

BSDMS Summary Report

29 Pearl River at eastbound U.S. 98 near Columbia, MS

Site Location:

Site ID:	29	
Site Name:	Pearl River at eastbound U.S. 98 near Columbia, MS	
County:	Marion	
Nearest City:	Columbia	Contact:
State:	MS	U.S. Geological Survey, WRD, MS. District
Latitude:	311414	100 W. Capitol Street, Suite 710 Jackson, MS. 39269 (601) 965-4600
Longitude:	895054	
USGS Station ID:	2489000	
Route Number:	98	
Route Class:	US	Publication:
Service Level:	Mainline	Turnipseed, D.P., and Smith, J.A., 1992, Monitoring lateral movement of channel banks on the Pearl River in Mississippi: Mississippi Water Resources Conference Proceedings, 1992, p.101-108.
Route Direction:	East	
Highway Mile Point:	118.5	
Stream Name:	Pearl River	
River Mile:		

Site Description:

This is a 696-ft-long bridge crossing the Pearl River about 1.5 mi southwest of Columbia at river mile 137.8. This entry is for the eastbound lanes, which are downstream from the westbound lanes. The bridge has four piers (pier nos. 4-7) within the low-water channel and pier no. 8 near the right (west) edge of the low-water channel. Pier nos. 3-6 consist of two rectangular, vertically tapered piers with a connecting web wall. Pier nos. 2 and 7-9 consist of two rectangular, vertically tapered piers with no connecting web wall. The upstream side of this bridge is 78 ft downstream from the upstream side of the westbound-lane bridge. The bridge is in a 190-ft-long vertical curve with 0.35% approach grades. The spill-through slopes at the abutments are earthen. Riprap is scattered on the left bank through the bridge opening and is scattered in the vicinity of pier no. 4, which should have an effect on the local scour.

The upstream left (east) bank has experienced lateral erosion in recent years. The bridge crossing is in a channel reach in a transition between a 125-degree bend about 1,700 ft upstream and a 145-degree bend about 1,100 ft downstream from the bridge. In an effort to control the bank erosion on the left bank, five flow deflectors were constructed along the left bank in 1985-86 from the bridge to about 1,600 ft upstream.

Scour data were collected during high and low flows using a fathometer. The flow velocities approaching the bridge piers were estimated using the velocities measured at the upstream side of the upstream bridge, about 78 ft upstream of this bridge. Therefore, the change in flow velocity that may have

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occurred between the upstream bridge and the upstream side of this downstream bridge is not accountable.

On October 4-9, 1991, bed samples were collected from the main channel at selected intervals along three channel cross sections. Individual samples with similar characteristics were combined for gradation analyses. The following is a brief description of the bed samples collected:

Cross Section	Distance Upstream	Sample	Comments
1	180 ft	1	Represents right part of channel begin near station 8180.
1	180 ft	2	Represents left part of channel end near station 8180.
2	1,200 ft	3	Within main flow of low-water channel, from tip of 4th jetty upstream to about 100 ft right.
2	1,200 ft	4	Right part of channel, 175ft from tip of 4th jetty to RWE
2	1,200 ft	5	Near upstream end of 4th jetty.
3	2,100 ft	6	At upstream end of sand/gravel bar, all samples here combined.

No bed samples were obtained at the piers due to debris, etc. Based on rod probings at the piers, the material at the base of the piers is thought to be mostly gravel with some sand and debris. Also, soil borings by the MDOT indicate gravel. Therefore, bed sample no. 6 was selected as representative.

Elevation Reference

Datum: MSL

MSL (ft):

Description of Reference Elevation:

Wire-weight gage attached to the upstream side of the upstream bridge. Check-bar reading at 61.00 ft (elev. 176.81 ft (NGVD)).
Centerline elevation of downstream bridge at the left (east) abutment (Elev. 155.46 ft).
BM-6.-- Chiseled square on downstream streamward corner of bridge seat of left (east) abutment (Elev. 151.47 ft).

