

BSDMS Summary Report

31 Clarks Fork Yellowstone River near Bridger, MT

Site Location:

Site ID: 31

Site Name: Clarks Fork Yellowstone River near Bridger, MT

County: Carbon

Nearest City: Bridger

State: MT

Latitude: 451551

Longitude: 1085436

USGS Station ID: 6207500

Route Number: 310

Route Class: US

Service Level: Mainline

Route Direction: NA

Highway Mile Point: 23.746

Stream Name: Clarks Fork Yellowstone River

River Mile:

Contact:
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Publication:
An unpublished level-2 analysis, to be submitted to MDT, will be on file at USGS - Montana District in late-January 1994.

Site Description:

The site is 2 miles south of Bridger, Montana. The bridge spans the main channel and has no scour countermeasures or upstream or downstream influences. The USGS gaging station "Clark Fork Yellowstone River near Belfry, MT" (06207500) is about 25 river miles upstream from the bridge. The USGS gaging station "Clarks Fork Yellowstone River at Edgar, MT", (06208500), is about 24 river miles downstream from the bridge. Selected flood-frequency estimates for the site using USGS stations 06207500 and 06208500 result in a 100-year peak estimate (Q100) of 13,800 cfs and a 500-year peak (Q500) of 15,900 cfs. The watershed is presumed to be fairly stable in terms of sediment yield and channel-change potential. An inspection of historic rating curves for the two gages showed no more than a few tenths of a foot shift per year and no consistent trend towards scouring or filling over the long term. The bed-material-sample transect was located within the bridge opening and because material was coarse, the sampling method used was a random-count procedure performed by hand in the field. Although live-bed scour was presumed for a level-2 analysis, critical-velocity and shear-stress calculations showed only marginal conditions for live-bed scour at Q100 and Q500. Clear-water scour was thus presumed for the measurements reported here, because armoring was believed to be a factor and actual flows were less than those (Q100 and Q500) used in the level-2 analysis. Determination of scour variables first required adjusting the horizontal stationing of the bridge for the 25-degree skewness to flow. The adjusted section was then plotted and scour variables measured.

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Elevation Reference

Datum: MSL

MSL (ft):

Description of Reference Elevation:

Benchmark is US Coast and Geodetic Survey (USCGS) monument (C564) having elevation 3670.388 from datum of 1988 and located on right upstream concrete abutment. Datum used on Montana Department of Transportation (MDT) drawings does not equal USCGS datum described above. The MDT datum is estimated to be about 3 feet lower (+/- 0.5 ft) than USCGS. The USCGS datum is used throughout this file. Elevations for pier and footings were estimated using USCGS datum and dimensions indicated on the MDT drawings.

Stream Data

Drainage Area (sq mi):	1809	Floodplain Width:	Little
Slope in Vicinity(ft/ft):	0.007	Natural Levees:	Little
Flow Impact:	Straight	Apparent Incision:	None
Channel Evolution	Premodified	Channel Boundary:	Alluvial
Armoring:	High	Banks Tree Cover:	Medium
Debris Frequency:	Occasional	Sinuosity:	Sinuous
Debris Effect:	Local	Braiding:	Locally
Stream Size:	Medium	Anabranching:	Locally
Flow Habit:	Perennial	Bars:	Unknown
Bed Material:	Gravel	Stream Width Variability:	Unknown
Valley Setting:	Moderate		

Roughness Data

Manning's n Values

	Left Overbank	Channel	Right Overbank
High:	0.05	0.045	0.06
Typical	0.05	0.045	0.06
Low:	0.05	0.045	0.06

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Bed Material

Measurement Number	Yr	Mo	Dy	Sampler	D95 (mm)	D84 (mm)	D50 (mm)	D16 (mm)	SP	Shape	Cohesion
1	1993	11	17	Hand	140	90	39	17	2.65		Non-Cohesive

Bed Material Comments

Measurement No: 1

Bridge Data

Structure No: P00004023+07461

Length(ft): 288

Width(ft): 44

Number of Spans: 3

Vertical Configuration: Horizontal

Low Chord Elev (ft): 3664.91

Upper Chord Elev (ft): 3665.21

Overtopping Elev (ft):

Skew (degrees): -25

Guide Banks: None

Waterway Classification: Main

Year Built: 1971

Avg Daily Traffic:

Plans on File: Yes

Parallel Bridges No

Upstream/Downstream: N/A

Continuous Abutment: No

Distance Between Centerlines:

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Distance Between Pier Faces:

Bridge Description:

The bridge is three-span prestressed concrete beams supported at two intermediate spans by concrete piers on spread footings. Abutments are type-III spillthru with concrete abutment ends supported on spread footings. Structural span measured from center of bearings of end bents equals 289 feet per drawing. Span measured in the field pertaining to conveyance of bridge section equals 288 feet. Data describing piers, abutments, and other longitudinal and vertical features are based on USGS survey work for measuring on-site scour, to perform a level-2 analysis, and to perform beta-level verification of the BRISTARS model using scour-related data from the site (planned).

