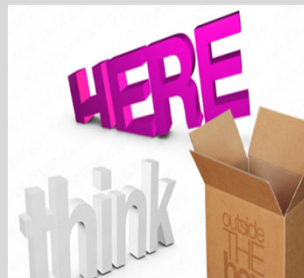


# Building a better mousetrap..... I mean bridge

## Restoring CR 573 over the Sturgeon River

(The Post Construction Shear Stud Project)



1-Unit = 42 tons -> Legal  
2-Unit = 77 tons -> Legal  
3-Unit = 82 tons -> Legal

+Class A Overload



# Definition of a Civil Engineer

## **Engineer** (en-juh-nēr) - Noun

1. One who solves problems that you didn't know you had, using methods you don't understand.
  2. One who does precision guesswork based on unreliable data provided by those of questionable knowledge.
  3. One who get excited about things nobody else cares about.
- *See also **wizard, magician***

## **Civil Engineer** (sivil en-juh-nēr) - Noun

1. Someone who designs and builds stuff based on assumptions that make no sense at all but somehow work.
  2. Like a regular engineer only way cooler.
- *See also **sorcerer, awesome, exceptional***

# CIVIL ENGINEERS



What my friends think I do.



What my mom thinks I do.



What society thinks I do.



What my boss thinks I do.



What construction contractors think I do.



What I think I do.



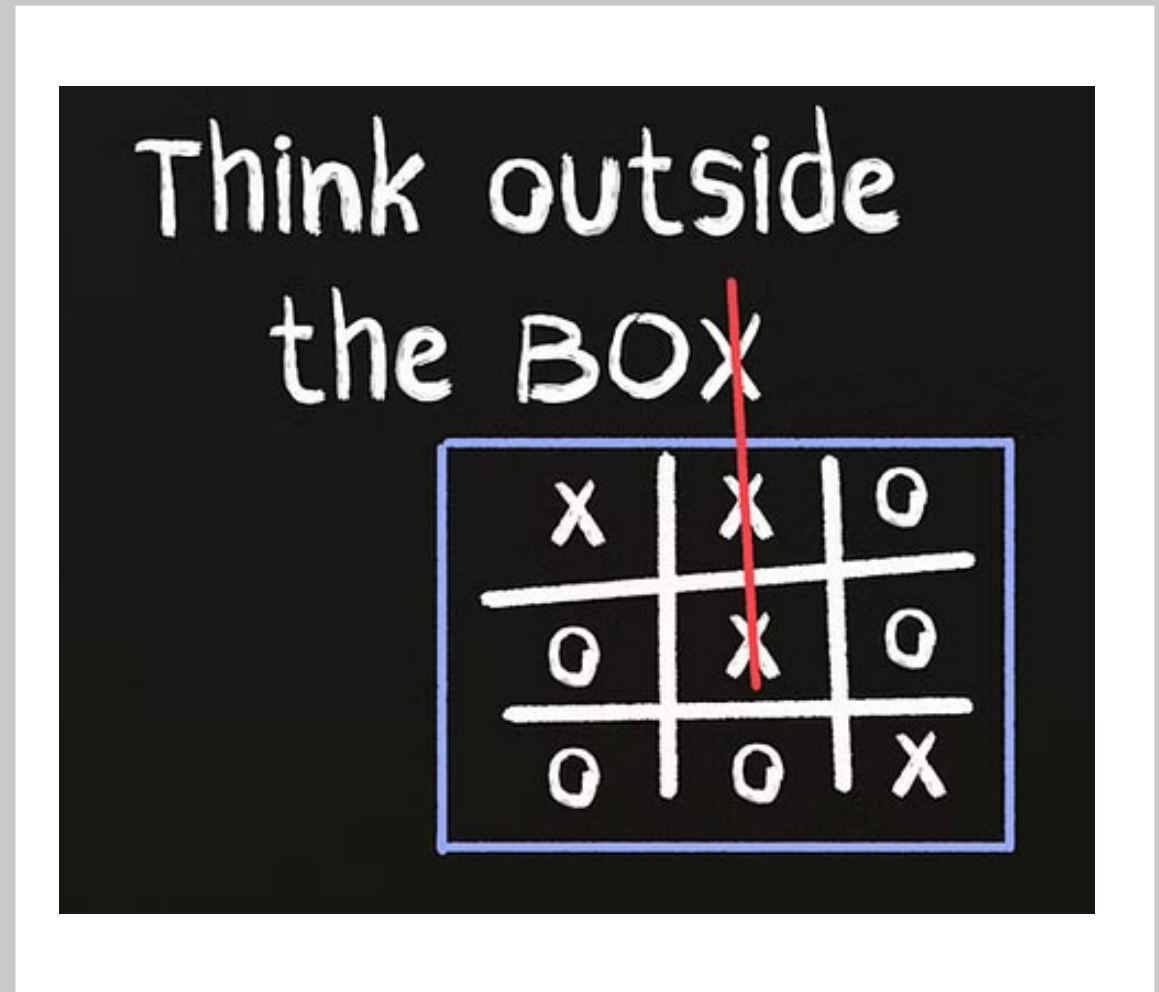
What I really do.

- **Engineer –**

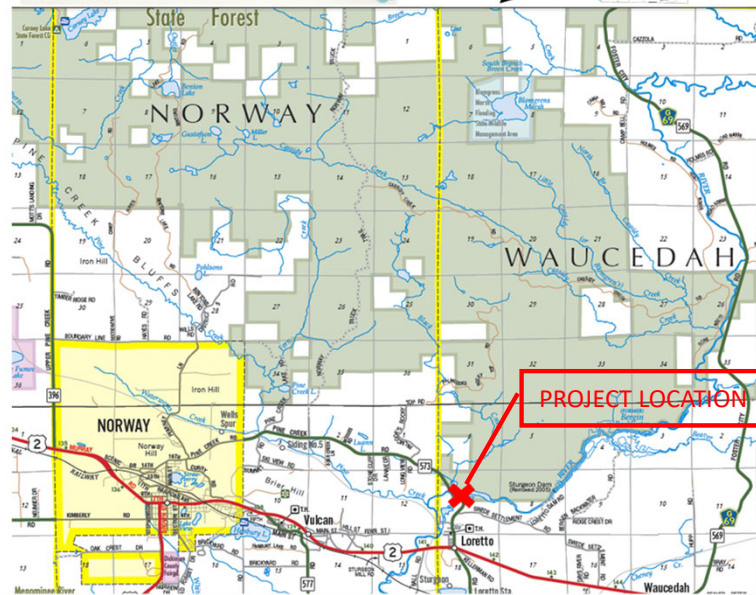
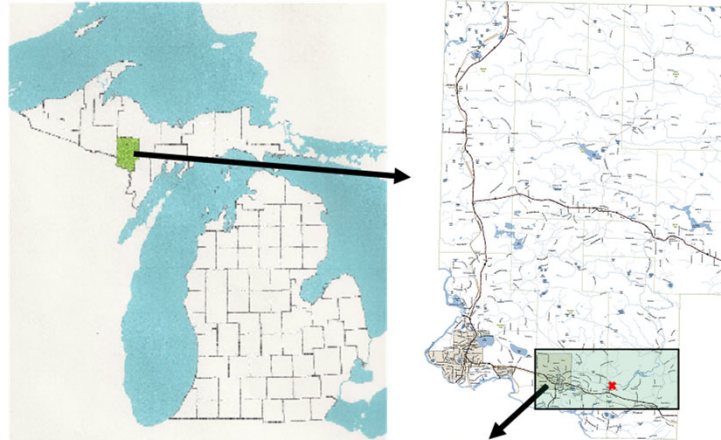
1. One who solves problems that you didn't know you had, using methods you don't understand.
2. One who does precision guesswork based on unreliable data provided by those of questionable knowledge.
3. One who get excited about things nobody else cares about.

- **Civil Engineer -**

1. Someone who designs and builds stuff based on assumptions that make no sense at all but somehow work.
2. Like a regular engineer only way cooler.

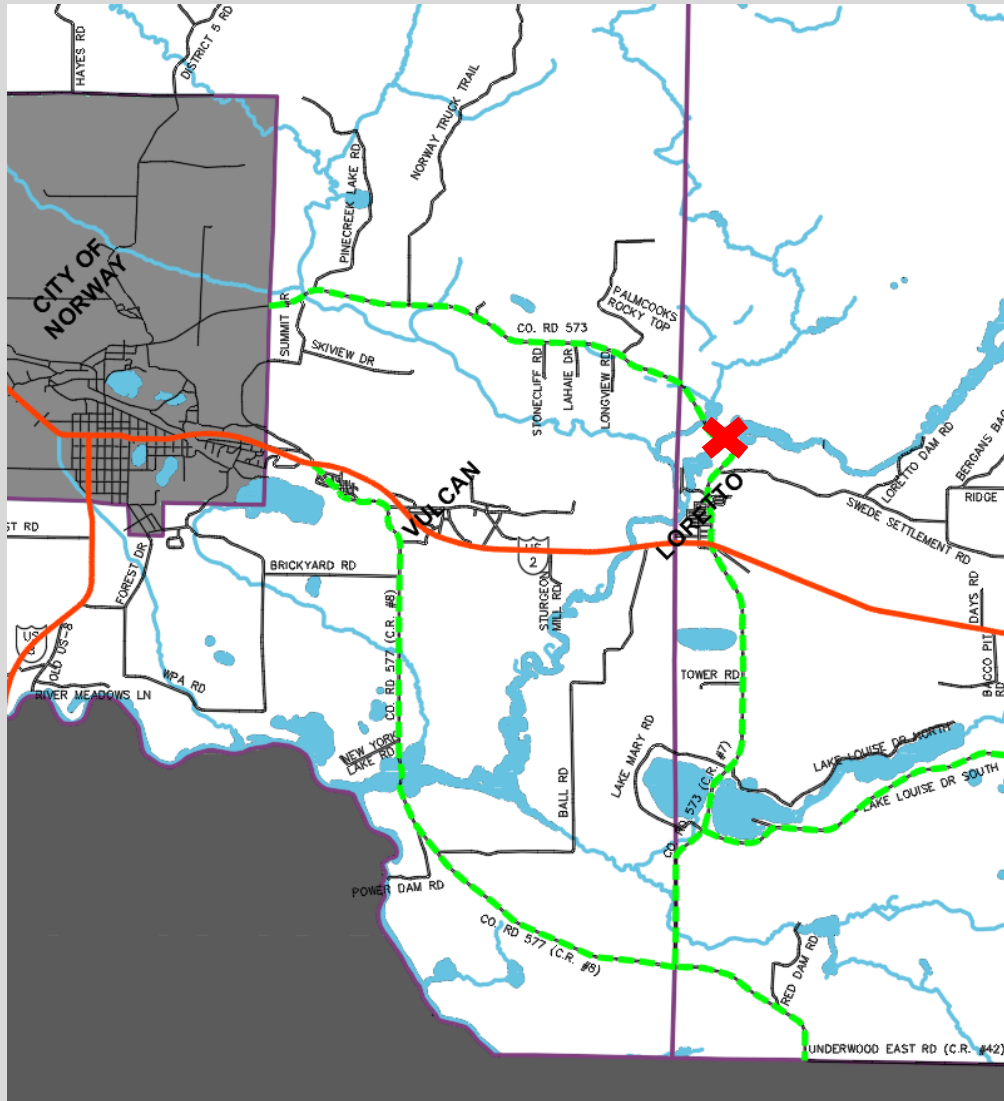


**COUNTY ROAD 573 OVER THE STURGEON RIVER BRIDGE REHABILITATION  
PROJECT, STRUCTURE 2194**  
In Dickinson County, Michigan

