.000	150.000
Ec (ksi)	4046.450	4046.450	3660.160
K1	0.900	0.900	0.900
Thermal coeff.(1/°F)	0.00000600		

* FDOT section 4.3.1, C4 requires that concrete strength at release be lesser than 0.8 * f'c or 6.0 ksi.

STRAND AND REBAR PROPERTIES

PRESTRESSED STEEL:
1/2-270K-SP, Low relaxation strands
Straight Pattern
Strand Diameter = 0.500 in
Tensile Strength(fpu) = 270.0 ksi
Use transformed strand and rebar: Strand Only

REINFORCING STEEL:
Tension/Shear steel: fy = 60.0 ksi Es = 29000 ksi

LOADS DATA

Loads generated using Permanent Load Wizard: NO
DEAD LOADS ON PRECAST
UNITS: (Point: kips, Location: ft, Line: klf, Trapez: klf)

Span	Beam	DC/DW	Type	Mag.1	Loc.1	Mag.2	Loc.2	Description
1	1	DC	Line	0.158	0.000	0.158	93.396	Stay-in-Place Deck Forms
1	2	DC	Line	0.158	0.000	0.158	93.396	Stay-in-Place Deck Forms
1	3	DC	Line	0.158	0.000	0.158	93.396	Stay-in-Place Deck Forms
1	4	DC	Line	0.158	0.000	0.158	93.396	Stay-in-Place Deck Forms
1	5	DC	Line	0.158	0.000	0.158	93.396	Stay-in-Place Deck Forms
1	6	DC	Line	0.158	0.000	0.158	93.396	Stay-in-Place Deck Forms
1	7	DC	Line	0.158	0.000	0.158	93.396	Stay-in-Place Deck Forms
1	8	DC	Line	0.158	0.000	0.158	93.396	Stay-in-Place Deck Forms
1	9	DC	Line	0.158	0.000	0.158	93.396	Stay-in-Place Deck Forms
1	10	DC	Line	0.158	0.000	0.158	93.396	Stay-in-Place Deck Forms
1	11	DC	Line	0.158	0.000	0.158	93.396	Stay-in-Place Deck Forms

DIAPHRAGM LOADS

Span	Beam	Load (kips)	Location (ft)
1	1	0.800	46.698
1	2	1.600	46.698
1	3	1.600	46.698
1	4	1.600	46.698
1	5	1.600	46.698
1	6	0.800	46.698

DEAD LOADS ON COMPOSITE
UNITS: (Point: kips, Location: ft, Line: klf, Trapez: klf, Area: ksf, Width: ft)

Span	DC/DW	Type	Mag.1	Loc.1/Width	Mag.2	Loc.2	Description
1	DC	Line	0.438	0.000	0.438	93.396	Left Curb Weight (42")
1	DC	Line	0.438	0.000	0.438	93.396	Right Curb Weight (42")

TEMPERATURE LOADS - NONE

LIVE LOADS
Live load deflection: not included.

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

Pedestrian Load - NONE

LIVE LOADS USED

LIVE LOAD LIBRARY: default.cs3

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	-	-

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

1 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

2 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

Legal Rating Loads:

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

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

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

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

2 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

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
Include Rigid Cross Section Assumption (Art. 4.6.2.2.2d):	YES
ADTT (Average Daily Truck Traffic) :	10000
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	-
Service III:	0.80	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

PROJECT DESIGN PARAMETERS

MULTIPLIERS:

Trans len mult:	Bonded	1.00
	Debonded	1.00
Dev len mult:	Bonded	1.60
	Debonded	2.00

Camber & Deflection Multiplier (PCI ref.)

	Erection	Final
Prestress:	1.80	2.20
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, Mr-prvd computed:	AASHTO equations
Horizontal Shear, Beam and Slab effects in Vu:	INCLUDED

STRESS LIMITS (Art. 5.9.4):

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

		PRECAST	
Strength		5.50*	ksi
Elasticity		4046.4	ksi
Max comp		3.30	ksi
Outer	15.00 %		
Max tens		-0.22	ksi
Max tens,	w/reinf	-0.89	ksi
Center	70.00 %		
Max tens		-0.22	ksi
Max tens,	w/reinf	-0.44	ksi

* FDOT section 4.3.1, C4 requires that concrete strength at release be lesser than 0.8 * f'c or 6.0 ksi.

STRESS LIMITS AT FINAL AFTER LOSSES:

	PRECAST		DECK	
Strength	5.50	ksi	4.50	ksi
Elasticity	4046.45	ksi	3660.16	ksi

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

	PRECAST		DECK	
Max comp	3.30	ksi	2.70	ksi

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

	PRECAST		DECK	
Max comp	2.47	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	2.20	ksi	-	ksi

SERVICE III (Tension):

	PRECAST		DECK	
Max tens	-0.45	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.5.9.5.3)
Days to release = 0.75
Rel. Humid.(RH) = 75.0 %

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	10000
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	1.80
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	1.60

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 = 3.30	0.09 x sqrt(f'c) = 0.22	0.90 x f'y = 218.70
Design Operating	0.60 x f'c = 3.30	0.24 x sqrt(f'c) = 0.56	0.90 x f'y = 218.70
Legal	0.60 x f'c = 3.30	0.24 x sqrt(f'c) = 0.56	-
Permit	0.60 x f'c = 3.30	0.24 x sqrt(f'c) = 0.56	0.90 x f'y = 218.70

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

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	1/2-270K-SP	5.50	5.50	4.50
Span:1, Beam:2	1/2-270K-SP	5.50	5.50	4.50
Span:1, Beam:3	1/2-270K-SP	5.50	5.50	4.50
Span:1, Beam:4	1/2-270K-SP	5.50	5.50	4.50
Span:1, Beam:5	1/2-270K-SP	5.50	5.50	4.50
Span:1, Beam:6	1/2-270K-SP	5.50	5.50	4.50
Span:1, Beam:7	1/2-270K-SP	5.50	5.50	4.50
Span:1, Beam:8	1/2-270K-SP	5.50	5.50	4.50
Span:1, Beam:9	1/2-270K-SP	5.50	5.50	4.50
Span:1, Beam:10	1/2-270K-SP	5.50	5.50	4.50
Span:1, Beam:11	1/2-270K-SP	5.50	5.50	4.50

