ATTACHMENT 1

INSPECTION REPORT

STATE OF WISCONSIN
DEPARTMENT OF TRANSPORTATION

Inspection Report for B-40-280

W GRANTOSA DR WB over STH 145-W FOND DU LAC AV

Jul 21,2018

Type	Prior	Frequency (mos)	Performed
Routine	07-21-16	24	X
Deck Evaluation			X
SIA Review	07-21-16	48	

Start Coordinates		End Coordinates (optional)	
Latitude	43°06'45.22"N	Latitude	
Longitude	88°00'08.74"W	Longitude	
Owner	STATE HIGHWAY DEPT	Maintainer	STATE HIGHWAY DEPT

Time Log

Hours	Minutes
1	55

Team members

	Name	Number	Signature	Signature Date
Inspector	Zippel, William J	9605	William J Zippel E-signed by William Zippel(wzippel)	10-02-18

BRIDGE INSPECTION REPORT
Wisconsin Department of Transportation
DT2007 2003 s.84.17 Wis. Stats.

Identification & Location

Feature On: W GRANTOSA DR WB	Section Town Range: S34 T08N R21E	Structure Number: **B-40-280**
Feature Under: STH 145-W FOND DU LAC AV	County: MILWAUKEE	
Location 0.2M E JCT STH 181	Municipality: MILWAUKEE	Structure Name:

Geometry

measurements in feet, except where noted

Approach Roadway Width: 36	Bridge Roadway Width: 36.0	Total Length: 198.2
Approach Pavement Width: 36	Deck Width: 45.5	Deck Area (sq ft): 9018

Traffic

	Lanes	ADT	ADT year	Traffic Pattern
On	3	4000	2016	ONE WAY TRAFFIC
Under	8	27900	2015	TWO WAY TRAFFIC

Capacity

Load Rating

Inventory rating: HS14	Overburden depth (in): 2.0	Last rating date: 01-14-13	Controlling: INTERIOR DECK GIRDER Moment
Operating rating: HS24	Deck surface material: MICROSILICA MODIFIED CONC	Re-rate for capacity (Y/N):	Control location: 4.9 SPAN 2, 34.1
Posting:	Re-rate notes:		

Hydraulic

Classification

Scour Critical Code(113): (N) NO WATERWAY	Q100 (ft3/sec): 0	
High water elevation (ft): 0.0	Velocity (ft/sec): 0.0	Sufficiency #: 52.7

Span(s)

Span #	Material	Configuration	Depth (in)	Length (ft)	Main
1	CONT STEEL	DECK GIRDER		34.0	
2	CONT STEEL	DECK GIRDER		70.0	Y
3	CONT STEEL	DECK GIRDER		60.0	
4	CONT STEEL	DECK GIRDER		30.0	

Expansion joint(s)

Temperature: File: | New: 72

Joint #	Location	Type	Last inspection date	Last measure (in)	New measure (in)
1	EAST ABUTMENT	SSA-400L	07-15-14	0.1	0.1
2	WEST ABUTMENT	SSA-400L	07-15-14	0.2	0.1

Clearance

Item	File Measurement (ft)	File Date	New Measurement (ft)
Highway Min Vertical Under Cardinal	14.76		
Highway Min Vertical Under Non-Cardinal	15.49		
Horizontal Under Cardinal	52.0		
Horizontal Under Non-Cardinal	61.3		
Highway Min Vertical On Cardinal			
Horizontal On Cardinal			

Special Components

Component	Year	Work Performed	Note
DECK - IOWA MIX	1992	OVERLAY - CONCRETE	MICRO-SILICA MODIFIED CONCRETE

Construction History

Year	Work Performed	FOS id
1993	ADD PED FENCING	1360-03-73
1992	OVERLAY - CONCRETE	1360-00-74
1965	NEW STRUCTURE	

Maintenance Items History

Item	Recommended by	Status	Status change	Year completed
Deck - Other Work	Tormey, Jeffrey T (9510)	REJECTED	02/24/17	
Monitor for concrete removal on underside of overhangs				
Misc - Other Work	Zalewski, Thomas A (9515)	REJECTED	10/01/18	
Repair sinkhole under bridge in STH 145 NB Lt. shoulder about 1' deep				
Deck - Repair Railing	Tormey, Jeffrey T (9510)	COMPLETE	10/01/18	2018
Repair Broken fence rail/post connection at NE Wingwall				

Maintenance Items

Item	Priority	Recommended by	Status	Status change
Misc - Remove/Monitor Loose Concrete	HIGH	Tormey, Jeffrey T (9510)	IDENTIFIED	02/24/17
Remove loose concrete at delams and monitor for concrete removal on underside of deck and overhangs.				
IMP-Structure Replacement	MEDIUM	Zalewski, Thomas A (9515)	IDENTIFIED	08/05/14
Recommend 2020				
Superstructure - Other Work	MEDIUM	Zalewski, Thomas A (9515)	IDENTIFIED	08/05/14
Replace sheared bolts at bearing hold down devices. Extend slot to accommodate movement.				
Substructure - Repair Abutment / Wings	MEDIUM	Zippel, William J (9605)	IDENTIFIED	10/01/18
Repair SW wing where joint has closed and bridge rail and tube rail are damaged.				
Misc - Repair / Replace Utilities or Signs	MEDIUM	Zippel, William J (9605)	IDENTIFIED	10/01/18
Replace obj marker sign at SE corner.				
Misc - Cut Brush	LOW	Tormey, Jeffrey T (9510)	IDENTIFIED	07/28/16
Remove tree from north edge of west slope paving.				
Approach - Patch Bituminous	LOW	Zippel, William J (9605)	IDENTIFIED	10/01/18
Repair open cracks and potholes forming at both approaches.				

Elements

Chk	Element	Defect	Description	UOM	Total	Quantity in Condition State 1	2	3	4
X	**12**		**Reinforced Concrete Deck-Black Steel Reinforcing**	SF	9,018	8,114	672	232	0
			Spans #'d West to East. Bays #'d from N to S.						
		1080	Delamination - Spall - Patched Area	SF		0	300	232	0
			Sp 1: Sound **and** unsound full depth deck repair - 2**5 SF CS2 and 25 SF CS3. D**elams **Bay 2 and S OH (4 SF CS3).** Sp **2: S**ound **and** unsound full depth deck repair - 100 **SF CS2 and 100 SF CS3.** **Sp 3: Sound and unsound full depth deck repair - 75 SF CS2 and 75 SF CS3. 12 SF Delam over ramp. 8SF Spall over Pier, S OH.** **Sp 4: Sound full depth deck repair - 100 SF CS2. 4 SF Delam Bay 2. 4 SF Spall over Pier, S OH.**					
		1130	Cracking (RC)	SF		8,646	372	0	0
			All spans: **Transverse, Longit, and map** cracking with eff & leaking **Sp 1: 65 SF CS2 Narrow transv cracks and 20 SF Longit CS2 cracks in Bay 3.** **Sp 2: 44 SF CS2 Narrow transv cracks and 50 SF CS2 map cracking in Bay 3.** **Sp 3: 39 SF CS2 Narrow transv cracks, 50 SF Longit CS2 cracks in Bay 3, and 50 SF CS2 map cracking in Bay 4.** **Sp 4: 64 SF CS2 Narrow transv cracks.**					
	8514		Concrete Overlay	SF	7,135	3,205	715	3,215	0
		3210	Debonding/Spall/Patched Area/Pothole	SF		0	0	2,500	0
			May 2015 IR: "Numerous large delaminations throughout the deck." 30-35% Delam. **Asphalt patch near Pier 1.**						
		3220	Crack (Wearing Surface)	SF		0	715	715	0
			Narrow to medium longit and map cr**ack**ing **throughout deck. Some overl**ap **with delams above.** **Approx 10% additional CS2 and 10% additional CS3.**						
X	**107**		**Steel Open Girder**	LF	1,167	0	1,107	60	0
			Spans #'d West to East. Girders **#'d** from **N** to **S.**						
		1000	Corrosion	LF		0	1,107	60	0
			Lt/med rust on Btm Flg; Lt freckled rust at underside btm flg; Lt to med freckled rust at webs, esp. at G1; **Section loss initiated in some areas** over **roadway (spans 2 and 3) or near abutments, especially at edges of bottom flanges (Approx 60LF CS3).**						
	8516		Painted Steel	SF	10,659	0	6,395	3,198	1,066
		3440	Effectiveness (Steel Protective Coatings)	SF		0	6,395	3,198	1,066
			Peeling paint at btm flg edge, bubbling at underside of flanges and webs**, freckled rust on webs.** **Approximate 60% CS2, 30% CS3, 10% CS4.**						
X	**205**		**Reinforced Concrete Column**	EA	9	3	0	6	0
			Piers #'d West to East. Columns #'d from N to S.						
		1080	Delamination - Spall - Patched Area	EA		0	0	6	0
			P1: Lge delam w/spall & exp rebar at **C**ol 1**, delam at base Col 2, delam near top Col 3: 3** @ CS3; P2: **U**nsound patch @ **a**ll 3 **C**ols, Spall with exp rebar col 3**:** 3 @ CS3; P3: **OK**						
		1130	Cracking (RC)	EA		0	0	0	0
			Defects overlap spalls/delams. P1: **Vertical narrow cracks in Col 1** P2: HL **to Narrow** map crks at patches P3: **OK.**						

X	**215**		**Reinforced Concrete Abutment**	LF	91	19	72	0	0
		1080	Delamination - Spall - Patched Area	LF		0	54	0	0
			W Abut - 4 **S**ound conc patches in body - 8' CS2, **S**ound patches in bkwl - 20' CS2; E Abut - 3 **S**ound conc patches in body - 6' CS2, **S**ound patches in bkwl - 20' CS2						
		1130	Cracking (RC)	LF		0	18	0	0
			W Abut - 4 **N**arrow vert crks in body - 4' CS2, 2 **N**arrow vert crks in bkwl - 2' CS2; E Abut - 6 **N**arrow vert crks in body - 6' CS2, 6 **N**arrow vert crks in bkwl - 6' CS2;						
X	**234**		**Reinforced Concrete Cap**	LF	127	122	0	5	0
			Piers #'d West to East.						
		1080	Delamination - Spall - Patched Area	LF		0	0	3	0
			P1: **D**elam @ N end - 1' CS**3**; P2: S**p**all **and** failed patch @ N end - 1' CS3; P3: Spall @ E Face Between Col 1-2 - 1' CS**3**						
		1130	Cracking (RC)	LF		0	0	2	0
			P2: HL crks at patch, **M**ed diag. crk between Col 1-2 extends through cap to both faces - 2' CS**3;**						
X	**300**		**Strip Seal Expansion Joint**	LF	72	0	0	72	0
			Both Jts nearly Closed, no measurement possible.						
		2310	Leakage, Seal Adhesion, Damage,Cracking	LF		0	0	72	0
			W Abut - **Cracks, abrasion, and small spalls at corners.** Jt closed - 36' CS3; E Abut - **Cracks, abrasion, and small spalls at corners.** Jt closed - 36' CS3						
X	**311**		**Moveable Bearing**	EA	24	0	11	13	0
			Located at both abutments and Piers 1 and 3						
		1000	Corrosion	EA		0	11	4	0
			W. Abut: Lt/Mod rust **- 4 @ CS2, 2** @ CS3 P1: Lt Rust - 6 @ CS2; P3: Lt rust - 6 @ CS2; **E**. Abut: Lt/Mod rust**, 4** @ CS2, **2** @ CS3						
		1020	Connection	EA		0	0	1	0
			E Abut: Girder 2 bearing has sheared **bolt at** hold down **assembly:** 1 @ CS3**. Broken keeper at G6 (Qty overlaps corrosion).**						
		2220	Alignment	EA		0	0	8	0
			W Abut: Bearings **G1, G5 and G6** are at limit of expansion**.** **E Abut: Bearings G5 and G6 are at limit of expansion.** **Qty overlaps corrosion.**						
		2240	Loss of Bearing Area	EA		0	0	0	0
			W. Abut: G1 not in contact with bronze plate. Qty overlaps corrosion. **E. Abut: G1 bearing is only about half in contact.**						
X	**313**		**Fixed Bearing**	EA	6	0	6	0	0
			Located at Pier 2						
		1000	Corrosion	EA		0	6	0	0
			Lt to mod rust						
X	**331**		**Reinforced Concrete Bridge Rail**	LF	438	237	130	71	0
		1080	Delamination - Spall - Patched Area	LF		0	100	71	0
			South: **S**hallow rebar w/rust stains - 100' CS2; **Small** spall at E end corner - 1' CS**3;** **D**elams at curb - 30' CS**3; Spall**s w/exposed rebar at curb - **4**0' CS3						
		1130	Cracking (RC)	LF		408	30	0	0
			North: **N**ar vert crks at fence posts - 30' CS2; HL map crks; South: HL horiz and map crks, Horiz crks/spall w/exp rebar at SW Wingwall**. Wide Horiz crack on back of rail where joint is tight. Quantity overlaps.**						

X	**8400**		**Integral Wingwall**	EA	4	3	1	0	0
		8903	Wall Deterioration SW: **HL** map crkng - CS**1**; NW: **HL map crkng** - CS**1**; SE: **N**arrow map crkng - CS2; NE: **OK.**	EA		2	1	0	0

Assessments

Chk	Element	Defect	Description	UOM	Total	Quantity in Condition State 1	2	3	4
X	**9001**		**Drainage - Ends of Structure** Curb and gutter at each corner; Inlet at NW	EA	4	4	0	0	0
X	**9009**		**Sidewalk** Transv and long HL crks throughout; **Large spall**s at curb, **some have fallen into shoulder. Many delams and** exist. patches **at curb.**	EA	1	0	0	1	0
X	**9011**		**Utilities** **Street lighting on piers: Corroded surface mounted conduits, some broken lights**	EA	1	0	0	1	0
X	**9030**		**Signs - Object Markers** **Sign that had been at the** SE corner **has been sheared off with impact.**	EA	1	0	0	0	1
X	**9042**		**Slope Protection- Concrete** E. Slope: Cracks w/minor settlement - CS2; W. Slope: Cracks w/settlement @ top, broken up around Cols @ toe, Tree growing along N edge of structure - CS2	EA	2	0	2	0	0
X	**9167**		**Steel Diaphragm** Lt/mod rust, heavier over Rdwy.	EA	60	0	60	0	0
X	**9323**		**Approach Roadway - Asphalt** E. Appr: Patched, Trans Crack w/settlement **all lanes. Potholes forming at PB and longit joints** - CS2; W. Appr: **C**racks, slightly low at hdr, **potholes forming** at **PB and around sewer MH** - CS2	EA	2	0	2	0	0
X	**9335**		**Decorative Rail** Lt rust on anchor bolts. Scrapes/gouges from traffic impact at E end. **At SW Corner, rail tubes are wearing into each other where exp jt has closed.**	EA	1	0	1	0	0
X	**9336**		**Luminaire Bases**	EA	2	2	0	0	0
X	**9337**		**Protective Screening** Peeling paint on galvanized posts and rails, Bottom Rail broken at end post connection at WE wingwall.	EA	1	0	1	0	0

NBI Ratings

	File	New
Deck	4	4
Superstructure	5	5
Substructure	5	5
Culvert	N	N
Channel	N	N
Waterway	N	N

Structure Specific Notes

Inspection Specific Notes

Inspector Site-Specific Safety Considerations

Structure Inspection Procedures

Access from shoulder.

Special Requirements

Chk	Hours	Cost	Comments

Routine

Document Comment/Description

Top of deck looking west.

Routine

Document Comment/Description

RC Deck - Sound and unsound full depth patches.

Routine

Document Comment/Description

RC Deck - Spalls Span 3 at South overhang over pier.
Steel Open Gir - Top flange corrosion.

Routine

Document Comment/Description

Conc OL - Asphalt patch near Pier 1 and cracking.

Routine

Document Comment/Description

Steel Open Gir - Corrosion with section loss initiated at Span 2 Girder 4.

Routine

Document Comment/Description

RC Col - P2: Unsound patch @ all 3 Cols. Photo shows Col 1 patch cracking and spall developing.

Routine

Document Comment/Description

RC Abut - W Abut - Typical sound patches and vertical cracks. Photo shows Bay 1.

Routine

Document Comment/Description

RC Cap - P2: Med diag. crk between Col 1-2 extends through cap to both faces - 2' CS3.

Routine

Document Comment/Description

RC Cap - Spall and failed patch at N End Pier 2.

Routine

Document Comment/Description

W Abut - Cracks, abrasion, and small spalls at corners. Jt closed.

Routine

Document Comment/Description

Moveable Bearings - West abut, G1. Corrosion on bearing and bronze plate is not in contact with girder sole plate.

Routine

Document Comment/Description

Moveable bearings - West Abut G2 broken bolt at hold down assembly.

Routine

Document Comment/Description

RC Bridge Rail - West end of South Rail, spalling in rail, cracking with rust stains, and spalls in curb section.

Routine

Document Comment/Description

RC Bridge Rail - West end of South Rail - Wide crack at joint where joint is tight.

Routine

Document Comment/Description

Sidewalk - Transv and long HL crks throughout; Large spalls at curb, some have fallen into shoulder. Many delams and exist. patches at curb.

Routine

Document Comment/Description

Obj Marker sign: Sheared off with impact at SE corner.

Routine

Document Comment/Description

Dec rail: At SE Corner, rail tubes are wearing into each other where exp jt has closed.

Non-Image Documents

Type	Document	Document Comment/Description	Attached
Deck Evaluation	b40-280_18_Kd1.pdf	May 2015 Deck Eval	X

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DECK INSPECTION SHEET

STRUCTURE NO.: B-40-280

FEATURE ON	MAINTAINER	COUNTY	ROADWAY WIDTH (FEET)	TOTAL LENGTH (FEET)
W. Grantosa Dr. (WB)	State	Milwaukee	36.0	198.2
FEATURE UNDER	**LOCATION**	**SKEW ANGLE**	**DECK AREA (sq.ft.)**	**RDWY AREA (sq.ft.)**
STH 145-W. Fond du Lac Ave.	0.2 ME Jct STH 181	9 Left	7,018	7,135
STRUCTURE TYPE	**SPANS**	**LENGTHS**	**NO. OF LANES**	**NO. OF SHOULDERS**
Cont Steel Deck Girder	4	34.0, 70.0, 60.0, 30.0	3	0

CONSTRUCTION HISTORY	YEAR	WORK PERFORMED
	1965	New Structure
	1992	Concrete Overlay

INFRARED SURVEY RESULTS (LEVEL 1)

ESTIMATED % TOTAL DISTRESS* 30-35 %

If <2% _____

DATE OF SURVEY	TOTAL ROADWAY AREA (sq. ft.)	AREA IN SHADE/DEBRIS (sq. ft.)	AREA INSPECTED (sq. ft.)
5/1/15	7,135	None	7,135

ESTIMATED % TOTAL DISTRESS IS THE DEFECT AREAS ONLY AND IS NOT THE ESTIMATED REHABILITATION AREA

TYPE OF DEFECT	PERCENT OF AREA INSPECTED					
	0-5	5-10	10-15	15-20	20-25	25+
Delamination						30-35%
Debonding	None					
Concrete Patching	None					
Asphalt Patching	None					
Spalling	None					
PREVIOUS SURVEYS						
YEAR LEVEL (Total Defects)						
2010 1					X	
2005 1			X			
2001 1		X				

COMMENTS: - Numerous large delaminations throughout the deck.

 # PATCHES: 0

 # OF CORES: 0 **RESULTS:** _____

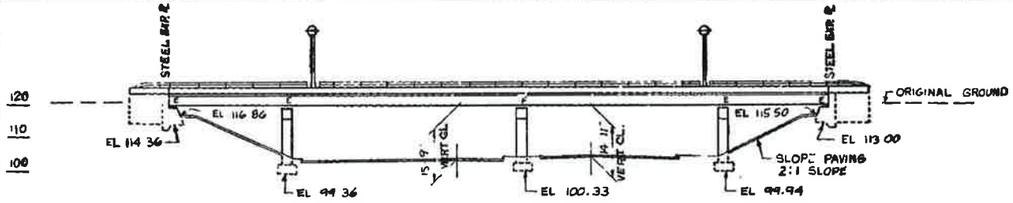
PROJECT ID.: 1000-70-15

WORK ORDER: #2

ATTACHMENT 2

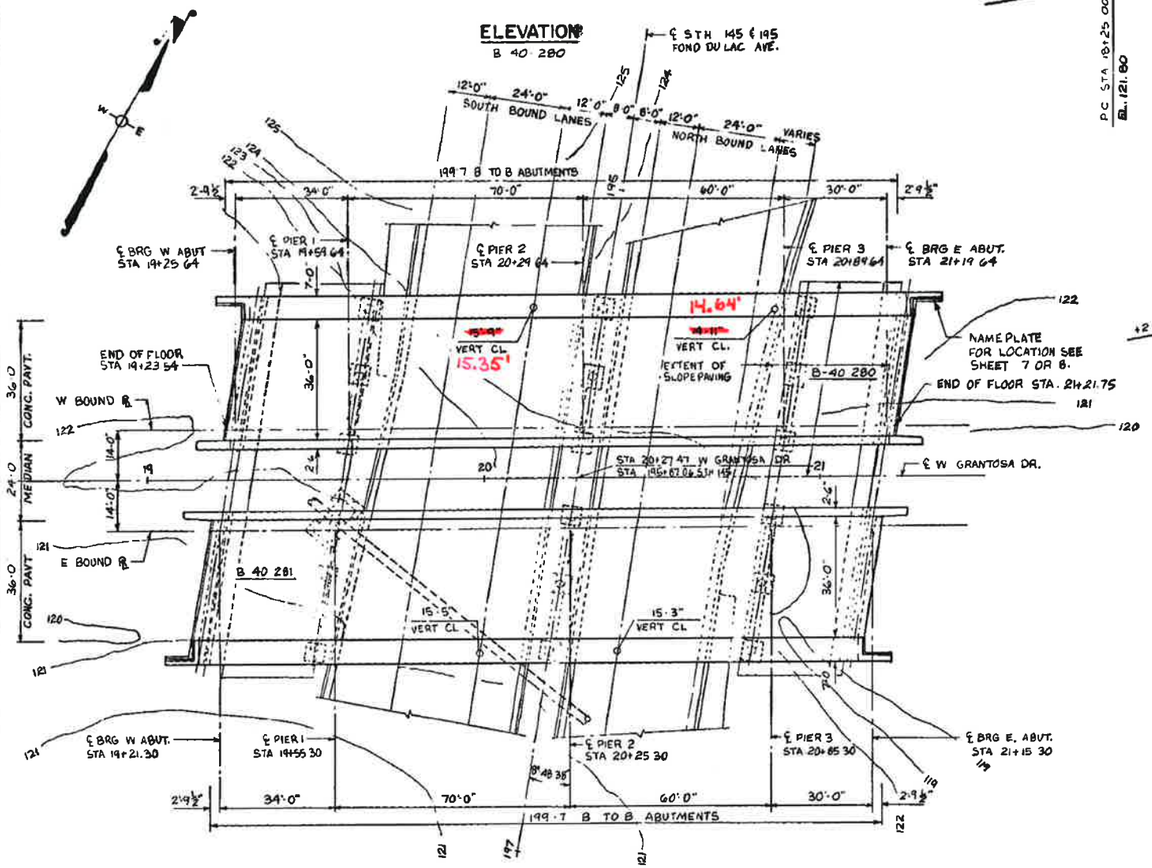
DEFICIENT AREAS

FORM E B 11 62



ELEVATION

B 40 280



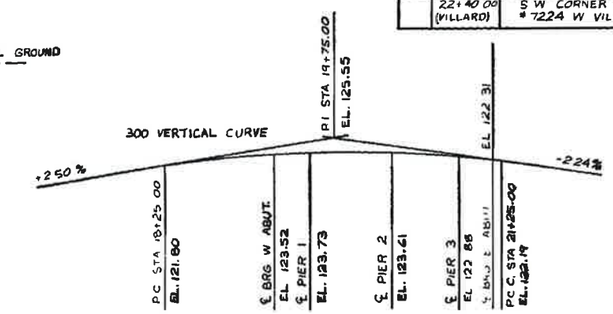
PLAN

4 SPAN CONTINUOUS STEEL I BEAM SUPERSTRUCTURE WITH CONC. 3 COLUMN PIERS AND CONCRETE SILL ABUTMENTS.

BENCH MARK

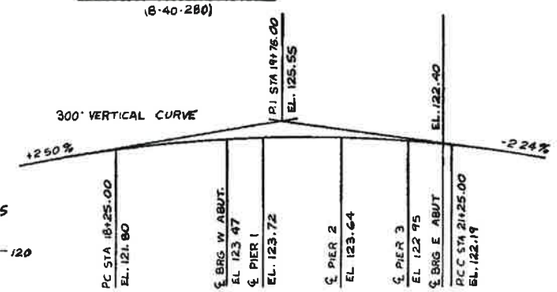
NO	STATION	DESCRIPTION	ELEV
	22+40.00 (VILLARD)	S W CORNER CONC PORCH #7224 W VILLARD AVE.	121.53

COUNTY & HIGHWAY	ROUTE & SECTION	CLASS & AGREEMENT STATE	FEDERAL	B P R DIVISION	PROJECT	SHEET NO	TOTAL SHEETS
40.1	27.1	22.6		4	FOZT-1(22) 170	383	



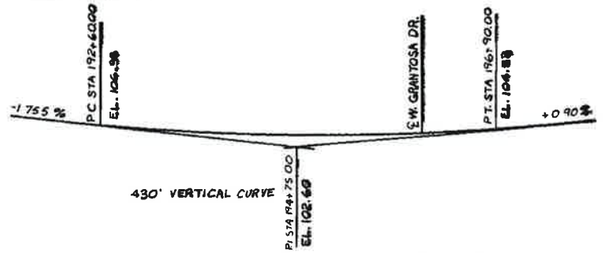
W.B. LANE WEST GRANTOSA DRIVE GRADE LINE

(B-40-280)



E.B. LANE WEST GRANTOSA DRIVE GRADE LINE

(B 40-281)



FOND DU LAC AVE. GRADE LINE

8'-0" RT. & LT OF ℄

GENERAL NOTES

DRAWINGS SHALL NOT BE SCALED.
ALL CONCRETE MASONRY SHALL BE GRADE A-A. f'_c = 1400 P.S.I.
HOT-POURED ELASTIC TYPE JOINT SEALER SHALL CONFORM TO ASTM DESIGNATION. D 1190.
BEVEL EXPOSED EDGES OF CONCRETE 1" UNLESS OTHERWISE SHOWN OR NOTED.
IMBED ALL BAR STEEL 2" UNLESS OTHERWISE SHOWN.
ALL FIELD CONNECTIONS SHALL BE ¾" ⌀ RIVETS OR HIGH STRENGTH BOLTS UNLESS OTHERWISE SHOWN.
THE SLOPE IN FRONT OF THE ABUTMENTS SHALL BE COVERED WITH "SLOPE PAVING" AS SHOWN IN "PLAN" ON THIS SHEET AND IN "SECTION AA" ON SHEET 6 & 14.
ALL SPACES EXCAVATED AND NOT OCCUPIED BY THE STRUCTURE SHALL BE BACKFILLED WITH GRANULAR BACKFILL TO THE ELEVATION AND SECTION EXISTING PRIOR TO EXCAVATION.

