

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

**LEVEL II BRIDGE SCOUR ANALYSIS FOR STRUCTURE 134026500200
ON ROUTE SC 265, CROSSING LITTLE FORK CREEK IN
CHESTERFIELD COUNTY, SOUTH CAROLINA**

By Noel M. Hurley, Jr. and Stephen T. Benedict

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



Columbia, South Carolina

1994



UNIT ABBREVIATIONS

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

OTHER ABBREVIATIONS

downstream	D/S
upstream	U/S
flood plain	f/p
Water-surface profile computation model	WSPRO
median diameter of bed material	D ₅₀
South Carolina Department of Transportation	SCDOT

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 134026500200 on Route SC 265,
crossing Little Fork Creek in Chesterfield County, South Carolina**

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This report provides the results of the detailed Level II analysis of scour potential at structure 134026500200 on Route SC 265, crossing Little Fork Creek in Chesterfield County, South Carolina (figure 1 in pocket; figures 5-8). The site is located near the divide of the Piedmont and upper Coastal Plain physiographic provinces near the town of Jefferson in the western part of Chesterfield County. The drainage area for the site is 15.0 mi², and is a predominantly rural drainage basin with little development in recent years. In the vicinity of the study site, the land is covered by moderate to dense woods consisting of hardwoods and pines.

In the study area, Little Fork Creek has a meandering channel with a slope of approximately 0.00496 ft/ft (26.2 ft/mi), an average channel top width of 32 ft and an average channel depth of 5.2 ft. The predominant channel bed material is sand (D_{50} is 0.93 mm) and the channel banks consist of a silty sand (D_{50} is 0.40 mm). In general, the banks have light to moderate woody vegetative cover and were noted to be relatively stable at the time of the Level I and Level II site visits, March 31, 1992 and February 1 and 8, 1994, respectively.

The Route SC 265 crossing of Little Fork Creek is a 120-ft-long, two-lane bridge consisting of four 30-ft concrete spans, supported by concrete piers with spillthrough abutments. The left and right abutments have some riprap coverage but the riprap is in poor condition and the abutments have eroded. 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 5 and graphs of the scour depths are shown on figures 2 and 3.

No as-built bridge plans were available from the SCDOT; therefore, no pile/footing penetration depths were determined. In addition, it should be noted that the SCDOT road plan borings (file number 435) show subsurface rock and gravel that could affect the scour depths shown in this study. For more information, see the SCDOT road plans in the pocket at the back of the report.

Table 1. --Remaining pile/footing penetration at piers/bents for the 100- and 500-year discharges at the upstream face of structure 134026500200 on Route SC 265, crossing Little Fork Creek in Chesterfield County, South Carolina

Pier/bent number	Station from left end of bridge (feet)	Pile tip/ footing elevation, SCDOT datum (feet)	Pile tip/ footing elevation, USGS datum (feet)	Ground elevation at pier/bent, USGS datum (feet)	Total ⁴ scour depth (feet)	Elevation of scour, USGS datum (feet)	Remaining pile/footing penetration (feet)
100-year discharge is 1,740 cubic feet per second							
4	30	-- ³	--	-0.3	5.7	-6.0	--
3	60	--	--	5.3	7.6	-2.3	--
2	90	--	--	4.8	7.6	-2.8	--
500-year discharge is 2,310 cubic feet per second							
4	30	--	--	-0.3	6.2	-6.5	--
3	60	--	--	5.3	9.5	-4.2	--
2	90	--	--	4.8	9.5	-4.7	--

¹ Pier/bent number corresponds to South Carolina Department of Transportation (SCDOT) road plans.

² Stations are determined from left to right looking downstream.

³ Dashes indicate no data. No as built pile tip/footing information was available from the SCDOT.

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

NOTE: The SCDOT road plan borings (file number 485) show subsurface rock and gravel that could reduce the scour depths shown in the above table. For more information, see the SCDOT plans in report pocket.

Table 2. --Remaining pile/footing penetration at piers/bents for the 100- and 500-year discharges at the downstream face of structure 134026500200 on Route SC 265, crossing Little Fork Creek in Chesterfield County, South Carolina

Pier/bent ¹ number	Station from ² left end of bridge (feet)	Pile tip/ ³ footing elevation, SCDOT datum (feet)	Pile tip/ footing elevation, USGS datum (feet)	Ground elevation at pier/bent, USGS datum (feet)	Total ⁴ scour depth (feet)	Elevation of scour, USGS datum (feet)	Remaining pile/footing penetration (feet)
100-year discharge is 1,740 cubic feet per second							
4	30	-- ³	--	0.4	5.7	-5.3	--
3	60	--	--	1.4	5.7	-4.3	--
2	90	--	--	5.3	7.6	-2.3	--
500-year discharge is 2,310 cubic feet per second							
4	30	--	--	0.4	6.2	-5.8	--
3	60	--	--	1.4	6.2	-4.8	--
2	90	--	--	5.3	9.5	-4.2	--

¹ Pier/bent number corresponds to South Carolina Department of Transportation (SCDOT) road plans.

² Stations are determined from left to right looking downstream.

³ Dashes indicate no data. No as built pile tip/footing information was available from the SCDOT.

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

NOTE: The SCDOT road plan borings (file number 435) show subsurface rock and gravel that could reduce the scour depths shown in the above table. For more information, see the SCDOT plans in report pocket.

Table 3. --Cumulative scour depths at piers/bents for the 100- and 500-year discharges at the upstream face of structure 134026500200 on Route SC 265, crossing Little Fork Creek in Chesterfield County, South Carolina

Pier/bent ¹ number	Station from ² left end of bridge (feet)	Contraction scour depth (feet)	Pier/bent scour depth without debris (feet)	Total ³ scour depth without debris (feet)
100-year discharge is 1,740 cubic feet per second				
4	30	0.0 ⁴	5.7	5.7
3	60	1.9	5.7	7.6
2	90	1.9	5.7	7.6
500-year discharge is 2,310 cubic feet per second				
4	30	0.0 ⁴	6.2	6.2
3	60	3.3	6.2	9.5
2	90	3.3	6.2	9.5

¹ Pier/bent number corresponds to South Carolina Department of Transportation (SCDOT) bridge plans.

² Stations are determined from left to right looking downstream.

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

⁴ The calculated contraction scour is a negative value, but was set equal to zero to reflect a more reasonable estimate of scour during peak flood conditions.

NOTE: The SCDOT road plan borings (file number 435) show subsurface rock and gravel that could reduce the scour depths shown in the above table. For more information, see the SCDOT plans in report pocket.

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 100- and 500-year discharges at the downstream face of structure 134026500200 on Route SC 265, crossing Little Fork Creek in Chesterfield County, South Carolina

Pier/bent ¹ number	Station from ² left end of bridge (feet)	Contraction scour depth (feet)	Pier/bent scour depth without debris (feet)	Total ³ scour depth without debris (feet)
100-year discharge is 1,740 cubic feet per second				
4	30	0.0 ⁴	5.7	5.7
3	60	0.0 ⁴	5.7	5.7
2	90	1.9	5.7	7.6
500-year discharge is 2,310 cubic feet per second				
4	30	0.0 ⁴	6.2	6.2
3	60	0.0 ⁴	6.2	6.2
2	90	3.3	6.2	9.5

¹ Pier/bent number corresponds to South Carolina Department of Transportation (SCDOT) bridge plans.

² Stations are determined from left to right looking downstream.

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

⁴ The calculated contraction scour is a negative value, but was set equal to zero to reflect a more reasonable estimate of scour during peak flood conditions.

NOTE: The SCDOT road plan borings (file number 435) show subsurface rock and gravel that could reduce the scour depths shown in the above table. For more information, see the SCDOT plans in report pocket.

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 5. --Abutment scour depths for the 100- and 500-year discharges at structure 134026500200 on Route SC 265, crossing Little Fork Creek in Chesterfield County, South Carolina

Recurrence interval for discharge	Discharge (cubic feet per second)	Depth of scour ^{1, 2} at left abutment (feet)	Depth of scour ^{1, 2} at right abutment (feet)
100-year	1,740	7.0	5.2
500-year	2,310	7.9	6.5

¹ Abutment scour depths were calculated using the Froehlich (1989) live-bed abutment scour equation, assuming no abutment protection.

² The words "right" and "left" refer to directions that would be reported by an observer facing downstream.

