BSDMS Summary Report

26 Pearl River at westbound S.R. 25 at Jackson, MS

Site Location:

Site ID: 26

Site Name: Pearl River at westbound S.R. 25 at Jackson, MS

County: Hinds

Nearest City: Jackson

State: MS

Latitude: 321956

Longitude: 900742

USGS Station ID: 2485735

Route Number: 25

Route Class: State

Service Level: Mainline

Route Direction: West

Highway Mile Point: 1.7

Stream Name: Pearl River

River Mile:

Contact:
U.S. Geological Survey, WRD, MS. District
100 W. Capitol Street, Suite 710
Jackson, MS. 39269

Publication:
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.

Site Description:

This is an 1,180-ft-long bridge crossing the Pearl River at Jackson at river mile 292.5. At this crossing, State Highway 25 is also known as Lakeland Drive. This entry is for the westbound lanes, which are upstream from the eastbound lanes. The bridge has a span arrangement of 15 at 40 ft, 1 at 90 ft, 1 at 120 ft, 1 at 90 ft, and 7 at 40 ft from right to left (west to east). The 40-ft spans are supported by single-pile bents (2L-15L and 20L-25L), the 90-ft spans are supported by a double-pile bent (16L & 19L) and a main pier (17L & 18L), and the 120-ft span is supported by two main piers (17L & 18L). The main piers consist of two 3.5-ft-diameter columns on a pile-supported footing. The pile bents consist of 16x16-in piles. A 75-ft-long spur dike is located at the right (west) abutment, and a 150-ft-long spur dike is located at the left (east) abutment.

Scour data were collected during high and low flows using a fathometer. The flow velocities approaching the bridge piers were determined from velocity soundings during discharge measurements obtained at the upstream side of the bridge. Ground-pentrating radar was also used at the site in July 1992 to detect infilling of scour holes.

On April 28, 1993, bed samples were collected from the main channel at selected intervals along three channel cross sections. Individual samples with similiar characteristics were combined for gradation analyses. The following is a brief description of the bed samples collected:

Cross Section	Distance Upstream	Sample	Comments

1	8 ft	1	Bed at about mid-span between bents 16-17L.
1	8 ft	2	Bed in vicinity of main piers 17-18L.
2	400 ft	3	Mid-channel.
2	400 ft	4	Left part channel.
3	800 ft	5	Mid-to-left part of channel.

The right part of the channel bed at cross sections 2 & 3 seems to be mostly silty clay. Bed sample no. 1 was used for bents 15-16L and sample no. 2 was used for main piers 17-18L. For pile bents 12-14L, the material is a clay with a cohesion of about 240 lb/ft2 and an angle of internal friction of about 27 degrees, as determined from shear-strength tests on Sept. 20, 1991.

Elevation Reference

Datum: MSL

MSL (ft):

Description of Reference Elevation:

RP-3.-- Chiseled square on top of light-pole base on upstream side of upstream bridge near right (east) edge of channel (Elev. 289.41 ft).
RP-4.-- Chiseled square on top of upstream handrail near RP-3 on upstream side of upstream bridge (Elev. 291.18 ft).

Stream Data

Drainage Area (sq mi):	3130	**Floodplain Width:**	Wide
Slope in Vicinity(ft/ft):	0.00019	**Natural Levees:**	Both
Flow Impact:	Right	**Apparent Incision:**	None
Channel Evolution	Premodified	**Channel Boundary:**	Alluvial
Armoring:	None	**Banks Tree Cover:**	Low
Debris Frequency:	Occasional	**Sinuosity:**	Meandering
Debris Effect:	Local	**Braiding:**	None
Stream Size:	Medium	**Anabranching:**	None
Flow Habit:	Perennial	**Bars:**	Narrow
Bed Material:	Sand	**Stream Width Variability:**	Wider
Valley Setting:	Moderate		

Roughness Data

Manning's n Values

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	Left Overbank	Channel	Right Overbank
High:			
Typical	0.16	0.038	0.12
Low:			

Bed Material

Measurement Number	Yr	Mo	Dy	Sampler	D95 (mm)	D84 (mm)	D50 (mm)	D16 (mm)	SP	Shape	Cohesion
1	1993	4	28	BMH-60	2.9	1.2	0.54	0.36	2.65		Non-Cohesive
2	1993	4	28	HAND (CUP)	1.3	0.9	0.39	0.26	2.65		Non-Cohesive
3	1993	4	28	BMH-60	9.5	5.5	0.39	0.26	2.65		Non-Cohesive
4	1993	4	28	BMH-60	1.7	1.3	0.64	0.35	2.65		Non-Cohesive
5	1993	4	28	BMH-60	1	0.4	0.29	0.18	2.65		Non-Cohesive