SUPERSTRUCTURE CONDITION NOT FULLY DOCUMENTED BECAUSE REDECKING IS ANTICIPATED, SEE PHOTOS IN _OTH.pdf

TOTAL ESTIMATED QUANTITIES

BID ITEMS	UNIT	SUPER	W ABUT	PIER 1	PIER 2	PIER 3	E ABUT	TOTAL
EXCAVATION FOR STRUCTURES	C.Y.		145	60	55	55	175	500
GRANULAR BACKFILL	C.Y.	—	40	45	45	40	40	210
CONCRETE MASONRY	C.Y.	241.4	70.5	40.6	44.7	38.0	70.9	506.1
BAR STEEL REINFORCEMENT	LB.	77,800	2,120	5,110	6,450	4,800	2,140	98,420
STRUCTURAL CARBON STEEL	LB.	35,570	—	—	—	—	—	85,570
STRUCTURAL LOW ALLOY STEEL	LB.	94,650	—	—	—	—	—	94,650
TUBULAR RAILING TYPE B	L.F.	428.9	—	—	—	—	—	428.9
SLOPE PAVING - CONCRETE	S.Y.	—	248	—	—	—	232	480
LUBRICATED BRONZE PLATES	LB.	276	—	—	—	—	—	276
BEARING PADS	S.F.	37	—	—	—	—	—	37
ELECTRICAL WORK (B-40 280)	L.S.	1	—	—	—	—	—	1
NON BID ITEMS								
½" ZINC OR ALUMINUM PLATES	S.F.	45	—	—	—	—	—	45

LIST OF DRAWINGS

REVISED

STATE HIGHWAY COMMISSION OF WISCONSIN

GENERAL PLAN

CO. MILWAUKEE | CITY VILLAGE TOWN MILWAUKEE | STA. 20+27.47
SECTION 34 | TOWN 8 N | RANGE 21 E
DESIGN SPEC. AASHO '61 | LOADING H20-S16 | CONST SPEC 1963
DATE 11-5-63 | DESIGN VGH | DRAWN DB | CKD

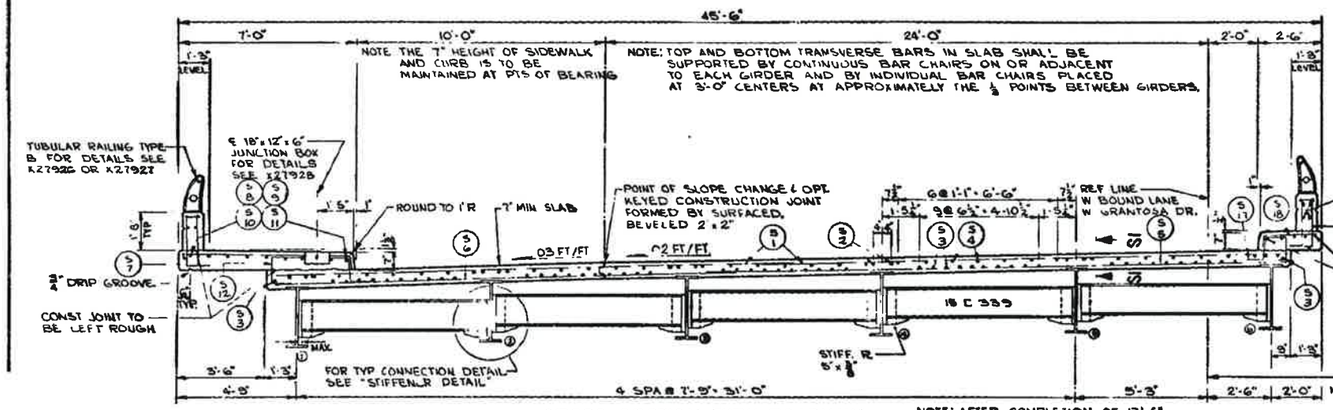
RECOMMENDED N. B. Schultz ENGINEER - MANAGER
APPROVED Z. L. Poetisch STATE HIGHWAY ENGINEER

STRUCTURE B - 40 - 280 | SHEET 1 OF 15

X 27920

FORM E B 12-62

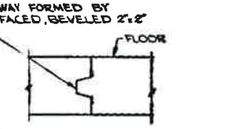
B P R DIVISION	PROJECT	SHEET NO	TOTAL SHEETS
4	F027-1(22) 171		383



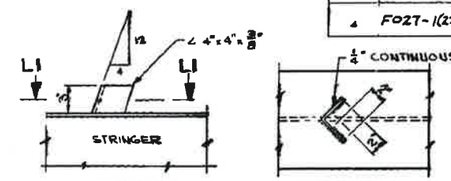
CROSS SECTION THRU ROADWAY

NOTE: AFTER COMPLETION OF 13'-6" POUR STRINGER 3 HAS TAKEN 21% OF ITS DEAD LOAD DEFLECTION.

NOTE: TRANSVERSE BAR STEEL REINFORCEMENT SHALL BE PLACED PARALLEL TO E OF SUBSTRUCTURE UNITS

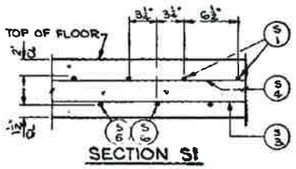


LONG & TRANS CONST. JT.
RUN STEEL THRU JOINT

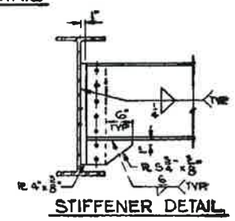


ELEVATION — SECTION L1

SHEAR LUG DETAIL



SECTION S1



STIFFENER DETAIL

HEAVY RUST @ BRG & BOTTOM FLANGE. MISSING BOLTS @ HOLD DOWN.

HEAVY LAMINATE RUST @ BRG & BOTTOM FLANGE

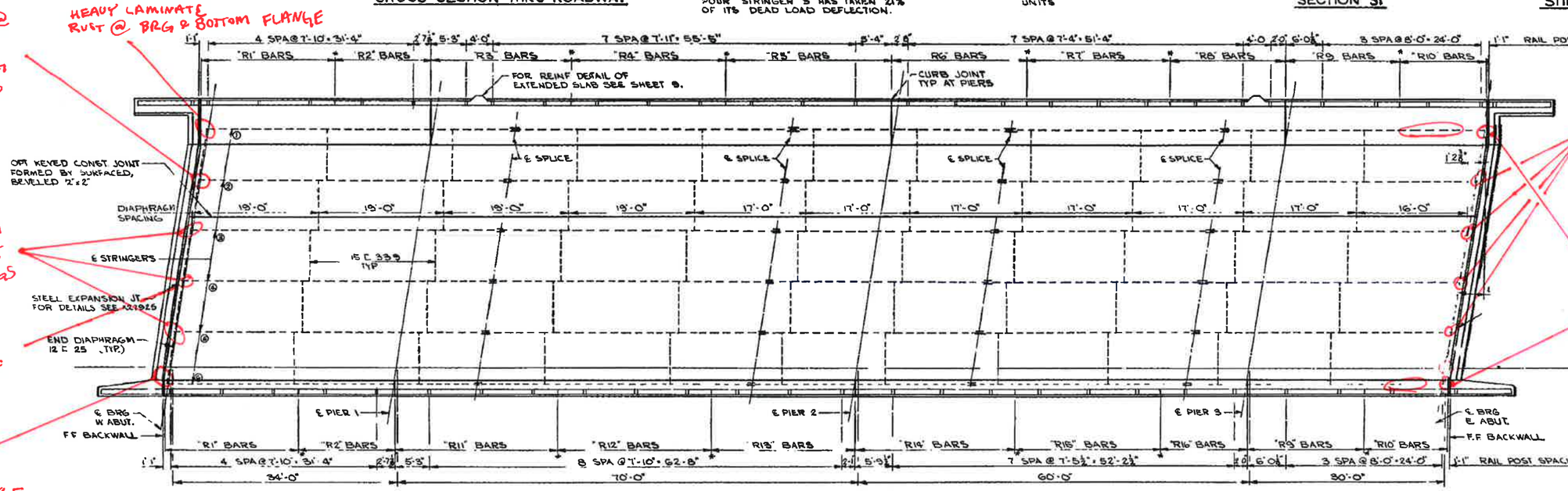
HEAVY BOTTOM FLANGE RUST, PITTING @ BRGS

BENT BRG SOLE PLATE

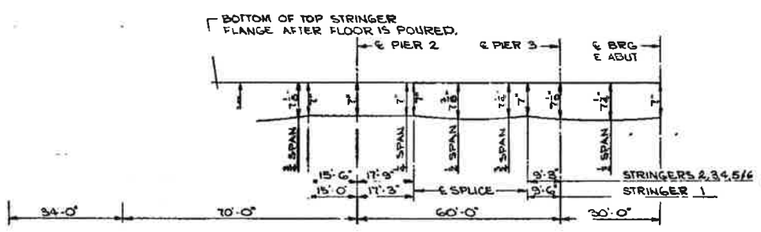
HEAVY RUST @ BRG. PITTING @ BOTTOM FLANGE

LAMINATE RUST & PITTING @ INTERIOR GIRDERS

HEAVY RUST/SECTION LOSE @ FASCIA BRG & BOTTOM FLANGE



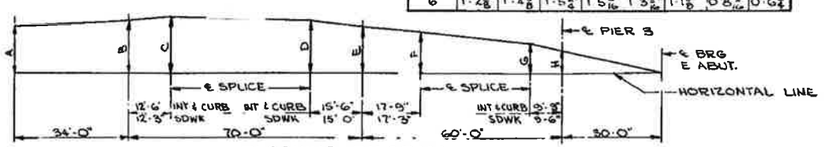
PLAN



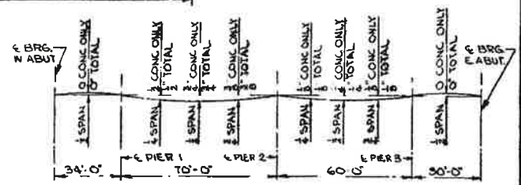
SLAB THICKNESS DIAGRAM

SLAB THICKNESSES SHOWN ARE THEORETICAL AND MAY NEED TO BE CHANGED TO COMPENSATE FOR CONSTRUCTION DISCREPANCIES.

BEAM	A	B	C	D	E	F	G	H
1	1'-4½"	1'-6"	1'-7"	1'-6"	1'-4"	1'-2½"	0'-9"	0'-7"
2	1'-4½"	1'-6"	1'-7"	1'-6"	1'-4"	1'-2½"	0'-9"	0'-7"
3	1'-5"	1'-5"	1'-6"	1'-5"	1'-4"	1'-2"	0'-9"	0'-6"
4	1'-5"	1'-5"	1'-6"	1'-5"	1'-4"	1'-2"	0'-9"	0'-6"
5	1'-2"	1'-5"	1'-6"	1'-5"	1'-3"	1'-1"	0'-8"	0'-6"
6	1'-2"	1'-4"	1'-5"	1'-5"	1'-3"	1'-1"	0'-8"	0'-6"



BLOCKING DIAGRAM



DEFLECTION DIAGRAM

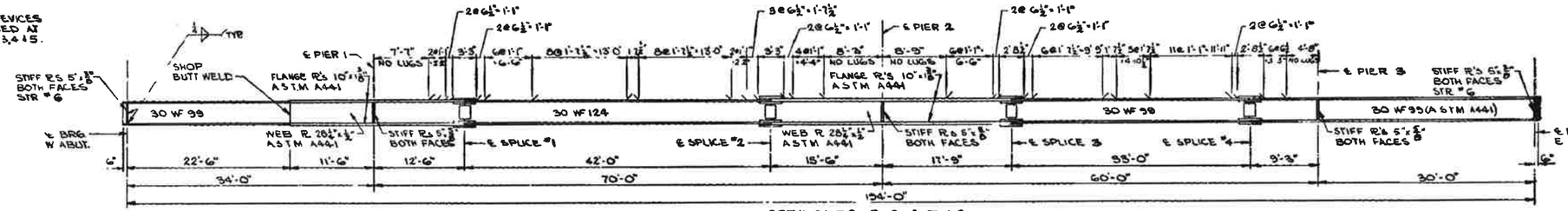
REVISED	STATE HIGHWAY COMMISSION OF WISCONSIN
	SUPERSTRUCTURE
	DESIGN SPEC AASHO 61 LOADING H 20 S16 CONST SPEC 1963
	DATE 11-5-62 DES. J.V.G.H. DRAWN J.C.K. CKD. JAH
	STRUCTURE B-40-280 SHEET 2 OF 15

X27921

FORM E B 12-66

S P R DIVISION	PROJECT	SHEET NO	TOTAL SHEETS
4	F027-1(22)-172	383	

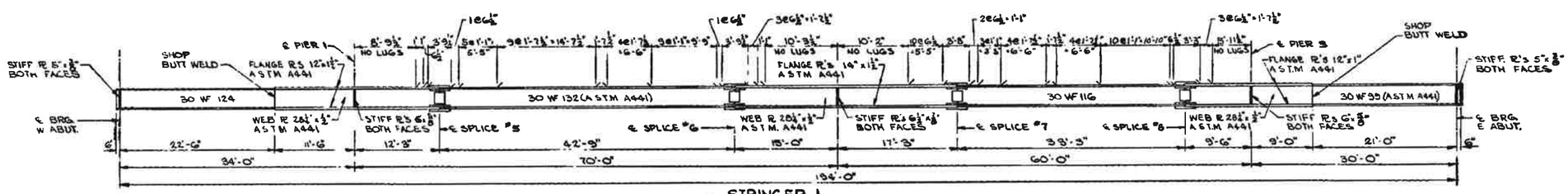
NOTE HOLD DOWN DEVICES SHALL BE USED AT STRINGERS 2,3,4 & 5.



NOTE: HOLD DOWN DEVICES SHALL BE USED ON STR 2,3,4 & 5 AT BOTH ABUTS.

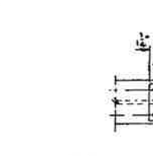
NOTE: STIFF R's @ ABUTS SHALL BE PLACED PARALLEL TO ℄ BRG.

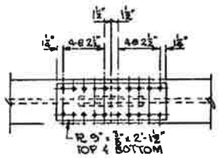
STRINGERS 2,3,4,5 & 6

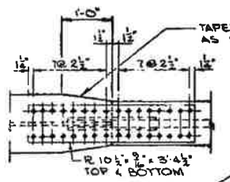


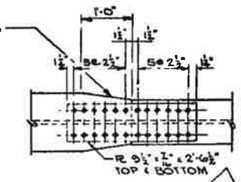
STRINGER 1
(SIDEWALK STR.)

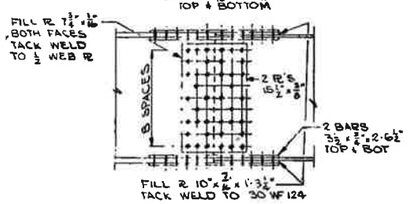
77,800#



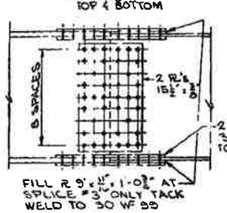




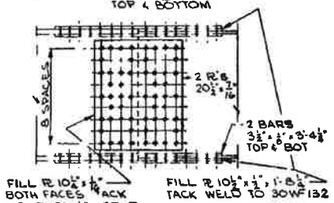




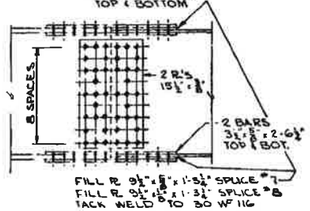
SPLICE 1 & 2



SPLICE 3 & 4
SPLICE #3 SHOWN SPLICE #4 SIMILIAR EXCEPT FOR NO SHIM R.



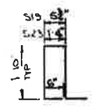
SPLICE 5 & 6



SPLICE 7 & 8

DETAIL A

DETAIL B

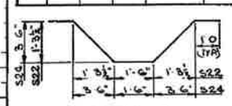


DETAIL C

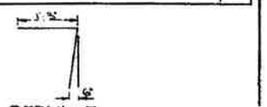
BILL OF BARS

DIMENSIONS IN BENDING DETAILS ARE OUT TO OUT.

POUR	MARK	NO	SIZE	LENGTH	SPACING	LOCATION	DET
	S1	726	6	21 - 3	6½	FLOOR - TOP - TRANS.	
	S2	36	5	15 - 0	SHOWN	" - " - LONG - SYM ABOUT ℄ PIERS	
	S3	312	5	33 - 9	6½	" - " - BOT - LONG	
	S4	210	5	33 - 9	1 - 1	" - " - TOP - LONG.	
	S5	362	6	19 - 0	6½	" - " - BOT - TRANS.	
	S6	362	6	24 - 0	6½	" - " - " - "	
	S7	195	6	7 - 0	1 - 0	SIDEWALK - TRANS.	A
	S8	9	5	34 - 6	SHOWN	" - LONG - SPAN 1	
	S9	18	5	35 - 6	"	" - " - " - " 2	
	S10	18	5	30 - 6	"	" - " - " - " 3	
	S11	9	5	30 - 6	"	" - " - " - " 4	
	S12	195	5	6 - 0	1 - 0	" - TRANS	B
	S13	5	6	34 - 6	SHOWN	CURB - LONG - SPAN 1	
	S14	10	6	35 - 6	"	" - " - " - " 2	
	S15	10	6	30 - 6	"	" - " - " - " 3	
	S16	5	6	30 - 6	"	" - " - " - " 4	
	S17	195	5	3 - 9	1 - 0	" - TRANS.	B
	S18	195	6	2 - 6	1 - 0	" " "	A
	S19	390	5	6 - 0	1 - 0	RAILING PARAPET - SDWK & CURB	C
	S20	10	4	7 - 3	SHOWN	DIAPHRAGM @ ABUTS	
	S21	50	5	2 - 6	1 - 6	" " @ " "	E
	S22	6	5	7 - 3	SHOWN	LIGHTING SUPPORTS	D
	S23	4	5	6 - 6	"	" " "	C
	S24	4	5	15 - 6	SHOWN	FLOOR @ LIGHTING SUPPORTS	D
	S25	4	5	7 - 0	"	" & SDWK @ LIGHTING SUPPORTS	B
	S26	4	5	7 - 9	"	" " 1 " @ " " "	B
	S27	4	5	8 - 9	"	" " 2 " @ " " "	B
	S28	4	5	9 - 6	"	" " 3 " @ " " "	B
	S29	36	6	5 - 9	10	" - TOP & BOT - TRANS - @ LTG SUP.	
	S30	4	5	3 - 6	SHOWN	" - " " & " - LONG - @ LTG SUP.	
	S31	4	5	6 - 3	"	" - " " & " - " - @ " "	



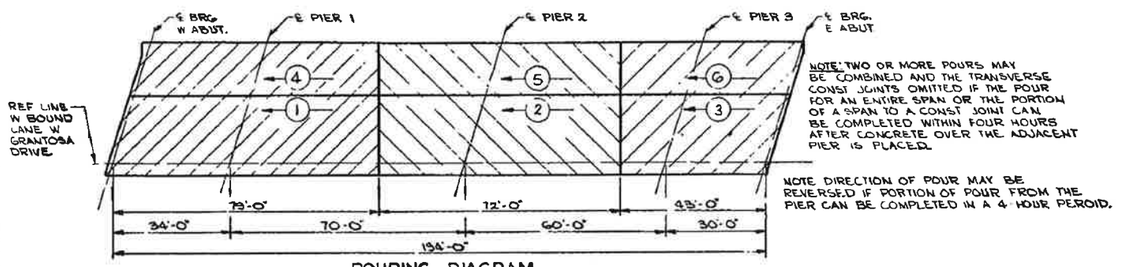
DETAIL D



DETAIL E

BILL OF BARS

POUR	MARK	NO	SIZE	LENGTH	SPACING	LOCATION	DET
RAILING PARAPET	R1	8	5	20-0	SHOWN	RAILING PARAPET	
	R2	8	5	14-0	"	" "	
	R3	4	5	20-9	"	" "	
	R4	4	5	23-3	"	" "	
	R5	4	5	24-9	"	" "	
	R6	4	5	20-6	"	" "	
	R7	4	5	21-6	"	" "	
	R8	4	5	16-6	"	" "	
	R9	8	5	17-6	"	" "	
	R10	8	5	12-6	"	" "	
	R11	4	5	24-6	"	" "	
	R12	4	5	23-0	"	" "	
	R13	4	5	21-3	"	" "	
	R14	4	5	24-0	"	" "	
	R15	4	5	22-0	"	" "	
	R16	4	5	12-9	"	" "	



POURING DIAGRAM

NOTE: TWO OR MORE POURS MAY BE COMBINED AND THE TRANSVERSE CONST JOINTS OMITTED IF THE POUR FOR AN ENTIRE SPAN OR THE PORTION OF A SPAN TO A CONST JOINT CAN BE COMPLETED WITHIN FOUR HOURS AFTER CONCRETE OVER THE ADJACENT PIER IS PLACED.

NOTE DIRECTION OF POUR MAY BE REVERSED IF PORTION OF POUR FROM THE PIER CAN BE COMPLETED IN A 4 HOUR PERIOD.

REVISED

STATE HIGHWAY COMMISSION OF WISCONSIN

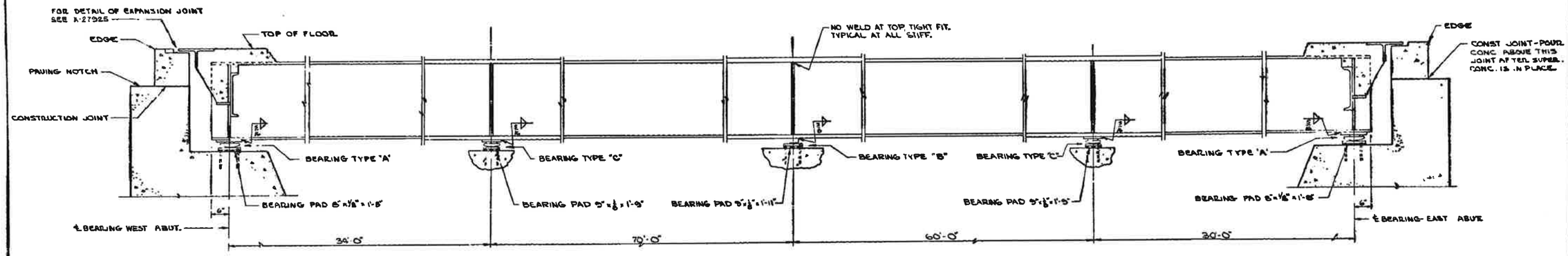
SUPERSTRUCTURE

DESIGN SPEC AASHO 61 LOADING H20 S16 COMP SPEC 1963

DATE 11-5-63 DESIGN V.G.H. DRAWN J.C.K. CKD. [illegible]

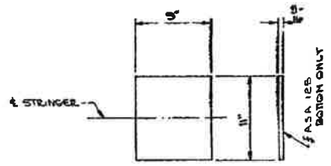
STRUCTURE B-40-280 SHEET 3 OF 15

X27922

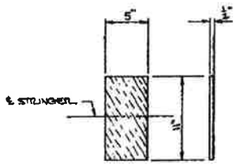


LONGITUDINAL SECTION

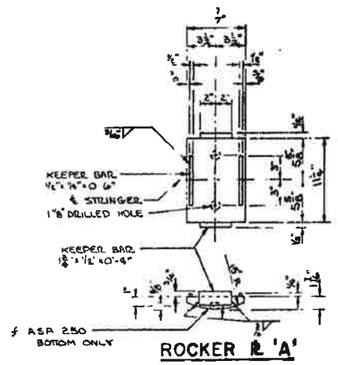
FOR LOCATION & DETAILS OF STRINGER SPLICE SEE X27922
SECTION IS PARALLEL TO STRINGER.



