BSDMS Summary Report

91 Conehoma Creek at State Highway 35, near Kosciusko, Mississippi

Site Location:

Site ID: 91

Site Name: Conehoma Creek at State Highway 35, near Kosciusko, Mississippi

County: Attala

Nearest City: Kosciusko

State: MS

Latitude: 330022

Longitude: 893356

USGS Station ID:

Route Number: 35

Route Class: State

Service Level: Mainline

Route Direction: NA

Highway Mile Point:

Stream Name: Conehoma Creek

River Mile:

Contact:

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Publication:

Site Description:

The State Highway 35 crossing of Conehoma Creek consists of a 120-foot-long bridge near station 1642+58 (Bridge No. 153.1) with a span arrangement of 2 spans at 20 ft (feet), 1 span at 40 ft, and 2 spans at 20 ft. The bridge has 2 intermediate single-pile bents (nos. 2 & 5) and 2 intermediate double-pile bents (nos. 3 & 4). Both abutments are partially riprapped. Construction of the bridge was completed in 1941.

The drainage area at the site is about 10.3 mi2 (square miles). The length of the channel from the site to the basin divide is about 6.0 mi (miles) and the average slope of the channel between points located at 10 and 85 percent of the length is about 17 ft/mi (feet per mile). Average channel and valley slopes in the vicinity of the crossing are about 5.4 ft/mi. The highway alignment is near normal to the channel and the flood plain in the vicinity of the crossing. Conehoma Creek converges with Yockanookany River about 2 ½ mi downstream of the State Highway 35 crossing (fig. 1).

The floods of April 12, 1979, and April 5, 2001, were significant at this site. The 1979 and 2001 flood hydraulics and scour estimates are presented in this report. The estimated peak discharges for both of these floods were greater than the 100-year flood estimated using procedures outlined in the 1991 USGS report, "Flood Characteristics of Mississippi Streams."

The USGS recovered flood marks on May 9, 1979, along the upstream and downstream sides of the highway following the extreme flood of April 12, 1979. A bridge cross

section, an approach cross section, and the flood marks were surveyed and photographs were taken by a private contractor in June 1979. The flood crested at an elevation of 402.6 ft at the downstream side of the bridge. The cross section surveyed at the downstream side of the bridge in June 1979 indicates scour occurred at the bridge during the flood. The scour likely occurred as the flood was peaking and perhaps beginning to recede.

The MDOT obtained photographs and ground-to-grade information at the site on April 9, 2001, after the severe flooding that occurred on April 5. The USGS flagged flood marks along the upstream and downstream sides of the highway on April 9, 2001, and surveyed these marks and additional channel geometry on February 13, 2002. The bridge section was surveyed during the site visit on October 27, 1994, for a scour evaluation report provided to the MDOT on February 10, 1995. When the 1979 and 1994 bridge sections were compared, it was apparent that some repairs (probably consisting of some earthwork and riprap) had been made, but no details were available at the time of this report. The flood crested at an elevation of 401.7 ft at the downstream side of the bridge. The cross sections surveyed at the downstream side of the bridge in April 2001 and February 2002 indicate scour occurred at the bridge during the flood.

Bed samples collected by the USGS on October 27, 1994, indicated the channel material was fine sand with a D84 of 0.29 mm, D50 of 0.10 mm, D16 of 0.017 mm, and a gradation coefficient of about 4.1. Based on MDOT geotechnical reports in the area, the stream has very likely scoured down into or near the top of the Zilpha Clay formation during the floods of April 12, 1979, and the April 5, 2001. A 1997 MDOT geotechnical report for Yockanookany River at proposed State Highway 14 Bypass of Kosciusko, located about 1.9 mi northwest of this site, indicates that the top of the Zilpha formation possesses a cohesion of about 1,320 lb/ft3, a friction angle of 31 degrees, and a unit weight of 119 lb/ft3. Gradation tests suggest that the top of the formation has a D84 of about 0.37 mm, D50 of 0.16 mm, D16 of 0.026 mm, and a gradation coefficient of about 3.8. The 1941 test-pile reports at this site noted that soil borings indicated sand stone at elevation 377.0 ft, and indicated a significant increase in bearing capacity at about the same elevation. So, the top of the Zilpha formation is likely at about elevation 377 ft at this site.

Elevation Reference

Datum: MSL

MSL (ft):

Description of Reference Elevation:

Elevations presented are to MDOT Datum from the bridge plans, which appears to be National Geodetic Vertical Datum of 1929 at this site.