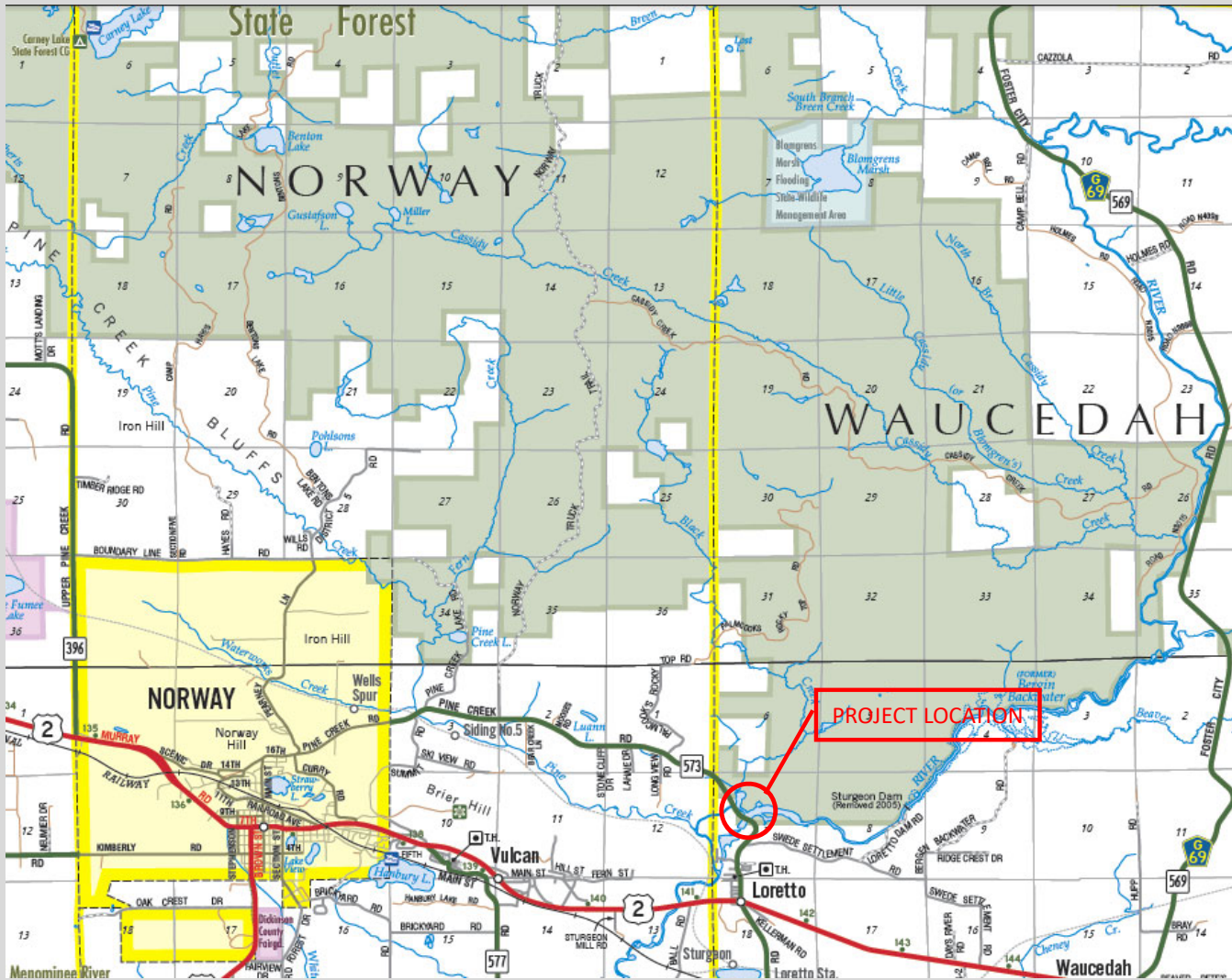


# County Road 573 over the Sturgeon River

- County Road 573 runs from the City of Norway to County Road 577 and 577 south into Menominee County.
- It was the main road in the area, originally constructed prior to most of the state and federal highways in the area.
- It is a rural road with many farms along it.
- It is the logical route for the timber industry to get logs from the interior of Dickinson County to US-2 and beyond.
- With the bridge load posted, all logging trucks, agricultural loads, etc. are forced to travel through downtown Norway.







# County Road 573 over the Sturgeon River

- Highway Bridge 573 over the Sturgeon River was constructed in 1945.
- It is a single span, steel beam superstructure with a concrete deck.
- There are seven W30x108 beams spanning approximately 55 feet supporting a 6 ½ - inch thick concrete deck.
- Minimal work since original construction
  - Only project- 2001 guardrail upgrades and remove and replace the asphalt surface as part of a roadway paving project















**MICHIGAN DEPARTMENT OF TRANSPORTATION  
BRIDGE ANALYSIS GUIDE**

load rating. This would include items such as beam flange or web section loss, deck deterioration, substructure unit section loss or being out of plumb.

In the final instance, a permit application may have been submitted for an overload vehicle to travel over a particular bridge or series of bridges along a proposed route. If a bridge has not been analyzed previously for this particular overload, that task must be completed before a answer to the permit application can be returned.

All load ratings should be performed based on the result of a recent inspection of the bridge and where possible the design and/or as-built plans for the structure must be reviewed.

**Michigan's Heavy Trucks.**

A key feature of Bridge Load Ratings in Michigan is the inclusion of all Michigan legal loads. Michigan law allows the use of trucks that far exceed the federal limit of 80,000 lb. Maximum total weights are not directly controlled by Michigan law; however, weights are indirectly controlled by a combination of maximum legal vehicle lengths, maximum legal axle loads and axle spacing. The combined effect of those items yields legal trucks that can weigh as much as 164,000 lb. Individual axle loads and tandem axle loads have a variety of legal limits based on spacing, but the overall maximums are limited to the federal limits for axle weights.

While it should be noted that a small percentage of commercial vehicles in Michigan operates at greater than the federal limit of 80,000 lb, the concentration of these heavy vehicles varies widely throughout the state. Some rural locations may rarely see a vehicle greater than 80,000 lb, while other areas, such as near an aggregate pit or manufacturing facility may experience frequent passage of heavy vehicles. As noted above, Operating Ratings are to be performed with the inclusion of all Michigan legal loads.

**MICHIGAN DEPARTMENT OF TRANSPORTATION  
BRIDGE ANALYSIS GUIDE**

Michigan Legal Vehicle Load Factors for Strength Limit States, 1000 ADTT						
Truck	Normal Loading		Designated Loading		Special Designated Loading	
	GWV (kips)	Load Factor, γ <sub>LL</sub>	GWV (kips)	Load Factor, γ <sub>LL</sub>	GWV (kips)	Load Factor, γ <sub>LL</sub>
1	33.4	1.65	33.4	1.65	39.0	1.65
2	41.4	1.65	47.4	1.65	45.4	1.65
3	54.4	1.65	54.4	1.65	54.4	1.65
4	67.4	1.65	67.4	1.65	67.4	1.65
5	78.0	1.65	84.0	1.65	84.0	1.65
6	95.4	1.57	101.4	1.51	101.4	1.51
7	113.4	1.40	119.4	1.36	119.4	1.36
8	85.4	1.65	91.4	1.61	91.4	1.61
9	51.4	1.65	51.4	1.65	49.5	1.65
10	59.4	1.65	65.4	1.65	56.4	1.65
11	77.4	1.65	83.4	1.65	67.1	1.65
12	111.4	1.42	117.4	1.37	117.4	1.37
13	119.4	1.36	125.4	1.32	125.4	1.32
14	132.4	1.28	132.4	1.28	132.4	1.28
15	137.4	1.25	143.3	1.22	143.3	1.22
16	132.4	1.28	138.4	1.25	138.4	1.25
17	145.4	1.21	151.4	1.19	151.4	1.19
18	148.0	1.20	154.0	1.18	154.0	1.18
19	111.4	1.42	117.4	1.37	117.4	1.37
20	87.4	1.65	87.4	1.65	87.4	1.65
21	145.4	1.21	151.4	1.19	151.4	1.19
22	155.4	1.17	161.4	1.15	161.4	1.15
23	148.0	1.20	154.0	1.18	154.0	1.18
24	116.0	1.38	122.0	1.34	122.0	1.34
25	158.0	1.16	164.0	1.14	164.0	1.14
26	50.0	1.65	50.0	1.65	50.0	1.65
27	72.0	1.65	72.0	1.65	72.0	1.65
28	80.0	1.65	80.0	1.65	80.0	1.65

Table 4a-2

MICHIGAN DEPARTMENT OF TRANSPORTATION  
BRIDGE ANALYSIS GUIDE

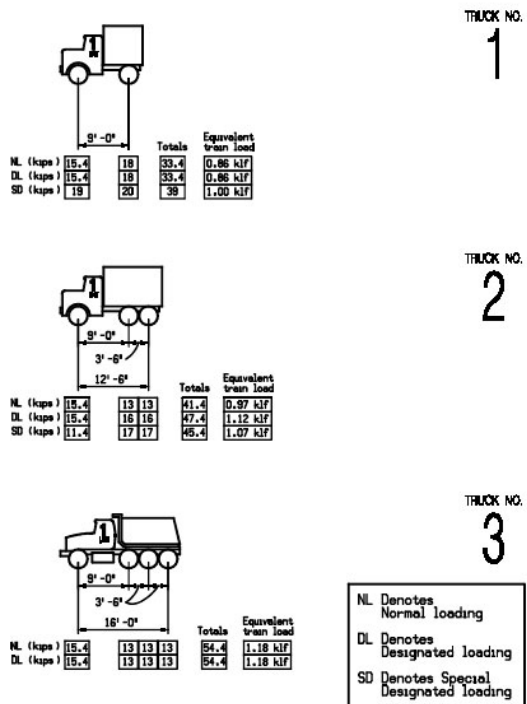


FIGURE 2.1  
Michigan Legal Vehicles

MICHIGAN DEPARTMENT OF TRANSPORTATION  
BRIDGE ANALYSIS GUIDE

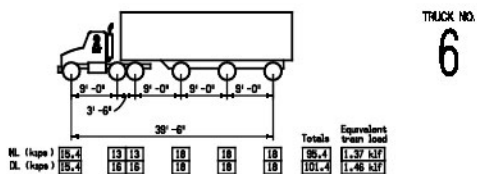
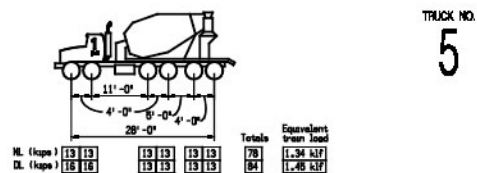
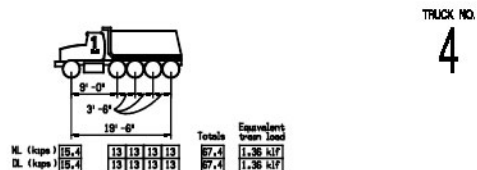


FIGURE 2.1 (Continued)  
Michigan Legal Vehicles

MICHIGAN DEPARTMENT OF TRANSPORTATION  
BRIDGE ANALYSIS GUIDE

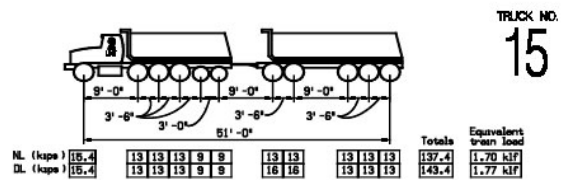
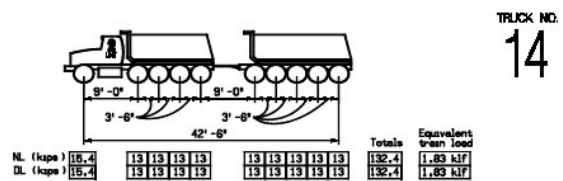
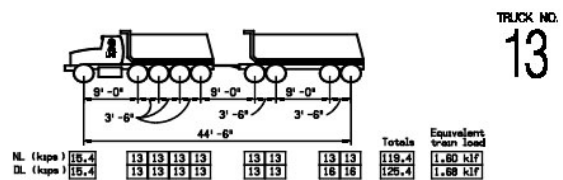


