U.S. DEPARTMENT OF THE INTERIOR

U.S. GEOLOGICAL SURVEY

LEVEL II BRIDGE SCOUR ANALYSIS FOR STRUCTURES 121007710500/7730500 ON INTERSTATE 77, CROSSING SOUTH FORK FISHING CREEK IN CHESTER COUNTY, SOUTH CAROLINA

By Eric J. Reuber 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
median diameter of bed material	D_{50}
South Carolina Department of Transportation	SCDOT
Water-Surface Profile computation model	WSPRO

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 structures 121007710500/7730500 on Interstate 77, crossing South Fork Fishing Creek in Chester County, South Carolina

by Eric J. Reuber and Stephen T. Benedict

This report provides the results of the detailed Level II analysis of scour potential at structures 121007710500/7730500 on Interstate 77, crossing South Fork Fishing Creek in Chester County, South Carolina (figure 1 in pocket; figures 5-10). The site is located in the Piedmont physiographic province near the town of Edgemoor in the northern part of Chester County. The drainage area for the site is 66.2 mi^2, 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, South Fork Fishing Creek has a mildly meandering channel with a slope of approximately 0.00088 ft/ft (4.65 ft/mi), an average channel top width of 82 ft and an average channel depth of 12.4 ft. It should be noted that there is a sharp meander in the low flow channel between the north and south bound bridges as shown on figure 10. The predominant channel bed material at the bridge is coarse sand (D_{50} is 3.0 mm) with some cobbles and boulders. The channel banks consist of a silty sand (D_{50} is 1.1 mm). In general, the banks have moderate woody vegetative cover and were noted to be relatively stable at the time of the Level I and Level II site visits, July 9, 1990, and February 10, 1992 and June 8, 1994, respectively.

The Interstate 77 crossing of South Fork Fishing Creek consists of twin 330-ft-long, two-lane bridges, each having eleven 30-ft concrete spans, supported by steel and concrete bents with spill-through abutments. Structure 121007710500 is the downstream bridge located on the north bound lane and structure 121007730500 is the upstream bridge located on the south bound lane. The left and right abutments for both bridges are protected by riprap. 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 6 and graphs of the scour depths is shown on figures 2 and 3.

Scour depth calculations indicate that for the 100- and 500-year discharges maximum pile tip exposure will be 0.6 ft and 3.9 ft for the south bound bridge (structure 121007730500), and 1.0 ft and 4.3 ft for the north bound bridge (structure 121007710500) respectively. These maximum exposure depths for the 100- and 500-year discharges occur at bent 5 on the north and south bound bridges

It should be noted that the SCDOT bridge plan borings (file number 12.477.3) show subsurface rock 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. In addition, cobbles, boulders, and bedrock outcrops were noted in the stream bed during site inspections.

Table 1. *--Remaining pile/footing penetration at piers/bents for the 100-year discharge at structure 121007730500 (south bound bridge) on Interstate 77, crossing South Fork Fishing Creek in Chester 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 [5] pile/footing penetration (feet)
100-year discharge is 10,600 cubic feet per second							
11	30	452.3	63.1	84.9 474.(	1.8	83.1	20.0
10	60	451.8	62.6	82.0 471.2	1.9	80.1	17.5
9	90	456.2	67.0	79.7 468.9	2.0	77.7	10.7
8	120	456.6	67.4	76.0 465.2	2.9	73.1	5.7
7	150	451.8	62.6	72.8 462.0	2.9	69.9	7.3
6	180	448.3	59.1	70.9 460.1	2.9	68.0	8.9
5	210	456.3	67.1	76.7 465.9	10.2	66.5	-0.6
4	240	458.0	68.8	79.3 468.5	9.0	70.3	1.5
3	270	458.9	69.7	81.0 470.2	8.4	72.6	2.9
2	300	461.2	72.0	86.7 475.9	1.9	84.8	12.8

[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] Pile tip/footing elevations obtained from SCDOT bridge plans. The maximum elevation at each pier/bent is used.

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

[5] A negative number signifies undermining of pile tip/footing.

NOTE: The SCDOT bridge plan borings (file number 12.477.3) show subsurface rock that could reduce the scour depths shown in the above table. For more information, see SCDOT plans in report pocket.

Table 2. *--Remaining pile/footing penetration at piers/bents for the 500-year discharge at structure 121007730500 (south bound bridge) on Interstate 77, crossing South Fork Fishing Creek in Chester 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[5] pile/footing penetration (feet)
500-year discharge is 15,700 cubic feet per second							
11	30	452.3	63.1	84.9	2.2	82.7	19.6
10	60	451.8	62.6	82.0	2.3	79.7	17.1
9	90	456.2	67.0	79.7	2.3	77.4	10.4
8	120	456.6	67.4	76.0	3.2	72.8	5.4
7	150	451.8	62.6	72.8	3.2	69.6	7.0
6	180	448.3	59.1	70.9	3.2	67.7	8.6
5	210	456.3	67.1	76.7	13.5	63.2	-3.9
4	240	458.0	68.8	79.3	12.3	67.0	-1.8
3	270	458.9	69.7	81.0	11.7	69.3	-0.4
2	300	461.2	72.0	86.7	2.2	84.5	7.5

[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] Pile tip/footing elevations obtained from SCDOT bridge plans. The maximum elevation at each pier/bent is used.

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

[5] A negative number signifies undermining of pile tip/footing.

NOTE: The SCDOT bridge plan borings (file number 12.477.3) show subsurface rock that could reduce the scour depths shown in the above table. For more information, see SCDOT plans in report pocket.

Table 3. *--Remaining pile/footing penetration at piers/bents for the 100-year discharge at structure 121007710500 (north bound bridge) on Interstate 77, crossing South Fork Fishing Creek in Chester 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 [5] pile/footing penetration (feet)
100-year discharge is 10,600 cubic feet per second							
11	30	455.2	66.0	87.5	1.8	85.7	19.7
10	60	448.7	59.5	81.8	1.9	79.9	20.4
9	90	453.4	64.2	80.0	2.0	78.0	13.8
8	120	455.0	65.8	74.8	2.9	71.9	6.1
7	150	454.7	65.5	71.0	2.9	68.1	2.6
6	180	455.3	66.1	72.2	2.9	69.3	3.2
5	210	459.3	70.1	79.3	10.2	69.1	-1.0
4	240	458.7	69.5	79.2	9.0	70.2	0.7
3	270	461.3	72.1	80.2	8.4	71.8	-0.3
2	300	465.0	75.8	85.0	1.9	83.1	7.3

[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] Pile tip/footing elevations obtained from SCDOT bridge plans. The maximum elevation at each pier/bent is used.

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

[5] A negative number signifies undermining of pile tip/footing.

NOTE: The SCDOT bridge plan borings (file number 12.477.3) show subsurface rock that could reduce the scour depths shown in the above table. For more information, see SCDOT plans in report pocket.

Table 4. *--Remaining pile/footing penetration at piers/bents for the 500-year discharge at structure 121007710500 (north bound bridge) on Interstate 77, crossing South Fork Fishing Creek in Chester 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 [5] pile/footing penetration (feet)
500-year discharge is 15,700 cubic feet per second							
11	30	455.2	66.0 455.2	87.5 476.7	2.2	85.3	19.3
10	60	448.7	59.5 448.7	81.8 471.0	2.3	79.5	20.0
9	90	453.4	64.2 453.4	80.0 469.2	2.3	77.7	13.5
8	120	455.0	65.8 455.0	74.8 464.0	3.2	71.6	5.8
7	150	454.7	65.5 454.7	71.0 460.2	3.2	67.8	2.3
6	180	455.3	66.1 455.3	72.2 461.4	3.2	69.0	2.9
5	210	459.3	70.1 459.3	79.3 468.5	13.5	65.8	-4.3
4	240	458.7	69.5 458.7	79.2 468.4	12.3	66.9	-2.6
3	270	461.3	72.1 461.3	80.2 469.4	11.7	68.5	-3.6
2	300	465.0	75.8 465.0	85.0 474.2	2.2	82.8	7.0

[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] Pile tip/footing elevations obtained from SCDOT bridge plans. The maximum elevation at each pier/bent is used.

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

[5] A negative number signifies undermining of pile tip/footing.

NOTE: The SCDOT bridge plan borings (file number 12.477.3) show subsurface rock that could reduce the scour depths shown in the above table. For more information, see SCDOT plans in report pocket.

Table 5. --*Cumulative scour depths at piers/bents for the 100-year discharge at structures 12100771050O/7730500 on Interstate 77, crossing South Fork Fishing Creek in Chester County, South Carolina*

Pier/bent [1] number	Station from [2] left end of bridge (feet)	Contraction scour depth (feet)	Pier/bent scour depth (feet)	Total [3] scour depth (feet)
100-year discharge is 10,600 cubic feet per second				
11	30	0[4]	1.8	1.8
10	60	0[4]	1.9	1.9
9	90	0[4]	2.0	2.0
8	120	0[4]	2.9	2.9
7	150	0[4]	2.9	2.9
6	180	0[4]	2.9	2.9
5	210	0[4]	10.2	10.2
4	240	0.0	9.0	9.0
3	270	0.0	8.4	8.4
2	300	0.0	1.9	1.9

[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 bridge plan (file number 12.477.3) borings show subsurface rock that could reduce the scour depths shown in the above table. For more information, see SCDOT plans in report pocket.

NOTE: Bents 3 through 5 are tower bents and were analyzed assuming debris accumulation.

