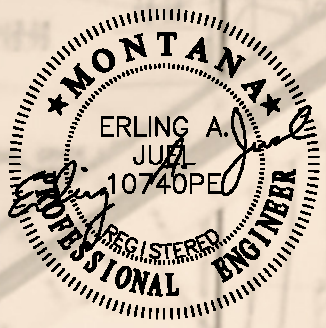
ST. MARY DIVERSION FACILITIES
STRUCTRUAL EVALUATION OF CANAL BRIDGES

FINAL REPORT

AUGUST 2007

"Lifeline of the Hi-line"



Thomas, Dean & Hoskins, Inc.

TD&H

Engineering Consultants

Montana DNRC
Conservation & Resource
Development Division

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PURPOSE AND SCOPE

The purpose and scope of this report is to inventory and characterize six existing bridges that currently cross the St. Mary Canal in order to evaluate potential conflicts and impacts from overall canal rehabilitation. Site visits were made to each bridge to document and assess the existing structure and substructure. Preliminary calculations and evaluations of all six bridges were performed. Our direct observations were supplemented with existing information for each bridge where available, obtained from the files of the BIA, the Blackfeet Tribe, USBR, MDT and the Glacier County Road Department This information is provided for the following six bridges:

- Babb Bridge – BIA Route 313
- Reid Ranch Access Bridge
- Powell Bridge a.k.a. "Memorial Bridge"
- DeWolfe Ranch Access Bridge
- Martin Bridge a.k.a. Whiskey Gap County Road Bridge
- Emigrant Gap County Road Bridge

The locations of the six bridges are shown on Figure 1.

This report does not include an evaluation of the St. Mary River Bridge for which a new crossing is being completed as a Montana Department of Transportation (MDT) project. Nor does this report include the former bridge at the St. Mary River Diversion Dam which has been abandoned.

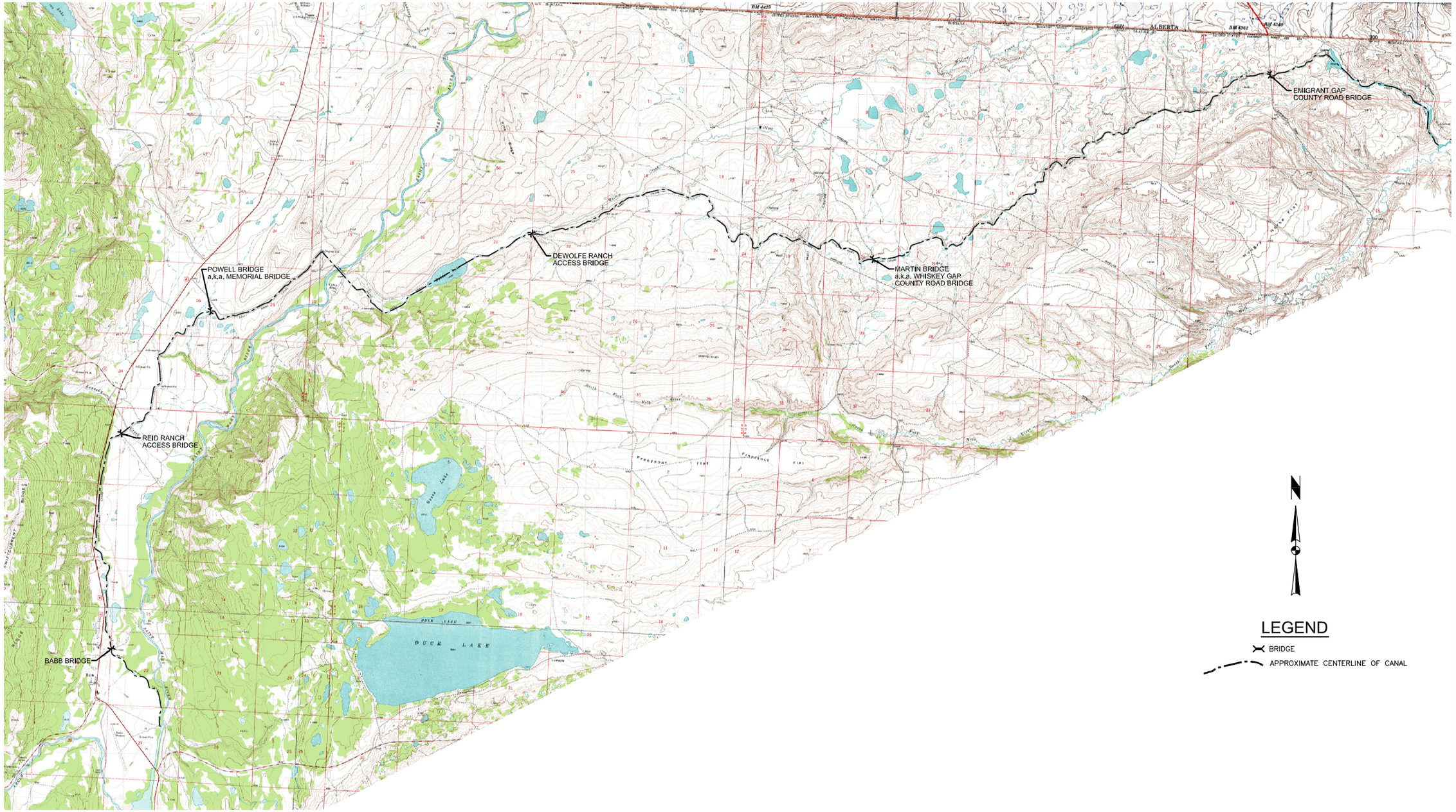


FIGURE 1

J:\2004\04-167\landdevelopment\g167\dwg\BRIDGE-FIG1.dwg, 8/2/2007 7:51:59 AM, MWC

MONTANA
ERLING A. JUEL
10740PE
REGISTERED PROFESSIONAL ENGINEER

REVISIONS
DESCR DATE BY
DESCR DATE BY
DESCR DATE BY

TD&H
THOMAS, DEAN & HOSKINS, INC.
ENGINEERING CONSULTANTS
GREAT FALLS–BOZEMAN–KALISPELL–HELENA
SPOKANE
LEWISTON
MONTANA
WASHINGTON
IDAHO

DRAWN BY:	MWC
DESIGNED BY:	EAJ
QUALITY CHECK:	
DATE:	05.08.07
JOB NO.	04-167
FIELDBOOK	

DNRC - CARDD
ST. MARY DIVERSION FACILITIES

STRUCTURAL EVALUATION OF CANAL BRIDGES

CAD NO. BRIDGE-FIG1 .DWG

SHEET 1 OF 1

BABB BRIDGE – BIA ROUTE 313

This canal crossing is slightly north of the U.S. Post Office in Babb, MT and a few hundred yards east of U.S. Route 89. The Babb Bridge is located in Section 22, T36N and R14W and at approximately Station 94+30 along the St. Mary Canal.

The bridge was designed by the MDT and was constructed in 1986. The bridge is owned and maintained by Glacier County. The bridge was last inspected on April 25, 2007 and is scheduled for reinspection in April 2009. The inspection report indicates the design loading designation is AASHTO HS-20. No major maintenance issues or concerns were identified. The last MDT inspection report (5 pages) is included at the end of this section. The MDT construction drawings (6 sheets) are also included.

The bridge is a two-lane crossing that spans approximately 60 feet. Two pile bents separate the crossing into three equal spans. The deck consists of a cast-in-place concrete deck, which has a three-span continuous geometry. The concrete slab is generally 14 inches in depth for the entire bridge length, with a few locations of localized thickening. At the pier, the slab is 16 inches deep, and 18 inches deep at the abutments. Abutments have a 14-inch bearing seat for the thickened slab edge.

The overall width of the concrete deck is 26'-10". The concrete curb allows for a clear travel width of 24'-0". An embedded steel angle is at each approach for edge protection from wheel impact loads. Along each side of the deck, standard DOT guardrails and posts are installed. The posts are steel W6x20s at 6'-3" on-center, with 6 by 6 timber spacers and neoprene pads beneath each steel base plate.

The three-span crossing is supported by two piers approximately at one third-points. Each pier is constructed with three steel pipe piles with a cast-in-place concrete pile cap. Pipe piles are 16 inches in diameter. Pile spacing is approximately 10'-8" on-center. The concrete pile cap is 36 inches wide by 24 inches deep.

Each abutment of the bridge is a cast-in-place breast wall with short and straight cast-in-place wingwalls. Each of the four concrete wingwalls is about 10 inches in width and 3'-4" in length.

The bridge is in excellent shape. Concrete shows no sign of rebar rusting, spalling, or deterioration. No significant cracks were found in the deck or foundation elements. Piles have some localized paint loss, but show no signs of significant rust.

At each abutment, the approximate distance from the top of the deck to the grade below is slightly less than 4 feet. At midspan, the distance from the top of deck to the level of the water at winter stage is almost 10 feet.

Beneath the bridge, the grade of the canal from each abutment to the canal bottom drops uniformly at an approximate slope of 3 to 1. Each bank takes about 15 feet of horizontal run to reach the top of water at winter stage. This grading profile will permit additional excavation within the channel if needed, and may allow for some minor channel redirection.

With respect to rehabilitation of the St. Mary Canal and related facilities, the existing Babb Bridge does not necessarily preclude rehabilitation of the existing alignment, canal prism and minor capacity increases. Significant horizontal shifts of the canal alignment, grade changes or capacity increases would warrant a replacement bridge to be built. A new bridge should be designed to be a single span structure to avoid foundation obstructions within the flow channel.

Babb Bridge – BIA Route 313

Photo 1.1– Babb Bridge Profile, Looking SE

Photo 1.2 – East Pier & Steel Pipe Piles.

Photo 1.3 – East Abutment

Photo 1.4 – Looking North, East Abutment


Photo 1.5– Looking East, Top of Deck

Photo 1.6– West Pier & Abutment

Photo 1.7 - East Pier & Steel Pipe Piles

Photo 1.8 – Profile (Looking North)

Montana Department of Transportation

INITIAL ASSESSMENT FORM FOR STRUCTURE :

L18227000+01001

Location : NE BABB Structure Name: Glacier County

General Location Data

District Code, Number, Location : **03** **Dist 3** **GREAT FALLS**
Division Code, Location : **32** **HAVRE**
County Code, Location : **035** **GLACIER**
City Code, Location : **00000** **RURAL AREA**
Kind fo Hwy Code, Description : **4** **4 County Hwy**
Signed Route Number : **18227**
Str Owner Code, Description : **2** **County Highway Agency**
Maintained by Code, Description : **2** **County Highway Agenc**
Intersecting Feature : **ST MARY CANAL** **058**
Kilometer Post, Mile Post : **0.16 km** **0.10**
Structure on the State Highway System : ☐ Latitude : **48°52'01"**
Structure on the National Highway System : ☐ Longitude : **113°25'53"**
Str Meet or Exceed NBIS Bridge Length : ☒

Traffic Data

Current ADT : **100** ADT Count Year : **2003** Percent Trucks : **3 %**

Construction Data

Construction Project Number : **BR 9018(3)**
Construction Station Number : **9+16.00**
Construction Drawing Number : **13716**
Construction Year : **1986**
Reconstruction Year :

Structure Loading, Rating and Posting Data

Loading Data :

Design Loading :		5 MS 18 (HS 20)
Inventory Load, Design :	32.6 mton	2 AS Allowable Stress
Operating Load, Design :	32.6 mton	2 AS Allowable Stress
Posting :		5 At/Above Legal Loads

Rating Data :

	Operating	Inventory	Posting
Truck 1 Type 3 :			
Truck 2 Type 3-S3 :			
Truck 3 Type 3-3 :	40		

Structure, Roadway and Clearance Data

Structure Deck, Roadway and Span Data :

Structure Length : **18.59 m**
Deck Area : **152.00 m sq**
Deck Roadway Width : **7.26 m**
Approach Roadway Width : **8.00 m**
Median Code, Description : **0 No median**

Structure Vertical and Horizontal Clearance Data :

Vertical Clearance Over the Structure : **99.99 m**
Reference Feature for Vertical Clearance : **N Feature not hwy or RR**
Vertical Clearance Under the Structure : **0.00 m**
Reference Feature for Lateral Underclearance : **N Feature not hwy or RR**
Minimum Lateral Under Clearance Right : **0.00 m**
Minimum Lateral Under Clearance Left : **0.00 m**

Span Data

Main Span

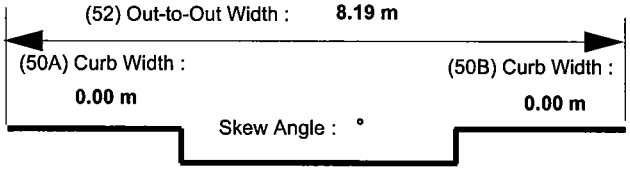
Number Spans : **3**
Material Type Code, Description : **2 Concrete continuous**
Span Design Code, Description : **1 Slab**

Approach Span

Number of Spans : **0**
Material Type Code, Description :
Span Design Code, Description :

Deck

Deck Structure Type : **1 Concrete Cast-in-Place**
Deck Surfacing Type : **1 Monolithic concrete (concurrently placed with struct**
Deck Protection Type : **0 None**
Deck Membrain Type : **0 None**



Structure Vertical and Horizontal Clearance Data Inventory Route :

Over / Under Direction Name	Inventory Route	South, East or Bi-directional Travel			North or West Travel		
		Direction	Vertical	Horizontal	Direction	Vertical	Horizontal
Route On Structure	L18227	Both	99.99 m	7.32 m	N/A		

BIA 313
IHSR RPT

INITIAL ASSESSMENT FORM FOR STRUCTURE :

L18227000+01001

Continue

Inspection Data

Sufficiency Rating : **87**
Health Index : **97.63**
Structure Status :**Not Deficient**

Inspection Due Date : 25 April 2009
(91) Inspection Fequency (months) : **24**

NBI Inspection Data

(90) Date of Last Inspection : 25 April 2007
(90) Inspection Date :

Last Inspected By : William Lay - 63
Inspected By :

(58) Deck Rating :	7	(68) Deck Geometry :	5	(36C) Approach Rail Rating :	N	(62) Culvert Rating :	N
(59) Superstructure Rating :	7	(67) Structure Rating :	7	(36A) Bridge Rail Rating :	0	(61) Channel Rating :	8
(60) Substructure Rating :	7	(69) Under Clearance :	N	(36B) Transition Rating :	N	(71) Waterway Adequacy :	8
(72) App Rdwy Align :	8	(41) Posting Status :	A	(36D) End Rail Rating :	0	(113) Scour Critical :	U

Unrepaired Spalls : 0 m sq

Deck Surfacing Depth : 0.00 in

Inspection Hours

Crew Hours for inspection : 1.5
Helper Hours : 0
Special Crew Hours : 0
Special Equipment Hours : 0

Snooper Required : N
Snooper Hours for inspection : 0
Flagger Hours : 0

Inspection Work Candidates

Candidate ID	Date Requested	Status	Priority	Effected Structure Unit	Scope of Work	Action	Covered Condition States
D31-FY2005-000225	11 April 2005	Not Approved	Medium	M Main 1	202 Paint Stl Column	Min Repair	
Paint steel columns when canal is dry							

Montana Department of Transportation

INITIAL ASSESSMENT FORM FOR STRUCTURE :

L18227000+01001

Continue

Element Inspection Data

********** Span : **Main-0** - **********

Element Description

Smart Flag	Scale Factor	Env	Quantity	Units	Insp Each	Pct Stat 1	Pct Stat 2	Pct Stat 3	Pct Stat 4	Pct Stat 5
Element 38 - Bare Concrete Slab										
	1	1	152	sq.m.	X	100 %	0 %	0 %	0 %	0 %

Previous Inspection Notes :

04/25/2007 - The skid resistance on the deck is mostly worn off. Minor and tight transverse cracks near both Piers. Some scrapes to the deck concrete near both Abutments from grading operations. ZZDZ
04/07/2005 - Same as previous for the tight transverse cracking. The skid resistance on the deck is mostly worn off. IUHP
04/10/2003 - Minor, tight transverse cracks near both Piers. Some scrapes to the deck concrete near both Abutments from grading operations. ORHK
04/24/2001 - 8.19 * 18.59 = 152.25 DEJO
05/12/1999 - None AGGN
06/25/1997 - None GATJ

Inspection Notes:

Smart Flag	Scale Factor	Env	Quantity	Units	Insp Each	Pct Stat 1	Pct Stat 2	Pct Stat 3	Pct Stat 4	Pct Stat 5
Element 202 - Paint Stl Column Pier 2 and 3										
	1	2	6	ea.		80 %	10 %	10 %	0 %	0 %

Previous Inspection Notes :

04/25/2007 - Some paint loss with some rust in those areas. Additional top coat loss down to the primer coat. ZZDZ
04/07/2005 - Same as previous report with a little more paint fade and rust spots. Made a work item to paint the columns when crews are available and canal is dry. IUHP
04/10/2003 - Some speckled rust forming throughout. Areas where finish coat paint is gone with shop prime coat visible. ORHK
04/24/2001 - Env. State #2 as wet part of the year.
Some paint loss with minor rust & pitting. DEJO
05/12/1999 - None AGGN
06/25/1997 - None GATJ

Inspection Notes:

Smart Flag	Scale Factor	Env	Quantity	Units	Insp Each	Pct Stat 1	Pct Stat 2	Pct Stat 3	Pct Stat 4	Pct Stat 5
Element 215 - R/Conc Abutment 1 and 4										
	1	1	22	m		95 %	5 %	0 %	0 %	

Previous Inspection Notes :

04/25/2007 - Some minor efflorescence and spalling concrete on the lower/old part of the Abutment at the joint between the slab and Abutment cap. This area is wet and has standing water today. ZZDZ
04/07/2005 - Same as previous report IUHP
04/10/2003 - Some minor efflorescence and spalling concrete on the lower/old part of the Abutment at the joint between the slab and Abutment cap. This area is leaking water today. ORHK
04/24/2001 - (8.19 * 2) + (4 * 1.36) = 21.82m DEJO
05/12/1999 - None AGGN
06/25/1997 - None GATJ

Inspection Notes:

INITIAL ASSESSMENT FORM FOR STRUCTURE :

L18227000+01001

Continue

********** Span : **Main-0 - (cont.)** **********

Element Description

Smart Flag	Scale Factor	Env	Quantity	Units	Insp Each	Pct Stat 1	Pct Stat 2	Pct Stat 3	Pct Stat 4	Pct Stat 5
Element 234 - R/Conc Cap Pier 2 and 3										
	1	1	16	m		100 %	0 %	0 %	0 %	%

Previous Inspection Notes :

04/25/2007 - No change and in generally Good condition. ZZDZ
04/07/2005 - Minor and tight surface shrinkage cracks. No problems noted. IUHP
04/10/2003 - Minor and tight shrinkage cracks. ORHK
04/24/2001 - 8.19 * 2 = 16.38m. Pier #2 and #3. DEJO

Inspection Notes:

Element 334 - Metal Rail Coated Doubled up W-Beam w\ Steel Posts

Smart Flag	Scale Factor	Env	Quantity	Units	Insp Each	Pct Stat 1	Pct Stat 2	Pct Stat 3	Pct Stat 4	Pct Stat 5
	1	1	39	m		85 %	10 %	5 %	0 %	0 %

Previous Inspection Notes :

04/25/2007 - Damage to the end shoes on the NW and SE departure ends. Loss of paint and some areas of rust noted in the posts. Some dings and scrapes to the rail. ZZDZ
04/07/2005 - Minor dings and scrapes to both rails. The corner of the Right end shoe at Abutment 4 is bent and slightly torn from an impact of some type. Minor rust spots on the lower portions of the posts. IUHP
04/10/2003 - Some minor scrapes and dings on both rails. Some very minor speckled rust on the rail posts. ORHK
04/24/2001 - 19.65 * 2 = 39.30m. Steel posts with doubled up W-beam rail. Unchanged from the last report. DEJO
05/12/1999 - None. AGGN
06/25/1997 - Damage to end piece of rail. GATJ

Inspection Notes:

INITIAL ASSESSMENT FORM FOR STRUCTURE :

L18227000+01001

Continue

General Inspection Notes

04/25/2007 - No change from previous report.	ZZDZ
04/07/2005 - No markers other than small reflective tabs on the rail joints. Minor bumps on and off of the structure from fill settlement.	IUHP
04/10/2003 - No markers on the structure. NBI 36A rated at a "0" because the rail is only doubled up W-beam with metal posts, which does not meet current standards.	ORHK
04/24/2001 - None.	DEJO
05/12/1999 - None.	AGGN
06/25/1997 - Sufficiency Rating Calculation Accepted by ops$u5963 at 10/6/97 13:27:55. Sufficiency Rating Calculation Accepted by ops$u5963 at 10/6/97 13:25:23. Sufficiency Rating Calculation Accepted by ops$a0241 at 8/29/97 12:06:06. OPS$A0241 inspection comments - Structure: L18227000+01001 - Date 6/25/97 - Previous comments -> Sufficiency Rating Calculation Accepted by ops$u5963 at 3/10/97 15:01:01. Sufficiency Rating Calculation Accepted by ops$u9004 at 2/19/97 14:18:20.	GATJ
08/01/1995 - Sufficiency Rating Calculation Accepted by ops$u5963 at 3/10/97 15:01:01. Sufficiency Rating Calculation Accepted by ops$u9004 at 2/19/97 14:18:20.	UOTS
10/01/1992 - Updated with tape 1995.	NB95
02/01/1991 - Updated with tape 1993.	NB93

FED. ROAD DIV. NO.	STATE	FED. AID PROJ. NO.	SHEET NO.
8	MONT.	BR 9018 (3)	B1

STATE OF MONTANA
DEPARTMENT OF HIGHWAYS

BRIDGE PLANS & QUANTITIES

FEDERAL AID PROJECT NO. BR 9018 (3) P.E. & CONST.

EAST OF BABB - ST. MARY CANAL

GLACIER COUNTY

LIST OF DRAWINGS

SHEET NO.	DWG. NO.	TITLE
B2	13716	GENERAL LAYOUT
B3	13717	FOOTING PLAN
B4	13718	ABUTMENTS NO. 1 & NO. 4
B5	13719	INTERMEDIATE BENTS NO. 2 & NO. 3
B6	13720	FLAT SLAB & RAIL DETAILS

~~ESTIMATED~~ BRIDGE ~~PLAN~~ QUANTITIES

LOCATION	LENGTH IN FEET	REINFORCING STEEL (LBS.)	STRUCTURAL STEEL (LUMP SUM)	CLASS "AD" CONCRETE (CU. YDS.)	CLASS "BD" MOD. CONC. (CU. YDS.) ‡	STEEL PIPE PILES 16" O.D. x ½" WALL TH. (LIN. FT.) FURNISH	STEEL PIPE PILES 16" O.D. x ½" WALL TH. (LIN. FT.) DRIVE	STRUC. EXC. TYPE 1 (CU. YDS.)	BRIDGE RAIL-DOUBLE RAIL (LIN. FT.)	REMOVE STRUCTURE (LUMP SUM)
ABUTMENT NO. 1		1106		11.6		~~80.0~~ 18.6	~~78.0~~ 111.6	~~6.0~~ 16.7		
BENT NO. 2		910		5.2		~~135.0~~ 171.7	~~111.0~~ 147.7			
BENT NO. 3		910	~~1.0~~ = $1000.00	5.2		~~135.0~~ 191.1	~~111.0~~ 167.1			~~1.0~~ = $20,000.00
ABUTMENT NO. 4		1106		11.6		~~80.0~~ 109.3	~~78.0~~ 107.3	~~6.0~~ 17.7		
SUPERSTRUCTURE	60.0	9886			74.3				125.0	
TOTAL	60.0	13918	~~1.0~~ = $1000.00	33.6	74.3	~~430.0~~ 585.7	378.0 533.7	5.0 34.4	125.0	~~1.0~~ = $20,000.00

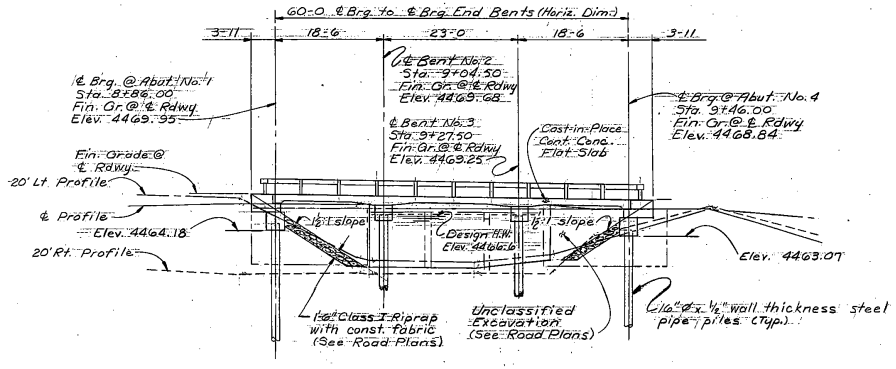
‡ See Special Provisions.

