

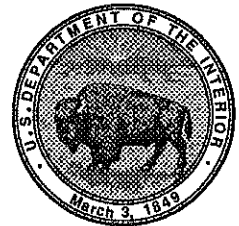
**U.S. DEPARTMENT OF THE INTERIOR  
U.S. GEOLOGICAL SURVEY**

**LEVEL II BRIDGE SCOUR ANALYSIS FOR STRUCTURE 182007800100  
ON ROUTE US 78, CROSSING CATTLE CREEK IN DORCHESTER  
COUNTY, SOUTH CAROLINA**

**By Toby D. Feaster and Whitney J. Stringfield**

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**Prepared in cooperation with the  
SOUTH CAROLINA DEPARTMENT  
OF TRANSPORTATION**



**Columbia, South Carolina**

**1994**

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## UNIT ABBREVIATIONS

cubic foot per second	ft <sup>3</sup> /s
feet per second	ft/s
foot	ft
mile	mi
millimeter	mm
square foot	ft <sup>2</sup>
square mile	mi <sup>2</sup>

## OTHER ABBREVIATIONS

downstream	D/S
upstream	U/S
flood plain	f/p
median diameter of bed material	D <sub>50</sub>
South Carolina Department of Transportation	SCDOT

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In this report, the words "right" and "left" refer to directions that would be reported by an observer facing downstream.

Sea level: In this report, "sea level" refers to the National Geodetic Vertical Datum of 1929-- a geodetic datum derived from a general adjustment of the first-order level nets of the United States and Canada, formerly called Sea Level Datum of 1929.

**Level II bridge scour analysis  
for structure 182007800100 on Route US 78,  
crossing Cattle Creek in Dorchester County, South Carolina**

by Toby D. Feaster and Whitney J. Stringfield

This report provides the results of the detailed Level II analysis of scour potential at structure 182007800100 on Route US 78, crossing Cattle Creek in Dorchester County, South Carolina (figure 1 in pocket; figures 4-7). The site is located in the lower Coastal Plain physiographic province near the town of Reevesville in the northwestern part of Dorchester County near the boundary between Dorchester and Orangeburg Counties. The drainage area for the site is 42.3 mi<sup>2</sup>, and is a predominately rural drainage basin with little development in recent years. In the vicinity of the study site, swampy conditions prevail with the flood plain being covered by moderately thick hardwoods with sparse to moderately thick undergrowth.

In the study area, Cattle Creek has a meandering channel with a slope of approximately 0.0009 ft/ft (4.8 ft/mi), an average channel top width of 45 ft and an average channel depth of 5.0 ft. The predominant channel bed material is a silty clayey sand ( $D_{50}$  is 0.34 mm) and the channel banks consist of a silty clayey sand ( $D_{50}$  is 0.18 mm). In general, the banks have moderate to heavy woody vegetative cover and were noted to be relatively stable at the time of the Level I and Level II site visits, May 24, 1990 and June 10, 1993, respectively.

The Route US 78 crossing of Cattle Creek is a 110-ft-long, two-lane bridge which has five 22-ft concrete spans, supported by concrete piers with spillthrough abutments. Both abutments have riprap protection. In this report, the words "right" and "left" refer to directions that would be reported by an observer facing downstream. Additional details describing conditions at the site are included in the Scour Report Summary.

Scour depths were computed using engineering judgement and the general guidelines described in Hydraulic Engineering Circular 18 (Richardson and others, 1993) and the Transportation Research Board Draft Paper, "Evaluating scour at bridges using WSPRO" (Arneson and others, 1992). Scour depths were calculated assuming an infinite depth of erosive material and a homogeneous particle-size distribution. The results of the scour analysis are presented in tables 1 through 4 and a graph of the scour depths is shown in figure 2.

Scour depth calculations indicate that maximum pile tip exposure will occur at bent 3. Scour caused by the 100- and 500-year discharges will cause the pile tips at bent 3 to be exposed by 11.4 and 18.0 ft, respectively. It should be noted that only partial pile tip/ footing information was available from the SCDOT. For more information, see the copy of SCDOT file number 18.251 in the pocket at the back of this report.

**Table 1. --Remaining pile/footing penetration at piers/bents for the 100-year discharge at structure 182007800100 on Route US 78, crossing Cattle Creek in Dorchester County, South Carolina**

Pier/bent number	Station from <sup>2</sup> left end of bridge (feet)	Pile tip/ <sup>3</sup> footing elevation, SCDOT datum (feet)	Pile tip/ footing elevation, USGS datum (feet)	Ground elevation at pier/bent, USGS datum (feet)	Total <sup>4</sup> scour depth (feet)	Elevation of scour, USGS datum (feet)	Remaining <sup>5</sup> pile/footing penetration (feet)
<b>100-year discharge is 2,940 cubic feet per second</b>							
5	22	82.7	75.5	89.4	22.9	66.5	-9.0
4	44	80.3	73.1	85.8	22.9	62.9	-10.2
3	66	81.7	74.5	86.0	22.9	63.1	-11.4
2	88	85.1	77.9	90.3	22.9	67.4	-10.5

<sup>1</sup> Pier/bent number corresponds to South Carolina Department of Transportation bridge plans.

<sup>2</sup> Stations are determined from left to right looking downstream.

<sup>3</sup> Pile tip/footing elevations obtained from SCDOT bridge plans. The maximum elevation at each pier/bent is used.

<sup>4</sup> Total scour depth is the sum of the contraction and pier/bent scour depths.

<sup>5</sup> A negative number signifies undermining of pile tip/footing

NOTE: Complete pile tip/footing elevations were not available from SCDOT. For more information, see scour assumptions in this report.

Table 2. --Remaining pile/footing penetration at piers/bents for the 500-year discharge at structure 182007800100 on Route US 78, crossing Cattle Creek in Dorchester County, South Carolina

Pier/bent number	Station from <sup>2</sup> left end of bridge (feet)	Pile tip/ <sup>3</sup> footing elevation, SCDOT datum (feet)	Pile tip/ footing elevation, USGS datum (feet)	Ground elevation at pier/bent, USGS datum (feet)	Total <sup>4</sup> scour depth (feet)	Elevation of scour, USGS datum (feet)	Remaining <sup>5</sup> pile/footing penetration (feet)
500-year discharge is 3,990 cubic feet per second							
5	22	82.7	75.5	89.4	29.5	59.9	-15.6
4	44	80.3	73.1	85.8	29.5	56.3	-16.8
3	66	81.7	74.5	86.0	29.5	56.5	-18.0
2	88	85.1	77.9	90.3	29.5	60.8	-17.1

<sup>1</sup> Pier/bent number corresponds to South Carolina Department of Transportation bridge plans.

<sup>2</sup> Stations are determined from left to right looking downstream.

<sup>3</sup> Pile tip/footing elevations obtained from SCDOT bridge plans. The maximum elevation at each pier/bent is used.

<sup>4</sup> Total scour depth is the sum of the contraction and pier/bent scour depths.

<sup>5</sup> A negative number signifies undermining of pile tip/footing

NOTE: Complete pile tip/footing elevations were not available from SCDOT. For more information, see scour assumptions in this report.

**Table 3. --Cumulative scour depths at piers/bents for the 100-year discharge at structure 182007800100 on Route US 78, crossing Cattle Creek in Dorchester County, South Carolina**

Pier/bent <sup>1</sup> number	Station from <sup>2</sup> left end of bridge (feet)	Contraction scour depth (feet)	Pier/bent scour depth without debris (feet)	Total <sup>3</sup> scour depth without debris (feet)
100-year discharge is 2,940 cubic feet per second				
5	22	15.9	7.0	22.9
4	44	15.9	7.0	22.9
3	66	15.9	7.0	22.9
2	88	15.9	7.0	22.9

<sup>1</sup> Pier/bent number corresponds to South Carolina Department of Transportation bridge plans.

<sup>2</sup> Stations are determined from left to right looking downstream.

<sup>3</sup> Total scour depth is the sum of the contraction and pier/bent scour depths.

NOTE: The pier and contraction scour equations used in this scour analysis were those recommended in Hydraulic Engineering Circular 18 (Richardson and others, 1993). Scour depths were calculated assuming an infinite depth of erosive material and a homogeneous particle-size distribution.

**Table 4.** Cumulative scour depths at piers/bents for the 500-year discharge at structure 182007800100 on Route US 78, crossing Cattle Creek in Dorchester County, South Carolina

Pier/bent <sup>1</sup> number	Station from <sup>2</sup> left end of bridge (feet)	Contraction scour depth (feet)	Pier/bent scour depth without debris (feet)	Total <sup>3</sup> scour depth without debris (feet)
500-year discharge is 3,990 cubic feet per second				
5	22	21.9	7.6	29.5
4	44	21.9	7.6	29.5
3	66	21.9	7.6	29.5
2	88	21.9	7.6	29.5

<sup>1</sup> Pier/bent number corresponds to South Carolina Department of Transportation bridge plans.

<sup>2</sup> Stations are determined from left to right looking downstream.

<sup>3</sup> Total scour depth is the sum of the contraction and pier/bent scour depths.