Stream Data

Drainage Area (sq mi):	5720	Floodplain Width:	Wide
Slope in Vicinity(ft/ft):	0.000189	Natural Levees:	Little
Flow Impact:	Right	Apparent Incision:	None
Channel Evolution	Unknown	Channel Boundary:	Alluvial
Armoring:	Unknown	Banks Tree Cover:	Medium
Debris Frequency:	Occasional	Sinuosity:	Meandering
Debris Effect:	Local	Braiding:	None
Stream Size:	Wide	Anabranching:	None

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Flow Habit: Unknown Bars: Narrow
Bed Material: Gravel Stream Width Variability: Random
Valley Setting: Moderate

Roughness Data

Manning's n Values

	Left Overbank	Channel	Right Overbank
High:			
Typical	0.18	0.03	0.18
Low:			

Bed Material

Measurement Number	Yr	Mo	Dy	Sampler	D95 (mm)	D84 (mm)	D50 (mm)	D16 (mm)	SP	Shape	Cohesion
1	1991	10	4	BMH-60	5.8	0.4	0.25	0.16	2.65		Non-Cohesive
2	1991	10	4	BMH-60	0.28	0.2	0.14	0.09	2.65		Non-Cohesive
3	1991	10	4	BMH-60	17.3	10	2.1	0.35	2.65		Non-Cohesive
4	1991	10	4	BMH-60	15	10	2	0.33	2.65		Non-Cohesive
5	1991	10	9	BMH-60	0.86	0.5	0.32	0.13	2.65		MILD
6	1991	10	9	SHOVEL	20	15	6.9	0.39	2.65		Non-Cohesive

Bed Material Comments

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Measurement No: 1

On October 4-9, 1991, bed samples were collected from the main channel at selected intervals along three channel cross sections. Individual samples with similar characteristics were combined for gradation analyses. The following is a brief description of the bed samples collected:

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1	180 ft		1	Represents right part of channel begin near station 8180.
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2	1,200 ft		4	Right part of channel, 175ft from tip of 4th jetty to RWE
2	1,200 ft		5	Near upstream end of 4th jetty.
3	2,100 ft		6	At upstream end of sand/gravel bar, all samples here combined.

No bed samples were obtained at the piers due to debris, etc. Based on rod probings at the piers, the material at the base of the piers is thought to be mostly gravel with some sand and debris. Also, soil borings by the MDOT indicate gravel. Therefore, bed sample no. 6 was selected as representative.

Measurement No: 2

On October 4-9, 1991, bed samples were collected from the main channel at selected intervals along three channel cross sections. Individual samples with similar characteristics were combined for gradation analyses. The following is a brief description of the bed samples collected:

Section	Cross Upstream	Distance	Sample	Comments
1	180 ft		1	Represents right part of channel begin near station 8180.
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2	1,200 ft		3	Within main flow of low-water channel, from tip of 4th jetty upstream to about 100 ft right.
2	1,200 ft		4	Right part of channel, 175ft from tip of 4th jetty to RWE
2	1,200 ft		5	Near upstream end of 4th jetty.
3	2,100 ft		6	At upstream end of sand/gravel bar, all samples here combined.

No bed samples were obtained at the piers due to debris, etc. Based on rod probings at the piers, the material at the base of the piers is thought to be mostly gravel with some sand and debris. Also, soil borings by the MDOT indicate gravel. Therefore, bed sample no. 6 was selected as representative.

Measurement No: 3

On October 4-9, 1991, bed samples were collected from the main channel at selected intervals along three channel cross sections. Individual samples with similar characteristics were combined for gradation analyses. The following is a brief description of the bed samples collected:

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2	1,200 ft		3	Within main flow of low-water channel, from tip of 4th jetty upstream to about 100 ft right.
2	1,200 ft		4	Right part of channel, 175ft from tip of 4th jetty to RWE
2	1,200 ft		5	Near upstream end of 4th jetty.
3	2,100 ft		6	At upstream end of sand/gravel bar, all samples here combined.

No bed samples were obtained at the piers due to debris, etc. Based on rod probings at the piers, the material at the base of the piers is thought to be mostly gravel with some sand and debris. Also, soil borings by the MDOT indicate gravel. Therefore, bed sample no. 6 was selected as representative.

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Measurement No: 4

On October 4-9, 1991, bed samples were collected from the main channel at selected intervals along three channel cross sections. Individual samples with similar characteristics were combined for gradation analyses. The following is a brief description of the bed samples collected:

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1	180 ft		1	Represents right part of channel begin near station 8180.
1	180 ft		2	Represents left part of channel end near station 8180.
2	1,200 ft		3	Within main flow of low-water channel, from tip of 4th jetty upstream to about 100 ft right.
2	1,200 ft		4	Right part of channel, 175ft from tip of 4th jetty to RWE
2	1,200 ft		5	Near upstream end of 4th jetty.
3	2,100 ft		6	At upstream end of sand/gravel bar, all samples here combined.