Span:1, Beam:1

PRESTRESSED STEEL:

0 strands, 1/2-270K-SP, Low relaxation strands

Straight Pattern

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	6.00*	0.2083	9.2083	No
2	US#4[M13]	60.0	0.40	12.00*	9.2083	46.2083	No
2	US#4[M13]	60.0	0.40	12.37*	46.2083	48.4792	No
2	US#4[M13]	60.0	0.40	12.00*	48.4792	85.4792	No
2	US#4[M13]	60.0	0.40	6.00*	85.4792	94.4792	No

* The stirrups spacing for vertical shear is bigger than the maximum spacing allowed.

Span:1, Beam:2

PRESTRESSED STEEL:

0 strands, 1/2-270K-SP, Low relaxation strands

Straight Pattern

REINFORCING STEEL:

Tension	/Shear	steel:
fy	60.0	ksi
Es	29000	ksi

Span:1, Beam:3

PRESTRESSED STEEL:
0 strands, 1/2-270K-SP, Low relaxation strands
Straight Pattern

REINFORCING STEEL:

Tension	/Shear	steel:
fy	60.0	ksi
Es	29000	ksi

Span:1, Beam:4

PRESTRESSED STEEL:
0 strands, 1/2-270K-SP, Low relaxation strands
Straight Pattern

REINFORCING STEEL:

Tension	/Shear	steel:
fy	60.0	ksi
Es	29000	ksi

Span:1, Beam:5

PRESTRESSED STEEL:
0 strands, 1/2-270K-SP, Low relaxation strands
Straight Pattern

REINFORCING STEEL:

Tension	/Shear	steel:
fy	60.0	ksi
Es	29000	ksi

Span:1, Beam:6

PRESTRESSED STEEL:
0 strands, 1/2-270K-SP, Low relaxation strands
Straight Pattern

REINFORCING STEEL:

Tension	/Shear	steel:
fy	60.0	ksi
Es	29000	ksi

Span:1, Beam:7

PRESTRESSED STEEL:
32 strands, 1/2-270K-SP, Low relaxation strands
Straight Pattern

END PATTERN (Ycg = 5.00 in):

11 @ 3.000 in	11 @ 5.000 in	9 @ 7.000 in	1 @ 9.000 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	6.00	0.2083	9.2083	No
2	US#4[M13]	60.0	0.40	12.00	9.2083	46.2083	No
2	US#4[M13]	60.0	0.40	12.37	46.2083	48.4792	No
2	US#4[M13]	60.0	0.40	12.00	48.4792	85.4792	No
2	US#4[M13]	60.0	0.40	6.00	85.4792	94.4792	No

Span:1, Beam:8

PRESTRESSED STEEL:
0 strands, 1/2-270K-SP, Low relaxation strands
Straight Pattern

REINFORCING STEEL:

Tension	/Shear	steel:
fy	60.0	ksi
Es	29000	ksi

Span:1, Beam:9

PRESTRESSED STEEL:
0 strands, 1/2-270K-SP, Low relaxation strands
Straight Pattern

REINFORCING STEEL:

Tension	/Shear	steel:
fy	60.0	ksi
Es	29000	ksi

Span:1, Beam:10

PRESTRESSED STEEL:
32 strands, 1/2-270K-SP, Low relaxation strands
Straight Pattern

END PATTERN (Ycg = 5.00 in):

11 @ 3.000 in	11 @ 5.000 in	9 @ 7.000 in	1 @ 9.000 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	6.00	0.2083	9.2083	No
2	US#4[M13]	60.0	0.40	12.00	9.2083	46.2083	No
2	US#4[M13]	60.0	0.40	12.37	46.2083	48.4792	No
2	US#4[M13]	60.0	0.40	12.00	48.4792	85.4792	No
2	US#4[M13]	60.0	0.40	6.00	85.4792	94.4792	No

Span:1, Beam:11

PRESTRESSED STEEL:
32 strands, 1/2-270K-SP, Low relaxation strands
Straight Pattern

END PATTERN (Ycg = 5.00 in):

11 @ 3.000 in	11 @ 5.000 in	9 @ 7.000 in	1 @ 9.000 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	6.00	0.2083	9.2083	No
2	US#4[M13]	60.0	0.40	12.00	9.2083	46.2083	No
2	US#4[M13]	60.0	0.40	12.37	46.2083	48.4792	No
2	US#4[M13]	60.0	0.40	12.00	48.4792	85.4792	No
2	US#4[M13]	60.0	0.40	6.00	85.4792	94.4792	No

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	Shear Dim	Contro Span/E
Strength I (Inv)	HL93 Design Load	-	1.75	1.25	1.50	0.75	1.35	-	0.5L	46.70	1/11	0.82	2.30	-	0.8L	75.04	1/10
Strength I (Op)	HL93 Design Load	-	1.35	1.25	1.50	0.75	1.75	-	0.5L	46.70	1/11	0.82	3.03	-	0.8L	75.04	1/10
Service III (Inv)	HL93 Design Load	-	0.80	1.00	1.00	0.75	1.13	-	0.5L	46.70	1/11	-	-	-	-	-	-
Service III (Op)	HL93 Design Load	-	0.80	1.00	1.00	0.75	1.51	-	0.5L	46.70	1/11	-	-	-	-	-	-