Abutment Data

Left Station: 0

Right Station: 0

Left Skew (deg): 0

Right Skew (deg) 0

Left Abutment Length (ft):

Right Abutment Length (ft)

Left Abutment to Channel Bank (ft):

Right Abutment to Channel Bank (ft):

Left Abutment Protection:

Right Abutment Protection

Contracted Opening Type: III

Embankment Skew (deg): 0

Embankment Slope (ft/ft): 5

Abutment Slope (ft/ft) 2

Wingwalls: No

Wingwall Angle (deg): 0

Pier Data

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Pier ID	Bridge			PierType	# Of Piles	Pile Spacing(ft)
	Station(ft)	Alignment	Highway Station			
1	96	20	0	Single		
2	192	20	0	Single		

Pier ID	Pier			Length(ft)	Protection	Foundation
	Width(ft)	Pier Shape	Shape Factor			
1	4.48	Sharp		50	None	Poured
2	4.48	Sharp		50	None	Poured

Pier ID	Top	Bottom	Foot or Pile	Cap Shape	Pile Tip
	Elevation(ft)	Elevation(ft)	Cap Width(ft)		
1	3641.86	3636.86	8	Square	
2	3641.63	3636.63	8	Square	

Pier Description

Pier ID 1

Because pier is tapered, pier width is average of base and top-most widths.

Pier ID 2

See description for pier P1. Elevations of piers and footings are based on USCG dimensions from MDT drawing no. 9284. No as-built information was used to confirm the elevations shown in this file. Elevations are +/- 0.5 feet.

Pier Scour Data

Pier ID	Date	Time	USOrDS
1	6/6/91	11:15	Upstream
1	6/10/91	12:30	Upstream
1	6/13/91	12:30	Upstream
1	6/18/91	12:45	Upstream
2	6/6/91	11:15	Upstream
2	6/10/91	12:30	Upstream
2	6/13/91	12:30	Upstream
2	6/18/91	12:45	Upstream

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Pier ID	Scour Depth	Accuracy (ft)	Side Slope (ft/ft)	TopWidth (ft)	Apprch Vel (ft/s)	Apprch Depth(ft)	Effective Pier Width	Skew to Flow(deg)
1	3.7	0.3	7	54	8.35	8.6	4.3	5
1	2.7	0.3	12.4	47	7.04	6.4	4.3	5
1	2.7	0.3	7.6	45	6.98	7.5	4.3	5
1	3.2	0.3	9.8	45	5	4.6	4.3	5
2	2.6	0.3	6.4	45	6.53	7.1	4.3	5
2	3	0.3	6.7	45	6.01	5.6	4.3	5
2	2.8	0.3	8.7	45	6.98	6.3	4.3	5
2	3	0.3	7	45	3.63	4.1	4.3	5

PierID	Sediment Transport	Bed Material	BedForm	Trough (ft)	Crest (ft)	Sigma	Debris Effects
1	Clear-water	Non-cohesive	Unknown			2.3	Insignificant
1	Clear-water	Non-cohesive	Unknown			2.3	Insignificant
1	Clear-water	Non-cohesive	Unknown			2.3	Insignificant
1	Clear-water	Non-cohesive	Unknown			2.3	Insignificant
2	Clear-water	Non-cohesive	Unknown			2.3	Insignificant
2	Clear-water	Non-cohesive	Unknown			2.3	Insignificant
2	Clear-water	Non-cohesive	Unknown			2.3	Insignificant
2	Clear-water	Non-cohesive	Unknown			2.3	Insignificant

PierID	D95 (mm)	D84 (mm)	D50 (mm)	D16 (mm)
1	140	90	39	17
1	140	90	39	17
1	140	90	39	17
1	140	90	39	17
2	140	90	39	17
2	140	90	39	17
2	140	90	39	17
2	140	90	39	17

Pier Scour Comments

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Pier ID 1 **Time:** 11:15 **US/DS:** Upstream

Measurements made from bridge w/sounding wt and reel. Effective pier width is avg at WSEL and at reference surface used to measure to base of scour hole. Approach velocity was estimated w/current meter at several stations located away from pier acceleration zone using the two-point velocity method.

Pier ID 1 **Time:** 12:30 **US/DS:** Upstream

See 6/6/91 description for P1.

Pier ID 1 **Time:** 12:30 **US/DS:** Upstream

See 6/6/91 description.

Pier ID 1 **Time:** 12:45 **US/DS:** Upstream

See 6/6/91 description for P1.

Pier ID 2 **Time:** 11:15 **US/DS:** Upstream

See 6/6/91 description for P1.

Pier ID 2 **Time:** 12:30 **US/DS:** Upstream

See 6/10/91 description for P1.

Pier ID 2 **Time:** 12:30 **US/DS:** Upstream

See 6/13/91 description for P1.

Pier ID 2 **Time:** 12:45 **US/DS:** Upstream

See 6/18/91 description for P1.

Abutment Scour

Contraction Scour

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Stage and Discharge Data

Peak Discharge					Flow (cfs)	Qacc	Peak Stage					Stage (ft)	Water Temp (C)	Return Period(yr)
year	mo	dy	hr	mi			year	mo	dy	hr	mi			
1992	10	8		0	270					0				
1991	6	18		0	3890					0				
1991	6	13		0	8070					0			2	
1991	6	10		0	6740					0			2	
1991	6	6		0	10100					0			10	
1991	5	8		0	380					0				

Hydrograph

Hydrograph Number	Year	Month	Day	Hr	Min	Sec	Stage(ft)	Discharge (cfs)
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Supporting Files

Photos of the Site (Dscn prefix; .jpg formats):

Description

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- 172. Looking from right to left across upstream side of bridge.
 - 173. Looking upstream along right bank
 - 174. Looking upstream along left bank
 - 175. Looking downstream