NOTE: The pier and contraction scour equations used in this scour analysis were those recommended in Hydraulic Engineering Circular 18 (Richardson and others, 1993). Scour depths were calculated assuming an infinite depth of erosive material and a homogeneous particle-size distribution.

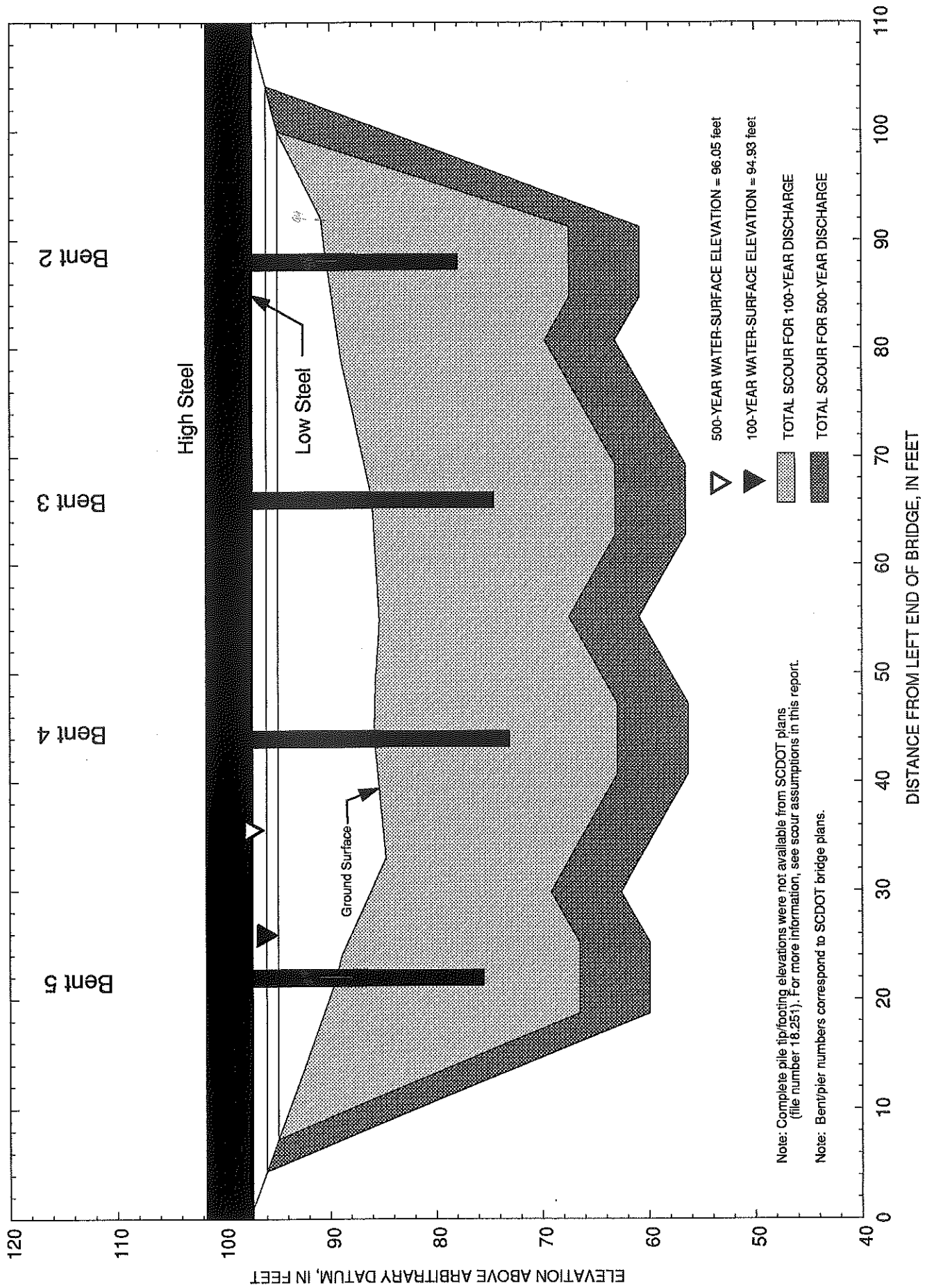


Figure 2.-- Total scour depths for the 100- and 500-year discharges at structure 182007800100 on Route US 78, crossing Cattle Creek in Dorchester County, South Carolina.

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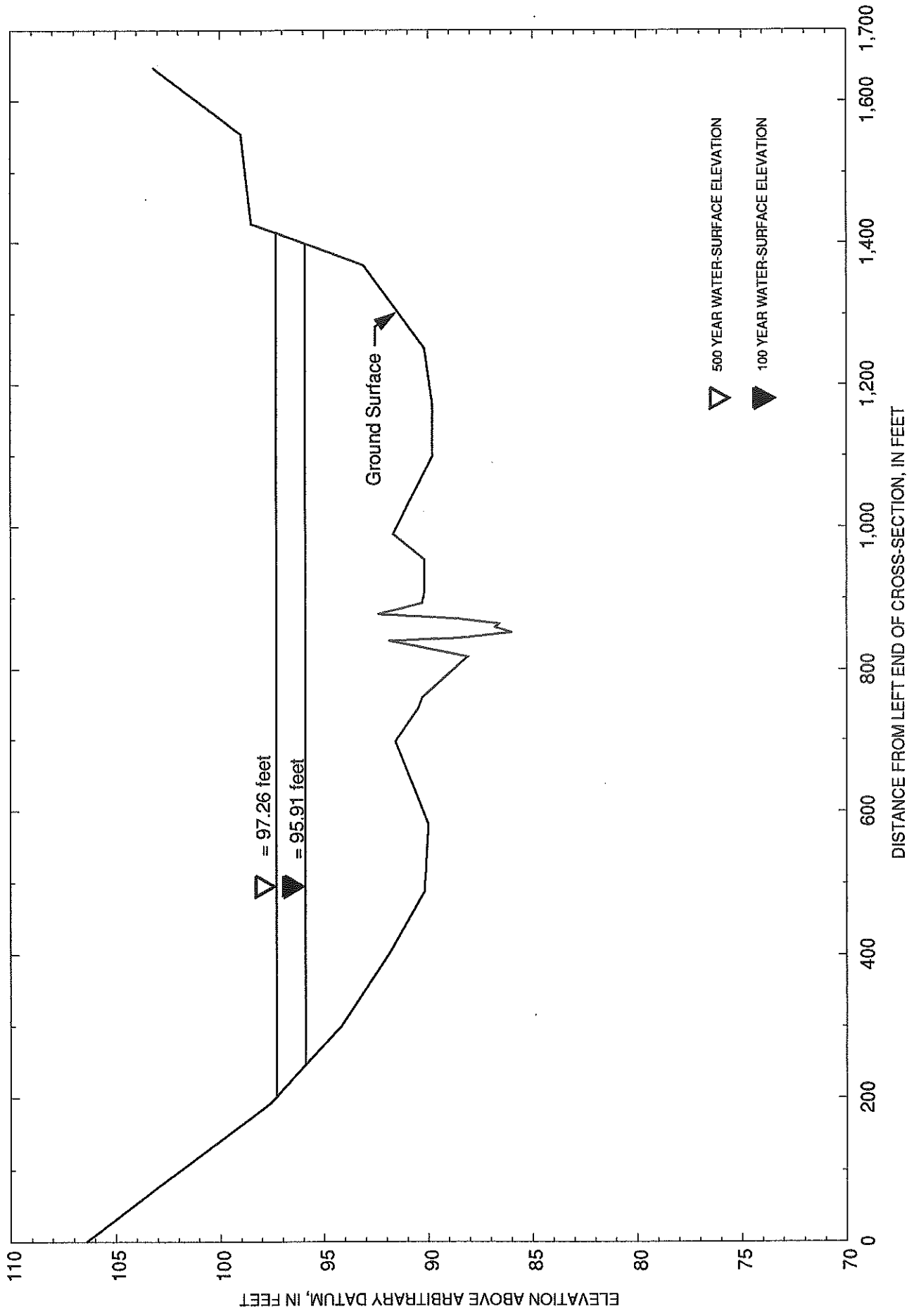


Figure 3.--Approach cross section at structure 182007800100 on Route US 78, crossing Cattle Creek in Dorchester County, South Carolina.

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**Figure 4.**--Structure 182007800100 on Route US 78, crossing Cattle Creek in Dorchester County, South Carolina as viewed from the upstream right bank (May 24, 1990).



**Figure 5.**--Structure 182007800100 on Route US 78, crossing Cattle Creek in Dorchester County, South Carolina as viewed from the downstream right bank (May 24, 1990).





**Figure 6.**--Upstream channel as viewed from structure 182007800100 on Route US 78, crossing Cattle Creek in Dorchester County, South Carolina (May 24, 1990).



**Figure 7.**--Downstream channel as viewed from structure 182007800100 on Route US 78, crossing Cattle Creek in Dorchester County, South Carolina (May 24, 1990).

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## SCOUR REPORT SUMMARY

*Structure Number* 182007800100      *Stream* Cattle Creek  
*County* Dorchester      *Road* US 78      *District* 6

### Description of Bridge

*Bridge length* 110 ft    *Bridge width* 31 ft    *Max span length* 22 ft  
*Alignment of bridge to road (on curve or straight)* straight  
*Abutment type* spillthrough      *Embankment type* sloping  
*Riprap on abutment?* yes      *Date of inspection* 5-24-1990  
*Description of riprap* Both abutments have 6- to 12- inch cobble and boulders in good condition.