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 Location	Shear Dim
1	7	Strength I (Inv)	HL93 Design Load	-	1.75	1.25	1.50	0.61	1.68	-	0.5L	46.70	0.73	2.63	-	0.8L	75.04
1	7	Strength I (Op)	HL93 Design Load	-	1.35	1.25	1.50	0.61	2.18	-	0.5L	46.70	0.73	3.46	-	0.8L	75.04
1	7	Service III (Inv)	HL93 Design Load	-	0.80	1.00	1.00	0.61	1.49	-	0.5L	46.70	-	-	-	-	-
1	7	Service III (Op)	HL93 Design Load	-	0.80	1.00	1.00	0.61	1.94	-	0.5L	46.70	-	-	-	-	-
1	10	Strength I (Inv)	HL93 Design Load	-	1.75	1.25	1.50	0.68	1.47	-	0.5L	46.70	0.82	2.30	-	0.8L	75.04
1	10	Strength I (Op)	HL93 Design Load	-	1.35	1.25	1.50	0.68	1.91	-	0.5L	46.70	0.82	3.03	-	0.8L	75.04
1	10	Service III (Inv)	HL93 Design Load	-	0.80	1.00	1.00	0.68	1.21	-	0.5L	46.70	-	-	-	-	-
1	10	Service III (Op)	HL93 Design Load	-	0.80	1.00	1.00	0.68	1.63	-	0.5L	46.70	-	-	-	-	-
1	11	Strength I (Inv)	HL93 Design Load	-	1.75	1.25	1.50	0.75	1.35	-	0.5L	46.70	0.75	2.53	-	0.7L	65.59
1	11	Strength I (Op)	HL93 Design Load	-	1.35	1.25	1.50	0.75	1.75	-	0.5L	46.70	0.75	3.33	-	0.2L	18.35
1	11	Service III (Inv)	HL93 Design Load	-	0.80	1.00	1.00	0.75	1.13	-	0.5L	46.70	-	-	-	-	-
1	11	Service III (Op)	HL93 Design Load	-	0.80	1.00	1.00	0.75	1.51	-	0.5L	46.70	-	-	-	-	-

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	Shear Dim	Cont Span
Strength I	C5 Truck	40.00	1.80	1.25	1.50	0.75	1.73	69.33	0.5L	46.70	1/11	0.82	2.99	119.62	0.2L	18.35	1/10
Strength I	ST5 Truck	40.00	1.80	1.25	1.50	0.75	1.98	79.29	0.5L	46.70	1/11	0.82	3.21	128.35	0.8L	75.04	1/10
Strength I	SU4 Truck	35.00	1.80	1.25	1.50	0.75	1.73	60.47	0.5L	46.70	1/11	0.82	2.89	101.08	0.8L	75.04	1/10
Service III	C5 Truck	40.00	0.80	1.00	1.00	0.75	1.99	79.53	0.5L	46.70	1/11	-	-	-	-	-	-
Service III	ST5 Truck	40.00	0.80	1.00	1.00	0.75	2.27	90.95	0.5L	46.70	1/11	-	-	-	-	-	-
Service III	SU4 Truck	35.00	0.80	1.00	1.00	0.75	1.98	69.36	0.5L	46.70	1/11	-	-	-	-	-	-

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	Shear Location	Shear Dim
1	7	Strength I	C5 Truck	40.00	1.80	1.25	1.50	0.61	2.16	86.33	0.5L	46.70	0.73	3.41	136.55	0.2L	18.35
1	7	Strength I	ST5 Truck	40.00	1.80	1.25	1.50	0.61	2.47	98.73	0.5L	46.70	0.73	3.66	146.50	0.8L	75.04
1	7	Strength I	SU4 Truck	35.00	1.80	1.25	1.50	0.61	2.15	75.30	0.5L	46.70	0.73	3.30	115.39	0.8L	75.04
1	7	Service III	C5 Truck	40.00	0.80	1.00	1.00	0.61	2.56	102.59	0.5L	46.70	-	-	-	-	-
1	7	Service III	ST5 Truck	40.00	0.80	1.00	1.00	0.61	2.93	117.32	0.5L	46.70	-	-	-	-	-
1	7	Service III	SU4 Truck	35.00	0.80	1.00	1.00	0.61	2.56	89.48	0.5L	46.70	-	-	-	-	-
1	10	Strength I	C5 Truck	40.00	1.80	1.25	1.50	0.68	1.89	75.45	0.5L	46.70	0.82	2.99	119.62	0.2L	18.35
1	10	Strength I	ST5 Truck	40.00	1.80	1.25	1.50	0.68	2.16	86.28	0.5L	46.70	0.82	3.21	128.35	0.8L	75.04
1	10	Strength I	SU4 Truck	35.00	1.80	1.25	1.50	0.68	1.88	65.81	0.5L	46.70	0.82	2.89	101.08	0.8L	75.04
1	10	Service III	C5 Truck	40.00	0.80	1.00	1.00	0.68	2.15	85.84	0.5L	46.70	-	-	-	-	-
1	10	Service III	ST5 Truck	40.00	0.80	1.00	1.00	0.68	2.45	98.17	0.5L	46.70	-	-	-	-	-
1	10	Service III	SU4 Truck	35.00	0.80	1.00	1.00	0.68	2.14	74.87	0.5L	46.70	-	-	-	-	-
1	11	Strength I	C5 Truck	40.00	1.80	1.25	1.50	0.75	1.73	69.33	0.5L	46.70	0.75	3.29	131.55	0.2L	18.35
1	11	Strength I	ST5 Truck	40.00	1.80	1.25	1.50	0.75	1.98	79.29	0.5L	46.70	0.75	3.53	141.18	0.2L	18.35
1	11	Strength I	SU4 Truck	35.00	1.80	1.25	1.50	0.75	1.73	60.47	0.5L	46.70	0.75	3.18	111.15	0.8L	75.04
1	11	Service III	C5 Truck	40.00	0.80	1.00	1.00	0.75	1.99	79.53	0.5L	46.70	-	-	-	-	-
1	11	Service III	ST5 Truck	40.00	0.80	1.00	1.00	0.75	2.27	90.95	0.5L	46.70	-	-	-	-	-
1	11	Service III	SU4 Truck	35.00	0.80	1.00	1.00	0.75	1.98	69.36	0.5L	46.70	-	-	-	-	-