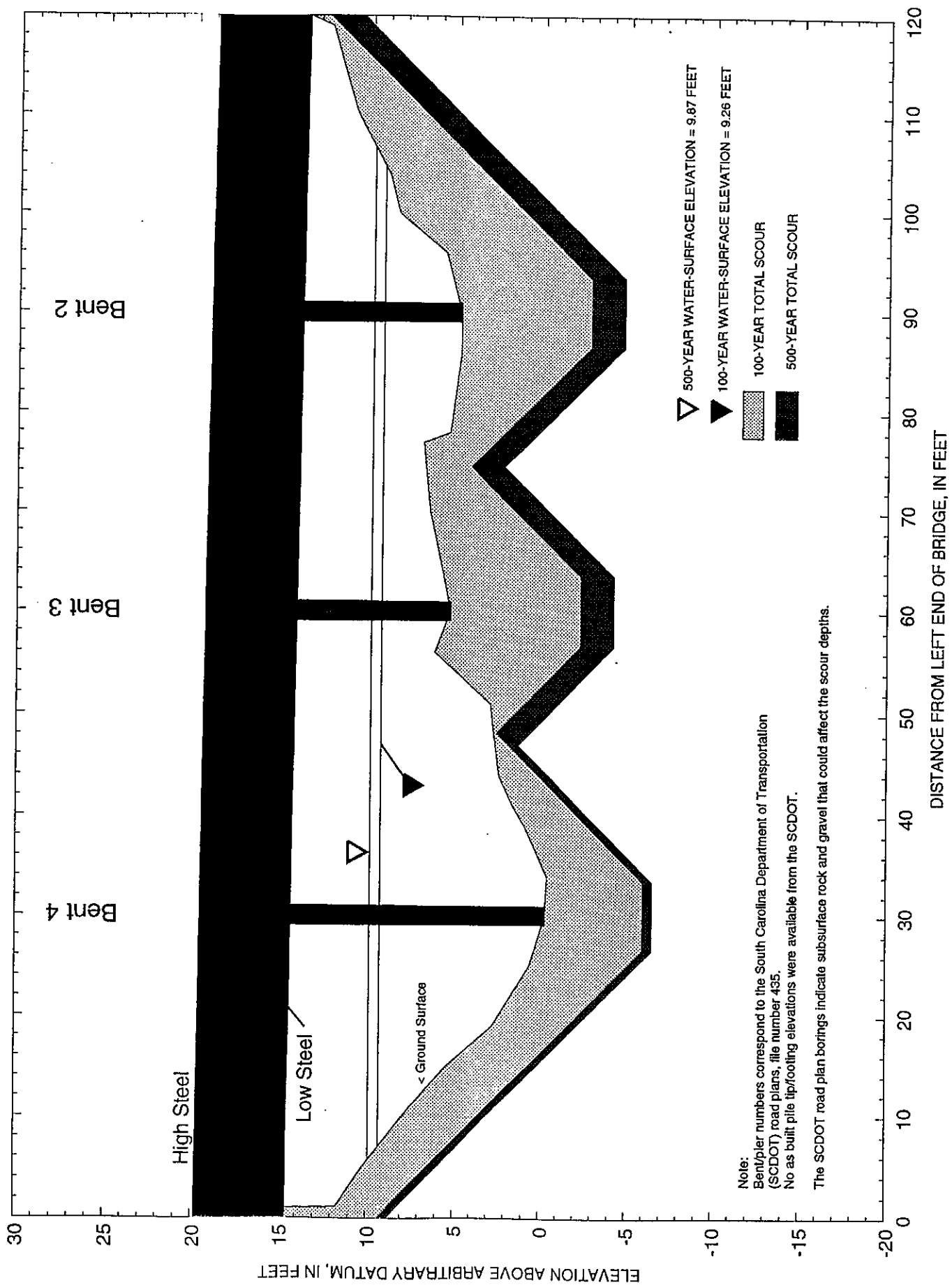


Figure 2.--Total scour depths for the 100- and 500-year discharges on the upstream face of structure 134026500200 on Route SC 265, crossing Little Fork Creek in Chesterfield County, South Carolina.



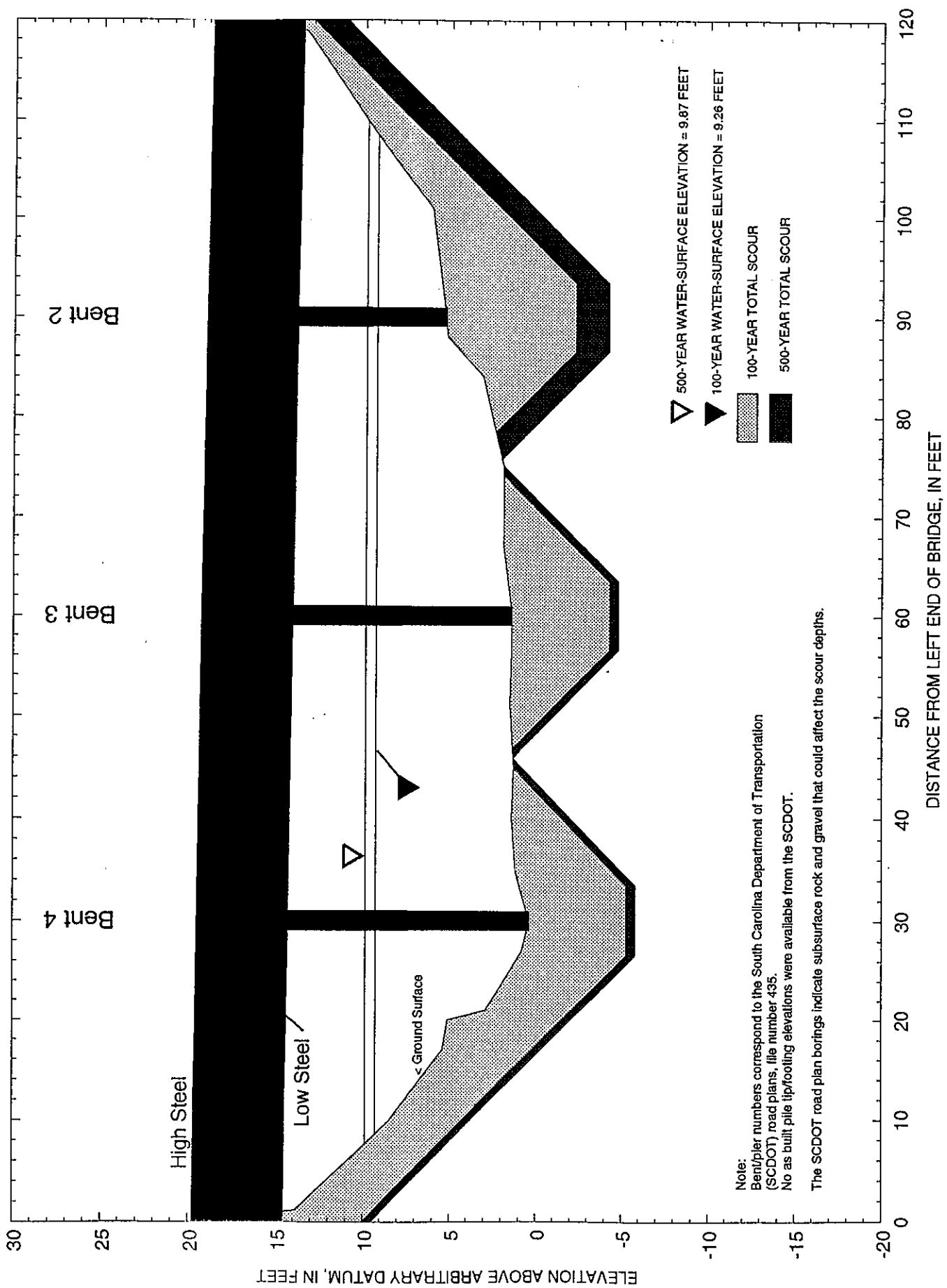


Figure 3.--Total scour depths for the 100- and 500-year discharges on the downstream face of structure 134026500200 on Route SC 265, crossing Little Fork Creek in Chesterfield County, South Carolina.



