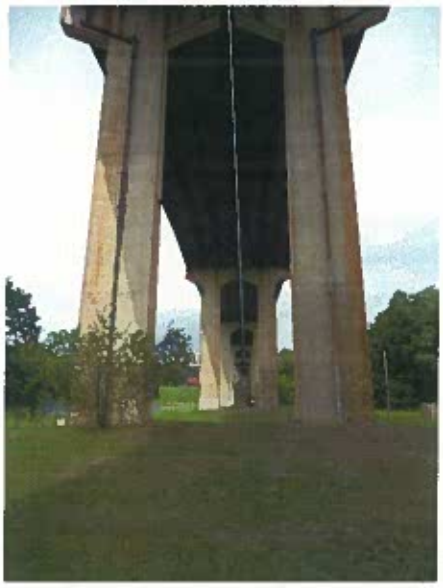
BRIDGE LOAD RATING REPORT

SUM-261-10.22L (S.R. 261 SB over the Little Cuyahoga River and MRTA Railroad) SFN: 7708645



Prepared For:

Ohio Department of Transportation – District 4

Prepared By:

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December 14, 2012

URS

Description of Bridge

SUM-261-10.22 L is a 20 span structure carrying S.R. 261 over the Little Cuyahoga River and the MRTA Railroad. The Superstructure consists of a non-composite reinforced concrete deck on continuous haunched steel plate girders. The superstructure is separated into 4 units at hinges in the plate girders. The substructure consists of wall type and single column piers supported on both piles and drilled shafts and full height and stub-type reinforced concrete abutments supported on piles.

Notes on Load Rating Assumptions

1. Based on URS' field inspection on 9/25/12 as well as previous experience with the 2010 rehabilitation there is no significant deterioration to the existing weathering steel plate girders. Additionally any deck and or parapet deficiencies were corrected during the rehabilitation.

2. The attached rehabilitation plans as well as original design plans were used for loading and current condition. Where appropriate for ease of evaluating the structure, dimensions that varied to the 1/16" were conservatively rounded to half inches.

3. The full length of the bridge will be modeled however it will be contained in two separate superstructure "units" within AASHTO VIRTIS to account for the flared end. One "unit" will contain all spans but calculate the load rating for Spans 4-20 for the 4 main girder lines. A second "unit" will contain only the first 4 spans and will check those spans for the 4 main girder lines as well as the additional girder. The critical rating for span 4 from either model will be used for the overall rating.

4. An additional 5% detail factor on the dead load has been added to account for the minor curvature effects as well as any miscellaneous connections.

5. The pedestrian load will be applied to Girder 1 only.

6. For reporting of legal loads only live load without pedestrian load will be reported as per AASHTO Manual for Bridge Evaluation 6A2.3.4 full pedestrian and live loads need not be considered concurrently for the fascia girder.

7. Per ODOT District 4 direction, the load ratings were initially performed using LRFR methods. Due to differences in the design model and the load rating model (i.e. 90% Truck Pair in LRFR) the structure cannot carry the full HL-93 LRFR loads. As the rating for HL-93 was below the LRFR capacity the bridge has been rated using LFR methods which correspond to the original bridge design loading of HS-20-44. This assumption is in accordance with section 900 of the 2004 edition of the ODOT Bridge Design Manual.

BRIDGE LOAD RATING SUMMARY REPORT

PROGRAM RESPONSIBLILITY	OHIO DEPARTMENT OF TRANSPORTATION	
MAINTENANCE RESPONSIBLILITY	OHIO DEPARTMENT OF TRANSPORTATION	

SFN	BRIDGE NUMBER	DISTRICT
7708645	SUM-261-10.22L	4
ORIGINAL CONSTRUCTION YEAR	**REHABILITATION YEAR**	**OVERALL STRUCTURE LENGTH (FT. 3351.0)**
1981	2010	3351.00

FIPS	FEATURE INTERSECTED:	FACILITY CARRIED
AKRON	Little Cuyahoga River and MRTA Railroad	SR 261

SPECIAL ASSUMPTIONS & COMMENTS:	Using construction drawings dated 1979; 20 span non-composite reinforced concrete deck on haunched steel plate girders (81.6', 95', 100', 100', 112', 123', 136', 190', 202', 201', 202', 220', 209', 209', 209', 209', 200', 197', 197', and 150')