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 6. *--Cumulative scour depths at piers/bents for the 500-year discharge at structures 121007710500/7730500 on Interstate 77, crossing South Fork Fishing Creek in Chester County, South Carolina*

Pier/bent [1] number	Station from [2] left end of bridge (feet)	Contraction scour depth (feet)	Pier/bent scour depth (feet)	Total [3] scour depth (feet)
500-year discharge is 15,700 cubic feet per second				
11	30	0[4]	2.2	2.2
10	60	0[4]	2.3	2.3
9	90	0[4]	2.3	2.3
8	120	0[4]	3.2	3.2
7	150	0[4]	3.2	3.2
6	180	0[4]	3.2	3.2
5	210	2.5	11.0	13.5
4	240	2.5	9.8	12.3
3	270	2.5	9.2	11.7
2	300	0.0	2.2	2.2

[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 bridge plan (file number 12.477.3) borings show subsurface rock that could reduce the scour depths shown in the above table. For more information, see SCDOT plans in report pocket.

NOTE: Bents 3 through 5 are tower bents and were analyzed assuming debris accumulation

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.

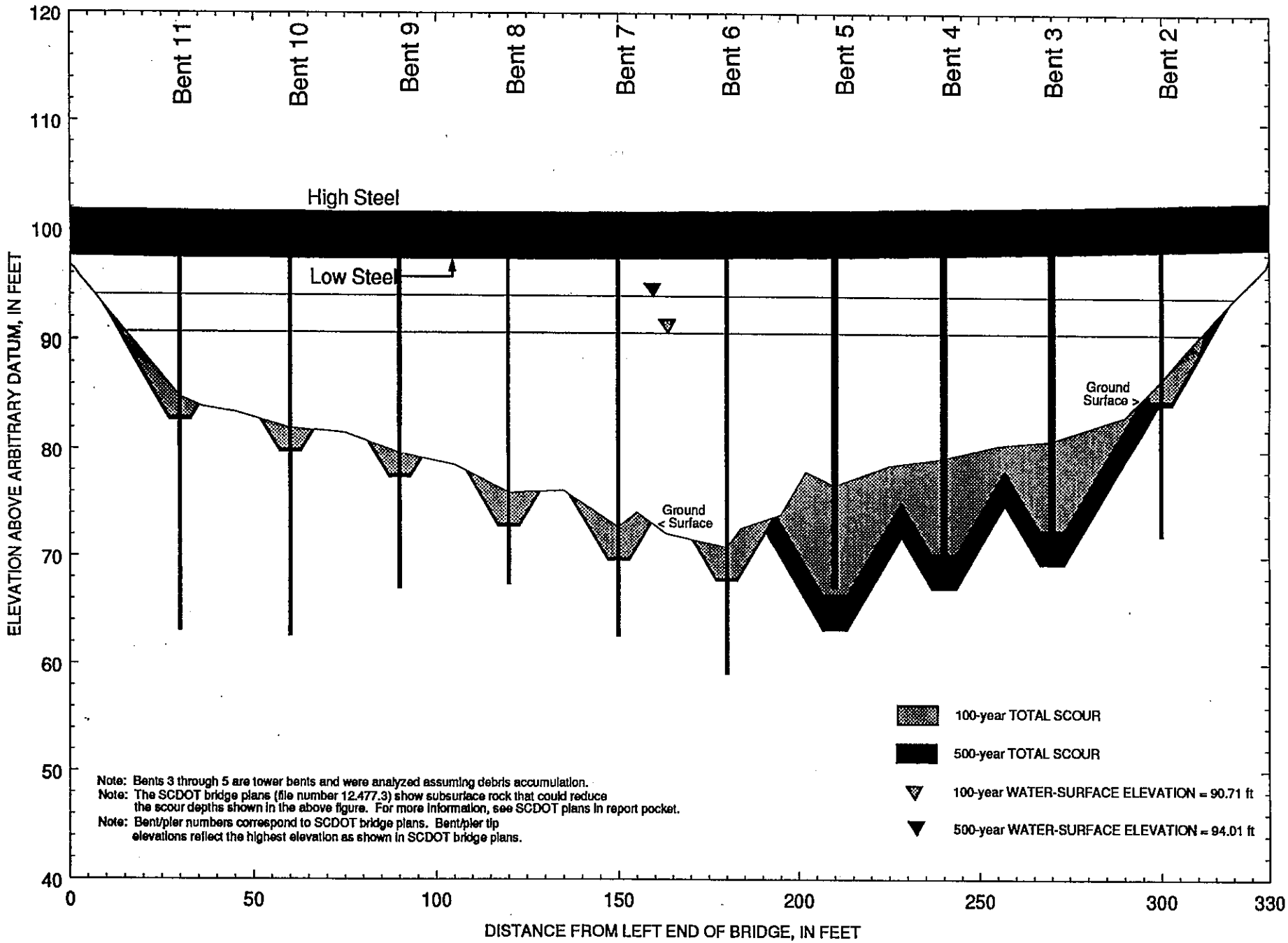


Figure 2.--Total scour depths for the 100- and 500-year discharges on the upstream face at structure 121007730500 (south bound Bridge) on Interstate 77, crossing South Fork Fishing Creek in Chester County, South Carolina.

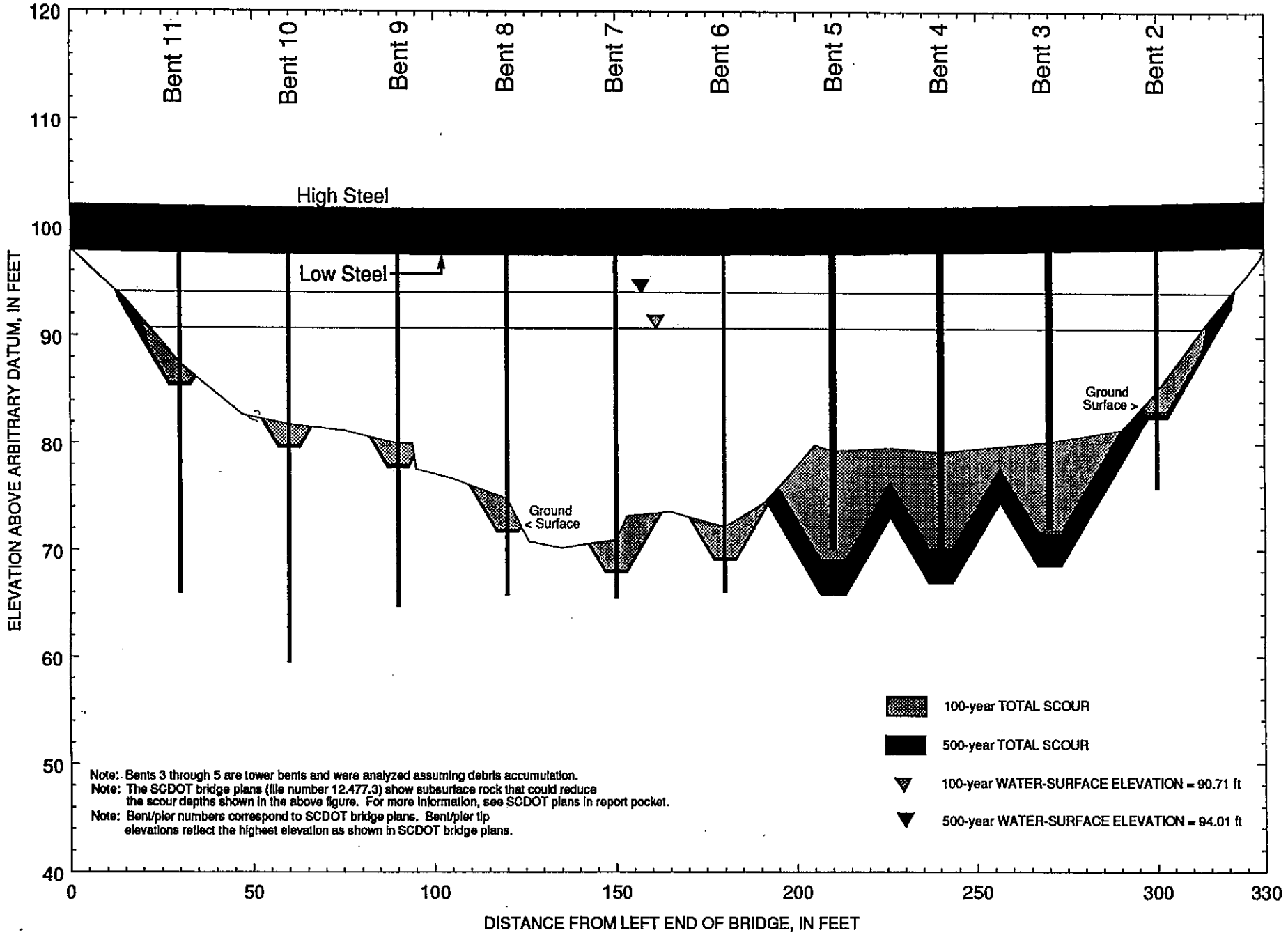


Figure 3.--Total scour depths for the 100- and 500-year discharges on the upstream face at structure 121007710500 (north bound Bridge) on Interstate 77, crossing South Fork Fishing Creek in Chester County, South Carolina.