No bed samples were obtained at the piers due to debris, etc. Based on rod probings at the piers, the material at the base of the piers is thought to be mostly gravel with some sand and debris. Also, soil borings by the MDOT indicate gravel. Therefore, bed sample no. 6 was selected as representative.

Measurement No: 5

On October 4-9, 1991, bed samples were collected from the main channel at selected intervals along three channel cross sections. Individual samples with similar characteristics were combined for gradation analyses. The following is a brief description of the bed samples collected:

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1	180 ft		1	Represents right part of channel begin near station 8180.
1	180 ft		2	Represents left part of channel end near station 8180.
2	1,200 ft		3	Within main flow of low-water channel, from tip of 4th jetty upstream to about 100 ft right.
2	1,200 ft		4	Right part of channel, 175ft from tip of 4th jetty to RWE
2	1,200 ft		5	Near upstream end of 4th jetty.
3	2,100 ft		6	At upstream end of sand/gravel bar, all samples here combined.

No bed samples were obtained at the piers due to debris, etc. Based on rod probings at the piers, the material at the base of the piers is thought to be mostly gravel with some sand and debris. Also, soil borings by the MDOT indicate gravel. Therefore, bed sample no. 6 was selected as representative.

Measurement No: 6

On October 4-9, 1991, bed samples were collected from the main channel at selected intervals along three channel cross sections. Individual samples with similar characteristics were combined for gradation analyses. The following is a brief description of the bed samples collected:

Section	Cross Distance	Upstream	Sample	Comments
1	180 ft		1	Represents right part of channel begin near station 8180.
1	180 ft		2	Represents left part of channel end near station 8180.
2	1,200 ft		3	Within main flow of low-water channel, from tip of 4th jetty upstream to about 100 ft right.
2	1,200 ft		4	Right part of channel, 175ft from tip of 4th jetty to RWE
2	1,200 ft		5	Near upstream end of 4th jetty.
3	2,100 ft		6	At upstream end of sand/gravel bar, all samples here combined.

No bed samples were obtained at the piers due to debris, etc. Based on rod probings at the piers, the material at the base of the piers is thought to be mostly gravel with some sand and debris. Also, soil borings by the MDOT indicate gravel. Therefore, bed sample no. 6 was selected as representative.

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Bridge Data

Structure No: 118.5B
Length(ft): 696
Width(ft): 27
Number of Spans: 9
Vertical Configuration: Curvilinear
Low Chord Elev (ft): 147.5
Upper Chord Elev (ft): 151.5
Overtopping Elev (ft): 155.2
Skew (degrees): 0
Guide Banks: None
Waterway Classification: Main
Year Built: 1933
Avg Daily Traffic: 5295
Plans on File: Yes
Parallel Bridges: Yes
Upstream/Downstream: Downstream
Continuous Abutment: No
Distance Between Centerlines: 75
Distance Between Pier Faces: 51
Bridge Description:

Abutment Data

Left Station: 7738
Right Station: 8434
Left Skew (deg): 0
Right Skew (deg): 0

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Left Abutment Length (ft):
 Right Abutment Length (ft)
 Left Abutment to Channel Bank (ft): 120
 Right Abutment to Channel Bank (ft): 50
 Left Abutment Protection:
 Right Abutment Protection
 Contracted Opening Type: III
 Embankment Skew (deg): 0
 Embankment Slope (ft/ft): 3
 Abutment Slope (ft/ft) 1.5
 Wingwalls: No
 Wingwall Angle (deg): 0

Pier Data

Pier ID	Bridge Station(ft)	Alignment	Highway Station	PierType	# Of Piles	Pile Spacing(ft)
4	7950	-78	7920	Single	0	
5	8140	-78	8140	Single	0	
6	8270	-78	8270	Single	0	
7	8311	-78	8311	Group	2	19.8

Pier ID	Pier Width(ft)	Pier Shape	Shape Factor	Length(ft)	Protection	Foundation
4	6	Square		26.8	Unknown	Poured
5	6	Square		26.8	Unknown	Poured
6	5.2	Square		26.5	Unknown	Poured
7	3.2	Square		23	Unknown	Poured