PLEASE SELECT ON RIGHT, WHERE APPROPRIATE, BY USING UP-DOWN ARROW BUTTONS

LOAD RATING PURPOSE:	1- Initial Load Rating
LOAD RATING SOFTWARE:	3 - VIRTIS
RATING SOURCE:	1 - Plan information available for load rating analysis (Default)
METHOD OF RATING:	2 - Load Factor Rating (LFR)
ORIGINAL DESIGN LOADING:	6 - HS20-44 & Alternate Military Loading

STRUCTURE RATING SUMMARY

LOADING TYPE	GVW (TONS)	RATING FACTOR - RF (x.xxx)	SAFE GVW (TONS)	Current Design Loading
INVENTORY RATING		0.972		2 - HS20 Loading
OPERATING RATING		1.624		2 - HS20 Loading
OHIO LEGAL - 2F1	15	5.201	78	OHIO LEGAL LOADS OVERALL MINIMUM RATING FACTOR
OHIO LEGAL - 3F1	23	3.512	81	*150%*
OHIO LEGAL - 4F1	27	3.088	83	OHIO LEGAL LOADS OVERALL CONTROLLING TRUCK
OHIO LEGAL - 5C1	40	2.696	108	*OHIO LEGAL - 5C1*

LOAD RESTRICTIONS RECOMMENDATION	NO ACTION IS NEEDED

RATED BY, PE#	REVIEWED BY, PE#	REPORT DATE
David Buchanan, EI	Paul Wischt, PE #54482	11/29/2012
AGENCY/FIRM	**PHONE NUMBER**	**EMAIL**
URS Corporation	330-836-9111	david.buchanan@urs.com

BR-100 (REV 4/2012)

Rating Results Summary Report

Name: Y BRIDGE SB Bridge ID: SUM-261-10.22L NBI: 7708645S
Struct-Def: SUPERSTRUCTURE... Member: G1 Member Alt:RATING

GIRDER (A) LFD

Live Load	Live Load Type	Rating Method	Inventory Load Rating (Ton)	Operating Load Rating (Ton)	Inventory Rating Factor	Operating Rating Factor	Inventory Location (ft)
HS 20-44	Lane	LFD	153.54	256.42	4.265	7.123	2389.67
Alternate Military Loading	Axle Load	LFD	208.33	347.92	8.681	14.497	550.17
HS 20-44	Axle Load	LFD	241.09	402.62	6.697	11.184	550.17
2F1	Axle Load	LFD	215.19	359.36	14.346	23.957	550.17
3F1	Axle Load	LFD	219.38	366.37	9.538	15.929	550.17
4F1	Axle Load	LFD	225.35	376.34	8.346	13.938	550.17
5C1	Axle Load	LFD	278.99	465.92	6.975	11.648	2494.17
HS 20-44	Lane + Pedestrian	LFD	43.62	72.84	1.212	2.023	2389.67
Alternate Military Loading	ruck + Pedestrian	LFD	36.95	61.71	1.540	2.571	2389.67
HS 20-44	ruck + Pedestrian	LFD	53.07	88.62	1.474	2.462	2389.67
2F1	ruck + Pedestrian	LFD	23.91	39.92	1.594	2.661	2389.67
3F1	ruck + Pedestrian	LFD	35.55	59.37	1.546	2.581	2389.67
4F1	ruck + Pedestrian	LFD	41.11	68.66	1.523	2.543	2389.67
5C1	ruck + Pedestrian	LFD	58.42	97.57	1.461	2.439	2389.67

LOWER REPORTED

Rating Results Summary Report

Name: Y BRIDGE SB Bridge ID: SUM-261-10.22L NBI: 7708645S
Struct-Def: SUPERSTRUCTURE... Member: G1 Member Alt:RATING