GENERAL ITEMS
Bridge Survey Controls 1.0 L. Sum ($9,000)
Furnish & Weld End Plates 2,609.30 units (See C.O. No. 1 - Work by Agreement)

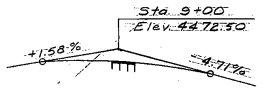
PREPARED BY W.A.B. 11-26-85 CHECKED BY S.D.K. 11-27-85

DRAWING NO. 13716 Q

FED. ROAD DIV. NO.	STATE	FED. AID PROJ. NO.	SHEET NO.
8	MONT.	BR 9018(3)	B2



ELEVATION

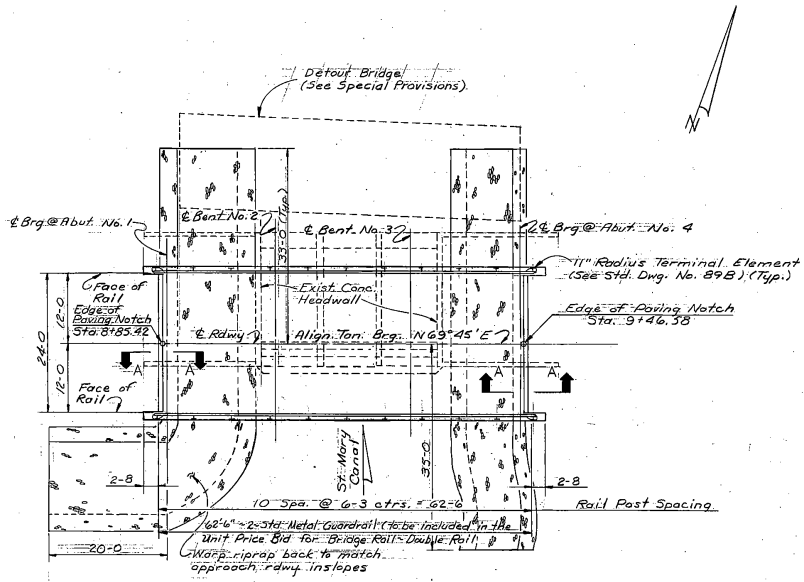


350' v.c.

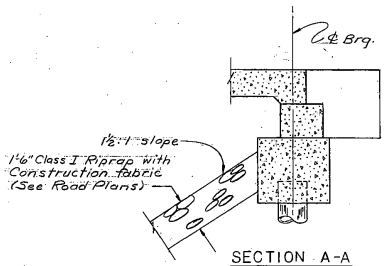
PROFILE GRADE
No Scale

HYDRAULIC DATA

Design Flow: 850 cfs
Design H.W. Elev.: 4466.6 ft.



PLAN



SECTION A-A
Scale: ⅜" = 1'-0"

NOTES

FINISHED GRADE: Finished grade of bridge at ℄ Roadway is the same as Profile grade shown on Road Plans.

LIVE LOAD: Standard HS20-44 loading.

SPECIFICATIONS: Montana Department of Highways and the Montana Highway Commission Standard Specifications for Road and Bridge Construction, 1981 Edition, and any amendments thereto, and Special Provisions shall govern unless otherwise noted. Design prepared in accordance with AASHTO Specifications, 1983 Edition, and any amendments thereto.

CAST IN PLACE CONCRETE: Unless otherwise approved all substructure concrete shall be Class "AD" and all superstructure concrete shall be Class "BD" Modified. See Special Provisions.

STRUCTURAL STEEL: All structural steel shall be measured and paid for on the Lump sum basis as set forth in the Standard Specifications. Estimated weight = 365 lbs.

REINFORCING STEEL: All reinforcing steel shall be of the deformed type and shall meet the requirements of A.S.T.M. Specifications A615, Grade 60 (A.A.S.H.T.O. M-31).

TRAFFIC CONTROL PLAN AND SEQUENCE OF OPERATIONS: See "Special Provisions."

STRUCTURE EXCAVATION: Excavation for the abutments shall be calculated from the lower limits of the unclassified excavation.

Class of Concrete	Min. Req'd Cylinder Strength to achieve 1.0 pay factor (p.s.i.)*	Strength for Design Purposes (p.s.i.)
"AD"	3400	3000
"BD" Modified	3900	3500

*See Supplemental Specifications, Article 10.06(c).

STATE OF MONTANA
DEPARTMENT OF HIGHWAYS

BRIDGE OVER ST. MARY CANAL
AT STA. 9+16.00
FEDERAL AID PROJECT NO. BR 9018(3)
GLACIER COUNTY
GENERAL LAYOUT

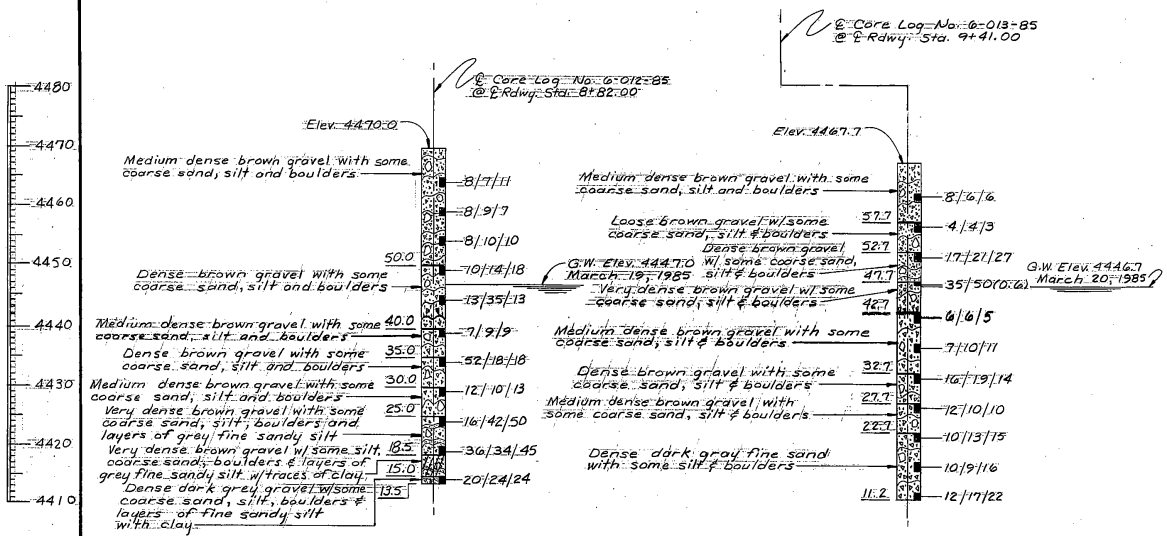
Scale: 1"=10'-0" except as noted
DRAWING NO. 13716

DESIGNED	10-29-84	S.A.N.
DRAWN	11-9-84	W.A.B.
CHECKED	11-5-85	S.D.K.
APPROVED	2-20-86	N.H.R.
REVISED		
REVISED		

Plastic Lead Used

K+E KEUFFEL & ESSER CO.

FED. ROAD DIV. NO.	STATE	FED. AID PROJ. NO.	SHEET NO.
8	MONT.	BR 9018 (3)	83



LOG OF BORINGS

NOTES

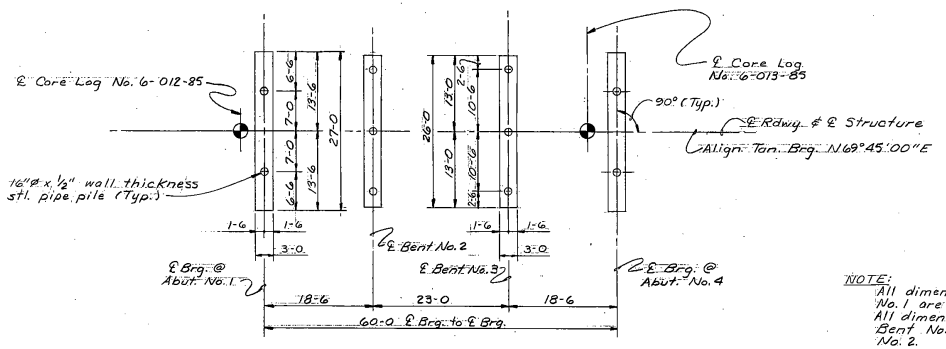
SOILS AND FOUNDATION MATERIALS: Borings were taken by the State of Montana, Department of Highways at the points shown on the Footing Plan.

The series of numbers shown on the Log of Borings indicates the number of blows per 6" penetration for each number of the series of a 2" sample tube which was driven in accordance with the Standard Penetration Test made with a 2" split tube sampler using a 140 pound hammer having a 30" drop. The total penetration of the sampler tube is indicated on the Core Logs after each series if 6" penetration was not achieved in 50 blows.

The State of Montana, Department of Highways, does not assume any responsibility for any variation or misinterpretation of the classes of materials and adjustment in bid prices will not be made if the materials found do not agree with those shown on the Log of Borings.

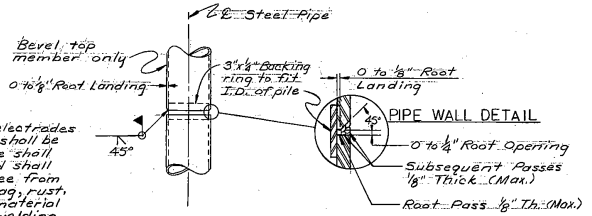
FOUNDATION PILES: For bidding purposes only, pile lengths have been estimated as shown on drawings.

NOTE:
Only E7018 or E7028 series electrodes with low hydrogen coverings shall be used. Maximum electrode size shall be 3/16". Surfaces to be welded shall be smooth, uniform and free from fins, tears, loose scale, slag, rust, grease, moisture or other material that would prevent proper welding.

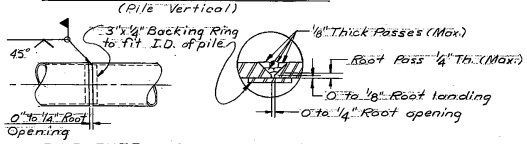


FOOTING PLAN

NOTE:
All dimensions shown for Abut. No. 1 are typ. for Abut No. 4. All dimensions shown for Bent No. 3 are typ. for Bent No. 2.



PILE EXTENSION AFTER DRIVING
(Pile Vertical)



PILE EXTENSION BEFORE DRIVING
(Rotate pile so that all welding is done in a flat position)

PERMISSIBLE WELDED SPLICE DETAILS
FOR 16" DIAMETER STEEL PIPE PILES
No Scale

STATE OF MONTANA
DEPARTMENT OF HIGHWAYS

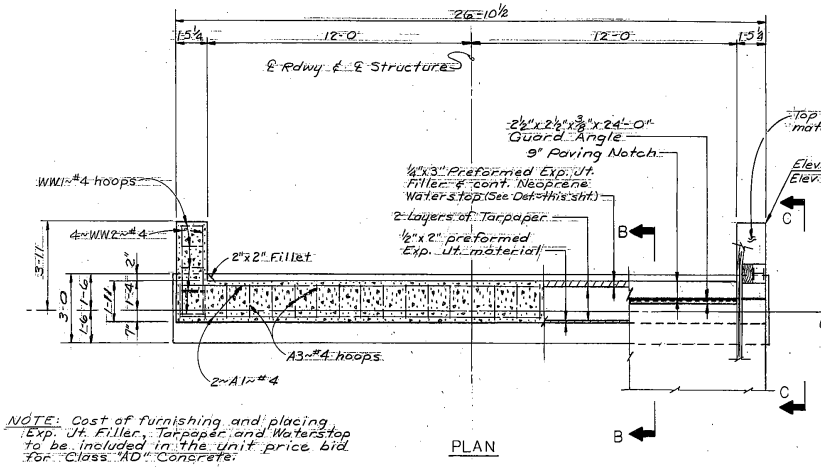
BRIDGE OVER ST. MARY CANAL
AT STA. 9+16.00
FEDERAL AID PROJECT NO. BR 9018 (3)
GLACIER COUNTY
FOOTING PLAN
Scale 1"=10'-0" Except as noted

DESIGNED	12-13-84	T.L.B.
DRAWN	4-9-85	W.A.B.
CHECKED	11-5-85	S.D.K.
REVISED		
REVISED		
REVISED		

DRAWING NO. 13717

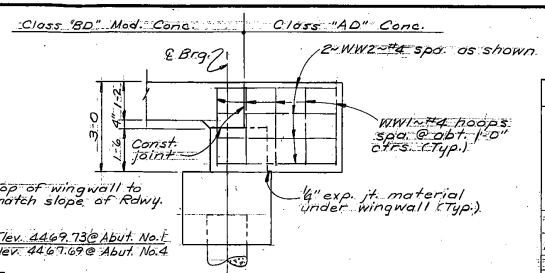
Plastic Lead

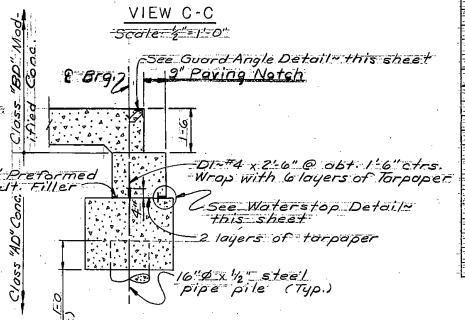
FED. ROAD DIV. NO.	STATE	FED. AID PROJ. NO.	SHEET NO.
8	MONT.	BR 9018(3)	84

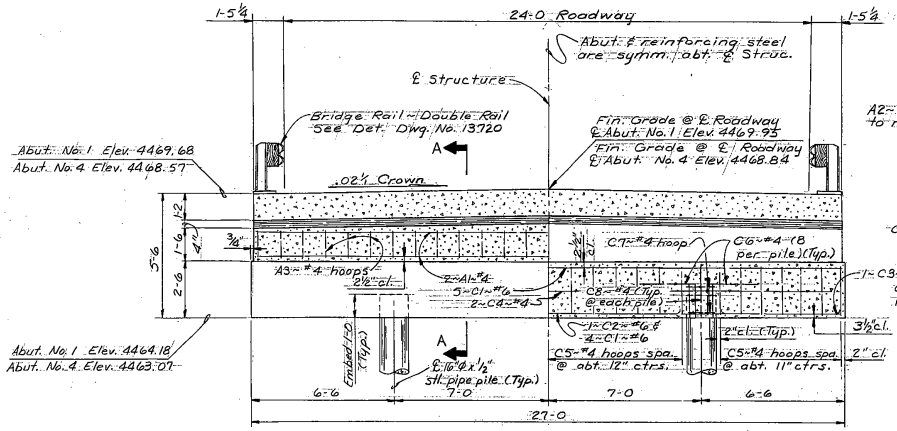


PLAN

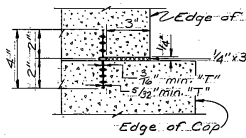
NOTE: Cost of furnishing and placing Exp. Jt. Filler, Tarpaper and Waterstop to be included in the unit price bid for Class "AD" Concrete.







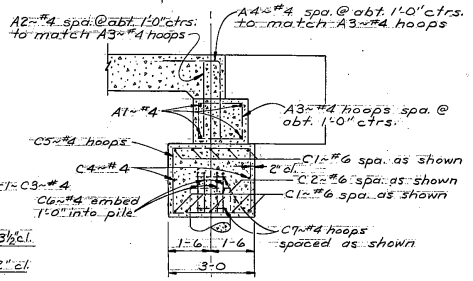
ELEVATION
Abut. No. 1 (Back on Line)
Abut. No. 4 (Ahead on Line)



WATERSTOP DETAIL
Scale: 3"=1'-0"

NOTE: Waterstop to be held in accurate position while concrete is placed.

NOTE: For the requirements of the waterstop material see "Supplemental Specifications".



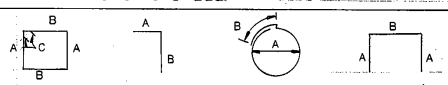
SECTION A-A
Scale: ½"=1'-0"

SECTION B-B
Scale: ½"=1'-0"

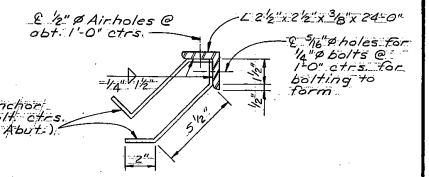
NOTE: Maximum Pile Pressure under: D.L.+L.L.=43.5 Tons/Pile.

NOTE: Estimated Pile Length = 40'-0".

BILL OF REINFORCING STEEL (ONE ABUTMENT ONLY)



STRAIGHT BARS				BENT BARS (All dim. are Out to Out.)							
Mark	Size	No.	Length	Mark	Size	No.	Type	Length	A	B	C	D
A1	#4	4	26'-6"	A3	#4	27	1	6'-3"	1'-2"	1'-7"	0'-4½"	
A2	4	27	2'-6"	A4	4	27	2	4'-6"	2'-0"	2'-6"		
C1	6	9	26'-8"	C5	4	27	1	10'-3"	2'-1"	2'-8"	0'-4½"	
C2	6	1	12'-4"	C6	4	16	2	3'-8"	2'-2"	1'-6"		
C3	4	2	5'-6"	C7	4	4	3	4'-6"	1'-0"	1'-4"		
C4	4	2	26'-8"	C8	4	2	4	5'-4"	1'-4"	2'-8"		
WW2	4	16	4'-2"	WW1	#4	10	1	8'-3"	2'-5"	1'-1"	0'-4½"	
D1	#4	79	2'-6"									



GUARD ANGLE DETAIL
Scale: 3"=1'-0"

NOTE: Guard Angle shall be set ⅛" below concrete surface.

NOTE: Guard Angle may be furnished in two pieces with end anchor bars 6" max. from each end. If furnished in two pieces they shall be field welded together and held in accurate position while placing conc.

STATE OF MONTANA
DEPARTMENT OF HIGHWAYS

BRIDGE OVER ST. MARY CANAL

AT STA. 9+16.00

FEDERAL AID PROJECT NO. BR 901.8(3)

GLACIER COUNTY

ABUTMENTS NO. 1 & NO. 4

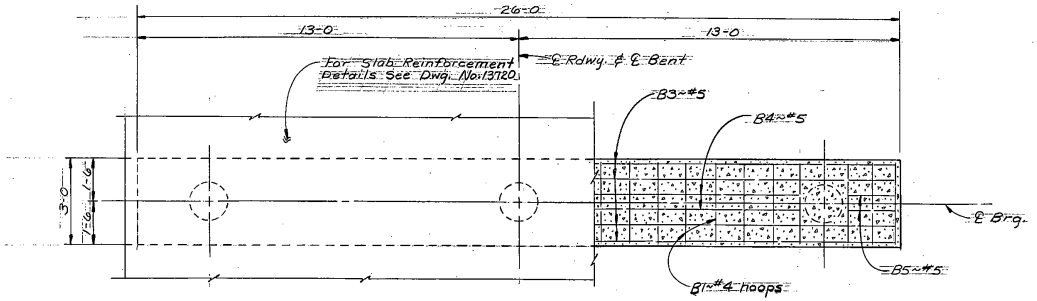
Scale: ⅜" = 1'-0" except as noted

DRAWING NO. 13718

DESIGNED	12-7-84	T.L.B.
DRAWN	5-10-85	W.A.B.
CHECKED	11-5-85	S.D.K.
REVISED		
REVISED		
REVISED		

Plastic Lead

FED. ROAD DIV. NO.	STATE	FED. AID PROJ. NO.	SHEET NO.
8	MONT.	BR 9018(3)	85



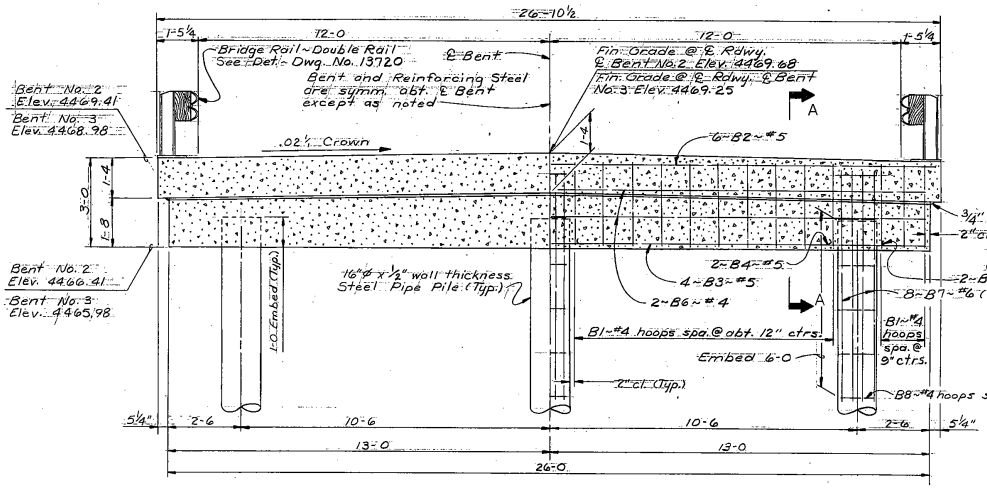
PLAN

BILL OF REINFORCING STEEL (FOR ONE BENT ONLY)

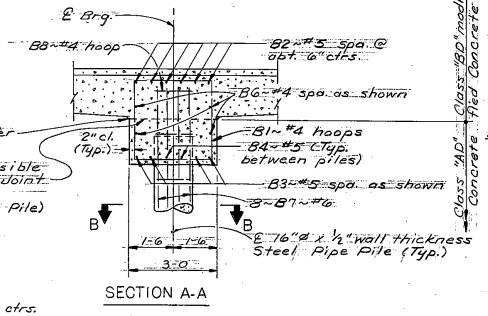
TYPE 1

TYPE 2

STRAIGHT BARS				BENT BARS (All dim are Out to Out)							
Mark	Size	No.	Length	Mark	Size	No.	Type	Length	A	B	C
B2	#5	6	26'-6"								
B3	5	4	25-8	B1	#4	26	1	11'-3"	2'-7"	2'-8"	0'-4½"
B4	5	4	8-10								
B5	5	4	1'-6	B8	#4	18	2	4'6"	1'-0"	1'-4"	
B6	4	4	25-8								
B7	#6	24	7'-8"								



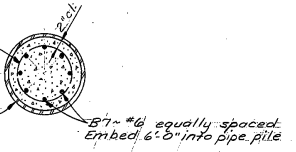
ELEVATION



SECTION A-A

NOTE: Estimated Pile length = 45'-0"

NOTE: Maximum Pile Pressure under: DL + LL = 72.0 Tons.



SECTION B-B

Scale: 1"=1'-0"

NOTE: The steel pipe piles shall be filled with Class "AD" concrete to the elevation of the bottom of the cap, after which the contractor shall wait a minimum of one day before placing the bent cap concrete. The cost of furnishing and placing the Class "AD" concrete shall be included in the unit price bid for "Steel Pipe Piles - Drive".