Pier ID	Top Elevation(ft)	Bottom Elevation(ft)	Foot or Pile Cap Width(ft)	Cap Shape	Pile Tip Elevation(ft)
4	115.1	93.7	10	Square	78

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5	115.1	94.4	10	Square	74
6	116.8	103.8	9.8	Round	85
7	124.7		5.2	Square	90

Pier Description

Pier ID 4

Pier consists of two 32-ft-high by 4.9-ft-long (at base) vertically tapered columns with a height of 9 ft at 4 ft wide, 11 ft at 5 ft wide, 12 ft at 6 ft wide connected by a 17.0-ft-long by 18-inch-wide web wall on a 10-ft-wide by 35-ft-long by 20-ft-deep concrete footing supported by untreated wooden piles.

Pier ID 5

Pier consists of two 32-ft-high by 4.9-ft-long (at base) vertically tapered columns with a height of 9 ft at 4 ft wide, 11 ft at 5 ft wide, 12 ft at 6 ft wide connected by a 17.0-ft-long by 18-inch-wide web wall on a 10-ft-wide by 35-ft-long by 20-ft-deep concrete footing supported by untreated wooden piles.

Pier coordinates for pier ID 5:

-3.0	115.1
-3.0	126.9
-2.5	127.1
-2.5	137.9
-2.0	138.1
-2.0	147.1
2.0	147.1
2.0	138.1
2.5	137.9
2.5	127.1
3.0	126.9
3.0	115.1
5.0	115.1
5.0	94.4
-5.0	94.4
-5.0	115.1
3.0	115.1

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Pier ID 6

Pier consists of two 29-ft-high by 4.6-ft-long (at base) vertically tapered columns with a height of 8 ft at 3.5 ft wide, 11 ft at 4.3 ft wide, and 10 ft at 5.2 ft wide connected by a 17.3-ft-long, 1.0-ft-wide web wall. Each column is on a 9.8-ft-dia., 13-ft-deep concrete footing with untreated wooden piles.

Pier coordinates for pier ID 6:

-2.585	116.8
-2.585	126.6
-2.165	126.8
-2.165	137.6
-1.75	137.8
-1.75	145.8
1.75	145.8
1.75	137.8
2.165	137.6
2.165	126.8
2.585	126.6
2.585	116.8
4.915	116.8
4.915	103.8
-4.915	103.8
-4.915	116.8
2.585	116.8

Pier ID 7

Pier consists of two 26.6-ft-high by 3.2-ft-long (at base) vertically tapered columns with a height of 11.3 ft at 2.5 ft wide by 2.5 ft long and 15.3 ft at 3.2 ft wide by 3.2 ft long spaced 19.8 ft apart on two 5.2-ft-wide by 7.4-ft-long footing (includes sheet-piling cofferdam that has been installed).

Pier coordinates for pier ID 7:

-2.6	110.0
-2.6	124.7
-1.585	124.7
-1.585	139.6
-1.25	139.9
-1.25	151.2
1.25	151.2
1.25	139.9
1.585	139.6
1.585	124.7
-1.585	124.7
2.6	124.7
2.6	110.0

Pier Scour Data

Pier ID	Date	Time	USOrDS
4	1/30/90	14:15	Downstream
4	5/10/91	14:45	Upstream
5	1/30/90	14:15	Upstream
5	5/10/91	14:45	Downstream
6	1/30/90	14:15	Upstream
6	5/10/91	14:45	Downstream

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7 1/30/90 14:15 Upstream
 7 5/10/91 14:45 Downstream

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)
4	4.8	0.5	3.1	35	7	22.3	5.4	14
4	2.3	0.5	3.3	21	7	24.6	5.4	8
5	5.3	0.5	2.8	35	6.5	28.1	6.1	8
5	3.9	0.5	4.4	47	6.4	28.9	6	11
6	5.7	1	2.6	37	3.5	26.4	5.5	0
6	7.4	1	3	61	5.1	30.1	5.7	11
7	4.1	0.5	3.8	27	1.9	23	3.9	0
7	2.5	1	3	35	2.9	28.9	4.1	0