FIGURE 2.1 (Continued)  
Michigan Legal Vehicles

MICHIGAN DEPARTMENT OF TRANSPORTATION  
BRIDGE ANALYSIS GUIDE

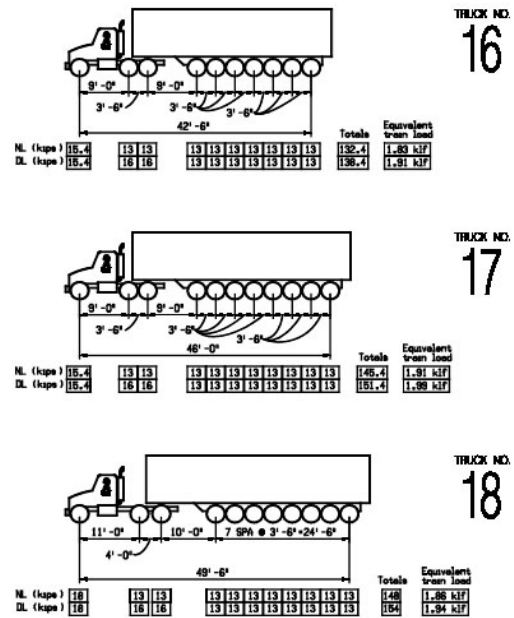


FIGURE 2.1 (Continued)  
Michigan Legal Vehicles

MICHIGAN DEPARTMENT OF TRANSPORTATION  
BRIDGE ANALYSIS GUIDE

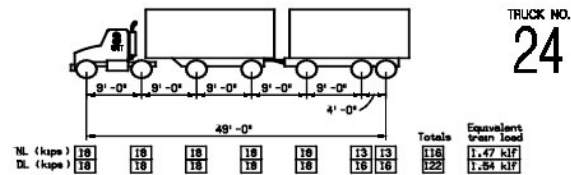
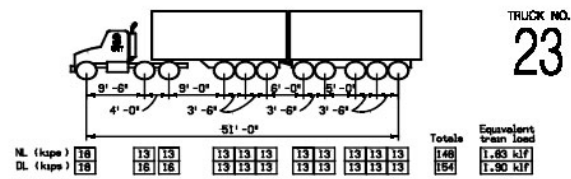
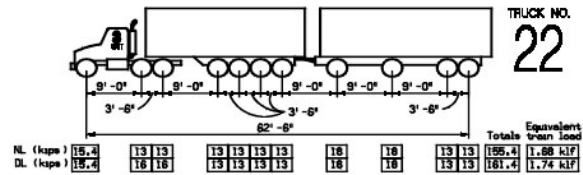
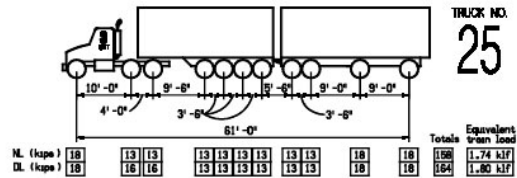
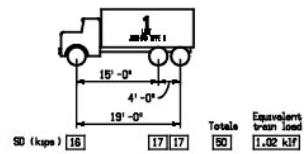


FIGURE 2.1 (Continued)  
Michigan Legal Vehicles

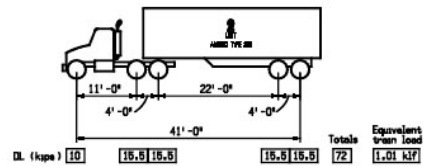
MICHIGAN DEPARTMENT OF TRANSPORTATION  
BRIDGE ANALYSIS GUIDE



TRUCK NO.  
**25**



TRUCK NO.  
**26**



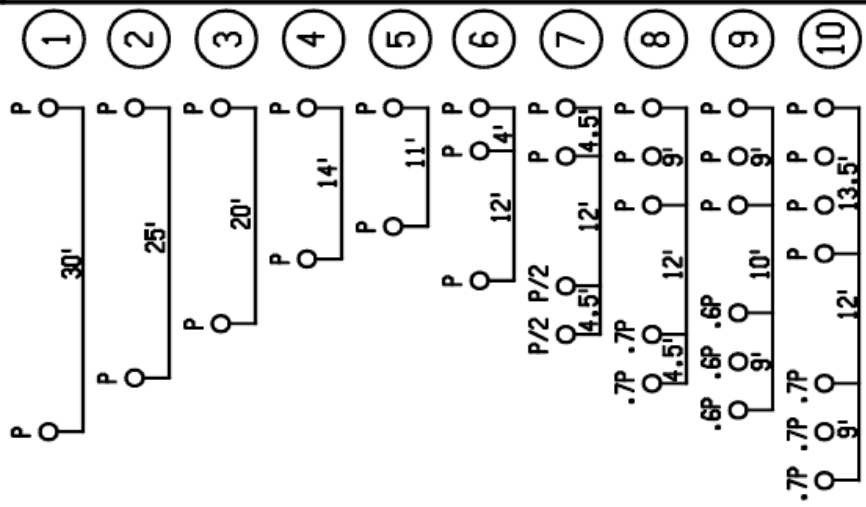
TRUCK NO.  
**27**

FIGURE 2.1 (Continued)  
Michigan Legal Vehicles



## MICHIGAN DEPARTMENT OF TRANSPORTATION BRIDGE ANALYSIS GUIDE

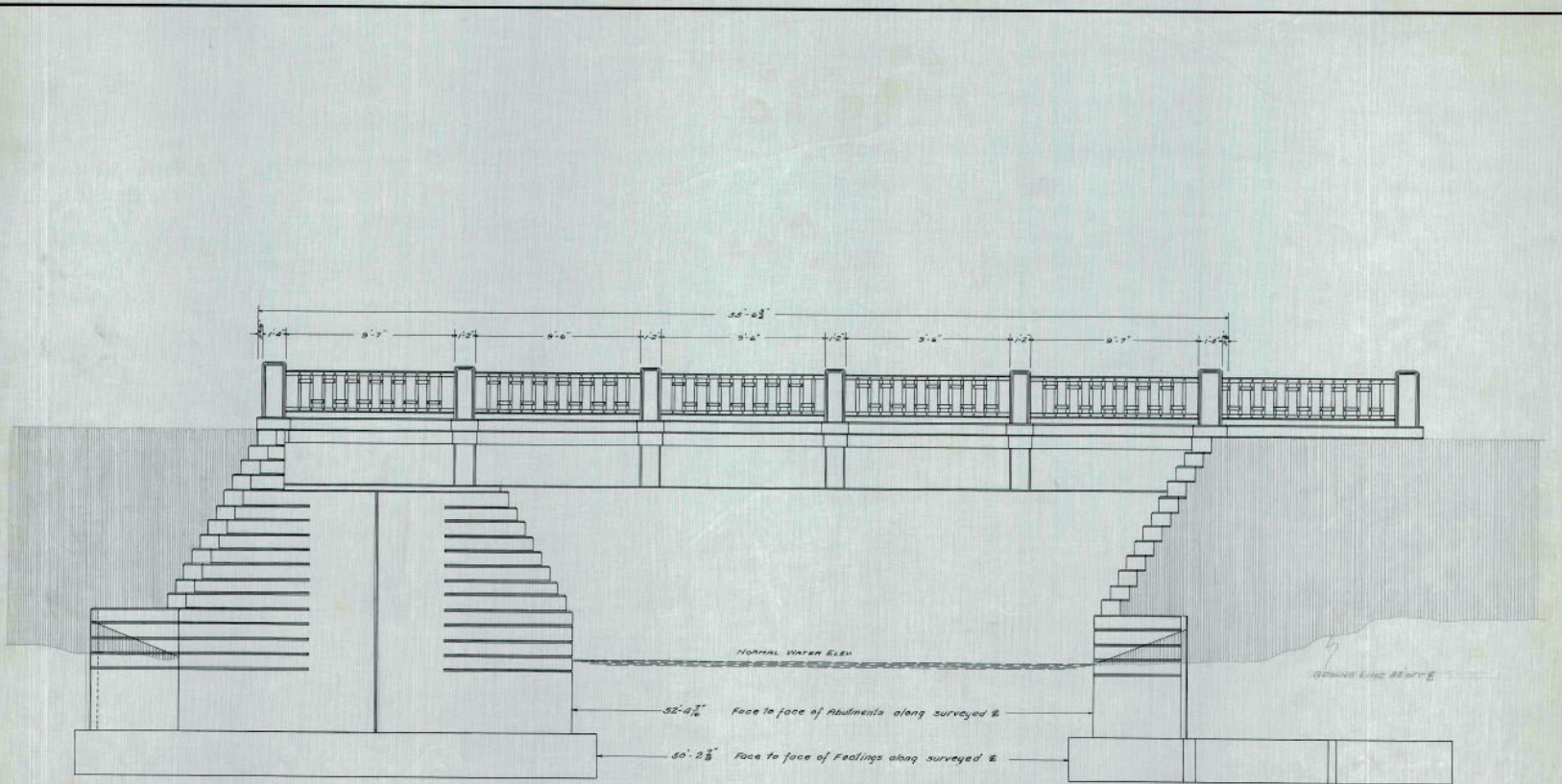
PERMISSIBLE AXLE LOADS (P) <sup>†</sup>					
CLASS A <sup>††</sup>	CLASS B <sup>††</sup>		CLASS C <sup>††</sup>		
	Axle (kips) († tons)	Axle (kips) († tons)	Gross (kips) († tons)	Gross (kips) († tons)	
60	60	60	60	60	60
38	38	38	38	38	38
60	60	60	59	57	57
38	38	38	38	38	38
60	60	60	54	49	49
38	38	38	38	38	38
60	60	60	52	44	44
38	38	38	38	38	38
63	36	54	54	45	45
46	38	57	57	46.5	46.5
34	29	63.8	63.8	52.8	52.8
33	27	64.8	64.8	52.8	52.8
29	24	73.2	73.2	20	61



\* \* \* \* \*

# Project History

- After the 2014 bridge ratings, the question was asked why various county bridges were load rated.
- Many had as the reason deteriorated girder, rotting wood abutments, etc.
- But not CR 573 over the Sturgeon River. This bridge was different.
  - No noticeable materials deficiency
  - It was the design

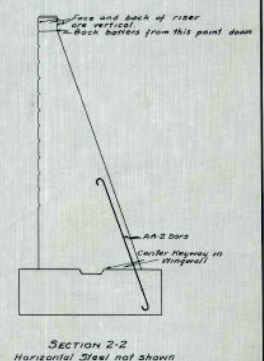
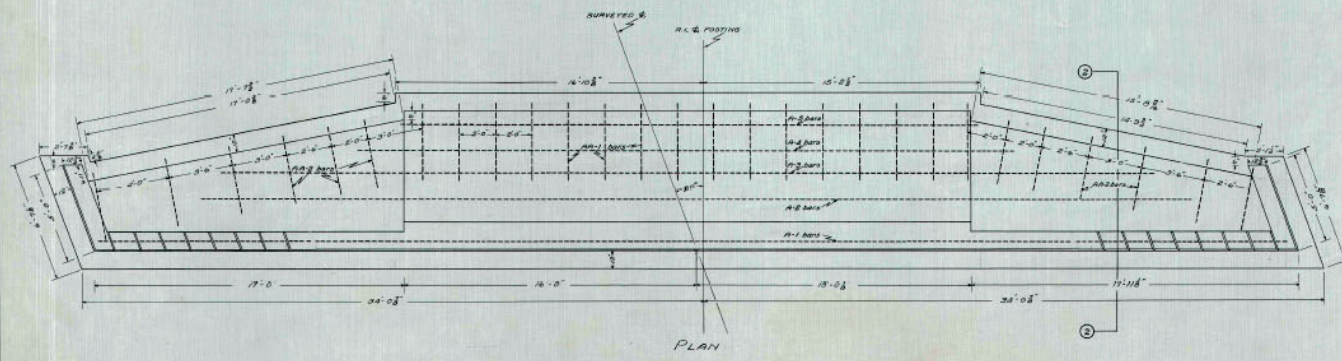
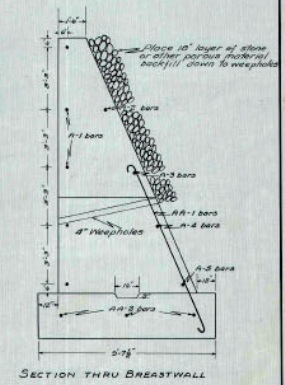
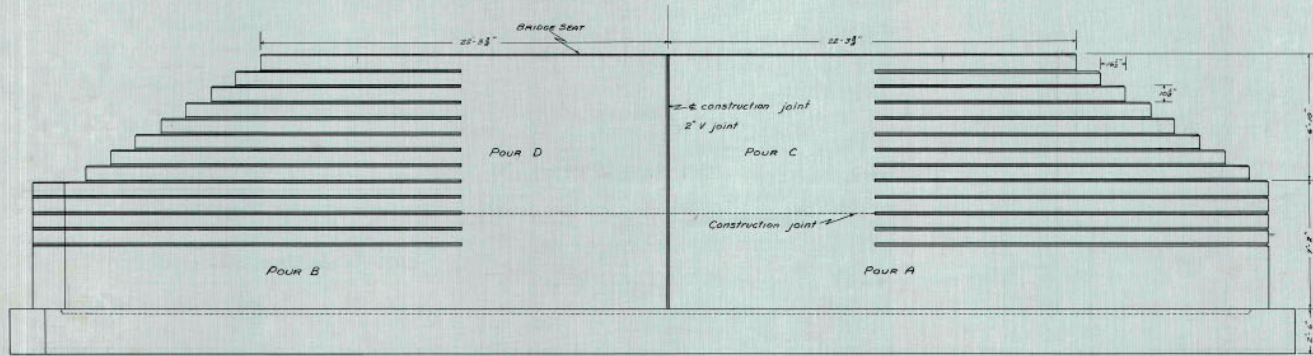
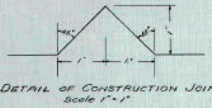