STATE OF MONTANA
DEPARTMENT OF HIGHWAYS

BRIDGE OVER ST. MARY CANAL

AT STA. 9+16.00

FEDERAL AID PROJECT NO. BR 9018(3)

GLACIER COUNTY

INTERMEDIATE BENTS NO. 2 & NO. 3

Scale: ½"=1'-0" except as noted

DRAWING NO. 13719

DESIGNED	12-13-84	T.L.B.
DRAWN	5-31-85	W.A.B.
CHECKED	11-5-85	S.O.K.
REVISED		
REVISED		
REVISED		

Plastic Lead

FED. ROAD DIV. NO.	STATE	FED. AID PROJ. NO.	SHEET NO.
8	MONT.	BR9018(3)	86

NOTES

REFLECTORS: A reflector shall be placed on each end rail post and at approx. equal spacing (25' max. ctrs. on every fourth rail post) between end rail posts. Reflectors shall be mounted with the reflectorized face toward oncoming traffic. The cost of the reflectors shall be included in the unit price bid for lin. ft. of bridge rail.

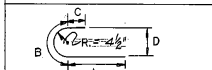
GALVANIZING: All bolts, nuts and washers shall be galvanized in accordance with A.S.T.M. Specifications A153. Bridge rail shall be galvanized in accordance with A.S.T.M. Specifications A525 or A123.

ERECTION: Rail posts shall be set perpendicular to the roadway grade. To obtain proper alignment, the anchor bolt assembly must be held in exact position while pouring the slab. To obtain proper grade, use vertical slots in rail post for adjustments.

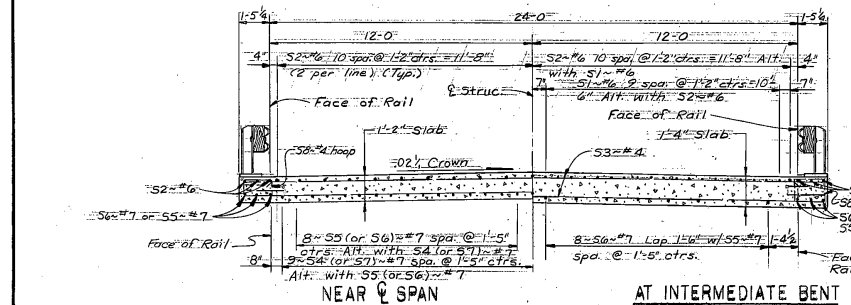
BRIDGE RAIL-DOUBLE RAIL: This item shall include metal guard rail, oval shouldered button head bolt, hex nut, washer, plate washer, treated timber blockout, post, base plate, anchor bolt assembly, lead sheets and shims. Metal guardrail shall conform to A.A.S.H.T.O. M-180 and shall be lapped in the direction of traffic.

PAYMENT: Bridge Rail-Double Rail shall be paid for by the lin. ft. which shall be full compensation for furnishing all materials, equipment and labor necessary and incidental to complete the item. The number of lin. ft. of Bridge Rail for payment shall be 125.0 as shown on the General Layout.

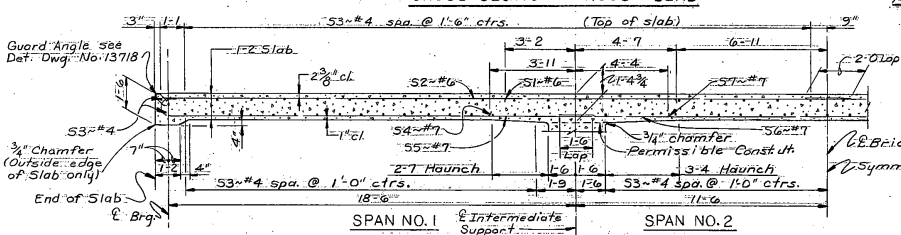
BILL OF REINFORCING STEEL



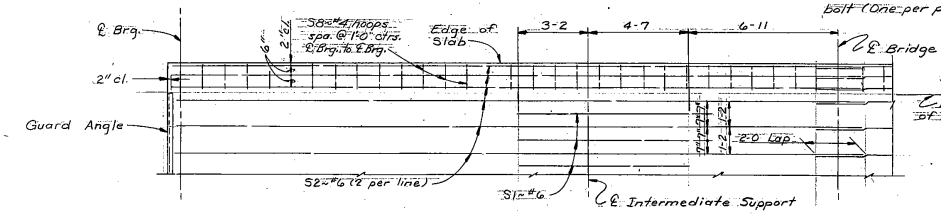
STRAIGHT BARS				BENT BARS (All dim. are Out to Out)								
Mark	Size	No.	Length	Mark	Size	No.	Type	Length	A	B	C	D
				S4	#7	34	1	16'-0"	14'-7"	1'-2"	0'-3"	0'-9"
S1	#6	40	7'-9"	S5	7	44	1	20'-8	19'-3	1'-2	0'-3	0'-9"
S2	6	54	31'-5	S8	4	122	2	4'-9	0'-11	1'-1	0'-4½	
S3	4	99	26'-6	S9	#5	36	3	4'-4"	1'-0"	1'-8"		
S6	7	22	24'-6									
S7	#7	17	14'-4"									



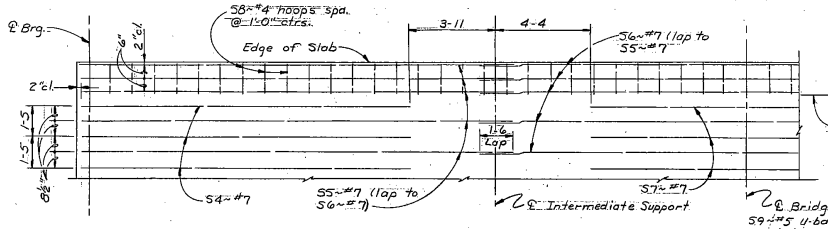
CROSS SECTION THROUGH SLAB



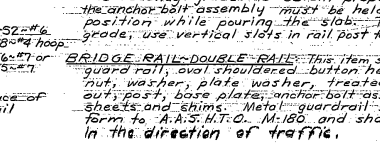
HALF LONGITUDINAL SECTION THROUGH SLAB



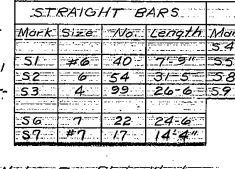
PART PLAN OF TOP LONGITUDINAL SLAB STEEL



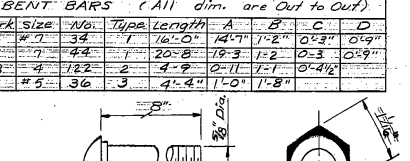
PART PLAN OF BOTTOM LONGITUDINAL SLAB STEEL



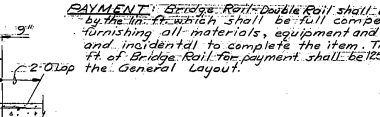
SECTION C-C
Scale: 1"=1'-0"



SECTION D-D
Scale: 1½"=1'-0"



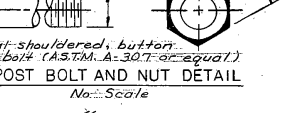
Note: For Plate Washer Details see Standard Dwg. No. 85A.



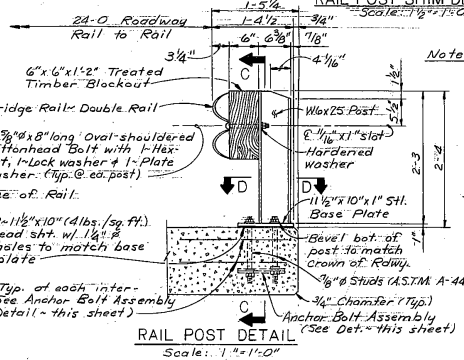
ANCHOR BOLT ASSEMBLY REINFORCEMENT DETAIL
Scale: 1"=1'-0"

RAIL POST SHIM DETAIL
Scale: 1½"=1'-0"

Note: The contractor shall furnish shims as regd to adjust rail to grade. Shims shall be placed between the lead sheet and the base plate with the slots toward ℄ Roadway.



RAIL POST ANCHOR BOLT ASSEMBLY
Scale: 1½"=1'-0"



RAIL POST DETAIL
Scale: 1"=1'-0"

Note: Top of slab under each rail post shall be finished to a smooth and uniform surface to assure a proper align. of the post and a tight fit between the lead sheet and the concrete. Bush hammering will not be permitted except to remove high spots.

Note: Rail posts and plates shall be painted according to the Standard Specifications.

DESIGNED	12-13-84	T.I.B.
DRAWN	6-4-85	W.A.B.
CHECKED	11-5-85	S.O.K.
REVISED		
REVISED		
REVISED		

STATE OF MONTANA
DEPARTMENT OF HIGHWAYS

BRIDGE OVER ST. MARY CANAL

AT STA. 9+16.00

FEDERAL AID PROJECT NO. BR 9018(3)

GLACIER COUNTY

FLAT SLAB & RAIL DETAILS

Scale: ⅜"=1'-0" except as noted

DRAWING NO. 13720

Plastic

REID RANCH ACCESS BRIDGE

This bridge is a private structure providing access to the Reid Family Ranch. The bridge is located in Section 3, T36N, and R14W and approximately Station 262+90 along the St. Mary Canal. The bridge is privately-owned and maintained. The year of construction for this structure is not known. Neither Glacier County nor MDT inspections have been performed. Construction drawings could not be located.

This canal crossing is very close to Kennedy Creek, on the Reid Ranch, a few hundred yards east of U.S. Route 89. The bridge is a single lane crossing that spans approximately 80 feet.

The structure itself is a two-span crossing, with a pile bent pier at mid-span, separating the superstructure into two, 40-foot simple spans. Precast, prestressed concrete girders with an integral deck are the primary superstructure. The girders are a modified double tee shape with a 36-inch depth. Each of the three girders is approximatley 5'-0" wide, and three girders with transition make up the 15'-2" deck width. A 6-inch wide by 9-inch high cast-in-place concrete curb on each side allows a 14'-2" clear travel width.

Each precast girder has a full-depth diaphragm that is cast between each stem of the double tees. The diaphragms are at the midpoint of each 40-foot span. The girders are in excellent shape, with no apparent spalling, damage, or cracking. The east end of the south curb exhibits damage and exposed rebar.

An exact estimate of the capacity of the precast girders is very difficult to determine from only field measurements. Knowledge of the embedded steel strand reinforcement in the bottom portion of the webs of the girders is needed to determine actual capacity of these girders. With the bridge in-place, the strands embedded and not visible, and no documentation available, an accurate estimate to the capacity of the girders cannot be made.

On each end of the bridge, there is about 15 feet of level existing grade before the riprap slope of the canal begins to drop towards the channel. The span of the bridge is 80 feet, but the channel width at this location is only approximately 40 to 45 feet. Therefore the bridge can accommodate additional widening if necessary.

The midspan pier has five timber piles, all with a slight downstream lean. Two of the five timber piles are leaning significantly. The concrete pilecap is 18 inches wide by 19 inches depth. There are 3-1/2-inch deep gaps at the bottom of the pilecap at each of the five timber piles. Several areas of deteriorated and broken concrete exist adjacent to the interface of the timber piles and concrete pile cap. This is a concern since the size of the pile cap is insufficient to resist the shear loads from the pier reaction from bridge deck selfweight and heavy truck traffic.

Timber piles are approximately 9 inches in diameter. They appear to be in satisfactory shape, but they are leaning significantly. It appears that the displacement-style piles may not have been driven to a proper embedment depth, especially since the soil conditions are gravelly with large cobbles and boulders. Large forces from bridge deck selfweight and heavy truck traffic at the center pier will overstress the five timber piles. In addition, the out-of-plumbness of these piles is a great concern for the general stability and soundness of the bridge.

Each abutment is cast-in-place concrete. The concrete appears to be in excellent shape. The east abutment seems to have been experiencing some bank erosion. The surrounding soil at grade is fine-grained, and there has been washout and soil loss under the abutment. Enough soil loss has occurred to expose the tops of the piles at the abutment. There is no soil in contact with the bottom of the east abutment. It appears that the abutment is totally suspended and supported upon four timber piles, with no bearing of the abutment on the existing grade.

Flat timber planks make up a rudimentary wingwall system at each abutment. This retaining system does not hold back much earth, but is not rated for large surcharge loads from heavy truck traffic.

The existing structure and foundation exhibit potential long-term concerns regarding stability and performance. To avoid potential liability from any canal improvements, this structure is recommended to be replaced with a single span structure to avoid channel obstructions. Since this bridge serves as a private access, the need for a single or two traffic lanes can be debated.

Recommended replacement of this structure therefore does not impose any restrictions or limitations to any proposed or potential improvements to the St. Mary Canal.

Reid Ranch Access Bridge

Photo 2.1– Bridge Profile Midspan Pier w/ Timber Piles

Photo 2.2 – West Abutment

Photo 2.3– Midspan Pier w/ Timber Piles

Photo 2.4 – East Abutment

Photo 2.5 – Midspan Pier w/ Timber Piles

Photo 2.6 – Timber Piles at Concrete Pile Cap

Photo 2.7 – Bridge Profile (Looking North)

Photo 2.8 – Spalling Concrete at Midspan Pile Cap

Photo 2.9 - Bridge Deck (Looking East)

Photo 2.10 – East Abutment

POWELL BRIDGE a.k.a "MEMORIAL BRIDGE"

This canal crossing is on the gravel road which forks south off of the Camp Nine Road about 2 miles west of the St. Mary River bridge and a few hundred yards east of U.S. 89. The bridge is located at Section 26, T37N and R14W and at approximately Station 386+00 along the St. Mary Canal. The bridge serves as access to at least two farms and/or ranches. It was reported by Mr. William Powell, local resident, that the USBR and Glacier County worked cooperatively approximately 15 years ago to replace a former private crossing.

Ownership was substantiated in the last MDT inspection road report performed April 25, 2007 in which the bridge is reportedly owned and maintained by Glacier County. The report also states the bridge was placed (reconstructed) in 1992. A copy of the MDT inspection report (5 pages) is provided at the end of this section.

The bridge is a built-up member, riveted steel through truss bridge. Its style and construction suggests that may have been fabricated in the 1920s or 1930s. The MDT inspection report indicates an original construction date of 1928 for the structure. A name plate or ID stamp was not found on the bridge. The general appearance of the bridge is that it is in excellent condition. There is very little surface rust or paint loss on the structure. There were no areas of severe corrosion, scaling, or impact damage discovered on the structure.

The total length of the bridge structure is 90 feet, but the current span of the structure is approximately 76 feet. This is due to the lack of a true end bearing and that the truss is simply bearing on gravel fill. The distance between each truss center is 22'-6", and the clear distance between each railing provides the deck with 20'-6" of clear travel width.

The truss is short profile, less than 10 feet in total steel elevation. No connecting bracing exists between each truss at the top of the trusses. Single angle bracing, in a "V" pattern, inter-connects each truss below the deck.

Intuitively, the built-up steel members of each truss are sturdy, solid, and in excellent condition. Preliminary structural analysis shows that the bottom and top chords, diagonals, and diagonals of the steel trusses all experience reasonable stress levels when under heavy truck traffic. Below is a list of the main structural members of truss:

- Top chords and end diagonals are back-to-back 10-inch channels with a 3/8-inch by 16-inch cover plate and connecting lattice bar.

- Main diagonals are double channel, flanges facing inward with connecting lattice bars. The depths of the channels differ along the span of the truss. The two end bays have 8-inch and 7-inch deep channels, and the middle four bays have 6-inch deep channels.

- Vertical members are built-up sections of four L3x3 angles, placed in a 6-1/2-inch by 9-inch pattern, with connecting lattice bars.

- Bottom chord of the truss is a double 12-inch deep channel, flanges facing inward, with a 9-inch distance from web to web. The double channels do not have cover plates, but are connected with lattice bars.

- Gusset Plates (3/8" thick) are used to connect intersecting members at all panel points.

At 9-foot intervals and at the ends, the two trusses are connected by deep built-up steel stringers. Each steel stringer is a built-up plate girder, with riveted double angles as the top and bottom flanges. The overall depth of the stringers is approximately 26-1/2-inches deep. The web plate is 3/8-inch thick, and the four angles that make up the flanges are L5x5x3/8s. Preliminary calculations show these built-up stringers to have similar section properties of a rolled W24x94. The bottoms of the stringers are flush with the bottom surface of the bottom chord of the trusses.

The total depth of the steel truss is 9'-10" from the top surface of the top chord to the bottom surface of the bottom chord. The top of the timber deck to the bottom surface of the bottom chord is 3'-2".

At the southwest corner of the truss, there is a simple wiring assembly connected to the bridge. It was not confirmed, but this may be some sort of passive cathotic protection system.

At the deck level, large timber stringers span the 9 feet between the steel stringers. The timbers run parallel to the bridge span and perpendicular to the steel stringers. All timbers are about 7-1/2" x 7-1/2". There are a total of nine rows of timbers, with spacing varying between 33-inches and 38-inches on center. There is a double set of timbers beneath the running planks of the deck.

The timber deck planking runs perpendicular to the timber stringers. They are 4"x12" full cut timbers, placed flat and side-by-side with a small gap between each plank, and cover the entire surface of the deck. Upon these planks are two sets of running planks, for wheel travel and tire wear. Each set of running planks has three, 3"x12" full cut timbers, laid flat and side-by-side. There is a 2'-4" clear space between the sets of running planks.

As stated, there are no true abutments or support points at either end of the truss bridge. At each end of the bridge, a short retaining wall with no wingwalls is found about 12 feet from the end of each truss. The short retaining walls hold the back gravel fill that extends to the elevation of the bottom of the steel girders. The truss is simply laid upon the gravel fill, without the existence of any rockers, truss pins, or bearing connections to a concrete foundation.

Qualitatively, it appears this steel truss is capable of carrying heavy truck traffic. The original design loading as reported in the MDT inspection is AASHTO HS-20. The rugged construction of the truss bridge, its excellent condition, and the reduced span of the actual crossing versus actual truss length, indicate that the steel trusses should be satisfactory in carrying heavy truck traffic. Preliminary calculations show the existing timber stringer and deck system will require replacement or reinforcement to be rated for heavy truck traffic.

With respect to potential canal improvements, the canal could be widened slightly at this location with little effect to the integrity of the bridge crossing. The existing grade slopes approximately 3 to 1 (H:V) from the short retaining wall to the canal below. The canal channel width at the bottom is about 35 to 40 feet at the crossing. Greater widening could be accomplished by placing the structure on concrete, retaining wall abutments. Because the truss bridge is essentially self-contained, it can be easily picked and placed at a new location should a canal realignment warrant bridge relocation.

Powell Bridge a.k.a "Memorial Bridge"

Photo 3.1 – Bridge Profile (Looking SW)

Photo 3.2 – East Abutment

Photo 3.3– Steel Stringers & Timbers

Photo 3.4– Upstream Truss (Looking East)

Photo 3.5 – East Abutment

Photo 3.6 – Truss Bearing on Gravel

Photo 3.7 – Top Chord, Diagonal & Vertical Connection

Photo 3.8 – Bottom Chord, Diagonal & Timber Deck

Photo 3.9 – Timbers Bearing on Steel Stringer

Photo 3.10 – Top Chord, Diagonal & Vertical Connection

Photo 3.11 – Bridge Underside

Photo 3.12 – Unidentified Electrical Wiring

Montana Department of Transportation

INITIAL ASSESSMENT FORM FOR STRUCTURE :

L18225000+03001

Location : 5M N BABB Structure Name: Glacier County

General Location Data

District Code, Number, Location : **03 Dist 3 GREAT FALLS**
Division Code, Location : **32 HAVRE**
County Code, Location : **035 GLACIER**
City Code, Location : **00000 RURAL AREA**
Kind fo Hwy Code, Description : **4 4 County Hwy**
Signed Route Number : **18225**
Str Owner Code, Description : **2 County Highway Agency**
Maintained by Code, Description : **2 County Highway Agenc**
Intersecting Feature : **SAINT MARY CANAL 065**
Kilometer Post, Mile Post : **0.48 km 0.30**
Structure on the State Highway System : ☐ Latitude : **48°56'04"**
Structure on the National Highway System : ☐ Longitude : **113°24'25"**
Str Meet or Exceed NBIS Bridge Length : ☒

Construction Data

Construction Project Number : **227A**
Construction Station Number : **0+00.00**
Construction Drawing Number : **322**
Construction Year : **1928**
Reconstruction Year : **1992**

Traffic Data

Current ADT : **100** ADT Count Year : **2003** Percent Trucks : **3 %**

Structure Loading, Rating and Posting Data

Loading Data :

Design Loading :		5 MS 18 (HS 20)
Inventory Load, Design :	9.9 mton	2 AS Allowable Stress
Operating Load, Design :	17.2 mton	2 AS Allowable Stress
Posting :		5 At/Above Legal Loads

Rating Data :

	Operating	Inventory	Posting
Truck 1 Type 3 :	29	17	
Truck 2 Type 3-S3 :	32	19	
Truck 3 Type 3-3 :	40	23	

Structure, Roadway and Clearance Data

Structure Deck, Roadway and Span Data :

Structure Length : **27.90 m**
Deck Area : **182.00 m sq**
Deck Roadway Width : **6.24 m**
Approach Roadway Width : **6.00 m**
Median Code, Description : **0 No median**

Structure Vertical and Horizontal Clearance Data :

Vertical Clearance Over the Structure : **99.99 m**
Reference Feature for Vertical Clearance : **N Feature not hwy or RR**
Vertical Clearance Under the Structure : **0.00 m**
Reference Feature for Lateral Underclearance : **N Feature not hwy or RR**
Minimum Lateral Under Clearance Right : **0.00 m**
Minimum Lateral Under Clearance Left : **0.00 m**

Span Data

Main Span

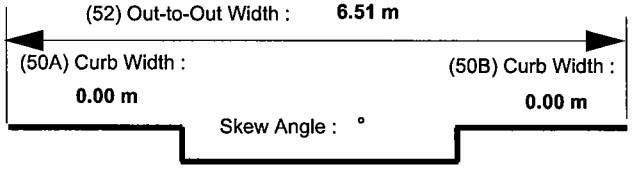
Number Spans : **1**
Material Type Code, Description : **3 Steel**
Span Design Code, Description : **10 Truss - Thru**

Deck

Deck Structure Type : **8 Wood or Timber**
Deck Surfacing Type : **0 None (no additional concrete thickness or wearing s**
Deck Protection Type : **0 None**
Deck Membrain Type : **0 None**

Approach Span

Number of Spans : **0**
Material Type Code, Description :
Span Design Code, Description :



Structure Vertical and Horizontal Clearance Data Inventory Route :

Over / Under Direction Name	Inventory Route	South, East or Bi-directional Travel			North or West Travel		
		Direction	Vertical	Horizontal	Direction	Vertical	Horizontal
Route On Structure	L18225	Both	99.99 m	6.00 m	N/A		

MEMORIAL BRIDGE
IHSP RPT

Montana Department of Transportation

INITIAL ASSESSMENT FORM FOR STRUCTURE :

L18225000+03001

Continue

Inspection Data

Sufficiency Rating : **48**
Health Index : **92.54**
Structure Status :**Func Obs - Elg Repl**

Inspection Due Date : 25 April 2009
(91) Inspection Fequency (months) : **24**
Next Fracture Critical Due Date : **25 Apr 2009**
Fracture Critical Detail : **Steel trusses**

NBI Inspection Data

(90) Date of Last Inspection : 25 April 2007
(90) Inspection Date :
Last Inspected By : William Lay - 63
Inspected By :

(58) Deck Rating :	6	(68) Deck Geometry :	5	(36C) Approach Rail Rating :	N	(62) Culvert Rating :	N
(59) Superstructure Rating :	6	(67) Structure Rating :	3	(36A) Bridge Rail Rating :	0	(61) Channel Rating :	8
(60) Substructure Rating :	5	(69) Under Clearance :	N	(36B) Transition Rating :	N	(71) Waterway Adequacy :	8
(72) App Rdwy Align :	6	(41) Posting Status :	A	(36D) End Rail Rating :	0	(113) Scour Critical :	U

Unrepaired Spalls : 0 m sq
Deck Surfacing Depth : 0.00 in

Inspection Hours

Crew Hours for inspection : 3.5
Helper Hours : 0
Special Crew Hours : 2
Special Equipment Hours : 0

Snooper Required : N
Snooper Hours for inspection : 0
Flagger Hours : 0

Inspection Work Candidates		Status	Priority	Effected Structure Unit	Scope of Work	Action	Covered Condition States
Candidate ID	Date Requested						
D31-FY2005-000239	22 June 2005	Not Approved	High	M Main	215 R/Conc Abutment	Rehab Elem	
Clean the approach fill away from the ends of the truss and bearings. Build backwall/wingwalls to keep material off of the first floorbeam and bearings.							