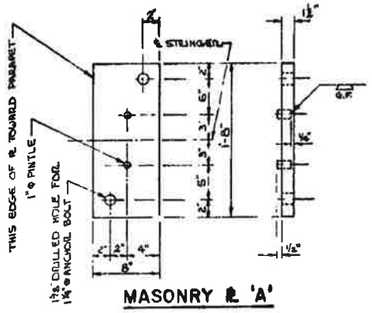
TOP ℞ 'A'



LUBRICATED BRONZE ℞



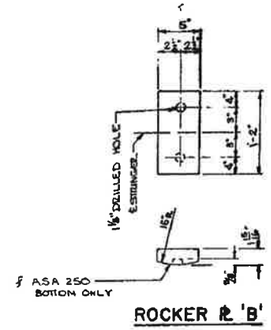
ROCKER ℞ 'A'



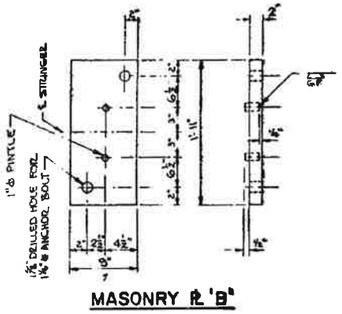
MASONRY ℞ 'A'

BEARING TYPE 'A'

2 REQ'D.



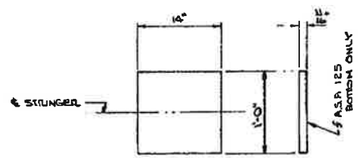
ROCKER ℞ 'B'



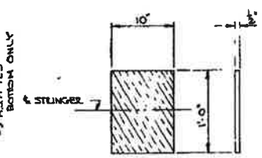
MASONRY ℞ 'B'

BEARING TYPE 'B'

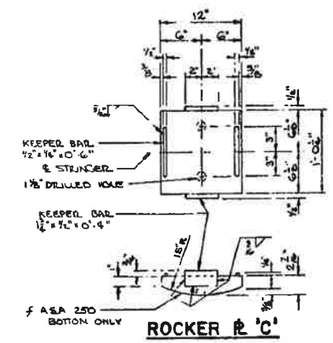
1 REQ'D.



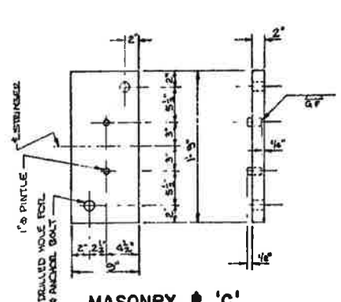
TOP ℞ 'C'



LUBRICATED BRONZE ℞



ROCKER ℞ 'C'



MASONRY ℞ 'C'

BEARING TYPE 'C'

2 REQ'D.

BEARING NOTES

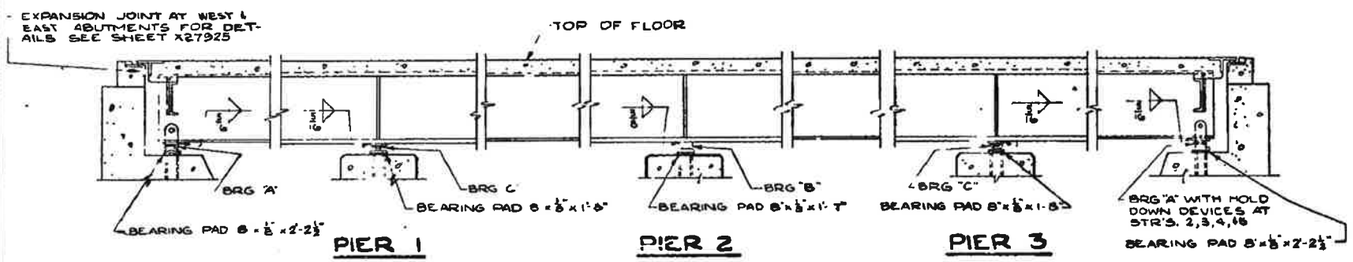
- ALL STRUCTURAL STEEL BEARING PLATES SHALL BE FLAT ROLLED STEEL PLATES WITH ALL SURFACES SMOOTH & FREE FROM WARP & ALL EDGES SMOOTH, STRAIGHT, & VERTICAL.
- ALL PLATE CUTS SHALL BE MACHINE FLAME CUTS OR MACHINE CUTS.
- PINTLES SHALL BE MACHINED TO A DRIVING FIT. CHAMFER TOP OF PINTLE ⅛".
- LUBRICATE TOP SURFACES ONLY OF BRONZE PLATES.
- ANCHOR BOLTS TO BE 1¼" Ø x 1'-4" LONG WITH ★ PROJECTION ABOVE TOP OF CONCRETE PEDESTAL. USE ONE 1¼" STANDARD LOCKWASHER & ONE HEX NUT PER BOLT. THREAD BACK 3".
- ALL MATERIAL EXCLUDING ANCHOR BOLTS, NUTS, AND WASHERS SHALL BE MADE OF A242 STEEL WITH A CORROSIVE RESISTANCE OF 4 OR MORE TIMES THAT OF A36 STEEL.
- THE TOP 4½" OF ANCHOR BOLTS, WASHERS & NUTS SHALL BE GALVANIZED.
- ALL MATERIAL IN BEARINGS, EXCLUDING BRONZE PLATES AND BEARING PADS SHALL BE PAID FOR AT THE UNIT PRICE BID FOR STRUCTURAL LOW ALLOY STEEL.
- ALL SURFACES MARKED ℄ SHALL BE MACHINE FINISHED.

★ BRG 'A' - 3½"
BRG 'B' - 4½"
BRG 'C' - 4½"

STATE HIGHWAY COMMISSION OF WISCONSIN
LONG. SECTION & BEARINGS STRINGER 1
DESIGNED AASHO '61 - H 20 S16 - 1963
DR. 11-5-63 - V.G.H. - CK. J.C.K.
STRUCTURE B 40 280 - SHEET 4 OF 15

X27923

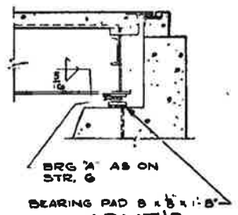
P. F. O. S. No.	PROJECT	SHEET No.	TOTAL SHEETS
4	F027-1(22)	174	383



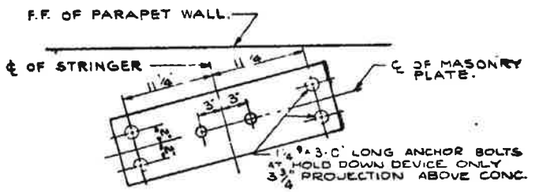
LONGITUDINAL SECTION

GENERAL NOTES

ALL STRUCTURAL STEEL BEARING PLATES SHALL BE FLAT ROLLED STEEL PLATES WITH ALL SURFACES SMOOTH & FREE FROM WARP & ALL EDGES SMOOTH, STRAIGHT & VERTICAL.
ALL PLATE CUTS SHALL BE MACHINE OR MACHINE FLAME CUTS.
ALL SURFACES MARKED "F" SHALL BE MACHINE FINISHED. "F" = A.S.A. 250.
ANCHOR BOLTS SHALL BE THREADED 3". PROVIDE ONE STD WROUGHT STEEL WASHER & ONE HEX. NUT PER BOLT.
LUBR. PLATE TOP SURFACE OF BRONZE PLATE ONLY.
MACHINE FINISH BOTTOM OF FLANGE PLATES A.S.A. 125 IN DIRECTION OF MOVEMENT. (EXPANSION BRG. ONLY)
ALL MATERIAL EXCEPT ANCHOR BOLTS, NUTS, AND WASHERS SHALL BE MADE OF A242 STEEL WITH A CORROSIVE RESISTANCE OF 4 OR MORE TIMES THAT OF A36 STEEL.
THE TOP 4½" OF ANCHOR BOLTS, WASHERS & NUTS SHALL BE GALVANIZED.
ALL MATERIAL IN BEARINGS EXCLUDING BRONZE PLATES AND BEARING PADS SHALL BE PAID FOR AT THE UNIT PRICE BID FOR STRUCTURAL LOW ALLOY STEEL.

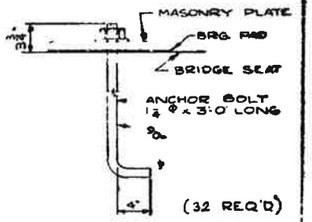


ABUT'S



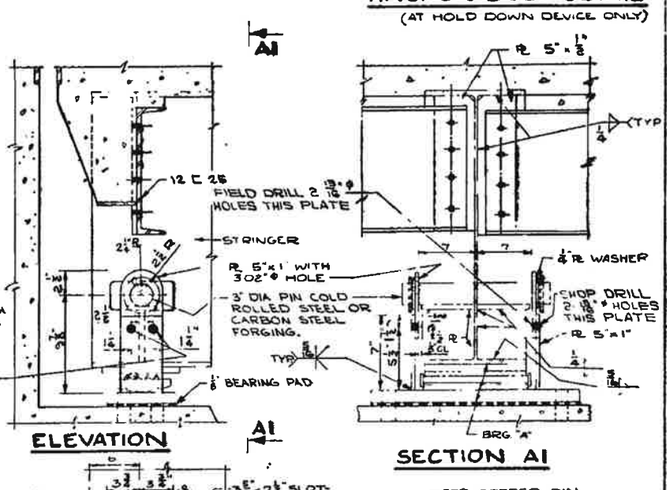
PRE-SET ANCHOR BOLT PLAN

(AT HOLD DOWN DEVICE ONLY)



ANCHOR BOLT DETAIL

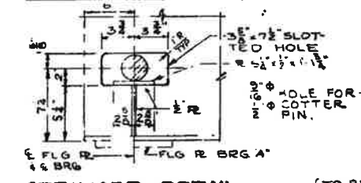
(AT HOLD DOWN DEVICE ONLY)



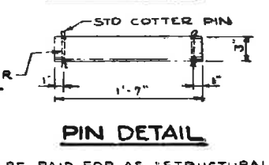
ELEVATION

SECTION A1

¾" HIGH TENSILE STRENGTH BOLTS BOLTS SHALL BE PLACED BEFORE SLAB IS POURED AFTER MAKING CERTAIN THAT ALL PARTS ARE PROPERLY SEATED.



STRINGER DETAIL

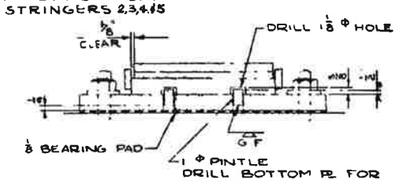


PIN DETAIL

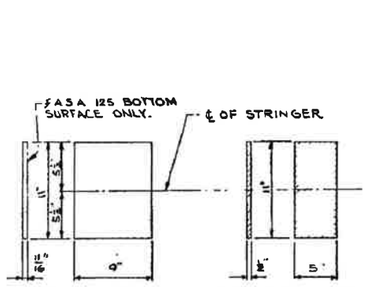
(TO BE PAID FOR AS "STRUCTURAL LOW ALLOY STEEL")

HOLD DOWN DEVICE DETAILS

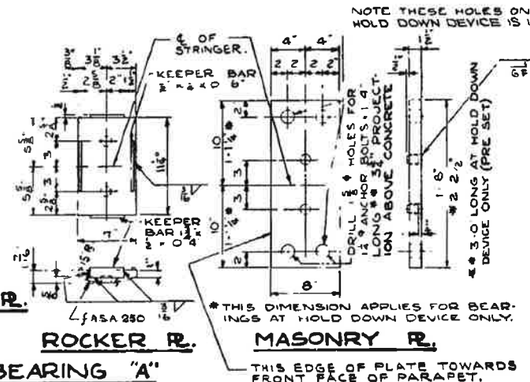
(AT ABUT'S ONLY)
STRINGERS 2,3,4,&5



TYPICAL PINTLE DETAIL - ALL BRG'S.



FLG. PL. LUBR. BRONZE PL.

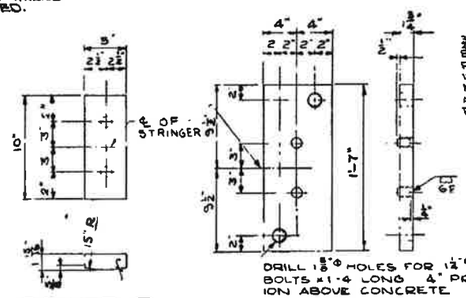


ROCKER PL. MASONRY PL.

BEARING "A"

(10 REQD. { 2 STD / 8 HOLD DOWN)

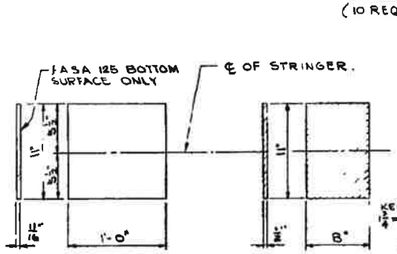
NOTE THESE HOLES ONLY WHERE HOLD DOWN DEVICE IS USED.



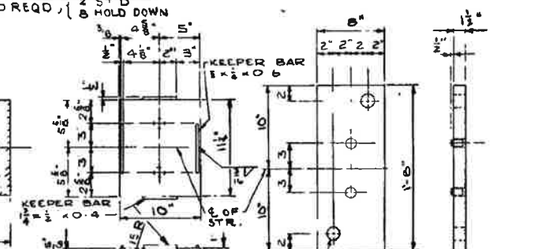
ROCKER PL. MASONRY PL.

BEARING "B"

5 REQ'D.



FLG. PL. LUBR. BRONZE PL.



ROCKER PL. MASONRY PL.

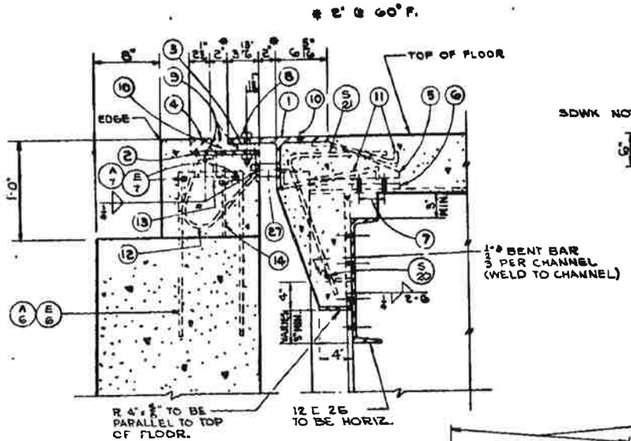
BEARING "C"

10 REQ'D.

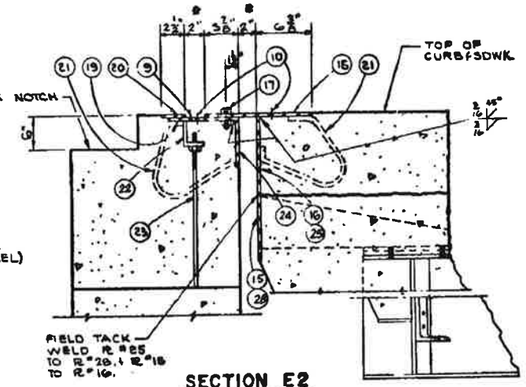
	STATE HIGHWAY COMMISSION OF WISCONSIN	
	LONG SECTION & BEARINGS STRINGERS 2,3,4,5 & 6	
	DESIGN SPEC AASHO 1961	LOADING H20 S16	DATE 1969
	DETAILED GS	CHECKED VBH	TRACED JCR	LOG
	STRUCTURE B-40-280	SHEET 5 OF 15	

X27924

S P R DIVISIONS	PROJECT	SHEET NUMBER	TOTAL SHEETS
4	F027-1(22) 175	383	

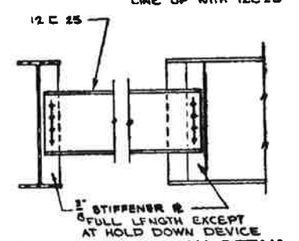


SECTION E1

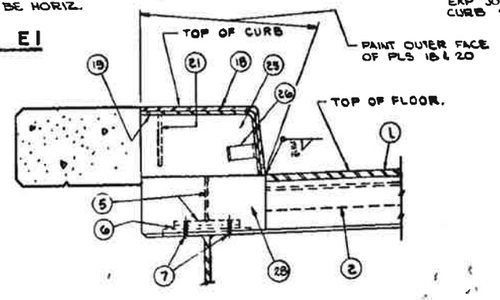


SECTION E2

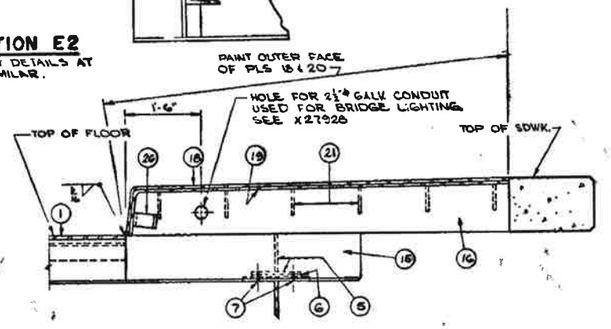
EXP JOINT DETAILS AT CURB SIMILAR.



TYPICAL DIAPHRAGM DETAIL



SECTION THRU JOINT AT CURB



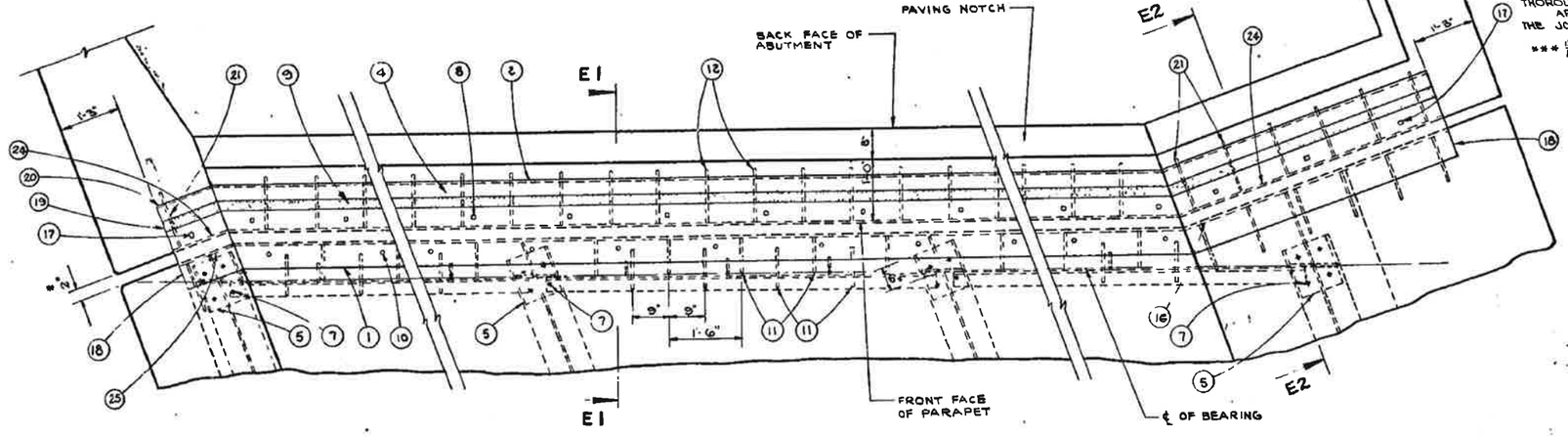
SECTION THRU JOINT AT SIDEWALK

LEGEND

#1 S.T. G" WF 39.5# = RDWY. WIDTH.
*#2 ∠ 6" × 4" × ⅜" = RDWY. WIDTH.
*#3 BAR 2" × ⅜" = RDWY. WIDTH. WELD TO ∠#2 WITH 2 LINES OF ¼" FILLET WELD. 2 @ G.
**#4 BAR 2½" × 1½" = RDWY. WIDTH. WELD TO ∠#2 WITH 2 LINES OF ¼" FILLET WELD. 2 @ G.
5. FABRILATED FROM ½" WELDED PL. WELD TO STEM & FLG OF ST#1 WITH ¼" FILLET WELD NEAR SIDE & FAR SIDE AND TO R #16 & #28.
6 ⅜" MIN. LAMINATED SHIM.(SLOTTED)
7 DRILL HOLES IN STRINGER FLANGE IN FIELD FOR 4- ⅞" ϕ ERECTION BOLTS
***8 ¾" ϕ BOLT WITH SQ NUT @ 2'-0" CTRS. TACK WELD NUT TO ∠#2. GREASE FOR EASY REMOVAL. 1 9/16" × 1⅝" SLOTTED HOLE IN S.T.#1. LONG DIMENSION OF SLOTTED HOLE TO BE PARALLEL TO ℄ RDWY
9 APPLY ½ ± COAT OF BITUMASTIC TO THIS SURFACE. AFTER CONCRETE HAS SET FILL WITH HOT POURED ELASTIC TYPE JOINT SEALER.
10 1¾" ϕ VENT HOLES @ 2'-0" CTRS. ON ∠#2 & ST#1 (@ 0'-9" CTRS ON PLS #16 & #5.
11. ⅝" ϕ BENT BAR @ 0'-9" ALTERNATE CTRS. BETWEEN STRINGERS. WELD TO S.T. #1 (1'-3" LG)
12. ⅝" ϕ BENT BAR @ 1'-0" CTRS. WELD TO ∠#2. (2'-0" LG)
13. ∠ 3" × 2½" × ⅜" × 0'-3" APPROX 5'-0" CTRS. WELD TO ∠#2. PROVIDE ⅞" ϕ HOLE IN 2½" LEG FOR BOLT #14.
14. ¾" ϕ BOLT x 0'-9" LG & NUT TACK WELD NUT TO ∠#13.
**15. ⅜" PL CUT TO SDWK LIMITS AS SHOWN. SHOP WELD TO ST#1 & #5.
**16 ⅜" PL CUT TO SDWK LIMITS AS SHOWN FIELD WELD TO PL #15.
17. SAME AS BOLT #8 EXCEPT FOR LENGTH.
*#18 ⅜" PLATE — BEND DOWN FACE OF CURB & SDWK. LIMITS AS SHOWN FIELD WELD TO S.T. #1.
**#18 ⅜" PLATE - BEND DOWN FACE OF CURB & SDWK LIMITS AS SHOWN
**#20. R 2½" × ⅜" BEND DOWN FACE OF CURB & SDWK LIMITS AS SHOWN WELD TO R #19. FIELD WELD TO BAR #4.
21 ⅝" ϕ BENT ANCHOR BAR. WELD TO R's 16 & 25, 18 & 16, & 19 & 24. 1'-6 LG ⅜" FIL WELDS ALL AROUND
22 ∠ 3" × 2½" × ⅜" × 0'-3" WELD TO R #19.
23 ¾" ϕ BOLT & NUT. TACK WELD NUT TO ∠#22 (1'-7 LG)
24 R G" × ⅜" - WELD TO R #19 CUT TO CURB & SDWK LIMITS AS SHOWN
**25 ⅜" PLATE — CUT TO CONFORM TO SHAPE OF CURB. FIELD WELD TO PL #28.
26. BAR 2½" × ⅜" × 1'-0" ⌙ WELD TO R's #18 & #19. AND ¾" ϕ BOLT PROVIDE 3" ϕ HOLES @ 5'-0" CTRS IN ST#1 & ∠#2 FOR ¾" ϕ BOLT.
27 BLOCK & BOLT FOR SHIPMENT WITH PIPE SLEEVE.
** 28 ⅜" PL CUT TO CURB LIMITS AS SHOWN. SHOP WELD TO ST#1 AND SUPPORT #5.

NOTES

EXPANSION JOINT SHALL BUILT TO CONFORM TO RDWY. SUPERELEVATION AND GRADE.
ONE FIELD SPLICE SHALL BE PERMITTED
ALL ITEMS MARKED **#, SHALL BE MADE OF A242 STEEL WITH A CORROSIVE RESISTANCE OF 4 OR MORE TIMES THAT OF A36 STEEL.
ALL MATERIAL IN EXPANSION JOINT SHALL BE PAID FOR AS STRUCTURAL LOW ALLOY STEEL.
AFTER CONCRETE HAS SET REMOVE BOLTS #8 & #17 AND FILL HOLES WITH HOT POURED ELASTIC TYPE JOINT SEALER.
NO PAINT SHALL BE APPLIED TO EXPANSION JOINT EXCEPT AS NOTED.
AFTER CONCRETE HAS SET THE JOINT OPENING SHALL BE THOROUGHLY CLEANED.
APPLY ± COAT OF BITUMASTIC TO METAL SURFACES FORMING THE JOINT AND FILL WITH HOT POURED ELASTIC TYPE JOINT SEALER
*** 13/16" ϕ HOLE IN BAR #3 & ∠#2.



PART PLAN

EAST ABUT SHOWN. WEST ABUT SIMILAR EXCEPT SDWK & CURB ARE REVERSED TO OPPOSITE SIDES.