RIGHT ANGLE ELEVATION

DICKINSON CO. ROAD COMMISSION  
**STURGEON RIVER BRIDGE**  
 COUNTY ROAD NO. 7 & STURGEON RIVER  
 SEC. 7 139N - R25W  
 LORETTO MICH  
 55 FT. CLEAR SPAN - STEEL GIRDER DECK  
 5 - 17' 3" ABUTMENTS  
 APPROVED \_\_\_\_\_  
 APPROVED \_\_\_\_\_  
 SCALE AS SHOWN DESIGN: H.L. MADSEN

SHEET No. 1 OF 5

FILE B12 No. 37

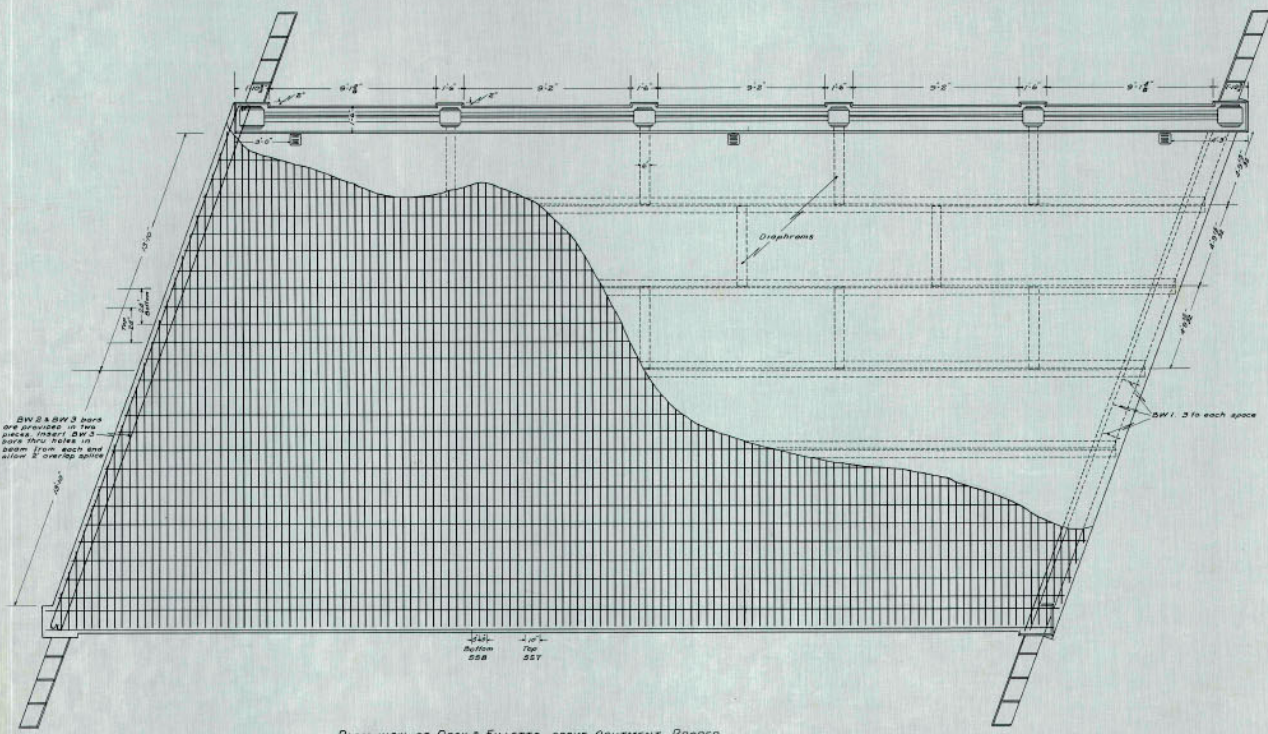


ABUTMENT DETAILS  
SCALE 3/8"=1'-0"

QUANTITY  
Two Postings 107.1 cu yd.  
Two Abutments 200.0 "

SHEET No. 2 of 5

FILE B12 No. 37



SW 2 & SW 3 bars are provided in two sections, insert SW 2 bars into ends of beam from each end and allow 2" overlap section

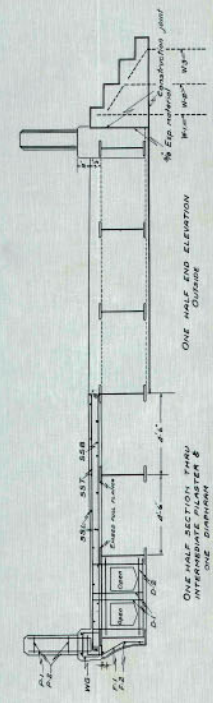
1/4" SW 2  
Bottom  
SSB

1/2" SW 3  
Top  
SSY

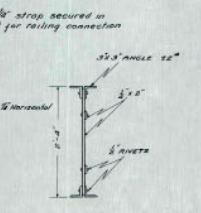
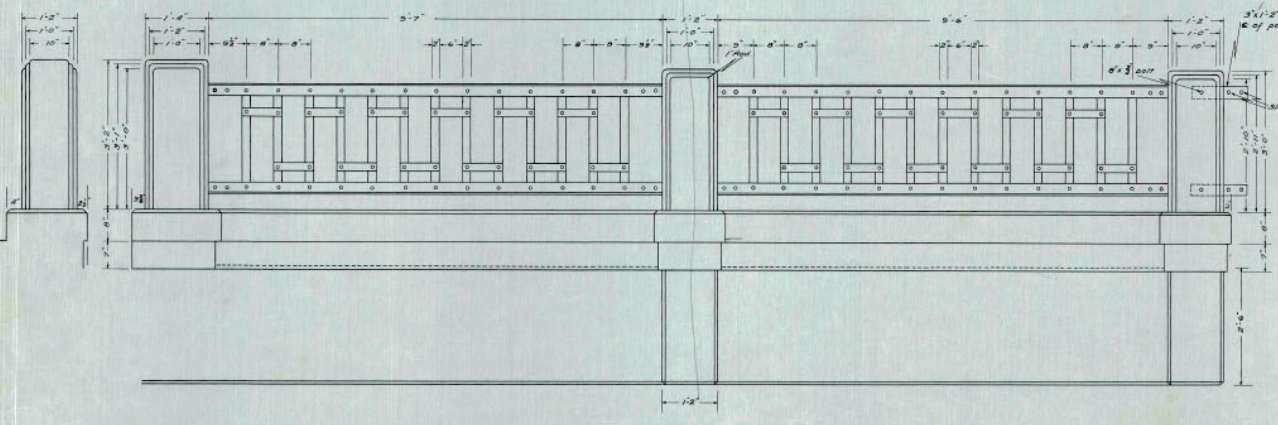
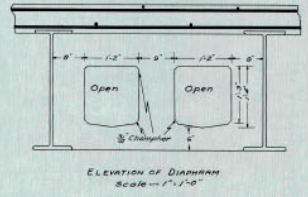
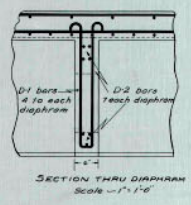
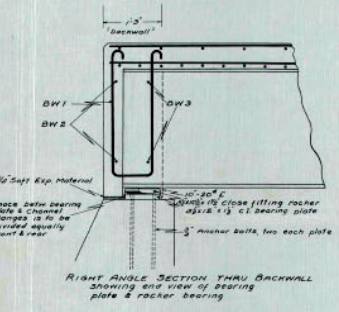
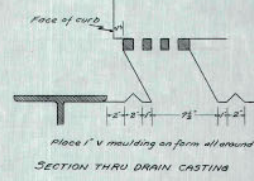
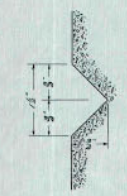
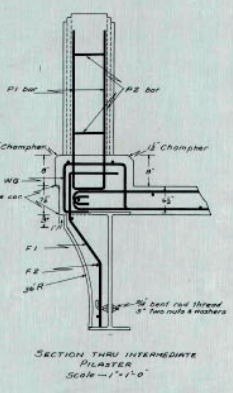
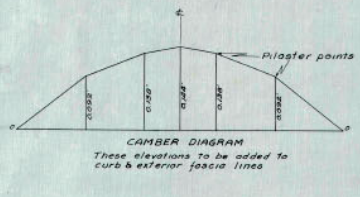
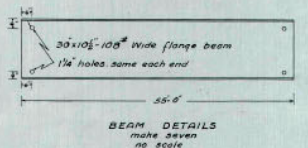
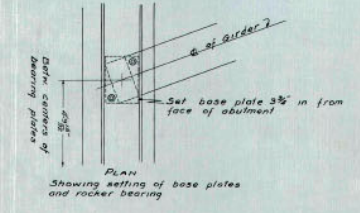
PLAN VIEW OF DECK & FILLETS ABOVE ABUTMENT PROPER  
SHOWING DECK STEEL ONLY  
SCALE - 1/4" = 1'-0"

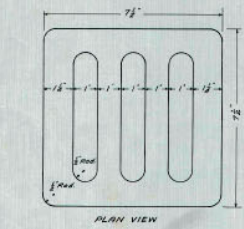
**SUPERSTRUCTURE**

607 cu yds CONCRETE

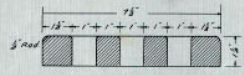


RIGHT ANGLE SECTION & ELEVATION

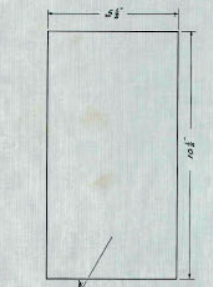




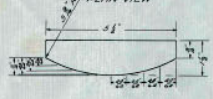
PLAN VIEW



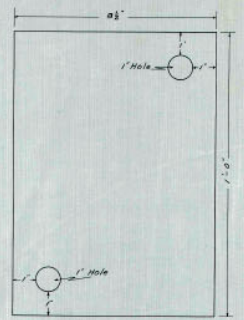
DRAIN CASTING CROSS SECTION Scale - 1" = 2'



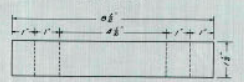
PLAN VIEW



ROCKER BEARING END VIEW Scale - 1" = 2'



PLAN VIEW



BEARING PLATE END VIEW Scale - 1" = 2'

To be constructed of GRAY IRON in accordance with the requirements of the Tentative Specifications for GRAY IRON CASTINGS, A.S.T.M. Designation 48B-32T. DICKINSON COUNTY, MICHIGAN.

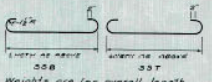
BAR SCHEDULE

502 3/8"		537 3/8"	
NO	LENGTH	NO	LENGTH
2	2'-0"	1	2'-0"
2	3'-7 1/2"	1	3'-7 1/2"
2	4'-3 1/2"	1	4'-3 1/2"
2	5'-2 1/2"	1	5'-2 1/2"
2	6'-7"	1	6'-7"
2	7'-0 1/2"	1	7'-0 1/2"
2	8'-0 1/2"	1	8'-0 1/2"
2	10'-0 1/2"	1	10'-0 1/2"
2	11'-2"	1	11'-2"
2	12'-3 1/2"	1	12'-3 1/2"
2	13'-4 1/2"	1	13'-4 1/2"
2	14'-7 1/2"	1	14'-7 1/2"
2	15'-2"	1	15'-2"
2	16'-10 1/2"	1	16'-10 1/2"
2	18'-0 1/2"	1	18'-0 1/2"
2	19'-2 1/2"	1	19'-2 1/2"
2	20'-4"	1	20'-4"
2	21'-3 1/2"	1	21'-3 1/2"
2	22'-7 1/2"	1	22'-7 1/2"
2	23'-0 1/2"	1	23'-0 1/2"
2	24'-11"	1	24'-11"
2	26'-0 1/2"	1	26'-0 1/2"
2	27'-2 1/2"	1	27'-2 1/2"
109	20'-2 1/2"	58	28'-4 1/2"
	466.470		1029.100
			TOTAL WT. 1495.570