Montana Department of Transportation

INITIAL ASSESSMENT FORM FOR STRUCTURE :

L18225000+03001

Continue

Element Inspection Data

********** Span : **Main-0** - **********

Element Description

Smart Flag	Scale Factor	Env	Quantity	Units	Insp Each	Pct Stat 1	Pct Stat 2	Pct Stat 3	Pct Stat 4	Pct Stat 5
Element 31 - Timber Deck										
	1	1	182	sq m	X	0	100	0	0	
						%	%	%	%	%

Previous Inspection Notes :

04/25/2007 - (1) plank on the East side near mid-span is crushed under the running plank and pulled up on its ends. Running plank show rot section loss, weathering, and some crushing. Deck planks show weathering and some minor wear. ZZDZ
04/07/2005 - Same with a couple of spikes pulling loose on the transverse decking. Some areas of rot in the longitudinal running planks. PZDZ
04/10/2003 - Minor checking in most of the transverse decking. Running plank show some wear and scraping. OZHK
04/24/2001 - 27.90 * 6.51 = 181.63 DEJT
Some weathering, wear, and splits/checks, minor in severity. 0.10m x 0.295m(width) running planks.
05/12/1999 - Checked AGGQ
09/04/1996 - QWTJ

Inspection Notes:

Smart Flag	Scale Factor	Env	Quantity	Units	Insp Each	Pct Stat 1	Pct Stat 2	Pct Stat 3	Pct Stat 4	Pct Stat 5
Element 117 - Timber Stringer										
	1	1	251	m		90	10	0	0	
						%	%	%	%	%

Previous Inspection Notes :

04/25/2007 - Some check now in the moderate size, but still all of them are one-sided. ZZDZ
04/07/2005 - Minor drying checks in all of the stringers. PZDZ
04/10/2003 - Unchanged from previous report. OZHK
04/24/2001 - 9 * 27.90 = 251.10m - 0.195m x 0.195m untreated stringers. Doubled up under the running planks. DEJT
Some minor splits & checks.
05/12/1999 - Checked AGGQ

Inspection Notes:

Smart Flag	Scale Factor	Env	Quantity	Units	Insp Each	Pct Stat 1	Pct Stat 2	Pct Stat 3	Pct Stat 4	Pct Stat 5
Element 121 - P/Stl Thru Truss/Bot										
	1	1	56	m2		80	15	5	0	0
						%	%	%	%	%

Previous Inspection Notes :

04/25/2007 - No change from previous report. ZZDZ
04/07/2005 - Same as previous reports and add that the ends of the bottom chords are buried in the approach fills. PZDZ
04/10/2003 - Some rusty spots and small areas of peeling paint, mostly near connections. Some thin spots in paint where you can see some ghosting of prime coat. OZHK
04/24/2001 - 27.90 * 2 = 55.80m DEJT
Some rust and scale with chalky paint throughout, minor in nature.
05/12/1999 - Rust, scale, and dented flange on bent #1 AGGQ
09/04/1996 - QWTJ

Inspection Notes:

INITIAL ASSESSMENT FORM FOR STRUCTURE :

L18225000+03001

Continue

********** Span : **Main-0 - (cont.)** **********

Element Description

Smart Flag	Scale Factor	Env	Quantity	Units	Insp Each	Pct Stat 1	Pct Stat 2	Pct Stat 3	Pct Stat 4	Pct Stat 5
Element 126 - P/Stl Thru Truss/Top										
	1	1	56	m		80	10	10	0	0
						%	%	%	%	%

Previous Inspection Notes :

04/25/2007 - No change from previous report. ZZDZ
04/07/2005 - Same on the paint. Ends of the top chord to bottom chord connections are buried in the fills. PZDZ
04/10/2003 - Minor areas of rust and scale. Some paint peel. Some ghosting of prime coat visible. OZHK
04/24/2001 - 27.90 * 2 = 55.80m DEJT
Some rust, scale, and chaulky paint throughout, minor in severity.
05/12/1999 - None AGGQ
09/04/1996 - QWTJ

Inspection Notes:

Element 152 - Paint Stl Floor Beam

Smart Flag	Scale Factor	Env	Quantity	Units	Insp Each	Pct Stat 1	Pct Stat 2	Pct Stat 3	Pct Stat 4	Pct Stat 5
	1	1	72	m		70	20	10	0	0
						%	%	%	%	%

Previous Inspection Notes :

04/25/2007 - No change from previous report. ZZDZ
04/07/2005 - Rust, scale, and chaulky paint. Minor damage on the top flanges and not a problem. PZDZ
04/10/2003 - Unchanged from previous inspection. OZHK
04/24/2001 - 11 * 6.51 = 71.61m DEJT
Some rust, scale, and chaulky paint throughout, mostly minor. Some paint loss / peeling. Some damage to the top flange of several of the floor beams.
05/12/1999 - None AGGQ
09/04/1996 - QWTJ

Inspection Notes:

Element 334 - Metal Rail Coated Lattice Panel Rail Mounted to the Truss

Smart Flag	Scale Factor	Env	Quantity	Units	Insp Each	Pct Stat 1	Pct Stat 2	Pct Stat 3	Pct Stat 4	Pct Stat 5
	1	1	56	m		70	20	10	0	0
						%	%	%	%	%

Previous Inspection Notes :

04/25/2007 - No new damage or paint loss since the last inspection. ZZDZ
04/07/2005 - Same as previous report. Right side at Abutment 1 has a fresh hit and in bent in the lattice panel. PZDZ
04/10/2003 - Minor scrapes and dings. Some paint peel and rust throughout. OZHK
04/24/2001 - 27.90 * 2 = 55.80m DEJT
Same as last report and also some damage from wider loads, rest is minor in severity.
05/12/1999 - Rust, scale, and flaked paint. AGGQ
09/04/1996 - QWTJ

Inspection Notes:

General Inspection Notes

04/25/2007 - No change from previous comments Dropped Eleemnt 215, R/C Abutment as not able to see/inspect FC showed no additional comments other than previously reported in the other (2) inspections	ZZDZ
04/07/2005 - Unsure of builder, but steel is from Illinois Steel No markers at the structure. Pipe gates mounted near the 1st vertical back from Abutment 2 Probably should add (2) fixed and (2) moveable bearings, but they are buried and the truss is bound up with no movement possible	PZDZ
04/10/2003 - No markers on structure NBI 58, deck rated at a "7" as no rot or section loss observed today Top of a bearing is just visible on the right side of Abutment 1. Bearing areas are buried with pit run gravel road material. Do not know if bearing devices are being used or how abutments are constructed.	OZHK
04/24/2001 - No markers. Unable to see or determine if the truss has any bearing devices, the ends of the truss are buried in pit run fill material.	DEJT
05/12/1999 - None	AGGQ
09/04/1996 - OPS$A024 inspection comments - Structure L18225000+03001 - Date 9/4/96 - Previous comments > Sufficiency Rating Calculation Accepted by ops$u5963 at 3/10/97 15:01:01 Sufficiency Rating Calculation Accepted by ops$u9004 at 2/19/97 14:18:19	QWTJ
05/01/1994 - Sufficiency Rating Calculation Accepted by ops$u5963 at 3/10/97 15:01:01 Sufficiency Rating Calculation Accepted by ops$u9004 at 2/19/97 14:18:19	UOTS
11/01/1991 - Updated with tape 1994	NB94
01/01/1990 - Updated with tape 1992	NB92

DEWOLFE RANCH ACCESS BRIDGE

This canal crossing is adjacent to the canal maintenance road, about 4 miles east of the St. Mary River Bridge and slightly east of Spider Lake. The location is Section 21, T37N, R13W and at approximately Station 667+85 along the St. Mary Canal. The history of this canal crossing is not known and the structure is assumed to be privately-owned. To our knowledge previous inspections were not performed on this structure.

An old damaged railroad TOFC (trailer on flat car) car has been used as the superstructure for this canal crossing. The trucks and coupler boxes have been removed from the car. The structure lacks a definitive point of bearing and the car is merely buried into the ground at the approaches to the crossing. A small timber breast wall exists in front of the bearing area of each end of the railcar to provide retaining for the supporting soil. The overall length of the railcar is 90 feet, but the current clear span is about 76 feet.

All structures and appurtenances on top of the railcar have been stripped to allow for travel over the crossing. There are two sets of two small steel channels that are found at the bottom of the railroad deck. The railroad deck is filled with dirt to create a driving surface.

The structural make-up of the railroad car is of a main steel girder running along the centerline of the car, with two small tube steel beams on each side of the center girder also running the length of the railroad car. Stiffening brackets spaced at 36-inch centers are connected to the center girder and support the free edge of the deck and the tube steel beams. On the upstream side of the crossing, most of the brackets have been damaged and offer little or no support. The upstream edge of the deck is also severely damaged in this area.

The main steel girder is a double web built-up section with a depth of about 22 inches and a bottom flange of 1” x 30” plate. The thickness of the web members of this girder cannot be determined.

The railroad car has noticeable sag at midspan without any live load on the deck. As a person walks across the span, there are large noticeable vibrations and bouncing effects are produced.

The crossing does not have a safe railing system. There is a single 2-1/2-inch diameter pipe for a railing that is welded to intermediate supports to the deck. The supports are fabricated with steel channel and plate welded to the deck at 9’-4” centers. This pipe is insufficient for a railing and some of the welds connecting the pipe to its supports are broken. The railcar is narrow in profile and does not provide a safe crossing width. The overall deck width is 9’-0” and the railing system reduces the travel width to only 8’-0”.

The crossing is extremely underdesigned for heavy truck traffic, considering both bridge sag and crossing width. Light duty trucks will cause extreme deflections, bounce, and sag during crossing, and the limited deck width is a definite safety issue. It is recommended that this crossing be replaced with an adequately designed single span, single lane structure.

Dewolfe Ranch Access Bridge

Photo 4.1 – Bridge Profile (Looking NE)

Photo 4.2 – Damaged Steel Stiffeners on Underside

Photo 4.3– Bridge Crossing

Photo 4.4 – West Abutment

Photo 4.5 – West Abutment

Photo 4.6 – Railing Connection

Photo 4.7 – East End of Bridge

Photo 4.8 – Transition of Steel Cross Section Near Bearing

MARTIN BRIDGE a.k.a WHISKEY GAP COUNTY ROAD BRIDGE

This bridge crosses the canal for Whiskey Gap Road, a few miles south of the U.S.-Canada border. The specific location is Section 20, T37N, R12W and at approximately Station 987+65 of the St. Mary Canal. The bridge is owned and maintained by Glacier County.

The bridge was designed by MDT and constructed in 1991. This bridge and the Emigrant Gap Bridge (next section) downstream on the canal were designed and constructed concurrently as a single project. The bridge is in excellent condition as evident by the recent MDT inspection performed April 20, 2004. The bridge is on an inspection frequency of 48 months. The structure is owned and maintained by Glacier County. The latest inspection report (4 pages) and the construction drawings (6 sheets) are provided at the end of this section.

The bridge is a single span crossing with precast, prestressed concrete girders. The deck length is about 83 feet. The actual bearing of the prestressed concrete girders is about 80 feet. The bridge has a straight geometry and is perpendicular to the canal.

The primary superstructure of the bridge consists of four precast, prestressed bulb-tee concrete girders. Each girder is approximately 6'-8" wide, for a total deck width of 26'-8". The railing system provides a clear travel width of 24'-0". The overall depth of the precast girders is about 36 inches, with a 6-inch thick integral slab. The bottom bulbs of the girders are approximately 6 inches deep x 24 inches wide.

At quarter-points of the girders, diaphragms are situated and consist of bolted steel channels (C10s). These C10 diaphragms are bolted to steel plate tabs that are embedded within the concrete bulb-tee girders. Each C10 diaphragm is coated with spray-on galvanized coating.

The bridge has DOT-style standard guardrails and posts consisting of W6x20 posts at 8'-4" o.c with 6x6 timber spacers and neoprene pads beneath base plates. The rails are connected to the posts with three 5/8-inch diameter bolts. The posts are connected through the concrete slab with four 3/4-inch bolts. Each post has a 3/4-inch thick base plate and a thin neoprene pad. Along both approaches, the DOT guardrails are supported by 6x8 timber posts with 6x8 timber spacers.

Each end of the span has a cast-in-place abutment. Each abutment has a 6-inch deep x 7-inch wide slab shelf. The bearing seat width of each abutment breast wall is 20 inches. Each prestressed concrete bulb-tee girder bears upon two steel plates (1-inch and 1-1/2-inch thick) that are 5 inches by 36 inches. Two 1-1/4-inch embedded threaded rods anchor the bearing plates to the concrete breastwall.

There is a surveying benchmark/hub located on the northeast wingwall (SMC-51).

About twenty feet from each bridge abutment, the surrounding grade drops to the canal channel at about a 2 to 1 to 3 to 1 slope. Due to this gentle slope and the solid construction of the bridge, the opportunity exists to widen or deepen the canal if required. Maintaining and incorporating this crossing into the overall canal rehabilitation program should be considered.

Martin Bridge a.k.a. Whiskey Gap County Road Bridge

Photo 5.1– Bridge Profile (Looking East)

Photo 5.2 – C10 Diaphragm

Photo 5.3 – Precast Girder & Abutment

Photo 5.4 – Precast Girder & Abutment

Photo 5.5 – Canal (Looking East)

Photo 5.6 – Bridge Crossing (Looking South)

Photo 5.7 – North Abutment

Photo 5.8 – Exposed Timber Pile at South Abutment

Photo 5.9 – Looking South

Photo 5.10 – South Abutment (Exposed Timber Piles)

Montana Department of Transportation

INITIAL ASSESSMENT FORM FOR STRUCTURE :

L18231007+02001

Location : 18M NE BABB Structure Name: Glacier County

General Location Data

District Code, Number, Location : **03** **Dist 3** **GREAT FALLS**
Division Code, Location : **32** **HAVRE**
County Code, Location : **035** **GLACIER**
City Code, Location : **00000** **RURAL AREA**
Kind fo Hwy Code, Description : **4** **4 County Hwy**
Signed Route Number : **18231**
Str Owner Code, Description : **2** **County Highway Agency**
Maintained by Code, Description : **2** **County Highway Agenc**
Intersecting Feature : **IRRIGATION CANAL 045**
Kilometer Post, Mile Post : **78.05 km** **48.50**
Structure on the State Highway System : ☐ Latitude : **48°57'03"**
Structure on the National Highway System : ☐ Longitude : **113°12'36"**
Str Meet or Exceed NBIS Bridge Length : ☒

Traffic Data

Current ADT : **100** ADT Count Year : **2000** Percent Trucks : **3 %**

Construction Data

Construction Project Number : **BR 9018(4)**
Construction Station Number : **15+20.00**
Construction Drawing Number : **14749**
Construction Year : **1991**
Reconstruction Year :

Structure Loading, Rating and Posting Data

Loading Data :

Design Loading :		**5 MS 18 (HS 20)**
Inventory Load, Design :	**32.4 mton**	**2 AS Allowable Stress**
Operating Load, Design :	**32.4 mton**	**2 AS Allowable Stress**
Posting :		**5 At/Above Legal Loads**

Rating Data :

	Operating	Inventory	Posting
Truck 1 Type 3 :			
Truck 2 Type 3-S3 :			
Truck 3 Type 3-3 :	40		

Structure, Roadway and Clearance Data

Structure Deck, Roadway and Span Data :

Structure Length : **24.99 m**
Deck Area : **201.00 m sq**
Deck Roadway Width : **7.32 m**
Approach Roadway Width : **6.49 m**
Median Code, Description : **0 No median**

Structure Vertical and Horizontal Clearance Data :

Vertical Clearance Over the Structure : **99.99 m**
Reference Feature for Vertical Clearance : **N Feature not hwy or RR**
Vertical Clearance Under the Structure : **0.00 m**
Reference Feature for Lateral Underclearance : **N Feature not hwy or RR**
Minimum Lateral Under Clearance Right : **0.00 m**
Minimum Lateral Under Clearance Left : **0.00 m**

Span Data

Main Span

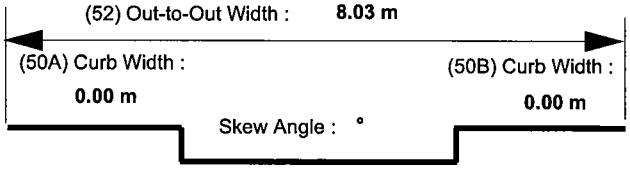
Number Spans : **1**
Material Type Code, Description : **5 Prestressed concrete**
Span Design Code, Description : **4 Tee Beam**

Approach Span

Number of Spans : **0**
Material Type Code, Description :
Span Design Code, Description :

Deck

Deck Structure Type : **N Not applicable**
Deck Surfacing Type : **0 None (no additional concrete thickness or wearing s**
Deck Protection Type : **0 None**
Deck Membrain Type : **0 None**



Structure Vertical and Horizontal Clearance Data Inventory Route :

Over / Under Direction Name	Inventory Route	South, East or Bi-directional Travel			North or West Travel		
		Direction	Vertical	Horizontal	Direction	Vertical	Horizontal
Route On Structure	L18231	Both	99.99 m	7.32 m	N/A		

WHISKEY GAP ROAD
INSP. RPT

INITIAL ASSESSMENT FORM FOR STRUCTURE :

L18231007+02001

Continue

Inspection Data

Sufficiency Rating : **99.7**
Health Index : **98.6**
Structure Status :**Not Deficient**

Inspection Due Date : 20 April 2008
(91) Inspection Fequency (months) : **48**

NBI Inspection Data

(90) Date of Last Inspection : 20 April 2004
(90) Inspection Date :
Last Inspected By : Charles Pepos - 107
Inspected By :

(58) Deck Rating :	8	(68) Deck Geometry :	6	(36C) Approach Rail Rating :	1	(62) Culvert Rating :	N
(59) Superstructure Rating :	8	(67) Structure Rating :	7	(36A) Bridge Rail Rating :	1	(61) Channel Rating :	8
(60) Substructure Rating :	7	(69) Under Clearance :	N	(36B) Transition Rating :	N	(71) Waterway Adequacy :	8
(72) App Rdwy Align :	8	(41) Posting Status :	A	(36D) End Rail Rating :	0	(113) Scour Critical :	U

Unrepaired Spalls : 0 m sq
Deck Surfacing Depth : 0.00 in

Inspection Hours

Crew Hours for inspection : 1.5
Helper Hours : 0
Special Crew Hours : 0
Special Equipment Hours : 0

Snooper Required : N
Snooper Hours for inspection : 0
Flagger Hours : 0

Inspection Work Candidates

Candidate ID	Date Requested	Status	Priority	Effected Structure Unit	Scope of Work	Action	Covered Condition States
D31-FY2004-000422	12 May 2004	Not Approved	low	M Main	215 R/Conc Abutment	Min Repair	
Repair the erosion problem at Abutment 1.							
D31-FY2004-000423	12 May 2004	Not Approved	Medium	M Main	Bridge	Spot Paint (flex)	
Spot paint as needed.							

INITIAL ASSESSMENT FORM FOR STRUCTURE :

L18231007+02001

Continue

Element Inspection Data

********** Span : **Main-0** - **********

Element Description

Smart Flag	Scale Factor	Env	Quantity	Units	Insp Each	Pct Stat 1	Pct Stat 2	Pct Stat 3	Pct Stat 4	Pct Stat 5
Element 109 - P/S Conc Open Girder										
	1	1	100	m		100	0	0	0	
						%	%	%	%	%

Previous Inspection Notes :

04/20/2004 - 4 * 24.99 = 99.96m. Some minor leakage between the joints of the Tee Beams. VMEC
05/08/2000 - None LELX
05/13/1999 - - FCKJ

Inspection Notes:

Smart Flag	Scale Factor	Env	Quantity	Units	Insp Each	Pct Stat 1	Pct Stat 2	Pct Stat 3	Pct Stat 4	Pct Stat 5
Element 181 - Pnt Vrt X-Frame										
	1	1	24	m		95	5	0	0	0
						%	%	%	%	%

Previous Inspection Notes :

04/20/2004 - 8.03 * 3 = 24.09m. Spot rust throughout, worse near the connections. VMEC

Inspection Notes:

Smart Flag	Scale Factor	Env	Quantity	Units	Insp Each	Pct Stat 1	Pct Stat 2	Pct Stat 3	Pct Stat 4	Pct Stat 5
Element 215 - R/Conc Abutment										
	1	1	22	m		90	10	0	0	
						%	%	%	%	%

Previous Inspection Notes :

04/20/2004 - (8.03 * 2) + (11.40 * 4) = 21.69m. Erosion at Abutment 1 is worse. Some animals are borrowing under the Abutment cap. Minor shrinkage cracks on the backwalls between the girders. Abutment cap to backwall joint is leaking at both Abutments; see photo. VMEC
05/08/2000 - South abutment (#1) has major erosion under the cap with exposed piling. LELX
05/13/1999 - - FCKJ

Inspection Notes:

Smart Flag	Scale Factor	Env	Quantity	Units	Insp Each	Pct Stat 1	Pct Stat 2	Pct Stat 3	Pct Stat 4	Pct Stat 5
Element 228 - Timb Submerged Pile										
	1	3	8	ea		100	0	0	0	
						%	%	%	%	%

Previous Inspection Notes :

04/20/2004 - Two treated timber pile under each Tee Beam. Top 1' is visible under the Abutment cap due to the erosion. VMEC
05/08/2000 - Exposed by the erosion at Abutment #1. LELX

Inspection Notes:

INITIAL ASSESSMENT FORM FOR STRUCTURE :

L18231007+02001

Continue

********** Span : **Main-0 - (cont.)** **********

Element Description

Smart Flag	Scale Factor	Env	Quantity	Units	Insp Each	Pct Stat 1	Pct Stat 2	Pct Stat 3	Pct Stat 4	Pct Stat 5
Element 313 - Fixed Bearing										
	1	1	8	ea		95	5	0		
						%	%	%	%	%

Previous Inspection Notes :

04/20/2004 - Minor spot rust on the exposed area of the bearings. VMEG
05/08/2000 - Minor rust. LELX

Inspection Notes:

Element 334 - Metal Rail Coated T-101

Smart Flag	Scale Factor	Env	Quantity	Units	Insp Each	Pct Stat 1	Pct Stat 2	Pct Stat 3	Pct Stat 4	Pct Stat 5
	1	1	56	m		90	10	0	0	0
						%	%	%	%	%

Previous Inspection Notes :

04/20/2004 - (24.99 * 2) + (1.40 * 4) = 55.58m. Total includes the T-101 on the U-Abutments. Rust spots on the box beam and rail posts. Areas of prime coat visible on the back side of the box beam. VMEG
05/08/2000 - None. LELX
05/13/1999 - FGKJ

Inspection Notes:

General Inspection Notes

04/20/2004 - NBI 36D, end section rated at a "0" due to south end section not being up to standards. North rail ends wrap around in a homemade IRT. VMEG
05/08/2000 - None. LELX
05/13/1999 - None. FGKJ
05/01/1994 - Sufficiency Rating Calculation Accepted by ops$u5963 at 3/10/97 15:01:02 Sufficiency Rating Calculation Accepted by ops$u9004 at 2/19/97 14:18:20 UOTS
01/01/1992 - Updated with tape 1994. NB94
08/01/1991 - Updated with tape 1992. NB92

FED. ROAD DIV. NO.	STATE	FED. AID PROJ. NO.	SHEET NO.
8	MONT.	BR 9018(4)	B1

STATE OF MONTANA
DEPARTMENT OF HIGHWAYS

BRIDGE PLANS & QUANTITIES

FEDERAL AID PROJECT NO. BR 9018(4) P.E. & CONST.