NOTE: CONC END DIAPHRAGM TO EXTEND BETWEEN WEBS OF FASCIA STRINGERS

REVISIONS	STATE HIGHWAY COMMISSION OF WISCONSIN
	EXPANSION JOINT
	DESIGN SPEC AASHO '61 LOADING H 20 S16 CORRT SPEC 1963
	DATE 11-5-63 SHEET NO STD DRAWN JCK CHD RR
	STRUCTURE B-40-280 SHEET 6 OF 15

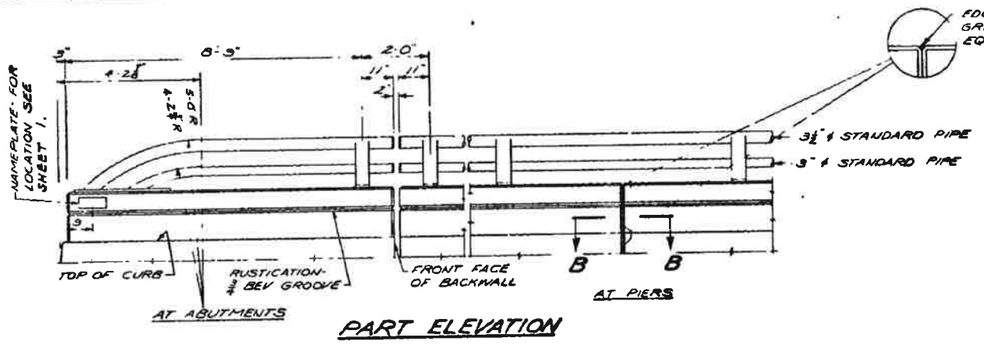
X 27925

23-DEC-1997 10:06

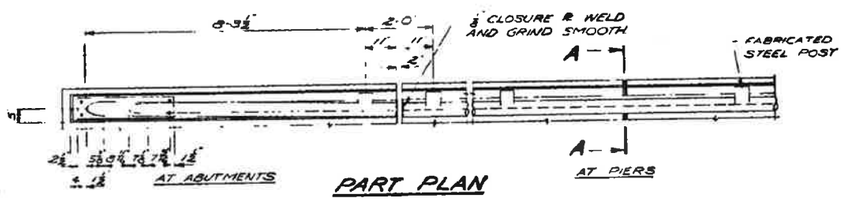
Screenscan

FORM E 9-12 62

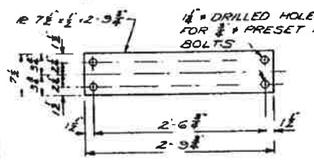
J P R DIVISION	PROJECT	SHEET NO	TOTAL SHEETS
4	F027-1(22) 176	383	



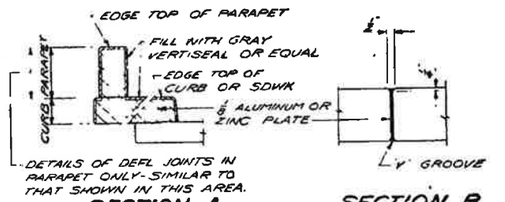
PART ELEVATION



PART PLAN

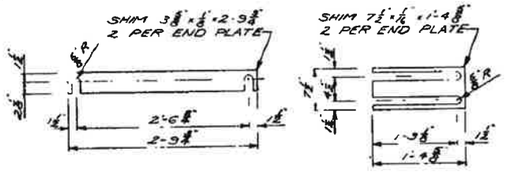


END PLATE

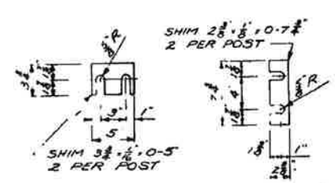


SECTION A

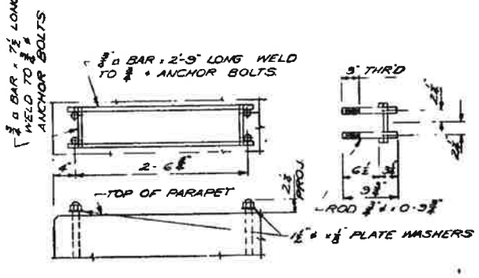
SECTION B

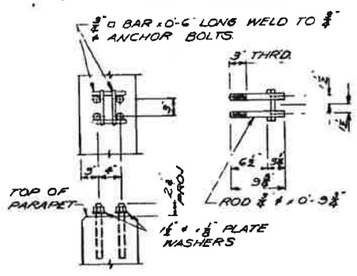


END PLATE SHIM DETAILS



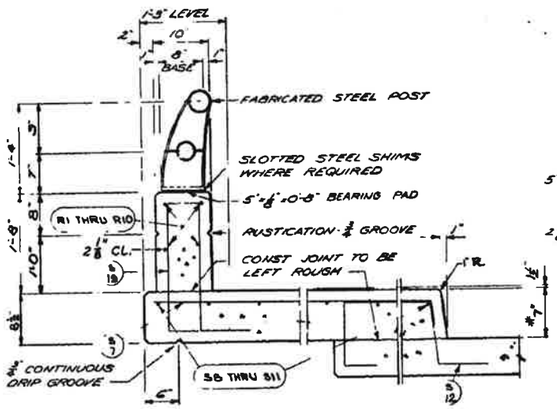
POST SHIM DETAILS



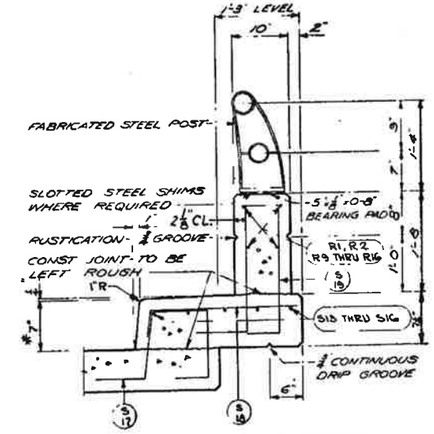


ANCHOR BOLT SETTING DETAILS

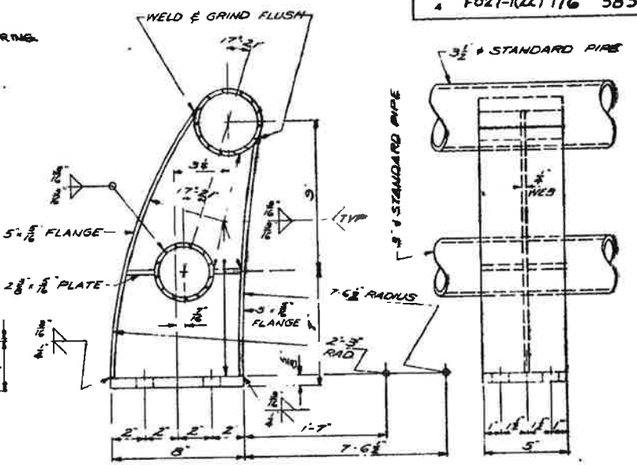
* THE 'T' HEIGHT OF CURB SHALL BE MAINTAINED AT ALL POINTS OF BEARING.

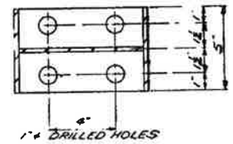


SECTION THRU SIDEWALK



SECTION THRU CURB

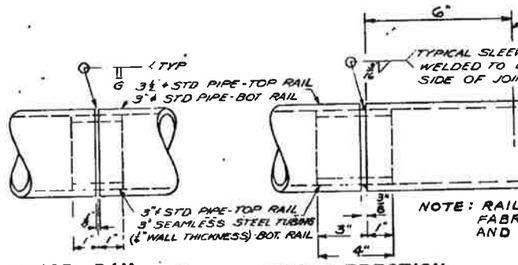




POST DETAILS

NOTES

1 STEEL RAIL POSTS SHALL BE SET NORMAL TO GRADE.
2 RAILING SHALL BE FABRICATED IN LENGTHS AS SHOWN.
3 STEEL SHIMS SHALL BE USED UNDER POSTS AND UNDER END PLATES WHERE REQUIRED FOR ALIGNMENT.
4 WHEN PARAPETS AND CURBS ARE POURED CONTINUOUSLY FROM END TO END THEY SHALL BE SEPARATED AT THE DEFLECTION JOINTS BY A PIECE OF ¼" ZINC OR ALUMINUM PLATE CUT AS SHOWN IN SECTION A BY SHADED AREA. IF CONSTRUCTION JOINTS IN PARAPETS AND CURBS ARE USED AT THE DEFLECTION JOINTS ONE SIDE OF JOINT SHALL BE COATED WITH BITUMINOUS PAINT AND PLATE SEPARATORS MAY BE OMITTED.
5 THE FOLLOWING MATERIALS SHALL BE USED:
TOP RAILING SHALL BE 3½" ϕ STANDARD PIPE ASTM DESIGNATION A53.
BOTTOM RAILING SHALL BE 3" ϕ STANDARD PIPE ASTM DESIGNATION A53.
POST SHALL BE FABRICATED FROM MATERIAL CONFORMING TO ASTM DESIGNATION A36.
ANCHOR BOLTS TO BE MADE FROM MATERIAL CONFORMING TO ASTM DESIGNATION A307.
SLEEVES SHALL BE 3" ϕ STANDARD PIPE ASTM DESIGNATION A53 FOR TOP RAIL AND 3 SEAMLESS STEEL TUBING (¼ WALL THICKNESS) FOR BOTTOM RAIL.
6 CAULK EXPOSED OPENINGS BETWEEN SHIMS WITH LEAD WOOL.



SHOP RAIL SPLICE DETAIL

IF USED THE LOCATION OF THE SHOP SPLICE SHALL BE SHOWN ON THE SHOP DRAWINGS.

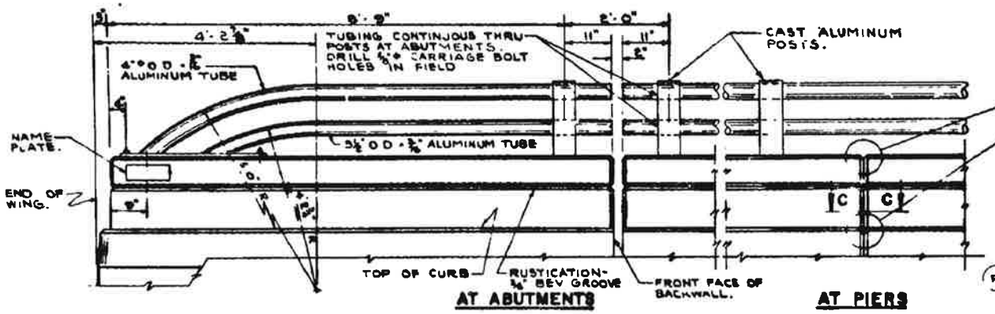
FIELD ERECTION JOINT DETAIL

NOTE: RAILING SHALL BE FABRICATED IN 2 AND 3 PANEL LENGTHS.

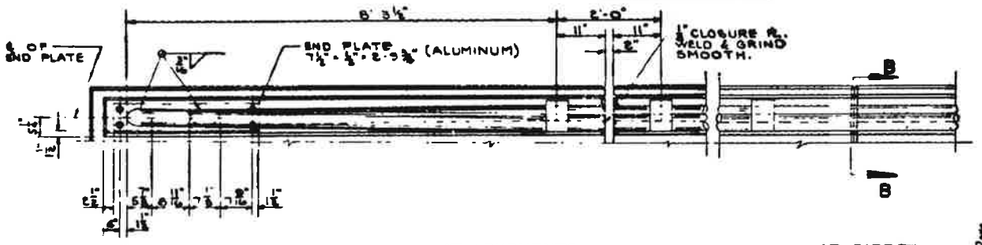
REVISED	STATE HIGHWAY COMMISSION OF WISCONSIN	
	TUBULAR STEEL RAILING TYPE "B"	
	DESIGN SPEC AASHO '61 · LOAD HIGH 20 S16	SHEET 1963
	DATE 11-5-63 · DESIGN ST. · DRAWN J.C.K. · CKD	
STRUCTURE B-40-280	SHEET 7 OF 15	

X27926

S.P.S. DISTRICT	PROJECT	PROJECT NO.	TOTAL SHEETS
4	FO27-1(22)	177	383

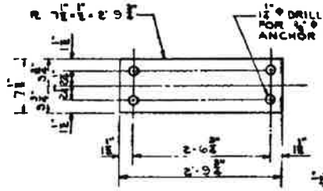


PART ELEVATION

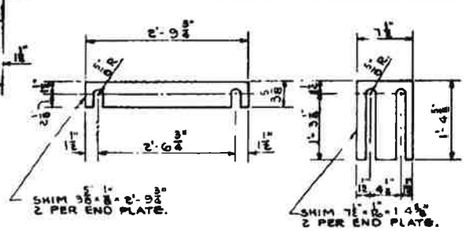


PART PLAN

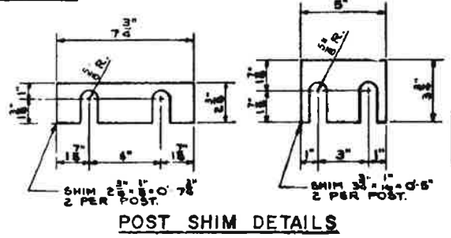
DOUBLE LINE ALUMINUM RAILING



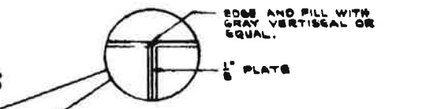
END PLATE
(ALUMINUM)



END PLATE SHIM DETAILS

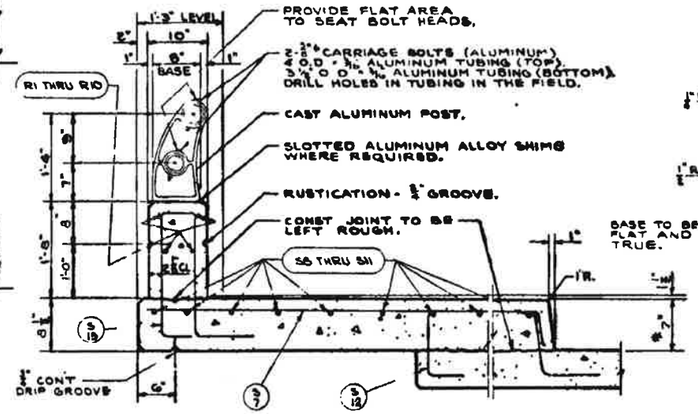


POST SHIM DETAILS

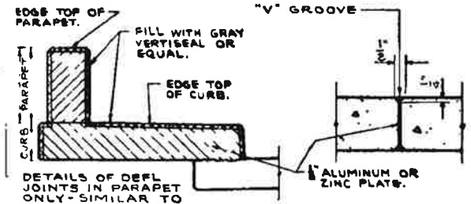


DETAIL AT TOP OF CURB & PARAPET

* THE 'T' HEIGHT OF CURB SHALL BE MAINTAINED AT ALL POINTS OF BEARING.



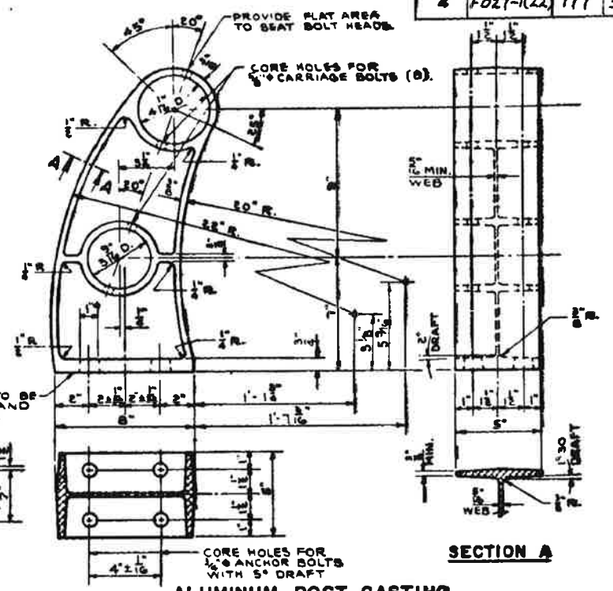
SECTION THRU SIDEWALK



SECTION B

SHOWING DEFLECTION JOINT IN CURB AND PARAPET AT PIERS.

SECTION C



ALUMINUM POST CASTING

NOTES

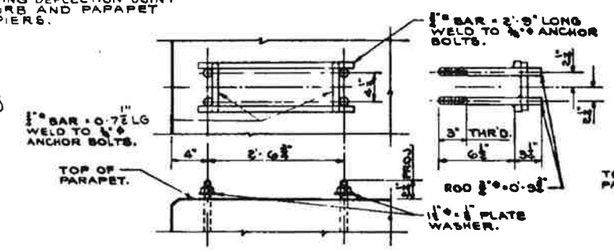
1. ALUMINUM RAILING POSTS TO BE SET NORMAL TO GRADE.

2. THE HEX NUTS, WASHERS AND THE UPPER 3" OF ¾ø-9¾" LONG ANCHOR BOLTS SHALL BE GALVANIZED OR CADMIUM PLATED. THE ANCHOR BOLT HOLES, BASE OF RAILING POSTS AND ANCHOR BOLTS, NUTS AND WASHERS SHALL BE COATED WITH AN ALUMINUM IMPREGNATED CAULKING COMPOUND. ANCHOR BOLTS, HEX NUTS AND WASHERS TO BE STRUCTURAL CARBON STEEL.

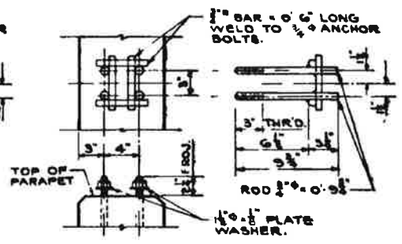
3. ALUMINUM TUBING SHALL BE FABRICATED IN 2 OR 3 PANEL LENGTHS

4. ALUMINUM ALLOY SHIMS SHALL BE USED UNDER POSTS AND UNDER END PLATES WHERE REQUIRED FOR ALIGNMENT.

5. WHEN PARAPETS AND CURBS ARE POURED CONTINUOUSLY FROM END TO END THEY SHALL BE SEPARATED AT THE DEFLECTION JOINTS BY A PIECE OF ⅛" ZINC OR ALUMINUM PLATE CUT AS SHOWN IN SECTION "B" BY THE SHADED AREA. IF CONSTRUCTION JOINTS IN PARAPETS AND CURBS ARE USED AT THE DEFLECTION JOINTS ONE SIDE OF JOINT SHALL BE COATED WITH BITUMINOUS PAINT AND PLATE SEPARATORS MAY BE OMITTED.



AT END PLATE



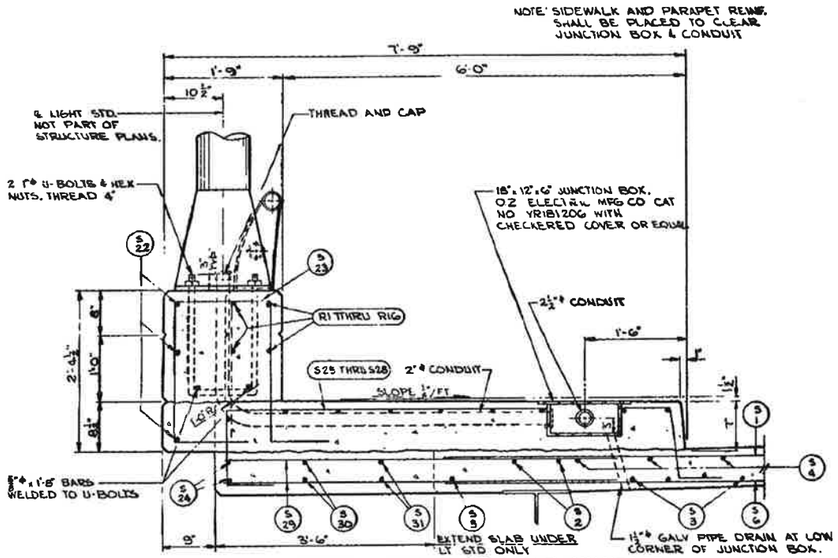
AT POSTS

ANCHOR BOLT SETTING DETAILS

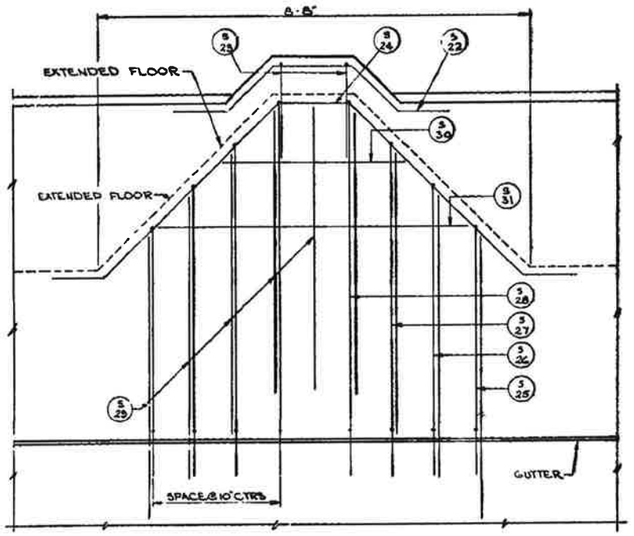
REVISED	STATE HIGHWAY COMMISSION OF WISCONSIN
	TUBULAR ALUMINUM RAILING TYPE B
	DESIGN SPEC A.A.S.H.O. '61 | LOADING H 20 S16 | DATE 1963
	DATE 11-5-63 | DESIGN S.T.O. | DRAWN J.C.N. | CHKD
	B-40-280 | SHEET 8 OF 15

X 27927

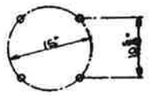
S P & DIVISION	PROJECT	SHEET NO	TOTAL SHEETS
4	FO2T-1(22) 178	383	



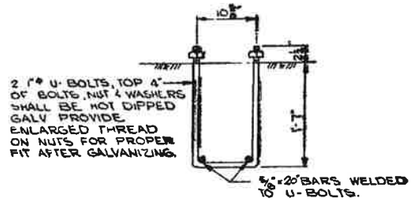
CROSS SECTION AT LIGHT STANDARD



REINFORCEMENT
PLAN AT LIGHT STANDARD

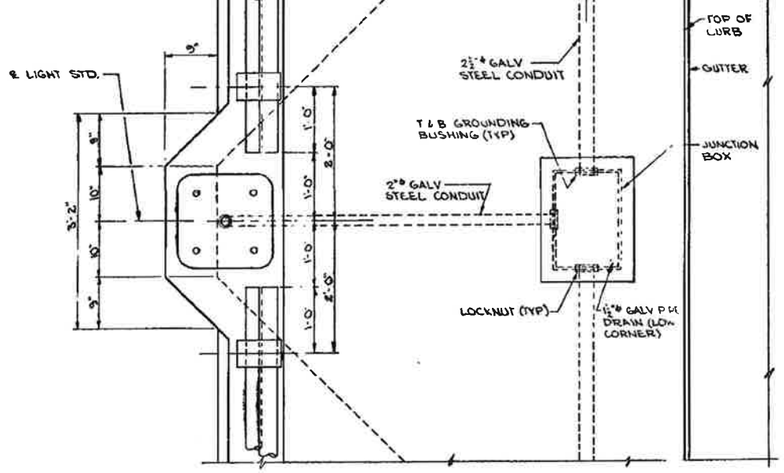


TRANSFORMER BASE BOLT LOCATION

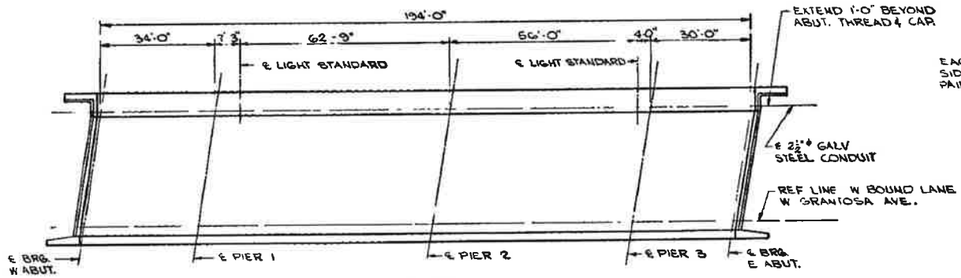


ANCHOR BOLT DETAIL

NOTE: ANCHOR ASSEMBLY TO BE INCLUDED IN BID ITEM "STRUCTURAL CARBON STEEL."



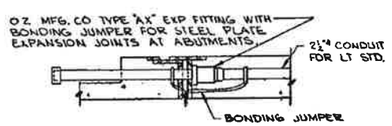
PLAN AT LIGHT STANDARD



PLAN

NOTES

PAINT ALL EMBEDDED CONDUIT FOR 18" ON EACH SIDE OF THE DEFLECTION JOINT IN SIDEWALK WITH A HEAVY COAT OF BITUMINOUS PAINT.