*Brief description of piers/pile bents* The bridge is supported by four bents with each consisting of two inner concrete piers (1.5 ft x 1.5 ft) and two outer concrete piles (1.35 ft x 1.35 ft).

*Is bridge skewed to flood plain according to USGS topo map?* yes    *Angle* 25  
*Is bridge located on a bend in channel?* no    *If so, describe (mild, moderate, severe)*

#### *Debris accumulation on bridge at time of Level I or Level II site visit:*

	<i>Date of inspection</i>	<i>Percent of channel blocked horizontally</i>	<i>Percent of channel blocked vertically</i>
<i>Level I</i>	<u>5-24-1990</u>	<u>0</u>	<u>0</u>
<i>Level II</i>	<u>-----</u>	<u>-----</u>	<u>-----</u>

*Potential for debris* Moderate to high because of swampy conditions with fallen trees in and around channel that might be transported by high flows.

*Describe any features near or at the bridge that may affect flow (include observation date).*  
A Southern Railway trestle 2,100 ft D/S of bridge will constrict flow.

**Description of Flood Plain**

*General topography* Swampy with a broad flood plain typical of lower Coastal Plain conditions.

*Flood-plain conditions at bridge site: downstream (D/S), upstream (U/S)*

*Date of inspection* 6-10-1993

*D/S left:* Swampy, medium hardwoods with sparse to medium undergrowth

*D/S right:* Swampy, medium hardwoods with sparse to medium undergrowth

*U/S left:* Swampy, medium hardwoods with sparse to medium undergrowth

*U/S right:* Swampy, medium hardwoods with sparse to medium undergrowth

**Description of Channel**

*Average top width* 45 ft                      *Average depth* 5 ft

*Predominant bed material* silty clayey sand    *Bank material* silty clayey sand

*Stream type (straight, meandering, braided, swampy, channelized)* Swampy with a mildly meandering channel.

*Vegetative cover on channel banks near bridge:*    *Date of inspection* 6-10-1993

*D/S left:* Banks fully covered with medium hardwoods and sparse undergrowth

*D/S right:* Banks fully covered with medium hardwoods and sparse undergrowth

*U/S left:* Banks fully covered with medium hardwoods and sparse undergrowth

*U/S right:* Banks fully covered with medium hardwoods and sparse undergrowth

*Do banks appear stable?* yes    *If not, describe location and type of instability and date of observation.* \_\_\_\_\_

*Describe any obstructions in channel and date of observation.* Fallen trees noted in U/S and D/S channel on 5-24-1990 and 6-10-1993.

## Hydrology

Drainage area 42.3 mi<sup>2</sup>

Percentage of drainage area in physiographic provinces:

<i>Physiographic province</i>	<i>Percent of drainage area</i>
<u>lower Coastal Plain</u>	<u>100</u>
_____	_____
_____	_____
_____	_____

Is drainage area considered rural or urban? rural Describe any significant urbanization and potential for development. Low potential for development. Rural area having little to no growth in recent years with agriculture being the predominant land use.

Is there a USGS gage on the stream of interest? no

USGS gage description \_\_\_\_\_

USGS gage number \_\_\_\_\_

Gage drainage area \_\_\_\_\_ mi<sup>2</sup>

Is there a lake/pond that will significantly affect hydrology/hydraulics? no

If so, describe \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

### Calculated Discharges

Q100 2,940 ft<sup>3</sup>/s

Q500 3,990 ft<sup>3</sup>/s

Method used to determine discharges Discharges computed using USGS regression equations developed by Wladimir B. Guimaraes and Larry R. Bohman in the report "Techniques for estimating magnitude and frequency of floods in South Carolina, 1988", WRIR 91-4157.

## Brief Description of the Water-Surface Profile Model (WSPRO) Analysis

*Datum for WSPRO analysis (USGS survey, sea level, SCDOT plans)* USGS survey

*Datum tie between USGS survey and SCDOT plans* Add 7.16 ft to USGS survey datum to obtain SCDOT plans' datum (file number 18.251).

*Description of reference marks used to determine USGS datum.* \_\_\_\_\_

RM1 is a chiseled square on the U/S, right abutment cap with an assumed elevation of 100.00 ft. RM2 is a chiseled square on the D/S, left abutment cap with an elevation of 99.98 ft.

### Cross-Sections Used in WSPRO Analysis

<i>*Cross-section ID</i>	<i>Section Reference Distance (SRD) in feet</i>	<i>**How cross-section was developed</i>	<i>Comments</i>
EXIT1	-2230	2	Shifted section to SRD
FULV1	-2100	2	FULV for railroad
BRDG1	-2100	1	Railroad trestle
APPR1	-1970	2	APPR for railroad
TMP1	-1050	2	Shifted section to SRD
EXIT	-110	1	EXIT for US 78 bridge
FULV	0	2	FULV for US 78 bridge
BRDG	0	1	US 78 bridge
APPR	141	1	APPR for US 78 bridge

\* For location of cross-sections see topographic map included with report (figure 1).  
For more detail on how cross-sections were developed see WSPRO input file.

\*\* Cross-section development: 1) survey at SRD 2) shift of survey data to SRD 3) modification of survey data based on topographic map 4) synthesized by combining channel survey data and topographic contours 5) other

*Description of data and assumptions used in developing WSPRO model.*

A Southern Railway trestle crosses Cattle Creek 2,100 feet D/S of the US 78 bridge. Because the trestle will affect the water-surface profile and is within two flood-plain widths D/S of the US 78 crossing, the trestle was included in the WSPRO analysis. D/S of the Southern Railway trestle, Cattle Creek has a relatively uniform flood plain with no other significant natural or man-made contractions of flow within two flood-plain widths. Therefore, it was assumed that slope-conveyance methodology would be adequate for determining the water-surface profile on the reach of interest.

A full valley cross section was surveyed along the D/S toe-of-fill at the US 78 bridge. Because the flood plain has uniform topography, the full valley survey was used, in combination with channel surveys taken at approximately one bridge width U/S and D/S of the US 78 bridge, to synthesize template sections as needed. Additionally, a survey was taken at the Southern Railway trestle. The more constricted bridge face (D/S face) was used in the WSPRO analysis in order to determine the highest possible velocities for the scour analysis.

## Bridge Hydraulics

*Average embankment elevation*      99.6    *ft*

*Average low steel elevation*      97.3    *ft*

*100-year discharge*      2,940    *ft<sup>3</sup>/s*

*Water-surface elevation at D/S bridge face*      94.93    *ft*

*Area of flow at D/S bridge face*      558    *ft<sup>2</sup>*

*Average velocity in bridge opening*      5.27    *ft/s*

*Maximum WSPRO tube velocity at bridge*      6.30    *ft/s*

*Water-surface elevation at Approach section with bridge*      95.91    *ft*

*Water-surface elevation at Approach section without bridge*      95.00    *ft*

*Amount of backwater caused by bridge*      0.91    *ft*

*500-year discharge*      3,990    *ft<sup>3</sup>/s*

*Water-surface elevation at D/S bridge face*      96.05    *ft*

*Area of flow at D/S bridge face*      657    *ft<sup>2</sup>*

*Average velocity in bridge opening*      6.08    *ft/s*

*Maximum WSPRO tube velocity at bridge*      7.33    *ft/s*

*Water-surface elevation at Approach section with bridge*      97.26    *ft*

*Water-surface elevation at Approach section without bridge*      96.15    *ft*

*Amount of backwater caused by bridge*      1.11    *ft*

## Scour

*Describe any special assumptions or considerations made in bridge scour analysis.*

Scour depths were computed using engineering judgement and the general guidelines described in Hydraulic Engineering Circular 18 (Richardson and others, 1993) and the Transportation Research Board Draft Paper, "Evaluating scour at bridges using WSPRO" (Arneson and others, 1992). Scour depths were calculated assuming an infinite depth of erosive material and a homogeneous particle-size distribution. The results of the scour analysis are presented in tables 1 through 4 and a graph of the scour depths is shown in figure 2.

The more constricted bridge face (D/S face) at the US 78 crossing of Cattle Creek was used in the WSPRO and scour analysis. Because the study site is dominated by swampy conditions with no well-defined channel at the bridge, all bents were analyzed assuming they were located within the channel. Therefore, 90 percent of the maximum WSPRO tube velocity at the bridge and the maximum flow depth at the bridge were used in the pier scour equation to determine the potential scour at each bent. Additionally, the large amounts of vegetation on the swampy flood plain will tend to reduce the amount of sediment transport during flood events. Therefore, it was decided that clear-water scour would best represent the contraction scour occurring at the bridge. The potential contraction scour at the bridge was determined by analyzing the bridge as a relief bridge with no bed material transport. No abutment scour computations were made because the abutments are protected by riprap.

It should be noted that the pile/tip footing elevation information shown on figure 2 pertains to piles added during the widening of the existing structure (SCDOT file number 18.251). No pile tip/footing information pertaining to the original structure was available from the SCDOT.