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	Shear Location	Shear Dim	Con Spa
Strength II	FL120	60.00	1.60	1.25	1.50	0.68	1.33	79.55	0.5L	46.70	1/10	0.82	1.67	100.29	0.3L	27.80	1/10
Service I	FL120	60.00	1.00	1.00	1.00	0.67	4.09	245.10	0.5L	46.70	1/11	-	-	-	-	-	-

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	Shear Location	Shear Dim
1	7	Strength II	FL120	60.00	1.60	1.25	1.50	0.61	1.52	91.03	0.5L	46.70	0.73	2.15	128.88	0.7L	65.59
1	7	Service I	FL120	60.00	1.00	1.00	1.00	0.61	4.70	281.76	0.5L	46.70	-	-	-	-	-
1	10	Strength II	FL120	60.00	1.60	1.25	1.50	0.68	1.33	79.55	0.5L	46.70	0.82	1.67	100.29	0.3L	27.80
1	10	Service I	FL120	60.00	1.00	1.00	1.00	0.68	4.52	271.01	0.5L	46.70	-	-	-	-	-
1	11	Strength II	FL120	60.00	1.60	1.25	1.50	0.67	1.35	80.86	0.5L	46.70	0.66	1.80	107.79	0.3L	27.80
1	11	Service I	FL120	60.00	1.00	1.00	1.00	0.67	4.09	245.10	0.5L	46.70	-	-	-	-	-

2.3.4. 102ft Span (42” Barrier)

PROJECT DATA

Project:	I-295 Over St. Johns River, 102'-0" Span (Type G and H Units), Widened Bridge
Designer:	HL
Date:	Mar/27/2015
Checked By:	KZ
Date Checked:	Mar/27/2015
User job number:	
State:	FL, State Job #:
State Specification:	Florida
Design Code:	AASHTO LRFD - [6th Edition, 2012]
Units:	US
Span Type:	Simple Span
Flared Girder:	No
Comments:	LRFR Load rating of 102'-0" span for Beams 10 & 11, Widened Bridge Revised run for 42" F-shape barriers
File Name:	C:\Users\21682\Desktop\Projects\Buckman Bridge\Load Rating\Concrete\Sp102 Wid_Rev1.csl

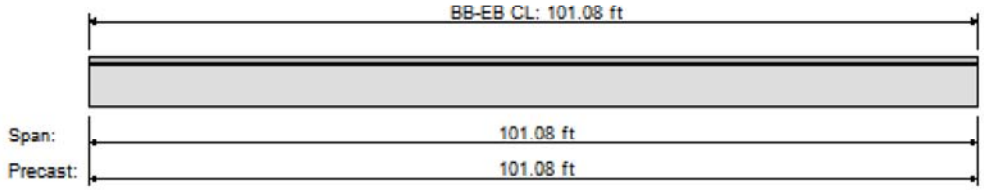
GEOMETRY DATA

BRIDGE LAYOUT

Overall Width (ft)	71.500
Left curb (ft)	1.750
Right curb (ft)	1.750
Curb-to-curb width (ft)	68.000
Number of spans	1
Number of lanes	5
Lane width (ft)	12.000
Eff Deck thick (in)	8.000
Sacrificial thick (in)	0.000
Haunch thickness (in)	2.000
Haunch width (in)	20.000
Bridge c/s,MI(Ixx) (in4)	8089665.50

SPAN DATA

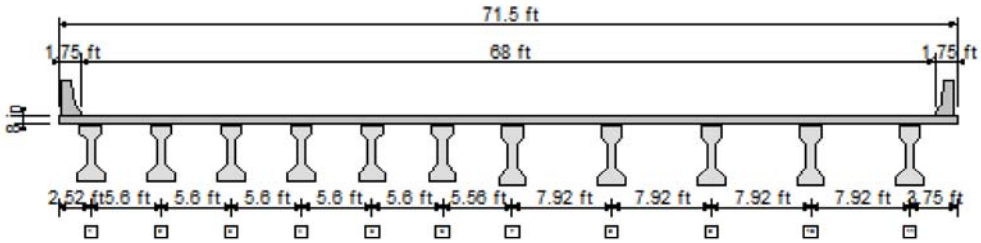
Precast length,	ft =	101.083
Bearing-to-bearing,	ft =	100.000
Release span,	ft =	101.083



BR01 - Bridge elevation

BEAM DATA

No	ID	Loc-prev ft	Area in2	MI(Ixx) in4	Height in	Yb in	B-topg in	B-trib ft
1	AASHTO-IV Exst	2.520	789.0	260740.0	54.00	24.73	20.00	5.319
2	AASHTO-IV Exst	5.599	789.0	260740.0	54.00	24.73	20.00	5.599
3	AASHTO-IV Exst	5.599	789.0	260740.0	54.00	24.73	20.00	5.602
4	AASHTO-IV Exst	5.604	789.0	260740.0	54.00	24.73	20.00	5.602
5	AASHTO-IV Exst	5.599	789.0	260740.0	54.00	24.73	20.00	5.599
6	AASHTO-IV Exst	5.599	789.0	260740.0	54.00	24.73	20.00	5.581
7	AASHTO-IV (MOD)	5.563	869.0	331853.0	58.00	27.61	20.00	6.740
8	AASHTO-IV (MOD)	7.917	869.0	331853.0	58.00	27.61	20.00	7.917
9	AASHTO-IV (MOD)	7.917	869.0	331853.0	58.00	27.61	20.00	7.917
10	AASHTO-IV (MOD)	7.917	869.0	331853.0	58.00	27.61	20.00	7.917
11	AASHTO-IV (MOD)	7.917	869.0	331853.0	58.00	27.61	20.00	7.709



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)	5.500*	5.500	4.500
Wc (pcf)	150.000	150.000	150.000
Ec (ksi)	4046.450	4046.450	3660.160
K1	0.900	0.900	0.900
Thermal coeff.(1/°F)	0.00000600		

* FDOT section 4.3.1, C4 requires that concrete strength at release be lesser than 0.8 * f'c or 6.0 ksi.