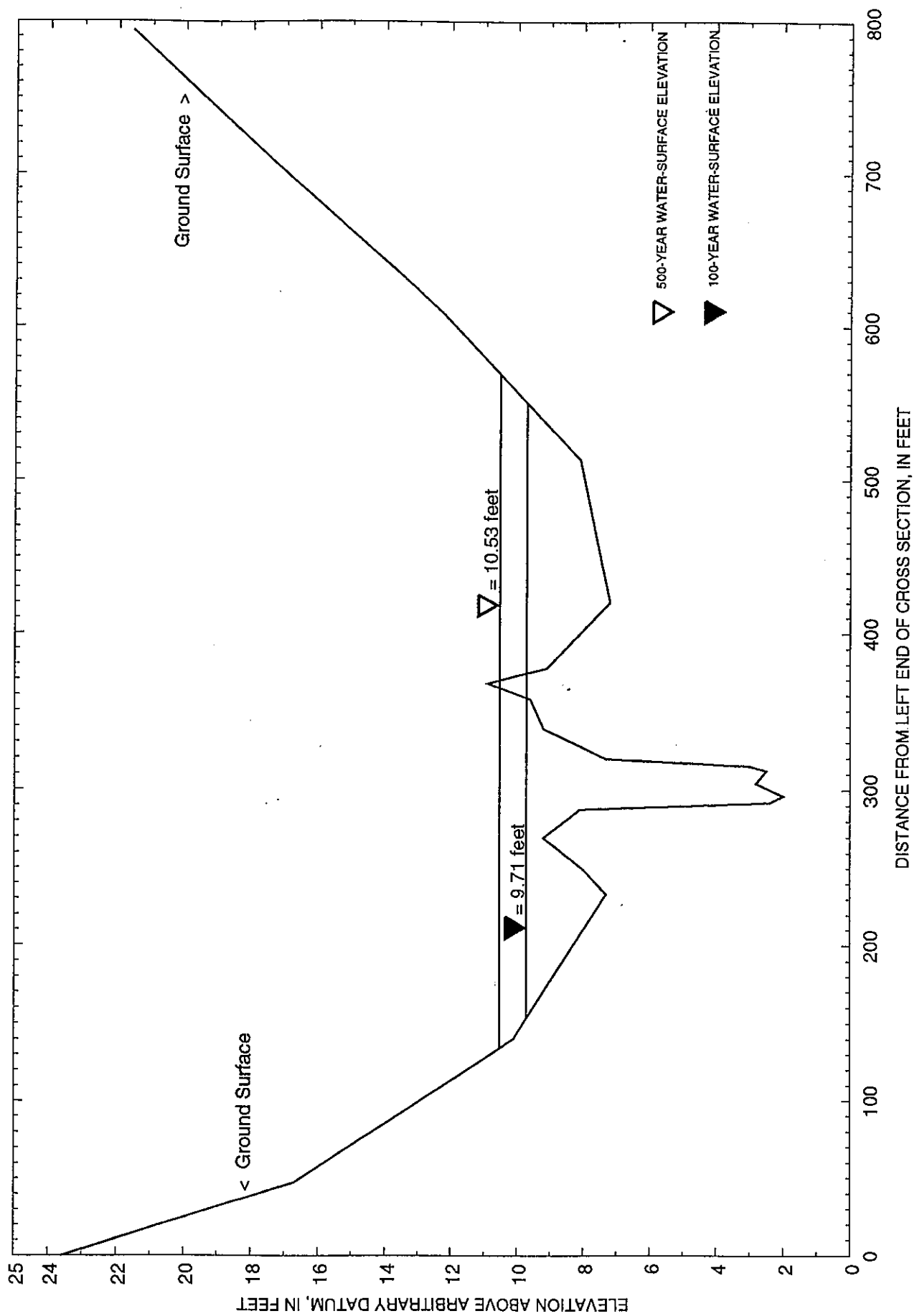


Figure 4.--Approach cross section of structure 134026500200 on Route SC 265, crossing Little Fork Creek in Chesterfield County, South Carolina.





Figure 5.--Structure 134026500200 on Route SC 265, crossing Little Fork Creek in Chesterfield County, South Carolina as viewed from the upstream left bank (March 31, 1992).



Figure 6.--Downstream channel as viewed from structure 134026500200 on Route SC 265, crossing Little Fork Creek in Chesterfield County, South Carolina (March 31, 1992).





Figure 7.--Structure 134026500200 on Route SC 265 crossing Little Fork Creek in Chesterfield, County, South Carolina, as viewed from the downstream channel (March 31, 1992).



Figure 8.--Upstream channel as viewed from structure 134026500200 on Route SC 265, crossing Little Fork Creek in Chesterfield County, South Carolina (March 31, 1992).



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SCOUR REPORT SUMMARY

Structure Number 134026500200 Stream Little Fork Creek
County Chesterfield Road SC 265 District 4

Description of Bridge

Bridge length 120 ft Bridge width 27 ft Max span length 30 ft

Alignment of bridge to road (on curve or straight) Straight

Abutment type Spillthrough Embankment type Sloping

Riprap on abutment? Yes Date of inspection 02-01-1994

Description of riprap The riprap on both abutments is in poor condition. The bulkhead is exposed on the left abutment and the lower half of the right abutment is eroded.

Brief description of piers/pile bents The three interior supports consist of two 1.9- by 2.3-ft rectangular piers. No subsurface pile/footing information was available.

Is bridge skewed to flood plain according to USGS topo map? Yes Angle 21

Is bridge located on a bend in channel? Yes If so, describe (mild, moderate, severe)

The channel bends to the right and flow impacts the left bank from approximately 70 ft upstream to 4 ft downstream of the bridge.

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

	Date of inspection	Percent of channel blocked horizontally	Percent of channel blocked vertically
Level I	<u>03-31-1992</u>	<u>45</u>	<u>20</u>
Level II	<u>02-01-1994</u>	<u>--</u>	<u>--</u>

Potential for debris Moderate: trees leaning over the channel upstream and downstream of the bridge. Fallen trees in channel just downstream of the bridge.

Describe any features near or at the bridge that may affect flow (include observation date).
Fallen trees in channel just downstream of the bridge, observed 03-31-1992.

Description of Flood Plain

General topography The site is near the Fall line and has rolling hills and a narrow flood plain.

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

Date of inspection 02-08-1994

D/S left: Moderate hardwoods with moderate underbrush

D/S right: Moderate hardwoods with moderate underbrush and some pines on the edge of the f/p

U/S left: Light to moderate hardwoods with thick underbrush and briars

U/S right: Moderate hardwoods with moderate underbrush and briars

Description of Channel

Average top width 32 *ft* *Average depth* 5.2 *ft*

Predominant bed material Sand *Bank material* Silty sand

Stream type (straight, meandering, braided, swampy, channelized) Meandering

Vegetative cover on channel banks near bridge: Date of inspection 03-31-1992

D/S left: Light to moderate hardwood coverage

D/S right: Light to moderate hardwood coverage

U/S left: Light to moderate hardwood coverage

U/S right: Light to moderate hardwood coverage

Do banks appear stable? Yes *If not, describe location and type of instability and date of observation.* The banks are relatively stable with some areas of moderate to heavy fluvial erosion observed during the Level I site visit on March 31, 1992.

Describe any obstructions in channel and date of observation. Fallen trees in channel just downstream of the bridge were observed on March 31, 1992.

Hydrology

Drainage area 15.0 mi^2

Percentage of drainage area in physiographic provinces:

<i>Physiographic province</i>	<i>Percent of drainage area</i>
<u>upper Coastal Plain</u>	<u>47</u>
<u>Piedmont</u>	<u>53</u>
<u></u>	<u></u>
<u></u>	<u></u>

Is drainage area considered rural or urban? Rural Describe any significant urbanization and potential for development. The area has a low potential for development.

Is there a USGS gage on the stream of interest? Yes

USGS gage description Little Fork Creek near Jefferson, SC

USGS gage number 02131320

Gage drainage area 15.0 mi^2

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

If so, describe

Calculated Discharges

Q_{100} 1,740 ft^3/s

Q_{500} 2,310 ft^3/s

Method used to determine discharges The discharges were estimated using the methods described in WRIR 91-4157, "Techniques for estimating magnitude and frequency of floods in South Carolina, 1988", by W.B. Guimaraes and L.R. Bohman.
The data from gaging station 02131320 was not used because only for years of flow data were available.

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 65.9 ft to the USGS
datum to obtain the SCDOT road plans' datum (file number 435).

Description of reference marks used to determine USGS datum. RM 1 is the head of a lag bolt in a power pole on the right bank, 20 ft D/S of the bridge, elevation is 10.09 ft.

RM 2 is a chiseled square on the D/S bridge rail, 10 ft left of the USGS gaging station, elevation is 18.98 ft. RM 3 is a steel bar on the U/S side of the bridge on the center span, elevation is 17.48 ft.

Cross Sections Used in WSPRO Analysis

[illegible]

* 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 SCDOT road plan data 5) other

Description of data and assumptions used in developing WSPRO model.

Little Fork Creek has a relatively uniform flood plain width in the study area, with no downstream natural or man-made contractions of flow that cause significant backwater at the Route SC 265 crossing. The flood plain begins to widen approximately 600 ft downstream of the bridge but was not included in the model because it is almost two flood-plain widths downstream of the Route SC 265 bridge. Therefore, it was assumed that slope-conveyance methodology would be adequate for estimating the starting-water-surface elevation for the water-surface profile computations.

For this study, the WSPRO model requires, as a minimum, an exit section one bridge width downstream of the bridge, a full-valley section at the downstream face of the bridge, the bridge section, and an approach section one bridge width upstream of the bridge. Cross sections at the upstream and downstream faces of the bridge were directly surveyed and the more constricted (upstream) bridge face was used in the WSPRO model. The section reference distance (SRD) at the downstream face of the bridge was set to zero. A Survey of the approach channel (located 122 ft upstream of the upstream bridge face) was adjusted by the channel slope and combined with the survey data from the SCDOT road plans (file number 435) for the Route SC 265 bridge. This cross section was shifted by the channel slope to the appropriate SRD to represent the exit, full-valley, and approach cross sections required by the WSPRO model.