# WSPRO INPUT FILE --Continued

```

*           Approach Section at Railway Trestle (distance from topographic map)
*
AS  APPR1   -1970    25
*
*           Reference point determined from survey data
*
BP           800
GT
*
*
XS  TMP1    -1050    25
GT
*
*           Exit Section approximately one b-width D/S of Bridge on US 78
*           (distance from survey data)
*
XS  EXIT    -110     25
GT
*
*           Full Valley Section at Bridge
*
XS  FULV     0       25
GT
*
*           D/S Face of Bridge
*
BR  BRDG     0   97.3   25
GR           0   97.3    1   97.3    1.1  97.2    12  93.1    22  89.4
GR           24  88.9    33  84.7    44  85.8    49  85.7    55  85.3
GR           66  86.0    79  88.9    88  90.3    92  90.8   100  94.9
GR           108.9  97.3  109  97.3   110  97.3    0  97.3
N           0.045  0.045  0.045
SA           22           88
CD           3   30.7    1.5  99.6
PW           85.8    1.5  86.0    1.5  86.0    3.0  89.4    3.0  89.4    4.5
PW           90.3    4.5  90.3    6.0  97.3    6.0  97.3    0
*
*           SURV2 is a synthesized cross section obtained by combining the flood
*           plain data surveyed at the D/S toe-of-fill with the approach
*           channel data surveyed at 128 ft U/S of the D/S bridge face on US 78
*           (distance determined from survey data).
*
XT  SURV2     128
GR           0   106.4    79   102.9    193   97.6    300   94.2
GR           401   91.9   488    90.2    582   90.0    698   91.6
GR           745   90.5   760    90.3    818   88.1    840   91.9
GR           844   88.5   852    86.0    859   86.8    864   86.6
GR           871   88.6   877    92.4    893   90.3    908   90.2
GR           954   90.2   990    91.7   1099   89.8   1174   89.8
GR          1251   90.2  1368    93.1   1427   98.5   1553   99.0
GR          1648  103.2
*

```

# WSPRO INPUT FILE --Continued

```

*
*   Approach Section to Bridge, approximately one b-width U/S.
*   (distance determined from survey data)
*
AS  APPR          141      25
*
*   Reference point determined from survey data
*
BP          818
GT
N          0.16          0.055          0.16
SA          840          877
*
*
HP 1 BRDG      94.93      0      94.93
HP 2 BRDG      95.00      0      95.00      2940
HP 1 APPR      95.91      0      95.91
HP 2 APPR      95.91      0      95.91      2940
HP 1 BRDG      96.05      0      96.05
HP 2 BRDG      96.12      0      96.12      3990
HP 1 APPR      97.26      0      97.26
HP 2 APPR      97.26      0      97.26      3990
*
EX
ER

```

# WSPRO OUTPUT

WSPRO                    FEDERAL HIGHWAY ADMINISTRATION - U. S. GEOLOGICAL SURVEY  
 V060188                   MODEL FOR WATER-SURFACE PROFILE COMPUTATIONS

Structure #: 182007800100                    file: cattle.flood  
 Cattle Creek at US 78                    TDF 11/30/93  
 Dorchester County, South Carolina

\*\*\* RUN DATE & TIME: 11-30-93 08:04

CROSS-SECTION PROPERTIES: ISEQ = 8; SECID = BRDG ; SRD = 0.

WSEL	SA#	AREA	K	TOPW	WETP	ALPH	LEW	REW	QCR
	1	37.	2321.	13.	15.				353.
	2	490.	64805.	60.	61.				7965.
	3	31.	1918.	11.	12.				295.
94.93		559.	69044.	84.	88.	1.09	7.	100.	7822.

HP 2 BRDG      95.00      0      95.00      2940

VELOCITY DISTRIBUTION: ISEQ = 8; SECID = BRDG ; SRD = 0.

	WSEL	LEW	REW	AREA	K	Q	VEL	
	95.00	6.9	100.4	564.6	70103.	2940.	5.21	
X STA.		6.9	24.3		28.9	32.1	34.7	37.3
A(I)			50.6		30.9	26.1	23.6	23.7
V(I)			2.91		4.76	5.63	6.23	6.21
X STA.		37.3	39.9		42.8	45.7	48.5	51.4
A(I)			23.3		24.6	24.1	24.3	23.8
V(I)			6.30		5.99	6.09	6.05	6.17
X STA.		51.4	54.1		56.8	59.5	62.3	65.2
A(I)			23.4		23.6	23.5	23.9	24.3
V(I)			6.30		6.23	6.25	6.16	6.06
X STA.		65.2	68.4		72.2	76.9	83.5	100.4
A(I)			25.5		27.3	30.1	35.8	52.2
V(I)			5.76		5.39	4.88	4.10	2.81

# WSPRO OUTPUT --Continued

WSPRO FEDERAL HIGHWAY ADMINISTRATION - U. S. GEOLOGICAL SURVEY  
 V060188 MODEL FOR WATER-SURFACE PROFILE COMPUTATIONS

Structure #: 182007800100 file: cattle.flood  
 Cattle Creek at US 78 TDF 11/30/93  
 Dorchester County, South Carolina

\*\*\* RUN DATE & TIME: 11-30-93 08:04

CROSS-SECTION PROPERTIES: ISEQ = 9; SECID = APPR ; SRD = 141.

WSEL	SA#	AREA	K	TOPW	WETP	ALPH	LEW	REW	QCR
	1	2465.	63300.	538.	538.				29946.
	2	267.	27133.	34.	37.				4282.
	3	2366.	64423.	473.	473.				30032.
95.91		5098.	154857.	1044.	1048.	2.58	247.	1399.	39774.

HP 2 APPR 95.91 0 95.91 2940

VELOCITY DISTRIBUTION: ISEQ = 9; SECID = APPR ; SRD = 141.

	WSEL	LEW	REW	AREA	K	Q	VEL
	95.91	246.6	1398.6	5098.1	154857.	2940.	0.58
X STA.	246.6		464.0	516.3		564.4	614.9
A(I)		565.1		266.0		253.1	262.9
V(I)		0.26		0.55		0.58	0.56
X STA.	677.6		748.1	793.7		828.9	850.6
A(I)		304.0		249.8		229.7	120.9
V(I)		0.48		0.59		0.64	1.22
X STA.	858.1		866.3	898.2		949.7	1016.5
A(I)		67.3		155.9		265.7	290.1
V(I)		2.18		0.94		0.55	0.51
X STA.	1076.1		1122.6	1168.7		1214.6	1265.6
A(I)		252.8		254.8		250.1	263.7
V(I)		0.58		0.58		0.59	0.56

# WSPRO OUTPUT --Continued

WSPRO                    FEDERAL HIGHWAY ADMINISTRATION - U. S. GEOLOGICAL SURVEY  
 V060188                    MODEL FOR WATER-SURFACE PROFILE COMPUTATIONS

Structure #: 182007800100                    file: cattle.flood  
 Cattle Creek at US 78                    TDF 11/30/93  
 Dorchester County, South Carolina

\*\*\* RUN DATE & TIME: 11-30-93 08:04

CROSS-SECTION PROPERTIES: ISEQ = 8; SECID = BRDG ; SRD = 0.

WSEL	SA#	AREA	K	TOPW	WETP	ALPH	LEW	REW	QCR
	1	54.	3790.	16.	17.				560.
	2	557.	80226.	60.	61.				9652.
	3	45.	3006.	15.	16.				452.
96.05		657.	87022.	91.	95.	1.11	4.	104.	9520.

HP 2 BRDG    96.12    0    96.12    3990

VELOCITY DISTRIBUTION: ISEQ = 8; SECID = BRDG ; SRD = 0.

	WSEL	LEW	REW	AREA	K	Q	VEL	
	96.12	4.0	104.5	663.0	88221.	3990.	6.02	
X STA.	4.0		22.8	28.0		31.5	34.2	37.0
A(I)		59.9		37.1	31.5	28.0		27.5
V(I)		3.33		5.38	6.33	7.13		7.25
X STA.	37.0		39.8	42.6		45.7	48.7	51.6
A(I)		27.7		27.6	28.4	28.6		28.0
V(I)		7.19		7.22	7.03	6.99		7.13
X STA.	51.6		54.5	57.3		60.2	63.2	66.3
A(I)		27.2		27.4	28.2	28.0		28.5
V(I)		7.33		7.28	7.07	7.12		7.00
X STA.	66.3		69.6	73.6		78.6	85.5	104.5
A(I)		29.6		31.7	36.1	42.0		59.9
V(I)		6.74		6.30	5.53	4.75		3.33

# WSPRO OUTPUT --Continued

WSPRO  
V060188

FEDERAL HIGHWAY ADMINISTRATION - U. S. GEOLOGICAL SURVEY  
MODEL FOR WATER-SURFACE PROFILE COMPUTATIONS

Structure #: 182007800100 file: cattle.flood  
Cattle Creek at US 78 TDF 11/30/93  
Dorchester County, South Carolina

\*\*\* RUN DATE & TIME: 11-30-93 08:04

CROSS-SECTION PROPERTIES: ISEQ = 9; SECID = APPR ; SRD = 141.