STRAND AND REBAR PROPERTIES

PRESTRESSED STEEL:
1/2-270K-SP, Low relaxation strands
Straight Pattern
Strand Diameter = 0.500 in
Tensile Strength(fpu) = 270.0 ksi
Use transformed strand and rebar: Strand Only

REINFORCING STEEL:
Tension/Shear steel: fy = 60.0 ksi Es = 29000 ksi

LOADS DATA

Loads generated using Permanent Load Wizard: NO
DEAD LOADS ON PRECAST
UNITS: (Point: kips, Location: ft, Line: klf, Trapez: klf)

Span	Beam	DC/DW	Type	Mag.1	Loc.1	Mag.2	Loc.2	Description
1	1	DC	Line	0.158	0.000	0.158	100.000	Stay-in-Place Deck Forms
1	2	DC	Line	0.158	0.000	0.158	100.000	Stay-in-Place Deck Forms
1	3	DC	Line	0.158	0.000	0.158	100.000	Stay-in-Place Deck Forms
1	4	DC	Line	0.158	0.000	0.158	100.000	Stay-in-Place Deck Forms
1	5	DC	Line	0.158	0.000	0.158	100.000	Stay-in-Place Deck Forms
1	6	DC	Line	0.158	0.000	0.158	100.000	Stay-in-Place Deck Forms
1	7	DC	Line	0.158	0.000	0.158	100.000	Stay-in-Place Deck Forms
1	8	DC	Line	0.158	0.000	0.158	100.000	Stay-in-Place Deck Forms
1	9	DC	Line	0.158	0.000	0.158	100.000	Stay-in-Place Deck Forms
1	10	DC	Line	0.158	0.000	0.158	100.000	Stay-in-Place Deck Forms
1	11	DC	Line	0.158	0.000	0.158	100.000	Stay-in-Place Deck Forms

DIAPHRAGM LOADS

Span	Beam	Load (kips)	Location (ft)
1	1	0.800	50.000
1	2	1.600	50.000
1	3	1.600	50.000
1	4	1.600	50.000
1	5	1.600	50.000
1	6	0.800	50.000

DEAD LOADS ON COMPOSITE
UNITS: (Point: kips, Location: ft, Line: klf, Trapez: klf, Area: ksf, Width: ft)

Span	DC/DW	Type	Mag.1	Loc.1/Width	Mag.2	Loc.2	Description
1	DC	Line	0.625	0.000	0.625	100.000	Left Curb Weight (42")
1	DC	Line	0.625	0.000	0.625	100.000	Right Curb Weight (42")

TEMPERATURE LOADS - NONE

LIVE LOADS
Live load deflection: not included.

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

Pedestrian Load - NONE

LIVE LOADS USED

LIVE LOAD LIBRARY: default.cs3

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	-	-

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

1 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

2 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

Legal Rating Loads:

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

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

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

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

2 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

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
Include Rigid Cross Section Assumption (Art. 4.6.2.2.2d):	YES
ADTT (Average Daily Truck Traffic) :	10000
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	-
Service III:	0.80	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

PROJECT DESIGN PARAMETERS

MULTIPLIERS:

Trans len mult:	Bonded	1.00
	Debonded	1.00
Dev len mult:	Bonded	1.60
	Debonded	2.00

Camber & Deflection Multiplier (PCI ref.)

	Erection	Final
Prestress:	1.80	2.20
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, Mr-prvd computed:	AASHTO equations
Horizontal Shear, Beam and Slab effects in Vu:	INCLUDED

STRESS LIMITS (Art. 5.9.4):

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

		PRECAST	
Strength		5.50*	ksi
Elasticity		4046.4	ksi
Max comp		3.30	ksi
Outer	15.00 %		
Max tens		-0.22	ksi
Max tens,	w/reinf	-0.89	ksi
Center	70.00 %		
Max tens		-0.22	ksi
Max tens,	w/reinf	-0.44	ksi

* FDOT section 4.3.1, C4 requires that concrete strength at release be lesser than 0.8 * f'c or 6.0 ksi.

STRESS LIMITS AT FINAL AFTER LOSSES:

	PRECAST		DECK	
Strength	5.50	ksi	4.50	ksi
Elasticity	4046.45	ksi	3660.16	ksi

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

	PRECAST		DECK	
Max comp	3.30	ksi	2.70	ksi

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

	PRECAST		DECK	
Max comp	2.47	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	2.20	ksi	-	ksi

SERVICE III (Tension):

	PRECAST		DECK	
Max tens	-0.45	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.5.9.5.3)
Days to release = 0.75
Rel. Humid.(RH) = 75.0 %

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	10000
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	1.80
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	1.60

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 = 3.30	0.09 x sqrt(f'c) = 0.22	0.90 x f'y = 218.70
Design Operating	0.60 x f'c = 3.30	0.24 x sqrt(f'c) = 0.56	0.90 x f'y = 218.70
Legal	0.60 x f'c = 3.30	0.24 x sqrt(f'c) = 0.56	-
Permit	0.60 x f'c = 3.30	0.24 x sqrt(f'c) = 0.56	0.90 x f'y = 218.70

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

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	1/2-270K-SP	5.50	5.50	4.50
Span:1, Beam:2	1/2-270K-SP	5.50	5.50	4.50
Span:1, Beam:3	1/2-270K-SP	5.50	5.50	4.50
Span:1, Beam:4	1/2-270K-SP	5.50	5.50	4.50
Span:1, Beam:5	1/2-270K-SP	5.50	5.50	4.50
Span:1, Beam:6	1/2-270K-SP	5.50	5.50	4.50
Span:1, Beam:7	1/2-270K-SP	5.50	5.50	4.50
Span:1, Beam:8	1/2-270K-SP	5.50	5.50	4.50
Span:1, Beam:9	1/2-270K-SP	5.50	5.50	4.50
Span:1, Beam:10	1/2-270K-SP	5.50	5.50	4.50
Span:1, Beam:11	1/2-270K-SP	5.50	5.50	4.50