Bed Material Comments

Measurement No: 1

On April 28, 1993, bed samples were collected from the main channel at selected intervals along three channel cross sections. Individual samples with similiar characteristics were combined for gradation analyses. The following is a brief description of the bed samples collected :

Cross Section	Distance Upstream	Sample	Comments
1	8 ft	1	Bed at about mid-span between bents 16-17L.
1	8 ft	2	Bed in vicinity of main piers 17-18L.
2	400 ft	3	Mid-channel.
2	400 ft	4	Left part channel.
3	800 ft	5	Mid-to-left part of channel.

The right part of the channel bed at cross sections 2 & 3 seems to be mostly silty clay. Bed sample no. 1 was used for bents 15-16L and sample no. 2 was used for main piers 17-18L. For pile bents 12-14L, the material is a clay with a cohesion of about 240 lb/ft2 and an angle of internal friction of about 27 degrees, as determined from shear-strength tests on Sept. 20, 1991.

Measurement No: 2

On April 28, 1993, bed samples were collected from the main channel at selected intervals along three channel cross sections. Individual samples with similiar characteristics were combined for gradation analyses. The following is a brief description of the bed samples collected :

Cross Section	Distance Upstream	Sample	Comments
1	8 ft	1	Bed at about mid-span between bents 16-17L.
1	8 ft	2	Bed in vicinity of main piers 17-18L.
2	400 ft	3	Mid-channel.
2	400 ft	4	Left part channel.
3	800 ft	5	Mid-to-left part of channel.

The right part of the channel bed at cross sections 2 & 3 seems to be mostly silty clay. Bed sample no. 1 was used for bents 15-16L and sample no. 2 was used for main piers 17-18L. For pile bents 12-14L, the material is a clay with a cohesion of about 240 lb/ft2 and an angle of internal friction of about 27 degrees, as determined from shear-strength tests on Sept. 20, 1991.

Measurement No: 3

On April 28, 1993, bed samples were collected from the main channel at selected intervals along three channel cross sections. Individual samples with similiar characteristics were combined for gradation analyses. The following is a brief description of the bed samples collected :

Cross Section	Distance Upstream	Sample	Comments
1	8 ft	1	Bed at about mid-span between bents 16-17L.
1	8 ft	2	Bed in vicinity of main piers 17-18L.
2	400 ft	3	Mid-channel.
2	400 ft	4	Left part channel.
3	800 ft	5	Mid-to-left part of channel.

The right part of the channel bed at cross sections 2 & 3 seems to be mostly silty clay. Bed sample no. 1 was used for bents 15-16L and sample no. 2 was used for main piers 17-18L. For pile bents 12-14L, the material is a clay with a cohesion of about 240 lb/ft2 and an angle of internal friction of about 27 degrees, as determined from shear-strength tests on Sept. 20, 1991.

Measurement No: 4

On April 28, 1993, bed samples were collected from the main channel at selected intervals along three channel cross sections. Individual samples with similiar characteristics were combined for gradation analyses. The following is a brief description of the bed samples collected :

Cross Section	Distance Upstream	Sample	Comments
1	8 ft	1	Bed at about mid-span between bents 16-17L.
1	8 ft	2	Bed in vicinity of main piers 17-18L.
2	400 ft	3	Mid-channel.
2	400 ft	4	Left part channel.
3	800 ft	5	Mid-to-left part of channel.

The right part of the channel bed at cross sections 2 & 3 seems to be mostly silty clay. Bed sample no. 1 was used for bents 15-16L and sample no. 2 was used for main piers 17-18L. For pile bents 12-14L, the material is a clay with a cohesion of about 240 lb/ft2 and an angle of internal friction of about 27 degrees, as determined from shear-strength tests on Sept. 20, 1991.

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Measurement No: 5

On April 28, 1993, bed samples were collected from the main channel at selected intervals along three channel cross sections. Individual samples with similiar characteristics were combined for gradation analyses. The following is a brief description of the bed samples collected :

Cross Section	Distance Upstream	Sample	Comments
1	8 ft	1	Bed at about mid-span between bents 16-17L.
1	8 ft	2	Bed in vicinity of main piers 17-18L.
2	400 ft	3	Mid-channel.
2	400 ft	4	Left part channel.
3	800 ft	5	Mid-to-left part of channel.