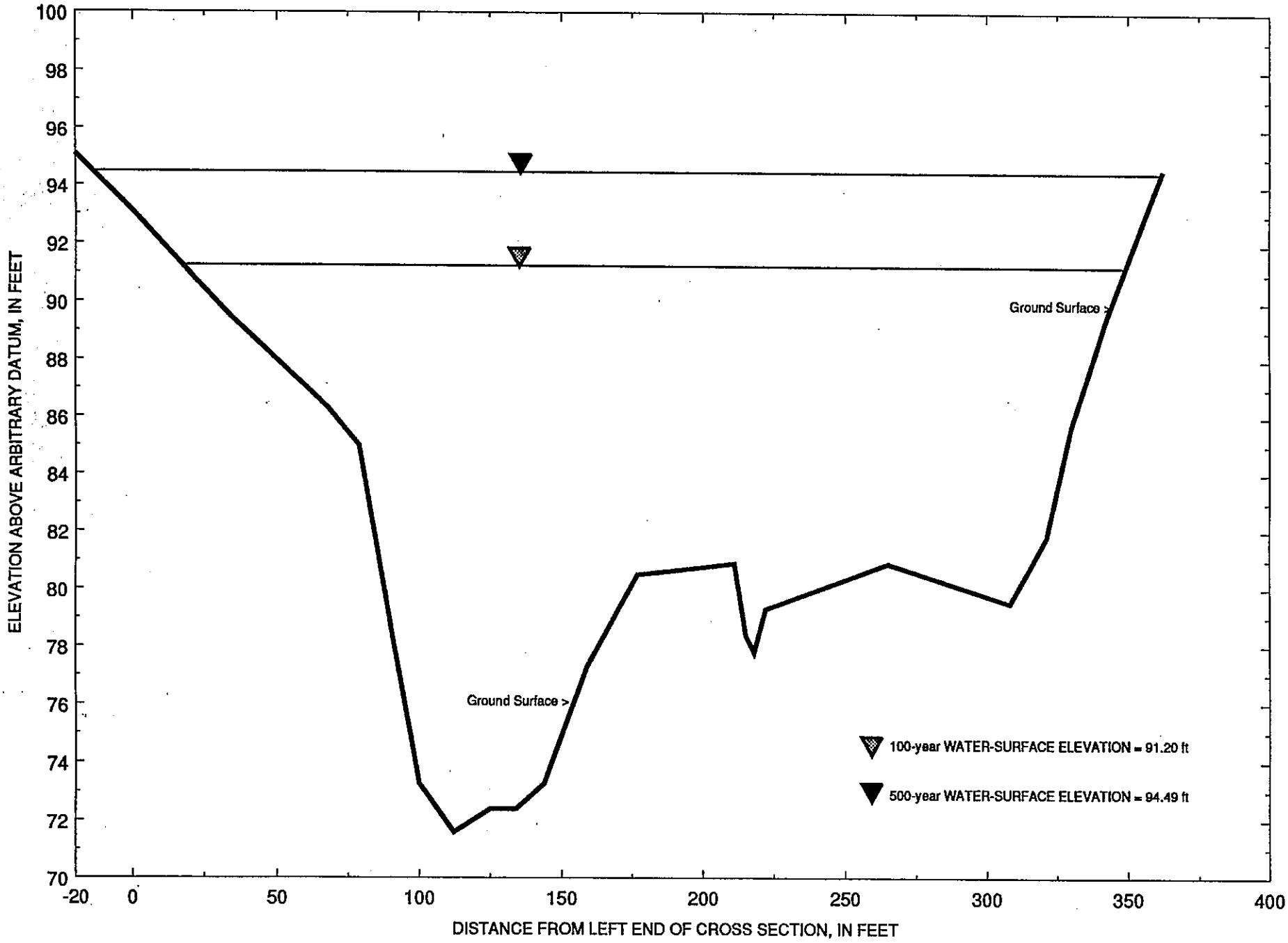


Figure 4.--Approach cross section upstream of structures 121007710500/773050
on Interstate 77, crossing South Fork Fishing Creek in Chester County, South Carolina.

Figure 5.--Structure 121007730500 on Interstate 77, crossing South Fork Fishing Creek in Chester County, South Carolina as viewed from the downstream structure 121007710500 (June 8, 1994).

Figure 6 --Structures 121007710500/7730500 on Interstate 77, crossing South Fork Fishing Creek in Chester County, South Carolina, as viewed from the upstream channel (February 10, 1992).

Figure 7.--Structure 121007710500 on Interstate 77, crossing South Fork Fishing Creek in Chester County, South Carolina as viewed from upstream structure 121007730500 (note debris accumulation) (June 8, 1994).

Figure 8 --Upstream channel as viewed from beneath structures 121007710500/7730500 on Interstate 77, crossing South Fork Fishing Creek in Chester County, South Carolina (February 10, 1992).

Figure 9.--Downstream channel as viewed from beneath structures 121007710500/7730500 on Interstate 77, crossing South Fork Fishing Creek in Chester County, South Carolina (February 10, 1992).

Figure 10.--Structure 121007730500 as viewed from structure 121007710500 on Interstate 77, crossing South Fork Fishing Creek in Chester County, South Carolina (note debris accumulation and sharp meander in low flow channel) (February 10, 1992).

SELECTED REFERENCES

Arcement, G.J., Jr., and Schneider, V.R., 1989, Guide for selecting Manning's roughness coefficients for natural channels and flood plains: U.S. Geological Survey Water-Supply Paper 2339, 38 p.

Arneson, L. A., Shearman, J. O., Jones, J. S., 1992, Evaluating scour at bridges using WSPRO: Transportation Research Board Draft Paper, 40 p.

Bohman, L. R., 1989, Determination of flood hydrographs for streams in South Carolina: Volume 1. Simulation of flood hydrographs for rural watersheds in South Carolina: U.S. Geological Survey Water-Resources Investigations Report 89-4087, 53 p.

Bohman, L. R., 1992, Determination of flood hydrographs for streams in South Carolina: Volume 2. Estimation of peak-discharge frequency, runoff volumes, and flood hydrographs for urban watersheds: U.S. Geological Survey Water-Resources Investigations Report 92-4040, 79 p.

Froehlich, D. C., 1989, Local scour at bridge abutments *in* Ports, M. A., ed., Hydraulic Engineering–Proceedings of the 1989 National Conference on Hydraulic Engineering: New York, American Society of Civil Engineers, p. 13-18.

Guimaraes, W. B., and Bohman, L. R., 1991, Techniques for estimating magnitude and frequency of floods in South Carolina, 1988: U.S. Geological Survey Water-Resources Investigation Report, 91-4157, 174 p.

Gunter, H.E., Mason, R.R., and Stamey, T.C., 1987, Magnitude and frequency of floods in rural and urban basins in North Carolina: U.S. Geological Survey Water-Resources Investigations Report, 87-4096, 54 p.

Laursen, E. M., 1960, Scour at bridge crossings: Journal of the Hydraulics Division, American Society of Civil Engineers, v. 86, no. HY2, p. 39-53.

Laursen, E. M., 1963, An analysis of relief bridge scour: Journal of the Hydraulics Division, American Society of Civil Engineers, v. 89, no. HY3, p. 93-118.

Richardson, E. V., Harrison, L. J., Richardson, J. R., and Davis, S. R., 1993, Evaluating scour at bridges: Federal Highway Administration Hydraulic Engineering Circular No. 18, Publication FHWA-IP-90-017, 131 p.

Richardson, E. V., Simons, D. B., and Julien, P. Y., 1990, Highways in the river environment: Federal Highway Administration Publication FHWA-HI-90-016.

Richardson, E. V., Simons, D. B., Karaki, S., Mahmood, K., and Stevens, M. A., 1975, Highways in the river environment: hydraulic and environmental design considerations: Federal Highway Administration.

Shearman, J. O., 1990, User's manual for WSPRO–a computer model for water surface profile computations: Federal Highway Administration Publication FHWA-IP-89-027, 187 p.

Shearman, J. O., Kirby, W. H., Schneider, V. R., and Flippo, H. N., 1986, Bridge waterways analysis model; research report: Federal Highway Administration Publication FHWA-RD-86-108, 112 p.

U.S. Geological Survey, Interagency Advisory Committee on Water Data, 1982, Guidelines for determining flood flow frequency, Bulletin 17B of the Hydrology Subcommittee, 190 p.

SCOUR REPORT SUMMARY

Structure Numbers 121007710500/7730500 *Stream* South Fork Fishing Creek

County Chester *Roads* I-77 (N&S) *District* 4

Description of Bridge

Bridge length 330 *ft* *Bridge width* *45(162) *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* 07/09/1990

Description of riprap Twelve- to 18- inch granite boulders protect the bottom half of the abutments.

Brief description of piers/pile bents Ten interior pile bents; bents 2 and 6 through 11 have eight 0.85 by 0.85-H piles while bents 3 though 5 are tower bents.

Is bridge skewed to flood plain according to USGS topo map? no *Angle* 0

Is bridge located on a bend in channel? yes *If so, describe (mild, moderate, severe)* The channel approaches the bridges fairly straight. However, the low flow channel has a sharp meander between the bridges (see figure 10).

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	07/09/1990	0-40	0-100
Level II	06/08/1994	0-40	0-100

Potential for debris High due to channel shifting (see figures 7 and 10).

Describe any features near or at the bridge that may affect flow (include observation date). A channel change was made through the bridge during construction of the bridges. The excavated material for the channel change was used to fill the old channel on the right overbank under the bridge.

* Each bridge is 45 ft wide. A total of 162 ft includes the width of the twin bridges plus the width of the median.

Description of Flood Plain

General topography Typical Piedmont with steep hills and narrow floodplains

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

Date of inspection 02/10/1992

D/S left: Moderately thick hardwoods with areas of thick pines and briars

D/S right: Moderately thick hardwoods

U/S left: Moderately thick hardwoods

U/S right: Heavily wooded with thickets

Description of Channel

Average top width 82 *ft* *Average depth* 12.4 *ft*

Predominant bed material sand/cobbles/boulders *Bank materi.* silty sand

Stream type (straight, meandering, braided, swampy, channelized) straight channel except between the bridges where the low flow channel has a sharp meander (see figure 10).

Vegetative cover on channel banks near bridge: Date of inspection 02/10/1992

D/S left: Small trees and thick bushes

D/S right: Small trees and thick bushes

U/S left: Small trees and thick bushes

U/S right: Small trees and thick bushes

Do banks appear stable? yes *If not, describe location and type of instability and date of observation.* Only minor fluvial erosion downstream of the bridges; noted 07/09/1990

Describe any obstructions in channel and date of observation.