BAR	SIZE	LENGTH	NO	WEIGHT
A-1	3/8"	66'-4"	10	961.31
A-2	1/2"	54'-5"	2	163.47
A-3	3/4"	51'-5"	2	153.98
A-4	3/8"	39'-0"	2	114.15
A-5	3/8"	31'-5"	2	55.38
AA-1	3/8"	5'-0"	32	482.69
AA-2	3/8"	7'-9"	24	317.11
AA-3	3/4"	34'-0"	10	510.00
BW-1	1/2"	7'-2 1/2"	36	173.57
BW-2	1/2"	10'-3"	4	50.65
BW-3	1/2"	14'-3"	4	39.96
D-1	1/2"	6'-7 1/2"	104	460.61
D-2	1/2"	4'-4"	182	526.83
F-1	1/2"	5'-3"	8	28.06
F-2	1/2"	11"	24	147.0
P-1	1/2"	7'-6"	24	117.57
P-2	1/2"	3'-7"	24	87.46
WG-1	1/2"	5'-9 1/2"	157	607.60
SSL	1/2"	20'-2"	70	1332.66
WH-1	1/2"	4'-0"	4	16.03
WH-2	1/2"	4'-0"	4	16.03
WH-3	1/2"	4'-6"	4	12.02
			TOTAL WT.	6272.66

GENERAL NOTES

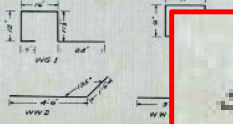
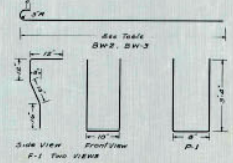
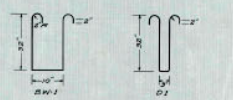
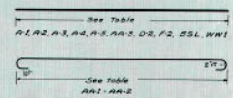
Concrete Mix to be as follows:  
 Footings 1:2:5  
 Abutments 1:2:4  
 Deck 1:2:3  
 Concrete is to be vibrated by striking the forms with light blows of a 2" wooden mallet. Concrete in abutments is to be deposited in a circle so as to prevent the rustication strips in the abutments where they occur. No spalling against the front forms, this must be done by tamping or ramming. The abutment form is to be entirely set and concrete cast in place as indicated on plans to eliminate excess pressure. Form ties in the bottom 7 feet of abutment are to be 1/2" round iron used with threaded form right-ends. Plumbs consisting of angular rack or split shoulders not in excess of 50 cubic feet may be used up to 10% of the concrete in footings and abutments. Plumbs must be at least 24" apart both ways.



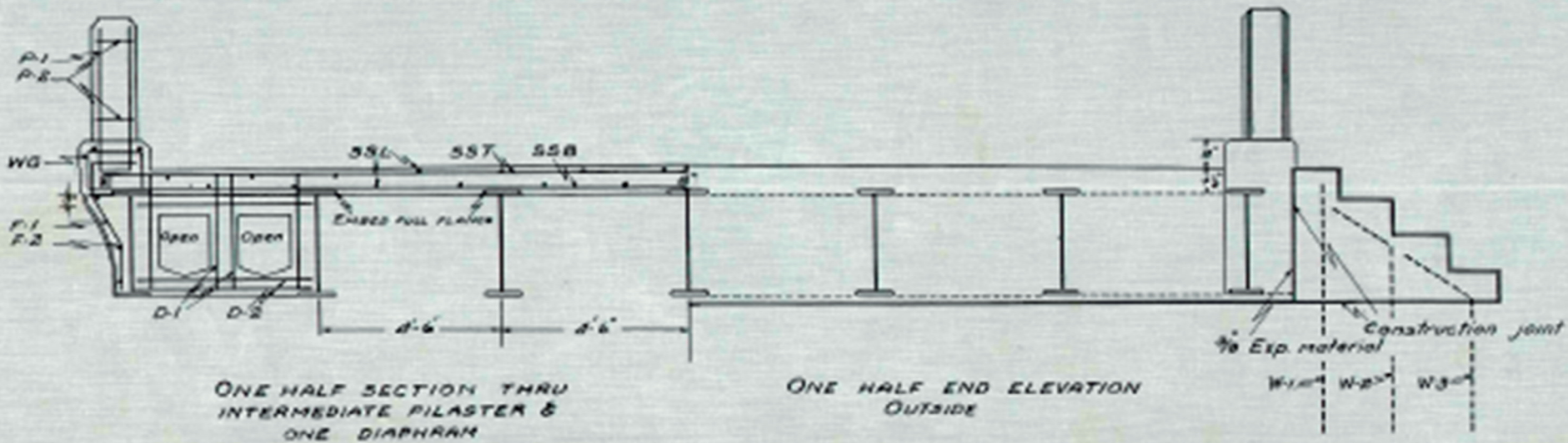
Weights are for overall length

1/2" ROUND SMOOTH MILD STEEL  
 25 Each @ A = 9'-6"  
 25 Each @ A = 9'-0"  
 25 Each @ A = 8'-0"  
 Tie Rods  
 TOTAL WT. = 422.55\*

NOTE - Weight of reinforcing bars is computed according to standard practice of the Concrete Reinforcing Steel Institute as adopted in 1934 to supersede former practice.



SHEET NO. 3 OF 3



ONE HALF SECTION THRU  
INTERMEDIATE PILASTER &  
ONE DIAPHRAM

ONE HALF END ELEVATION  
OUTSIDE

RIGHT ANGLE SECTION & ELEVATION

PLAN VIEW OF DECK & FILLETS ABOVE ABUTMENT PROPER  
SHOWING DECK STEEL ONLY  
SCALE - 1/4" = 1'-0"

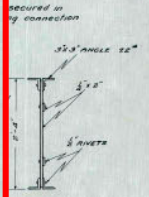
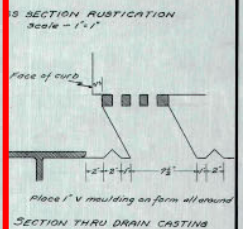
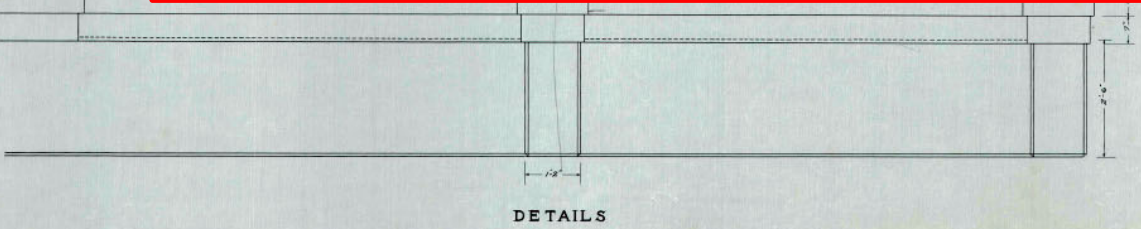
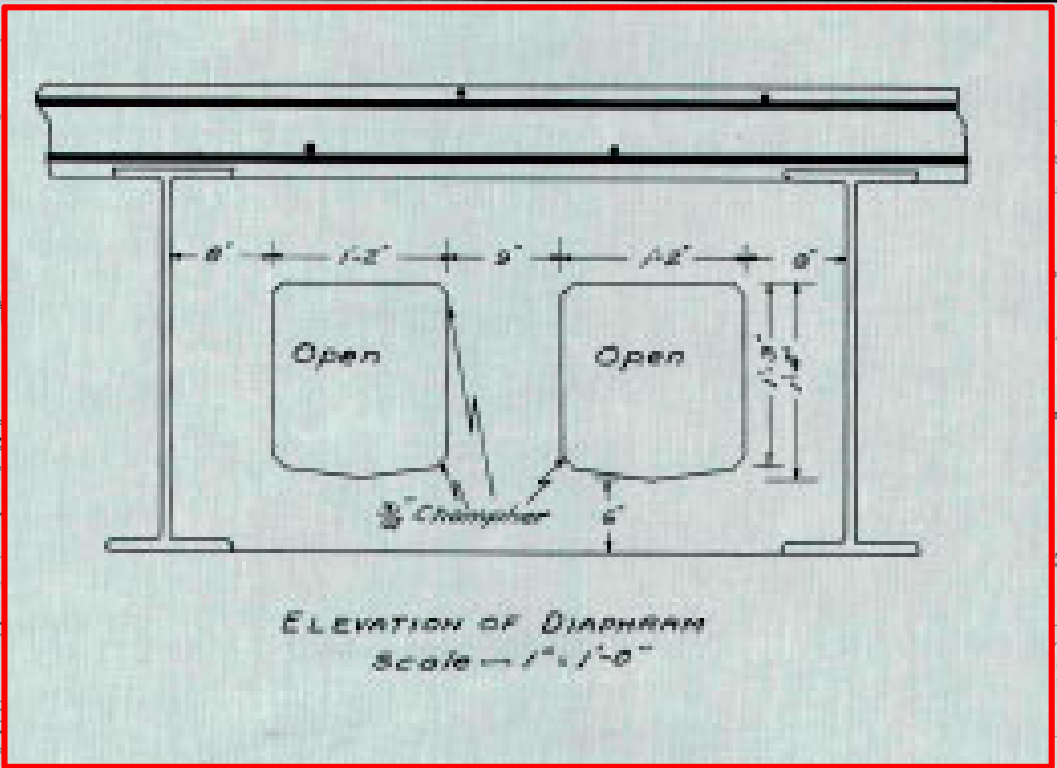
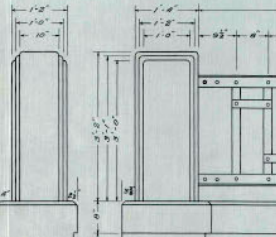
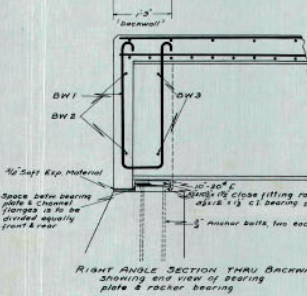
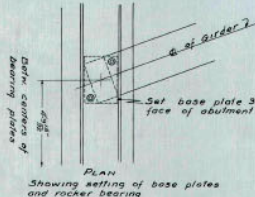
SUPERSTRUCTURE

607 cu yds CONCRETE

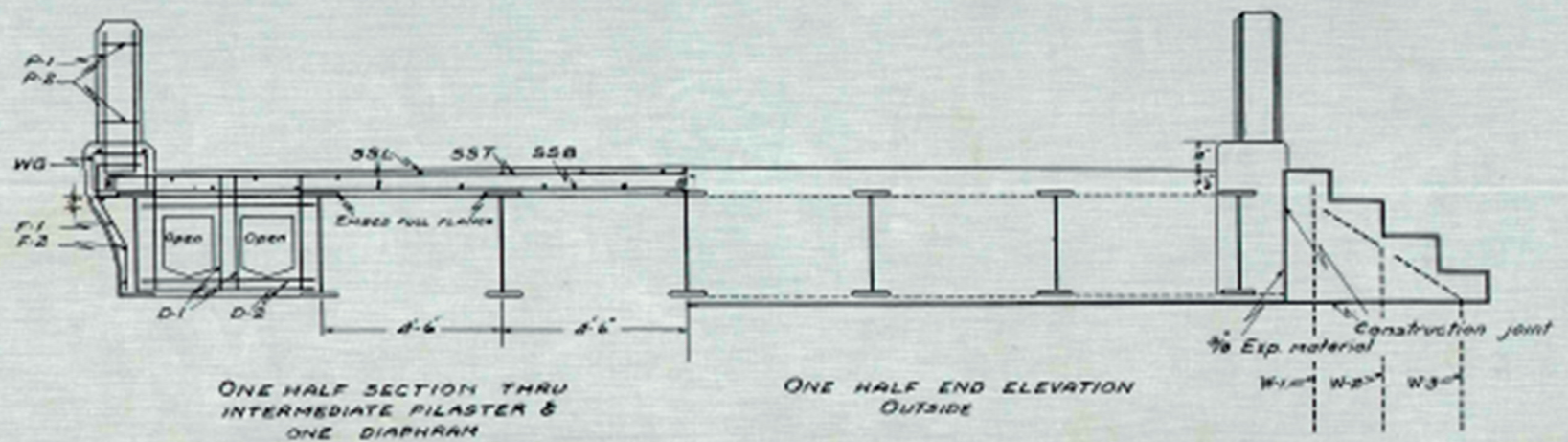
SHEET No. 3 of 5

FILE B12 No.37

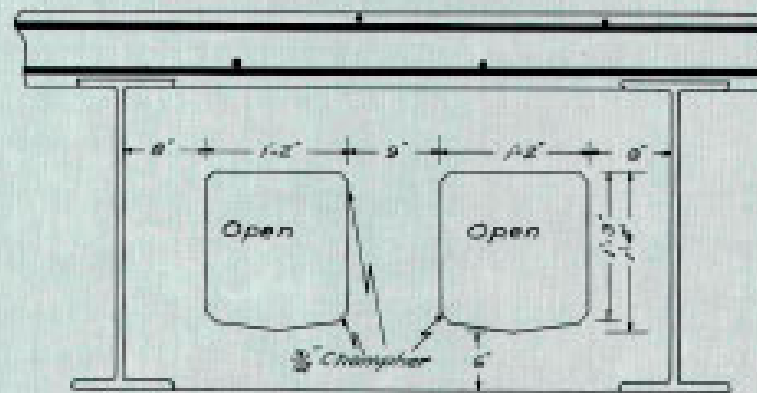




SHEET No 4 of 5

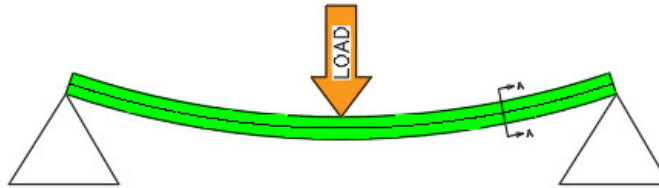


RIGHT ANGLE SECTION & ELEVATION



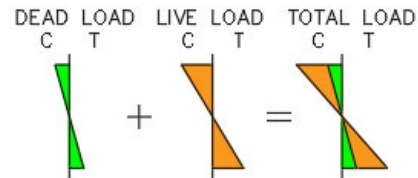
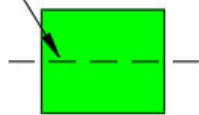
ELEVATION OF DIAPHRAM  
Scale - 1" = 1'-0"