WSEL	SA#	AREA	K	TOPW	WETP	ALPH	LEW	REW	QCR
	1	3217.	94217.	576.	577.				43131.
	2	313.	35216.	34.	37.				5415.
	3	3013.	94617.	486.	487.				42565.
97.26		6543.	224050.	1096.	1100.	2.36	204.	1413.	58998.

HP 2 APPR 97.26 0 97.26 3990

VELOCITY DISTRIBUTION: ISEQ = 9; SECID = APPR ; SRD = 141.

	WSEL	LEW	REW	AREA	K	Q	VEL
	97.26	204.1	1413.3	6542.6	224050.	3990.	0.61
X STA.	204.1		446.7	501.3	551.4	601.7	659.7
A(I)		756.7		333.9	324.0	326.9	345.9
V(I)		0.26		0.60	0.62	0.61	0.58
X STA.	659.7		727.8	780.7	819.3	849.0	857.9
A(I)		367.2		332.3	295.9	202.6	87.6
V(I)		0.54		0.60	0.67	0.98	2.28
X STA.	857.9		867.3	904.2	955.2	1021.7	1078.7
A(I)		88.9		224.3	325.3	365.7	340.4
V(I)		2.24		0.89	0.61	0.55	0.59
X STA.	1078.7		1127.0	1174.0	1222.4	1274.5	1413.3
A(I)		323.3		316.8	321.3	328.4	535.2
V(I)		0.62		0.63	0.62	0.61	0.37

# WSPRO OUTPUT --Continued

WSPRO FEDERAL HIGHWAY ADMINISTRATION - U. S. GEOLOGICAL SURVEY  
 V060188 MODEL FOR WATER-SURFACE PROFILE COMPUTATIONS

Structure #: 182007800100 file: cattle.flood  
 Cattle Creek at US 78 TDF 11/30/93  
 Dorchester County, South Carolina  
 \*\*\* RUN DATE & TIME: 11-30-93 08:04

XSID:CODE	SRDL	LEW	AREA	VHD	HF	EGL	CRWS	Q	WSEL
SRD	FLEN	REW	K	ALPH	HO	ERR	FR#	VEL	
EXIT1:XS	*****	296.	3498.	0.04	*****	92.53	89.91	2940.	92.48
-2230.	*****	1381.	97933.	4.08	*****	*****	0.16	0.84	
FULV1:FV	130.	296.	3503.	0.04	0.12	92.65	*****	2940.	92.60
-2100.	130.	1382.	98113.	4.08	0.00	0.00	0.16	0.84	
<<<<<THE ABOVE RESULTS REFLECT "NORMAL" (UNCONSTRICTED) FLOW>>>>>									
APPR1:AS	130.	296.	3507.	0.04	0.12	92.77	*****	2940.	92.72
-1970.	130.	1382.	98277.	4.08	0.00	0.00	0.16	0.84	
<<<<<THE ABOVE RESULTS REFLECT "NORMAL" (UNCONSTRICTED) FLOW>>>>>									

<<<<<RESULTS REFLECTING THE CONSTRICTED FLOW FOLLOW>>>>>

XSID:CODE	SRDL	LEW	AREA	VHD	HF	EGL	CRWS	Q	WSEL
SRD	FLEN	REW	K	ALPH	HO	ERR	FR#	VEL	
BRDG1:BR	130.	18.	452.	0.96	0.27	93.55	89.00	2940.	92.59
-2100.	130.	84.	53744.	1.46	0.75	0.00	0.50	6.51	

TYPE	PPCD	FLOW	C	P/A	LSEL	BLEN	XLAB	XRAB
3.	1.	1.	0.827	0.064	100.60	*****	*****	*****

XSID:CODE	SRDL	LEW	AREA	VHD	HF	EGL	CRWS	Q	WSEL
SRD	FLEN	REW	K	ALPH	HO	ERR	FR#	VEL	
APPR1:AS	115.	260.	4629.	0.02	0.22	93.86	90.15	2940.	93.84
-1970.	156.	1394.	145719.	3.56	0.09	0.00	0.10	0.64	
M(G)	M(K)	KQ	XLKQ	XRKQ	OTEL				
0.939	0.714	41790.	815.	881.	93.79				

<<<<<END OF BRIDGE COMPUTATIONS>>>>>

XSID:CODE	SRDL	LEW	AREA	VHD	HF	EGL	CRWS	Q	WSEL
SRD	FLEN	REW	K	ALPH	HO	ERR	FR#	VEL	
TMP1 :XS	920.	273.	4221.	0.03	0.43	94.30	*****	2940.	94.27
-1050.	920.	1389.	127720.	3.72	0.00	0.00	0.12	0.70	
EXIT :XS	940.	282.	3925.	0.03	0.55	94.85	*****	2940.	94.82
-110.	940.	1386.	115186.	3.85	0.00	0.00	0.13	0.75	
FULV :FV	110.	283.	3900.	0.03	0.07	94.93	*****	2940.	94.89
0.	110.	1386.	114179.	3.86	0.00	0.00	0.13	0.75	
<<<<<THE ABOVE RESULTS REFLECT "NORMAL" (UNCONSTRICTED) FLOW>>>>>									

# WSPRO OUTPUT --Continued

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APPR :AS      141.   275.   4164.  0.02  0.09  95.02  *****  2940.  95.00
          141.   141.  1389.  114738.  2.82  0.00   0.00   0.10   0.71
          <<<<<THE ABOVE RESULTS REFLECT "NORMAL" (UNCONSTRICTED) FLOW>>>>>
    