None observed 02/10/1992.

Hydrology

Drainage area 66.2 mi^2

Percentage of drainage area in physiographic provinces:

Physiographic province	*Percent of drainage area*
S.C. Piedmont (high flow)	100

Is drainage area considered rural or urban? rural *Describe any significant urbanization and potential for development.* Moderate to low potential for development. Basin presently has no significant urbanization.

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

USGS gage description _____

USGS gage number _____

Gage drainage area _____ mi^2

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

If so, describe _____

Calculated Discharges

Q100 10,600 ft^3/s *Q500* 15,700 ft^3/s

Method used to determine discharges The drainage basin is located in the "high flow" area of South Carolina; therefore, the method prescribed by C.L. Sanders (written commun., 1993) was used to compute flood discharges. In general, this method uses North Carolina USGS flood discharge equations (WRIR 87-4096) to compute the 100-year discharge, and extrapolates the 500-year discharge using the 100-year discharge, in addition to the computed 2- and 10-year discharges (USGS Bulletin 17B, p. 5-2).

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 389.2 ft to USGS survey datum to obtain SCDOT plans' datum (file number 12.477.3).

Description of reference marks used to determine USGS datum. RM1 is a chiseled square on the upstream left headwall of the south bound bridge with an assumed elevation of 100.00 ft. RM2 is a chiseled square on the downstream left headwall of the north bound bridge with an elevation of 100.13 ft

Cross Sections Used in WSPRO Analysis

*Cross section ID	*Section Reference Distance (SRD) in feet*	**How cross section was developed*	*Comments*
EXIT	-330	2	Exit Section
FULV	0	2	Full Valley Section
BRDGU	0	1	U/S Face of south bound bridge
APP	492	23	Approach Section

* 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.

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. There are twin bridges at this crossing of South Fork Fishing Creek having the same length and similar cross section geometry. These bridges were modeled in WSPRO as one large bridge. Cross sections at the upstream and downstream faces of both bridges were directly surveyed and the most constricted bridge face (upstream face of the upstream (south bound bridge)) was used in the WSPRO model. The section reference distance (SRD) at the downstream face of the bridge was set to zero. An exit cross section was surveyed approximately 398 ft downstream of the downstream bridge face, and an approach cross section was surveyed approximately 330 ft upstream of the upstream bridge face. These cross sections were shifted by the channel slope to the appropriate SRD to represent the exit and full-valley cross sections required by the WSPRO model. The ends of the cross sections were slightly extended using the outer surveyed points.

The crossing of South Fork Fishing Creek of Interstate 77 is approximately 4,500 ft upstream of the confluence with Fishing Creek. Downstream of Interstate 77, the natural floodplain of South Fork Fishing Creek begins to widen and the channel slope increases as the creek approaches the confluence. An estimation of the steeper downstream slope was made in the following way: Using the USGS topographic map (Edgemoor, SC), the bed elevation at the confluence of South Fork Fishing Creek and Fishing Creek was determined from contours 141 meters (m) and 138m on Fishing Creek. This elevation at the confluence was used with contour 141m on South Fork Fishing Creek to determine the steeper slope of 0.0016 ft/ft.

A sensitivity analysis using templates representing the downstream widening floodplain compared with slope-conveyance methodology at the Exit section was made. From this analysis it was determined that using slope-conveyance methodology with the steeper slope of 0.0016 ft/ft, at the Exit Section, provided reasonable estimates for the starting water-surface elevation. Therefore this method was used in the WSPRO analysis. A slope of 0.00088 ft/ft was obtained using the contours on the upstream (144m) and downstream (141m) sides of the bridge. This slope was used for shifting cross section data.

The overbanks at the bridge have a large amount of brush. Therefore, the Manning's roughness coefficients on the overbanks at the bridge were increased to reflect this condition.

Bridge Hydraulics

Average embankment elevation 100.0 *ft*

Average low steel elevation 95.7 *ft*

100-year discharge 10,600 ft^3/s

Water-surface elevation at D/S bridge face 90.71 *ft*

Area of flow at D/S bridge face 3347 ft^2

Average velocity in bridge opening 3.17 *ft/s*

Maximum WSPRO tube velocity at bridge 4.75 *ft/s*

Water-surface elevation at Approach section with bridge 91.20 *ft*

Water-surface elevation at Approach section without bridge 91.24 *ft*

Amount of backwater caused by bridge 0.0 *ft*

500-year discharge 15,700 ft^3/s

Water-surface elevation at D/S bridge face 94.04 *ft*

Area of flow at D/S bridge face 4361 ft^2

Average velocity in bridge opening 3.60 *ft/s*

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

Water-surface elevation at Approach section with bridge 94.49 *ft*

Water-surface elevation at Approach section without bridge 94.55 *ft*

Amount of backwater caused by bridge 0.0 *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 6 and graphs of the scour depths are shown on figures 2 and 3.

The twin bridges at this crossing of South Fork Fishing Creek have the same length and similar cross section geometry. Bents 3 through 5 are tower bents which often catch debris. Therefore, these bents were analyzed for local scour assuming the bents are blocked with debris. The pier width for these bents was determined by estimating the width between the sloping piles at the ground line. The pier length was set equal to pier width.

The local pier scour was determined using the Colorado State University pier scour equation (Richardson and others, 1993). Bents 9 through 11 are located on the left overbank and were analyzed using the maximum left overbank WSPRO tube velocity and the depth of flow at each bent. Bents 2 through 5 are located on the right overbank and were analyzed using the maximum right overbank WSPRO tube velocity and the depth of flow at each bent. Bent 8 is located near the top of the left bank and was analyzed as if it was in the channel to account for the possibility of a shift in the channel during a flood event. Bents 6 and 7 are located in the channel. Bents 6 through 8 were analyzed using 90 percent of the maximum WSPRO tube velocity and the maximum depth within the channel at the bridge. The maximum depth within the channel was used to account for possible changes in the thalweg during a flood event.

The left and right overbanks at the bridge were analyzed for contraction scour using Laursen's clear-water contraction scour equation (Richardson and others, 1993). The channel contraction scour was analyzed using Laursen's modified live-bed contraction scour equation (Richardson and others, 1993).

The contraction scour equations indicate the deposition of sediment on the left overbank, and 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 1 through 6 and figures 2 and 3.

No abutment scour computations were made because the abutments are protected by riprap.

It should be noted that the SCDOT bridge plan borings (file number 12.477.3) show subsurface rock 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. Also, cobbles, boulders, and bedrock outcrops were noted in the streambed during site inspections that could tend to minimize scour. It should be noted that a channel change was made through the bridge during construction of the bridges. The excavated material for the channel change was used to fill the old channel on the right overbank under the bridge. This filled material could possibly be more susceptible to scour than the original in situ soils.

WSPRO INPUT FILE

```
*          WSPRO PROFILES--STRUCTURE 121007730500
T2         SOUTH FORK FISHING CREEK AT I-77 in CHESTER CO.
T3         LEVEL II BRIDGE SCOUR ANALYSIS
*
*
Q           10600      15700
*          SLOPE:
*            THE BED ELEVATION AT THE CONFLUENCE (s.f.fishing/fishing creek)
*            WAS DETERMINED FROM CONTOURS 141m AND 138m ON FISHING CREEK.
*            THIS ELEVATION AT THE CONFLUENCE WAS USED WITH CONTOUR 141m
*            ON S. FORK FISHING CREEK TO DETERMINE SLOPE (0.0016) USED FOR
*            FOR DETERMINING THE STARTING WATER SURFACE ELEVATION.
*            THIS WAS DONE BECAUSE THE CHANNEL'S SLOPE INCREASES FURTHER
*            DOWN PAST THE EXIT.  SLOPE (0.00088) WAS OBTAINED USING THE
*            CONTOURS ON THE U/S (144 m) AND D/S (141 m) SIDES OF THE
*            BRIDGE.  THIS SLOPE WAS USED FOR SHIFTING CROSS SECTION DATA.
SK         0.0016     0.0016
*
*            CROSS SECTIONS FULV AND EXIT WERE DEVELOPED BY TRANSFERRING
*            THE SURVEYED CROSS SECTION (SRD = 398) TO THE APPROPRIATE
*            SRD AND ADJUSTING BY THE CHANNEL SLOPE.  THE RIGHT END OF
*            THE CROSS SECTION WAS EXTENDED USING THE LAST SURVEYED POINTS.
*
XT   TEMP     -398
GR             0 102.2    21 91.2    44 85.7    86 84.8   112 84.1
GR           133  83.1   152 81.4   165 80.7   173 82.0   179 79.7
GR           200  80.6   215 82.4   220 77.4   230 73.6   235 70.9
GR           259  67.8   271 70.9   282 80.4   339 80.3   374 80.3
GR           406  82.9   425 89.3   435 91.0   450 93.6   465 95.2
*
XS   EXIT     -330 * * * 0.00088
GT
N            0.20       0.14      0.065      0.14
SA                152        215        282
*
PX
XS   FULV     0 * * * 0.00088
GT
N            0.20       0.14      0.065      0.14
SA                152        215        282
*
PX
*          THE UPSTREAM FACE OF THE UPSTREAM BRIDGE (I-77) WAS THE
*          MORE RESTRICTIVE AND WAS USED IN THE ANALYSIS.  THE OVER
*          BANK N-VALUES AT THE BRIDGE ARE HIGH DUE TO THE LARGE
*          AMOUNTS OF THICK AND MEDIUM VEGETATION.
*
BR   BRDGU 0 95.7
GR             0  96.7     1  96.4    15  90.8    30  84.9    36  84.0
GR            45  83.5    60  82.0    75  81.6    90  79.7   105  78.6
GR           120  76.0   135  76.2   150  72.8   155  74.2   163  72.2
GR           172  71.5   180  70.9   184  72.7   195  74.0   202  78.0
GR           210  76.7   225  78.6   240  79.3   255  80.5   270  81.0
GR           290  83.2   300  86.7   315  92.2   329  96.9   330  97.7
GR             0  96.7
N            0.09       0.065      0.09
SA                105        202
PW 1         70.9 0.85   72.8 0.85   72.8 1.70   76.0 1.70   76.0 2.55
```

```
PW          76.7 2.55   76.7 4.25   79.3 4.25   79.3 5.95   79.7 5.95
PW          79.7 6.80   81.0 6.80   81.0 8.50   82.0 8.50   82.0 9.35
PW          84.9 9.35   84.9 10.20  86.7 10.20  86.7 11.05  98.0 11.05
PW          98.0 0.00
CD          3 162 2 100.0
*
PX
*           THE APPROACH SECTION WAS SURVEYED 337 FEET UPSTREAM OF THE
*           UPSTREAM BRIDGE FACE.  THE ENDS OF THE CROSS SECTION WERE
*           EXTENDED USING THE END SURVEYED POINTS.
*
AS   APP    492
BP          0
GR          -20  95.1
GR            0  93.1   34  89.5   68  86.3   79  85.0   91  78.1
GR          100  73.3  112  71.6  125  72.4  134  72.4  144  73.3
GR          159  77.3  177  80.5  211  80.9  215  78.4  218  77.8
GR          222  79.3  265  80.9  308  79.5  321  81.8  330  85.7
GR          342  89.4  362  94.6
N           0.14    0.065     0.20
SA               79        177
*
PX
HP 1 BRDGU   90.71, ,90.71,10600
HP 2 BRDGU   90.87, ,90.87,10600
HP 1 APP     91.20, ,91.20,10600
HP 2 APP     91.20, ,91.20,10600
HP 1 BRDGU   94.04, ,94.04,15700
HP 2 BRDGU   94.20, ,94.20,15700
HP 1 APP     94.49, ,94.49,15700
HP 2 APP     94.49, ,94.49,15700
*
EX
ER
```