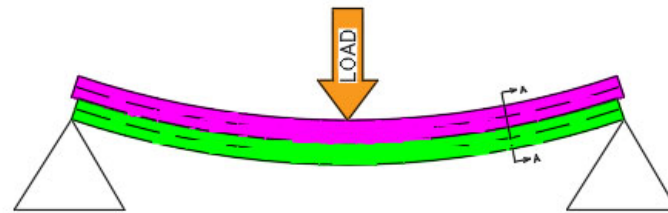
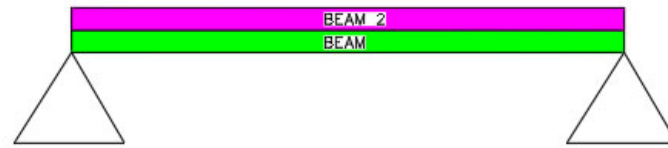




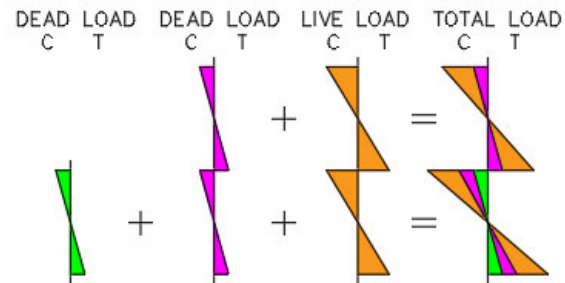
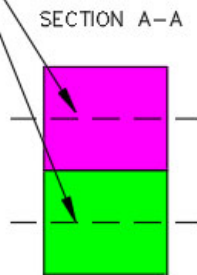
NEUTRAL  
AXIS

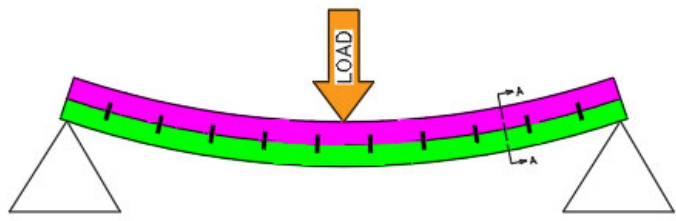
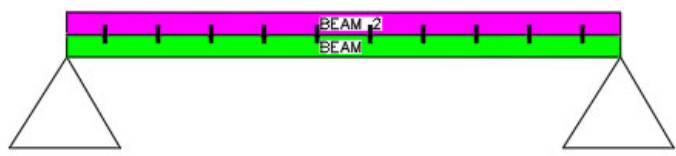
SECTION A-A





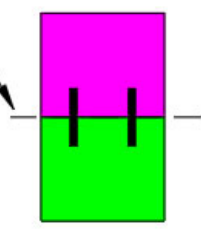
NEUTRAL  
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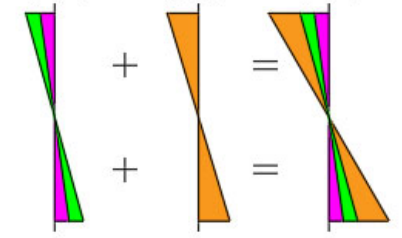


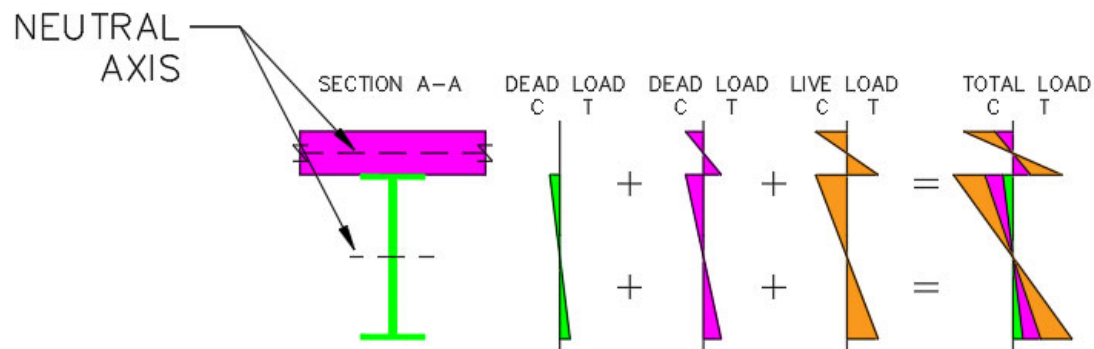
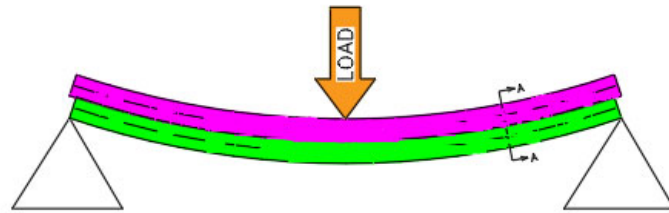
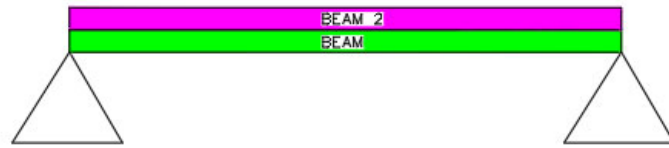
NEUTRAL  
AXIS

SECTION A-A

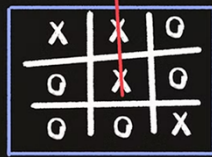


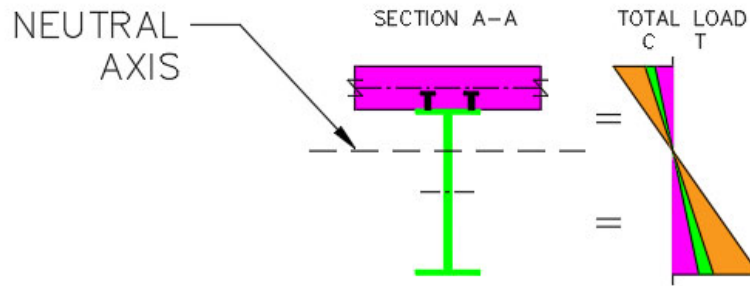
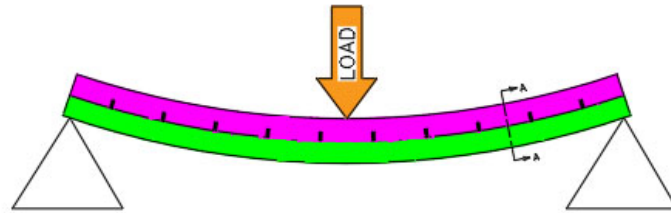
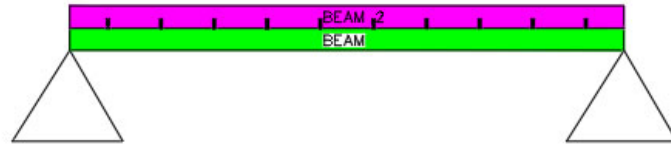
DEAD LOAD C o T      LIVE LOAD C o T      TOTAL LOAD C o T