The right part of the channel bed at cross sections 2 & 3 seems to be mostly silty clay. Bed sample no. 1 was used for bents 15-16L and sample no. 2 was used for main piers 17-18L. For pile bents 12-14L, the material is a clay with a cohesion of about 240 lb/ft2 and an angle of internal friction of about 27 degrees, as determined from shear-strength tests on Sept. 20, 1991.

Bridge Data

Structure No: 1.7A

Length(ft): 1180

Width(ft): 32

Number of Spans: 21

Vertical Configuration: Curvilinear

Low Chord Elev (ft): 282

Upper Chord Elev (ft): 285.2

Overtopping Elev (ft): 283.7

Skew (degrees): 25

Guide Banks: Elliptical

Waterway Classification: Main

Year Built: 1966

Avg Daily Traffic: 16440

Plans on File: Yes

Parallel Bridges Yes

Upstream/Downstream: Upstream

Continuous Abutment: No

Distance Between Centerlines: 88

Distance Between Pier Faces: 59

Bridge Description:
Number of spans is actually 25.

Abutment Data

Left Station: 0

Right Station: 0

Left Skew (deg): 0

Right Skew (deg) 0

Left Abutment Length (ft): 0

Right Abutment Length (ft) 0

Left Abutment to Channel Bank (ft):

Right Abutment to Channel Bank (ft):

Left Abutment Protection:

Right Abutment Protection

Contracted Opening Type: Unknown

Embankment Skew (deg): 0

Embankment Slope (ft/ft):

Abutment Slope (ft/ft)

Wingwalls: No

Wingwall Angle (deg): 0

Pier Data

Pier ID	Bridge Station(ft)	Alignment	Highway Station	PierType	# Of Piles	Pile Spacing(ft)
12L	9990	0	9990	Group	5	6.25
13L	10030	0	10030	Group	5	6.25
14L	10070	0	10070	Group	5	6.25

15L	10110	0	10110	Group	5	6.25
16L	10150	0	10150	Group	9	
17L	10240	0	10240	Group	2	17
18L	10360	0	10360	Group	2	17
19L	10450	0	10450	Group	9	

Pier ID	Pier Width(ft)	Pier Shape	Shape Factor	Length(ft)	Protection	Foundation
12L	1.33	Square		26.3	None	Piles
13L	1.33	Square		26.3	None	Piles
14L	1.33	Square		26.3	None	Piles
15L	1.33	Square		26.3	None	Piles
16L	2.67	Square		26.3	None	Piles
17L	3.5	ylindrica		20.5	None	Poured
18L	3.5	ylindrica		20.5	None	Poured
19L	2.67	Square		26.3	None	Piles

Pier ID	Top Elevation(ft)	Bottom Elevation(ft)	Foot or Pile Cap Width(ft)	Cap Shape	Pile Tip Elevation(ft)
12L				Unknown	218
13L				Unknown	219
14L				Unknown	219
15L				Unknown	219
16L				Unknown	214
17L	255.7	251.2	11	Square	215
18L	255.6	251.1	11	Square	215
19L				Unknown	224

Pier Description

Pier ID 12L

The pier consists of one row of five 16x16-inch concrete piles spaced 6.25 ft apart.

Pier ID 13L

The pier consists of one row of five 16x16-inch concrete piles spaced 6.25 ft apart.

Pier ID 14L

The pier consists of one row of five 16x16-inch concrete piles spaced 6.25 ft apart.

Pier ID 15L

The pier consists of one row of five 16x16-inch concrete piles spaced 6.25 ft apart.

Pier ID 16L

The pier has two rows of 16x16-inch concrete piles battered at 1 into 1 ft. One row has five piles spaced 6.25 ft apart, and the other row has four piles spaced 8.33 ft apart. At top of piles (elev.279.2), rows are spaced 2.0 ft apart. Bottom of cap is at elev. 278.1 ft.

Pier ID 17L

The pier has two 3.5-ft-diameter concrete columns spaced 17 ft apart. Columns have 11-ft-wide by 10-ft-long by 4.5-ft-deep concrete footings (with 3.5-ft-wide connecting webs) supported by eight 18-in concrete piles. There are three piles at the us side of the footing, two in middle, and three at the ds side.

Pier coordinates for pier ID 17L:

-1.75	255.7
-1.75	281.2
1.75	281.2
1.75	276.7
-1.75	276.7
1.75	276.7
1.75	255.7
5.5	255.7
5.5	251.2
-5.5	251.2
-5.5	255.7
1.75	255.7

Pier ID 18L

The pier has two 3.5-ft-diameter concrete columns spaced 17 ft apart. Columns have 11-ft-wide by 10-ft-long by 4.5-ft-deep concrete footings (with 3.5-ft-wide connecting webs) supported by eight 18-in concrete piles. There are three piles at the us side of the footing, two in middle, and three at the ds side.