```

WSPRO                    FEDERAL HIGHWAY ADMINISTRATION - U. S. GEOLOGICAL SURVEY  
V060188                   MODEL FOR WATER-SURFACE PROFILE COMPUTATIONS

Structure #: 182007800100                    file: cattle.flood  
Cattle Creek at US 78                    TDF 11/30/93  
Dorchester County, South Carolina  
\*\*\* RUN DATE & TIME: 11-30-93 08:04

<<<<<RESULTS REFLECTING THE CONSTRICTED FLOW FOLLOW>>>>>

XSID:CODE	SRDL	LEW	AREA	VHD	HF	EGL	CRWS	Q	WSEL
SRD	FLEN	REW	K	ALPH	HO	ERR	FR#	VEL	
BRDG :BR	110.	7.	558.	0.69	0.23	95.61	91.21	2940.	94.93
0.	110.	100.	68975.	1.59	0.53	0.00	0.46	5.27	

TYPE	PPCD	FLOW	C	P/A	LSEL	BLEN	XLAB	XRAB
3.	0.	1.	0.792	0.076	97.30	*****	*****	*****

XSID:CODE	SRDL	LEW	AREA	VHD	HF	EGL	CRWS	Q	WSEL
SRD	FLEN	REW	K	ALPH	HO	ERR	FR#	VEL	
APPR :AS	110.	247.	5099.	0.01	0.24	95.92	91.83	2940.	95.91
141.	154.	1399.	154906.	2.58	0.07	0.02	0.07	0.58	

M(G)	M(K)	KQ	XLKQ	XRKQ	OTEL
0.917	0.771	35263.	814.	907.	95.87

<<<<<END OF BRIDGE COMPUTATIONS>>>>>

# WSPRO OUTPUT --Continued

WSPRO FEDERAL HIGHWAY ADMINISTRATION - U. S. GEOLOGICAL SURVEY  
 V060188 MODEL FOR WATER-SURFACE PROFILE COMPUTATIONS

Structure #: 182007800100 file: cattle.flood  
 Cattle Creek at US 78 TDF 11/30/93  
 Dorchester County, South Carolina  
 \*\*\* RUN DATE & TIME: 11-30-93 08:04

XSID:CODE	SRDL	LEW	AREA	VHD	HF	EGL	CRWS	Q	WSEL
SRD	FLEN	REW	K	ALPH	HO	ERR	FR#	VEL	
EXIT1:XS	*****	269.	4340.	0.05	*****	93.37	90.24	3990.	93.32
-2230.	*****	1391.	132904.	3.67	*****	*****	0.15	0.92	

FULV1:FV	130.	269.	4344.	0.05	0.12	93.49	*****	3990.	93.44
-2100.	130.	1391.	133082.	3.67	0.00	0.00	0.15	0.92	

<<<<<THE ABOVE RESULTS REFLECT "NORMAL" (UNCONSTRICTED) FLOW>>>>>

APPR1:AS	130.	269.	4348.	0.05	0.12	93.61	*****	3990.	93.57
-1970.	130.	1391.	133247.	3.67	0.00	0.00	0.15	0.92	

<<<<<THE ABOVE RESULTS REFLECT "NORMAL" (UNCONSTRICTED) FLOW>>>>>

<<<<<RESULTS REFLECTING THE CONSTRICTED FLOW FOLLOW>>>>>

XSID:CODE	SRDL	LEW	AREA	VHD	HF	EGL	CRWS	Q	WSEL
SRD	FLEN	REW	K	ALPH	HO	ERR	FR#	VEL	
BRDG1:BR	130.	18.	499.	1.47	0.29	94.84	90.19	3990.	93.37
-2100.	130.	85.	62041.	1.48	1.19	0.00	0.60	7.99	

TYPE	PPCD	FLOW	C	P/A	LSEL	BLEN	XLAB	XRAB
3.	1.	1.	0.821	0.064	100.60	*****	*****	*****

XSID:CODE	SRDL	LEW	AREA	VHD	HF	EGL	CRWS	Q	WSEL
SRD	FLEN	REW	K	ALPH	HO	ERR	FR#	VEL	
APPR1:AS	115.	219.	6016.	0.02	0.22	95.18	90.47	3990.	95.16
-1970.	158.	1408.	212337.	3.20	0.12	-0.01	0.09	0.66	

M(G)	M(K)	KQ	XLKQ	XRKQ	OTEL
0.940	0.743	54567.	815.	883.	95.12

<<<<<END OF BRIDGE COMPUTATIONS>>>>>

XSID:CODE	SRDL	LEW	AREA	VHD	HF	EGL	CRWS	Q	WSEL
SRD	FLEN	REW	K	ALPH	HO	ERR	FR#	VEL	
TMP1 :XS	920.	233.	5524.	0.03	0.37	95.55	*****	3990.	95.53
-1050.	920.	1403.	187773.	3.31	0.00	0.00	0.10	0.72	
EXIT :XS	940.	245.	5128.	0.03	0.47	96.03	*****	3990.	96.00
-110.	940.	1399.	168763.	3.41	0.00	0.00	0.11	0.78	
FULV :FV	110.	246.	5092.	0.03	0.06	96.09	*****	3990.	96.06
0.	110.	1399.	167025.	3.42	0.00	0.00	0.12	0.78	

<<<<<THE ABOVE RESULTS REFLECT "NORMAL" (UNCONSTRICTED) FLOW>>>>>

WSPRO OUTPUT --Continued

APPR :AS 141. 239. 5351. 0.02 0.08 96.17 \*\*\*\*\* 3990. 96.15  
 141. 141. 1401. 166393. 2.53 0.00 0.00 0.09 0.75  
 <<<<<THE ABOVE RESULTS REFLECT "NORMAL" (UNCONSTRICTED) FLOW>>>>>

WSPRO FEDERAL HIGHWAY ADMINISTRATION - U. S. GEOLOGICAL SURVEY  
 V060188 MODEL FOR WATER-SURFACE PROFILE COMPUTATIONS

Structure #: 182007800100 file: cattle.flood  
 Cattle Creek at US 78 TDF 11/30/93  
 Dorchester County, South Carolina  
 \*\*\* RUN DATE & TIME: 11-30-93 08:04

<<<<<RESULTS REFLECTING THE CONSTRICTED FLOW FOLLOW>>>>>

XSID:CODE	SRDL	LEW	AREA	VHD	HF	EGL	CRWS	Q	WSEL
SRD	FLEN	REW	K	ALPH	HO	ERR	FR#	VEL	
BRDG :BR	110.	4.	657.	0.93	0.21	96.98	92.25	3990.	96.05
0.	110.	104.	87001.	1.62	0.74	0.00	0.51	6.08	

TYPE PPCD FLOW C P/A LSEL BLEN XLAB XRAB  
 3. 0. 1. 0.786 0.075 97.30 \*\*\*\*\* \*\*\*\*\* \*\*\*\*\*

XSID:CODE	SRDL	LEW	AREA	VHD	HF	EGL	CRWS	Q	WSEL
SRD	FLEN	REW	K	ALPH	HO	ERR	FR#	VEL	
APPR :AS	110.	204.	6547.	0.01	0.23	97.28	92.09	3990.	97.26
141.	156.	1413.	224283.	2.36	0.07	0.02	0.07	0.61	

M(G) M(K) KQ XLKQ XRKQ OTEL  
 0.914 0.781 48840. 811. 911. 97.23