BRIDGES OVER ST. MARY'S CANAL - N.E. BABB

GLACIER COUNTY

LIST OF DRAWINGS

SHEET NO.	DWG. NO.	TITLE
B2	14749	GENERAL LAYOUT AT STA. 15+20.00
B3	14750	FOOTING PLAN
B4	14751	BENTS NO. 1 & NO. 2
B5	14752	ERECTION PLAN AND MISC. DETAILS
B6	14753	BEAM AND SHOE DETAILS

SHEET NO.	DWG. NO.	TITLE
B7	14754	GENERAL LAYOUT AT STA. 17+60.50
B8	14755	FOOTING PLAN
B9	14756	BENTS NO. 1 & NO. 2
B10	14757	ERECTION PLAN AND MISC. DETAILS
B11	14758	WINGWALL DETAILS
B12	14759	BEAM AND SHOE DETAILS
B13	SBR-T101 (REV. 2-6-90)	STANDARD BRIDGE RAIL - TYPE T101

ESTIMATED BRIDGE PLAN QUANTITIES

STRUCTURE	LOCATION	LENGTH IN FEET	STRUCTURE EXCAVATION TYPE I (CU. YDS.)	CLASS "AD" CONCRETE (CU. YDS.)	PRESTRESSED BEAM - BULB-T (LN.FT.)	STRUCTURAL STEEL (LUMP SUM)	14"Ø TREATED TIMBER PILES (LIN.FT.) FURNISH	14"Ø TREATED TIMBER PILES (LIN.FT.) DRIVE	14"Ø TREATED TIMBER TEST PILES (L. SUM)	REINFORCING STEEL (LBS.)	BRIDGE RAIL - T101 (LIN. FT.)	BRIDGE SURVEY (L. SUM)	TRAFFIC CONTROL (UNITS)
STRUCTURE @ STA. 15+20.0	BENT NO. 1		~~15~~ 13.1	17.8		.49	~~175~~ 171.2	~~168~~ 164.2	.50	1037		.50	420
	BENT NO. 2		~~15~~ 13.1	17.7			~~175~~ 171.1	~~168~~ 164.1		1040			
	SUPERSTRUCTURE	80			320						200		
	SUBTOTAL	80	~~30~~ 26.2	35.5	320	.49 $1,470	~~350~~ 342.3	~~336~~ 328.3	.50 $4,000	2077	200	.50 $3,000	420
STRUCTURE @ STA. 17+60.5	BENT NO. 1		~~15~~ 14.5	19.2		.51	~~175~~ 187.8	~~168~~ 180.8	.50	1235		.50	420
	BENT NO. 2		~~15~~ 14.5	19.2			~~175~~ 191.5	~~168~~ 184.5		1238			
	SUPERSTRUCTURE	80			320						~~216.7~~ 216.67		
	SUBTOTAL	80	~~30~~ 29.0	38.4	320	.51 $1,530	~~350~~ 379.3	~~336~~ 365.3	.50 $4,000	2473	~~216.7~~ 216.67	.50 $3,000	420
	TOTAL	160	~~60~~ 55.2	73.9	640	1.0 $3,000	~~700~~ 721.6	~~672~~ 693.6	1.0 $8,000	4550	~~416.7~~ 416.67	1.0 $6,000	840

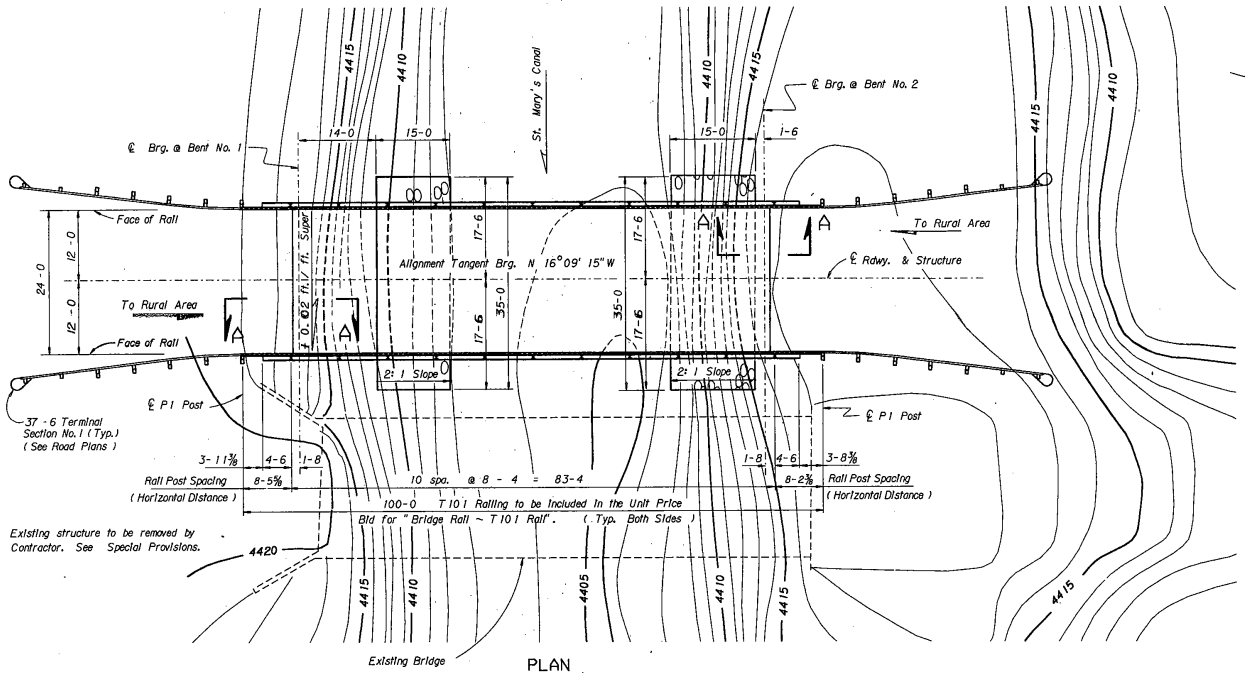
PREPARED BY L.R.T. 8-1-90   CHECKED BY T.L.B.

MONTANA CADD BRMJM 03-APR-1992 11:59 ZF2:[C60005] 10860SHT.BRG;1

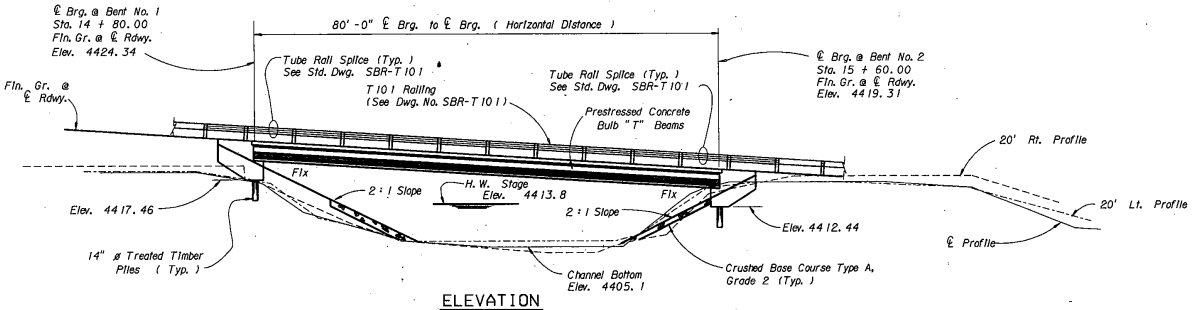
DRAWING NO. 147490

[60,5] 10860SHT.BRG

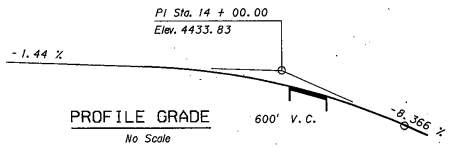
FED. ROAD DIV. NO.	STATE	FED. AID PROJ. NO.	SHEET NO.
8	MONT.	BR 9018 (4)	B2



PLAN



ELEVATION



PROFILE GRADE

No Scale

NOTES

FINISHED GRADE: Finished grade of bridge at centerline roadway is the same as Profile Grade shown on Road Plans.

LIVE LOAD: Standard HS20-44 loading.

SPECIFICATIONS: Montana Department of Highways and the Montana Highway Commission Standard Specifications for Road and Bridge Construction, 1987 Edition, and any amendments thereto, and Special Provisions shall govern unless otherwise noted. Design prepared in accordance with A. A. S. H. T. O. Specifications, 1989 Edition, and any amendments thereto.

STRUCTURAL STEEL: All structural steel shall be measured and paid for on the lump sum basis as set forth in the Standard Specifications. Estimated weight: 1846 lbs.

REINFORCING STEEL: All reinforcing steel shall be of the deformed type and shall meet the requirements of A. S. T. M. Specification A615, Grade 60 (A. A. S. H. T. O. M-31).

CAST IN PLACE CONCRETE: Unless otherwise approved, all cast-in-place concrete shall be Class "AD".

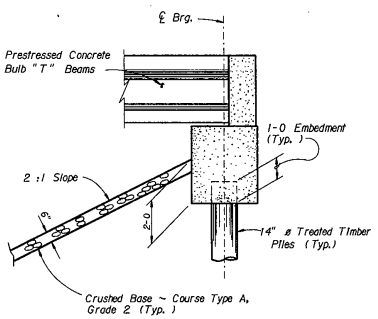
STRUCTURE EXCAVATION: See "Special Provisions".

TRAFFIC CONTROL PLAN AND SEQUENCE OF OPERATIONS: See Special Provisions.

UTILITIES: For location of utilities, see the appropriate Road Plans sheet.

STREAM DATA

Drift	None
Scour	Light
Ice	None
Design Flow	950 c. f. s.
Design High Water	4413.8
Design Velocity	2.4 f. p. s.



SECTION A-A

Scale: 3/8" = 1'-0"

Class of Concrete	Minimum Req'd. Cylinder Strength to achieve a 1.0 Pay Factor (p. s. i.)	Strength for Design Purposes (p. s. i.)
"AD"	3400	3000

DESIGNED	11-1-88	LT/DC
DRAWN	9-8-88	D. W. C.
CHECKED	7-23-90	T. L. B.
APPROVED	8-9-90	J. C. H.
REVISED		
REVISED		

STATE OF MONTANA
DEPARTMENT OF HIGHWAYS

BRIDGE OVER ST. MARY'S CANAL

AT STA. 15 + 20.00

FEDERAL AID PROJECT NO. BR 9018 (4)

GLACIER COUNTY

GENERAL LAYOUT

Scale: 1" = 10'-0" except as noted

DRAWING NO. 14749

10-AUG-1990 10:11 BRAUM MONTANA CADD [60,5]1086genl.brg

[60,5]1086GENL.BRG

FED. ROAD DIV. NO.	STATE	FED. AID PROJ. NO.	SHEET NO.
8	MONT.	BR 9018(4)	83

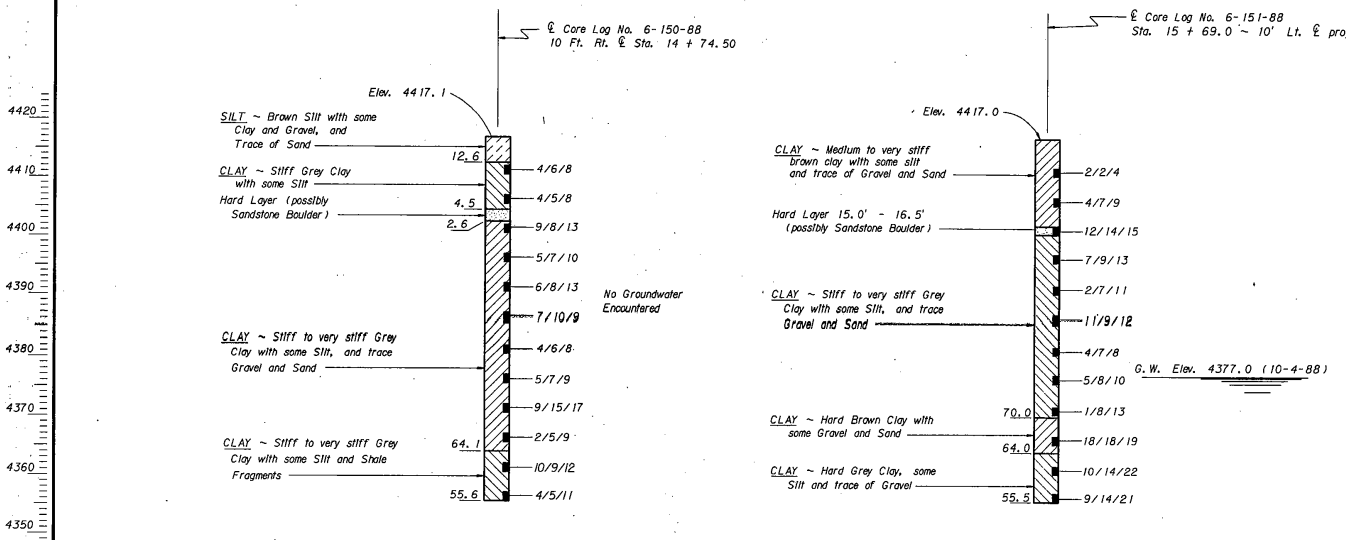
NOTES:

SOILS AND FOUNDATION MATERIALS: Borings were taken by the State of Montana, Department of Highways at the points shown on the Footing Plan.

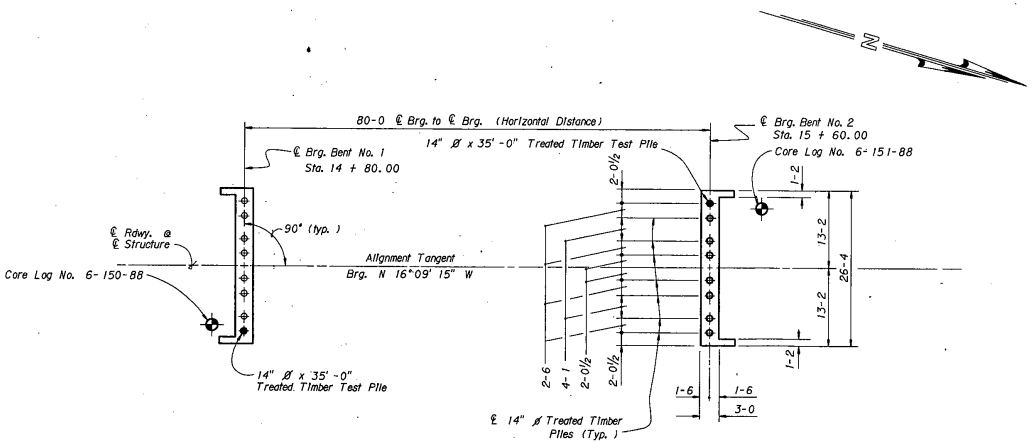
The series of numbers shown on the Log of Borings indicates the number of blows per 6" penetration for each number of the series of a 2" sample tube which was driven in accordance with the Standard Penetration Test made with a 2" split tube sampler using a 140 pound hammer having a 30" drop. The total penetration of the Sampler-Tube is indicated on the Core Logs after each series if 6" penetration was not achieved in 50 blows.

The State of Montana, Department of Highways does not assume any responsibility for any variation or misinterpretation of the classes of materials and adjustments will not be made if the materials found do not agree with those shown on the Log of Borings.

FOUNDATION PILES: For bidding purposes only, pile lengths have been estimated as shown on the bent drawing.



LOG OF BORINGS



FOOTING PLAN

NOTE: Dimensions shown for Bent No. 2 are typical for Bent No. 1.

DESIGNED	11-1-88	L.R.T.
DRAWN	9-8-88	L.R.T.
CHECKED	7-23-90	T.L.B.
REVISED		
REVISED		
REVISED		

STATE OF MONTANA
DEPARTMENT OF HIGHWAYS

BRIDGE OVER ST. MARY'S CANAL

AT STA. 15 + 20.00

FEDERAL AID PROJECT NO. BR 9018 (4)

GLACIER COUNTY

FOOTING PLAN

Scale: 1" = 10'-0" except as noted

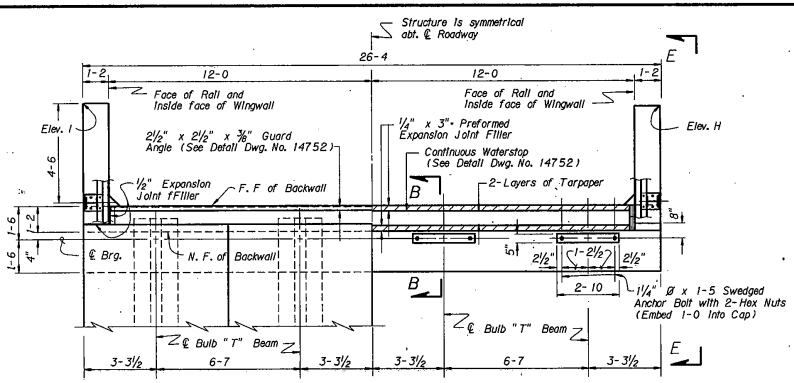
DRAWING NO. 14750

[60, 51086FTPL.BRG

10-AUG-1990 10:12 BRUM

MONTANA CADD [60,51086ftpl.brg

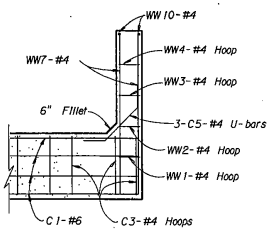
FED. ROAD DIV. NO.	STATE	FED. AID PROJ. NO.	SHEET NO.
8	MONT.	BR 9018(4)	B4



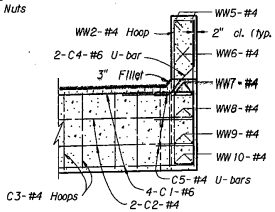
PLAN

NOTE: All concrete in the cap and backwall shall be Class "AD" Concrete

NOTE: For shoe details see Dwg. No. 14753



SECTION D-D



SECTION C-C

TABLE OF ELEVATIONS		
Elev.	Bent No. 1	Bent No. 2
A	4424.34	4419.31
B	4424.60	4419.57
C	4424.08	4419.05
D	4420.96	4415.92
E	4421.48	4416.45
F	4417.21	4412.17
G	4417.73	4412.70
H	4424.96	4419.16
I	4424.44	4418.63

NOTE: Lap all #4 bars 1-4 min.

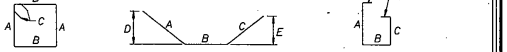
NOTE: N. F. denoted near face. F. F. denoted fill face.

NOTE: For Rail Post anchorage see Std. Dwg. SBR-T101.

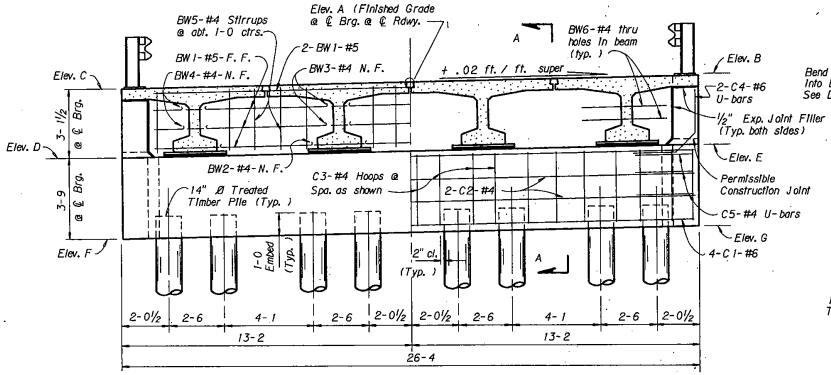
NOTE: The cost of furnishing and placing expansion joint filler, tarpaper and waterstop to be included in the unit price bid for Class "AD" Concrete.

NOTE: Expansion joint filler to be securely nailed to concrete and held in accurate position while placing concrete.