Span:1, Beam:1

PRESTRESSED STEEL:
0 strands, 1/2-270K-SP, Low relaxation strands
Straight Pattern

REINFORCING STEEL:

Tension	/Shear	steel:
fy	60.0	ksi
Es	29000	ksi

Span:1, Beam:2

PRESTRESSED STEEL:
0 strands, 1/2-270K-SP, Low relaxation strands
Straight Pattern

REINFORCING STEEL:

Tension	/Shear	steel:
fy	60.0	ksi
Es	29000	ksi

Span:1, Beam:3

PRESTRESSED STEEL:
0 strands, 1/2-270K-SP, Low relaxation strands
Straight Pattern

REINFORCING STEEL:

Tension	/Shear	steel:
fy	60.0	ksi
Es	29000	ksi

Span:1, Beam:4

PRESTRESSED STEEL:
0 strands, 1/2-270K-SP, Low relaxation strands
Straight Pattern

REINFORCING STEEL:

Tension	/Shear	steel:
fy	60.0	ksi
Es	29000	ksi

Span:1, Beam:5

PRESTRESSED STEEL:
0 strands, 1/2-270K-SP, Low relaxation strands
Straight Pattern

REINFORCING STEEL:

Tension	/Shear	steel:
fy	60.0	ksi
Es	29000	ksi

Span:1, Beam:6

PRESTRESSED STEEL:

0 strands, 1/2-270K-SP, Low relaxation strands
Straight Pattern

REINFORCING STEEL:

Tension	/Shear	steel:
fy	60.0	ksi
Es	29000	ksi

Span:1, Beam:7

PRESTRESSED STEEL:
38 strands, 1/2-270K-SP, Low relaxation strands
Straight Pattern

END PATTERN (Ycg = 5.63 in):

11 @ 3.000 in	11 @ 5.000 in	9 @ 7.000 in	7 @ 9.000 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	6.00	0.2083	9.7083	No
2	US#4[M13]	60.0	0.40	12.00	9.7083	49.7083	No
2	US#4[M13]	60.0	0.40	9.00	49.7083	50.5416	No
2	US#4[M13]	60.0	0.40	9.00	50.5417	51.3750	No
2	US#4[M13]	60.0	0.40	12.00	51.3750	91.3750	No
2	US#4[M13]	60.0	0.40	6.00	91.3750	100.8750	No

Span:1, Beam:8

PRESTRESSED STEEL:
0 strands, 1/2-270K-SP, Low relaxation strands
Straight Pattern

REINFORCING STEEL:

Tension	/Shear	steel:
fy	60.0	ksi
Es	29000	ksi

Span:1, Beam:9

PRESTRESSED STEEL:
0 strands, 1/2-270K-SP, Low relaxation strands
Straight Pattern

REINFORCING STEEL:

Tension	/Shear	steel:
fy	60.0	ksi
Es	29000	ksi

Span:1, Beam:10

PRESTRESSED STEEL:
38 strands, 1/2-270K-SP, Low relaxation strands
Straight Pattern

END PATTERN (Ycg = 5.63 in):

11 @ 3.000 in	11 @ 5.000 in	9 @ 7.000 in	7 @ 9.000 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	6.00	0.2083	9.7083	No
2	US#4[M13]	60.0	0.40	12.00	9.7083	49.7083	No
2	US#4[M13]	60.0	0.40	9.00	49.7083	50.7496	No
2	US#4[M13]	60.0	0.40	9.00	50.7496	51.5830	No
2	US#4[M13]	60.0	0.40	12.00	51.5830	91.5830	No
2	US#4[M13]	60.0	0.40	6.00	91.5830	101.0830	No

Span:1, Beam:11

PRESTRESSED STEEL:
38 strands, 1/2-270K-SP, Low relaxation strands
Straight Pattern

END PATTERN (Ycg = 5.63 in):

11 @ 3.000 in	11 @ 5.000 in	9 @ 7.000 in	7 @ 9.000 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	6.00	0.2083	9.7083	No
2	US#4[M13]	60.0	0.40	12.00	9.7083	49.7083	No
2	US#4[M13]	60.0	0.40	9.00	49.7083	50.7496	No
2	US#4[M13]	60.0	0.40	9.00	50.7496	51.5830	No
2	US#4[M13]	60.0	0.40	12.00	51.5830	91.5830	No
2	US#4[M13]	60.0	0.40	6.00	91.5830	101.0830	No

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	Shear Dim	Contro Span/E
Strength I (Inv)	HL93 Design Load	-	1.75	1.25	1.50	0.75	1.42	-	0.5L	50.00	1/11	0.82	2.20	-	0.8L	80.32	1/10
Strength I (Op)	HL93 Design Load	-	1.35	1.25	1.50	0.75	1.85	-	0.5L	50.00	1/11	0.82	2.89	-	0.8L	80.32	1/10
Service III (Inv)	HL93 Design Load	-	0.80	1.00	1.00	0.75	1.14	-	0.5L	50.00	1/11	-	-	-	-	-	-
Service III (Op)	HL93 Design Load	-	0.80	1.00	1.00	0.75	1.49	-	0.5L	50.00	1/11	-	-	-	-	-	-