Think outside  
the BOX

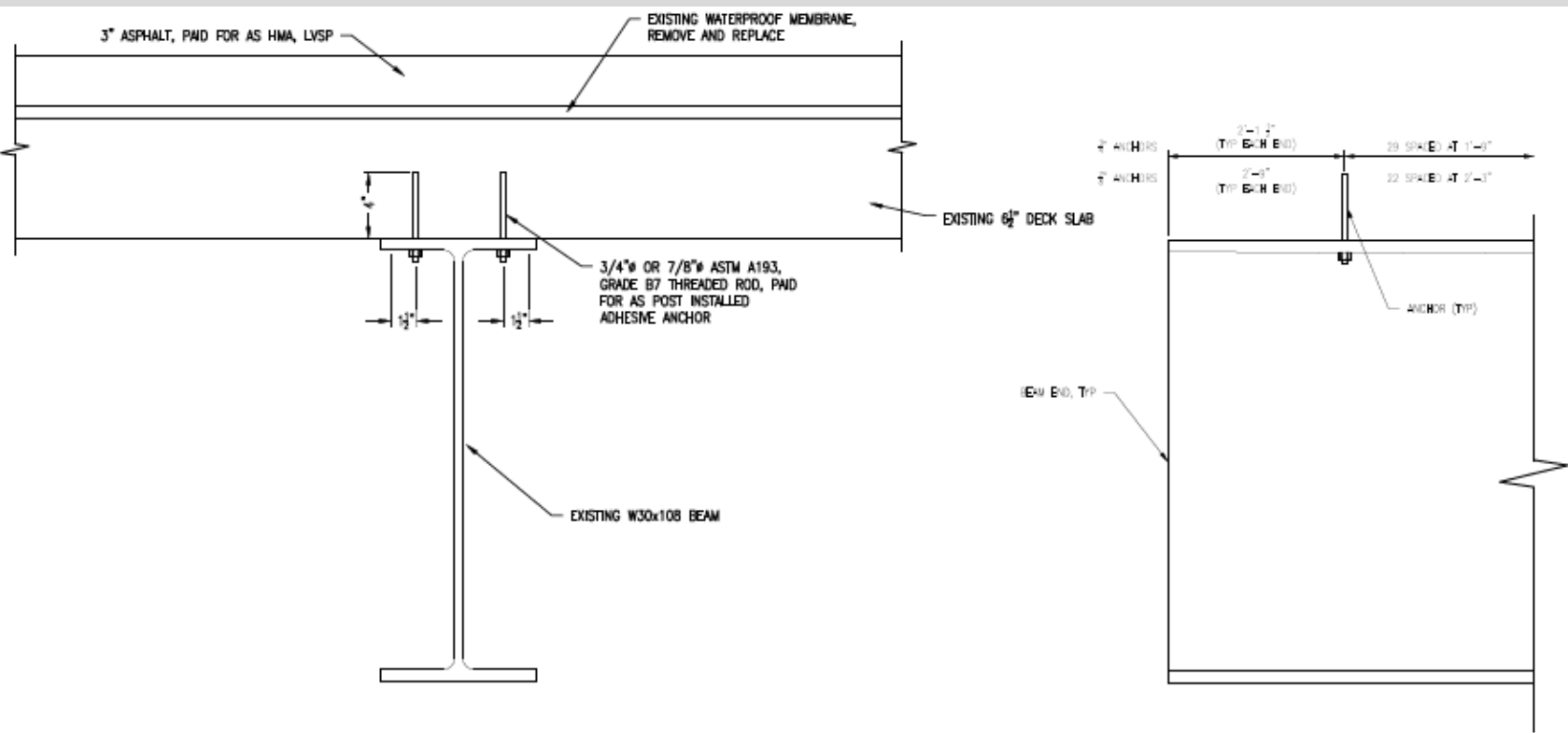




Think outside  
the BOX

x	x	o
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o	o	x





PROPOSED EPOXY ANCHOR DETAILS  
SCALE: NOT TO SCALE

RDRAIL, REMOVE AND REINSTALL  
FOR AS GUARDRAIL, RECONST, TYPE T

Think outside  
the BOX

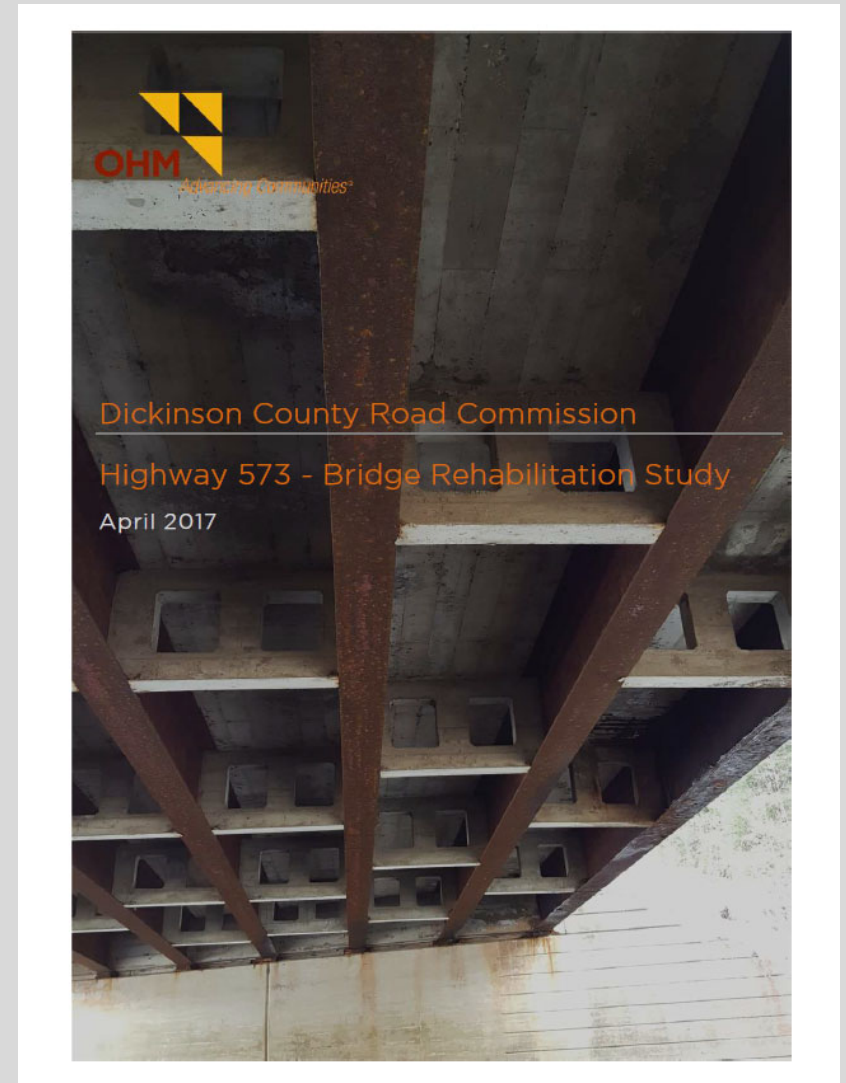
x	x	o
o	x	o
o	o	x

# Project History

- The Dickinson County Road Commission saw it was just the shear studs missing, and asked why can't we add them and increase our load capacity?
  - Why can't we drill into the concrete add them?
- The road commission tried to get other opinions from consultants and others on retrofitting in shear studs.
  - Everyone said no, its not worth it. Tear down the bridge and rebuild it. Then you will have the load capacity to carry the log trucks
- But putting the numbers to it a new bridge was expensive.
  - Seemed like drilling in some studs would be cheaper. Also, a new bridge would need lots of permitting. There was a discussion the adding studs might be able to be a maintenance thing and not need all the permitting as not changing the weir flow, bottom cord elevation, waterway opening, or anything.

# Project History

- In 2016, OHM came on board in support of the project
    - They saw this as something new and innovative.
  - Funding was secured in 2018 (critical bridge)
  - Bids were taken on 6/4/2021
    - And
- **NO BIDS!!!!**



# Project History

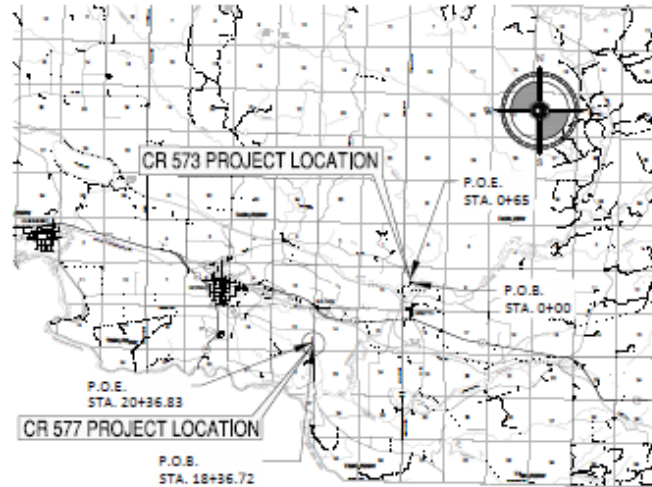
- Of course, we wanted to bid it again.
  - It is unethical to bid the same thing twice
  - Nothing to change the in the project. The only idea was adding some roadwork.
    - but estimates were over budget so adding more work was a no.
- In the same letting we had another bridge project –CR 577 over Sturgeon River
  - Catch was it was done with a different consultant- Coleman Engineering.
  - Only 1 bid which was 122.16% over the estimate on this bridge.
    - Didn't want to rebid that as fear prices would only go up.
- The idea was floated to combine the 2 bridges into a single bid.
  - Surprisingly, everyone agreed to do this
  - On February 4, 2022, the combined project had a bid opening.
    - This time 2 bids and the project went forward

# DICKINSON COUNTY ROAD COMMISSION

IN COOPERATION WITH THE  
MICHIGAN DEPARTMENT OF TRANSPORTATION  
AND THE  
FEDERAL HIGHWAY ADMINISTRATION

## INDEX OF SHEETS

SHEET NO. C1	TITLE, INDEX & LOCATION MAP
SHEET NO. C2	LEGEND, NOTES & UTILITIES
SHEET NO. C3	APPROACH DETAILS
SHEET NO. C4	TRAFFIC CONTROL AND DETOUR ROUTE
SHEET NO. C5	CONSTRUCTION SIGNING
SHEET NO. C8	QUANTITIES SHEET
SHEET NO. CT-C13	MISCELLANEOUS DETAIL SHEET
SHEET NO. C14	BRIDGE REHABILITATION DETAILS
SHEET NO. 01	COVER SHEET
SHEET NO. 02	TRAFFIC CONTROL, DETOUR SIGNAGE
SHEET NO. 03	EXISTING AND PROPOSED CROSS SECTIONS
SHEET NO. 04	DEMOLITION PLAN
SHEET NO. 05	PROPOSED PLAN OF STRUCTURE
SHEET NO. 06	ANCHOR LAYOUT
SHEET NO. 07	DETAILS AND TYPICALS
SHEET NO. 08	STRUCTURAL STEEL REPAIRS
SHEET NO. 09	ABUTMENT DETAILS
SHEET NO. 010	B-10-G DRAIN CASTING ASSEMBLY
SHEET NO. 011-019	R-090-U GUARDRAIL TYPES A, B, D, T, MGS-6, & MGS-4D



**CR 573 (SN 2194) BRIDGE  
OVER THE STURGEON RIVER  
JOB NUMBER: 208083  
CONTROL SECTION: 22000  
DICKINSON COUNTY, MICHIGAN  
SECTION 7, T39N, R28W**

THIS PROJECT CONSISTS OF:  
Proposed site plans and associated detail drawings for bridge rehabilitation and approaches.

**COLEMAN ENGINEERING COMPANY**



625 CIRCLE DRIVE - IRON MOUNTAIN, MICHIGAN 49801 - (506) 774-8440  
200 EAST AYER STREET - IRONWOOD, MICHIGAN 49848 - (506) 942-5048  
120 US HWY 41 E., STE. B - NISKAUNE, MICHIGAN 49866 - (506) 475-7489  
790 MARVELLE LANE, UNIT 3 - GREENSBAY, WI 54904 - (920) 284-9408  
October, 2011

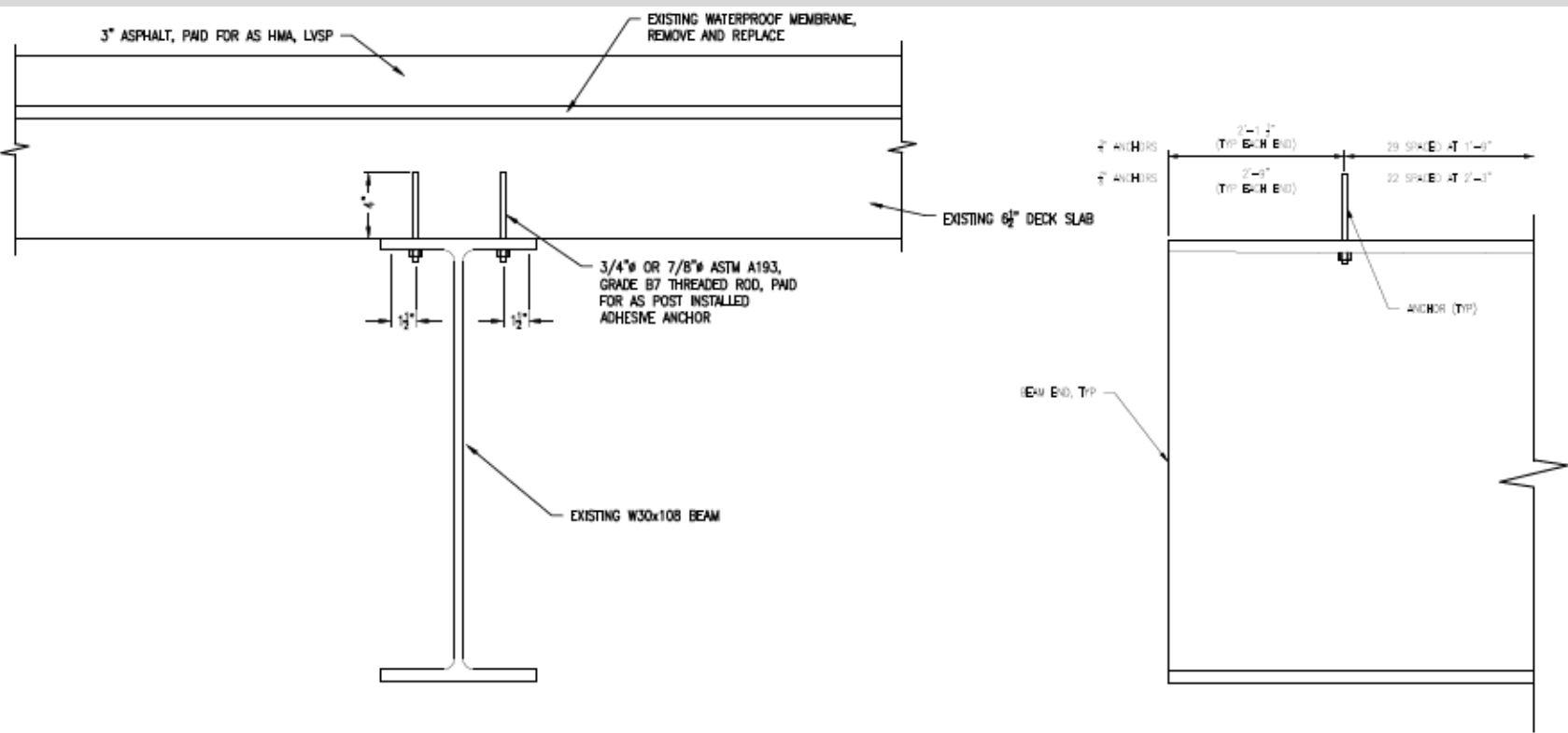
**CR 577 (SN 2200) BRIDGE  
OVER THE STURGEON RIVER  
JOB NUMBER: 207728  
CONTROL SECTION: 22000  
DICKINSON COUNTY, MICHIGAN  
SECTION 23, T39N, R29W**