Bridge Hydraulics

Average embankment elevation 16.6 *ft*

Average low steel elevation 14.3 *ft*

100-year discharge 1,740 *ft³/s*

Water-surface elevation at D/S bridge face 9.26 *ft*

Area of flow at D/S bridge face 441 *ft²*

Average velocity in bridge opening 3.95 *ft/s*

Maximum WSPRO tube velocity at bridge 5.54 *ft/s*

Water-surface elevation at Approach section with bridge 9.71 *ft*

Water-surface elevation at Approach section without bridge 9.59 *ft*

Amount of backwater caused by bridge 0.12 *ft*

500-year discharge 2,310 *ft³/s*

Water-surface elevation at D/S bridge face 9.87 *ft*

Area of flow at D/S bridge face 498 *ft²*

Average velocity in bridge opening 4.64 *ft/s*

Maximum WSPRO tube velocity at bridge 6.54 *ft/s*

Water-surface elevation at Approach section with bridge 10.53 *ft*

Water-surface elevation at Approach section without bridge 10.29 *ft*

Amount of backwater caused by bridge 0.24 *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 5 and graphs of the scour depths are shown on figures 2 and 3.

The local pier scour was determined using the Colorado State University pier scour equation (Richardson and others, 1993). Little Fork Creek expands significantly as it flows through the Route SC 265 bridge. The channel widens from 41 to 68 ft from the upstream to downstream bridge faces. This appears to be caused by high flows deflecting off the left bank just upstream of and at the bridge. Therefore, bents 2, 3, and 4 were analyzed as if they were in the channel to account for the possibility of additional channel widening and bank erosion occurring at the bridge during a flood. Ninety percent of the maximum WSPRO tube velocity and the maximum depth within the channel at the bridge were used to analyze the bents. The maximum depth within the channel was used to account for possible changes in the thalweg during a flood.

Figure 2, which represents the potential scour depths that could occur at the Route SC 265 crossing of Little Fork Creek, was developed using the more constricted (upstream) bridge face cross section. Because of the channel widening between the upstream and downstream bridge faces, figure 3 was included in the report to show the potential scour depths that could occur at the downstream face of the Route SC 265 bridge.

The right overbank at the bridge was analyzed for contraction scour using Laursen's clear-water contraction scour equation (Richardson and others, 1993). The left abutment is located on the left bank, therefore no left overbank scour computations were made. The channel contraction scour was analyzed using Laursen's modified live-bed contraction scour equation (Richardson and others, 1993).

The live-bed contraction scour equation indicates the deposition of sediment in the channel at the bridge during the 100- and 500-year floods. (See negative scour values determined in scour calculations included at the end of the report). However, it seems unreasonable to expect sediment deposition at the bridge during peak flood conditions. Therefore, the negative scour values were set equal to zero as reflected in tables 3 and 4 and figures 2 and 3.

The abutments are partially covered by riprap that is in poor condition and the abutments have eroded. Therefore, abutment scour was calculated using the Froehlich (1989) live-bed abutment scour equation.

It should be noted that the SCDOT road plan borings (file number 435) show subsurface rock and gravel that could affect the scour depths shown in this study. For more information, see the SCDOT bridge plans in the pocket at the back of the report.

WSPRO INPUT FILE

T1 WSPRO PROFILES--STRUCTURE 134026500200
T2 LITTLE FORK CREEK AT ROUTE SC 265, CHESTERFIELD COUNTY, SC
T3 LEVEL II BRIDGE SCOUR ANALYSIS
J1 * * * 0.85

*
* Q100 Q500
Q 1740 2310
SK 0.00496 0.00496
*

*
* THE TEMPLATE CROSS SECTION (TEMP) IS A COMBINATION OF THE SURVEY
* OF THE APPROACH CHANNEL AND GROUND POINTS TAKEN FROM SCDOT ROAD
* PLANS. THE APPROACH CHANNEL WAS SURVEYED 122 FT UPSTREAM OF THE
* BRIDGE. IN ADDITION, THE FLOOD-PLAIN DATA TAKEN FROM THE SCDOT
* ROAD PLANS WAS ADJUSTED FOR THE SKEW OF 20 DEGREES. THE CROSS
* SECTION WAS LOCATED AT THE APPROPRIATE SECTION REFERENCE DISTANCE
* AND THE DATA POINTS ADJUSTED BY THE CHANNEL SLOPE. THE DOWNSTREAM
* CHANNEL ROUGHNESS COEFFICIENTS WERE INCREASED SLIGHTLY TO ACCOUNT
* FOR LARGE DEBRIS IN THE CHANNEL.
*

XT TEMP 149
GR 0 23.6 47 16.7 140 10.1 233 7.3 249 8.0
GR 269 9.2 287 8.1 292 2.4 296 2.0 304 2.8
GR 312 2.5 315 3.0 319 7.3 338 9.2 357 9.6
GR 368 10.9 378 9.1 420 7.2 513 8.1 607 12.2
GR 700 17.0 794 21.6
*

XS EXIT -120 * * * 0.00496
GT
N 0.18 0.048 0.18
SA 287 319
*

XS FULV 0 * * * 0.00496
GT
*

*
* THE UPSTREAM BRIDGE FACE WAS THE MORE RESTRICTIVE AND WAS USED
* IN THE COMPUTATIONS. THE BRIDGE SKEW WAS DETERMINED FROM THE
* TOPOGRAPHIC MAP.
*

*
* SRD LOW STEEL SKEW
BR BRDGU 0 14.3 21
GR 0 14.9 1 14.6 1.1 11.7 5 10.2 10 7.9
GR 15 5.4 19 2.7 25 0.6 30 -0.3 34 -0.4
GR 39 0.9 41 1.6 44 2.4 51 3.0 56 6.2
GR 60 5.3 70 6.5 77 6.9 78 5.4 86 4.8
GR 90 4.8 96 5.7 100 8.4 104 9.0 110 10.9
GR 119 12.4 120 13.7 0 14.9
N 0.045 0.045 0.045
SA 15 56
PW 1 -0.3 1.9 4.8 1.9 4.8 3.8 5.3 3.8 5.3 5.7 14.3 5.7 14.3 0.0
CD 3 27 1.6 16.6
*

WSPRO INPUT FILE --Continued

*
* THE APPROACH CROSS SECTION IS A COMBINATION OF THE SURVEY
* OF THE APPROACH CHANNEL AND GROUND POINTS TAKEN FROM SCDOT ROAD
* PLANS. THE APPROACH CHANNEL WAS SURVEYED 122 FT UPSTREAM OF THE
* BRIDGE AND THE APPROACH FLOOD PLAIN WAS TAKEN FROM THE ROAD PLANS
* THE CROSS SECTION WAS LOCATED AT THE APPROPRIATE SECTION REFERENCE
* DISTANCE AND THE DATA POINTS ADJUSTED BY THE CHANNEL SLOPE.

AS APP 147 * * * 0.00496
GT
BP 272
N 0.18 0.045 0.16 0.18
SA 287 319 513
*

PX EXIT 850 25
PX APP 850 25
PX BRDGU 120 25
*

HP 1 BRDGU 9.26, ,9.26,1740
HP 2 BRDGU 9.32, ,9.32,1740
HP 1 APP 9.71, ,9.71,1740
HP 2 APP 9.71, ,9.71,1740
HP 1 BRDGU 9.87, ,9.87,2310
HP 2 BRDGU 9.94, ,9.94,2310
HP 1 APP 10.53, ,10.53,2310
HP 2 APP 10.53, ,10.53,2310
*

EX
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WSPRO OUTPUT

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

WSPRO PROFILES--STRUCTURE 134026500200
LITTLE FORK CREEK AT ROUTE SC 265, CHESTERFIELD COUNTY, SC
LEVEL II BRIDGE SCOUR ANALYSIS

*** RUN DATE & TIME: 10-05-94 11:07

CROSS-SECTION PROPERTIES: ISEQ = 3; SECID = BRDGU; SRD = 0.

WSEL	SA#	AREA	K	TOPW	WETP	ALPH	LEW	REW	QCR
	1	14.	658.	7.	8.				110.
	2	282.	33833.	38.	41.				4354.
	3	145.	10049.	46.	48.				1464.
9.26		441.	44540.	91.	97.	1.18	7.	105.	5069.

VELOCITY DISTRIBUTION: ISEQ = 3; SECID = BRDGU; SRD = 0.