DETAIL OF EXPANSION FITTING

ESTIMATED QUANTITIES FOR ELECTRICAL WORK

ITEM	UNIT	QUANTITY
2½"℄ GALV STEEL CONDUIT	LF	202
2"℄ GALV STEEL CONDUIT	LF	15
18"x12"x6" FLANGED JUNCTION BOX	EACH	2
EXPANSION FITTING (2½"℄)	EACH	2
2½"℄ GALV PIPE CAPS	EACH	2
2"℄ GALV PIPE CAPS	EACH	2

ONLY MAJOR ITEMS ARE LISTED IN ESTIMATED QUANTITIES FOR ELECTRICAL WORK AND ARE GIVEN FOR THE CONTRACTORS CONVENIENCE. THE CONTRACTOR SHALL VERIFY THEIR ACCURACY

REVISED	STATE HIGHWAY COMMISSION OF WISCONSIN
	LIGHTING DETAILS
	DESIGN SPEC AASHO '61 | LOADING H 20 S16 | CONST SPEC 1963
	DATE 11-8-63 | DESIGN VGH | DRAWN JCK | CHKD
	STRUCTURE B-40-280 | SHEET 9 OF 15

X27928

FORM E-B 12-68

R P A DIVISION	PROJECT	SHEET NO.	TOTAL SHEETS
6	FOZT-1(22) 179	383	

1.5'x0.5' MAP CRACK w/ LEACHING

3.5'x1' DISCOLORING

2'x2' DISCOLORING

EL. 124.15 EL. 120.22 EL. 120.08 EL. 119.34 EL. 119.79 EL. 119.80 EL. 123.06 EL. 123.47 EL. 119.36 EL. 114.36

ELEVATION

34'-5"

* DIMENSIONS AT FRONT FACE OF PARAPET

1'-3" LEVEL

BEVELED RUSTICATION GROOVE

CONST JOINT TO BE LEFT ROUGH

SECTION THRU RAILING PARAPET

CONST JOINT. POUR ALL CONCRETE ABOVE THIS JOINT AFTER SUPER IS IN PLACE. ¾" V-GROOVE IN FF OF WING

BILL OF BARS

2120 #

DIMENSIONS IN BENDING DETAILS ARE OUT TO OUT

POUR	MARK	NO	SIZE	LENGTH	SPACING	LOCATION	DET
	A1	18	4	23-3	SHOWN	BODY - HORIZ	
	A2	46	4	4-6	1-0	" - VERT.	A
	A3	6	8	23-6	SHOWN	" - HORIZ	
	A4	23	4	13-3	2-0	" - VERT	B
	A5	6	4	18-9	SHOWN	PARAPET - HORIZ	
	A6	35	5	4-9	1-0	" - VERT.	C
	A7	8	4	8-6	SHOWN	" - HORIZ. DO NOT LAP	
	A8	23	5	8-3	1-6	" - VERT	C
	A9	8	4	10-9	8	PARAPET & SDWK.	C
	A10	10	4	4-9	SHOWN	BODY & WING	D
	A11	3	4	16-3	1-6	WING 2	D
	A12	7	4	8-3	1-6	" "	
	A13	7	4	8-3	1-6	" "	
	A14	6	4	11-0	1-6	WING 1	D
	A15	5	4	9-3	1-6	" "	
	A16	9	4	9-3	1-6	" "	
	A17	28	4	3-9	SHOWN	GRID	D
	A18	16	4	4-0	SHOWN	"	
	A19	8	5	9-5	SHOWN	RAILING PARAPET	
	A20	20	5	6-0	1-0	" "	C
	A21	8	4	11-6	1-6	WING 1	
	A22	9	4	12-9	1-6	WING 2	
	A23	3	4	11-0	1-6	WING 2	D

DETAIL "A"

DETAIL B

DETAIL C

DETAIL D

SLOPE TOP AND FACE OF WING TO MATCH CURB ON SUPER

PLAN

CRACKS IN ABUT. F.F. WERE PATCHED PREVIOUSLY

℄ BEARING

W BOUND ℄ W GRANTOSA DRIVE

TYP STR'S 1 & 6

TYP STR'S 2,3,4 & 5

℄ STRINGERS

℄ OF STRINGERS

BACK FACE

SDWK NOTCH

PAVING NOTCH

SLOPE 1" TYP.

FOOTING PLAN

SECTION A-A

SECTION B-B

SECTION C-C

ELEVATION WING 1

ELEVATION WING 2

EL 124.05 CONST. JOINT

EL. 124.15

EL 123.47

EL 123.39 CONST JOINT

CONCRETE ABOVE THIS JOINT TO BE POURED AFTER SUPERSTRUCTURE IS IN PLACE. LEAVE JOINT ROUGH.

OPTIONAL KEYED CONST. JOINT FORMED BY SURFACED, BEVELED 2 x 6" EXTEND THRU WINGS.

TOP OF BERM EL. 116.86

SLOPE PAVING 2:1 SLOPE

SLOPE 1" BETWEEN BRIDGE SEATS

B.F.

STATE HIGHWAY COMMISSION OF WISCONSIN

WEST ABUTMENT

DESIGN SPEC AASHO 61 | LOADING H20-S16 | CONST SPEC 1963

DATE 11 5-63 DESIGN V.G.H | DRAWN C.H.R | CKD

STRUCTURE B - 40-280 | SHEET 10 OF 15

X 27929

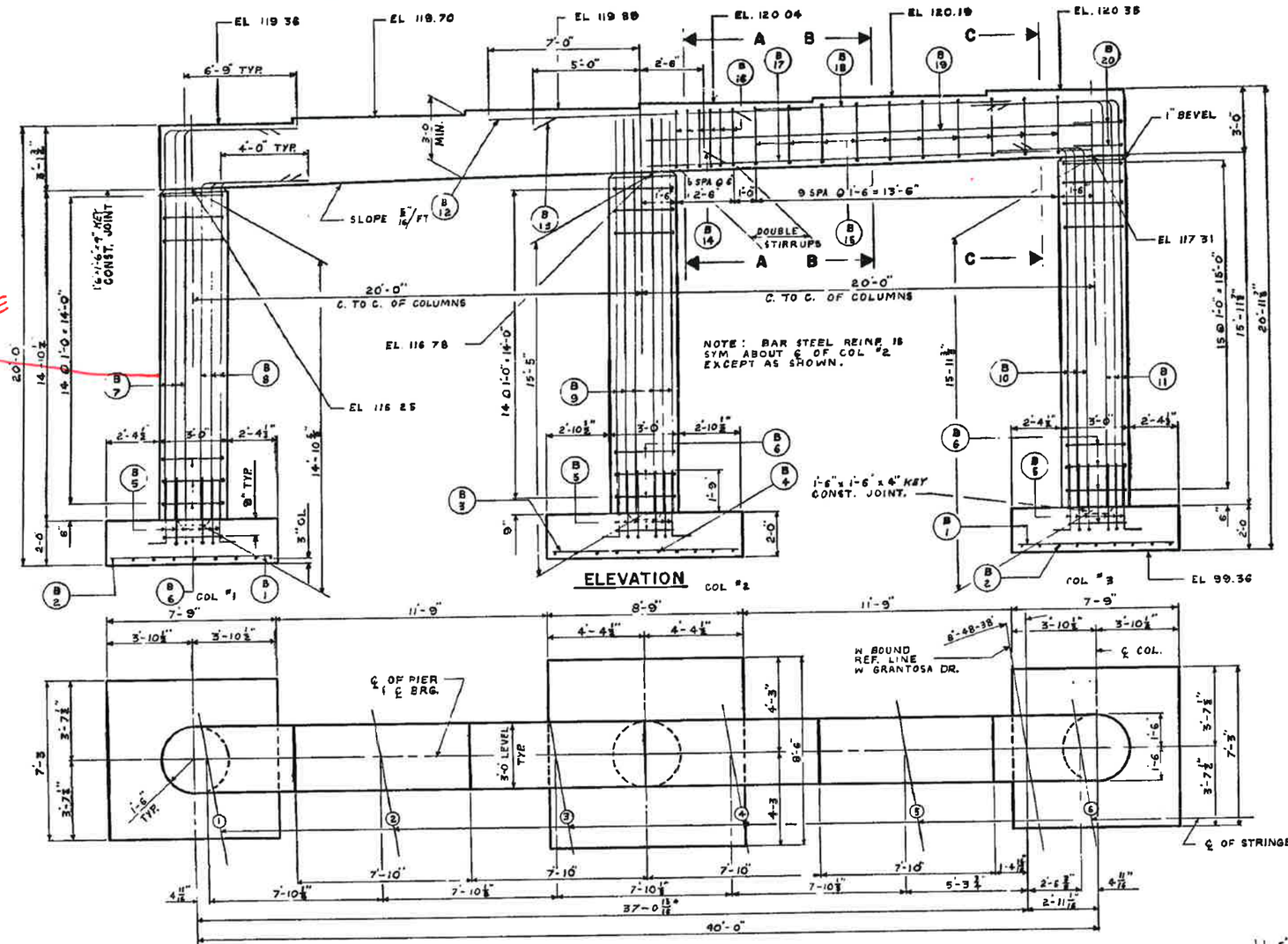
23-DEC-1997 10:08

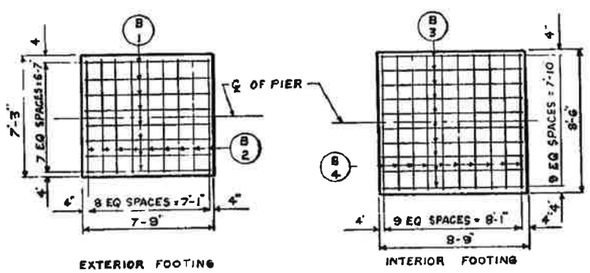
Screenscan

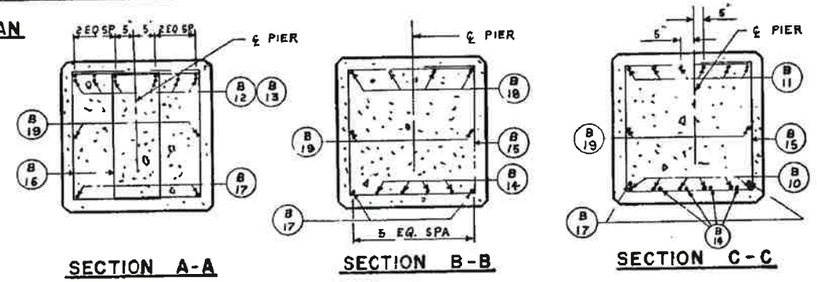
FORM E B 12-68

B F R DIVISION	PROJECT	SHEET NO	TOTAL SHEETS
4	F027-1(21)	180	383

8'x2' SPALL NORTH FACE





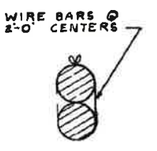


BILL OF BARS 5,110#

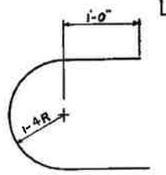
DIMENSIONS IN BENDING DETAILS ARE OUT TO OUT.

POUR	MARK	NO	SIZE	LENGTH	SPACING	LOCATION	DET
FOOTINGS	B1	16	6	7-3	SHOWN	EXTERIOR FOOTINGS	
	B2	18	5	6-9	SHOWN	" "	
	B3	10	7	8-3	SHOWN	INTERIOR "	
	B4	10	7	8-0	SHOWN	" "	
	B5	36	7	3-6	SHOWN	FOOTING & COLUMNS #	B
	B6	3	4	9-6	SHOWN	" - HOOPS	C
	B6	46	4	9-6	SHOWN	COLUMN - HOOPS	C
COLUMNS & GIRDER	B7	6	7	24-6	SHOWN	COLUMN 1 VERT	B
	B8	6	7	19-0	SHOWN	" 1 "	B
	B9	12	7	18-0	SHOWN	" 2 "	
	B10	6	7	20-3	SHOWN	" 3 "	B
	B11	6	7	25-6	SHOWN	" 3 "	B
	B12	6	10	14-0	SHOWN	GIRDER TOP # ##	
	B13	6	10	10-0	SHOWN	" " # ##	
	B14	8	11	17-6	SHOWN	" BOTTOM	
	B15	20	4	11-9	SHOWN	" STIRRUPS	D
	B16	24	5	10-3	SHOWN	" "	D
	B17	4	11	20-0	SHOWN	" BOTTOM	
	B18	8	5	11-6	SHOWN	" TOP	
	B19	4	4	20-0	SHOWN	" SIDES	
	B20	4	4	6-3	SHOWN	" ENDS	A

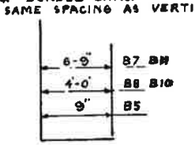
BAR BUNDLE DETAIL



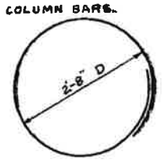
DETAIL A



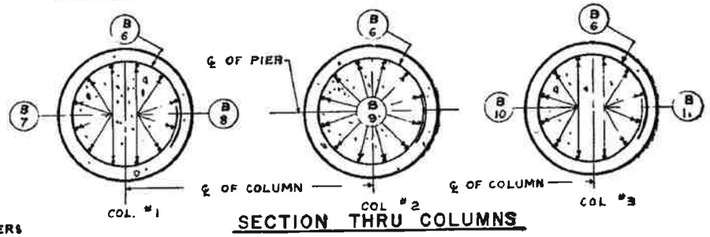
DETAIL B



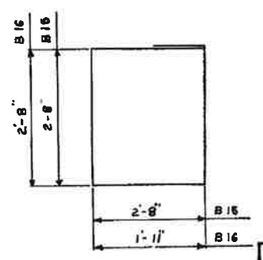
DETAIL C



** BUNDLE BARS.
# SAME SPACING AS VERTICAL COLUMN BARS.



SECTION THRU COLUMNS



DETAIL D

CONCRETE MASONRY

FOOTINGS	13.8 C.Y
COLUMNS	12.1 C.Y
GIRDER	14.7 C.Y
TOTAL	40.6 C.Y

REVISED	STATE HIGHWAY COMMISSION OF WISCONSIN
	PIER 1
	DESIGN SPEC AASHO '61 LOADING H20 S16 CONST SPEC 1963
	DATE 5 63 DES VGH DRAWN CHP CKD
	STRUCTURE B-40-280 SHEET 11 OF 15

X 27930

FORM E 8-12-68

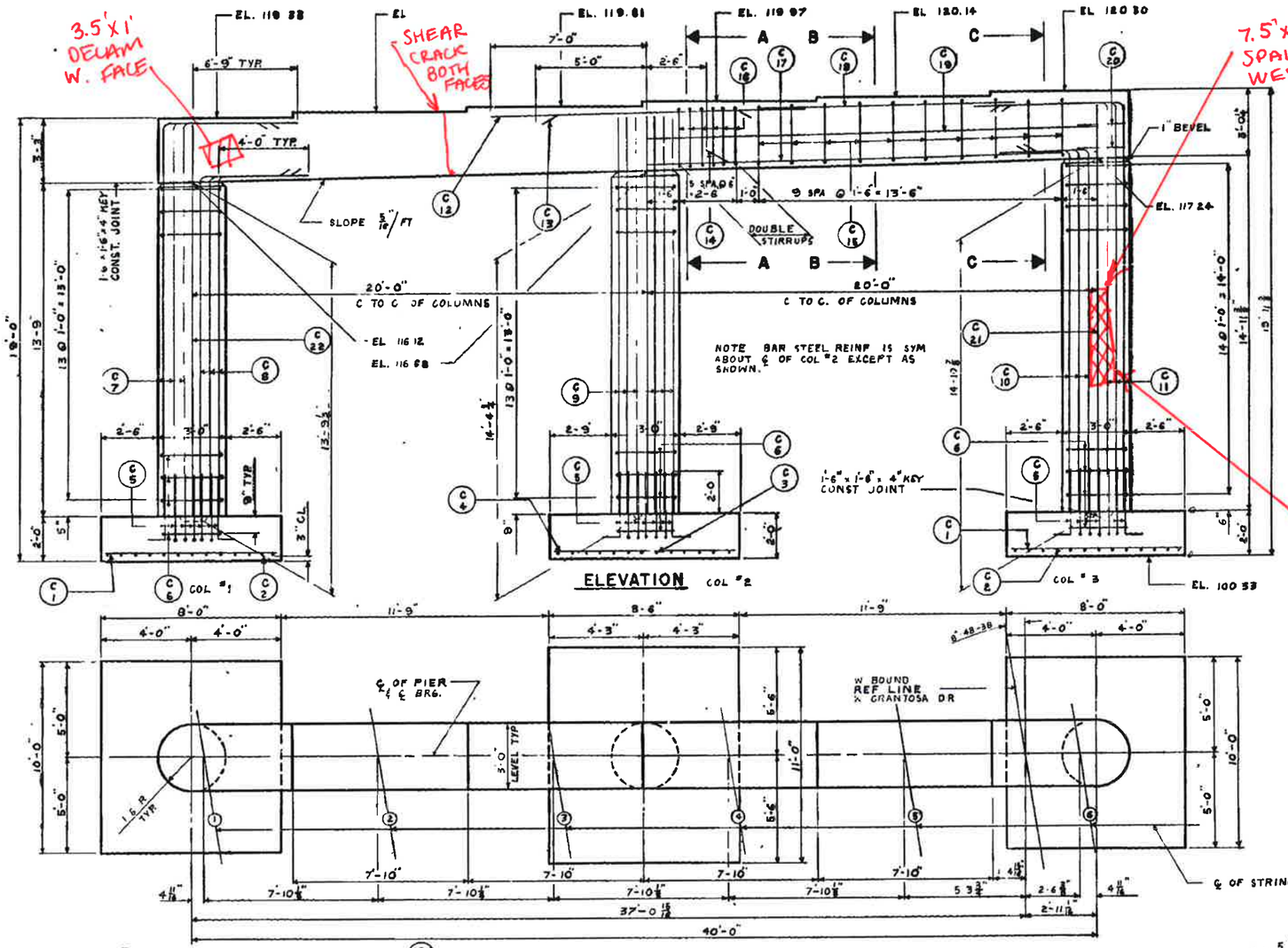
D.P.R. DIVISION	PROJECT	SHEET NO.	TOTAL SHEETS
4	F027-1(22) 181		383

3.5'x1' DELAM W. FACE

SHEAR CRACK BOTH FACES

7.5'x2.5' SPALL WEST FACE

3'x1' DELAM EAST FACE



ELEVATION

PLAN

WIRE BARS @ 2'-0" CENTERS

BAR BUNDLE DETAIL

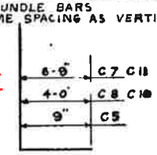
BILL OF BARS

6,450 #

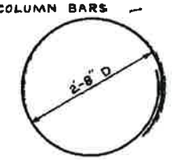
DIMENSIONS IN BENDING DETAILS ARE OUT TO OUT

POUR	MARK	NO	SIZE	LENGTH	SPACING	LOCATION	DET.
FOOTINGS	C1	26	5	7-6	SHOWN	EXTERIOR FOOTING	
	C2	28	6	9-6	SHOWN	" "	
	C3	16	7	10-6	SHOWN	INTERIOR "	
	C4	13	6	8-0	SHOWN	" "	
	C5	42	8	4-0	SHOWN	FOOTING & COLUMNS *	B
	C6	3	4	9-6	1-0	" - HOOPS	C
COLUMNS & GIRDER	C6	43	4	9-6	SHOWN	COLUMN - HOOPS	C
	C7	6	8	23-6	SHOWN	COLUMN 1 VERT.	B
	C8	6	8	18-0	SHOWN	" 1 "	B
	C9	14	8	17-0	SHOWN	" 2 "	
	C10	6	8	19-0	SHOWN	" 3 "	B
	C11	6	8	24-6	SHOWN	" 3 "	B
	C12	6	10	14-0	SHOWN	GIRDER TOP **	
	C13	6	10	10-0	SHOWN	" "	
	C14	8	11	17-6	SHOWN	" BOTTOM	
	C15	20	4	11-9	SHOWN	" STIRRUPS	D
	C16	24	5	10-3	SHOWN	" "	D
	C17	4	11	20-0	SHOWN	" BOTTOM	
	C18	8	5	11-6	SHOWN	" TOP	
	C19	4	4	20-0	SHOWN	" SIDES	
	C20	4	4	6-3	SHOWN	" ENDS	A
	C21	2	8	17-6	SHOWN	COLUMN 3 VERT	
	C22	2	8	16-3	SHOWN	" 1 "	

** BUNDLE BARS
* SAME SPACING AS VERTICAL COLUMN BARS

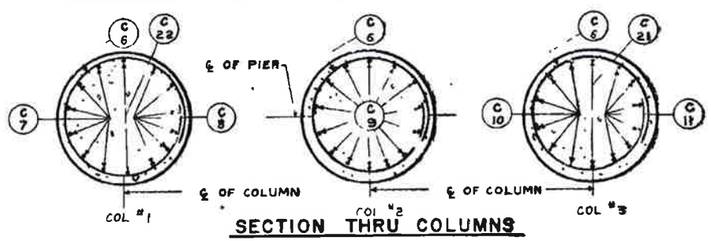


DETAIL B

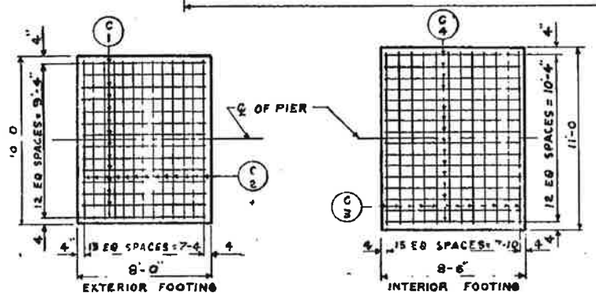


DETAIL C

DETAIL A



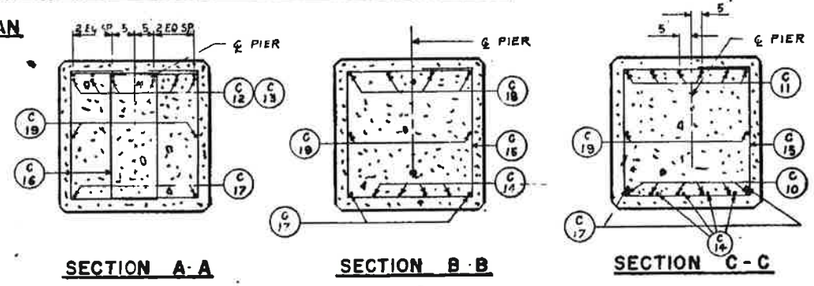
SECTION THRU COLUMNS



EXTERIOR FOOTING

INTERIOR FOOTING

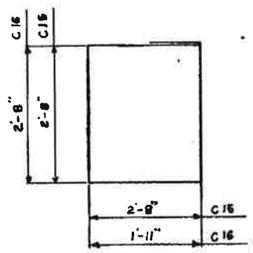
FOOTING PLAN



SECTION A-A

SECTION B-B

SECTION C-C



DETAIL D

CONCRETE MASONRY

FOOTINGS	188 C.Y.
COLUMNS	113 C.Y.
GIRDER	146 C.Y.
TOTAL	447 C.Y.