GIRDER (A) LFD

Live Load	Inventory Location Span-(%)	Operating Location (ft)	Operating Location Span-(%)	Inventory Limit State	Operating Limit State
HS 20-44	15 - (100.0)	2389.67	5 - (100.0)	Design Flexure - Steel	Design Flexure - Steel
Alternate Military Loading	6 - (50.0)	550.17	6 - (50.0)	Design Flexure - Steel	Design Flexure - Steel
HS 20-44	6 - (50.0)	550.17	6 - (50.0)	Design Flexure - Steel	Design Flexure - Steel
2F1	6 - (50.0)	550.17	6 - (50.0)	Design Flexure - Steel	Design Flexure - Steel
3F1	6 - (50.0)	550.17	6 - (50.0)	Design Flexure - Steel	Design Flexure - Steel
4F1	6 - (50.0)	550.17	6 - (50.0)	Design Flexure - Steel	Design Flexure - Steel
5C1	16 - (50.0)	2494.17	16 - (50.0)	Design Flexure - Steel	Design Flexure - Steel
HS 20-44	15 - (100.0)	2389.67	5 - (100.0)	Design Flexure - Steel	Design Flexure - Steel
Alternate Military Loading	15 - (100.0)	2389.67	5 - (100.0)	Design Flexure - Steel	Design Flexure - Steel
HS 20-44	15 - (100.0)	2389.67	5 - (100.0)	Design Flexure - Steel	Design Flexure - Steel
2F1	15 - (100.0)	2389.67	5 - (100.0)	Design Flexure - Steel	Design Flexure - Steel
3F1	15 - (100.0)	2389.67	5 - (100.0)	Design Flexure - Steel	Design Flexure - Steel
4F1	15 - (100.0)	2389.67	5 - (100.0)	Design Flexure - Steel	Design Flexure - Steel
5C1	15 - (100.0)	2389.67	5 - (100.0)	Design Flexure - Steel	Design Flexure - Steel

Rating Results Summary Report

Name: Y BRIDGE SB Bridge ID: SUM-261-10.22L NBI: 7708645S
Struct-Def: SUPERSTRUCTURE... Member: G1 Member Alt:RATING

GIRDER (A) LFD

Live Load	Impact	Lane
HS 20-44	As Requested	As Requested
Alternate Military Loading	As Requested	As Requested
HS 20-44	As Requested	As Requested
2F1	As Requested	As Requested
3F1	As Requested	As Requested
4F1	As Requested	As Requested
5C1	As Requested	As Requested
HS 20-44	As Requested	As Requested
Alternate Military Loading	As Requested	As Requested
HS 20-44	As Requested	As Requested
2F1	As Requested	As Requested
3F1	As Requested	As Requested
4F1	As Requested	As Requested
5C1	As Requested	As Requested

Rating Results Summary Report

Name: Y BRIDGE SB Bridge ID: SUM-261-10.22L NBI: 7708645S
Struct-Def: SUPERSTRUCTURE... Member: G2 Member Alt:RATING

GIRDER (B) LFD

Live Load	Live Load Type	Rating Method	Inventory Load Rating (Ton)	Operating Load Rating (Ton)	Inventory Rating Factor	Operating Rating Factor	Inventory Location (ft)
HS 20-44	Lane	LFD	35.09	58.60	0.975	1.628	2389.67
Alternate Military Loading	Axle Load	LFD	45.66	76.26	1.903	3.177	40.84
HS 20-44	Axle Load	LFD	55.54	92.75	1.543	2.576	40.84
2F1	Axle Load	LFD	47.55	79.41	3.170	5.294	40.84
3F1	Axle Load	LFD	49.24	82.22	2.141	3.575	40.84
4F1	Axle Load	LFD	50.83	84.88	1.882	3.144	40.84
5C1	Axle Load	LFD	64.74	108.11	1.618	2.703	2494.17

Rating Results Summary Report

Name: Y BRIDGE SB Bridge ID: SUM-261-10.22L NBI: 7708645S
Struct-Def: SUPERSTRUCTURE... Member: G2 Member Alt:RATING

GIRDER (B) LFD

Live Load	Inventory Location Span-(%)	Operating Location (ft)	Operating Location Span-(%)	Inventory Limit State	Operating Limit State
HS 20-44	15 - (100.0)	2389.67	5 - (100.0)	Design Flexure - Steel	Design Flexure - Steel
Alternate Military Loading	1 - (50.0)	40.84	1 - (50.0)	Design Flexure - Steel	Design Flexure - Steel
HS 20-44	1 - (50.0)	40.84	1 - (50.0)	Design Flexure - Steel	Design Flexure - Steel
2F1	1 - (50.0)	40.84	1 - (50.0)	Design Flexure - Steel	Design Flexure - Steel
3F1	1 - (50.0)	40.84	1 - (50.0)	Design Flexure - Steel	Design Flexure - Steel
4F1	1 - (50.0)	40.84	1 - (50.0)	Design Flexure - Steel	Design Flexure - Steel
5C1	16 - (50.0)	2494.17	16 - (50.0)	Design Flexure - Steel	Design Flexure - Steel

Rating Results Summary Report

Name: Y BRIDGE SB Bridge ID: SUM-261-10.22L NBI: 7708645S
Struct-Def: SUPERSTRUCTURE... Member: G2 Member Alt:RATING