WSPRO OUTPUT

```
WSPRO          FEDERAL HIGHWAY ADMINISTRATION - U. S. GEOLOGICAL SURVEY
V042094            MODEL  FOR  WATER-SURFACE  PROFILE  COMPUTATIONS

          SOUTH FORK FISHING CREEK AT I-77 in CHESTER CO.
          LEVEL II BRIDGE SCOUR ANALYSIS
            *** RUN DATE & TIME: 07-08-94  07:53
     CROSS-SECTION PROPERTIES:  ISEQ =  3;  SECID = BRDGU;  SRD =        0.

      WSEL  SA#      AREA          K   TOPW   WETP  ALPH     LEW     REW       QCR
              1       720      47313     90     91                              11582
              2      1585     229834     97    100                              36356
              3      1042      76980    109    111                              18299
     90.71           3348     354127    296    301  1.38      15     311      54470
1
   HP 2 BRDGU   90.87, ,90.87,10600                                                1
WSPRO          FEDERAL HIGHWAY ADMINISTRATION - U. S. GEOLOGICAL SURVEY
V042094            MODEL  FOR  WATER-SURFACE  PROFILE  COMPUTATIONS

          SOUTH FORK FISHING CREEK AT I-77 in CHESTER CO.
          LEVEL II BRIDGE SCOUR ANALYSIS
            *** RUN DATE & TIME: 07-08-94  07:53


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

          WSEL      LEW      REW     AREA          K         Q      VEL
         90.87     14.8    311.4   3395.3   361262.   10600.     3.12

 X STA.        14.8       66.4       91.8      108.6      118.7      127.5
   A(I)           326.9      252.0      201.3      139.1      130.8
   V(I)            1.62       2.10       2.63       3.81       4.05

 X STA.       127.5      136.6      144.5      151.3      158.5      164.8
   A(I)           133.2      126.6      119.7      122.9      115.7
   V(I)            3.98       4.19       4.43       4.31       4.58

 X STA.       164.8      170.7      176.5      182.2      188.7      195.7
   A(I)           112.5      111.7      112.0      117.9      120.1
   V(I)            4.71       4.75       4.73       4.49       4.41

 X STA.       195.7      207.7      222.6      241.1      264.4      311.4
   A(I)           169.4      200.6      220.9      248.3      313.8
   V(I)            3.13       2.64       2.40       2.13       1.69
1
```

WSPRO OUTPUT --Continued

```
   HP 1 APP      91.20, ,91.20,10600                                          1
 WSPRO          FEDERAL HIGHWAY ADMINISTRATION - U. S. GEOLOGICAL SURVEY
 V042094            MODEL  FOR  WATER-SURFACE  PROFILE  COMPUTATIONS

          SOUTH FORK FISHING CREEK AT I-77 in CHESTER CO.
          LEVEL II BRIDGE SCOUR ANALYSIS
            *** RUN DATE & TIME: 07-08-94  07:53
     CROSS-SECTION PROPERTIES:  ISEQ =  4;  SECID = APP  ;  SRD =     492.

      WSEL  SA#      AREA         K   TOPW   WETP  ALPH    LEW    REW      QCR
            1         187      4179     61     61                          1856
            2        1542    216182     98    102                         34726
            3        1698     57565    172    175                         30271
     91.20           3427    277926    331    338  2.36     18    349     40730
1
   HP 2 APP      91.20, ,91.20,10600                                          1
 WSPRO          FEDERAL HIGHWAY ADMINISTRATION - U. S. GEOLOGICAL SURVEY
 V042094            MODEL  FOR  WATER-SURFACE  PROFILE  COMPUTATIONS

          SOUTH FORK FISHING CREEK AT I-77 in CHESTER CO.
          LEVEL II BRIDGE SCOUR ANALYSIS
            *** RUN DATE & TIME: 07-08-94  07:53



     VELOCITY DISTRIBUTION:  ISEQ =  4;  SECID = APP  ;  SRD =     492.

          WSEL      LEW      REW     AREA         K         Q     VEL
         91.20     17.9    348.9   3427.0   277926.    10600.    3.09

 X STA.       17.9       90.1       98.1      103.8      108.6      113.2
   A(I)          291.5      117.4      101.8       91.0       88.5
   V(I)           1.82       4.52       5.20       5.83       5.99

 X STA.      113.2      117.7      122.4      127.0      131.7      136.4
   A(I)          88.0       89.3       86.7       88.5       88.3
   V(I)          6.03       5.94       6.11       5.99       6.00

 X STA.      136.4      141.2      146.3      152.3      159.3      167.9
   A(I)          88.4       91.4       98.3      102.8      112.6
   V(I)          5.99       5.80       5.39       5.15       4.71

 X STA.      167.9      182.2      217.8      250.9      287.5      348.9
   A(I)         160.3      384.5      381.6      388.8      487.3
   V(I)          3.31       1.38       1.39       1.36       1.09
1
```

WSPRO OUTPUT --Continued

```
  HP 1 BRDGU   94.04, ,94.04,15700                                        1
WSPRO          FEDERAL HIGHWAY ADMINISTRATION - U. S. GEOLOGICAL SURVEY
V042094            MODEL  FOR  WATER-SURFACE  PROFILE  COMPUTATIONS

          SOUTH FORK FISHING CREEK AT I-77 in CHESTER CO.
          LEVEL II BRIDGE SCOUR ANALYSIS
            *** RUN DATE & TIME: 07-08-94  07:53
    CROSS-SECTION PROPERTIES:  ISEQ =  3;  SECID = BRDGU;  SRD =       0.

     WSEL  SA#      AREA         K   TOPW   WETP  ALPH    LEW    REW      QCR
             1      1033     81064     98    100                        19029
             2      1908    313090     97    100                        48018
             3      1421    121667    118    121                        27918
    94.04            4362    515820    314    321  1.36      7    320     79113
1
  HP 2 BRDGU   94.20, ,94.20,15700                                        1
WSPRO          FEDERAL HIGHWAY ADMINISTRATION - U. S. GEOLOGICAL SURVEY
V042094            MODEL  FOR  WATER-SURFACE  PROFILE  COMPUTATIONS

          SOUTH FORK FISHING CREEK AT I-77 in CHESTER CO.
          LEVEL II BRIDGE SCOUR ANALYSIS
            *** RUN DATE & TIME: 07-08-94  07:53


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

        WSEL      LEW      REW     AREA         K         Q     VEL
       94.20      6.5    321.0   4412.3   524284.    15700.    3.56

X STA.          6.5       58.2       83.0      102.0      114.2      123.5
  A(I)            412.4      312.9      277.8      196.1      167.4
  V(I)             1.90       2.51       2.83       4.00       4.69

X STA.        123.5      132.7      141.8      149.5      157.0      164.1
  A(I)            166.4      168.6      156.6      155.7      151.6
  V(I)             4.72       4.66       5.01       5.04       5.18

X STA.        164.1      170.7      176.9      183.4      190.7      199.0
  A(I)            147.5      141.6      148.0      153.5      164.3
  V(I)             5.32       5.54       5.30       5.11       4.78

X STA.        199.0      213.1      229.5      247.7      270.1      321.0
  A(I)            240.8      263.3      272.8      304.6      410.3
  V(I)             3.26       2.98       2.88       2.58       1.91
```