	WSEL	LEW	REW	AREA	K	Q	VEL
	9.32	6.9	105.0	446.7	45320.	1740.	3.89
X STA.		6.9	19.3	22.2		24.5	26.5
A(I)		36.3		19.2	17.7	16.7	16.1
V(I)		2.40		4.54	4.90	5.21	5.39
X STA.		28.4	30.2	32.0		33.7	35.6
A(I)		15.7		15.9	16.0	16.8	15.9
V(I)		5.54		5.46	5.42	5.19	5.47
X STA.		37.5	39.5	42.0		44.9	48.0
A(I)		16.2		17.9	19.0	19.5	20.9
V(I)		5.38		4.86	4.57	4.47	4.17
X STA.		51.5	61.0	70.9		82.0	88.4
A(I)		36.4		30.6	33.1	26.3	40.5
V(I)		2.39		2.84	2.63	3.31	2.15

WSPRO OUTPUT --Continued

WSPRO
V060188

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

WSPRO PROFILES--STRUCTURE 134026500200

LITTLE FORK CREEK AT ROUTE SC 265, CHESTERFIELD COUNTY, SC
LEVEL II BRIDGE SCOUR ANALYSIS

*** RUN DATE & TIME: 10-05-94 11:07

CROSS-SECTION PROPERTIES: ISEQ = 4; SECID = APP ; SRD = 147.

WSEL	SA#	AREA	K	TOPW	WETP	ALPH	LEW	REW	QCR
	1	172.	1678.	134.	134.				1104.
	2	207.	21726.	32.	37.				2982.
	3	294.	3821.	177.	178.				2143.
	4	30.	216.	37.	37.				154.
9.71		702.	27442.	381.	386.	5.75	153.	550.	2257.

VELOCITY DISTRIBUTION: ISEQ = 4; SECID = APP ; SRD = 147.

	WSEL	LEW	REW	AREA	K	Q	VEL
	9.71	152.6	550.1	702.4	27442.	1740.	2.48
X STA.	152.6	252.3	292.3	293.8	295.3	296.7	
A(I)	135.7	61.1	11.3	10.7	11.1		
V(I)	0.64	1.42	7.72	8.15	7.87		
X STA.	296.7	298.1	299.6	301.2	302.8	304.5	
A(I)	11.0	11.0	11.5	11.4	11.5		
V(I)	7.88	7.92	7.54	7.65	7.58		
X STA.	304.5	306.1	307.8	309.4	311.0	312.5	
A(I)	11.5	11.6	11.5	11.3	11.3		
V(I)	7.54	7.48	7.59	7.73	7.67		
X STA.	312.5	314.2	316.9	426.8	467.6	550.1	
A(I)	11.4	16.4	125.6	92.0	113.6		
V(I)	7.63	5.30	0.69	0.95	0.77		

WSPRO OUTPUT --Continued

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

WSPRO PROFILES--STRUCTURE 134026500200
LITTLE FORK CREEK AT ROUTE SC 265, CHESTERFIELD COUNTY, SC
LEVEL II BRIDGE SCOUR ANALYSIS

*** RUN DATE & TIME: 10-05-94 11:07

CROSS-SECTION PROPERTIES: ISEQ = 3; SECID = BRDGU; SRD = 0.

WSEL	SA#	AREA	K	TOPW	WETP	ALPH	LEW	REW	QCR
	1	19.	979.	9.	10.				159.
	2	306.	38621.	38.	41.				4905.
	3	173.	13192.	47.	50.				1877.
9.87		498.	52792.	94.	100.	1.17	6.	107.	5998.

VELOCITY DISTRIBUTION: ISEQ = 3; SECID = BRDGU; SRD = 0.

	WSEL	LEW	REW	AREA	K	Q	VEL
	9.94	5.6	107.0	504.5	53785.	2310.	4.58
X STA.		5.6	19.0	22.0		24.5	26.6
A(I)		41.7		21.4	20.3	18.6	18.5
V(I)		2.77		5.41	5.68	6.20	6.23
X STA.		28.6	30.5	32.4		34.3	36.3
A(I)		18.1		17.7	18.5	18.5	18.6
V(I)		6.39		6.54	6.23	6.24	6.19
X STA.		38.4	40.6	43.4		46.5	49.8
A(I)		18.8		20.7	21.7	22.2	34.3
V(I)		6.15		5.59	5.33	5.21	3.37
X STA.		56.4	64.0	74.9		83.3	89.3
A(I)		30.8		36.2	33.2	28.4	46.4
V(I)		3.75		3.19	3.48	4.07	2.49

WSPRO OUTPUT --Continued

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

WSPRO PROFILES--STRUCTURE 134026500200

LITTLE FORK CREEK AT ROUTE SC 265, CHESTERFIELD COUNTY, SC

LEVEL II BRIDGE SCOUR ANALYSIS

*** RUN DATE & TIME: 10-05-94 11:07

CROSS-SECTION PROPERTIES: ISEQ = 4; SECID = APP ; SRD = 147.

WSEL	SA#	AREA	K	TOPW	WETP	ALPH	LEW	REW	QCR
	1	292.	3704.	153.	153.				2282.
	2	233.	26514.	32.	37.				3567.
	3	444.	7294.	189.	189.				3860.
	4	68.	645.	56.	56.				428.
10.53		1037.	38156.	430.	435.	6.69	134.	569.	3530.

VELOCITY DISTRIBUTION: ISEQ = 4; SECID = APP ; SRD = 147.

	WSEL	LEW	REW	AREA	K	Q	VEL
	10.53	133.8	568.9	1036.6	38156.	2310.	2.23
X STA.	133.8		230.2	290.1	292.8	294.5	296.2
A(I)		163.5	141.0		19.6	14.5	14.1
V(I)		0.71	0.82		5.91	7.96	8.17
X STA.	296.2		297.9	299.6	301.4	303.3	305.2
A(I)		14.3	14.2		14.5	15.1	14.8
V(I)		8.10	8.14		7.95	7.66	7.80
X STA.	305.2		307.1	309.0	310.8	312.6	314.6
A(I)		14.8	14.9		14.7	14.7	15.1
V(I)		7.83	7.76		7.87	7.87	7.64
X STA.	314.6		324.3	416.2	448.7	484.5	568.9
A(I)		40.4	147.0		104.3	103.2	141.8
V(I)		2.86	0.79		1.11	1.12	0.81

WSPRO OUTPUT --Continued

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

WSPRO PROFILES--STRUCTURE 134026500200
LITTLE FORK CREEK AT ROUTE SC 265, CHESTERFIELD COUNTY, SC
LEVEL II BRIDGE SCOUR ANALYSIS
*** RUN DATE & TIME: 10-05-94 11:07

XSID:CODE	SRDL	LEW	AREA	VHD	HF	EGL	CRWS	Q	WSEL
SRD	FLEN	REW	K	ALPH	HO	ERR	FR#	VEL	
EXIT :XS	*****	155.	671.	0.60	*****	8.90	7.11	1740.	8.30
-120.	*****	548.	24704.	5.70	*****	*****	0.82	2.59	

FULV :FV	120.	155.	677.	0.59	0.59	9.50	*****	1740.	8.91
0.	120.	549.	24849.	5.73	0.00	0.01	0.81	2.57	

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

APP :AS	147.	157.	658.	0.60	0.69	10.19	*****	1740.	9.59
147.	147.	547.	26109.	5.54	0.01	0.00	0.83	2.64	

<<<<<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	
BRDGU:BR	120.	7.	441.	0.31	0.67	9.56	6.42	1740.	9.26
0.	120.	105.	44509.	1.26	0.00	0.01	0.36	3.95	

TYPE	PPCD	FLOW	C	P/A	LSEL	BLEN	XLAB	XRAB
3.	1.	1.	0.890	0.077	14.30	*****	*****	*****

XSID:CODE	SRDL	LEW	AREA	VHD	HF	EGL	CRWS	Q	WSEL
SRD	FLEN	REW	K	ALPH	HO	ERR	FR#	VEL	
APP :AS	120.	153.	702.	0.55	0.64	10.26	8.46	1740.	9.71
147.	127.	550.	27422.	5.75	0.06	0.01	0.77	2.48	

M(G)	M(K)	KQ	XLKQ	XRKQ	OTEL
0.755	0.191	22099.	274.	372.	9.22

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

WSPRO OUTPUT --Continued

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

WSPRO PROFILES--STRUCTURE 134026500200
LITTLE FORK CREEK AT ROUTE SC 265, CHESTERFIELD COUNTY, SC
LEVEL II BRIDGE SCOUR ANALYSIS
*** RUN DATE & TIME: 10-05-94 11:07

XSID:CODE	SRDL	LEW	AREA	VHD	HF	EGL	CRWS	Q	WSEL
SRD	FLEN	REW	K	ALPH	HO	ERR	FR#	VEL	
EXIT :XS	*****	137.	949.	0.62	*****	9.62	7.97	2310.	9.00
-120.	*****	564.	32781.	6.68	*****	*****	0.74	2.43	