BILL OF REINFORCING STEEL (One Bent Only)

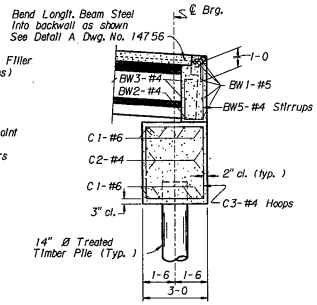


STRAIGHT BARS				BENT BARS (All dimensions are out to out.)									
Mark	Size	No.	Length	Mark	Size	No.	Type	Length	A	B	C	D	E
BACKWALL STEEL - ONE BENT ONLY													
BW1	#5	5	23'-8"	BW5	#4	15	3	6'-2"	2'-9"	0'-10"	1'-9"	0'-5"	
BW2	4	3	4-3										
BW3	4	6	5-9										
BW4	4	4	1-6										
BW6	4	8	4-0										
C1	6	8	26-0	C3	4	22	1	12-10	3-4	2-8	0-5		
C2	4	4	26-0	C4	6	4	2	5-0	1-9	1-6	1-9	1-3	1'-3"
				C5	4	6	2	4-0	1-0	2-0	1-0	0-8½	0-8½
WINGWALL STEEL FOR BENT NO. 2 ONLY (VIEW E-E)													
WW5	4	4	5-3	WW1	4	2	1	14-2	5-11	0-10	0-5		
WW6	4	8	5-6	WW2	4	2	1	15-2	6-4	0-10	0-5		
WW7	4	4	6-4	WW3	4	2	1	13-2	5-2	0-10	0-5		
WW8	4	4	5-6	WW4	4	2	1	9-4	3-5	0-10	0-5		
WW9	4	4	4-6										
				WW10	4	4	2	9-6	2-0	5-10	1-9	1-5½	1-2½
WINGWALL STEEL FOR BENT NO. 1 ONLY (VIEW F-F)													
WW12	4	4	5-2	WW1	4	2	1	14-2	5-11	0-10	0-5		
WW13	4	4	5-6	WW2	4	2	1	15-2	6-4	0-10	0-5		
WW14	4	4	4-11	WW3	4	2	1	13-2	5-2	0-10	0-5		
WW15	4	4	6-0	WW4	4	2	1	9-4	3-5	0-10	0-5		
WW16	4	4	5-0										
WW17	#4	4	4'-1"	WW11	#4	4	2	10'-1"	1'-9"	6'-5"	1'-11"	1'-1"	1'-6½"

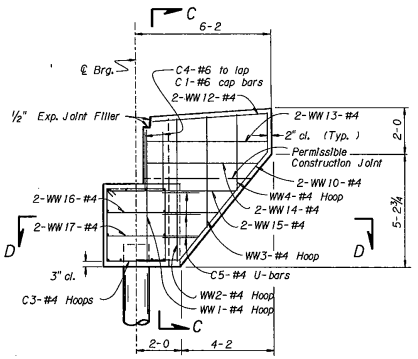


ELEVATION

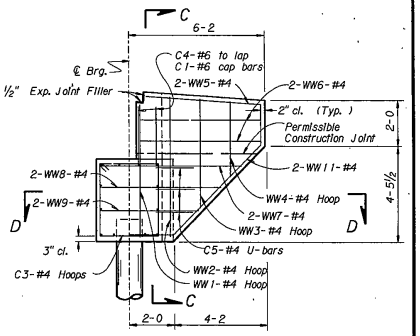
(Bent No. 2 shown - Ahead on Line)
(Bent No. 1 similar)



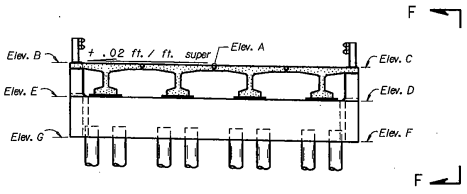
SECTION A-A



VIEW F-F

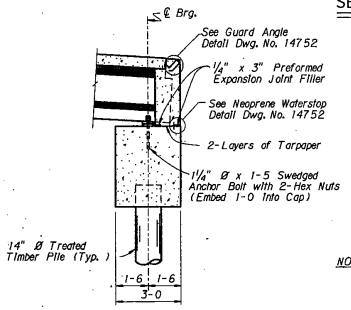


VIEW E-E



ELEVATION

(Bent No. 1 - Back on Line)



SECTION B-B

NOTE: Maximum pile load under D.L. + L.L. = 24.7 tons per pile
Estimated pile length = 25'-0"

STATE OF MONTANA
DEPARTMENT OF HIGHWAYS

BRIDGE OVER ST. MARY'S CANAL
AT STA. 15+20.00

FEDERAL AID PROJECT NO. BR 9018 (4)

GLACIER COUNTY

BENTS NO. 1 AND NO. 2

DESIGNED	3-24-89	L. R. T.
DRAWN	10-5-89	L. R. T.
CHECKED	7-23-90	T. L. B.
REVISED		
REVISED		
REVISED		

Scale ~ ⅜" = 1-0 (Except as noted)

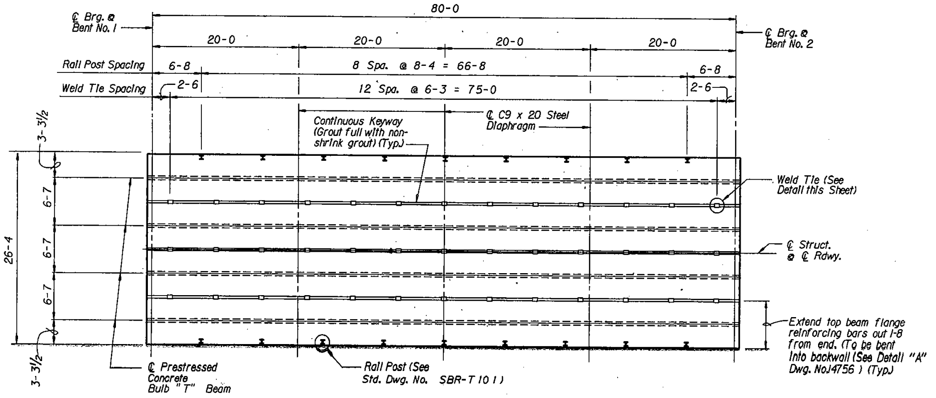
DRAWING NO. 14751

[60, 51086ENDB. BRG

FED. ROAD DIV. NO.	STATE	FED. AID PROJ. NO.	SHEET NO.
8	MONT.	BR 9018 (4)	B5

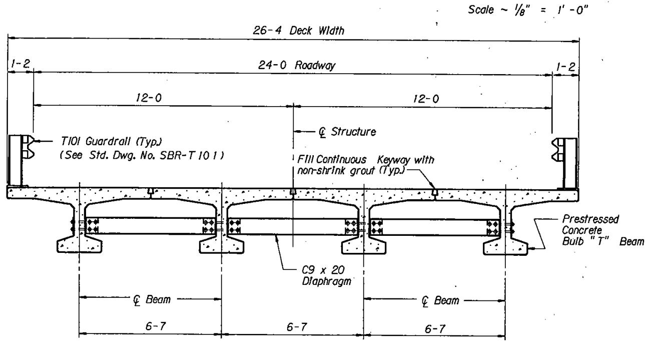
NOTES

HARDWARE: Embedded plates, anchors, angles, rods, anchor bolts, hold down devices, lifting devices & any other hardware which is to be incorporated in the beam shall be approved by the Engineer before fabrication is begun.



ERECTION PLAN

Scale ~ ⅛" = 1'-0"

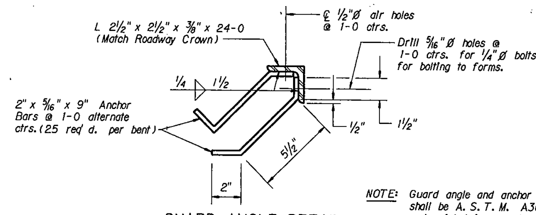


TRANSVERSE SECTION

Scale ~ ⅜" = 1'-0"

NOTE: The cost of furnishing, placing & welding bars, rods & angles to be included in the Unit Price Bid for Prestressed Bulb "T" Beam.

NOTE: Non-shrink grout to be used in the beam keyways shall be non-metallic, non-gaseous grout. Cost of non-shrinking grout to be included in the Unit Price Bid for Class "AD" Concrete.

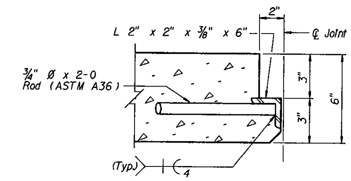


GUARD ANGLE DETAIL

Scale ~ 3" = 1'-0"

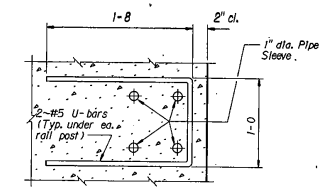
NOTE: Guard angle and anchor bars shall be A. S. T. M. A36 steel and painted in accordance with Standard Specifications.

NOTE: Guard Angle may be furnished in two pieces with anchor bars 6" max. from each end. If furnished in two pieces they shall be field welded together. Recess angle ⅛" below finished grade and hold in accurate position while placing concrete.



BULB "T" JOINT CONNECTION DETAIL

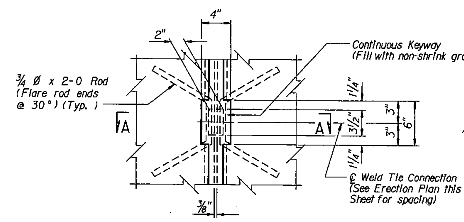
Scale ~ 3" = 1'-0"



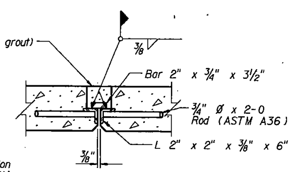
ANCHOR BOLT ASSEMBLY REINFORCEMENT

Scale ~ 1½" = 1'-0"

(By Prestressed Beam Manufacturer)



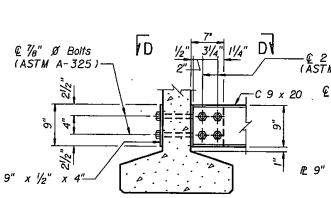
PLAN VIEW



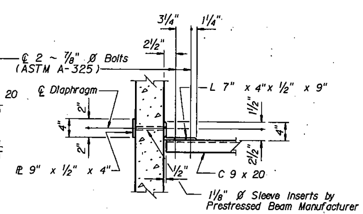
SECTION A-A

WELD TIE CONNECTION DETAILS

Scale ~ 1½" = 1'-0"



END SECTION



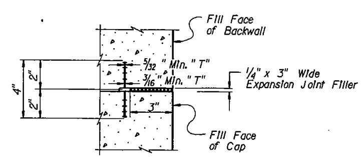
SECTION D-D

DIAPHRAGM DETAILS

Scale ~ 1" = 1-0

NOTE: Diaphragms shall be painted according to the Standard Specifications.

NOTE: The cost of furnishing & placing of diaphragms, channels, plates, angles & bolts shall be paid for in the Lump Sum Bid for Structural Steel.



WATERSTOP DETAIL

Scale: 3" = 1'-0"

NOTE: Waterstop is to be held in accurate position while concrete is placed

STATE OF MONTANA
DEPARTMENT OF HIGHWAYS

BRIDGE OVER ST. MARY'S CANAL

AT STA. 15+20.00

FEDERAL AID PROJECT NO. BR 9018 (4)

GLACIER COUNTY

ERECTION PLAN AND MISC. DETAILS

Scale ~ As noted

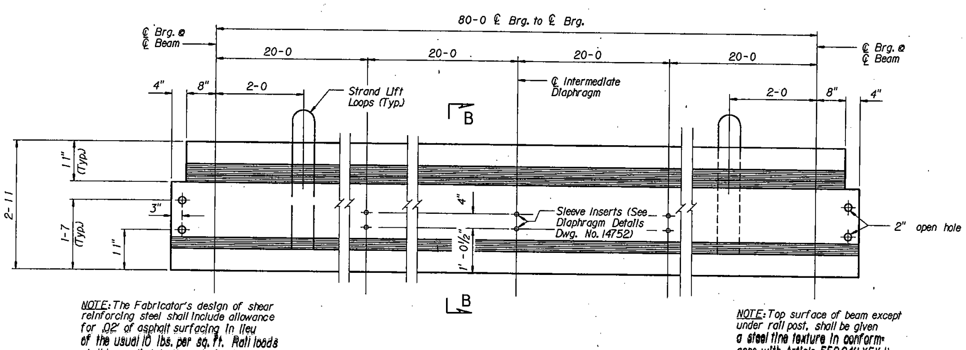
DESIGNED	9-14-89	L. R. T.
DRAWN	9-14-89	L. R. T.
CHECKED	7-23-90	T. L. B.
REVISED		
REVISED		
REVISED		

DRAWING NO. 14752

[60, 4] 1086ERECT. BRG

MONTANA CADD 10-AUG-1990 10:18 BRMAIN [60, 5] 1086ERECT.BRG

FED. ROAD DIV. NO.	STATE	FED. AID PROJ. NO.	SHEET NO.
8	MONT.	BR 9018(4)	B6

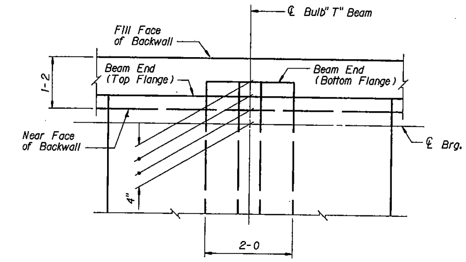


NOTE: The Fabricator's design of shear reinforcing steel shall include allowance for .02' of asphalt surfacing in lieu of the usual 10 lbs. per sq. ft. Rail loads shall be applied to the exterior beam only.

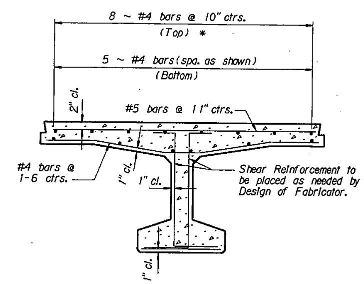
ELEVATION

NOTE: Top surface of beam except under rail post, shall be given a steel tine texture in conformance with Article 552.04(L)(5)(d).

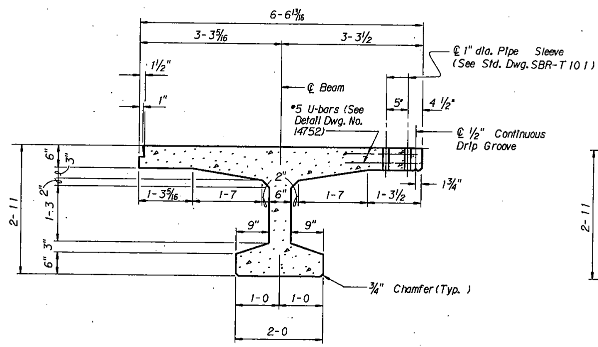
* NOTE: Extend top beam flange reinforcing bars out 1-8 from end.



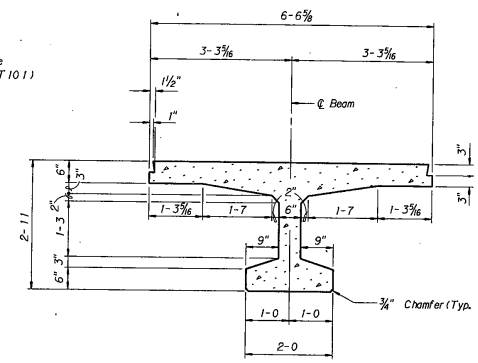
BEAM END DETAIL



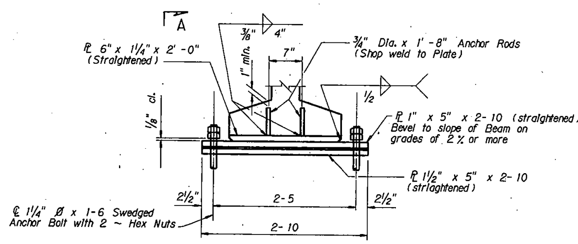
REINFORCING PLACEMENT DETAIL



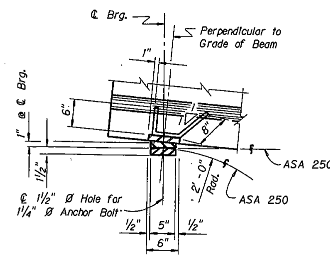
SECTION B-B EXTERIOR BEAM



SECTION B-B INTERIOR BEAM



END VIEW



VIEW A-A

FIXED SHOE DETAILS

Scale ~ 1" = 1'-0"

NOTES

STRUCTURAL STEEL: All Structural Steel shall be A36 except as noted.

PRESTRESSING STEEL: Prestressing Steel shall be 7/16" or 1/2" dia. Maximum stress for design before transfer shall be 0.70 f's unless otherwise approved.

BEAM LENGTH: To allow for elastic shortening, shrinkage & creep the overall length of the beam shall be increased by 0.0075 inches per foot of length.

VARIATIONS: Variations in the general shape or in the deck width or span lengths from those shown on the Bridge Drawings shall not be allowed without the approval of the Engineer. Variation requiring the alteration of backwall, diaphragm & rail post connections shown on the Bridge Drawings shall be approved by the Engineer before fabrication is begun.

SPECIFICATIONS: Design shall be in accordance with A.A.S.H.T.O. Standard Specifications for Highway Bridges, 1989 Edition & any amendments thereto. Montana State Highway Commission Standard Specifications for Road & Bridge Construction, 1987 Edition & any amendments thereto & Special Provisions shall govern unless otherwise noted. The Fabricator's design calculations shall show stresses in the beam under each loading condition that is anticipated in the manufacture, handling & service life of the beam. The beam shall be designed & fabricated to support the Dead Load & Live Load stresses & provide a minimum ultimate moment capacity shown on this Sheet.

Anchor bolts, nuts and shoe plates to be included in the unit price bid for Prestressed Beams.

Span Length (℄ Brg. to ℄ Brg.)			80-0
Beam D.L. Stress (p.s.i.)	Int.	F.B.	-1742
	Int.	F.T.	848
	Ext.	F.B.	-1740
	Ext.	F.T.	842
Total D.L.+L.L.+I Design Stress (p.s.i.)	Int.	F.B.	-4039
	Int.	F.T.	1964
	Ext.	F.B.	-4107
	Ext.	F.T.	1986
x Factored Moment at Section (ft.-kips)	Int.	Mu	2848
	Ext.	Mu	2887

x Mu = 1.3 [(D.L. + 5/3 (L.L. + I)]

NOTE :

The nominal moment strength of the section (Mn) shall be greater than or equal to Mu/Ø where Ø = 1.0

PRESTRESSED CONCRETE BEAMS: Prestressed Concrete Beams shall be fabricated in accordance with the details shown on this Drawing & Drawing No. 14752. Maximum f'c (Compressive Strength of Concrete at 28 days) for design shall be 6000 p.s.i. Design Stresses without prestresses are as indicated in the table above.

DESIGNED	6-24-89	L. R. T.
DRAWN	9-14-89	L. R. T.
CHECKED	7-23-90	T. L. B.
REVISED		
REVISED		
REVISED		

STATE OF MONTANA
DEPARTMENT OF HIGHWAYS

BRIDGE OVER ST. MARY'S CANAL
AT STA. 15+20.00

FEDERAL AID PROJECT NO. BR 9018 (4)

GLACIER COUNTY

BEAM AND SHOE DETAILS

Scale ~ 3/4" = 1-0 (Except as noted)

DRAWING NO. 14753

[60.5] 1086BMDET.BRG

MONTANA CADD 10-AUG-1990 10:20 BRAM

EMIGRANT GAP COUNTY ROAD BRIDGE

The Emigrant Gap County Road Bridge is the furthest downstream crossing on the canal and is located within a mile of the U.S.-Canada border. The location is in Section 6, T37N, R11W and approximately Station 1363+85 of the St. Mary Canal.

The bridge is owned and maintained by Glacier County. The structure was designed by MDT and constructed in 1991 as stated earlier. This bridge and the Whiskey Gap Crossing were combined into a single project. As such the construction of this bridge is a near duplicate of the Whisky Gap Bridge. There are only minimal differences to the construction of the two bridges, which are outlined below.

The Emigrant Gap County Road Bridge has a deck length of 80 feet. The actual bearing of the prestressed concrete girders is about 77 feet. The bridge has a skewed geometry. The angle of skew of the bridge to the roadway is approximately 30 degrees.

There is a surveying benchmark/hub located on the northeast wingwall (SMC-52).

At each abutment, the vertical distance from the top of the deck to the grade below is 6 to 7 feet. At each end, the surrounding grade drops to the canal channel at a rate of less than 3 to 1 for about 15 feet until the bottom of the channel is encountered.

The bridge is in excellent condition and was last inspected by MDT, April 20, 2004 and is on a 4-year cycle. Copies of the most recent inspection report (4 pages) and construction drawings (6 sheets) are included at the end of this section.

Emigrant Gap County Road Bridge

Photo 6.1 – Profile (Looking West)

Photo 6.2 – C10 Diaphragm

Photo 6.3 – Bridge Crossing (Looking South)

Photo 6.4 – Canal (Looking West)

Photo 6.5 – North Abutment

Photo 6.6 – Guardrail, Post, and Deck Connection

Photo 6.7 – Precast Girder Bearing on Steel Plates

Photo 6.8 – South Abutment

Montana Department of Transportation

INITIAL ASSESSMENT FORM FOR STRUCTURE :

L18205032+08001

Location : 35M N BROWNING Structure Name: Glacier County

General Location Data

District Code, Number, Location : **03 Dist 3 GREAT FALLS**
Division Code, Location : **32 HAVRE**
County Code, Location : **035 GLACIER**
City Code, Location : **00000 RURAL AREA**
Kind fo Hwy Code, Description : **4 4 County Hwy**
Signed Route Number : **18205**
Str Owner Code, Description : **2 County Highway Agency**
Maintained by Code, Description : **2 County Highway Agenc**
Intersecting Feature : **IRRIGATION CANAL 046**
Kilometer Post, Mile Post : **52.79 km 32.80**
Structure on the State Highway System : ☐ Latitude : **48°59'27"**
Structure on the National Highway System : ☐ Longitude : **113°05'38"**
Str Meet or Exceed NBIS Bridge Length : ☒

Construction Data

Construction Project Number : **BR 9018(4)**
Construction Station Number : **17+61.00**
Construction Drawing Number : **14754**
Construction Year : **1991**
Reconstruction Year :

Traffic Data

Current ADT : **100** ADT Count Year : **2000** Percent Trucks : **3 %**

Structure Loading, Rating and Posting Data

Loading Data :

Design Loading :		**5 MS 18 (HS 20)**
Inventory Load, Design :	**32.4 mton**	**2 AS Allowable Stress**
Operating Load, Design :	**32.4 mton**	**2 AS Allowable Stress**
Posting :		**5 At/Above Legal Loads**

Rating Data :

	Operating	Inventory	Posting
Truck 1 Type 3 :			
Truck 2 Type 3-S3 :			
Truck 3 Type 3-3 :	40		

Structure, Roadway and Clearance Data

Structure Deck, Roadway and Span Data :

Structure Length : **24.99 m**
Deck Area : **201.00 m sq**
Deck Roadway Width : **7.32 m**
Approach Roadway Width : **6.49 m**
Median Code, Description : **0 No median**

Structure Vertical and Horizontal Clearance Data :

Vertical Clearance Over the Structure : **99.99 m**
Reference Feature for Vertical Clearance : **N Feature not hwy or RR**
Vertical Clearance Under the Structure : **0.00 m**
Reference Feature for Lateral Underclearance : **N Feature not hwy or RR**
Minimum Lateral Under Clearance Right : **0.00 m**
Minimum Lateral Under Clearance Left : **0.00 m**

Span Data

Main Span

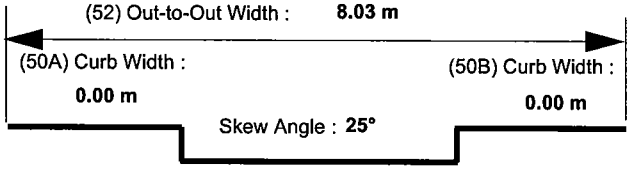
Number Spans : **1**
Material Type Code, Description : **5 Prestressed concrete**
Span Design Code, Description : **4 Tee Beam**

Approach Span

Number of Spans : **0**
Material Type Code, Description :
Span Design Code, Description :

Deck

Deck Structure Type : **N Not applicable**
Deck Surfacing Type : **0 None (no additional concrete thickness or wearing s**
Deck Protection Type : **0 None**
Deck Membrain Type : **0 None**



Structure Vertical and Horizontal Clearance Data Inventory Route :

Over / Under Direction Name	Inventory Route	South, East or Bi-directional Travel			North or West Travel		
		Direction	Vertical	Horizontal	Direction	Vertical	Horizontal
Route On Structure	L18205	Both	99.99 m	7.32 m	N/A		

EMIGRANT GAP ROAD
INSP RPT

Montana Department of Transportation

INITIAL ASSESSMENT FORM FOR STRUCTURE :

L18205032+08001

Continue

Inspection Data

Inspection Due Date : 20 April 2008

Sufficiency Rating : **94.1**
Health Index : **99.83**
Structure Status :**Not Deficient**

(91) Inspection Fequency (months) : **48**

NBI Inspection Data

(90) Date of Last Inspection : 20 April 2004
(90) Inspection Date :
Last Inspected By : Charles Pepos - 107
Inspected By :

(58) Deck Rating :	8	(68) Deck Geometry :	6	(36C) Approach Rail Rating :	1	(62) Culvert Rating :	N
(59) Superstructure Rating :	8	(67) Structure Rating :	7	(36A) Bridge Rail Rating :	1	(61) Channel Rating :	8
(60) Substructure Rating :	7	(69) Under Clearance :	N	(36B) Transition Rating :	N	(71) Waterway Adequacy :	8
(72) App Rdwy Align :	7	(41) Posting Status :	A	(36D) End Rail Rating :	0	(113) Scour Critical :	U

Unrepaired Spalls : 0 m sq
Deck Surfacing Depth : 0.00 in

Inspection Hours

Crew Hours for inspection :	1.5	Snooper Required :	N
Helper Hours :	0	Snooper Hours for inspection :	0
Special Crew Hours :	0	Flagger Hours :	0
Special Equipment Hours :	0		

Inspection Work Candidates

Candidate ID	Date Requested	Status	Priority	Effected Structure Unit	Scope of Work	Action	Covered Condition States
D31-FY2004-000421	12 May 2004	Not Approved	low	M Main	215 R/Conc Abutment	Min Repair	
Riprap and repair/fill back in the area of erosion on the right end of Abutment 2's backwall.							