WSPRO OUTPUT --Continued

```
   HP 1 APP      94.49, ,94.49,15700                                          1
 WSPRO          FEDERAL HIGHWAY ADMINISTRATION - U. S. GEOLOGICAL SURVEY
 V042094            MODEL  FOR  WATER-SURFACE  PROFILE  COMPUTATIONS

          SOUTH FORK FISHING CREEK AT I-77 in CHESTER CO.
          LEVEL II BRIDGE SCOUR ANALYSIS
            *** RUN DATE & TIME: 07-08-94  07:53
     CROSS-SECTION PROPERTIES:  ISEQ =  4;  SECID = APP  ;  SRD =      492.

      WSEL  SA#      AREA         K    TOPW    WETP  ALPH     LEW     REW      QCR
              1       439     13132      93      93                              5423
              2      1865    296627      98     102                             46164
              3      2284     89961     185     188                             45594
     94.49           4588    399721     375     383  2.52     -13     362     57294
1
   HP 2 APP      94.49, ,94.49,15700                                          1
 WSPRO          FEDERAL HIGHWAY ADMINISTRATION - U. S. GEOLOGICAL SURVEY
 V042094            MODEL  FOR  WATER-SURFACE  PROFILE  COMPUTATIONS

          SOUTH FORK FISHING CREEK AT I-77 in CHESTER CO.
          LEVEL II BRIDGE SCOUR ANALYSIS
            *** RUN DATE & TIME: 07-08-94  07:53


     VELOCITY DISTRIBUTION:  ISEQ =  4;  SECID = APP  ;  SRD =      492.

          WSEL      LEW      REW     AREA         K         Q     VEL
         94.49    -13.9    361.6   4588.4   399721.    15700.    3.42

 X STA.       -13.9        84.8        94.9       101.5       107.0       112.1
   A(I)           504.5       158.2       134.1       119.2       115.2
   V(I)            1.56        4.96        5.85        6.59        6.81

 X STA.       112.1       117.1       122.0       127.2       132.3       137.4
   A(I)           112.4       110.7       114.8       113.2       112.7
   V(I)            6.98        7.09        6.84        6.93        6.97

 X STA.       137.4       142.8       148.5       155.1       162.8       171.8
   A(I)           114.9       117.8       126.4       133.5       141.2
   V(I)            6.83        6.67        6.21        5.88        5.56

 X STA.       171.8       194.2       226.0       258.0       293.3       361.6
   A(I)           313.7       462.8       462.5       493.8       626.7
   V(I)            2.50        1.70        1.70        1.59        1.25
1
   *
   EX
```

WSPRO OUTPUT --Continued

```
WSPRO          FEDERAL HIGHWAY ADMINISTRATION - U. S. GEOLOGICAL SURVEY
V042094            MODEL  FOR  WATER-SURFACE  PROFILE  COMPUTATIONS

          SOUTH FORK FISHING CREEK AT I-77 in CHESTER CO.
          LEVEL II BRIDGE SCOUR ANALYSIS
            *** RUN DATE & TIME: 07-08-94  07:53

 XSID:CODE    SRDL     LEW      AREA    VHD     HF      EGL     CRWS        Q     WSEL
       SRD    FLEN     REW         K  ALPH     HO      ERR      FR#      VEL

EXIT :XS    ******      26      3630  0.35  *****   90.34    82.67    10600    89.99
     -329   ******     429    264749  2.65  *****  *******    0.28     2.92

FULV :FV       330      25      3727  0.33   0.51   90.85  *******    10600    90.52
        0      330     430    273094  2.65   0.00    0.00     0.27     2.84
          <<<<<THE ABOVE RESULTS REFLECT "NORMAL" (UNCONSTRICTED) FLOW>>>>>

APP  :AS       492      18      3441  0.35   0.72   91.59  *******    10600    91.24
      492      492     349    279302  2.36   0.01    0.00     0.26     3.08
          <<<<<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       330      15      3347  0.17   0.53   90.87    81.71    10600    90.71
        0      330     311    354001  1.07   0.00    0.01     0.17     3.17

     TYPE PPCD FLOW       C     P/A     LSEL   BLEN   XLAB   XRAB
       3.   1.   1.   0.966   0.039    95.70 ****** ****** ******

 XSID:CODE    SRDL     LEW      AREA    VHD     HF      EGL     CRWS        Q     WSEL
       SRD    FLEN     REW         K  ALPH     HO      ERR      FR#      VEL

APP  :AS       330      18      3426  0.35   0.51   91.55    82.68    10600    91.20
      492      333     349    277820  2.36   0.16    0.00     0.26     3.09

      M(G)   M(K)        KQ    XLKQ    XRKQ    OTEL
     0.111  0.056  262470.    -13.     282.    90.72

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

WSPRO OUTPUT --Continued

```
WSPRO          FEDERAL HIGHWAY ADMINISTRATION - U. S. GEOLOGICAL SURVEY
V042094            MODEL  FOR  WATER-SURFACE  PROFILE  COMPUTATIONS

          SOUTH FORK FISHING CREEK AT I-77 in CHESTER CO.
          LEVEL II BRIDGE SCOUR ANALYSIS
            *** RUN DATE & TIME: 07-08-94  07:53

 XSID:CODE    SRDL     LEW      AREA    VHD     HF      EGL     CRWS        Q     WSEL
       SRD    FLEN     REW         K  ALPH     HO      ERR      FR#      VEL

EXIT :XS    ******      17      5015  0.40  *****    93.71    84.74    15700    93.31
      -329  ******     448    392464  2.65  ***** *******     0.26     3.13

FULV :FV       330      17      5119  0.39   0.51    94.23 *******    15700    93.84
          0    330     449    402728  2.65   0.00     0.00     0.26     3.07
          <<<<<THE ABOVE RESULTS REFLECT "NORMAL" (UNCONSTRICTED) FLOW>>>>>

APP  :AS       492     -14      4612  0.46   0.75    95.01 *******    15700    94.55
        492    492     362    402296  2.53   0.03     0.00     0.27     3.40
          <<<<<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       330       7      4361  0.22   0.54    94.25    83.68    15700    94.04
          0    330     320    515652  1.08   0.00     0.01     0.18     3.60

     TYPE PPCD FLOW      C     P/A    LSEL   BLEN   XLAB   XRAB
       3.   1.   1.  0.964   0.038   95.70 ****** ****** ******

 XSID:CODE    SRDL     LEW      AREA    VHD     HF      EGL     CRWS        Q     WSEL
       SRD    FLEN     REW         K  ALPH     HO      ERR      FR#      VEL

APP  :AS       330     -13      4589  0.46   0.54    94.95    84.48    15700    94.49
        492    332     362    399773  2.52   0.16     0.00     0.27     3.42

      M(G)   M(K)       KQ   XLKQ   XRKQ    OTEL
     0.170  0.044  382221.   -20.   294.    93.98

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

PIER SCOUR COMPUTATIONS
FOR
SOUTH FORK FISHING CREEK AT I-77 (North & South) Q-100
CHESTER COUNTY #021007710500/7730500 EJR-6/7/94

HYDRAULIC VARIABLES USED IN CSU EQUATION

PIER NUMBER	11	10	9	8	7	6	5	4
PIER STATION (FT)	30	60	90	120	150	180	210	240
LOCATION OF PIER	LFP	LFP	LFP	MCL	MCL	MCM	RFP	RFP
Y1: DEPTH (FT)	5.9	8.9	11.2	20.0	20.0	20.0	14.2	11.6
V1: VEL. (FPS)	2.1	2.1	2.1	4.3	4.3	4.3	2.6	2.
a: PIER WIDTH (FT)	0.9	0.9	0.9	0.9	0.9	0.9	8.7	7.
L: PIER LENGTH (FT)	6.8	6.8	6.8	6.8	6.8	6.8	8.7	7.5
PIER SHAPE	1	1	1	1	1	1	1	1
ATTACK ANGLE	0	0	0	0	0	0	0	0
K1 (SHAPE COEF.)	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10
K2 (ANGLE COEF.)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
FROUDE NO.	0.15	0.12	0.11	0.17	0.17	0.17	0.12	0.

COMPUTED SCOUR DEPTHS USING CSU EQUATION

SCOUR DEPTH (FT)	1.64	1.73	1.79	2.63	2.63	2.63	9.24	8.17
MAX SCOUR DEPTH (FT)	1.80	1.91	1.97	2.89	2.89	2.89	10.17	8.

HYDRAULIC VARIABLES USED IN CSU EQUATION

PIER NUMBER	3	2
PIER STATION (FT)	270	300
LOCATION OF PIER	RFP	RFP
Y1: DEPTH (FT)	9.9	4.1
V1: VEL. (FPS)	2.6	2.6
a: PIER WIDTH (FT)	7.0	0.9
L: PIER LENGTH (FT)	7.0	6.8
PIER SHAPE	1	1
ATTACK ANGLE	0	0
K1 (SHAPE COEF.)	1.10	1.10
K2 (ANGLE COEF.)	1.00	1.00
FROUDE NO.	0.15	0.23

COMPUTED SCOUR DEPTHS USING CSU EQUATION

SCOUR DEPTH (FT)	7.64	1.72
MAX SCOUR DEPTH (FT)	8.41	1.90

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

CONTRACTION SCOUR COMPUTATIONS
FOR
SOUTH FORK FISHING CREEK AT I-77 (North & South) Q-100
CHESTER COUNTY #021007710500/7730500 EJR-6/7/94

LIVE-BED SCOUR COMPUTATIONS

	MAIN CHANNEL	CONTRACTED SECTION
DISCHARGE (CFS)	8245.	6880.
BOTTOM WIDTH (FT)	98.0	94.4
MANNINGS n	0.065	0.065
AVERAGE DEPTH (FT)	18.6	

ENERGY SLOPE	0.00200
D50 (FT)	0.0098
FALL VELOCITY (FPS)	1.10
K1 COEF.	0.64
K2 COEF.	0.21

COMPUTED DEPTH AT CONTRACTED SECTION (FT)	=	16.3
DEPTH AT MAIN CHANNEL (FT)	=	18.6
DEPTH OF CONTRACTION SCOUR (FT)	=	-2.3