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 Location	Shear Dim
1	7	Strength I (Inv)	HL93 Design Load	-	1.75	1.25	1.50	0.60	1.80	-	0.5L	50.00	0.73	2.71	-	0.2L	19.68
1	7	Strength I (Op)	HL93 Design Load	-	1.35	1.25	1.50	0.60	2.33	-	0.5L	50.00	0.73	3.56	-	0.2L	19.68
1	7	Service III (Inv)	HL93 Design Load	-	0.80	1.00	1.00	0.60	1.53	-	0.5L	50.00	-	-	-	-	-
1	7	Service III (Op)	HL93 Design Load	-	0.80	1.00	1.00	0.60	1.96	-	0.5L	50.00	-	-	-	-	-
1	10	Strength I (Inv)	HL93 Design Load	-	1.75	1.25	1.50	0.67	1.58	-	0.5L	50.00	0.82	2.20	-	0.8L	80.32
1	10	Strength I (Op)	HL93 Design Load	-	1.35	1.25	1.50	0.67	2.05	-	0.5L	50.00	0.82	2.89	-	0.8L	80.32
1	10	Service III (Inv)	HL93 Design Load	-	0.80	1.00	1.00	0.67	1.24	-	0.5L	50.00	-	-	-	-	-
1	10	Service III (Op)	HL93 Design Load	-	0.80	1.00	1.00	0.67	1.63	-	0.5L	50.00	-	-	-	-	-
1	11	Strength I (Inv)	HL93 Design Load	-	1.75	1.25	1.50	0.75	1.42	-	0.5L	50.00	0.75	2.41	-	0.8L	80.32
1	11	Strength I (Op)	HL93 Design Load	-	1.35	1.25	1.50	0.75	1.85	-	0.5L	50.00	0.75	3.18	-	0.8L	80.32
1	11	Service III (Inv)	HL93 Design Load	-	0.80	1.00	1.00	0.75	1.14	-	0.5L	50.00	-	-	-	-	-
1	11	Service III (Op)	HL93 Design Load	-	0.80	1.00	1.00	0.75	1.49	-	0.5L	50.00	-	-	-	-	-

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	Shear Dim	Cont Span
Strength I	C5 Truck	40.00	1.80	1.25	1.50	0.75	1.85	73.83	0.5L	50.00	1/11	0.82	2.86	114.57	0.8L	80.32	1/10
Strength I	ST5 Truck	40.00	1.80	1.25	1.50	0.75	2.09	83.43	0.5L	50.00	1/11	0.82	3.08	123.39	0.8L	80.32	1/10
Strength I	SU4 Truck	35.00	1.80	1.25	1.50	0.75	1.86	65.08	0.5L	50.00	1/11	0.82	2.80	98.14	0.8L	80.32	1/10
Service III	C5 Truck	40.00	0.80	1.00	1.00	0.75	1.98	79.21	0.5L	50.00	1/11	-	-	-	-	-	-
Service III	ST5 Truck	40.00	0.80	1.00	1.00	0.75	2.24	89.52	0.5L	50.00	1/11	-	-	-	-	-	-
Service III	SU4 Truck	35.00	0.80	1.00	1.00	0.75	2.00	69.83	0.5L	50.00	1/11	-	-	-	-	-	-

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	Shear Location	Shear Dim
1	7	Strength I	C5 Truck	40.00	1.80	1.25	1.50	0.60	2.33	93.35	0.5L	50.00	0.73	3.52	140.88	0.8L	80.32
1	7	Strength I	ST5 Truck	40.00	1.80	1.25	1.50	0.60	2.64	105.49	0.5L	50.00	0.73	3.79	151.66	0.2L	19.68
1	7	Strength I	SU4 Truck	35.00	1.80	1.25	1.50	0.60	2.35	82.29	0.5L	50.00	0.73	3.45	120.68	0.2L	19.68
1	7	Service III	C5 Truck	40.00	0.80	1.00	1.00	0.60	2.61	104.40	0.5L	50.00	-	-	-	-	-
1	7	Service III	ST5 Truck	40.00	0.80	1.00	1.00	0.60	2.95	117.98	0.5L	50.00	-	-	-	-	-
1	7	Service III	SU4 Truck	35.00	0.80	1.00	1.00	0.60	2.63	92.03	0.5L	50.00	-	-	-	-	-
1	10	Strength I	C5 Truck	40.00	1.80	1.25	1.50	0.67	2.05	81.86	0.5L	50.00	0.82	2.86	114.57	0.8L	80.32
1	10	Strength I	ST5 Truck	40.00	1.80	1.25	1.50	0.67	2.31	92.52	0.5L	50.00	0.82	3.08	123.39	0.8L	80.32
1	10	Strength I	SU4 Truck	35.00	1.80	1.25	1.50	0.67	2.06	72.17	0.5L	50.00	0.82	2.80	98.14	0.8L	80.32
1	10	Service III	C5 Truck	40.00	0.80	1.00	1.00	0.67	2.17	87.00	0.5L	50.00	-	-	-	-	-
1	10	Service III	ST5 Truck	40.00	0.80	1.00	1.00	0.67	2.46	98.32	0.5L	50.00	-	-	-	-	-
1	10	Service III	SU4 Truck	35.00	0.80	1.00	1.00	0.67	2.19	76.69	0.5L	50.00	-	-	-	-	-
1	11	Strength I	C5 Truck	40.00	1.80	1.25	1.50	0.75	1.85	73.83	0.5L	50.00	0.75	3.15	125.89	0.8L	80.32
1	11	Strength I	ST5 Truck	40.00	1.80	1.25	1.50	0.75	2.09	83.43	0.5L	50.00	0.75	3.39	135.61	0.8L	80.32
1	11	Strength I	SU4 Truck	35.00	1.80	1.25	1.50	0.75	1.86	65.08	0.5L	50.00	0.75	3.08	107.83	0.8L	80.32
1	11	Service III	C5 Truck	40.00	0.80	1.00	1.00	0.75	1.98	79.21	0.5L	50.00	-	-	-	-	-
1	11	Service III	ST5 Truck	40.00	0.80	1.00	1.00	0.75	2.24	89.52	0.5L	50.00	-	-	-	-	-
1	11	Service III	SU4 Truck	35.00	0.80	1.00	1.00	0.75	2.00	69.83	0.5L	50.00	-	-	-	-	-

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	Shear Location	Shear Dim	Con Spa
Strength II	FL120	60.00	1.60	1.25	1.50	0.67	1.45	86.76	0.5L	50.00	1/10	0.82	1.77	106.22	0.3L	29.78	1/10
Service I	FL120	60.00	1.00	1.00	1.00	0.66	3.26	195.37	0.5L	50.00	1/11	-	-	-	-	-	-