Stream Data

Drainage Area (sq mi):	10.3	**Floodplain Width:**	Wide
Slope in Vicinity(ft/ft):	.0010	**Natural Levees:**	Unknown
Flow Impact:	Straight	**Apparent Incision:**	None
Channel Evolution	Unknown	**Channel Boundary:**	Alluvial

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Armoring:	None	**Banks Tree Cover:**	Medium
Debris Frequency:	Unknown	**Sinuosity:**	Sinuous
Debris Effect:	Unknown	**Braiding:**	None
Stream Size:	Medium	**Anabranching:**	Unknown
Flow Habit:	Perennial	**Bars:**	Unknown
Bed Material:	Sand	**Stream Width Variability:**	Unknown
Valley Setting:	Low		

Roughness Data

Manning's n Values

	Left Overbank	Channel	Right Overbank
High:			
Typical			
Low:			

Bed Material

Measurement Number	Yr	Mo	Dy	Sampler	D95 (mm)	D84 (mm)	D50 (mm)	D16 (mm)	SP	Shape	Cohesion
1				Grab		0.3	0.1	0.02	2.65		Non-Cohesive
2				Grab		0.4	0.16	0.03			Cohesive

Bed Material Comments

Measurement No: 1

Bed samples collected at the SR 35 bridge site in the main channel; gradation coefficient of 4.1

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Measurement No: 2

This measurement was taken in the Zilpha Clay formation, which based on MDOT geotechnical reports in the area, the stream has very likely scoured down into or near the top of this formation during the floods of April 12, 1979, and the April 5, 2001. A 1997 MDOT geotechnical report for Yockanookany River at proposed State Highway 14 Bypass of Kosciusko, located about 1.9 mi northwest of this site, indicates that the top of the Zilpha formation possesses a cohesion of about 1,320 lb/ft3, a friction angle of 31 degrees, and a unit weight of 119 lb/ft3. Gradation tests suggest that the top of the formation has a D84 of about 0.37 mm, D50 of 0.16 mm, D16 of 0.026 mm, and a gradation coefficient of about 3.8. The 1941 test-pile reports at this site noted that soil borings indicated sand stone at elevation 377.0 ft, and indicated a significant increase in bearing capacity at about the same elevation. So, the top of the Zilpha formation is likely at about elevation 377 ft at this site.

Bridge Data

Structure No: 153.1

Length(ft): 120

Width(ft): 27

Number of Spans: 5

Vertical Configuration: Horizontal

Low Chord Elev (ft): 401

Upper Chord Elev (ft): 401.8

Overtopping Elev (ft): 404.4

Skew (degrees): 0

Guide Banks: None

Waterway Classification: Main

Year Built: 1941

Avg Daily Traffic: 4200

Plans on File: Yes

Parallel Bridges No

Upstream/Downstream: N/A

Continuous Abutment: Yes

Distance Between Centerlines:

Distance Between Pier Faces:

Bridge Description:

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Abutment Data

Left Station: 1642.58

Right Station: 1643.78

Left Skew (deg): 0

Right Skew (deg) 0

Left Abutment Length (ft): 707

Right Abutment Length (ft) 1344

Left Abutment to Channel Bank (ft): 741

Right Abutment to Channel Bank (ft): 1388

Left Abutment Protection: Riprap

Right Abutment Protection Riprap

Contracted Opening Type: IV

Embankment Skew (deg):

Embankment Slope (ft/ft): 1.5

Abutment Slope (ft/ft) 1.5

Wingwalls: No

Wingwall Angle (deg):

Pier Data

Pier ID	Bridge Station(ft)	Alignment	Highway Station	PierType	# Of Piles	Pile Spacing(ft)
1	20	0		Group	4	7
2	40	0		Group	8	7
3	80	0		Group	8	7

4	100	0		Group	4	7

Pier ID	Pier Width(ft)	Pier Shape	Shape Factor	Length(ft)	Protection	Foundation
1	1.2	Cylindrical		21	Unknown	Piles
2	3	Cylindrical		21	Unknown	Piles
3	3	Cylindrical			Unknown	Piles
4	1.2	Cylindrical			Unknown	Piles

Pier ID	Top Elevation(ft)	Bottom Elevation(ft)	Foot or Pile Cap Width(ft)	Cap Shape	Pile Tip Elevation(ft)
1				Unknown	374
2				Unknown	375
3				Unknown	376
4				Unknown	376

Pier Description

Pier ID 1

Pier #1 is an intermediate pile bent consisting of 4 cylindrical timber piles. Pier numbering is from left to right looking downstream.

Pier ID 2

Pier #2 is an intermediate pile bent consisting of 8 cylindrical timber piles. Pier numbering is from left to right looking downstream.