LEFT OVERBANK IN BRIDGE OPENING
CLEAR-WATER CONTRACTION SCOUR COMPUTATIONS

DISCHARGE IN CONTRACTED SECTION (CFS)	=	1416.
WIDTH OF CONTRACTED SECTION (FT)	=	69.0
MEDIAN GRAIN SIZE (FT)	=	0.0045
COMPUTED DEPTH OF CONTRACTED SECTION (FT)	=	8.0
AVERAGE FLOOD PLAIN DEPTH (FT)	=	12.6
DEPTH OF CONTRACTION SCOUR (FT)	=	-4.6

RIGHT OVERBANK IN BRIDGE OPENING
CLEAR-WATER CONTRACTION SCOUR COMPUTATIONS

DISCHARGE IN CONTRACTED SECTION (CFS)	=	2304.
WIDTH OF CONTRACTED SECTION (FT)	=	88.0
MEDIAN GRAIN SIZE (FT)	=	0.0045
COMPUTED DEPTH OF CONTRACTED SECTION (FT)	=	9.9
AVERAGE FLOOD PLAIN DEPTH (FT)	=	9.9
DEPTH OF CONTRACTION SCOUR (FT)	=	0.0

PIER SCOUR COMPUTATIONS
FOR
SOUTH FORK FISHING CREEK AT I-77 (North & South) Q-500
CHESTER COUNTY #021007710500/7730500 EJR-6/7/94

HYDRAULIC VARIABLES USED IN CSU EQUATION

PIER NUMBER	11	10	9	8	7	6	5	4
PIER STATION (FT)	30	60	90	120	150	180	210	240
LOCATION OF PIER	LFP	LFP	LFP	MCL	MCL	MCM	RFP	RFP
Y1: DEPTH (FT)	9.3	12.2	14.5	23.3	23.3	23.3	17.5	14.5
V1: VEL. (FPS)	2.8	2.8	2.8	5.0	5.0	5.0	3.0	3.0
a: PIER WIDTH (FT)	0.9	0.9	0.9	0.9	0.9	0.9	8.7	7.5
L: PIER LENGTH (FT)	6.8	6.8	6.8	6.8	6.8	6.8	8.7	7.5
PIER SHAPE	1	1	1	1	1	1	1	1
ATTACK ANGLE	0	0	0	0	0	0	0	0
K1 (SHAPE COEF.)	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10
K2 (ANGLE COEF.)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
FROUDE NO.	0.16	0.14	0.13	0.18	0.18	0.18	0.13	0.14

COMPUTED SCOUR DEPTHS USING CSU EQUATION

SCOUR DEPTH (FT)	1.98	2.06	2.11	2.87	2.87	2.87	10.01	8.9
MAX SCOUR DEPTH (FT)	2.18	2.26	2.32	3.15	3.15	3.15	11.02	9.79

HYDRAULIC VARIABLES USED IN CSU EQUATION

PIER NUMBER	3	2
PIER STATION (FT)	270	300
LOCATION OF PIER	RFP	RFP
Y1: DEPTH (FT)	13.2	7.5
V1: VEL. (FPS)	3.0	3.0
a: PIER WIDTH (FT)	7.0	0.9
L: PIER LENGTH (FT)	7.0	6.8
PIER SHAPE	1	1
ATTACK ANGLE	0	0
K1 (SHAPE COEF.)	1.10	1.10
K2 (ANGLE COEF.)	1.00	1.00
FROUDE NO.	0.14	0.19

COMPUTED SCOUR DEPTHS USING CSU EQUATION

SCOUR DEPTH (FT)	8.37	1.97
MAX SCOUR DEPTH (FT)	9.21	2.17

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

CONTRACTION SCOUR COMPUTATIONS
FOR
SOUTH FORK FISHING CREEK AT I-77 (North & South) Q-500
CHESTER COUNTY #021007710500/7730500 EJR-6/7/94

LIVE-BED SCOUR COMPUTATIONS

	MAIN CHANNEL	CONTRACTED SECTION
DISCHARGE (CFS)	11651.	9530.
BOTTOM WIDTH (FT)	98.0	94.4
MANNINGS n	0.065	0.065
AVERAGE DEPTH (FT)	21.9	

ENERGY SLOPE	0.00210
D50 (FT)	0.0098
FALL VELOCITY (FPS)	1.10
K1 COEF.	0.64
K2 COEF.	0.21

COMPUTED DEPTH AT CONTRACTED SECTION (FT)	=	18.9
DEPTH AT MAIN CHANNEL (FT)	=	21.9
DEPTH OF CONTRACTION SCOUR (FT)	=	-3.0

LEFT OVERBANK IN BRIDGE OPENING
CLEAR-WATER CONTRACTION SCOUR COMPUTATIONS

DISCHARGE IN CONTRACTED SECTION (CFS)	=	2467.
WIDTH OF CONTRACTED SECTION (FT)	=	69.0
MEDIAN GRAIN SIZE (FT)	=	0.0045
COMPUTED DEPTH OF CONTRACTED SECTION (FT)	=	12.9
AVERAGE FLOOD PLAIN DEPTH (FT)	=	15.9
DEPTH OF CONTRACTION SCOUR (FT)	=	-3.0

RIGHT OVERBANK IN BRIDGE OPENING
CLEAR-WATER CONTRACTION SCOUR COMPUTATIONS

DISCHARGE IN CONTRACTED SECTION (CFS)	=	3703.
WIDTH OF CONTRACTED SECTION (FT)	=	88.0
MEDIAN GRAIN SIZE (FT)	=	0.0045
COMPUTED DEPTH OF CONTRACTED SECTION (FT)	=	14.8
AVERAGE FLOOD PLAIN DEPTH (FT)	=	12.3
DEPTH OF CONTRACTION SCOUR (FT)	=	2.5

FED. ROAD	STATE	COUNTY	FILE NO.	PROJECT NO.	ROUTE NO.	SHEET NO.	TOTAL SHEETS
3	S.C.	CHESTER	12.477.3	I-77-1(31)	I-77	1	12

INDEX OF SHEETS

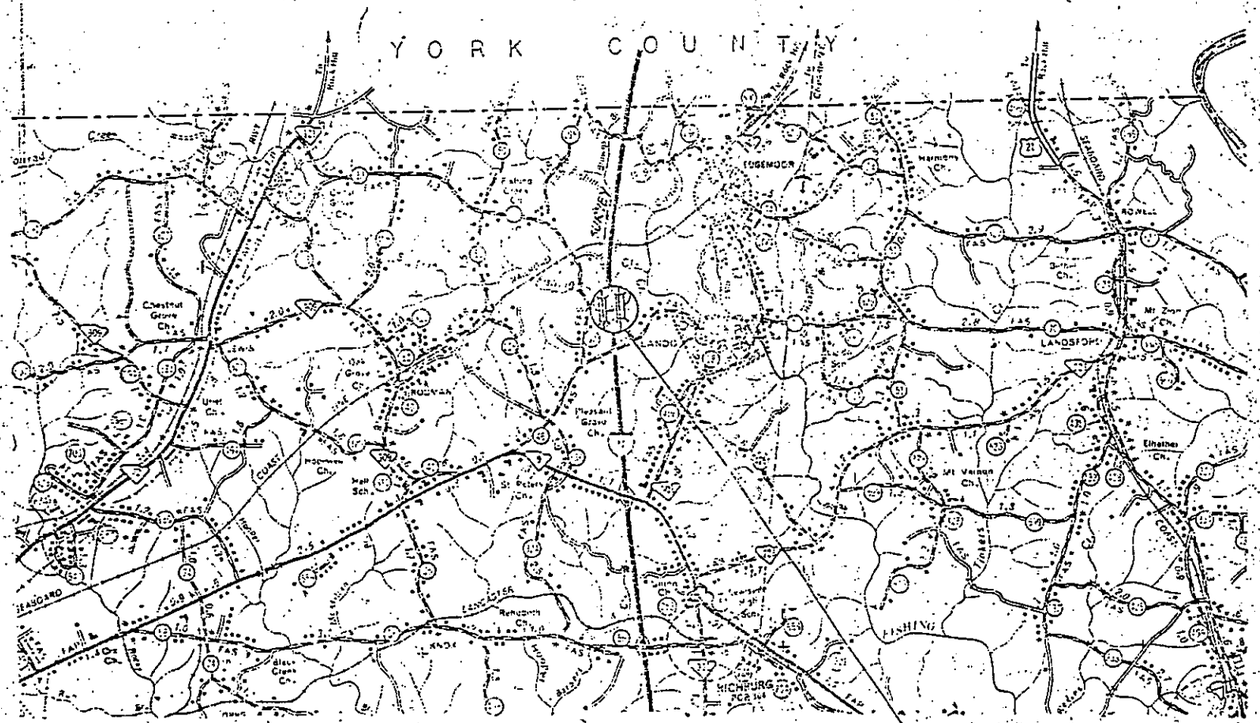
SOUTH CAROLINA
STATE HIGHWAY DEPARTMENT
COLUMBIA

PLAN AND PROFILE OF PROPOSED STATE HIGHWAY

FED. AID PROJECT NO. I-77-1(31)
FILE NO. 12.477.3
ROUTE NO. I-77
CHESTER COUNTY
TWIN BRIDGES OVER
SOUTH FORK FISHING CREEK

SUMMARY OF ESTIMATED QUANTITIES	
CLASS 'A' CONCRETE	2451.6 C.Y.
REINFORCING STEEL	458628 LBS.
STRUCTURAL STEEL (SWAY BRACING)	15608 LBS.
*HP 10 x 42 STEEL BEARING PILING	6364 L.F.