FULV :FV	120.	136.	955.	0.61	0.59	10.22	*****	2310.	9.61
0.	120.	565.	32959.	6.70	0.00	0.01	0.73	2.42	

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

APP :AS	147.	137.	935.	0.62	0.68	10.91	*****	2310.	10.29
147.	147.	563.	34763.	6.51	0.00	0.00	0.74	2.47	

<<<<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	
BRDGU:BR	120.	6.	498.	0.45	0.71	10.32	7.27	2310.	9.87
0.	120.	107.	52760.	1.35	0.00	0.01	0.41	4.64	

TYPE	PPCD	FLOW	C	P/A	LSEL	BLEN	XLAB	XRAB
3.	1.	1.	0.859	0.076	14.30	*****	*****	*****

XSID:CODE	SRDL	LEW	AREA	VHD	HF	EGL	CRWS	Q	WSEL
SRD	FLEN	REW	K	ALPH	HO	ERR	FR#	VEL	
APP :AS	120.	134.	1038.	0.52	0.66	11.05	9.27	2310.	10.53
147.	130.	569.	38204.	6.69	0.07	0.02	0.65	2.23	

M(G)	M(K)	KQ	XLKQ	XRKQ	OTEL
0.766	0.272	27590.	273.	374.	10.09

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

PIER SCOUR COMPUTATIONS

FOR

Little Fork Creek at Route SC 265, Str. 134026500200, Chesterfield Co., SC

Q100 Case I, No debris accumulation. Computed by NMH 10-94

HYDRAULIC VARIABLES USED IN CSU EQUATION

PIER NUMBER	4	3	2
PIER STATION (FT)	30	60	90
LOCATION OF PIER	mcl	mcm	trb
Y1: DEPTH (FT)	9.6	9.6	9.6
V1: VEL. (FPS)	5.0	5.0	5.0
a: PIER WIDTH (FT)	1.9	1.9	1.9
L: PIER LENGTH (FT)	4.6	4.6	4.6
PIER SHAPE	1	1	1
ATTACK ANGLE	21	21	21
K1 (SHAPE COEF.)	1.00	1.00	1.00
K2 (ANGLE COEF.)	1.33	1.33	1.33
FROUDE NO.	0.28	0.28	0.28

COMPUTED SCOUR DEPTHS USING CSU EQUATION

SCOUR DEPTH (FT)	5.19	5.19	5.19
MAX SCOUR DEPTH (FT)	5.71	5.71	5.71

"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. 4

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. 2

CONTRACTION SCOUR COMPUTATIONS

FOR

Little Fork Creek at Route SC 265, Str. 134026500200, Chesterfield Co., SC

Q100 Case I, No debris accumulation. Computed by NMH 10-94

LIVE-BED SCOUR COMPUTATIONS

	MAIN CHANNEL	CONTRACTED SECTION
DISCHARGE (CFS)	1380.	1320.
BOTTOM WIDTH (FT)	32.0	36.4
MANNINGS n	0.045	0.045
AVERAGE DEPTH (FT)	7.2	

ENERGY SLOPE	0.00550
D50 (FT)	0.0032
FALL VELOCITY (FPS)	0.50
K1 COEF.	0.69
K2 COEF.	0.37

COMPUTED DEPTH AT CONTRACTED SECTION (FT)	=	6.3
DEPTH AT MAIN CHANNEL (FT)	=	7.2
DEPTH OF CONTRACTION SCOUR (FT)	=	-0.9

 RIGHT OVERBANK IN BRIDGE OPENING
 CLEAR-WATER CONTRACTION SCOUR COMPUTATIONS

DISCHARGE IN CONTRACTED SECTION (CFS)	=	393.
WIDTH OF CONTRACTED SECTION (FT)	=	44.8
MEDIAN GRAIN SIZE (FT)	=	0.0016

COMPUTED DEPTH OF CONTRACTED SECTION (FT)	=	5.2
AVERAGE FLOOD PLAIN DEPTH (FT)	=	3.3
DEPTH OF CONTRACTION SCOUR (FT)	=	1.9

ABUTMENT SCOUR COMPUTATIONS

FOR

Little Fork Creek at Route SC 265, Str. 134026500200, Chesterfield Co., SC
Q100 Case I, No debris accumulation. Computed by NMH 10-94

LEFT ABUTMENT SCOUR COMPUTATIONS

ABUTMENT TYPE	3 -SPILL THROUGH
DISCHARGE BLOCKED BY ABUTMENT (CFS)	162.
AREA BLOCKED BY ABUTMENT (SQ FT)	188.0
DEPTH OF FLOW AT ABUTMENT (FT)	3.9
LENGTH OF ABUT. 90 DEG. TO FLOW (FT)	134.0
ABUTMENT SKEW (DEG)	21
AJUSTED ABUTMENT LENGTH (FT)	48.2
AVERAGE F/P VELOCITY U/S OF ABUT. (FPS)	0.9
FROUDE NUMBER	0.077
K1 COEF.	0.6
K2 COEF.	1.0

DESIGN DEPTH OF SCOUR (FROELICH EQUATION, 1989) (FT) = 7.0

RIGHT ABUTMENT SCOUR COMPUTATIONS

ABUTMENT TYPE	3 -SPILL THROUGH
DISCHARGE BLOCKED BY ABUTMENT (CFS)	210.
AREA BLOCKED BY ABUTMENT (SQ FT)	258.0
DEPTH OF FLOW AT ABUTMENT (FT)	0.3
LENGTH OF ABUT. 90 DEG. TO FLOW (FT)	169.0
ABUTMENT SKEW (DEG)	-21
AJUSTED ABUTMENT LENGTH (FT)	860.0
AVERAGE F/P VELOCITY U/S OF ABUT. (FPS)	0.8
FROUDE NUMBER	0.262
K1 COEF.	0.6
K2 COEF.	1.0

DESIGN DEPTH OF SCOUR (FROELICH EQUATION, 1989) (FT) = 5.2

PIER SCOUR COMPUTATIONS

FOR

Little Fork Creek at Route SC 265, Str. 134026500200, Chesterfield Co., SC

Q500 Case I, No debris accumulation. Computed by NMH 10-94

HYDRAULIC VARIABLES USED IN CSU EQUATION

PIER NUMBER	4	3	2
PIER STATION (FT)	30	60	90
LOCATION OF PIER	mcl	mcm	trb
Y1: DEPTH (FT)	10.2	10.2	10.2
V1: VEL. (FPS)	5.9	5.9	5.9
a: PIER WIDTH (FT)	1.9	1.9	1.9
L: PIER LENGTH (FT)	4.6	4.6	4.6
PIER SHAPE	1	1	1
ATTACK ANGLE	21	21	21
K1 (SHAPE COEF.)	1.00	1.00	1.00
K2 (ANGLE COEF.)	1.33	1.33	1.33
FROUDE NO.	0.33	0.33	0.33

COMPUTED SCOUR DEPTHS USING CSU EQUATION

SCOUR DEPTH (FT)	5.62	5.62	5.62
MAX SCOUR DEPTH (FT)	6.18	6.18	6.18

"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. 4

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. 2

CONTRACTION SCOUR COMPUTATIONS

FOR

Little Fork Creek at Route SC 265, Str. 134026500200, Chesterfield Co., SC
Q500 Case I, No debris accumulation. Computed by NMH 10-94

=====

LIVE-BED SCOUR COMPUTATIONS

	MAIN CHANNEL	CONTRACTED SECTION
DISCHARGE (CFS)	1610.	1690.
BOTTOM WIDTH (FT)	32.0	36.4
MANNINGS n	0.045	0.045
AVERAGE DEPTH (FT)	8.0	

ENERGY SLOPE	0.00560
D50 (FT)	0.0032
FALL VELOCITY (FPS)	0.50
K1 COEF.	0.69
K2 COEF.	0.37

COMPUTED DEPTH AT CONTRACTED SECTION (FT)	=	7.6
DEPTH AT MAIN CHANNEL (FT)	=	8.0
DEPTH OF CONTRACTION SCOUR (FT)	=	-0.4

RIGHT OVERBANK IN BRIDGE OPENING
CLEAR-WATER CONTRACTION SCOUR COMPUTATIONS

DISCHARGE IN CONTRACTED SECTION (CFS)	=	577.
WIDTH OF CONTRACTED SECTION (FT)	=	44.8
MEDIAN GRAIN SIZE (FT)	=	0.0016

COMPUTED DEPTH OF CONTRACTED SECTION (FT)	=	7.2
AVERAGE FLOOD PLAIN DEPTH (FT)	=	3.9
DEPTH OF CONTRACTION SCOUR (FT)	=	3.3