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	Shear Location	Shear Dim
1	7	Strength II	FL120	60.00	1.60	1.25	1.50	0.60	1.65	98.94	0.5L	50.00	0.73	2.29	137.34	0.2L	19.68
1	7	Service I	FL120	60.00	1.00	1.00	1.00	0.60	3.88	232.67	0.5L	50.00	-	-	-	-	-
1	10	Strength II	FL120	60.00	1.60	1.25	1.50	0.67	1.45	86.76	0.5L	50.00	0.82	1.77	106.22	0.3L	29.78
1	10	Service I	FL120	60.00	1.00	1.00	1.00	0.67	3.65	219.11	0.5L	50.00	-	-	-	-	-
1	11	Strength II	FL120	60.00	1.60	1.25	1.50	0.66	1.47	88.14	0.5L	50.00	0.66	2.08	124.70	0.3L	29.78
1	11	Service I	FL120	60.00	1.00	1.00	1.00	0.66	3.26	195.37	0.5L	50.00	-	-	-	-	-

Appendix E. Speed Data

Average Speed at Detector

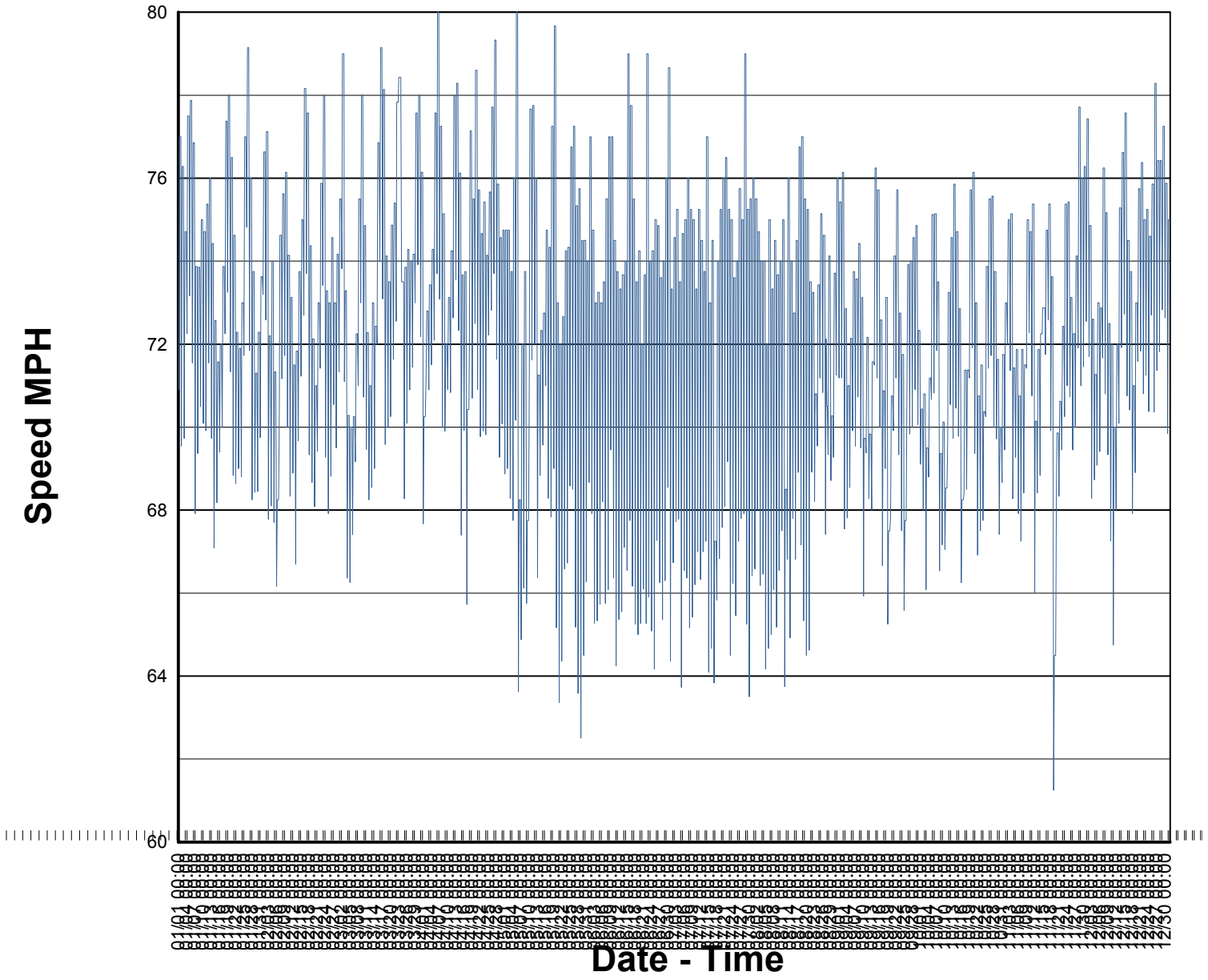
Report Template Version: 1.2

Created On:	05/18/2015 12:28:10
Center:	District 2
Filter Parameters Selected:	[From Date Time]: 04/30/2010 00:00, [To Date Time]: 04/30/2015 23:59, [Detector Station]: 458

Detector:	VDS 295S027_N Buckman
Roadway:	I-295, Southbound
Location:	I-295 @ N Buckman Bridge SB
Date:	04/30/2010 00:00 to 04/30/2015 23:59
Interval:	Daily

Average Speed at Detector

Report Template Version: 1.2



Average Speed at Detector

Report Template Version: 1.2

Created On:	05/18/2015 12:28:14
Center:	District 2
Filter Parameters Selected:	[From Date Time]: 04/30/2010 00:00, [To Date Time]: 04/30/2015 23:59, [Detector Station]: 459

Detector:	VDS 295S028_S Buckman
Roadway:	I-295, Northbound
Location:	I-295 @ S Buckman Bridge NB
Date:	04/30/2010 00:00 to 04/30/2015 23:59
Interval:	Daily

Average Speed at Detector

Report Template Version: 1.2