GIRDER (B) LFD

Live Load	Impact	Lane
HS 20-44	As Requested	As Requested
Alternate Military Loading	As Requested	As Requested
HS 20-44	As Requested	As Requested
2F1	As Requested	As Requested
3F1	As Requested	As Requested
4F1	As Requested	As Requested
5C1	As Requested	As Requested

Rating Results Summary Report

Name: Y BRIDGE SB Bridge ID: SUM-261-10.22L NBI: 7708645S
Struct-Def: SUPERSTRUCTURE... Member: G3 Member Alt:RATING

GIRDER (L) LFD

Live Load	Live Load Type	Rating Method	Inventory Load Rating (Ton)	Operating Load Rating (Ton)	Inventory Rating Factor	Operating Rating Factor	Inventory Location (ft)
HS 20-44	Lane	LFD	35.00	58.46	0.972	1.624	2389.67
Alternate Military Loading	Axle Load	LFD	44.86	74.92	1.869	3.122	40.84
HS 20-44	Axle Load	LFD	54.56	91.12	1.516	2.531	40.84
2F1	Axle Load	LFD	46.72	78.02	3.114	5.201	40.84
3F1	Axle Load	LFD	48.37	80.78	2.103	3.512	40.84
4F1	Axle Load	LFD	49.93	83.39	1.849	3.088	40.84
5C1	Axle Load	LFD	64.58	107.85	1.615	2.696	2494.17

Rating Results Summary Report

Name: Y BRIDGE SB Bridge ID: SUM-261-10.22L NBI: 7708645S
Struct-Def: SUPERSTRUCTURE... Member: G3 Member Alt:RATING

GIRDER (C) LFD

Live Load	Inventory Location Span-(%)	Operating Location (ft)	Operating Location Span-(%)	Inventory Limit State	Operating Limit State
HS 20-44	15 - (100.0)	2389.67	5 - (100.0)	Design Flexure - Steel	Design Flexure - Steel
Alternate Military Loading	1 - (50.0)	40.84	1 - (50.0)	Design Flexure - Steel	Design Flexure - Steel
HS 20-44	1 - (50.0)	40.84	1 - (50.0)	Design Flexure - Steel	Design Flexure - Steel
2F1	1 - (50.0)	40.84	1 - (50.0)	Design Flexure - Steel	Design Flexure - Steel
3F1	1 - (50.0)	40.84	1 - (50.0)	Design Flexure - Steel	Design Flexure - Steel
4F1	1 - (50.0)	40.84	1 - (50.0)	Design Flexure - Steel	Design Flexure - Steel
5C1	16 - (50.0)	2494.17	16 - (50.0)	Design Flexure - Steel	Design Flexure - Steel

Rating Results Summary Report

Name: Y BRIDGE SB Bridge ID: SUM-261-10.22L NBI: 7708645S
Struct-Def: SUPERSTRUCTURE... Member: G3 Member Alt:RATING

G1 GIRDER (L) LFD

Live Load	Impact	Lane
HS 20-44	As Requested	As Requested
Alternate Military Loading	As Requested	As Requested
HS 20-44	As Requested	As Requested
2F1	As Requested	As Requested
3F1	As Requested	As Requested
4F1	As Requested	As Requested
5C1	As Requested	As Requested

Rating Results Summary Report

Name: Y BRIDGE SB Bridge ID: SUM-261-10.22L NBI: 7708645S
Struct-Def: SUPERSTRUCTURE... Member: G4 Member Alt:RATING

GIRDER (D) LFD

Live Load	Live Load Type	Rating Method	Inventory Load Rating (Ton)	Operating Load Rating (Ton)	Inventory Rating Factor	Operating Rating Factor	Inventory Location (ft)
HS 20-44	Lane	LFD	47.04	78.56	1.307	2.182	2389.67
Alternate Military Loading	Axle Load	LFD	56.66	94.62	2.361	3.943	40.84
HS 20-44	Axle Load	LFD	68.92	115.09	1.914	3.197	40.84
2F1	Axle Load	LFD	59.00	98.54	3.934	6.569	40.84
3F1	Axle Load	LFD	61.09	102.03	2.656	4.436	40.84
4F1	Axle Load	LFD	63.07	105.32	2.336	3.901	40.84
5C1	Axle Load	LFD	82.59	137.93	2.065	3.448	2494.17

Rating Results Summary Report

Name: Y BRIDGE SB Bridge ID: SUM-261-10.22L NBI: 7708645S
Struct-Def: SUPERSTRUCTURE... Member: G4 Member Alt:RATING