<<<<<END OF BRIDGE COMPUTATIONS>>>>>

ER

PIER SCOUR COMPUTATIONS  
 FOR  
 CATTLE CREEK AT US 78 STR. 182007800100 DORCHESTER, CO., SC  
 Q100 = 2940 cfs CASE 1 (without debris) 11/30/93 TDF

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HYDRAULIC VARIABLES USED IN CSU EQUATION

PIER NUMBER	1	2	3	4
PIER STATION (FT)	22	44	66	88
LOCATION OF PIER	mcl	mcm	mcr	mcr
Y1: DEPTH (FT)	10.3	10.3	10.3	10.3
V1: VEL. (FPS)	5.7	5.7	5.7	5.7
a: PIER WIDTH (FT)	1.5	1.5	1.5	1.5
L: PIER LENGTH (FT)	5.7	5.7	5.7	5.7
PIER SHAPE	1	1	1	1
ATTACK ANGLE	25	25	25	25
K1 (SHAPE COEF.)	1.00	1.00	1.00	1.00
K2 (ANGLE COEF.)	1.78	1.78	1.78	1.78
FROUDE NO.	0.31	0.31	0.31	0.31

COMPUTED SCOUR DEPTHS USING CSU EQUATION

SCOUR DEPTH (FT)	6.34	6.34	6.34	6.34
MAX SCOUR DEPTH (FT)	6.97	6.97	6.97	6.97

"MAX SCOUR DEPTH" includes an additional 10 percent of the computed CSU scour depth as recommended in HEC 18

THE COMPUTED PIER SKEW CORRECTION COEFFICIENT WAS FOUND BY EXTRAPOLATING THE LEFT END OF THE TABLE BACK TO 1 AT PIER NO. 1

THE COMPUTED PIER SKEW CORRECTION COEFFICIENT WAS FOUND BY EXTRAPOLATING THE LEFT END OF THE TABLE BACK TO 1 AT PIER NO. 2

THE COMPUTED PIER SKEW CORRECTION COEFFICIENT WAS FOUND BY EXTRAPOLATING THE LEFT END OF THE TABLE BACK TO 1 AT PIER NO. 3

THE COMPUTED PIER SKEW CORRECTION COEFFICIENT WAS FOUND BY EXTRAPOLATING THE LEFT END OF THE TABLE BACK TO 1 AT PIER NO. 4

RELIEF BRIDGE OPENING  
CLEAR-WATER CONTRACTION SCOUR COMPUTATIONS  
FOR  
CATTLE CREEK AT US 78 STR. 182007800100 DORCHESTER, CO., SC  
Q100 = 2940 cfs CASE 1 (without debris) 11/30/93 TDF

---

DISCHARGE IN CONTRACTED SECTION (CFS)	=	2940.
WIDTH OF CONTRACTED SECTION (FT)	=	57.7
MEDIAN GRAIN SIZE (FT)	=	0.0014
COMPUTED DEPTH OF CONTRACTED SECTION (FT)	=	24.5
AVERAGE FLOOD PLAIN DEPTH (FT)	=	8.6
DEPTH OF CONTRACTION SCOUR (FT)	=	15.9

PIER SCOUR COMPUTATIONS  
 FOR  
 CATTLE CREEK AT US 78 STR. 182007800100 DORCHESTER, CO., SC  
 Q500 = 3990 cfs CASE 1 (without debris) 11/30/93 TDF

---

HYDRAULIC VARIABLES USED IN CSU EQUATION

PIER NUMBER	1	2	3	4
PIER STATION (FT)	22	44	66	88
LOCATION OF PIER	mcl	mcm	mcr	mcr
Y1: DEPTH (FT)	11.4	11.4	11.4	11.4
V1: VEL. (FPS)	6.6	6.6	6.6	6.6
a: PIER WIDTH (FT)	1.5	1.5	1.5	1.5
L: PIER LENGTH (FT)	5.7	5.7	5.7	5.7
PIER SHAPE	1	1	1	1
ATTACK ANGLE	25	25	25	25
K1 (SHAPE COEF.)	1.00	1.00	1.00	1.00
K2 (ANGLE COEF.)	1.78	1.78	1.78	1.78
FROUDE NO.	0.34	0.34	0.34	0.34

COMPUTED SCOUR DEPTHS USING CSU EQUATION

SCOUR DEPTH (FT)	6.86	6.86	6.86	6.86
MAX SCOUR DEPTH (FT)	7.55	7.55	7.55	7.55

"MAX SCOUR DEPTH" includes an additional 10 percent of the computed CSU scour depth as recommended in HEC 18

THE COMPUTED PIER SKEW CORRECTION COEFFICIENT WAS FOUND BY EXTRAPOLATING THE LEFT END OF THE TABLE BACK TO 1 AT PIER NO. 1

THE COMPUTED PIER SKEW CORRECTION COEFFICIENT WAS FOUND BY EXTRAPOLATING THE LEFT END OF THE TABLE BACK TO 1 AT PIER NO. 2

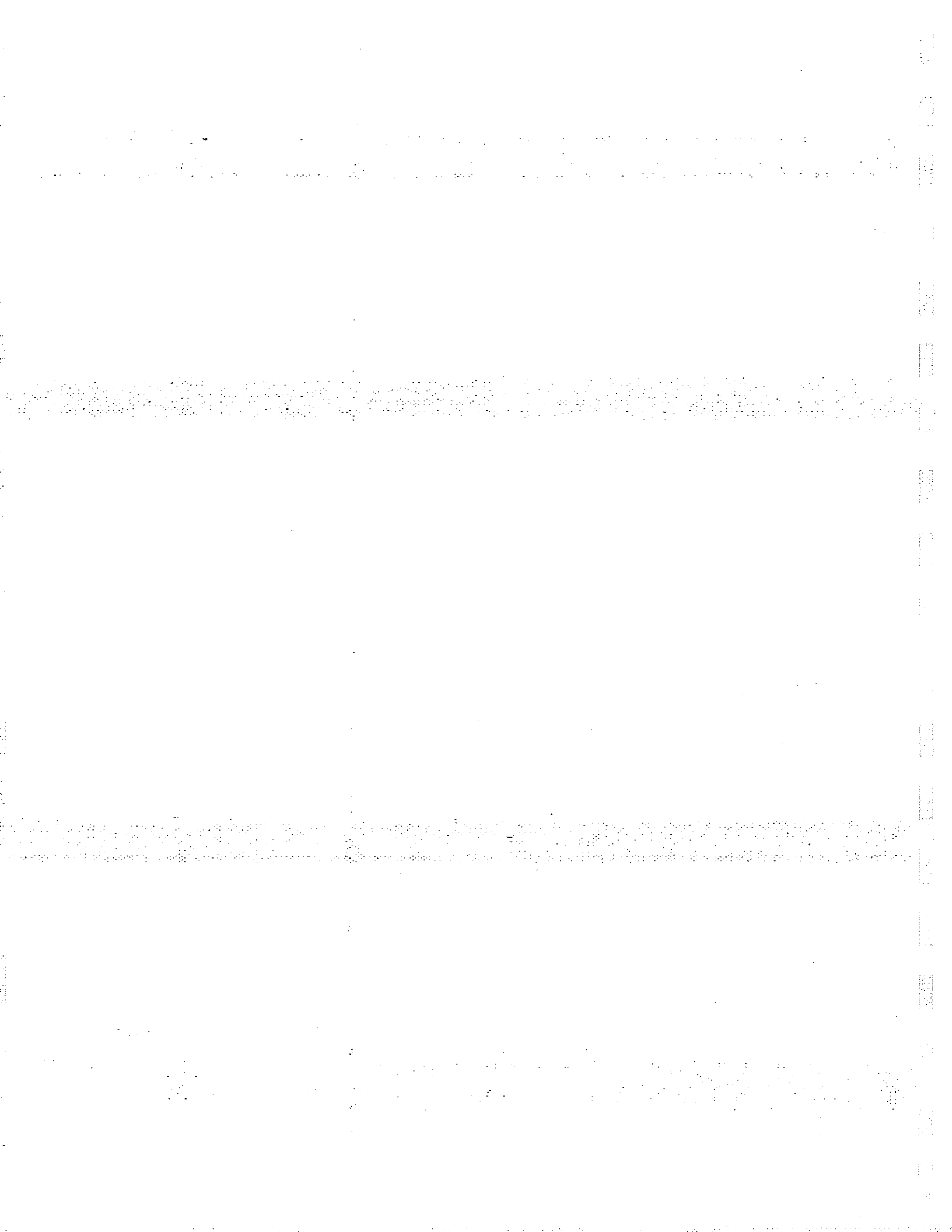
THE COMPUTED PIER SKEW CORRECTION COEFFICIENT WAS FOUND BY EXTRAPOLATING THE LEFT END OF THE TABLE BACK TO 1 AT PIER NO. 3

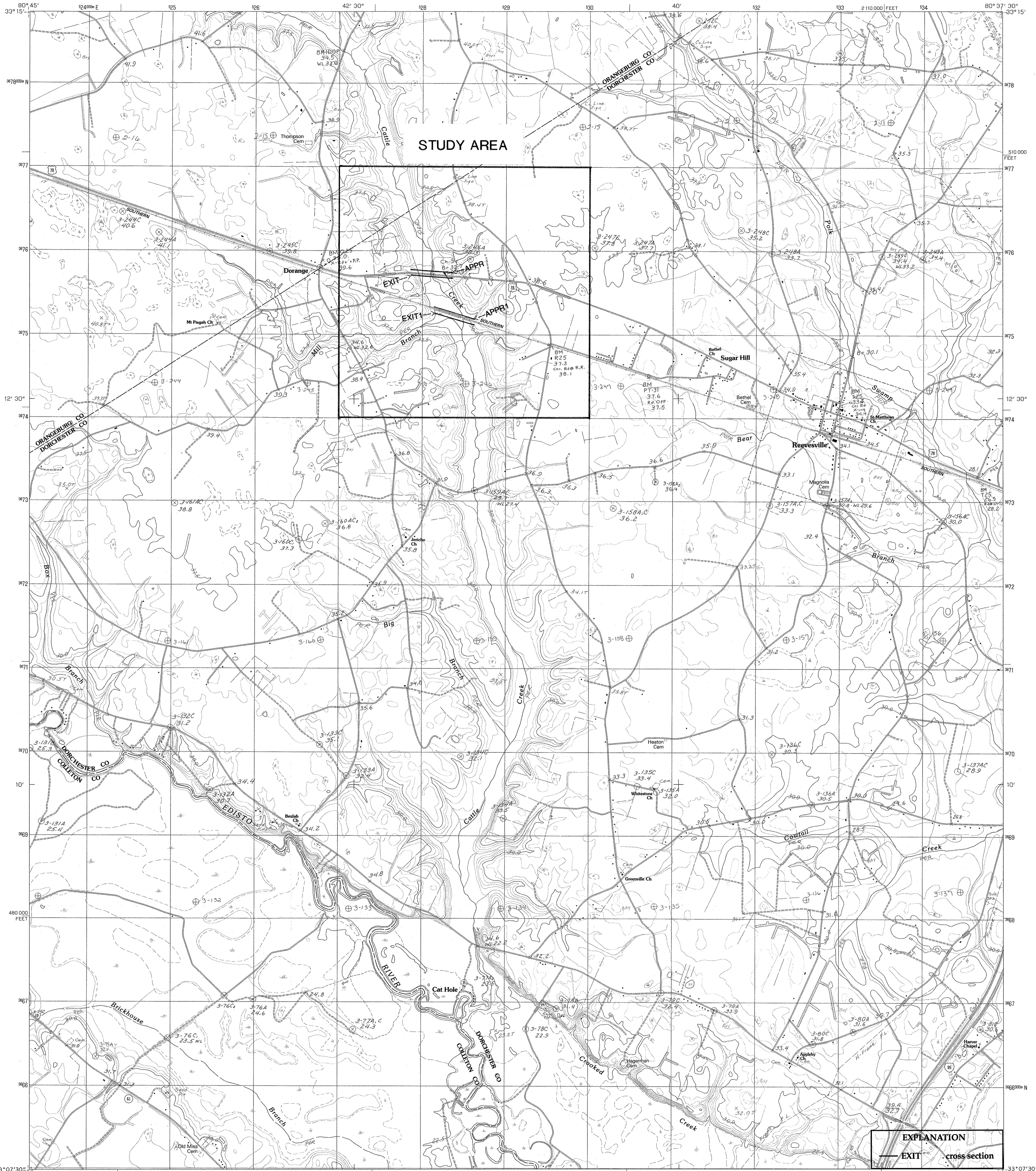
THE COMPUTED PIER SKEW CORRECTION COEFFICIENT WAS FOUND BY EXTRAPOLATING THE LEFT END OF THE TABLE BACK TO 1 AT PIER NO. 4

RELIEF BRIDGE OPENING  
CLEAR-WATER CONTRACTION SCOUR COMPUTATIONS  
FOR  
CATTLE CREEK AT US 78 STR. 182007800100 DORCHESTER, CO., SC  
Q500 = 3990 cfs CASE 1 (without debris) 11/30/93 TDF

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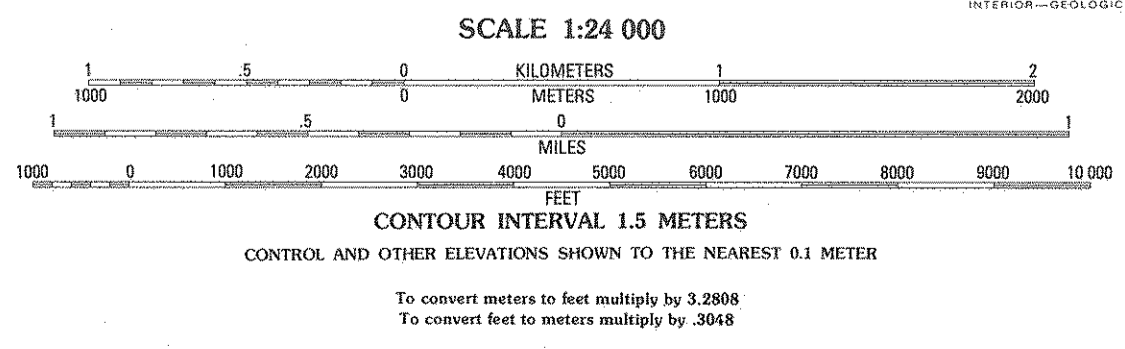
DISCHARGE IN CONTRACTED SECTION (CFS)	=	3990.
WIDTH OF CONTRACTED SECTION (FT)	=	57.7
MEDIAN GRAIN SIZE (FT)	=	0.0014
COMPUTED DEPTH OF CONTRACTED SECTION (FT)	=	31.9
AVERAGE FLOOD PLAIN DEPTH (FT)	=	10.0
DEPTH OF CONTRACTION SCOUR (FT)	=	21.9





PRODUCED BY THE UNITED STATES GEOLOGICAL SURVEY  
CONTROL BY U.S.G.S. NAD83 AND SOUTH CAROLINA GEODETIC SURVEY  
COMPILED FROM AERIAL PHOTOGRAPHS TAKEN . . . . . 1974  
FIELD CHECKED . . . . . 1976. MAP EDITED . . . . . 1982  
PROJECTION . . . . . LAMBERT CONFORMAL CONIC  
GRID. 1000-METER UNIVERSAL TRANSVERSE MERCATOR . . . . . ZONE 17  