Montana Department of Transportation

INITIAL ASSESSMENT FORM FOR STRUCTURE :

L18205032+08001

Continue

Element Inspection Data

********** Span : **Main-0** - **********

Element Description										
Smart Flag	Scale Factor	Env	Quantity	Units	Insp Each	Pct Stat 1	Pct Stat 2	Pct Stat 3	Pct Stat 4	Pct Stat 5
Element 109 - P/S Conc Open Girder										
	1	1	100	m		100	0	0	0	
						%	%	%	%	%
Previous Inspection Notes :										
04/20/2004 - 4 * 24.99 = 99.96m. Some minor leakage along the joints between the Tee Beams. VZEF										
05/15/2000 - None PEJK										
05/18/1999 - None IGJX										
Inspection Notes:										
Element 181 - Pnt Vrt X-Frame										
	1	1	24	m		95	5	0	0	0
						%	%	%	%	%
Previous Inspection Notes :										
04/20/2004 - 8.03 * 3 = 24.09m. Rusty spots along the bolt connections. Spot rust in the webs of the diaphragms. VZEF										
Inspection Notes:										
Element 215 - R/Conc Abutment										
	1	2	27	m		100	0	0	0	
						%	%	%	%	%
Previous Inspection Notes :										
04/20/2004 - (6.90 * 2) + (4 * 2.35) = 27.20m. Env. State 2 as damp most of the year. U-type wingwalls behind the Abutment caps. NE corner at Abutment 2 is eroding under the cap; see photo. VZEF										
Inspection Notes:										
Element 313 - Fixed Bearing										
	1	1	8	ea		95	5	0		
						%	%	%	%	%
Previous Inspection Notes :										
04/20/2004 - Some minor spot rust where they are exposed. VZEF										
Inspection Notes:										
Element 334 - Metal Rail Coated T-101										
	1	1	59	m		90	10	0	0	0
						%	%	%	%	%
Previous Inspection Notes :										
04/20/2004 - (24.99 * 2) + (4 * 2.35) = 59.38m. Add the length of T-101 on the U-type wingwalls as it is continuous with the bridge rail. Box beam rail behind the W-beam has some spot rust with the prime coat showing. Some spot rust on the rail posts. VZEF										
05/15/2000 - T-101 rail PEJK										
05/18/1999 - None IGJX										
Inspection Notes:										

INITIAL ASSESSMENT FORM FOR STRUCTURE :

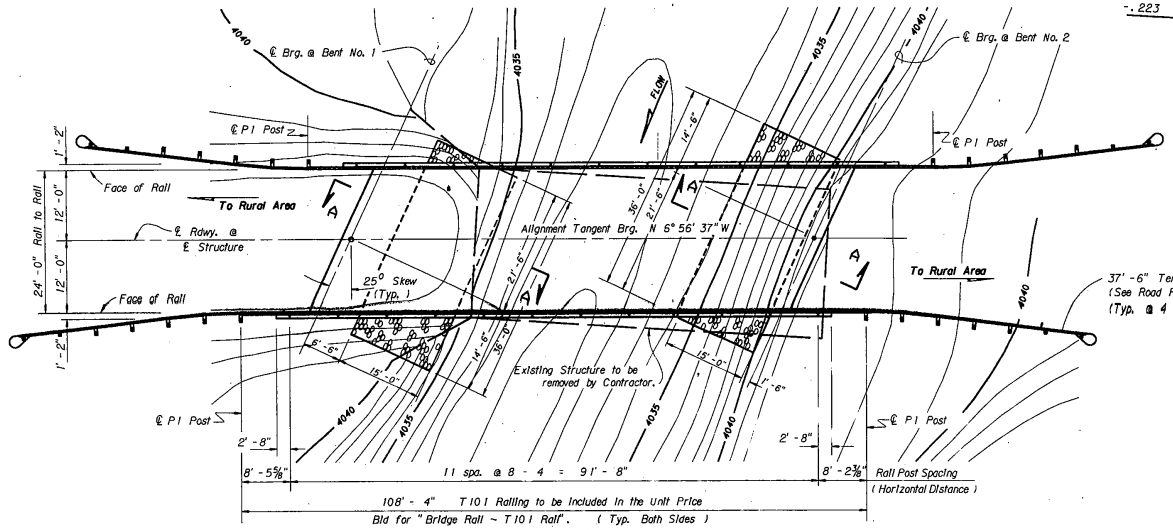
L18205032+08001

Continue

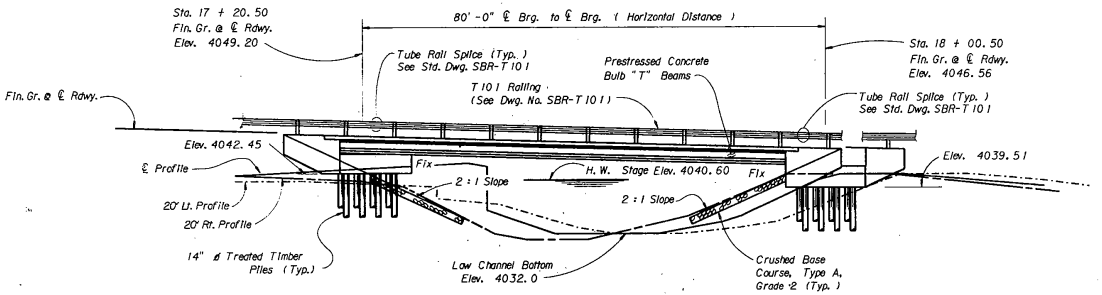
General Inspection Notes

04/20/2004 - NBI 36D, end section, rated at a "0" as not up to current standards NBI 60, substructure, rated at a "7" due to undermining and scour at Abutment 2 - Right side	VZEF
05/15/2000 - Guardrail on all (4) corners and the rail is up to current standards - Lacking fill material on the 10:1 tapers into the end anchor sections of the rail	PEJK
05/18/1999 - None	IGJX
05/01/1994 - Sufficiency Rating Calculation Accepted by ops$u5963 at 3/10/97 15:01:01 Sufficiency Rating Calculation Accepted by ops$u9004 at 2/19/97 14:18:15	UOTS
01/01/1992 - Updated with tape 1994	NB94
08/01/1991 - Updated with tape 1992	NB92

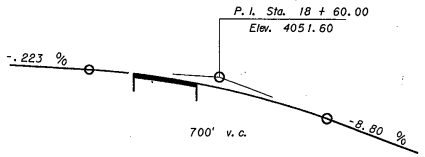
FED. ROAD DIV. NO.	STATE	FED. AID PROJ. NO.	SHEET NO.
8	MONT.	BR 9018 (4)	B 7



PLAN

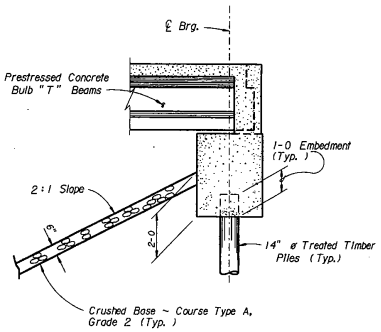


ELEVATION



PROFILE GRADE

No Scale



SECTION A-A

Scale: ⅜" = 1'-0"

NOTES

FINISHED GRADE: Finished grade of bridge at centerline roadway is the same as Profile Grade shown on Road Plans.

LIVE LOAD: Standard HS20-44 loading.

SPECIFICATIONS: Montana Department of Highways and the Montana Highway Commission Standard Specifications for Road and Bridge Construction, 1987 Edition, and any amendments thereto, and Special Provisions shall govern unless otherwise noted. Design prepared in accordance with A. A. S. H. T. O. Specifications, 1989 Edition, and any amendments thereto.

STRUCTURAL STEEL: All structural steel shall be measured and paid for on the lump sum basis as set forth in the Standard Specifications. Estimated weight: 1885 lbs.

REINFORCING STEEL: All reinforcing steel shall be of the deformed type and shall meet the requirements of A. S. T. M. Specification A615, Grade 60 (A. A. S. H. T. O. M-31).

CAST IN PLACE CONCRETE: Unless otherwise approved, all substructure concrete shall be Class "AD" concrete.

STRUCTURE EXCAVATION: See "Special Provisions."

TRAFFIC CONTROL PLAN AND SEQUENCE OF OPERATIONS: See "Special Provisions."

UTILITIES: For location of utilities, see the appropriate Road Plans sheet.

ASSIGNED ELEVATION DATUM ~ The elevations shown are from an assigned elevation datum and do not correspond to actual elevations. See Road Plans.

Class of Concrete	Minimum Req'd. Cylinder Strength to achieve a 1.0 Pay Factor (p.s.i.)	Strength for Design Purposes (p.s.i.)
"AD"	3400	3000

STREAM DATA

Drift:	None
Scour:	Light
Ice:	None
Design Flow:	850 c.f.s.
Design High Water:	4040.6
Design Velocity:	2.2 f.p.s.

DESIGNED	9-6-88	D.W.C.
DRAWN	9-6-88	D.W.C.
CHECKED	7-23-90	T.L.B.
APPROVED	8-9-90	J.C.H.
REVISED		
REVISED		

STATE OF MONTANA
DEPARTMENT OF HIGHWAYS

BRIDGE OVER ST. MARY'S CANAL

AT STA. 17 + 60.50

FEDERAL AID PROJECT NO. BR 9018 (4)

GLACIER COUNTY

GENERAL LAYOUT

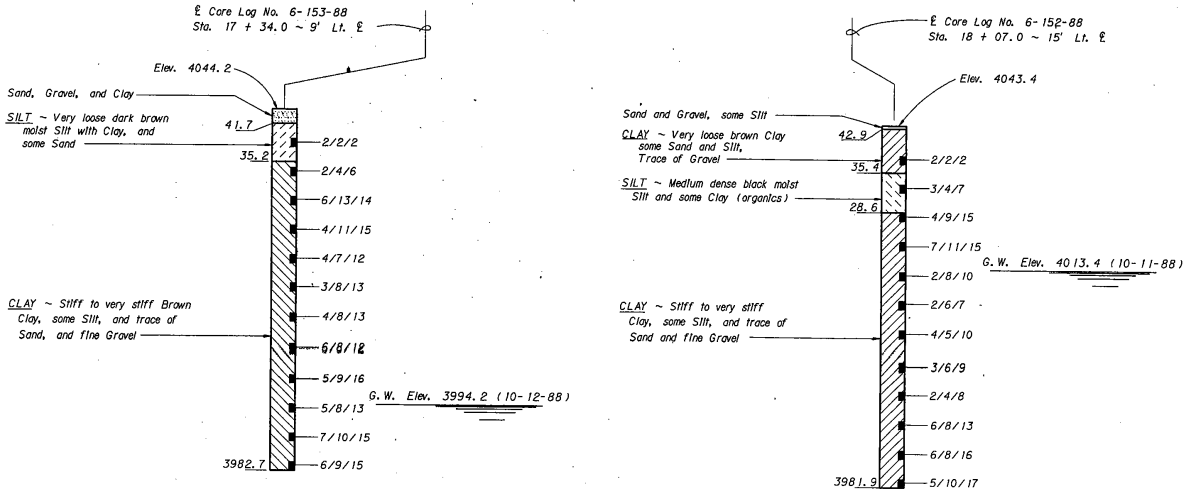
Scale: 1" = 10'-0" except as noted

DRAWING NO. 14754

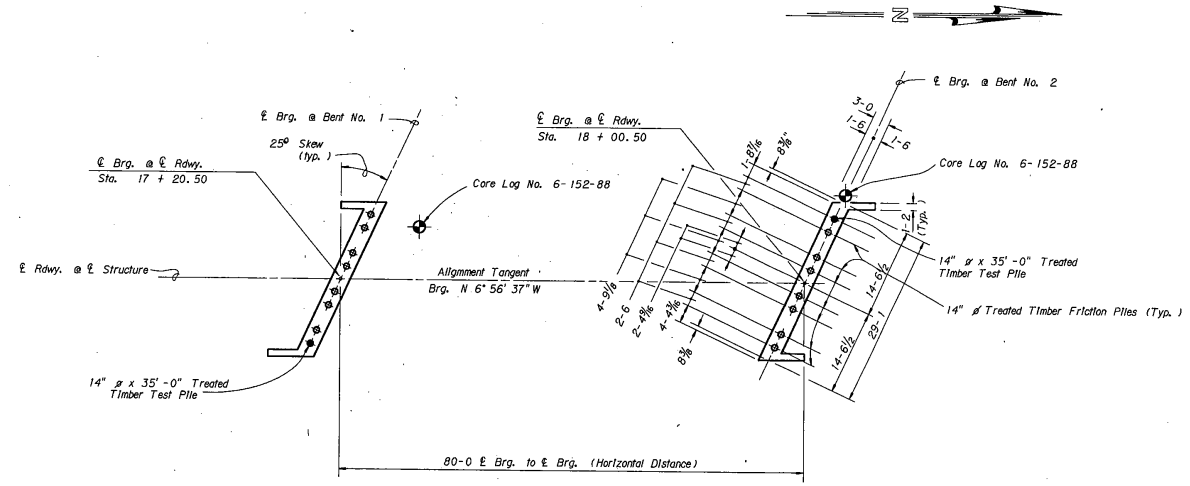
[60,51086GL.BRG

10-AUG-1990 10:33 BRMM MONTANA CADD [60,51086gl.brg

FED. ROAD DIV. NO.	STATE	FED. AID PROJ. NO.	SHEET NO.
8	MONT.	BR 9018(4)	B8



LOG OF BORINGS



FOOTING PLAN

NOTE: Dimensions shown for Bent No. 2 are typical for Bent No. 1.

NOTES:

SOILS AND FOUNDATION MATERIALS: Borings were taken by the State of Montana, Department of Highways at the points shown on the Footing Plan.

The series of numbers shown on the Log of Borings indicates the number of blows per 6" penetration for each number of the series of a 2" sample tube which was driven in accordance with the Standard Penetration Test made with a 2" split tube sampler using a 140 pound hammer having a 30" drop. The total penetration of the Sampler-Tube is indicated on the Core Logs after each series if 6" penetration was not achieved in 50 blows.

The State of Montana, Department of Highways does not assume any responsibility for any variation or misinterpretation of the classes of materials and adjustments will not be made if the materials found do not agree with those shown on the Log of Borings.

FOUNDATION PILES: For bidding purposes only, pile lengths have been estimated as shown on the bent drawing.

DESIGNED	11/2/88	A. G. C.
DRAWN	11/2/88	D. W. C.
CHECKED	7/23/90	T. L. B.
REVISED		
REVISED		
REVISED		

STATE OF MONTANA
DEPARTMENT OF HIGHWAYS

BRIDGE OVER ST. MARY'S CANAL

AT 17 + 60.50

FEDERAL AID PROJECT NO. BR 9018 (4)

GLACIER COUNTY

FOOTING PLAN

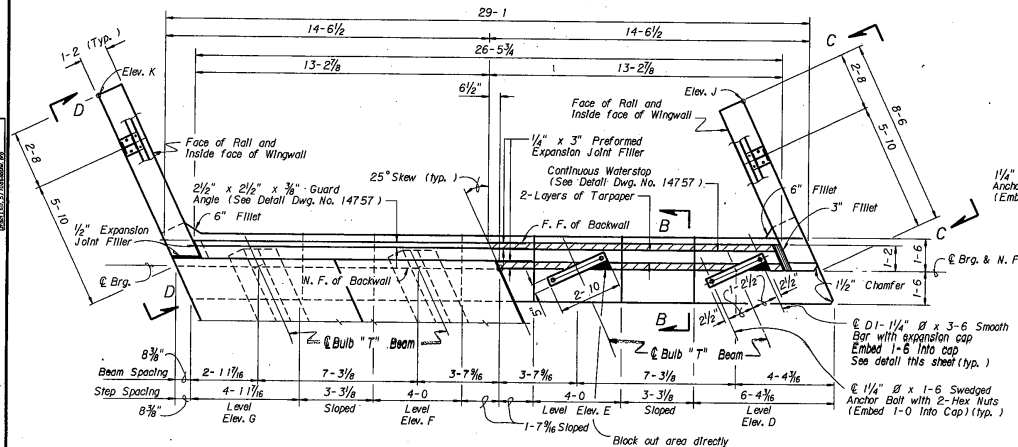
Scale: 1" = 10'-0"

DRAWING NO. 14755

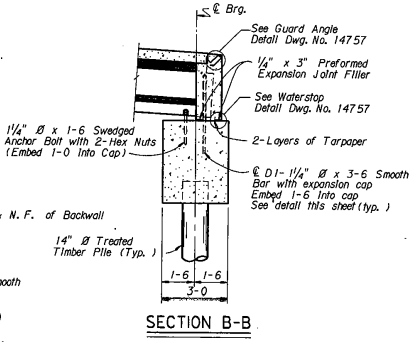
MONTANA CADD 10-AUG-1990 10:31 BRW,M [60,5]1086fpskw.brg

[60,5]1086FPSKW.BRG

FED. ROAD DIV. NO.	STATE	FED. AID PROJ. NO.	SHEET NO.
8	MONT.	BR 9018(4)	B9



PLAN



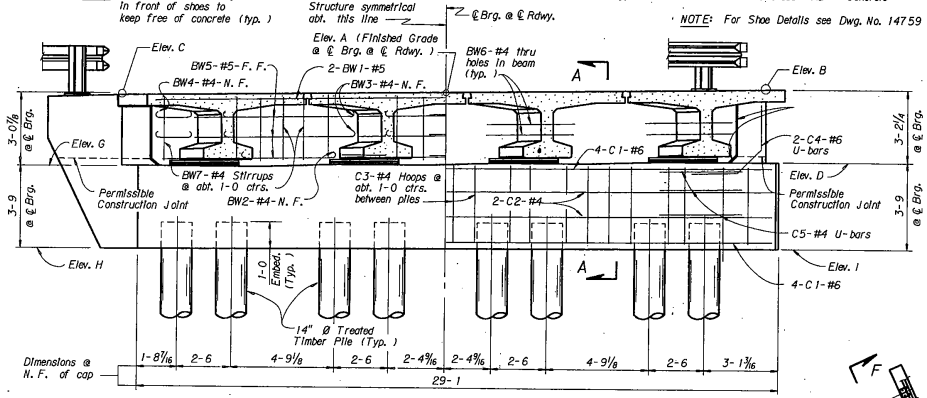
SECTION B-B

BILL OF REINFORCING STEEL (One Bent Only)										
TYPE 1					TYPE 2					
STRAIGHT BARS					BENT BARS (All dimensions are out to out.)					
Mark	Size	No.	Length		Mark	Size	No.	Type	Length	A	B	C	D	E
BW1	#5	2	26'-1"		BW7	#4	17	2	6'-1"	2'-9"	0'-10"	1'-9"	0'-4½"	
BW2	4	3	4-9											
BW3	4	6	6-4											
BW4	4	4	1-9											
BW5	4	6	13-11											
BW6	4	8	4-0											
C1	6	8	28-9		C3	4	24	1	12-10	3-4	2-8	0-5		
C2	#4	4	28'-9"											

NOTE: Block out area directly in front of shoes to keep free of concrete (typ.)

NOTE: All concrete in the cap and backwall shall be Class "AD" Concrete

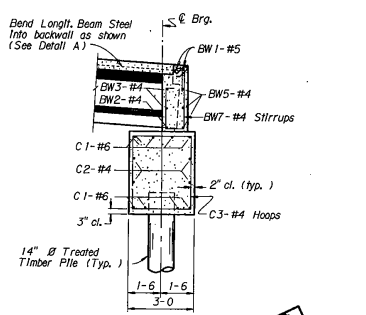
NOTE: For Shoe Details see Dwg. No. 14759



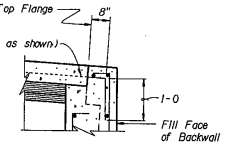
ELEVATION

(Bent No. 2 shown - Ahead on Line)
(Bent No. 1 similar)

NOTE: Maximum Pile Load under D.L. + L.L. = 25.4 Tons per pile
Estimated Pile Length = 25'-0"



SECTION A-A



DETAIL A

No Scale

NOTE: For wingwall reinforcing steel see Dwg. No. 14758

NOTE: Lap all #5 bars 1-8 min.

NOTE: Lap all #4 bars 1-4 min.

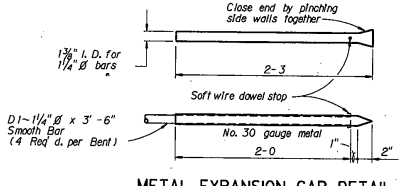
NOTE: N. F. denotes near face. F. F. denotes fill face.

NOTE: For Rail Post anchorage see Std. Dwg. SBR-T101.

NOTE: The cost of furnishing and placing expansion joint filler, tarpaper and waterstop to be included in the unit price bid for Class "AD" Concrete.

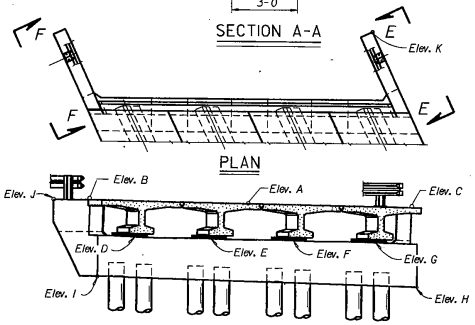
NOTE: Expansion joint filler to be securely nailed to concrete and held in accurate position while placing concrete.

TABLE OF ELEVATIONS		
Elev.	Bent No. 1	Bent No. 2
A	4049.20	4046.56
B	1049.37	4046.79
C	4049.02	4046.33
D	4046.19	4043.70
E	4046.13	4043.56
F	4046.02	4043.31
G	4045.92	4043.18
H	4042.17	4039.43
I	4042.44	4039.95
J	4049.59	4046.47
K	4049.26	4046.00



METAL EXPANSION CAP DETAIL

Scale ~ 1½" = 1'-0"



PLAN

ELEVATION

(Bent No. 1 - Back on Line)

DESIGNED	6-6-89	O. A. H.
DRAWN	10-18-89	L. R. T.
CHECKED	7-23-90	T. L. B.
REVISED		
REVISED		
REVISED		

STATE OF MONTANA
DEPARTMENT OF HIGHWAYS

BRIDGE OVER ST. MARY'S CANAL

AT STA. 17+60.50

FEDERAL AID PROJECT NO. BR 9018 (4)

GLACIER COUNTY

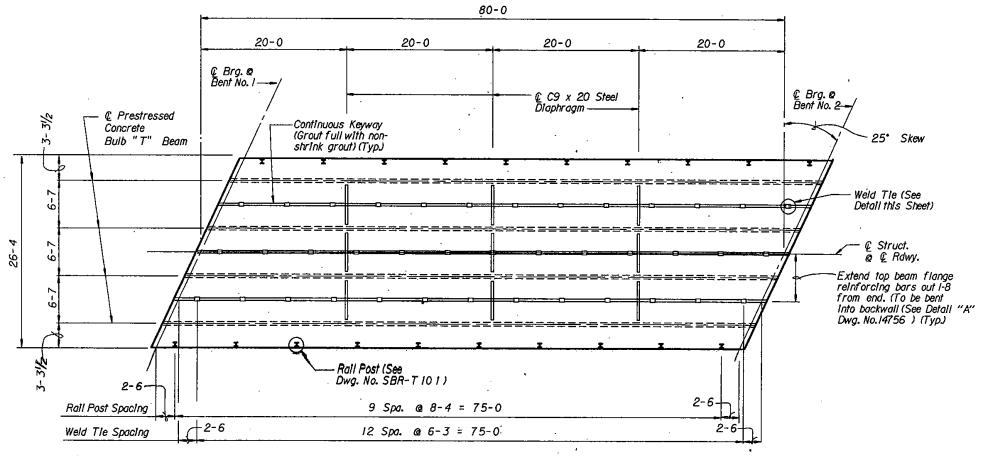
BENTS NO. 1 AND NO. 2

Scale ~ ⅜" = 1-0 (Except as noted)

DRAWING NO. 14756

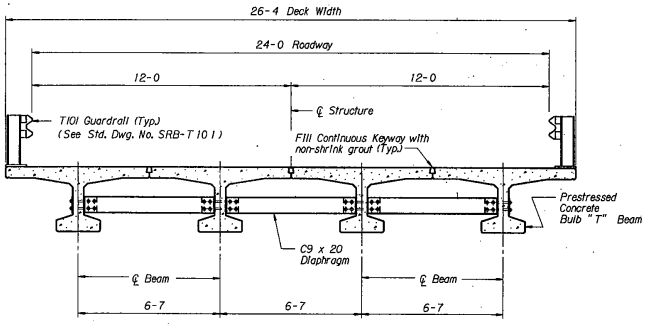
[60, 5] 1086EBSKW. BRG

FED. ROAD DIV. NO.	STATE	FED. AID PROJ. NO.	SHEET NO.
8	MONT.	BR 9018(4)	B10



ERECTION PLAN

Scale ~ ⅛" = 1'-0"

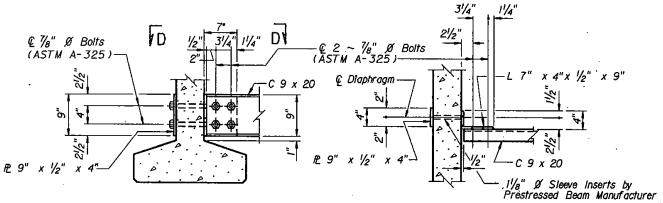


TRANSVERSE SECTION

Scale ~ ⅜" = 1'-0"

NOTE: The cost of furnishing, placing & welding bars, rods & angles to be included in the Unit Price Bid for Prestressed Bulb "T" Beam.