GIRDER (5) LFD

Live Load	Inventory Location Span-(%)	Operating Location (ft)	Operating Location Span-(%)	Inventory Limit State	Operating Limit State
HS 20-44	15 - (100.0)	2389.67	5 - (100.0)	Design Flexure - Steel	Design Flexure - Steel
Alternate Military Loading	1 - (50.0)	40.84	1 - (50.0)	Design Flexure - Steel	Design Flexure - Steel
HS 20-44	1 - (50.0)	40.84	1 - (50.0)	Design Flexure - Steel	Design Flexure - Steel
2F1	1 - (50.0)	40.84	1 - (50.0)	Design Flexure - Steel	Design Flexure - Steel
3F1	1 - (50.0)	40.84	1 - (50.0)	Design Flexure - Steel	Design Flexure - Steel
4F1	1 - (50.0)	40.84	1 - (50.0)	Design Flexure - Steel	Design Flexure - Steel
5C1	16 - (50.0)	2494.17	16 - (50.0)	Design Flexure - Steel	Design Flexure - Steel

Rating Results Summary Report

Name: Y BRIDGE SB
Struct-Def: GIRDER E SUPER...

Bridge ID: SUM-261-10.22L
Member: G2

NBI: 7708645S
Member Alt:RATING

GIRDER (E)

LFD

Live Load	Live Load Type	Rating Method	Inventory Load Rating (Ton)	Operating Load Rating (Ton)	Inventory Rating Factor	Operating Rating Factor	Inventory Location (ft)
HS 20-44	Lane	LFD	51.81	86.52	1.439	2.403	383.67
Alternate Military Loading	Axle Load	LFD	49.92	83.37	2.080	3.474	40.84
HS 20-44	Axle Load	LFD	52.46	87.61	1.457	2.434	383.67
2F1	Axle Load	LFD	50.63	84.54	3.375	5.636	383.67
3F1	Axle Load	LFD	50.97	85.13	2.216	3.701	383.67
4F1	Axle Load	LFD	51.25	85.59	1.898	3.170	383.67
5C1	Axle Load	LFD	61.35	102.45	1.534	2.561	383.67

* NOTE GIRDER (E) ONLY SPANS 1-4 +14' TO HEADER BEAM

Rating Results Summary Report

Name: Y BRIDGE SB
Struct-Def: GIRDER E SUPER...

Bridge ID: SUM-261-10.22L
Member: G2

NBI: 7708645S
Member Alt:RATING

GIRDER (E) LFD

Live Load	Inventory Location Span-(%)	Operating Location (ft)	Operating Location Span-(%)	Inventory Limit State	Operating Limit State
HS 20-44	5 - (50.0)	383.67	5 - (50.0)	Design Shear - Steel	Design Shear - Steel
Alternate Military Loading	1 - (50.0)	40.84	1 - (50.0)	Design Flexure - Steel	Design Flexure - Steel
HS 20-44	5 - (50.0)	383.67	5 - (50.0)	Design Shear - Steel	Design Shear - Steel
2F1	5 - (50.0)	383.67	5 - (50.0)	Design Shear - Steel	Design Shear - Steel
3F1	5 - (50.0)	383.67	5 - (50.0)	Design Shear - Steel	Design Shear - Steel
4F1	5 - (50.0)	383.67	5 - (50.0)	Design Shear - Steel	Design Shear - Steel
5C1	5 - (50.0)	383.67	5 - (50.0)	Design Shear - Steel	Design Shear - Steel

* NOTE GIRDER (E) ONLY SPANS 1-4 + 14' TO HEADER BEAM

Rating Results Summary Report

Name: Y BRIDGE SB
Struct-Def: GIRDER E SUPER...

Bridge ID: SUM-261-10.22L
Member: G2

NBI: 7708645S
Member Alt:RATING

GIRDER (E) LFD

Live Load	Impact	Lane
HS 20-44	As Requested	As Requested
Alternate Military Loading	As Requested	As Requested
HS 20-44	As Requested	As Requested
2F1	As Requested	As Requested
3F1	As Requested	As Requested
4F1	As Requested	As Requested
5C1	As Requested	As Requested

* NOTE GIRDER (E) ONLY SPANS 1-4 + 14' TO HEADER BEAM

URS

SUBJECT: SUM-261-10.22 L LOAD RATING

BY: DEB

DATE: 11/28/12

REF:

PAGE: OF

COMPUTE DISTRIBUTION FACTORS FOR FLARED END OF SB Y-BRIDGE

① FROM 0'-296'-8" = 4'-9" (A) 10'-7" (E) 10'-7" (B) 10'-11" (C) 10'-11" (D) 3'-9"

② FROM 296'-8" - 390'8" = 4'-9" TO 5'-0" (A) 10'-7" TO 5'-9" (E) 10'-7" TO 5'-9" (B) 10'-11" (C) 10'-11" (D) 3'-9"

③ FROM 390'-8" TO END = 5'-0" (A) 10'-11" (B) 10'-11" (C) 10'-11" (D) 3'-9"

BEAMS (C) AND (D) USE PROGRAM DF AS THEY ARE CONSTANT

ZONE ①

BEAM (A) USE SIMPLE BEAM FOR V/M AS IT SUPPORTS SW.

1ST WHL @ 10'-10" FROM L EDGE = 4'-6"/10'-7" = 0.425

DEFLECTION = 1 LANE => 2 WHLS / 5 BMS = 0.40
2 OR MORE => 2 WHLS x 3 LNS x 0.90 / 5 BMS = 1.08

BEAM (E) SEE ATTACHMENT #1 FOR CALCS

BEAM (B) SEE ATTACHMENT #2 FOR CALCS

ZONE ③

BEAM (A) USE SIMPLE BEAM FOR V/M AS IT SUPPORTS SW

1ST WHL @ 10'-10" FROM L EDGE = 5'-1"/10'-11" = 0.466

DEFLECTION = 1 LANE => 2 WHLS / 4 BMS = 0.50
2 OR MORE => 2 WHLS x 2 LNS x 1.0 / 4 BMS = 1.0

BEAM (B) SEE ATTACHMENT #3 FOR CALCS

URS

SUBJECT: SUM -261- 10,22L LOAD RATING

BY: DEB

DATE: 11/28/12

REF:

PAGE: OF

DISTRIBUTION FACTORS CONT

ZONE (2) VARIES ZONE (1) TO FOLLOWING

BEAM (A) USE SIMPLE BEAM FOR V/M AS IT SUPPORTS SW

1ST WHL @10'-10" FROM L EDGE = NO LL TO (A) AT THIS PT

DEFLECTION : 1 LANE => 2WHLS/5BMS = 0.90
2 OR MORE => 2WHLS x 2LNS x 0.90/5BMS = 0.72] - (E) & (B) ALSO

BEAM (E) USE SIMPLE BEAM FOR V@ SUPPORT

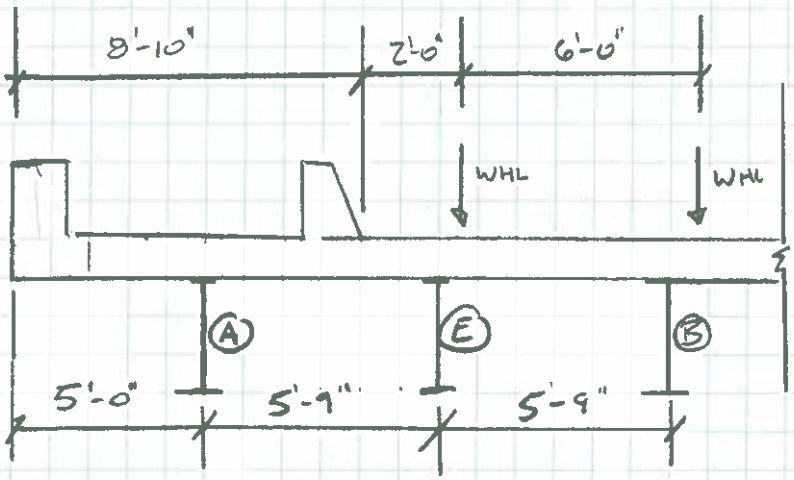
1ST WHL @ 10'-10" FROM L EDGE = 5'-8"/5'-9" = 0.99

V/M = 1LN = 5'-9"/7 = 0.821 2 OR MORE = 5'-4"/5.5 = 1.05

BEAM (B)

V@ SUPPORT = 1 + 4'-11"/10'-11" = 1.450

V/M = 1LN = 8'-4"/7 = 1.190 2 OR MORE = 8'-4"/5.5 = 1.515



ATTACHMENT #1

RATING Std Dist Factor

```
**********************************************************************
** Note that this file contains the distribution factors            **
** computed by the Virtis wizard based on the bridge description    **
** in Virtis on the date and time below.  These computed values     **
** may not match those shown in Virtis if the user has changed      **
** the Virtis bridge description after these distribution           **
** factors were computed.                                           **
**********************************************************************
```