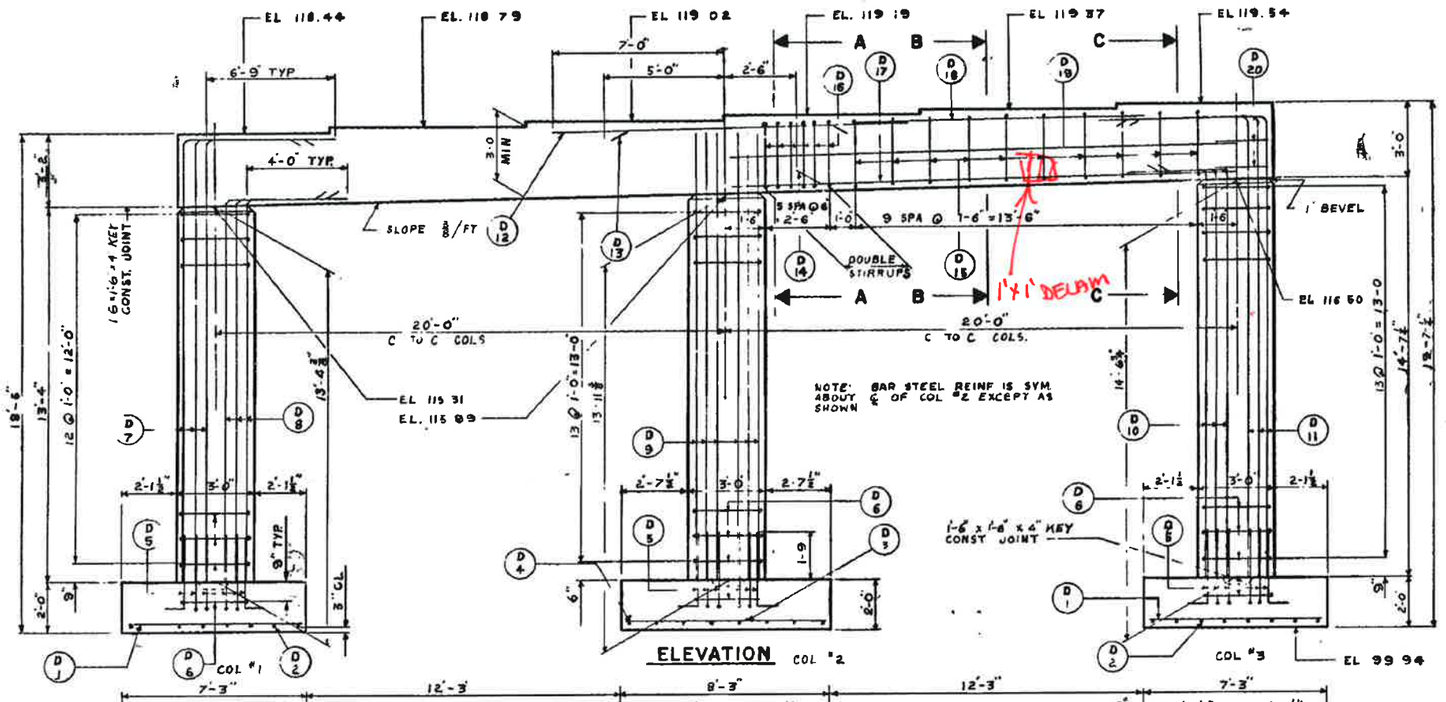
REVISED	STATE HIGHWAY COMMISSION OF WISCONSIN
	PIER 2
	DESIGN SPEC. AASHO 61 LOADING H20-S16 CONST SPEC 1963
	DATE 11-5 63 DESIGN V & H DRAWN C H P CHKD.
	STRUCTURE B-40-280 SHEET 12 OF 15

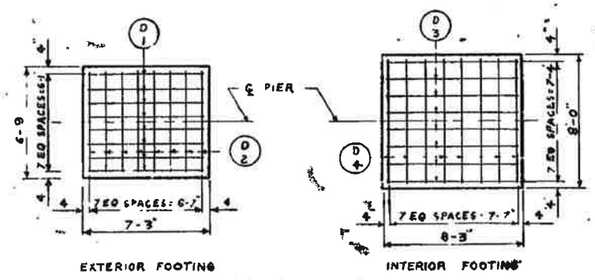
X 27931

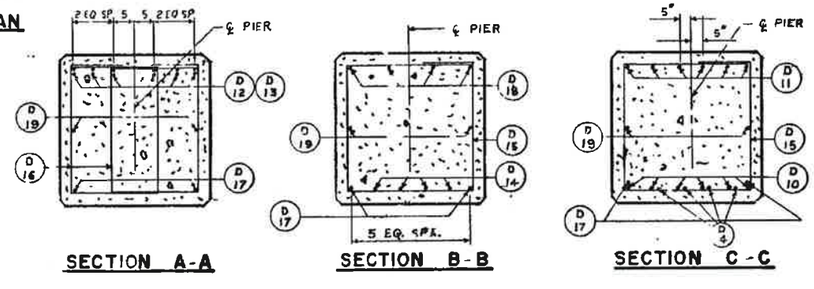
23-DEC-1997 10:09

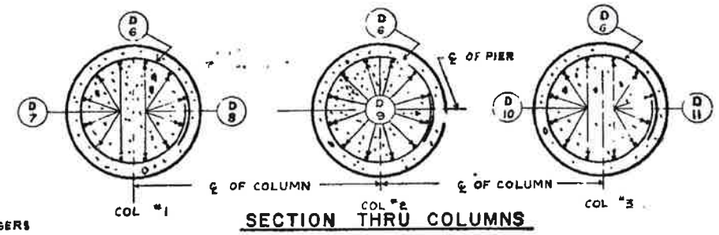
Screenscan

DIV | PROJECT | SHEET NO | NO SHEETS
4 | F027-1(22) | 182 | 383







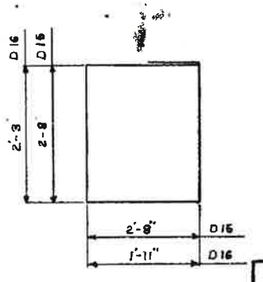


BILL OF BARS 4,800

DIMENSIONS IN BENDING DETAILS ARE OUT TO OUT

PO. #	MARK	NO	SIZE	LENGTH	SPACING	LOCATION	DET.
FOOTINGS	D1	16	5	6-9	SHOWN	EXTERIOR FOOTINGS	
	D2	16	5	6-3	SHOWN	" "	
	D3	8	7	7-9	SHOWN	INTERIOR "	
	D4	8	7	7-6	SHOWN	" "	
	D5	36	7	3-6	SHOWN	FOOTING & COLUMNS #	B
	D6	5	4	9-6	SHOWN	" HOOPS	C
COLUMNS & GIRDER	D6	41	4	9-6	SHOWN		C
	D7	6	7	23-0	SHOWN	COLUMN 1 VERT	B
	D8	6	7	17-9	SHOWN	" 1 "	B
	D9	12	7	16-6	SHOWN	" 2 "	
	D10	6	7	18-9	SHOWN	" 3 "	B
	D11	6	7	24-0	SHOWN	" 3 "	B
	D12	6	10	14-0	SHOWN	GIRDER TOP ##	
	D13	6	10	10-0	SHOWN	" " ##	
	D14	8	11	17-6	SHOWN	" BOTTOM	
	D15	20	4	11-9	SHOWN	" STIRRUPS	D
	D16	24	5	10-3	SHOWN	" "	D
	D17	4	11	20-0	SHOWN	" BOTTOM	
	D18	8	5	11-6	SHOWN	" TOP	
	D19	4	4	20-0	SHOWN	" SIDES	
	D20	4	4	6-3	SHOWN	" ENDS	A

BUNDLE BARS
* SAME SPACING AS VERT COL BARS.



CONCRETE MASONRY

FOOTINGS	12.2 C.Y
COLUMNS	11.0 C.Y
GIRDER	14.8 C.Y
TOTAL	38.0 C.Y

REVISED	STATE HIGHWAY COMMISSION OF WISCONSIN
	PIER 3
	DESIGN SPEC AASHO 61 | LOADING H20 S16 | CONST SPEC 1963
	DATE 11-5-63 | DESIGN V&H | DRAWN C.H.P | CKD. mc
STRUCTURE B-40-280	SHEET 13 OF 15

X 27932

G P R DIVISION	PROJECT	SHEET NO.	TOTAL SHEETS
4	FOZ7-1(22) 183	383	

2'x0.5' MAP CRACKING

EL 122.10

EL 121.87

EL. 118.00

EL. 118.26

EL 121.72

VARIOUS BACKWALL DISCOLORATIONS/DELAMS/CRACKS. BACKWALL ANTICIPATED TO BE REPLACED

EL. 118.48

EL. 118.68

EL 118.85

MAP CRACKING ALONG WING

EL 122.94

EL. 119.03

0.75' x 5' SPALL

EL 113.00

* DIMENSIONS AT FRONT FACE OF PARAPET.

ELEVATION

1'-3" LEVEL

2"

10"

¾" BEVELED RUSTICATION GROOVE

CONST. JOINT TO BE LEFT ROUGH

SECTION THRU RAILING PARAPET

CONST JOINT. POUR ALL CONCRETE ABOVE THIS JOINT AFTER SUPER IS IN PLACE. ¾" V-GROOVE IN F.F. OF WING.

BILL OF BARS

2140 #

DIMENSIONS IN BENDING DETAILS ARE OUT TO OUT.

POUR MARK	NO	SIZE	LENGTH	SPACING	LOCATION	DET
E1	18	4	23-3	SHOWN	BODY - HORIZ.	
E2	46	4	4-6	1-0	" - VERT	A
E3	6	6	23-6	SHOWN	" - HORIZ.	
E4	23	4	13-3	2-0	" - VERT	B
E5	6	4	18-9	SHOWN	PARAPET - HORIZ	
E6	35	5	4-9	1-0	" - VERT	C
E7	8	4	8-6	SHOWN	" - HORIZ DO NOT LAP	
E8	23	5	8-3	1-8	" - VERT	C
E9	16	4	6-6	8	PARAPET & SDWK.	D
E10	10	4	4-9	SHOWN	BODY & WING	D
E11	3	4	16-0	1-6	WING 3	D
E12	6	4	8-3	1-8	" 3	
E13	8	4	8-9	1-8	" 3	
E14	6	4	11-0	1-8	" 4	D
E15	5	4	9-3	1-8	" 4	
E16	9	4	9-3	1-8	" 4	
E17	28	4	3-9	SHOWN	GRID	D
E18	20	4	4-0	SHOWN	"	
E19	8	5	9-3	SHOWN	RAILING PARAPET	
E20	20	5	6-0	1-0	" "	C
E21	8	4	10-9	1-8	WING 3	
E22	8	4	12-3	1-8	" 4	
E23	3	4	11-0	1-8	" 3	D

DETAIL A

DETAIL B

DETAIL C

DETAIL D

PLAN

34'-5"

F.F PARAPET

℄ BEARING

SDWK NOTCH

PRE-SET ANCHOR BOLTS SEE SHEET 5

TYP STR'S 1 & 5

TYP STR'S 2 THRU 4

℄ STRINGERS

8°48'38" W BOUND & W GRANTOSA DRIVE

BACK FACE

PAVING NOTCH

℄ OF STRINGERS

SLOPE 1" TYP

LEVEL TYP

40'-7"

FOOTING PLAN

W. BOUND & W GRANTOSA DRIVE

TOP OF BERM EL. 115.50

SLOPE PAVING 2:1 SLOPE

CONCRETE ABOVE THIS JOINT TO BE POURED AFTER SUPERSTRUCTURE IS IN PLACE. LEAVE JOINT ROUGH.

SLOPE 1" BETWEEN BRIDGE SEATS

℄ BEARING

OPTIONAL KEYED CONST JOINT FORMED BY SURFACED, BEVELED 2"x6" EXTEND THRU WINGS

SECTION A-A

SLOPE TOP AND FACE OF WING TO CONFORM TO CURB ON SUPER

SECTION C-C

SECTION B-B

ELEVATION WING 3

EL 122.10

EL 121.97

CONST. JOINT

ELEVATION WING 4

EL 122.94

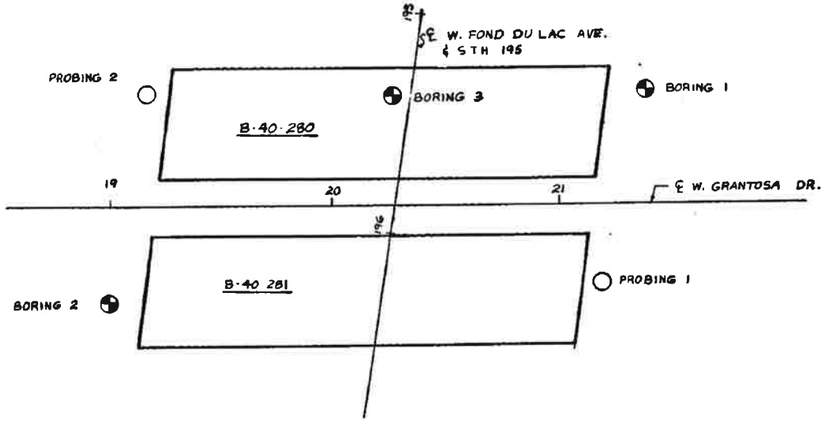
EL. 122.71

CONST. JOINT

REVISED	STATE HIGHWAY COMMISSION OF WISCONSIN
	EAST ABUTMENT
	DESIGN SPEC AASHO 61' | LOADING H20-S16 | CONST SPEC 1963
	DATE 11 5 63 | DESIGN V G H | DRAWN C H R | CKD
STRUCTURE B - 40 - 280	SHEET 14 OF 15

X 27933

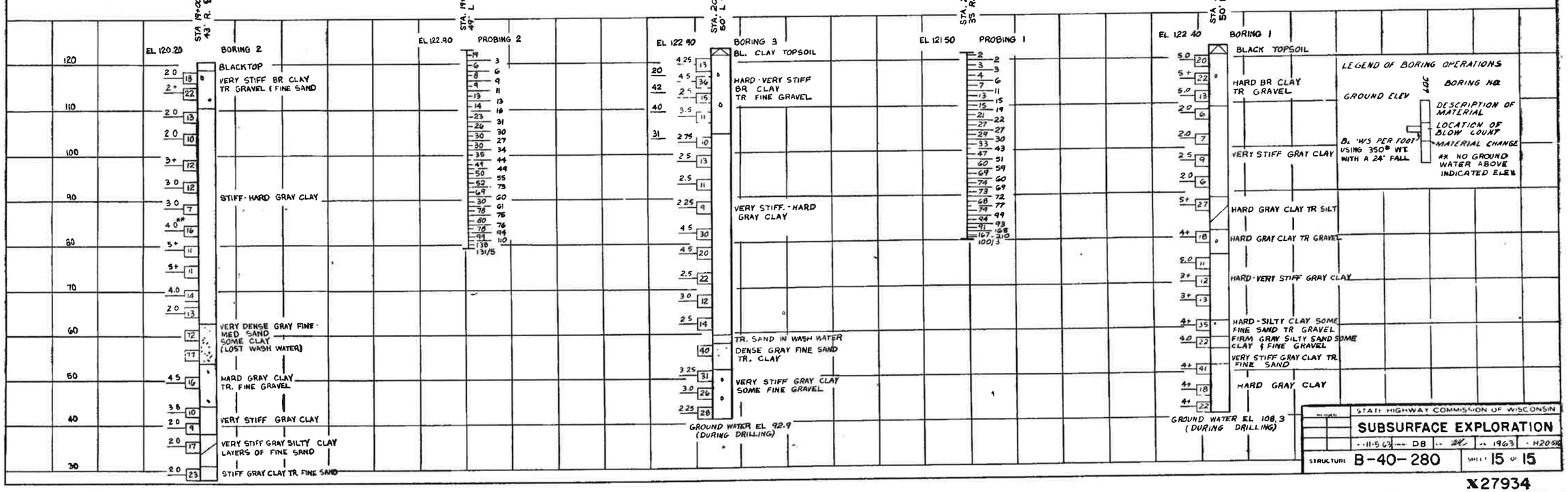
W.P.C. DIVISION	PROJECT	SHEET NO.	TOTAL SHEETS
4	F027-1(22)	184	383



SUBSURFACE EXPLORATION FOR FOUNDATION DESIGN

FOR THE DESIGN OF THE STRUCTURE FOUNDATION, TO OBTAIN RELATIVE DATA CONCERNING THE CHARACTER OF MATERIAL IN AND UPON WHICH THE FOUNDATION MIGHT BE BUILT, BORINGS AND/OR SOUNDINGS WERE MADE AT POINTS APPROXIMATELY AS INDICATED ON THIS DRAWING WITH THE LOG OF SUCH EXPLORATION DATA AS INTERPRETED FOR SUCH DESIGN PURPOSE AS SHOWN. THE EXPLORATIONS WERE MADE BY ORDINARY AND CONVENTIONAL METHODS AND CARE DEEMED ADEQUATE FOR SUCH PURPOSE. HOWEVER, SINCE IT IS A MATTER OF COMMON KNOWLEDGE THAT THE EXACT CHARACTER OF ANY MATERIAL AND ITS REACTION IS DIFFICULT TO DETERMINE FROM SUCH SUBSURFACE EXPLORATION AND THAT THE KIND AND CHARACTER OF MATERIAL AT THE SITE WHERE THE FOUNDATIONS ARE BUILT MAY VARY SUBSTANTIALLY FROM THAT INDICATED BY THE LOG THEY ARE MADE AVAILABLE TO THE BIDDERS SIMPLY FOR WHAT THEY ARE WORTH, WITHOUT ANY WARRANTY, EXPRESSED OR IMPLIED THAT THE MATERIAL TO BE ENCOUNTERED IN BUILDING THE FOUNDATION WILL CONFORM THEREWITH. IF THE LOG IS USED BY THE CONTRACTOR IN MAKING HIS BID, IT IS HEREBY EXPRESSLY STIPULATED THAT THE COMMISSION ACCEPTS NO RESPONSIBILITY FOR SAID USE.

UNLESS OTHERWISE SPECIFIED THE BLOWS PER FOOT AT THE LOCATIONS INDICATED ARE BASED ON DRIVING A 2" OD x 1.4" ID SPLIT SPOON SAMPLER WITH A 140 LB. HAMMER HAVING A FREE FALL OF 30 INCHES. THE BLOW COUNT IS TAKEN IN UNDISTURBED SOIL IMMEDIATELY BELOW A CASED OR OPEN HOLE ELIMINATING SIDE FRICTION ON THE DRIVE PIPE.



STATE HIGHWAY COMMISSION OF WISCONSIN

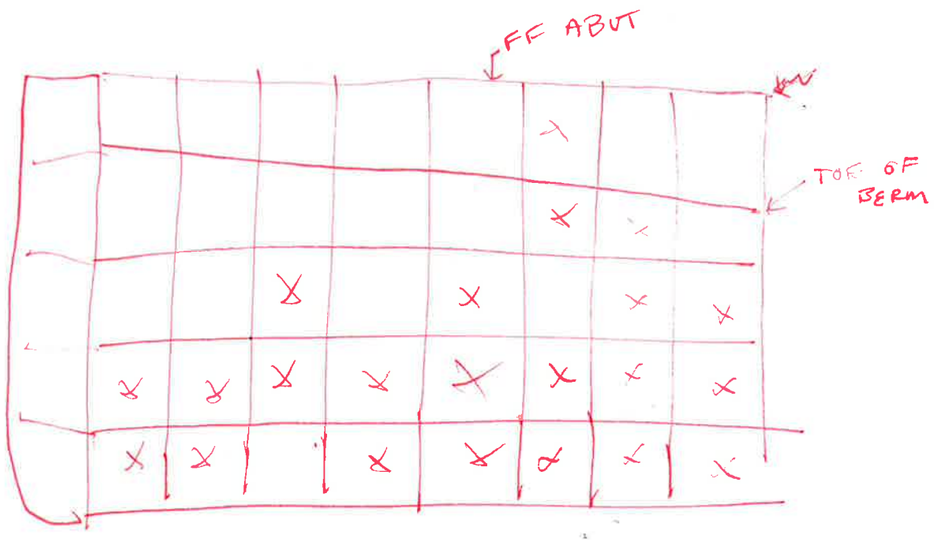
SUBSURFACE EXPLORATION

11-5-63 — DB — 1963 — H2050

STRUCTURE B-40-280 — SHEET 15 OF 15

X27934

LOOKING EAST



LOOKING WEST

SLOPE PAVING

B-40-280

ATTACHMENT 3

ASBESTOS REPORT

708 Heartland Trail, Suite 3000
Madison, WI 53717

608.826.3600 PHONE
608.826.3941 FAX

www.TRCsolutions.com

Bridge Asbestos Inspection Report

WisDOT Project ID: 0656-50-30
Structure Number: B-40-0280
Structure Name: W. Grantosa Drive WB over STH 145/Fond du Lac Avenue
City/County: City of Milwaukee, Milwaukee County
Lat/Long Coordinates: 430645.22/ 880008.74
TRC Project Number: 283673.0000.0000
Date Inspected: July 20, 2017
Inspected By/License Number: Ross Hartwick, AII-195369

Findings:

Files available online for this bridge were reviewed, including the "As-built" drawings. The inspection to identify and collect samples of potential asbestos-containing material (ACM) was completed following WisDOT standard sampling procedure for bridge inspections found in FDM 21-35-45.

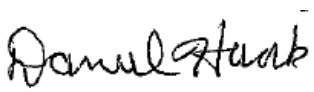
The gasket located under the railing attachment plates on the concrete parapet tested positive for asbestos greater than 1% and is therefore regulated ACM. If the ACM will be disturbed during the planned bridge rehabilitation, the ACM must be removed prior to any work. Standard Special Provision (STSP) 203-005 should be incorporated into the specifications. If the ACM will not be disturbed during the planned bridge rehabilitation, STSP 107-120 should be included in the specifications.

Sample Number	Sample Description	Sample Location	Analytical Results and Method	Friable/ Non-friable or No ACM	Quantity of ACM Material
WB-1	Black paint	Pedestrian fence, railing	PLM, non-detect	No ACM	0
WB-2	Black paint	Pedestrian fence, railing	PLM, non-detect	No ACM	
WB-3	Black paint	Pedestrian fence, railing	PLM, non-detect	No ACM	

Sample Number	Sample Description	Sample Location	Analytical Results and Method	Friable/ Non-friable or No ACM	Quantity of ACM Material
WB-4	Caulk	Parapet expansion joint, sidewalk joint	PLM, non-detect	No ACM	0
WB-5	Caulk	Parapet expansion joint, sidewalk joint	PLM, non-detect	No ACM	
WB-6	Caulk	Parapet expansion joint, sidewalk joint	PLM, non-detect	No ACM	
WB-7	Gasket	Under railing attachment plate	PLM, 5%	Non-friable	7.5”x34”x2 + 7.5”x7.5”x28 = 14.5 sq ft
WB-8	Gasket	Under railing attachment plate	Not analyzed, positive stop	--	
WB-9	Gasket	Under railing attachment plate	Not analyzed, positive stop	--	
WB-10	Tar	Bearing support piers	PLM, non-detect	No ACM	0
WB-11	Tar	Bearing support piers	PLM, non-detect	No ACM	
WB-12	Tar	Bearing support piers	PLM, non-detect	No ACM	
WB-13	Silver paint	Girder	PLM, non-detect	No ACM	0
WB-14	Silver paint	Girder	PLM, non-detect	No ACM	
WB-15	Silver paint	Girder	PLM, non-detect	No ACM	
WB-16	Silver paint	Galvanized metal conduit	PLM, non-detect	No ACM	0
WB-17	Silver paint	Galvanized metal conduit	PLM, non-detect	No ACM	
WB-18	Silver paint	Galvanized metal conduit	PLM, non-detect	No ACM	

If you have any questions, please contact me, at (608) 826-3628.

TRC Environmental Corporation



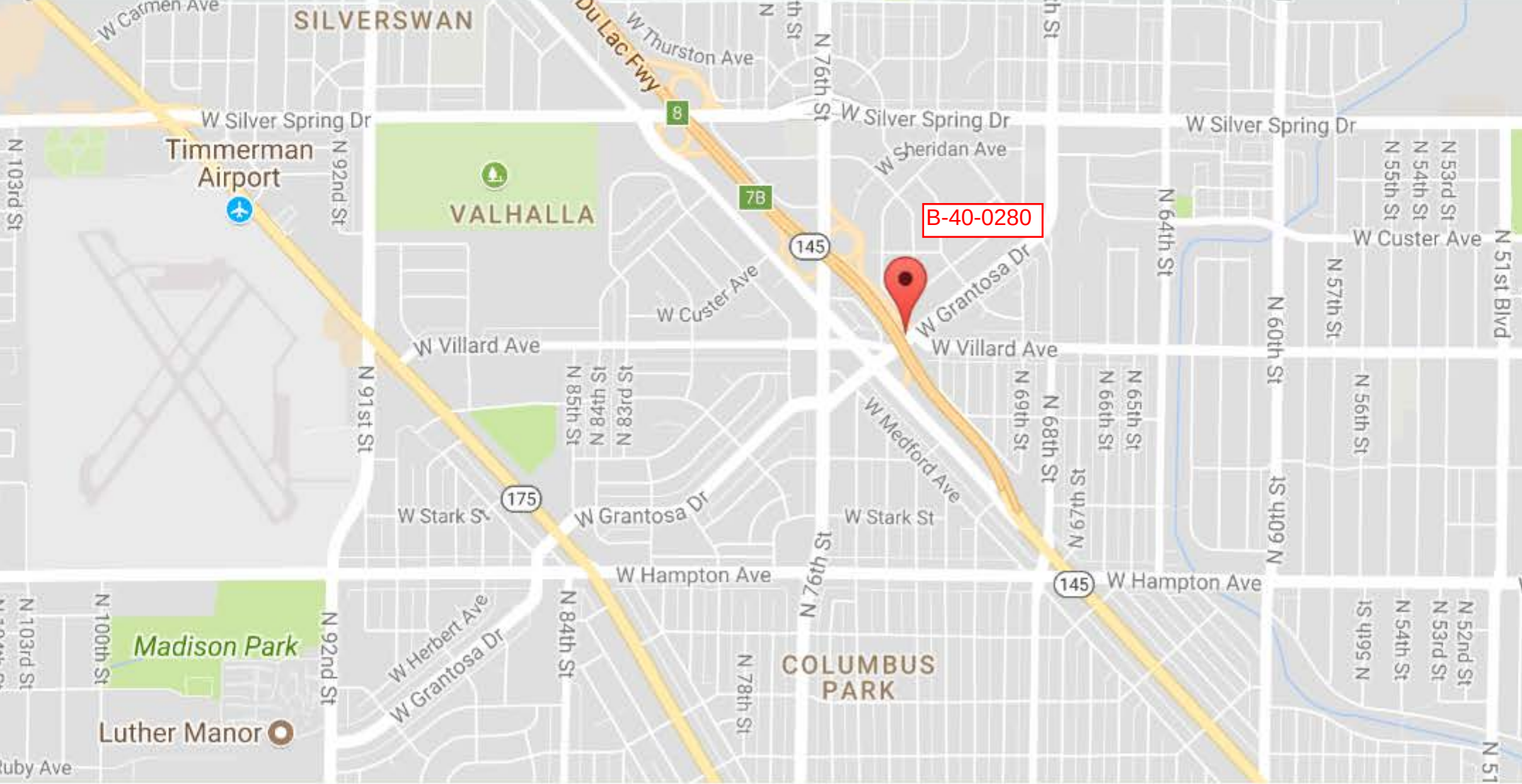
Daniel Haak
Project Manager

Ross Hartwick
Asbestos Inspector

Attachments: Location Map, Photos, and Laboratory Report

Report Distribution:

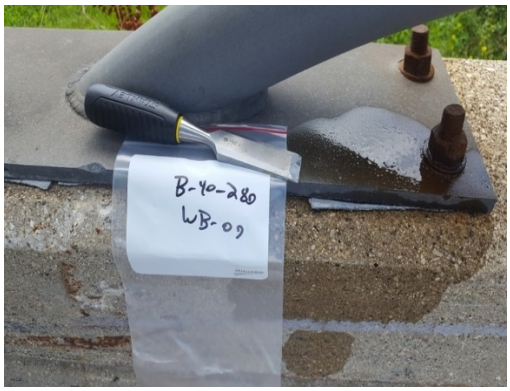
Recipient	Electronic (PDF) Copy	Paper Copy
BTS-ESS sharlene.tebeest@dot.wi.gov	X (via email)	X
REC Andrew.malsom@dot.wi.gov	X (via email)	
Project Manager jason.zemke@dot.wi.gov	X (via email)	
Other		


B-40-0280
SILVERSWAN
W Carmen Ave
W Thurston Ave
Du Lac Fwy
8
W Silver Spring Dr
Timmerman Airport
VALHALLA
7B
145
W Sheridan Ave
W Custer Ave
W Grantosa Dr
W Villard Ave
N 103rd St
N 92nd St
N 91st St
N 85th St
N 84th St
N 83rd St
N 76th St
N 64th St
N 60th St
N 57th St
N 56th St
N 55th St
N 54th St
N 53rd St
N 51st Blvd
W Medford Ave
N 69th St
N 68th St
N 67th St
N 66th St
N 65th St
175
W Stark St
W Hampton Ave
Madison Park
Luther Manor
W Herbert Ave
N 100th St
N 78th St
COLUMBUS PARK
N 52nd St
Ruby Ave

Bridge B-40-0280

Black paint on pedestrian fence and railing

Caulk in parapet expansion joint and sidewalk joint



Gasket under railing attachment plate on parapet

Tar on bridge bearing support piers

Silver paint on girder

Silver paint on galvanized metal conduit

Industrial Hygiene Laboratory
21 Griffin Road North
Windsor, CT 06095
(860) 298-6308

TRC
Results you can rely on

BULK ASBESTOS ANALYSIS REPORT

CLIENT: Wisconsin Department of Transportation

Lab Log #: 0050965
Project #: 283673.0000.0000
Date Received: 07/21/2017
Date Analyzed: 07/21/2017

Site: Bridge Inspection, B-40-280

POLARIZED LIGHT MICROSCOPY by EPA 600/R-93/116

Sample No.	Color	Homogenous	Multi-Layered	Layer No.	Other Matrix Materials		Asbestos %	Asbestos Type
WB-01	Black (paint)	Yes	No	- -		- - -	ND	None
WB-02	Black (paint)	Yes	No	- -		- - -	ND	None
WB-03	Black (paint)	Yes	No	- -		- - -	ND	None
WB-04	Grey (caulk)	Yes	No	- -		- - -	ND	None
WB-05	Grey (caulk)	Yes	No	- -		- - -	ND	None
WB-06	Grey (caulk)	Yes	No	- -		- - -	ND	None
WB-07	Grey (gasket)	Yes	No	- -		- - -	5%	Chrysotile
WB-08	- -	- -	- -	- -		- -	NA/PS	- -
WB-09	- -	- -	- -	- -		- -	NA/PS	- -
WB-10	Dark Grey (tar)	Yes	No	- -	10%	synthetic fiber	ND	None
WB-11	Dark Grey (tar)	Yes	No	- -	10%	synthetic fiber	ND	None
WB-12	Dark Grey (tar)	Yes	No	- -	10%	synthetic fiber	ND	None
WB-13	Black/Silver (paint)	Yes	No	- -		- - -	ND	None
WB-14	Black/Silver (paint)	Yes	No	- -		- - -	ND	None
WB-15	Black/Silver (paint)	Yes	No	- -		- - -	ND	None
WB-16	Black/Brown (paint)	Yes	No	- -		- - -	ND	None
WB-17	Black/Brown (paint)	Yes	No	- -		- - -	ND	None

Industrial Hygiene Laboratory
21 Griffin Road North
Windsor, CT 06095
(860) 298-6308

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Results you can rely on

POLARIZED LIGHT MICROSCOPY by EPA 600/R-93/116

Sample No.	Color	Homogenous	Multi-Layered	Layer No.	Other Matrix Materials	Asbestos %	Asbestos Type
WB-18	Black/Brown (paint)	Yes	No	- -	- - -	ND	None

Reporting limit- asbestos present at 1%
ND - asbestos was not detected
Trace - asbestos was observed at level of less than 1%
NA/PS - Not Analyzed / Positive Stop
SNA- Sample Not Analyzed- See Chain of Custody for details

Note: Polarized-light microscopy is not consistently reliable in detecting asbestos in floor coverings and similar non-friable organically bound materials. In those cases, EPA recommends, and certain states (e.g. NY) require, that negative results be confirmed by quantitative transmission electron microscopy.