PierID	Sediment Transport	Bed Material	BedForm	Trough (ft)	Crest (ft)	Sigma	Debris Effects
4	Live-bed	Non-cohesive	Unknown			6.2	Insignificant
4	Live-bed	Non-cohesive	Unknown			6.2	Insignificant
5	Live-bed	Non-cohesive	Unknown			6.2	Insignificant
5	Live-bed	Non-cohesive	Unknown			6.2	Insignificant
6	Live-bed	Non-cohesive	Unknown			6.2	Insignificant
6	Live-bed	Non-cohesive	Unknown			6.2	Insignificant
7	Live-bed	Non-cohesive	Unknown			6.2	Insignificant
7	Live-bed	Non-cohesive	Unknown			6.2	Insignificant

PierID	D95 (mm)	D84 (mm)	D50 (mm)	D16 (mm)
4	20	15	6.9	0.39
4	20	15	6.9	0.39
5	20	15	6.9	0.39
5	20	15	6.9	0.39
6	20	15	6.9	0.39
6	20	15	6.9	0.39
7	20	15	6.9	0.39
7	20	15	6.9	0.39

Pier Scour Comments

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Pier ID 4 **Time:** 14:15 **US/DS:** Downstream

Reference bed is at elev. 116.8 ft at downstream side. No defined scour hole is on upstream side. Minimum bed is at downstream side at 112.0 ft. At upstream side, bed is at 116.4 ft. Scour-hole depth = $116.8 - 112.0 = 4.8$ ft.

Effective pier width is a depth-weighted average of the irregular pier widths.

Pier ID 4 **Time:** 14:45 **US/DS:** Upstream

Reference bed is at elev. 115.8 ft.
Minimum bed elev. at pier is at upstream side at 113.5 ft.
Scour-hole depth = $115.8 - 113.5 = 2.3$ ft.

Effective pier width is a depth-weighted average of the irregular pier widths.

Pier ID 5 **Time:** 14:15 **US/DS:** Upstream

Reference bed is at elev. 111.0 ft.
Minimum bed elev. At pier is at upstream side at 105.7 ft.
Scour-hole depth = $111.0 - 105.7 = 5.3$ ft.

Effective pier width is a depth-weighted average of the irregular pier widths.

Pier ID 5 **Time:** 14:45 **US/DS:** Downstream

Reference bed at downstream side of pier is at elev. 111.5 ft.
Minimum bed elev. at pier is at downstream side at 107.6 ft.
Scour-hole depth = $111.5 - 107.6 = 3.9$ ft, at us side, $111.7 - 108.6 = 3.1$ ft.

Effective pier width is a depth-weighted average of the irregular pier widths.

Pier ID 6 **Time:** 14:15 **US/DS:** Upstream

Reference bed is at elev. 112.7 ft.
Minimum bed elev. at pier is at upstream side at 107.0 ft (rough soundings).
Scour-hole depth = $112.7 - 107.0 = 5.7$ ft.

Effective pier width is a depth-weighted average of the irregular pier widths.

Pier ID 6 **Time:** 14:45 **US/DS:** Downstream

Reference bed is at elev. 110.3 ft at downstream side.
Minimum bed elev. at pier is at downstream side at 102.9 ft (rough soundings).
Scour-hole depth = $110.3 - 102.9 = 7.4$ ft, at us side, $110.7 - 105.7 = 5.0$ ft.

Effective pier width is a depth-weighted average of the irregular pier widths.

Pier ID 7 **Time:** 14:15 **US/DS:** Upstream

Reference bed is at elev. 116.1 ft.
Minimum bed elev. at pier is at upstream side at 112.0 ft.
Scour-hole depth = $116.1 - 112.0 = 4.1$ ft.

Effective pier width is a depth-weighted average of the irregular pier widths.

Pier ID 7 **Time:** 14:45 **US/DS:** Downstream

Reference bed at upstream side is at elev 111.5 ft. Minimum bed at upstream side is at 109.0 ft. At downstream side, bed is at 108.6 ft, but there is no defined hole. Scour-hole depth = $111.5 - 109.0 = 2.5$ ft.

Effective pier width is a depth-weighted average of the irregular pier widths.

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Abutment Scour

Contraction Scour

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			
1990	1	27	13:35	35	73000	5	1990	1	27	13:35	35	140.38		25
1991	5	10	13:20	20	71700	5	1991	5	10	13:20	20	140.37		25
				0		none	1990	1	30		0	139.09		
				0		none	1990	2	5		0	134.73		
				0		none	1990	2	14		0	134.09		
				0		none	1990	3	28		0	123.43		

Hydrograph

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