ABUTMENT SCOUR COMPUTATIONS
FOR

Little Fork Creek at Route SC 265, Str. 134026500200, Chesterfield Co., SC
Q500 Case I, No debris accumulation. Computed by NMH 10-94
=====

LEFT ABUTMENT
SCOUR COMPUTATIONS

ABUTMENT TYPE	3 -SPILL THROUGH
DISCHARGE BLOCKED BY ABUTMENT (CFS)	225.
AREA BLOCKED BY ABUTMENT (SQ FT)	297.0
DEPTH OF FLOW AT ABUTMENT (FT)	4.5
LENGTH OF ABUT. 90 DEG. TO FLOW (FT)	153.0
ABUTMENT SKEW (DEG)	21

AJUSTED ABUTMENT LENGTH (FT)	66.0
AVERAGE F/P VELOCITY U/S OF ABUT. (FPS)	0.8
FROUDE NUMBER	0.063
K1 COEF.	0.6
K2 COEF.	1.0

DESIGN DEPTH OF SCOUR (FROELICH EQUATION, 1989) (FT) = 7.9

RIGHT ABUTMENT
SCOUR COMPUTATIONS

ABUTMENT TYPE	3 -SPILL THROUGH
DISCHARGE BLOCKED BY ABUTMENT (CFS)	406.
AREA BLOCKED BY ABUTMENT (SQ FT)	425.0
DEPTH OF FLOW AT ABUTMENT (FT)	0.9
LENGTH OF ABUT. 90 DEG. TO FLOW (FT)	200.0
ABUTMENT SKEW (DEG)	-21

AJUSTED ABUTMENT LENGTH (FT)	472.2
AVERAGE F/P VELOCITY U/S OF ABUT. (FPS)	1.0
FROUDE NUMBER	0.177
K1 COEF.	0.6
K2 COEF.	1.0

DESIGN DEPTH OF SCOUR (FROELICH EQUATION, 1989) (FT) = 6.5

1

2

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STATE OF SOUTH CAROLINA STATE HIGHWAY DEPARTMENT

PLAN AND PROFILE OF PROPOSED STATE HIGHWAY

U.S. WORKS PROGRAM
HIGHWAY PROJECT NO. W.P.S.S. & W.P.M.S. 435

ROUTE NO. 265

CHESTERFIELD COUNTY FROM LYNCHES RIVER TO INTERSECTION WITH ROUTE NO. 35 IN TOWN OF JEFFERSON

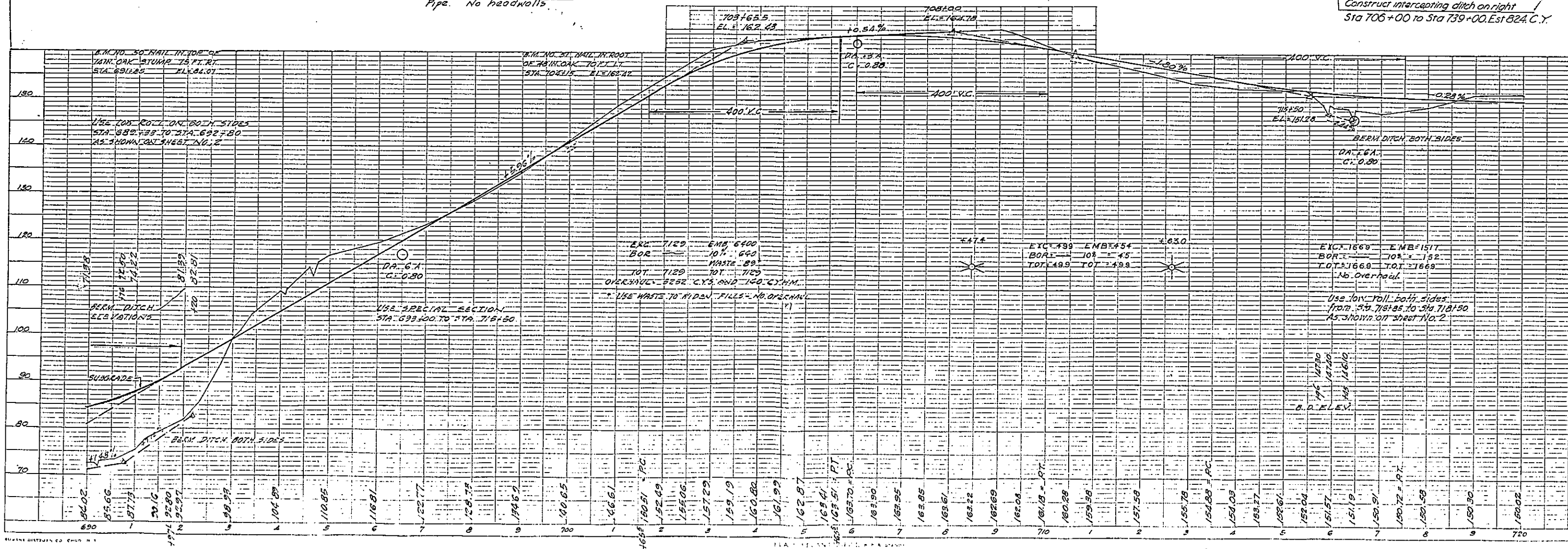
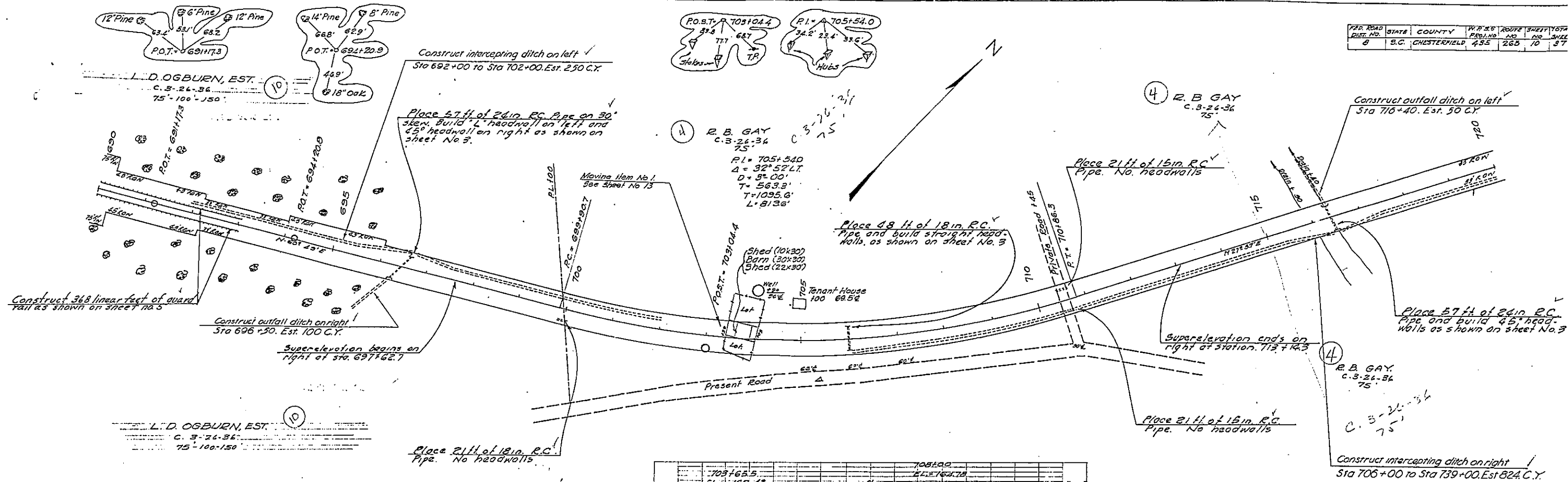
SCALES: PLAN AND PROFILE 1 INCH=100 FEET HORIZONTAL; 1 INCH=10 FEET VERTICAL