The Laboratory at TRC follows the EPA's Interim Method for the Determination of Asbestos in Bulk Insulation 1982 (EPA 600/M4-82-020) Bulk Analysis Code 18/A01 and the EPA recommended Method for the Determination of Asbestos in Bulk Building Materials July 1993, R.L. Perkins and B.W. Harvey, (EPA/600/R-93/116) Bulk Analysis Code 18/A03, which utilize polarized light microscopy (PLM). Our analysts have completed an accredited course in asbestos identification. TRC's Laboratory is accredited under the National Voluntary Laboratory Accreditation Program (NVLAP), for Bulk Asbestos Fiber Analysis, NVLAP Code 18/A01, effective through June 30, 2018. TRC is accredited by the AIHA Laboratory Accreditation Programs (AIHA-LAP), LLC in the Industrial Hygiene Program (IHLAP) for PLM effective through October 1, 2018. Asbestos content is determined by visual estimate unless otherwise indicated. Quality Control is performed in-house on at least 10% of samples and QC data related to the samples is available upon written request from client.

Analyzed by: K. Williamson — Kathleen Williamson, Laboratory Manager

Reviewed by: Cathryn Lemire — Cathryn Lemire, Approved Signatory

Date Issued
07/23/2017

ATTACHMENT 3

ASBESTOS REPORT

708 Heartland Trail, Suite 3000
Madison, WI 53717

608.826.3600 PHONE
608.826.3941 FAX

www.TRCsolutions.com

Bridge Asbestos Inspection Report

WisDOT Project ID: 0656-50-30
Structure Number: B-40-0280
Structure Name: W. Grantosa Drive WB over STH 145/Fond du Lac Avenue
City/County: City of Milwaukee, Milwaukee County
Lat/Long Coordinates: 430645.22/ 880008.74
TRC Project Number: 283673.0000.0000
Date Inspected: July 20, 2017
Inspected By/License Number: Ross Hartwick, AII-195369

Findings:

Files available online for this bridge were reviewed, including the "As-built" drawings. The inspection to identify and collect samples of potential asbestos-containing material (ACM) was completed following WisDOT standard sampling procedure for bridge inspections found in FDM 21-35-45.

The gasket located under the railing attachment plates on the concrete parapet tested positive for asbestos greater than 1% and is therefore regulated ACM. If the ACM will be disturbed during the planned bridge rehabilitation, the ACM must be removed prior to any work. Standard Special Provision (STSP) 203-005 should be incorporated into the specifications. If the ACM will not be disturbed during the planned bridge rehabilitation, STSP 107-120 should be included in the specifications.

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WB-14	Silver paint	Girder	PLM, non-detect	No ACM	
WB-15	Silver paint	Girder	PLM, non-detect	No ACM	
WB-16	Silver paint	Galvanized metal conduit	PLM, non-detect	No ACM	0
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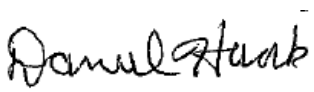
If you have any questions, please contact me, at (608) 826-3628.

TRC Environmental Corporation



Daniel Haak
Project Manager

Ross Hartwick
Asbestos Inspector

Attachments: Location Map, Photos, and Laboratory Report

Report Distribution:

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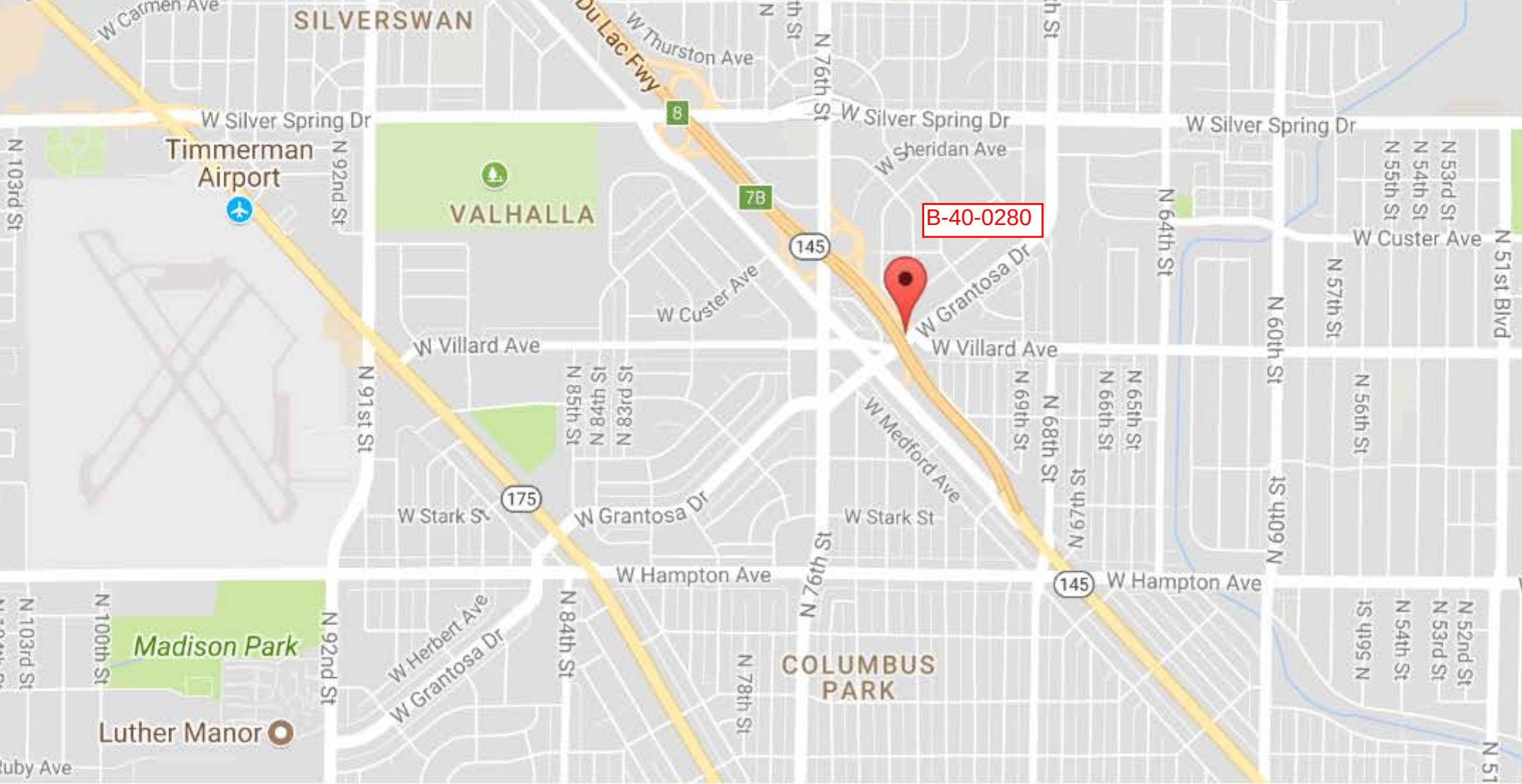
REC Andrew.malsom@dot.wi.gov	X (via email)	
Project Manager jason.zemke@dot.wi.gov	X (via email)	
Other		


B-40-0280
SILVERSWAN
W Carmen Ave
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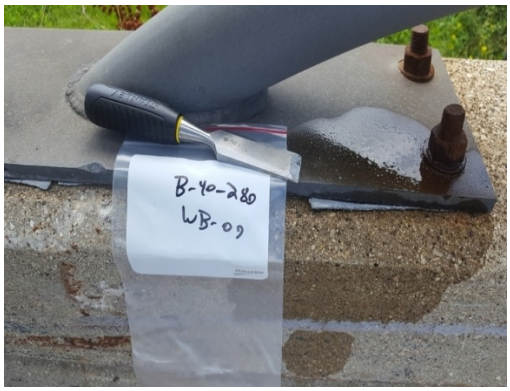
Du Lac Fwy
8
W Silver Spring Dr
Timmerman Airport
VALHALLA
7B
145
W Sheridan Ave
W Custer Ave
W Grantosa Dr
W Villard Ave
N 103rd St
N 92nd St
N 91st St
N 85th St
N 84th St
N 83rd St
N 76th St
N 64th St
N 60th St
N 57th St
N 56th St
N 55th St
N 54th St
N 53rd St
N 51st Blvd
W Medford Ave
N 69th St
N 68th St
N 67th St
N 66th St
N 65th St
175
W Stark St
W Hampton Ave
Madison Park
Luther Manor
W Herbert Ave
N 100th St
N 78th St
COLUMBUS PARK
N 52nd St
Ruby Ave

Bridge B-40-0280

Black paint on pedestrian fence and railing

Caulk in parapet expansion joint and sidewalk joint



Gasket under railing attachment plate on parapet

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Silver paint on galvanized metal conduit

Industrial Hygiene Laboratory
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Windsor, CT 06095
(860) 298-6308

TRC
Results you can rely on

BULK ASBESTOS ANALYSIS REPORT

CLIENT: Wisconsin Department of Transportation

Lab Log #: 0050965
Project #: 283673.0000.0000
Date Received: 07/21/2017
Date Analyzed: 07/21/2017

Site: Bridge Inspection, B-40-280

POLARIZED LIGHT MICROSCOPY by EPA 600/R-93/116

Sample No.	Color	Homogenous	Multi-Layered	Layer No.	Other Matrix Materials		Asbestos %	Asbestos Type
WB-01	Black (paint)	Yes	No	- -		- - -	ND	None
WB-02	Black (paint)	Yes	No	- -		- - -	ND	None
WB-03	Black (paint)	Yes	No	- -		- - -	ND	None
WB-04	Grey (caulk)	Yes	No	- -		- - -	ND	None
WB-05	Grey (caulk)	Yes	No	- -		- - -	ND	None
WB-06	Grey (caulk)	Yes	No	- -		- - -	ND	None
WB-07	Grey (gasket)	Yes	No	- -		- - -	5%	Chrysotile
WB-08	- -	- -	- -	- -		- -	NA/PS	- -
WB-09	- -	- -	- -	- -		- -	NA/PS	- -
WB-10	Dark Grey (tar)	Yes	No	- -	10%	synthetic fiber	ND	None
WB-11	Dark Grey (tar)	Yes	No	- -	10%	synthetic fiber	ND	None
WB-12	Dark Grey (tar)	Yes	No	- -	10%	synthetic fiber	ND	None
WB-13	Black/Silver (paint)	Yes	No	- -		- - -	ND	None
WB-14	Black/Silver (paint)	Yes	No	- -		- - -	ND	None
WB-15	Black/Silver (paint)	Yes	No	- -		- - -	ND	None
WB-16	Black/Brown (paint)	Yes	No	- -		- - -	ND	None
WB-17	Black/Brown (paint)	Yes	No	- -		- - -	ND	None

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21 Griffin Road North
Windsor, CT 06095
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TRC
Results you can rely on

POLARIZED LIGHT MICROSCOPY by EPA 600/R-93/116

Sample No.	Color	Homogenous	Multi-Layered	Layer No.	Other Matrix Materials	Asbestos %	Asbestos Type
WB-18	Black/Brown (paint)	Yes	No	- -	- - -	ND	None

Reporting limit- asbestos present at 1%
ND - asbestos was not detected
Trace - asbestos was observed at level of less than 1%
NA/PS - Not Analyzed / Positive Stop
SNA- Sample Not Analyzed- See Chain of Custody for details

Note: Polarized-light microscopy is not consistently reliable in detecting asbestos in floor coverings and similar non-friable organically bound materials. In those cases, EPA recommends, and certain states (e.g. NY) require, that negative results be confirmed by quantitative transmission electron microscopy.

The Laboratory at TRC follows the EPA's Interim Method for the Determination of Asbestos in Bulk Insulation 1982 (EPA 600/M4-82-020) Bulk Analysis Code 18/A01 and the EPA recommended Method for the Determination of Asbestos in Bulk Building Materials July 1993, R.L. Perkins and B.W. Harvey, (EPA/600/R-93/116) Bulk Analysis Code 18/A03, which utilize polarized light microscopy (PLM). Our analysts have completed an accredited course in asbestos identification. TRC's Laboratory is accredited under the National Voluntary Laboratory Accreditation Program (NVLAP), for Bulk Asbestos Fiber Analysis, NVLAP Code 18/A01, effective through June 30, 2018. TRC is accredited by the AIHA Laboratory Accreditation Programs (AIHA-LAP), LLC in the Industrial Hygiene Program (IHLAP) for PLM effective through October 1, 2018. Asbestos content is determined by visual estimate unless otherwise indicated. Quality Control is performed in-house on at least 10% of samples and QC data related to the samples is available upon written request from client.

Analyzed by: K. Williamson — Kathleen Williamson, Laboratory Manager

Reviewed by: Cathryn Lemire — Cathryn Lemire, Approved Signatory

Date Issued
07/23/2017

ATTACHMENT 4

STRUCTURE ALTERNATIVE

REPORT & ASSOCIATED E-MAILS

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MEMORANDUM

TO: Roy Stollenwerk, P.E. & Christine Hanna, P.E.

FROM: GRAEF

DATE: October 26, 2018

SUBJECT: Bridge Alternative Life Cycle Cost Analysis
ID 1360-11-00
Grantosa Dr. over STH 145
Bridges B-40-280 and B-40-281
Milwaukee County

Construction is planned on two bridges over STH 145 as part of Project 1360-11-70. The project is scheduled for a PS&E date of May 1, 2020 and construction is currently scheduled for 2021.

The abutments on Bridges B-40-280 and B-40-281 are supported by spread footings. A site visit on March 23, 2018 indicated the east abutments of both bridges had slid towards STH 145, and possibly rotated. Although efforts to address the abutment movements were made in 1992 by way of lengthening the expansion slots of the hold-down bearings, at the time of GRAEF's inspection additional movements had taken place which had left the expansion bearings significantly out of alignment. As a result, alternatives to address the abutment movements were investigated.

Bridge improvement options include:

1. Conversion of the east and west abutments on both bridges to semi-expansion seats.
2. Replacement of the east and west abutments on both bridges
3. Complete bridge replacement using steel girders that match the existing substandard vertical clearance.
4. Complete bridge replacement using prestressed girders that raise the roadway profile to meet a minimum vertical clearance of 16'-4".

For each alternative, a construction and life cycle cost analysis has been prepared. A 75-year analysis period has been selected based on the anticipated design life of newly constructed bridges in Wisconsin, and an effective discount rate of 3.5% was assumed. Future major construction/rehabilitation activities were assumed at specified years beyond the initial construction. Recurring future maintenance items (such as bridge inspections) were not included as these were assumed to be the same for all alternatives. Construction unit costs used for the life cycle cost analysis are listed in Appendix A.

Conversion to Semi-Expansion Abutments

Semi-expansion abutments allow the girder ends to contract in cold temperatures, but provide restraint in hotter temperatures. Use of ½" thick elastomeric girder bearing pads placed on polyethylene sheets allow the girder ends to freely slide and result in a low maintenance bearing system. Conversion of the existing abutments to semi-expansion abutments will require temporary shoring of the existing bridge girders, existing abutment removal above the bearing seats, removal of the existing steel hold-down bearing devices, placing new elastomeric bearing pads under the girders, and casting a solid diaphragm to encase the ends of the bridge girders. Cleaning and flame metallizing the girder ends will help to protect the steel from future corrosion due to encasement in the concrete diaphragms

Use of semi-expansion bearings on steel girder bridges is limited to 150-ft which is less than the existing 194-ft bridge length. The Bureau of Structures Development Unit is willing to grant an exception to this provision given the shallow 30" girder depth.

Because the existing abutment bodies will be reused and the original bridge was designed for an H-20 load, the soil bearing pressure was checked for the additional dead load of the semi-expansion bearing's concrete end diaphragm and the HS-20 live loading used for load rating purposes. Preliminary results using service loads indicate that the maximum soil bearing press is approximately 2.9 ksf at the abutment toe under full dead plus live loads. This is less than the 5.0 ksf allowable soil bearing pressure indicated in the original abutment design calculations, and suggests abutment conversion is a feasible option.

A second feasibility check for this alternative was performed to address girder uplift. AASHTO Standard Specifications 3.17.1 was checked using results from an MDX line girder model. Preliminary calculations indicate that the end diaphragm will need to be extended 2.5-ft beyond the abutment front face to provide adequate dead load to resist uplift forces. See Figure 1.

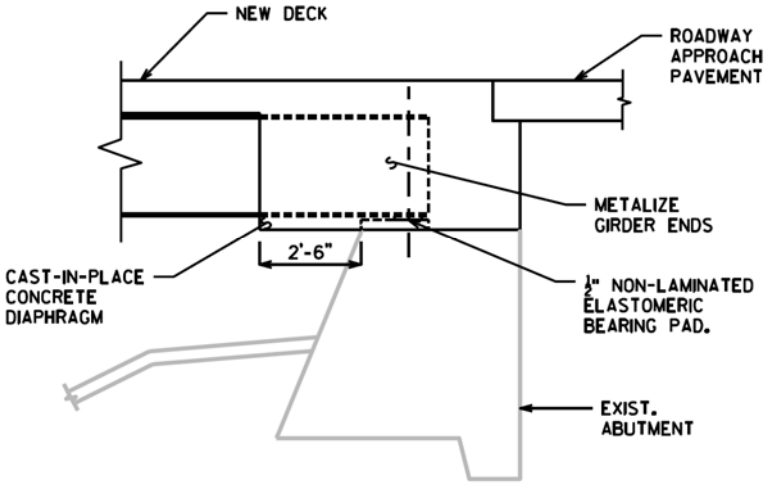

Figure 1: Conversion to Semi-expansion Abutment

For this alternative, the life cycle cost estimate considered that the existing bridge will be approximately 55 years old when rehabilitated. Appendix B lists the analysis details. Assumptions for major bridge construction activities for the 75-year analysis period include the following:

Year 0, bridge age 55 years - new deck construction, abutment conversion to semi-expansion bearings, steel girder repainting, and flame metallizing the steel girder ends. Miscellaneous repairs were assumed to cost 15% of the major rehabilitation items. Construction costs also include associated roadway approach work and contingencies.

Year 20, bridge age 75 years – concrete overlay, and miscellaneous repairs assumed to cost 20% of the major rehabilitation items.

Year 35, bridge age 90 years – demolition and construction of a new prestressed concrete girder bridge with structural approach slabs. The new bridge length is assumed to be 7% greater than the existing bridge to accommodate the new roadway profile. Construction costs also include roadway work to raise Grantosa Drive, acquire right-of-way, and associated contingencies.

Year 55, bridge age 20 years – concrete overlay, and miscellaneous repairs assumed to cost 10% of the major rehabilitation items.

Year 70, bridge age 35 years - new deck construction, and miscellaneous repairs assumed to cost 15% of the major rehabilitation items.

Year 75, bridge age 40 years – no major construction activities are anticipated at this stage. As part of the life cycle cost analysis, a residual value of the bridge was estimated to represent the remaining service life beyond year 75. It was estimated based on an anticipated NBI condition rating of 6 for a 40-year old bridge, prorated against an NBI rating of 9 when new and 3 at the end of its service life. The residual value is calculated as:

$$\frac{(\text{cost for a new bridge}) \times (NBI_{40} - NBI_{\text{service life}})}{(NBI_{new} - NBI_{\text{service life}})}$$

Abutment Replacements

For this alternative, type A3 pile supported abutments were assumed. Type A3 pile supported abutments have a minimum of 2 rows of piles with the front row battered to help resist lateral forces (see Figure 2). Current practice in Wisconsin is to generally use pile supported abutments to control vertical settlement. Replacement of the existing abutments will require temporary shoring of the existing bridge girders, existing abutment removal, pile driving, concrete placement for the new abutments and wingwalls, and installation of new hold-down expansion bearings under the girders. Given the age of the bridge, it was assumed that construction of new structure approach slabs would not be cost effective even though new abutments could be designed to handle these loads.

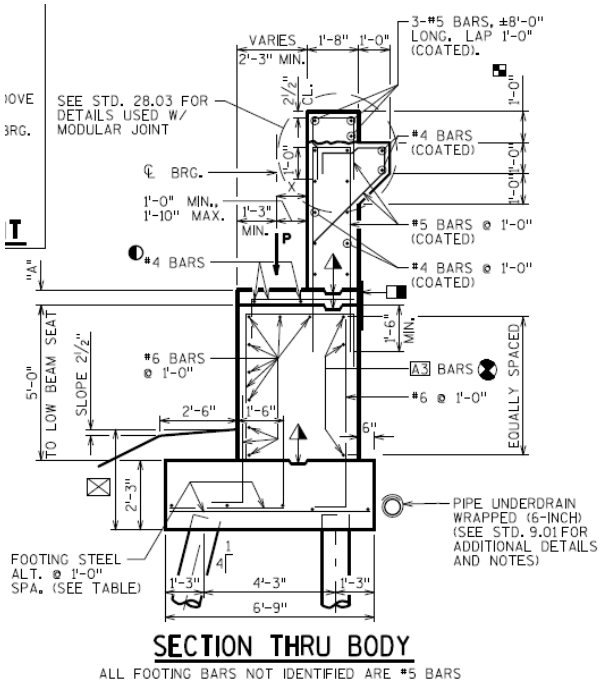

Figure 2: Standard A3 Abutment

Caution will be required while driving piles at the west abutment for bridge B-40-280 due to an existing 24" sanitary sewer passing underneath. This active sewer is located approximately 22-ft below the existing roadway and crosses the centerline of bearing at about a 30-degree angle.

For this alternative, the life cycle cost estimate considered that the existing bridge will be approximately 55 years old when rehabilitated. Appendix C lists the analysis details. Assumptions for major bridge construction activities for the 75-year analysis period include the following:

> Year 0, bridge age 55 years - new deck construction, drive piles, replace the abutments, steel girder repainting, and miscellaneous repairs assumed to cost 15% of the major rehabilitation items. Construction costs also include associated roadway approach work and contingencies.
>
> Year 20, bridge age 75 years – concrete overlay, and miscellaneous repairs assumed to cost 20% of the major rehabilitation items.

Year 35, bridge age 90 years – demolition and construction of a new prestressed concrete girder bridge with structural approach slabs. The new bridge length is assumed to be 7% greater than the existing bridge to accommodate the new roadway profile. Construction costs also include roadway work to raise Grantosa Drive, acquire right-of-way, and associated contingencies.