DATE PLOTTED  
TITLE, INDEX &  
LOCATION MAP

DATE PLOTTED  
CR 577 CROSSING THE STURGEON RIVER  
DICKINSON COUNTY ROAD COMMISSION

DATE PLOTTED  
DATE AND  
BY  
12/27/25  
SJM  
18/010

**1**

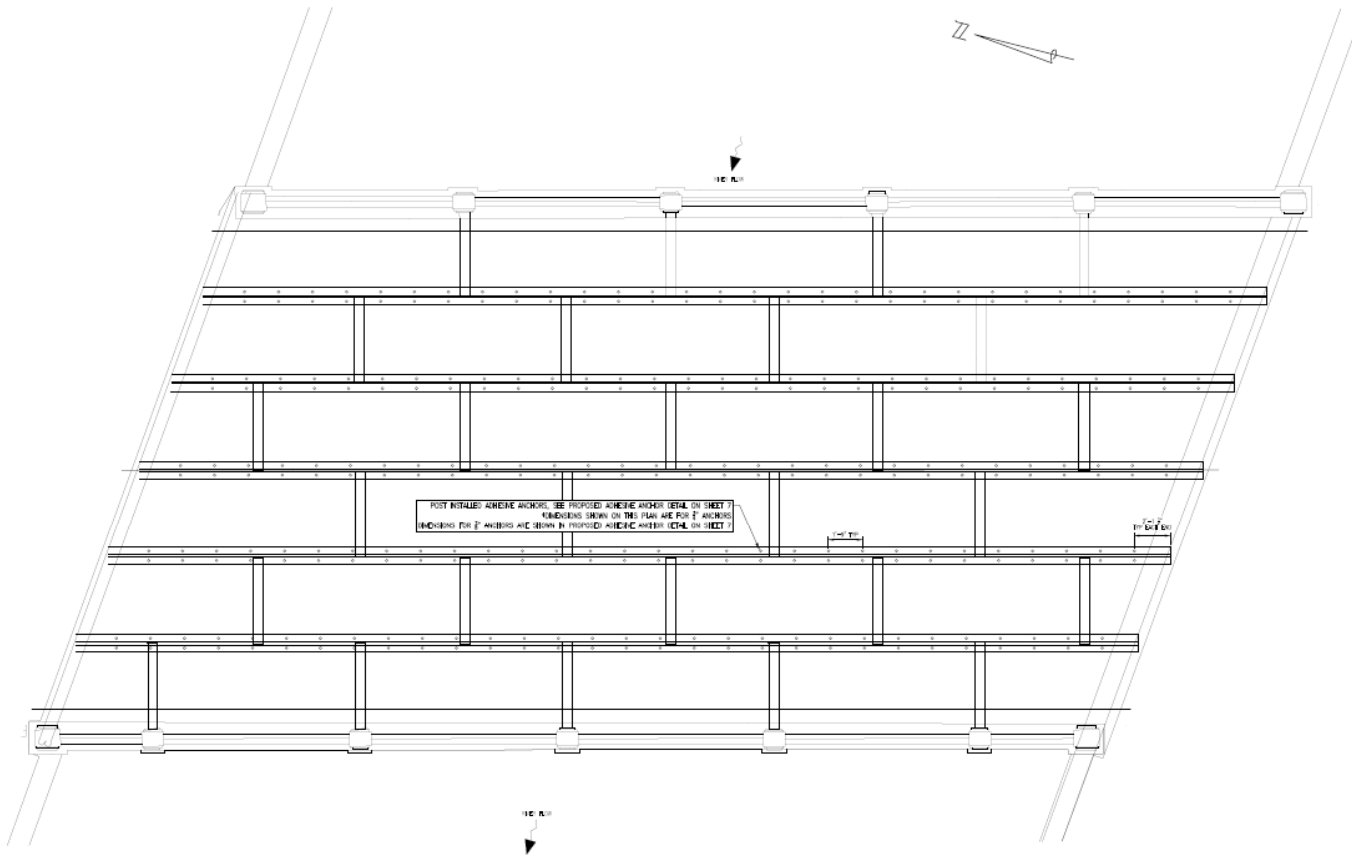


PROPOSED EPOXY ANCHOR DETAILS  
SCALE: NOT TO SCALE

RDRAIL, REMOVE AND REINSTALL  
FOR AS GUARDRAIL, RECONST, TYPE T

Think outside  
the BOX

x	x	o
o	x	o
o	o	x



POST INSTALLED ANCHOR LAYOUT  
SCALE: 1/4"=1'-0"

NOTE  
ANCHOR INSTALLATION SHALL BE PERFORMED PRIOR TO  
NEW CONCRETE INSTALLATION.

**OHM**  
ARCHITECT ENGINEER PLANNERS  
424 HANCOCK ST.  
MILWAUKEE, WI 53212  
P (414) 962-6200 F (414) 962-6103  
OHM-AD@OHM.COM

DATE: 11/11/2014  
BY: J. H. HARRIS  
CHECKED BY: J. H. HARRIS  
SCALE: 1/4"=1'-0"

PROJECT: COUNTY ROAD 573 (SN 2164) BRIDGE  
SHEET: ANCHOR LAYOUT

DICKINSON COUNTY ROAD COMMISSION  
COUNTY ROAD 573 (SN 2164) BRIDGE  
ANCHOR LAYOUT



Think outside  
the BOX

x	x	o
o	x	o
o		x



Think outside  
the BOX

x	x	o
o	x	o
o	o	x



















WARNING: MANUFACTURER INSTRUCTIONS MUST BE FOLLOWED  
ADVERTENCIA: LAS INSTRUCCIONES DEL FABRICANTE DEBEN SER SEGUIDAS

**RED HEAT**  
**A7+**

**HIGH STRENGTH, QUICK CURE, ALL-WEATHER  
CONCRETE & MASONRY ANCHORING ADHESIVE**  
*Alta Resistencia, Curacion Rapido, Todo Clima, Andas de Adhesivo para Concreto y Albañileria*

BEST USED BY: AAAA  
10/21/2022 394887

ICC-ES ESR-3003  
2016 IBC COMPLIANT  
MASONRY APPROVED  
ICC-ES ESR-3161

ICC  
ES

NSF  
Certified to  
ANSI/NSF-61

Contents: 28 oz., 825 mL  
Part No. A7-1000  
**MOST VERSATILE QUICK CURE**

WARNING: MANUFACTURER INSTRUCTIONS MUST BE FOLLOWED  
ADVERTENCIA: LAS INSTRUCCIONES DEL FABRICANTE DEBEN SER SEGUIDAS





The   
**Creative**  
Engineer

THAT MISSING CHUNK ISN'T  
PART OF THE BRIDGE'S DESIGN.  
IT'S JUST A COFFEE STAIN  
ON THE BLUEPRINT

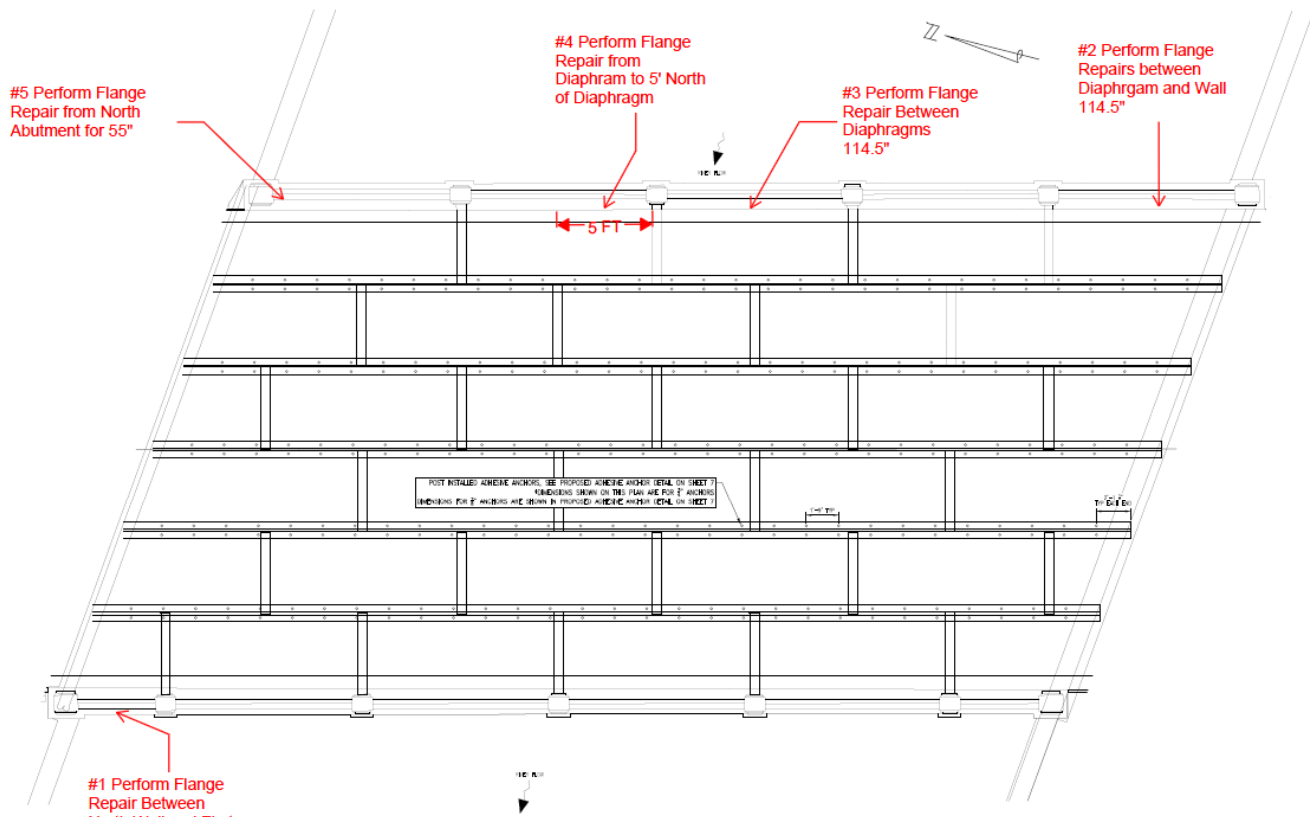












#5 Perform Flange Repair from North Abutment for 55"

#4 Perform Flange Repair from Diaphragm to 5' North of Diaphragm

#3 Perform Flange Repair Between Diaphragms 114.5"

#2 Perform Flange Repairs between Diaphragm and Wall 114.5"

#1 Perform Flange Repair Between North Wall and First Diaphragm 114"

5 FT

POST INSTALLED ANCHOR ANCHORS, SEE PROPOSED ANCHOR ANCHOR DETAIL ON SHEET DIMENSIONS SHOWN ON THE PLAN ARE FOR 2" ANCHORS DIMENSIONS FOR 3" ANCHORS ARE SHOWN IN PROPOSED ANCHOR ANCHOR DETAIL ON SHEET

POST INSTALLED ANCHOR LAYOUT  
SCALE 1/4"=1'-0"

NOTE:  
ANCHOR INSTALLATION SHALL BE REFERENCED PER DETAIL 169-DATING INSTALLATION

OHM  
 424 Harpers St.  
 Madison, WI 53705  
 P (608) 455-5511 F (608) 455-4443  
 OHM@OHM.COM

DATE	DESCRIPTION

PROJECT	DICKINSON COUNTY ROAD COMMISSION
LOCATION	COUNTY ROAD 573 (SN 2194) BRIDGE
CONTRACT	ANCHOR LAYOUT

DATE	DESCRIPTION



DRAWING DATE: 11/15/2018 11:53:00 AM FILE: 20181115115300.dwg USER: c:\users\jacob\documents\autocad\jacob.dwg





# Conclusions

- Post construction shear studs is a way to improve load rating in select bridges.
  - Load rating went from 42 ton (1 unit), 50 ton (2 unit), 57 ton (3 unit) to 42 ton, 77 ton, 82 ton and allow Class A overload

# Conclusions

- Post construction shear studs was far less expensive than a new bridge.
  - Actual project cost \$604,592.50 (\$407,505.90 structure, \$196,966.60 road)
    - Project also included some deep and shallow deck patching, remove and replace asphalt wearing surface with membrane, some structure steel repairs, and some guardrail repairs.
  - New bridge estimate at time of grant application (2017) was \$956,000
  - Using current pricing (2022) new bridge estimate is \$1,428,934 (\$1.4 million)

- We would like to thank our partners in making this happen
  - OHM Advisors, Coleman Engineering, Hebert Construction and MDOT



# Questions?



Lance Malburg, P.E.  
Engineer  
E-Mail: [Lance@Dicknsoncrc.com](mailto:Lance@Dicknsoncrc.com)  
Dickinson County Road Commission  
Main: (906) 774-1588  
Engineering: (906) 774-1162



ZANE HYRKAS, PE | **OHM Advisors**® | est. 1962

PROJECT MANAGER

D (906) 696-7137 C (906) 370-9263 O (906) 482-0535  
[zane.hyrkas@ohm-advisors.com](mailto:zane.hyrkas@ohm-advisors.com) | [OHM-Advisors.com](http://OHM-Advisors.com)