FED. ROAD DIST. NO.	STATE	COUNTY	PROJ. NO.	ROUTE NO.	SHEET NO.
8	S. C.	CHESTERFIELD	435	265	1

SUMMARY OF ESTIMATED QUANTITIES

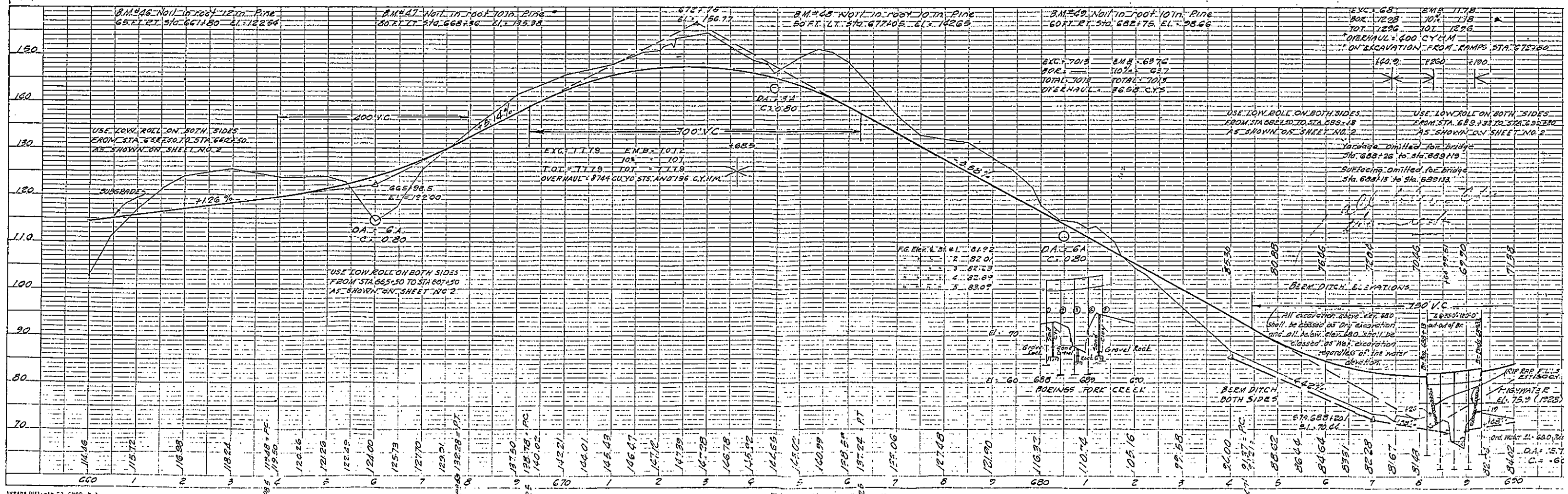
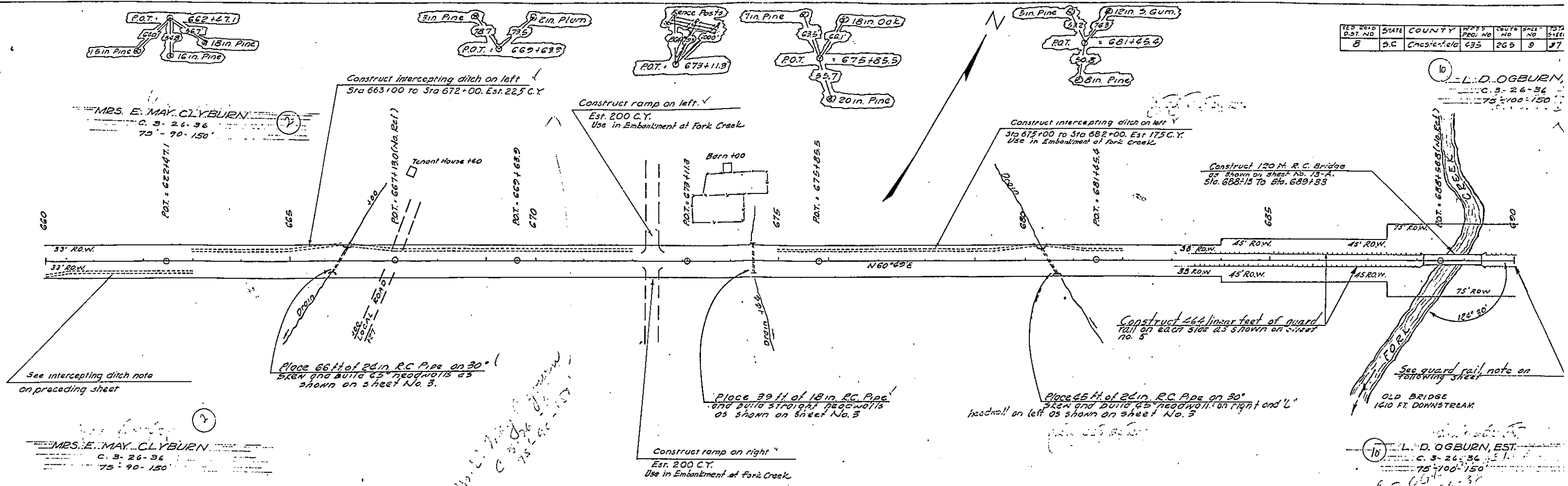
STATION	SHEET NO.	ITEM	CONCRETE (CU. YD.)		REINFORCING STEEL (LBS.)	EXCAVATION (CU. YD.)		PILES (LINEAR FEET)		TOTAL	
			CLASS "A"	CLASS "B"		STRUCTURES	WELL	DRY	TREATED		UNTREATED
658+19 659+50 659+50 659+53	3	ENDWALLS FOR PIPE CULVERTS		22.82	75						
	8-15	3'X3'X92' R.C. BOX CULVERT	30.31		1302	53					
	8-15	3'X3'X84' R.C. BOX CULVERT	27.94		3991	53					
	9	ON FILL ADJACENT TO BRIDGES									
TOTALS			58.25	22.82	8328	111					
751+00	3	ENDWALLS FOR PIPE CULVERTS		7.20							
	12-16	3'X3'X56' R.C. BOX CULVERT	19.61		2725	31					
TOTALS			19.61	7.20	2725	31					
W.P.S.S. TOTAL PIPE FOR CULVERTS W.P.M.S.											
QUANTITY		REINFORCING CONC.		REINFORCING CONCRETE		TOTALS		TOTALS		TOTALS	
15'	63	15'	219	15'	219	TOTAL CLEARING AND GRUBBING WITHIN 200'		1255	1255	TOTAL	
18'	258	18'	192	18'	192	TOTAL CLEARING AND GRUBBING OF BORROW & MATERIAL PIT		100	100	TOTAL	
24'	225	24'		24'		TOTAL UNCLASSIFIED EXCAVATION		30,291	30,291	TOTAL	
30'	68	30'		30'		TOTAL DREDGEHAUL AT ONE AND ONE-HALF CENTS PER C.Y.		18,725	18,725	TOTAL	
TOTAL FOR RELAY PIPE CULVERTS		TOTAL		TOTAL		TOTAL DREDGEHAUL OF EXCAVATION MATERIALS		11,503	11,503	TOTAL	
QUANTITY	LINEAR FEET	QUANTITY	LINEAR FEET	QUANTITY	LINEAR FEET	TOTAL SELECTED MATERIAL FOR SHOULDER		2,819	2,819	TOTAL	
15'		15'		15'		TOTAL SCREFFING, MIXING, REMIXING, SHAPING AND BUSHING		6,880	6,880	TOTAL	
18'		18'		18'		TOTAL ADDITIONAL SCREFFING, MIXING, REMIXING, SHAPING AND BUSHING		2,225	2,225	TOTAL	
24'		24'		24'		TOTAL GUARD RAIL		1664	1664	TOTAL	
30'		30'		30'		TOTAL FEDERAL AID MARKERS				TOTAL	
TOTAL		TOTAL		TOTAL		TOTAL FEDERAL AID NUMBER PLATES				TOTAL	

FED. ROAD DIST. NO.	STATE	COUNTY	W.P.S. PROJ. NO.	ROUTE NO.	SHEET NO.	TOTAL SHEET
8	S.C.	CHESTERFIELD	495	268	10	97



DES. NO.	STATE	COUNTY	PROJECT NO.	ROUTE NO.	SHEET NO.	TOTAL SHEETS
8	S.C.	Cherokee	435	265	9	17

L.D. OGBURN, EST.
C. 3-26-36
75+00-150





United States Department of the Interior



GEOLOGICAL SURVEY
Water Resources Division
Stephenson Center, Suite 129
720 Gracern Road
Columbia, SC 29210-7651

October 17, 1994

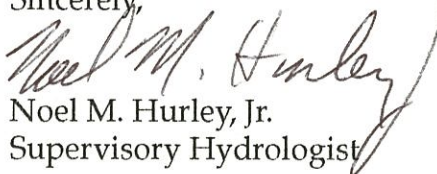
William H. Hulbert, P.E.
Hydraulic Engineer
South Carolina Department of Transportation
955 Park Street
Columbia, South Carolina 29202

Dear Mr. Hulbert:

We are pleased to transmit to you another report of the Level II Bridge Scour Program titled, "Level II bridge scour analysis for structure 134026500200 on Route SC 265, crossing Little Fork Creek in Chesterfield County, South Carolina," by Noel M. Hurley, Jr. and Stephen T. Benedict. This report has been reviewed and approved by the U.S. Geological Survey, S.C. District.

If you have any questions concerning this report please contact me (750-6126) or Stephen Benedict (750-6150) and we will be glad to assist you.

Sincerely,


Noel M. Hurley, Jr.
Supervisory Hydrologist

Enclosure