Bridge: Y BRIDGE SB
Bridge ID: SUM-261-10.22L NBI Structure ID: 7708645S
BID: 30

Superstructure Def: SUPERSTRUCTURE SPANS 1-4
Member: DE
Member Alternative: RATING

Date: 11/28/2012 Time: 04:04:09 PM

AASHTO Standard Specifications for Highway Bridges, Seventeenth Edition - 2002

Article 3.12 Reduction in Load Intensity

3 Lane Reduction Factor = 0.90
4 or more Lane Reduction Factor = 0.75

Simple Beam Distribution

Compute Simple Beam Deck Distribution Factors

DF = 1.43

Number Lanes Loaded = 1

Truck Wheel Positions from Left Edge of Deck

Truck	Left Wheel (ft)	Right Wheel (ft)
1	15.33	21.33

DF = 1.72

Number Lanes Loaded = 3

Truck Wheel Positions from Left Edge of Deck

Truck	Left Wheel (ft)	Right Wheel (ft)
1	10.83	16.83
2	22.83	28.83
3	34.83	40.83

```
============================
Moment Distribution Factors
============================

---------------------------------------
Concrete Deck on Interior Beams
(Article 3.23.2.2 and Table 3.23.1)
---------------------------------------

Check Range of Applicability
----------------------------
Input:
S =   10.58  (ft)          s <= 10.0: One Lane FAILED
                           s <= 16.0: Multi Lane PASSED


******* WARNING! *********
One or more range of applicability checks failed.
The simple beam distribution factors will be used as necessary


Compute Moment Distribution Factors
-----------------------------------
Input:
S =   10.58  (ft)

One Design Lane Loaded:
Use Simple Beam DF =   1.43 Wheels

Two or More Design Lanes Loaded:
DF = S/  5.50 =       1.92 Wheels


============================
Shear Distribution Factors
============================

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Concrete Deck on Interior Beams
(Article 3.23.1.2)
--------------------------------
Same as moment distribution factors:

One Design Lane Loaded:
DF =   1.43 Wheels

Two or More Design Lanes Loaded:
DF =   1.92 Wheels


=====================================
Shear at Supports Distribution Factors
=====================================
Use simple beam distribution factors:

One Design Lane Loaded:
DF =   1.43 Wheels

Two or More Design Lanes Loaded:
DF =   1.72 Wheels
```

Deflection Distribution Factors

Compute Deflection Distribution Factors

Input:
Number Lanes = 3
Reduction Factor = 0.90
Number Beams = 5

One Design Lane Loaded:
DF = 2.0/Number beams = 2.0/5 = 0.40 Wheels

Two or More Design Lanes Loaded:
DF = 2.0 * Number Lanes * Reduction Factor/ Number beams = (2.0 * 3 * 0.90)/5 = 1.08 Wheels

ATTACHMENT #2

RATING Std Dist Factor

```
**********************************************************************
** Note that this file contains the distribution factors            **
** computed by the Virtis wizard based on the bridge description    **
** in Virtis on the date and time below.  These computed values     **
** may not match those shown in Virtis if the user has changed      **
** the Virtis bridge description after these distribution           **
** factors were computed.                                           **
**********************************************************************
```

Bridge: Y BRIDGE SB
Bridge ID: SUM-261-10.22L NBI Structure ID: 7708645S
BID: 30

Superstructure Def: SUPERSTRUCTURE SPANS 1-4
Member: ~~GX~~ (B)
Member Alternative: RATING