Pier ID 3

Pier #3 is an intermediate pile bent consisting of 8 cylindrical timber piles. Pier numbering is from left to right looking downstream.

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Pier ID 4

Pier #4 is an intermediate pile bent consisting of 4 cylindrical timber piles. Pier numbering is from left to right looking downstream.

Pier Scour Data

Abutment Scour

ContractionScour

Measurement Number	Contracted Date	Contracted Time	Uncontracted Date	Uncontracted Time	US/DS	Scour Depth(ft)
1	4/12/1979		4/12/1979			4
2	4/5/2001		4/5/2001			6

Measurement Number	Accuracy	Contracted Avg Vel(ft/s)	Contracted Discharge(cfs)	Contracted Depth(ft)	Contracted Width(ft)
1	1	9.27	8973	12.9	76
2	3	9.25	6750	9.4	75

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Measurement Number	Uncontracted Avg Vel(ft/s)	Uncontracted Discharge(cfs)	Uncontracted Depth(ft)	Uncontracted Width(ft)	Channel Contraction Ratio
1	0.95	10200	14.2	42	
2	0.68	6750	13.8	42	

Measurement Number	Pier Contraction Ratio	Scour Location	Eccent-ricity	Sediment Transport	Bed Form	Debris Effects
1		Main Channel		Live-bed	Unknown	nsignifican
2		Main Channel		Live-bed	Unknown	nsignifican

Measurement Number	D95 (mm)	D84 (mm)	D50 (mm)	D16 (mm)	Sigma Bed Material	Bed Material
1		0.29	0.1	0.017		Non-Cohesive
2						Non-Cohesive

Contraction Scour Comments

Measurement No. 1

Left overbank scour
measurement.
Contraction scour was estimated for the floods of April 12, 1979, and April 5, 2001, and compared to measured scour. Since the measured scour was based on a post-flood sections, infilling could possibly suggest measured scour depths less than what actually occurred. Contraction scour characteristics included in the database were taken from the WSPRO model.
The HEC-18 estimated post-scour elevations suggest that the bridge would have collapsed during both the 1979 and 2001 floods because the piling would have been undermined. Keeping the same subarea stationing limits for the post-scour section as were used for the pre-scour section so that a consistent top width could be determined, the average depths for pre- and post-scour conditions were determined for the overbank and the main channel. These pre- and post-scour depths were used to determine average contraction (mostly) scour depths in the overbank and main-channel areas.
April 12, 1979: HEC-18 method suggested about 3, 19, and 3 ft of contraction scour in the left (south) overbank, main channel, and right (north) overbank, respectively. HEC-18 method for pressure-flow conditions suggested about 2, 27, and 0 ft of contraction scour in the left (south) overbank, main channel, and right (north) overbank, respectively.

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Measurement No. 2

Contraction scour was estimated for the floods of April 12, 1979, and April 5, 2001, and compared to measured scour. Since the measured scour was based on a post-flood sections, infilling could possibly suggest measured scour depths less than what actually occurred. The only approach cross-section data available for the site was surveyed just after the 1979 flood. Channelization of the reach downstream of the bridge has lead to significant changes in the channel. The accuracy of the scour observations, especially for the 2001 flood, is degraded due to the absence of a reliable reference surface.

Contraction scour characteristics included in the database were taken from the WSPRO model.
The HEC-18 estimated post-scour elevations suggest that the bridge would have collapsed during both the 1979 and 2001 floods because the piling would have been undermined. Keeping the same subarea stationing limits for the post-scour section as were used for the pre-scour section so that a consistent top width could be determined, the average depths for pre- and post-scour conditions were determined for the overbank and the main channel. These pre- and post-scour depths were used to determine average contraction (mostly) scour depths in the overbank and main-channel areas.

April 5, 2001: About 0, 8, and 2 ft of mostly contraction scour occurred in the left (south) overbank, main channel, and right (north) overbank, respectively. HEC-18 method suggested about 3, 19, and 4 ft of contraction scour in the left (south) overbank, main channel, and right (north) overbank, respectively. HEC-18 method for pressure-flow conditions suggested about 1, 19, and 2 ft of contraction scour in the left (south) overbank, main channel, and right (north) overbank, respectively.

Stage and Discharge Data

Peak Discharge					Flow		Peak Stage					Stage	Water	Return
year	mo	dy	hr	mi	(cfs)	Qacc	year	mo	dy	hr	mi	(ft)	Temp (C)	Period(yr)
					10,200							405.0		
					6,800							401.7		

Hydrograph

Supporting Files

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