NOTE: Non-shrink grout to be used in the beam keyways shall be non-metallic, non-gaseous grout. Cost of non-shrinking grout to be included in the Unit Price Bid for Class "AD" Concrete.



END SECTION

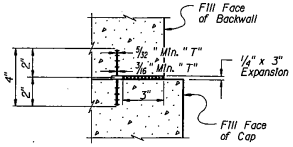
SECTION D-D

DIAPHRAGM DETAILS

Scale ~ 1" = 1'-0"

NOTE: Diaphragms shall be painted according to the Standard Specifications.

NOTE: The cost of furnishing & placing of diaphragms, channels, plates, angles & bolts shall be paid for in the Lump Sum Bid for Structural Steel.



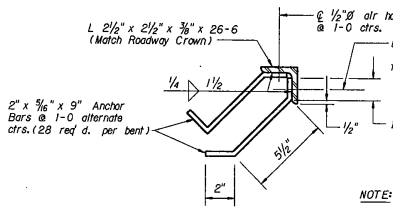
WATERSTOP DETAIL

Scale: 3" = 1'-0"

NOTE: Waterstop is to be held in accurate position while concrete is placed

NOTES

HARDWARE: Embedded plates, anchors, angles, rods, anchor bolts, hold down devices, lifting devices & any other hardware which is to be incorporated in the beam shall be approved by the Engineer before fabrication is begun.

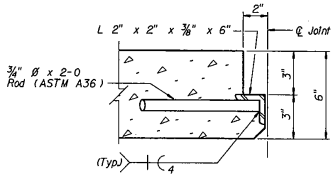


GUARD ANGLE DETAIL

Scale ~ 3" = 1'-0"

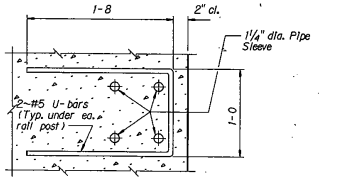
NOTE: Guard Angle may be furnished in two pieces with anchor bars 6" max. from each end. If furnished in two pieces they shall be field welded together. Recess angle ⅛" below finished grade and hold in accurate position while placing concrete.

NOTE: Guard angle and anchor bars shall be A. S. T. M. A36 steel and painted in accordance with Standard Specifications.



BULB "T" JOINT CONNECTION DETAIL

Scale ~ 3" = 1'-0"

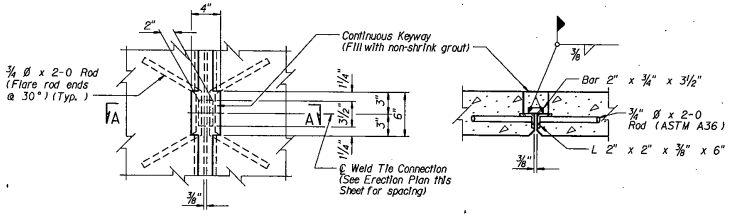


ANCHOR BOLT ASSEMBLY REINFORCEMENT

Scale ~ 1½" = 1'-0"

(By Prestressed Bm. Mf'r.)

(See Dwg. No. SBR-T 101)



PLAN VIEW

SECTION A-A

WELD TIE CONNECTION DETAILS

Scale ~ 1½" = 1'-0"

STATE OF MONTANA
DEPARTMENT OF HIGHWAYS

BRIDGE OVER ST. MARY'S CANAL

AT STA. 17+60.50

FEDERAL AID PROJECT NO. BR 9018 (4)

GLACIER COUNTY

ERECTION PLAN AND MISC. DETAILS

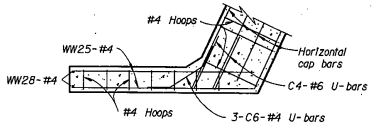
Scale ~ As noted

DESIGNED	6-3-89	O. A. H.
DRAWN	9-14-89	L. R. T.
CHECKED	7-23-90	T. L. B.
REVISED		
REVISED		
REVISED		

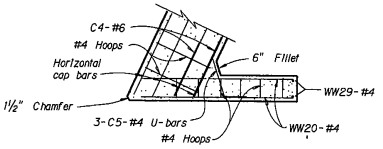
DRAWING NO. 14757

[60, 5] 1086ERSKW. BRG

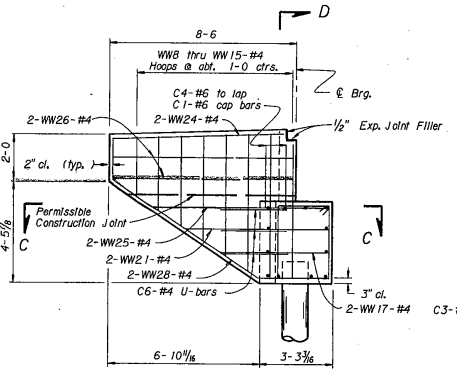
FED. ROAD DIV. NO.	STATE	FED. AID PROJ. NO.	SHEET NO.
8	MONT.	BR 9018(4)	B11



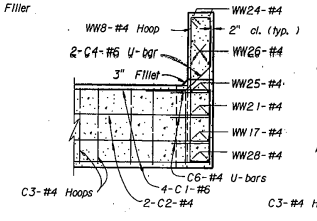
SECTION C-C



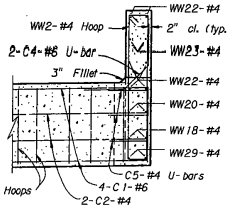
SECTION G-G



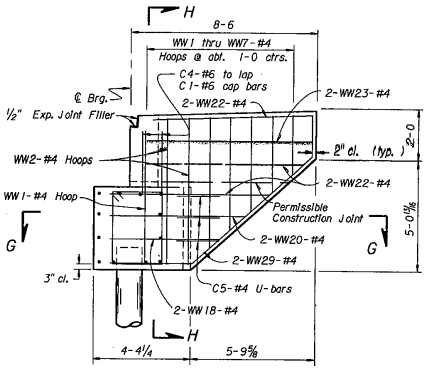
VIEW D-D



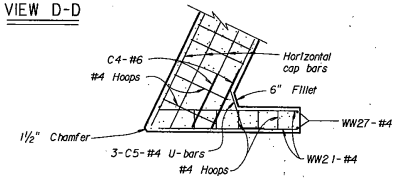
SECTION D-D



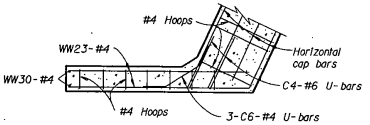
SECTION H-H



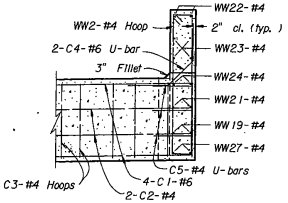
VIEW E-E



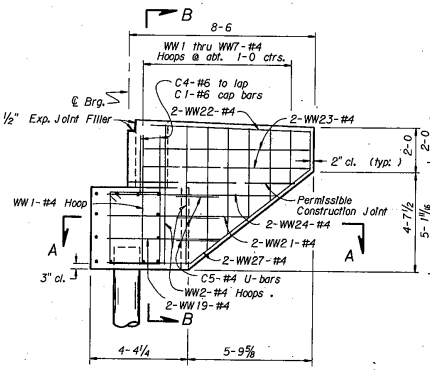
SECTION A-A



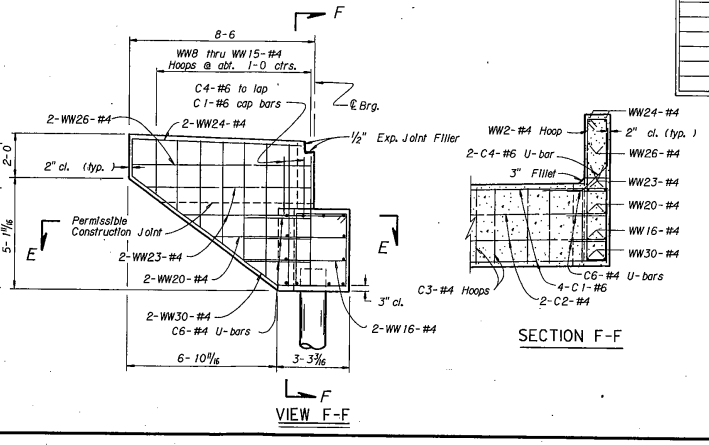
SECTION E-E



SECTION B-B



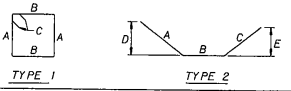
VIEW C-C



VIEW F-F

SECTION F-F

BILL OF REINFORCING STEEL



STRAIGHT BARS				BENT BARS (All dimensions are out to out.)								
Mark	Size	No.	Length	Mark	Size	No.	Type	Length	A	B	C	D	E
				BENT NO. 1 (VIEW E-E & F-F)									
WW16	#4	2	4'-9"	C4	#6	4	2	5'-0"	1'-9"	1'-6"	1'-9"	1'-3"	1'-3"
WW18	↓	2	5-0	C5	4	3	2	3-10	1-0	1-10	1-0	0-8½	0-11½
WW20		4	6-2	C6	↓	3	2	3-10	1-0	1-10	1-0	0-7	0-6
WW22		8	7-3										
WW23		6	7-6	WW1		1	1	14-2	5-10	0-10	0-5		
WW24		2	7-9	WW2				15-2	6-4				
WW26	4	2	8'-2"	WW3				13-10	5-8				
				WW4				12-4	4-11				
				WW5				10-8	4-1				
				WW6				9-0	3-3				
				WW7				7-6	2-6				
				WW8				14-2	5-10				
				WW9				15-4	6-5				
				WW10				14-6	6-0				
				WW11				13-2	5-4				
				WW12				11-8	4-7				
				WW13				10-4	3-11				
				WW14				8-10	3-2				
				WW15	4	1	1	7-6	2-6	0-10	0-5		
				WW29	4	2	2	12-9	3-9	7-3	1-9	2-6	1-3
				WW30	#4	2	2	13'-0"	1'-8"	8'-4"	3'-0"	1'-4"	1'-10"
				BENT NO. 2 (VIEW C-C & D-D)									
WW17	4	2	4-8	C4	#6	4	2	5'-0"	1'-9"	1'-6"	1'-9"	1'-3"	1'-3"
WW19	↓	2	4-10	C5	4	3	2	3-10	1-0	1-10	1-0	0-8½	0-11½
WW21		4	6-6	C6	↓	3	2	3-10	1-0	1-10	1-0	0-7	0-6
WW22		2	7-3										
WW23		4	7-6	WW1		1	1	14-2	5-10	0-10	0-5		
WW24		4	7-9	WW2				15-2	6-4				
WW25		2	8-0	WW3				13-10	5-8				
WW26	#4	4	8'-2"	WW4				12-4	4-11				
				WW5				10-8	4-1				
				WW6				9-0	3-3				
				WW7				7-6	2-6				
				WW8				14-2	5-10				
				WW9				15-4	6-5				
				WW10				14-6	6-0				
				WW11				13-2	5-4				
				WW12				11-8	4-7				
				WW13				10-4	3-11				
				WW14				8-10	3-2				
				WW15	4	1	1	7-6	2-6	0-10	0-5		
				WW27	4	2	2	12-5	3-9	6-11	1-9	2-4	2-4
				WW28	#4	2	2	12'-11"	1'-9"	8'-2"	3'-2"	1'-5"	1'-9"

DESIGNED	6-6-89	O. A. H.
DRAWN	6-29-90	L. R. T.
CHECKED	7-23-90	T. L. B.
REVISED		
REVISED		
REVISED		

STATE OF MONTANA
DEPARTMENT OF HIGHWAYS

BRIDGE OVER ST. MARY'S CANAL

AT STA. 17+60.50

FEDERAL AID PROJECT NO. BR 9018 (4)

GLACIER COUNTY

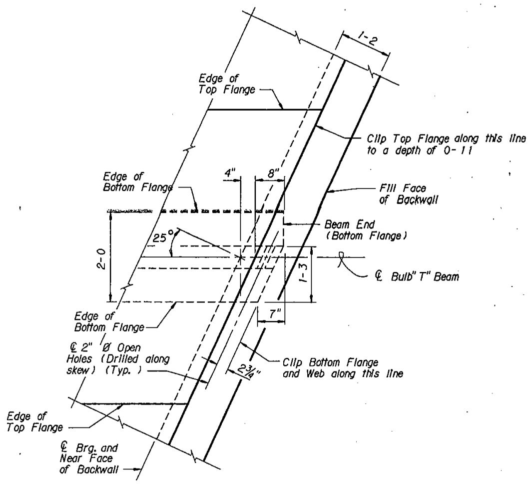
WINGWALL STEEL DETAILS

Scale ~ ⅜" = 1-0

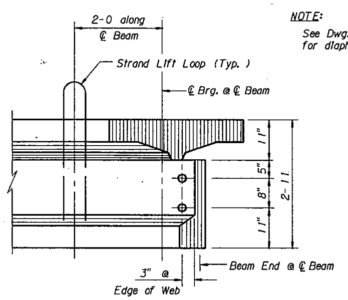
DRAWING NO. 14758

[60.5] 1086WINGS.BRG

FED. ROAD DIV. NO.	STATE	FED. AID PROJ. NO.	SHEET NO.
8	MONT.	BR 9018(4)	B12

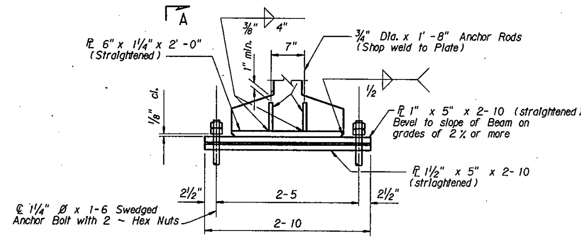


BEAM END DETAIL - PLAN

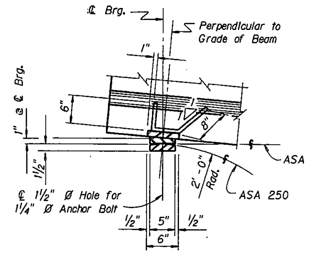


BEAM END DETAIL - ELEVATION

NOTE:
See Dwg. No. 14757 for diaphragm sleeve inserts.



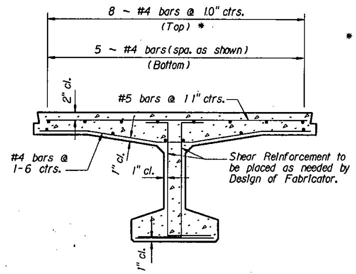
END VIEW



VIEW A-A

FIXED SHOE DETAILS

Scale ~ 1" = 1'-0"

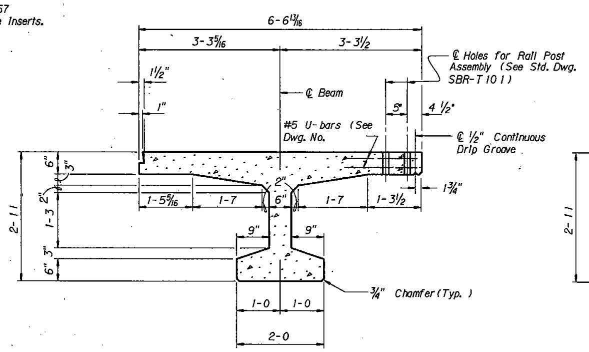


REINFORCING PLACEMENT DETAIL

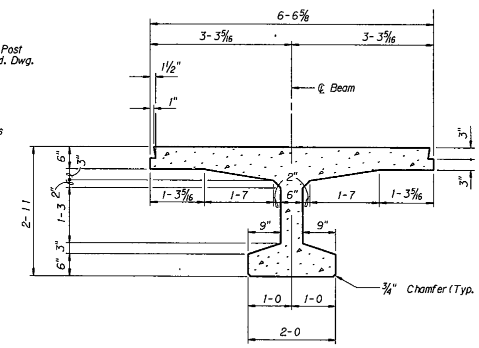
* NOTE: Extend top beam flange reinforcing bars out 1-8 from end

NOTE: Top surface of beam except under rail post, shall be given a steel tine texture in conformance with Article 552.04(L)(5)(d).

NOTE: The Fabricator's design of shear reinforcing steel shall include allowance for .02' of asphalt surfacing in lieu of the usual 10 lbs. per sq. ft. Rail loads shall be applied to the exterior beam only.



SECTION B-B EXTERIOR BEAM



SECTION B-B INTERIOR BEAM

NOTES

STRUCTURAL STEEL: All Structural Steel shall be A36 except as noted.

PRESTRESSING STEEL: Prestressing Steel shall be 7/16" or ½" dia. Maximum stress for design before transfer shall be 0.70 f's unless otherwise approved.

BEAM LENGTH: To allow for elastic shortening, shrinkage & creep the overall length of the beam shall be increased by 0.0075 inches per foot of length.

VARIATIONS: Variations in the general shape or in the deck width or span lengths from those shown on the Bridge Drawings shall not be allowed without the approval of the Engineer. Variation requiring the alteration of backwall, diaphragm & rail post connections shown on the Bridge Drawings shall be approved by the Engineer before fabrication is begun.

SPECIFICATIONS: Design shall be in accordance with A.A.S.H.T.O. Standard Specifications for Highway Bridges, 1989 Edition & any amendments thereto. Montana State Highway Commission Standard Specifications for Road & Bridge Construction, 1987 Edition & any amendments thereto & Special Provisions shall govern unless otherwise noted. The Fabricator's design calculations shall show stresses in the beam under each loading condition that is anticipated in the manufacture, handling & service life of the beam. The beam shall be designed & fabricated to support the Dead Load & Live Load stresses and provide the minimum ultimate moment capacity shown on this sheet.

Anchor bolts, nuts and shoe plates to be included in the unit price bid for Prestressed Beams.

Span Length (℄ Brg. to ℄ Brg.)			80-0
Beam D.L. Stress (p.s.i.)	Int.	F.B.	-1742
		F.T.	848
	Ext.	F.B.	-1740
		F.T.	842
Total D.L.+L.L.+I Design Stress (p.s.i.)	Int.	F.B.	-4039
		F.T.	1964
	Ext.	F.B.	-4107
		F.T.	1986
* Factored Moment at Section (ft.-kips)	Int.	Mu	2848
	Ext.	Mu	2887

* Mu = 1.3 [(D.L. + 5/3 (L.L. + I)]

NOTE:
The nominal moment strength of the section (Mn) shall be greater than or equal to Mu/Ø where Ø = 1.0

PRESTRESSED CONCRETE BEAMS: Prestressed Concrete Beams shall be fabricated in accordance with the details shown on this Drawing & Drawing No. 14757. Maximum f'c (Compressive Strength of Concrete at 28 days) for design shall be 6000 p.s.i. Design Stresses without prestresses are as indicated in the table above.

DESIGNED	5-30-89	O. A. H.
DRAWN	9-14-89	L. R. T.
CHECKED	7-23-90	T. L. B.
REVISED		
REVISED		
REVISED		

STATE OF MONTANA
DEPARTMENT OF HIGHWAYS

BRIDGE OVER ST. MARY'S CANAL
AT STA. 17 + 60.50
FEDERAL AID PROJECT NO. BR 9018 (4)
GLACIER COUNTY

BEAM AND SHOE DETAILS

Scale ~ ¾" = 1'-0" (Except as noted)

DRAWING NO. 14759

[60, 5] 1086BMSKW. BRG

SUMMARY

This report summarizes six bridges that currently cross the St. Mary Canal. The purpose of this study is to provide an inventory and background data of the existing bridges. Their limitations and restrictions to potential canal improvements were summarized. These improvements include potential canal realignments, changes to channel grades or inverts, and widening to accommodate increased capacity or desired geometrics.

This report does not include an evaluation of the St. Mary River Bridge for which a new crossing is currently being performed as a Montana Department of Transportation (MDT) project. Nor does this report include the former bridge at the St. Mary River Diversion Dam which has been abandoned.

Two of the bridges are considered privately-owned providing private and limited access across the canal. The remaining structures are owned and maintained by Glacier County. Both of the private structures, the Reid Ranch and DeWolfe Ranch Accesses, are recommended to be replaced as part of canal improvements. This recommendation is warranted for safety and to avoid potential liability exposure. Depending on language contained in any encroachment permits provided by the USBR, replacement costs may be the responsibility of the private owners.

Two public bridges, Whiskey Gap and Emigrant Gap, can accommodate moderate canal widening and/or grade changes. These structures are very similar, relatively new and exhibit adequate geometrics. The recommendation is to maintain canal alignment and grade if possible at these two locations.

The Powell Bridge, a.k.a. Memorial Bridge, is a self-contained, single lane, steel truss bridge with good length and capacity. It is possible to reuse and relocate this structure if supported on dedicated foundation abutments, to accommodate most anticipate canal improvements. New timber stringers, planks and running boards would most likely be warranted.

The Babb Bridge is a three span, cast-in-place concrete structure with limited length and height clearance. In our opinion, it can only accommodate slight canal widening and grade changes. Replacement with a single span structure is preferred.

The specifics of each bridge are summarized on the following Table. These recommendations should be re-evaluated when a preferred canal capacity, channel geometrics and any alignment and grade changes are identified.

ST. MARY DIVERSION FACILITIES

SUMMARY OF CANAL CROSSINGS

Bridge Structure	Owner	Year Constructed	Structure Type	Number of ans/Overall Length	Number of Lanes/Travel Width	Possible Canal Accommodations				
						Slight Widening?	Moderate Widening?	Grade Changes?	Can Structure Be Relocated?	Recommendation
Babb	Glacier Co.	1986	Cast-In-Place Concrete	3/60’	2/ 24’ - 0”	Yes	No	Up – No Down – Yes	No	Replace with Single Span
Reid Ranch Access	Private	Unknown	Pre Cast Concrete Beams	2/80’	1/ 14’ – 2”	N/A	N/A	N/A	N/A	Replace with Single Span
Powell a.k.a. Memorial	Glacier Co.	1928/1992	Through Steel Truss w/Timber Deck	1/90’	1/ 20’ – 6”	Yes	Yes	Yes	Yes	Reuse & Relocate if Necessary
DeWolfe Ranch Access	Private	Unknown	TOFC RR Car	1/90’	1/ 8’ – 0”	N/A	N/A	N/A	N/A	Replace with Single Span
Martin a.k.a. Whiskey Gap	Glacier Co.	1991	Pre Cast Concrete Beams	1/80’	2/ 24’ – 0”	Yes	Yes	Yes	No	Maintain Canal Alignment and Grade if Possible
Emigrant Gap	Glacier Co.	1991	Pre Cast Concrete Beams	1/80’	2/ 24’ – 0”	Yes	Yes	Yes	No	Maintain Canal Alignment And Grade if Possible.