Date: 11/28/2012 Time: 04:14:27 PM

AASHTO Standard Specifications for Highway Bridges, Seventeenth Edition - 2002

Article 3.12 Reduction in Load Intensity

3 Lane Reduction Factor = 0.90
4 or more Lane Reduction Factor = 0.75

Simple Beam Distribution

Compute Simple Beam Deck Distribution Factors

DF = 1.45

Number Lanes Loaded = 1

Truck Wheel Positions from Left Edge of Deck

Truck	Left Wheel (ft)	Right Wheel (ft)
1	25.92	31.92

DF = 2.15

Number Lanes Loaded = 2

Truck Wheel Positions from Left Edge of Deck

Truck	Left Wheel (ft)	Right Wheel (ft)
1	19.92	25.92
2	29.92	35.92

```
============================
Moment Distribution Factors
============================

---------------------------------------
Concrete Deck on Interior Beams
(Article 3.23.2.2 and Table 3.23.1)
---------------------------------------

Check Range of Applicability
----------------------------
Input:
S =   10.75  (ft)          s <= 10.0: One Lane FAILED
                           s <= 16.0: Multi Lane PASSED


******* WARNING! *********
One or more range of applicability checks failed.
The simple beam distribution factors will be used as necessary


Compute Moment Distribution Factors
-----------------------------------
Input:
S =   10.75  (ft)

One Design Lane Loaded:
Use Simple Beam DF =   1.45 Wheels

Two or More Design Lanes Loaded:
DF = s/  5.50 =       1.95 Wheels


============================
Shear Distribution Factors
============================

--------------------------------
Concrete Deck on Interior Beams
(Article 3.23.1.2)
--------------------------------
Same as moment distribution factors:

One Design Lane Loaded:
DF =   1.45 Wheels

Two or More Design Lanes Loaded:
DF =   1.95 Wheels


====================================
Shear at Supports Distribution Factors
====================================
Use simple beam distribution factors:

One Design Lane Loaded:
DF =   1.45 Wheels

Two or More Design Lanes Loaded:
DF =   2.15 Wheels


================================
```

Deflection Distribution Factors
==========

Compute Deflection Distribution Factors

Input:
Number Lanes = 3
Reduction Factor = 0.90
Number Beams = 5

One Design Lane Loaded:
DF = 2.0/Number beams = 2.0/5 = 0.40 Wheels

Two or More Design Lanes Loaded:
DF = 2.0 * Number Lanes * Reduction Factor/ Number beams = (2.0 * 3 * 0.90)/5 = 1.08 Wheels

ATTACHMENT #3

RATING Std Dist Factor

```
**********************************************************************
** Note that this file contains the distribution factors            **
** computed by the Virtis wizard based on the bridge description    **
** in Virtis on the date and time below.  These computed values     **
** may not match those shown in Virtis if the user has changed      **
** the Virtis bridge description after these distribution           **
** factors were computed.                                           **
**********************************************************************
```

Bridge: Y BRIDGE SB
Bridge ID: SUM-261-10.22L NBI Structure ID: 7708645S
BID: 30

Superstructure Def: SUPERSTRUCTURE SPANS 1-20
Member: G2 (5)
Member Alternative: RATING

Date: 11/28/2012 Time: 03:18:26 PM

AASHTO Standard Specifications for Highway Bridges, Seventeenth Edition - 2002

Article 3.12 Reduction in Load Intensity

3 Lane Reduction Factor = 0.90
4 or more Lane Reduction Factor = 0.75

Simple Beam Distribution

Compute Simple Beam Deck Distribution Factors

DF = 1.45

Number Lanes Loaded = 1

Truck Wheel Positions from Left Edge of Deck

Truck	Left Wheel (ft)	Right Wheel (ft)
1	15.92	21.92

Moment Distribution Factors

Concrete Deck on Interior Beams
(Article 3.23.2.2 and Table 3.23.1)

Check Range of Applicability

Input:
S = 10.92 (ft) s <= 10.0: One Lane FAILED
s <= 16.0: Multi Lane PASSED

******* WARNING! *********
One or more range of applicability checks failed.
The simple beam distribution factors will be used as necessary

Compute Moment Distribution Factors

Input:
S = 10.92 (ft)

One Design Lane Loaded:
Use Simple Beam DF = 1.45 Wheels

Two or More Design Lanes Loaded:
DF = s/ 5.50 = 1.98 Wheels

==========
Shear Distribution Factors
==========

Concrete Deck on Interior Beams
(Article 3.23.1.2)

Same as moment distribution factors:

One Design Lane Loaded:
DF = 1.45 Wheels

Two or More Design Lanes Loaded:
DF = 1.98 Wheels

==========
Shear at Supports Distribution Factors
==========
Use simple beam distribution factors:

One Design Lane Loaded:
DF = 1.45 Wheels

Two or More Design Lanes Loaded:
DF = 1.82 Wheels

==========
Deflection Distribution Factors
==========

Compute Deflection Distribution Factors

Input:
Number Lanes = 2
Reduction Factor = 1.00
Number Beams = 4

One Design Lane Loaded:
DF = 2.0/Number beams = 2.0/4 = 0.50 Wheels

Two or More Design Lanes Loaded:

RATING Std Dist Factor

DF = 2.0 * Number Lanes * Reduction Factor/ Number beams = (2.0 * 2 * 1.00)/4 = 1.00 Wheels