10,000-FOOT STATE GRID TICKS . . . . . SOUTH CAROLINA SOUTH ZONE  
UTM GRID DECLINATION . . . . . 0°10' EAST  
1982 MAGNETIC NORTH DECLINATION . . . . . 6°4' WEST  
VERTICAL DATUM . . . . . NATIONAL GEODETIC VERTICAL DATUM OF 1929  
HORIZONTAL DATUM . . . . . 1927 NORTH AMERICAN DATUM  
To place on the predicted North American Datum of 1983, move  
the projection lines as shown by dashed corner ticks (14 meters  
south and 17 meters west)

**PROVISIONAL MAP**  
Produced from original  
manuscript drawings. Informa-  
tion shown as of date of  
field check



QUADRANGLE LOCATION

1	2	3	1 Branchville North
			2 Bowman
			3 Wadlow Swamp
			4 Branchville South
4	5	6	5 St George
			6 Williams
			7 St George SW
6	7	8	8 Grover

ADJOINING 7.5' QUADRANGLE NAMES

**EXPLANATION**

— EXIT — cross section

CONTOURS AND ELEVATIONS IN METERS  
ROAD LEGEND

Improved Road  
Unimproved Road  
Trail

○ Interstate Route ○ U. S. Route ○ State Route

REEVESVILLE, S. C.  
PROVISIONAL EDITION 1982  
33080-B6-TM-024

**Figure 1.—Topography of study area and location of cross sections used in WSPRO analysis for structure 182007800100 on Route US 78, crossing Cattle Creek in Dorchester County, South Carolina.**

INDEX OF SHEETS

- SHEET NO. 1 TITLE SHEET
- 2 CURB AND GUTTER DETAILS
- 3 BRIDGE PLAN AND PROFILE
- 4 & 5 DETAILS FOR WIDENING BRIDGE
- 6 ORIGINAL CONSTRUCTION DETAILS

STATE OF SOUTH CAROLINA  
STATE HIGHWAY DEPARTMENT

PLAN AND PROFILE OF PROPOSED  
STATE HIGHWAY  
WIDENING OF BRIDGE OVER  
CATTLE CREEK

DORCHESTER COUNTY

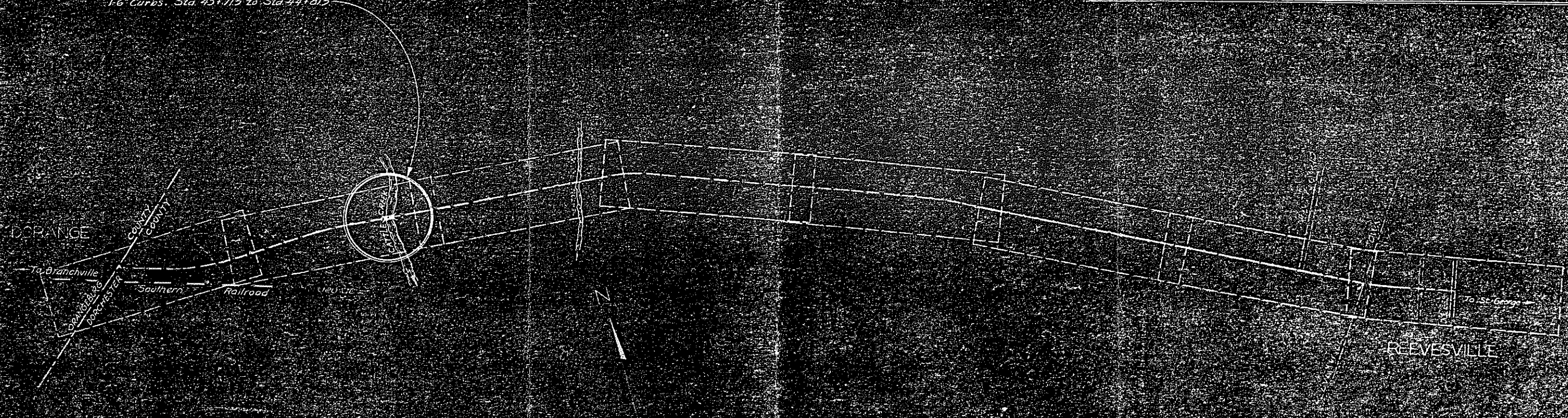
FED. AID PROJ. NO. S-103 (2)  
S. C. DOCKET NO. J8 251

SCALE: PLAN AND PROFILE, 1 INCH = 100 FEET HORIZONTAL, 1 INCH = 10 FEET VERTICAL

FED. ROAD DISTRICT	STATE	COUNTY	DOCKET NO.	ROUTE NO.	SHEET NO.	TOTAL SHEETS
10	S.C.	DORCHESTER	J8 251	103	1	6

SUMMARY OF ESTIMATED QUANTITIES		
ALTERNATE NO. 1 (16" R.C. PILES)		
ITEM	QUANTITY	UNIT
Class A Concrete	6034	cu. Yds.
Reinforcing Steel	12,353	Lbs.
1/6" Precast Concrete Piling	384	Lf.
Riprap	700	Tons
ALTERNATE NO. 2 (10" STEEL H-PILES)		
ITEM	QUANTITY	UNIT
Class A Concrete	6076	cu. Yds.
Reinforcing Steel	12,443	Lbs.
Steel H-Piling (10" x 42")	600	Lf.
Riprap	200	Tons

Widen existing 110'-0" R.C. Bridge from 18'-0" to 26'-0" Roadway with 1'-6" Curbs. Sta. 43+71.5 to Sta. 44+81.5



CONVENTIONAL SIGNS

	Advance Warning of Road Work
	Stop
	Yield
	No Left Turn
	No Right Turn
	No U-Turn
	No Through Trucks
	No Trucks
	No Motorcycles
	No Bicycles
	No Pedestrians
	No Animals
	No Firearms
	No Alcohol
	No Drugs
	No Weapons
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# PILE RECORD ON DOCKET NO. 102511

FED. ROAD DIST. NO.	STATE	COUNTY	DOCKET NO.	ROUTE NO.	SHEET NO.	TOTAL SHEETS
14	S.C.	ROCHESTER	102511	US 78	9	11

WEIGHT OF HAMMER 5000# FALL 2.75' TYPE Single Acting Steam (Vulcan No. 1)

BENT NO.	FOOTING	PILE NO.	DATE DRIVEN	DIAMETER BUTT	DIAMETER TIP	PENETRATION	PEN. PER BLOW	BEARING	ELEVATION PILE TIP	ELEVATION CUT-OFF	LENGTH IN PLACE	ORIGINAL LENGTH	LENGTH CUT-OFF	PAY LENGTH	C.O. AT 0.40 OF UNIT PRICE	C.O. AT 0.25 OF UNIT PRICE
1		1	4-10-51	16"	9"	13.82	0'	68.8	83.92	102.62	19.70	32.00	12.30	32.00		
		2	4-9-51	"	"	16.86	0'	68.8	82.14	"	20.88	32.00	11.52	32.00		
2		3	4-10-51	"	"	15.36	0'	68.8	82.38	"	20.24	32.00	11.76	32.00		
		4	4-9-51	"	"	11.04	0'	68.8	85.12	"	17.50	32.00	14.50	32.00		
3		5	4-9-51	"	"	13.31	0'	68.8	79.27	"	22.35	32.75	10.40	32.75		
		6	4-7-51	"	"	10.64	0'	68.8	81.73	"	20.89	32.75	11.86	32.75		
4		7	4-2-51	"	"	10.75	0.003	57.1	80.26	"	22.36	32.75	10.39	32.75		
		8	4-4-51	"	"	12.74	0'	68.8	79.03	"	23.59	32.75	9.16	32.75		
5		9	4-3-51	"	"	12.80	0'	68.8	82.69	"	19.93	32.00	12.07	32.00		
		10	4-5-51	"	"	14.71	0'	68.8	82.16	"	20.46	32.00	11.54	32.00		
6		11	4-3-51	"	"	15.30	0'	68.8	83.15	"	19.47	32.00	12.53	32.00		
		12	4-6-51	"	"	15.71	0'	68.8	83.19	"	19.43	32.00	12.57	32.00		

TOTAL																
GRAND TOTAL																387.88

NOTES CONCERNING ANY UNUSUAL FOUNDATION CONDITION			REMARKS
BENT NO.	FOOTING	PILE NO.	
All			All piles driven to refusal in road except Bent 4, Pile 7, which crushed at top just before refusal was reached.

TOTAL