Pier coordinates for pier ID 18L:

-1.75	255.6
-1.75	281.1
1.75	281.1
1.75	276.6
-1.75	276.6
1.75	276.6
1.75	255.6
5.5	255.6
5.5	251.1
-5.5	251.1
-5.5	255.6
1.75	255.6

Pier ID 19L

Pier has two rows of 16x16-in concrete piles battered at 1 in to 1 ft. One row has five piles spaced 6.25 ft apart, and the other row has four piles spaced 8.33 ft apart. At top of piles (elev. 279.2 ft), rows are spaced 2.0 ft apart. Bottom of cap is at elev. 278.1 ft.

Pier Scour Data

Pier ID	Date	Time	USOrDS
12L	2/25/91	14:30	Upstream
12L	5/1/91	10:00	Downstream
14L	2/25/91	14:30	Upstream
14L	5/1/91	10:00	Upstream

15L	2/25/91	14:30	Upstream
15L	5/1/91	10:00	Downstream
16L	2/25/91	14:30	Upstream
16L	5/1/91	10:00	Upstream
17L	1/31/90	15:00	Upstream
17L	2/25/91	14:30	Upstream
17L	5/1/91	10:00	Upstream
18L	1/31/90	15:00	Upstream
18L	2/25/91	14:30	Upstream
18L	5/1/91	10:00	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)
12L	2	0.5	1.6	16	2.52	9.6	1.33	28
12L	2.5	0.5	2.5	18	2.78	16.7	1.33	23
14L	0	0.5			3.14	24.1	1.33	18
14L	0	0.5			4.16	21	1.33	16
15L	1.3	0.5	2.7	20	3.78	29.2	1.33	16
15L	3	0.5	5.8	40	4.39	29	1.33	14
16L	1.4	0.5	4.6	23	3.96	29	2.66	16
16L	1.4	0.5		24	4.68	26.9	2.66	8
17L	2	0.5	4.7	25	2.84	17.5	5.8	11
17L	3.6	0.5	3.8	41	3.37	22	5.4	16
17L	4.1	0.5	3.9	41	3.47	21.4	4.7	11
18L	1.6	0.5	2.4	19	1.3	17.4	5.8	11
18L	2	0.5	3.9	21	1.91	21.1	5.3	16
18L	2.6	0.5	2	18	2.21	22.3	4.9	14

PierID	Sediment Transport	Bed Material	BedForm	Trough (ft)	Crest (ft)	Sigma	Debris Effects
12L	Clear-water	Cohesive	Unknown				Insignificant
12L	Clear-water	Cohesive	Unknown				Insignificant
14L	Clear-water	Cohesive	Unknown				Insignificant
14L	Clear-water	Cohesive	Unknown				Insignificant
15L	Live-bed	Non-cohesive	Unknown			1.8	Insignificant
15L	Live-bed	Non-cohesive	Unknown			1.8	Insignificant
16L	Live-bed	Non-cohesive	Unknown			1.8	Insignificant
16L	Live-bed	Non-cohesive	Unknown			1.8	Moderate

17L	Live-bed	Non-cohesive	Unknown	1.9	Insignificant
17L	Live-bed	Non-cohesive	Unknown	1.9	Insignificant
17L	Live-bed	Non-cohesive	Unknown	1.9	Insignificant
18L	Live-bed	Non-cohesive	Unknown	1.9	Moderate
18L	Live-bed	Non-cohesive	Unknown	1.9	Moderate
18L	Live-bed	Non-cohesive	Unknown	1.9	Insignificant

PierID	D95 (mm)	D84 (mm)	D50 (mm)	D16 (mm)
12L				
12L				
14L				
14L				
15L	2.9	1.2	0.54	0.36
15L	2.9	1.2	0.54	0.36
16L	2.9	1.2	0.54	0.36
16L	2.9	1.2	0.54	0.36
17L	1.3	0.9	0.39	0.26
17L	1.3	0.9	0.39	0.26
17L	1.3	0.9	0.39	0.26
18L	1.3	0.9	0.39	0.26
18L	1.3	0.9	0.39	0.26
18L	1.3	0.9	0.39	0.26

Pier Scour Comments

Pier ID 12L **Time:** 14:30 **US/DS:** Upstream

Reference bed is at elev. 261.8 ft.
Minimum bed elev. at the pier is at the downstream side at 256.9 ft.
Scour-hole depth = 261.8 - 259.8 = 2.0 ft. The downstream bed is not in a defined hole.