Year 55, bridge age 20 years – concrete overlay, and miscellaneous repairs assumed to cost 10% of the major rehabilitation items.

Year 70, bridge age 35 years - new deck construction, and miscellaneous repairs assumed to cost 15% of the major rehabilitation items.

Year 75, bridge age 40 years – no major construction activities are anticipated at this stage. As part of the life cycle cost analysis, a residual value of the bridge was estimated to represent the remaining service life beyond year 75. It was estimated using the same method for the semi-expansion abutment conversion alternative.

Complete Replacement with a New Steel Girder Bridge

This alternative replaces the existing structures with steel girder bridges at the same roadway profile as the existing. The current substandard vertical clearance will remain. For life cycle cost analysis purposes, a steel girder replacement bridge with the same total length, width, and substructure locations as the existing was assumed. This approach was judged to be feasible because the existing abutments and piers are founded on shallow footings and there are no existing piles to cause interferences. Caution must be exercised concerning pile design and driving to avoid the existing 24" sanitary sewer at the west abutment of B-40-280 and the west pier of B-40-281. Structure approach slabs were assumed to be constructed as part of the bridge replacement given the projected ADT on Grantosa Drive.

For this alternative, the life cycle cost estimate considered that the existing bridge will have a life span of 75 years. Appendix D lists the analysis details. Assumptions for major bridge construction activities for the 75-year analysis period include the following:

Year 0, bridge age 0 years – demolition and construction of a new steel girder bridge with structural approach slabs. The new bridge deck area is assumed to match the existing bridge.

Year 20, bridge age 20 years – concrete overlay, and miscellaneous repairs assumed to cost 10% of the major rehabilitation items.

Year 35, bridge age 35 years – new deck construction, and miscellaneous repairs assumed to cost 15% of the major rehabilitation items.

Year 55, bridge age 55 years – concrete overlay, and miscellaneous repairs assumed to cost 20% of the major rehabilitation items.

Year 75, bridge age 75 years – demolition and construction of a new prestressed concrete girder bridge is assumed, but these costs are not included in the life cycle analysis because the new bridge's service life falls beyond the 75-year study period. In addition, it is assumed that the existing bridge has no remaining usable service life and therefore no residual value.

Complete Replacement with a New Prestressed Concrete Girder Bridge

This alternative replaces the existing structures with 36" deep prestressed concrete girder bridges. Since this alternative requires raising the profile of Grantosa Drive, it is assumed the roadway profile is raised to attain the 16'-4" minimum vertical clearance required for STH 145. For life cycle cost analysis purposes, length of a prestressed concrete girder replacement bridge was approximated to be about 7% greater than the existing assuming a 3:1 embankment extension at the top of the existing. The bridge widths were assumed to be unchanged from the existing, as were the pier locations. This approach was judged to be feasible because the existing abutments and piers are founded on shallow footings and there are no existing piles to cause interference. Caution must be exercised concerning pile design and driving to avoid the existing 24" sanitary sewer at the west abutment of B-40-280 and the west pier of B-40-281. Structure approach slabs were assumed to be constructed as part of the bridge replacement given the projected ADT on Grantosa Drive.

Associated roadway improvements include raising the profile of Grantosa Drive approximately 2'-5" to attain a minimum vertical clearance of 16'-4" to meet FDM 11-35 requirements for new bridges. The required rise in roadway profile considers a 36W" prestressed concrete girder shape which has the capacity to span up to 100-ft. It is assumed that right-of-way acquisition will be required for the raised profile on Grantosa Drive.

For this alternative, the life cycle cost estimate considered that the existing bridge will have a life span of 75 years. Appendix E lists the analysis details. Assumptions for major bridge construction activities for the 75-year analysis period include the following:

Year 0, bridge age 0 years – demolition and construction of a new prestressed concrete girder bridge with structural approach slabs. The new bridge length is

assumed to be 7% greater than the existing bridge to accommodate the new roadway profile. Construction costs also include roadway work to raise Grantosa Drive, acquire right-of-way, and associated contingencies.

Year 20, bridge age 20 years – concrete overlay, and miscellaneous repairs assumed to cost 10% of the major rehabilitation items.

Year 35, bridge age 35 years – new deck construction, and miscellaneous repairs assumed to cost 15% of the major rehabilitation items.

Year 55, bridge age 55 years – concrete overlay, and miscellaneous repairs assumed to cost 20% of the major rehabilitation items.

Year 75, bridge age 75 years – demolition and construction of a new prestressed concrete girder bridge is assumed, but these costs are not included in the life cycle analysis because the new bridge's service life falls beyond the 75-year study period. In addition, it is assumed that the existing bridge has no remaining usable service life and therefore no residual value.

Conclusions

Results of the life cycle cost analyses are summarized in Table 1 below.

Table 1: Life Cycle Costs of Design Alternatives

Description	Initial Cost at Year 0	Life Cycle Cost at Present Value	Life Cycle Cost as an Annuity
Alternative 1 – Redeck and conversion to a semi-expansion abutment	$1,230,000 per bridge, *$2,460,000 total*	$2,320,000 per bridge, *$4,640,000 total*	$87,900/bridge/year, *$176,000 total/year*
Alternative 2 – Redeck and abutment replacement	$1,530,000 per bridge, *$3,060,000 total*	$2,630,000 per bridge, *$5,270,000 total*	$99,800/bridge/year, *$200,000 total/year*
Alternative 3 – Replacement with steel girder bridge	$1,950,000 per bridge, *$3,900,000 total*	$2,410,000 per bridge, *$4,820,000 total*	$91,100/bridge/year, *$182,000 total/year*
Alternative 4 – Replacement with prestressed concrete girder bridge	$3,090,000 per bridge, *$6,180,000 total*	$3,510,000 per bridge, *$7,020,000 total*	$133,000/bridge/year, *$266,000 total/year*

Recommendations

Results of the life cycle cost analysis show that Alternative 1, redeck and conversion to a semi-expansion abutment, has not only the lowest life cycle cost, but also the lowest first cost as part of the current project. This is a result of maximizing the existing bridge's

service life and original public investment, and of minimizing the amount of rehabilitation work needed to address the abutment movements.

A technical concern is the continued use of abutments experiencing excessive movements and hold-down bearings exhibiting uplift damage. These concerns are addressed by conversion to a semi-expansion abutment. Semi-expansion abutments by nature will provide lateral bracing against forces that tend to cause abutment sliding and overturning. In addition, final design to provide adequate dead load of the end diaphragms will eliminate undesirable live load uplift forces. A technical advantage offered by Alternative 1 is that pile driving is not needed, thereby eliminating the risk of damaging the existing 24" sanitary sewer.

Given the economic and technical benefits, we recommend that Alternative 1 be selected as the preferred option.

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APPENDIX A

Construction Unit Costs

Rehab Unit Prices from WisDOT Year End Structure Cost Summary Spreadsheets and the WisDOT Bridge Manaual

New Steel Bridge

Year	Unit Cost $/SF	Ave. Unit Cost $/SF	
2016	$147.09	$168.37	**Say $175/SF**
2015	$201.30		
2014	$182.81		
2013	$142.28		
Sum =	$673.48		

New PPC Bridge

Year	Unit Cost $/SF	Ave. Unit Cost $/SF	
2017	$123.10	$116.55	**Say $125/SF**
2016	$117.76		
2015	$132.82		
2014	$108.15		
2013	$100.92		
Sum =	$582.75		

Concrete Overlay (use total system values)

Year	Unit Cost $/SF	Ave. Unit Cost $/SF	
2017	$14.51	$18.86	**Say $20/SF**
2016	$23.89		
2015	$18.19		
Sum =	$56.59		

New Deck (use total system values)

Year	Unit Cost $/SF	Ave. Unit Cost $/SF	
2017	$85.13	$78.83	**Say $80/SF**
2016	$78.37		
2015	$73.00		
Sum =	$236.50		

Painting (use total system values)

Year	Unit Cost $/SF	Ave. Unit Cost $/SF	
2017	$16.29	$19.37	**Say $18/SF**
2016	$16.93		
2015	$24.90		
Sum =	$58.12		

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APPENDIX B

Alternative 1 – Conversion to Semi-expansion Abutments

LIFE CYCLE COST ANALYSIS WORK SHEET

Project Name: Grantosa Ave. Bridge Alternative Analysis B-40-280/281
Project Number: 2017-0145.00
Date: 10/11/2018

OPTION: Alternate #1 - Convert (2) existing abutments to semi-expansion

Discount Rate (effective): **3.5%** (accounts for relative financial risk of investment)

Life Cycle: **75** years

Salvage (Residual) Value as a % of Replacement Cost: **50.0%** (assumes NBI = 9 new, 3 at end of service life, and 6 at end of analysis period)

Year	Description	Quantity	Unit	Unit Price	Extension (use present values)	Present Value
	INITIAL COSTS					
0	New deck on 55 year old bridge	9100	SF	$80	$728,000	$728,000
0	Convert 2 abutments to semi-expansion	2	EACH	$47,000	$94,000	$94,000
0	Steel girder repainting	10700	SF	$18	$192,600	$192,600
0	Misc. repairs (15% of major rehab items)	1	LS	$152,190	$152,190	$152,190
0	Roadway approach, mobilization, earthwork contingencies, etc. PER BRIDGE	1	LS	$66,000	$66,000	$66,000
0					$0	$0
	Subtotal - Initial Costs					**$1,232,790**
	FUTURE ITEMS (ONE TIME COSTS)					
20	Concrete overlay on 75 year old bridge	9100	SF	$20	$182,000	$91,467
20	Misc. repairs (20% of major rehab items)	1	LS	$36,400	$36,400	$18,293
20					$0	$0
20					$0	$0
35	Demo existing 90 year old bridge	9100	SF	$20	$182,000	$54,596
35	New PPC girder bridge	9750	SF	$125	$1,218,750	$365,597
35	New structure approach slabs	1	LS	$57,000	$57,000	$17,099
35	Raising Grantosa, mobilization, earthwork contingencies, etc. PER BRIDGE	1	LS	$1,400,000	$1,400,000	$419,968
35	ROW acquisition	1	LS	$180,000	$180,000	$53,996
55	Concrete overlay on 20 year old bridge	9750	SF	$20	$195,000	$29,398
55	Misc. repairs (10% of major rehab items)	1	LS	$19,500	$19,500	$2,940
55					$0	$0
55					$0	$0
70	New deck on 35 year old bridge	9750	SF	$80	$780,000	$70,189
70	Misc. repairs (15% of major rehab items)	1	LS	$117,000	$117,000	$10,528
70					$0	$0
70					$0	$0
75	Salvage (Residual) value - 40 year old bridge	1	LS	($609,375)	-$609,375	-$46,170
	Future Items (annual costs)					
	None anticipated			$0	$0	$0
	Total Life Cycle Costs					**$2,320,690**
	Annuity Cost/Year	*n =*	*75*	*years*		*$87,883*

APPENDIX C

Alternative 2 – Abutment Replacement

LIFE CYCLE COST ANALYSIS WORK SHEET

Project Name: Grantosa Ave. Bridge Alternative Analysis B-40-280/281
Project Number: 2017-0145.00
Date: 10/11/2018

OPTION: Alternate #2 - Replace (2) existing abutments

Discount Rate (effective): **3.5%** (accounts for relative financial risk of investment)

Life Cycle: **75** years

Salvage (Residual) Value as a % of Replacement Cost: **50.0%** (assumes NBI = 9 new, 3 at end of service life, and 6 at end of analysis period)

Year	Description	Quantity	Unit	Unit Price	Extension (use present values)	Present Value
	INITIAL COSTS					
0	New deck on 55 year old bridge	9100	SF	$80	$728,000	$728,000
0	Replace 2 abutment	2	EACH	$176,000	$352,000	$352,000
0	Steel girder repainting	10700	SF	$18	$192,600	$192,600
0	Misc. repairs (15% of major rehab items)	1	LS	$190,890	$190,890	$190,890
0	Roadway approach, mobilization, earthwork contingencies, etc. PER BRIDGE	1	LS	$66,000	$66,000	$66,000
0					$0	$0
	Subtotal - Initial Costs					**$1,529,490**
	FUTURE ITEMS (ONE TIME COSTS)					
20	Concrete overlay on 75 year old bridge	9100	SF	$20	$182,000	$91,467
20	Misc. repairs (20% of major rehab items)	1	LS	$36,400	$36,400	$18,293
20					$0	$0
20					$0	$0
35	Demo existing 90 year old bridge	9100	SF	$20	$182,000	$54,596
35	New PPC girder bridge	9750	SF	$125	$1,218,750	$365,597
35	New structure approach slab	2	EACH	$57,000	$114,000	$34,197
35	Raising Grantosa, mobilization, earthwork contingencies, etc. PER BRIDGE	1	LS	$1,400,000	$1,400,000	$419,968
35	ROW acquisition	1	LS	$180,000	$180,000	$53,996
55	Concrete overlay on 20 year old bridge	9750	SF	$20	$195,000	$29,398
55	Misc. repairs (10% of major rehab items)	1	LS	$19,500	$19,500	$2,940
55					$0	$0
55					$0	$0
70	New deck on 35 year old bridge	9750	SF	$80	$780,000	$70,189
70	Misc. repairs (15% of major rehab items)	1	LS	$117,000	$117,000	$10,528
70					$0	$0
70					$0	$0
75	Salvage (Residual) value - 40 year old bridge	1	LS	($609,375)	-$609,375	-$46,170
	Future Items (annual costs)					
	None anticipated			$0	$0	$0
	Total Life Cycle Costs					**$2,634,489**
	Annuity Cost/Year	*n =*	*75*	*years*		*$99,766*

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APPENDIX D

Alternative 3 – Steel Girder Bridge Replacement

LIFE CYCLE COST ANALYSIS WORK SHEET

Project Name: **Grantosa Ave. Bridge Alternative Analysis B-40-280/281**
Project Number: **2017-0145.00**
Date: **10/25/2018**

OPTION: **Alternate #3 - New steel girder bridge (200' x 45.5')**

Discount Rate (effective): **3.5%** (accounts for relative financial risk of investment)

Life Cycle: **75** years

Year	Description	Quantity	Unit	Unit Price	Extension (use present values)	Present Value
	INITIAL COSTS					
0	Demo existing bridge	9100	SF	$20	$182,000	$182,000
0	New steel girder bridge	9100	SF	$175	$1,592,500	$1,592,500
0	New structure approach slabs	2	EACH	$57,000	$114,000	$114,000
0	Roadway approach, mobilization, earthwork contingencies, etc. PER BRIDGE	1	LS	$66,000	$66,000	$66,000
0					$0	$0
	Subtotal - Initial Costs					**$1,954,500**
	FUTURE ITEMS (ONE TIME COSTS)					
20	Concrete overlay	9100	SF	$20	$182,000	$91,467
20	Misc. repairs (10% of major rehab items)	1	LS	$18,200	$18,200	$9,147
20					$0	$0
20					$0	$0
35	New deck	9100	SF	$80	$728,000	$218,383
35	Steel girder repainting	10700	SF	$18	$192,600	$57,776
35	Misc. repairs (15% of major rehab items)	1	LS	$138,090	$138,090	$41,424
35					$0	$0
35					$0	$0
55	Concrete overlay	9100	SF	$20	$182,000	$27,438
55	Misc. repairs (20% of major rehab items)	1	LS	$36,400	$36,400	$5,488
55					$0	$0
55					$0	$0
75					$0	$0
75					$0	$0
	Future Items (annual costs)					
	None anticipated			$0	$0	$0
	Total Life Cycle Costs					**$2,405,622**
	Annuity Cost/Year	*n =*	*75*	*years*		*$91,099*

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APPENDIX E

Alternative 4 – Prestressed Concrete Girder Bridge Replacement

LIFE CYCLE COST ANALYSIS WORK SHEET

Project Name: Grantosa Ave. Bridge Alternative Analysis B-40-280/281
Project Number: 2017-0145.00
Date: 10/25/2018

OPTION: Alternate #4 - New PPC girder bridge (214' x 45.5')

Discount Rate (effective): **3.5%** (accounts for relative financial risk of investment)

Life Cycle: **75** years

Year	Description	Quantity	Unit	Unit Price	Extension (use present values)	Present Value
	INITIAL COSTS					
0	Demo existing bridge	9100	SF	$20	$182,000	$182,000
0	New PPC girder bridge	**9750**	SF	$125	$1,218,750	$1,218,750
0	New structure approach slabs	2	EACH	$57,000	$114,000	$114,000
0	Raising Grantosa, mobilization, earthwork contingencies, etc. PER BRIDGE	1	LS	$1,400,000	$1,400,000	$1,400,000
0	ROW acquisition	1	LS	$180,000	$180,000	$180,000
	Subtotal - Initial Costs					**$3,094,750**
	FUTURE ITEMS (ONE TIME COSTS)					
20	Concrete overlay	**9750**	SF	$20	$195,000	$98,000
20	Misc. repairs (10% of major rehab items)	1	LS	$19,500	$19,500	$9,800
20					$0	$0
20					$0	$0
35	New deck	**9750**	SF	$80	$780,000	$233,982
35	Misc. repairs (15% of major rehab items)	1	LS	$117,000	$117,000	$35,097
35					$0	$0
35					$0	$0
55	Concrete overlay	**9750**	SF	$20	$195,000	$29,398
55	Misc. repairs (20% of major rehab items)	1	LS	$39,000	$39,000	$5,880
55					$0	$0
55					$0	$0
75					$0	$0
75						$0
	Future Items (annual costs)					
	None anticipated			$0	$0	$0
	Total Life Cycle Costs					**$3,506,907**
	Annuity Cost/Year	*n =*	*75*	*years*		*$132,804*

From:	Landini, Anthony P - DOT
To:	Stollenwerk, Roy T - DOT
Cc:	DOT 13601100 STH 145-Grantosa-Leon; Wood, Kevin; Schowalter, Steven; Hanna, Christine - DOT; Ksontini, Najoua - DOT; Pettit, Mary Beth
Subject:	RE: I.D. 1360-11-00 | STH 145 | Amendment for Alternatives Analysis at Grantosa B-40-280/281
Date:	Tuesday, October 30, 2018 10:25:50 AM
Attachments:	image001.png image002.png image003.png

Roy

The memorandum has been revised as per discussions with Consultant.

Tony

From: Pettit, Mary Beth [mailto:marybeth.pettit@graef-usa.com]
Sent: Friday, October 26, 2018 2:05 PM
To: Stollenwerk, Roy T - DOT <Roy.Stollenwerk@dot.wi.gov>; Landini, Anthony P - DOT <Anthony.Landini@dot.wi.gov>
Cc: DOT 13601100 STH 145-Grantosa-Leon <DOT13601100STH145-Grantosa-Leon@dot.wi.gov>; Wood, Kevin <kevin.wood@graef-usa.com>; Schowalter, Steve <steven.schowalter@graef-usa.com>; Hanna, Christine - DOT <Christine.Hanna@dot.wi.gov>; Ksontini, Najoua - DOT <najoua.ksontini@dot.wi.gov>
Subject: RE: I.D. 1360-11-00 | STH 145 | Amendment for Alternatives Analysis at Grantosa B-40-280/281

All,

Kevin and Tony have corresponded this week and the memorandum has been finalized and attached for your records.

Thank you to everyone for your help! We will incorporate the recommendation of the deck replacement with the conversion to semi-expansion abutments.

Thank you,
Mary Beth

From: Stollenwerk, Roy T - DOT [mailto:Roy.Stollenwerk@dot.wi.gov]
Sent: Tuesday, October 23, 2018 3:22 PM
To: Landini, Anthony P - DOT <Anthony.Landini@dot.wi.gov>
Cc: DOT 13601100 STH 145-Grantosa-Leon <DOT13601100STH145-Grantosa-Leon@dot.wi.gov>; Wood, Kevin <kevin.wood@graef-usa.com>; Pettit, Mary Beth <marybeth.pettit@graef-usa.com>; Schowalter, Steven <steven.schowalter@graef-usa.com>; Hanna, Christine - DOT <Christine.Hanna@dot.wi.gov>; Ksontini, Najoua - DOT <najoua.ksontini@dot.wi.gov>
Subject: RE: I.D. 1360-11-00 | STH 145 | Amendment for Alternatives Analysis at Grantosa B-40-280/281

Tony,

Thanks for your review and concurrence.

Kevin and Mary Beth – Please respond to Tony's comment regarding the LCC analysis for Alternatives 3 & 4 and resubmit is necessary. Thanks.

Roy Stollenwerk
30% Design Project Manager
Wisconsin Department of Transportation
PH: (262) 548-6474

From: Landini, Anthony P - DOT
Sent: Tuesday, October 23, 2018 12:43 PM
To: Stollenwerk, Roy T - DOT <Roy.Stollenwerk@dot.wi.gov>
Cc: DOT 13601100 STH 145-Grantosa-Leon <DOT13601100STH145-Grantosa-Leon@dot.wi.gov>; Wood, Kevin <kevin.wood@graef-usa.com>; Pettit, Mary Beth <marybeth.pettit@graef-usa.com>; Schowalter, Steve <steven.schowalter@graef-usa.com>; Hanna, Christine - DOT <Christine.Hanna@dot.wi.gov>; Ksontini, Najoua - DOT <najoua.ksontini@dot.wi.gov>
Subject: RE: I.D. 1360-11-00 | STH 145 | Amendment for Alternatives Analysis at Grantosa B-40-280/281

Roy

BOS concurs with recommended Alternative 1 – Re-deck and conversion to a semi-expansion abutments.

This is a nice report, but I believe there is a problem with the LCC analysis for Alternatives 3 & 4 that does not affect the recommendation. By adding the cost of a new bridge at year 75, which is the analysis period, the remaining service life of that new structure should be subtracted. If the Consultant agrees, I suggest the report be updated and resubmitted so we have the proper documentation.

Tony

From: Stollenwerk, Roy T - DOT
Sent: Tuesday, October 16, 2018 3:21 PM
To: Landini, Anthony P - DOT <Anthony.Landini@dot.wi.gov>
Cc: DOT 13601100 STH 145-Grantosa-Leon <DOT13601100STH145-Grantosa-Leon@dot.wi.gov>; Wood, Kevin <kevin.wood@graef-usa.com>; Pettit, Mary Beth <marybeth.pettit@graef-usa.com>; Schowalter, Steve <steven.schowalter@graef-usa.com>; Hanna, Christine - DOT <Christine.Hanna@dot.wi.gov>

Subject: RE: I.D. 1360-11-00 | STH 145 | Amendment for Alternatives Analysis at Grantosa

Tony,

GRAEF has submitted the attached Bridge Alternative Life Cycle Cost Analysis for the Grantosa Drive bridges of STH 145, Bridges B-40-280 and B-40-281. Their conclusion is that Alternative 1 – Redeck and conversion to a semi-expansion abutment has the lowest first cost and lowest life cycle cost. Please review the analysis and comment on their recommendation of Alternative 1 as the preferred option.

Thanks, and let us know if you have any questions.

Roy Stollenwerk
30% Design Project Manager
Wisconsin Department of Transportation
PH: (262) 548-6474

From: Landini, Anthony P - DOT
Sent: Thursday, September 06, 2018 3:25 PM
To: Stollenwerk, Roy T - DOT <Roy.Stollenwerk@dot.wi.gov>
Cc: Bonk, Aaron M - DOT <Aaron.Bonk@dot.wi.gov>; Shadewald, Laura - DOT <Laura.Shadewald@dot.wi.gov>
Subject: RE: I.D. 1360-11-00 | STH 145 | Amendment for Alternatives Analysis at Grantosa

Roy

The scope for ii should be to convert both abutments to semi-expansion.

Aaron and Laura have been more involved in man hour estimates so one of them may be willing to provide comments on that portion.

Tony

From: Stollenwerk, Roy T - DOT
Sent: Thursday, September 06, 2018 1:55 PM
To: Landini, Anthony P - DOT <Anthony.Landini@dot.wi.gov>
Cc: DOT 13601100 STH 145-Grantosa-Leon <DOT13601100STH145-Grantosa-Leon@dot.wi.gov>
Subject: FW: I.D. 1360-11-00 | STH 145 | Amendment for Alternatives Analysis at Grantosa

Tony,

GRAEF has submitted the attached draft amendment for the alternative analysis for the Grantosa Drive abutments that are tipping. We would like to get the amendment going as soon as possible so

that we can keep the project design on schedule. Could you please review the scope of work to make sure it includes the information that BOS is looking for. Your opinion on the cost of the amendment would also be appreciated.

Thanks for your help.

Roy Stollenwerk
30% Design Project Manager
Wisconsin Department of Transportation
PH: (262) 548-6474

From: Pettit, Mary Beth [mailto:marybeth.pettit@graef-usa.com]
Sent: Friday, August 31, 2018 2:59 PM
To: Stollenwerk, Roy T - DOT <Roy.Stollenwerk@dot.wi.gov>
Cc: Schowalter, Steve <steven.schowalter@graef-usa.com>; Wood, Kevin <kevin.wood@graef-usa.com>
Subject: [WARNING: ATTACHMENT(S) MAY CONTAIN MALWARE]I.D. 1360-11-00 | STH 145 | Amendment for Alternatives Analysis at Grantosa

Roy,

Per our discussion earlier this week, please find attached a draft of the amendment for the study and memo preparation for the alternatives at Grantosa. Most importantly, we need to be sure the scope the way it is written on page 2 covers what you believe should be in the report. We can discuss next steps with this amendment once you have had a chance to review.

We are planning to complete this work in approximately 3 weeks.

Please feel free to call with questions\concerns.

Thank you!

Mary Beth Pettit, P.E.
Principal

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