Pier ID 12L **Time:** 10:00 **US/DS:** Downstream

Reference bed is at elev. 256.9 ft.
Minimum bed elev. at the pier is at the downstream side at 254.4 ft.
Scour-hole depth = 256.9 - 254.4 = 2.5 ft.

Pier ID 14L **Time:** 14:30 **US/DS:** Upstream

Reference bed is at elev. 247.3 ft.
Minimum bed elev. at the pier at the upstream side is at 247.3 ft.
Scour-hole depth = 247.3 - 247.3 = 0 ft.

Pier ID 14L **Time:** 10:00 **US/DS:** Upstream

Reference bed is at elev. 252.6 ft.
Minimum bed at the pier at the upstream side is at 252.6 ft.
Scour-hole depth = 252.6 - 252.6 = 0 ft. Pile is on edge of bank. Bed elev. at downstream side is at 250.0 ft, but there is not defined hole.

Pier ID 15L **Time:** 14:30 **US/DS:** Upstream

Reference bed is at elev. 242.2 ft.
Minimum bed is at downstream side at 239.4 ft, but it is not in a defined scour hole.
Scour-hole depth = 242.2 - 240.9 = 1.3 ft.

Pier ID 15L **Time:** 10:00 **US/DS:** Downstream

Reference bed is at elev. 244.6 ft.
Minimum bed elev. At the pier is at the downstream side at 241.6 ft.
Scour-hole depth = 244.6 - 241.6 = 3.0 ft.

Pier ID 16L **Time:** 14:30 **US/DS:** Upstream

Reference bed is at elev. 242.4 ft.
Minimum bed elev. at the pier is at the upstream side at 241.0 ft.
Scour-hole depth = 242.4 - 241.0 = 1.4 ft.

Pier ID 16L **Time:** 10:00 **US/DS:** Upstream

Reference bed is at elev. 246.7 ft. Minimum bed elev.iIs at upstream side at 244.8 ft, but bed is at 245.3 ft for Dmax of the hole. Scour-hole depth = 246.7 - 245.3 = 1.4 ft. Scour-hole side slope was not determined--a tree was caught on a pile.

Pier ID 17L **Time:** 15:00 **US/DS:** Upstream

Reference bed is at elev. 249.5 ft.
Minimum bed elev. at pier is at the upstream side at 247.5 ft.
Scour-hole depth = 249.5 -247.5 = 2.0 ft.
Effective pier width is depth weighted using column and footing widths.

Pier ID 17L **Time:** 14:30 **US/DS:** Upstream

Reference bed is at elev. 249.4 ft.
Minimum bed elev. at pier is at upstream side at 245.8 ft.
Scour--hole depth = 249.4 - 245.8 = 3.6 ft.
Effective pier width is depth weighted using column and footing widths.

Pier ID 17L **Time:** 10:00 **US/DS:** Upstream

Reference bed is at elev. 252.2 ft.
Minimum bed elev. at pier is at upstream side at 248.1 ft.
Scour-hole depth = 252.2 - 248.1 = 4.1 ft.
Effective pier width is depth weighted using column and footing widths.

Pier ID 18L **Time:** 15:00 **US/DS:** Upstream

Reference bed is at elev. 249.6 ft.
Minimum bed elev. at the pier is at the upstream side at 248.0 ft.
Scour-hole depth = 249.6 - 248.0 = 1.6 ft.
Effective pier width is depth weighted using column and footing widths.

Pier ID 18L **Time:** 14:30 **US/DS:** Upstream

Reference bed is at elev. 250.3 ft.
Minimum bed elev. at the pier is at upstream side at 248.3 ft.
Scour-hole depth = 250.3 - 248.3 = 2.0 ft.
Effective pier width is depth weighted using column and footing widths.

Pier ID 18L **Time:** 10:00 **US/DS:** Downstream

Reference bed is at elev. 251.3 ft.at upstream and downstream sides.
Minimum bed at pier at downstream side is at 248.7 ft., and 248.8 ft. upstream.
Scour-hole depth = 251.3 - 248.7 = 2.6 ft., 251.3 - 248.8 = 2.5 ft. upstream.
Effective pier width is depth weighted using column and footing widths.

Abutment Scour

ContractionScour

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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)
1991	5	1	11:10	10	49800	5	1991	5	1	11:10	10	273.6		7
1991	2	25	15:00	0	36800	5	1991	2	25	15:00	0	271.42		3
				0		none	1991	1	31	15:00	0	267		
				0		none	1991	9	20		0	250.8		
				0		none	1990	9	20		0	250.4		
				0		none	1990	8	15		0	250.4		

Hydrograph

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

Supporting Files