*NOTE: STRUCTURAL STEEL IN PILES SHALL CONTAIN NOT LESS THAN 0.2% COPPER.



LAYOUT

Construct Twin 330'-0" R.C. (Flat Slab) Bridges from Sta. 3917+80.00 to Sta. 3921+10.00 along I-77.

Net Length of Roadway	0.000 Miles
Net Length of Bridges	0.063 Miles
Net Length of Project	0.063 Miles
Length of Exceptions	0.000 Miles
Gross Length of Project	0.063 Miles

LEGEND
PROPOSED HIGHWAY

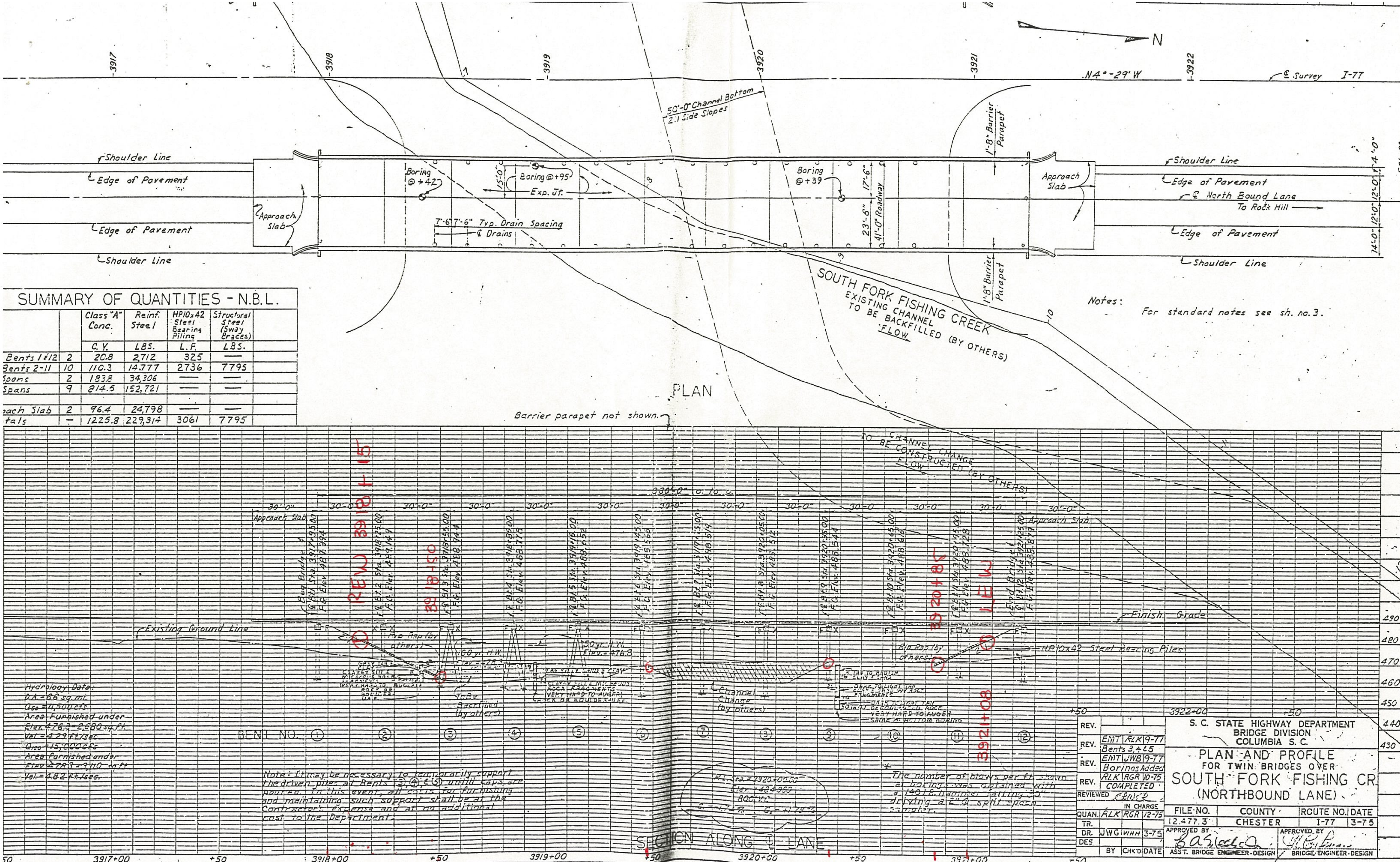
CONVENTIONAL SIGNS

Trolley Poles	
Power Poles	
Telephone or Telegraph Poles	
Marsh	
Trees	
Brush	
Stumps	
Buildings	
Bridge	
Concrete Box Culvert	
Pipe Culvert	
Drop Inlet and Culvert	
Hub on Center Line	

APPROVED:
E. A. Clinton 10-1-77
STATE HIGHWAY ENGINEER DATE

DEPARTMENT OF COMMERCE
BUREAU OF PUBLIC ROADS
APPROVED:
DISTRICT ENGINEER DATE

RECOMMENDED BY:
J. M. Coffman 10-12-77
BRIDGE ENGINEER DESIGN DATE



SUMMARY OF QUANTITIES - N.B.L.

		Class "A" Conc.	Reinf. Steel	HP10x42 Steel Bearing Piling	Structural Steel (Sway Braces)
		C.Y.	LBS.	L.F.	LBS.
Bents 1 & 12	2	20.8	2,712	325	—
Bents 2-11	10	110.3	14,777	2736	7795
Spans	2	183.8	34,306	—	—
Spans	9	814.5	152,721	—	—
...ach Slab	2	96.4	24,798	—	—
...tals	—	1225.8	229,314	3061	7795

Hydrology Data:
D.A. = 66 sq. mi.
Q_{50} = 11,500 cfs
Area Furnished under Elev. 476.8 = 2,680 sq. ft.
Vel. = 4.29 ft/sec.
Q_{100} = 15,000 cfs
Area furnished under Elev. 478.3 = 3,110 sq. ft.
Vel. = 4.82 ft/sec.

Note: It may be necessary to temporarily support the driven piles at Bents ③, ④, & ⑤ until caps are poured. In this event, all costs for furnishing and maintaining such support shall be at the Contractor's expense and at no additional cost to the Department.

P.I. Sta. = 3920+00.00
Elev. = 484.959
800' V.C.

* The number of blows per ft. shown at borings was obtained with a 140 lb. hammer falling 30" driving a 2" Ø split spoon sampler.

REV.			
REV.	EMT	RLK	9-77
	Bents 3,4 & 5		
REV.	EMT	JWB	9-77
	Borings Added		
REV.	RLK	RGR	10-75
	COMPLETED		
REVIEWED			
IN CHARGE			
QUAN.	RLK	RGR	12-75
TR.			
DR.	JWG	WHH	3-75
DES			
	BY	CHK'D	DATE

S. C. STATE HIGHWAY DEPARTMENT
BRIDGE DIVISION
COLUMBIA S. C.

PLAN AND PROFILE
FOR TWIN BRIDGES OVER
SOUTH FORK FISHING CR.
(NORTHBOUND LANE)

FILE NO.	COUNTY	ROUTE NO.	DATE
12.477.3	CHESTER	I-77	3-75

APPROVED BY ASST. BRIDGE ENGINEER-DESIGN

APPROVED BY BRIDGE ENGINEER-DESIGN

DIV. NO.						
3	S.C.	CHESTER	12.477.3	I-77	89	1225

SOUTH FORK
FISHING CREEK
EXISTING CHANNEL
TO BE BACKFILLED (BY OTHERS)

N

Channel Change
50'-0" Channel Bottom
2:1 Side Slopes

1'-8" Barrier Parapet

Shoulder Line
Edge of Pavement
To Columbia
Edge of Pavement
Shoulder Line

Approach Slab

Boring @+10
Boring @+25
Exp. Jt.
Boring @+55
Boring @+92
Boring @+15
Boring @+75
Boring @+07
Boring @+65

7'-6" 7'-6" Typ. Drain Spacing
6 Drains

17'-6" 2'-6" 41'-0" Roadway

1'-8" Barrier Parapet

Approach Slab

Shoulder Line
Edge of Pavement
℄ South Bound Lane
Edge of Pavement
Shoulder Line

4'-0" 12'-0" 12'-0" 14'-0"

3917 3918 3919 3920 3921

℄ Survey I-77

N4°-29'W

FLOW

FLOW

PLAN

SUMMARY OF QUANTITIES - S.B.L.

	No.	Class "A" Conc.	Reinf. Steel	HP10x42 Steel Bearing Piling	Structural Steel (Sway Bracing)
		C.Y.	LBS.	L.F.	LBS.
End Bents 1 & 12	2	208	2,712	375	—
Int. Bents 2-11	10	110.3	14,777	2928	7813
End Spans	2	183.8	34,306	—	—
Int. Spans	9	814.5	152,721	—	—
Approach Slab	2	96.4	24,798	—	—
Totals	—	1225.5	229,314	3303	7813

Notes:
For standard notes see sh. no. 10

Barrier parapet not shown

Approach Slab

Finish Grade

HP 10x42 Steel Bearing Piles

Existing Ground Line

Rip Rap toy

Rip Rap toy

Ground Water Elev. 464

100 yr H.W. Elev. 478

50 yr H.W. Elev. 474

Table Backfill (by others)

For Hydrology Data See Sh. No. 7

PT Sta. = 3920+00.00
Elev. = 484.990
200' V.C.
G1 = +1.74%
G2 = +1.28%

BENT NO. ①

Note: It may be necessary to temporarily support the driven piles at Bents 2, 3, & 4 until caps are poured. In this event, all cost for furnishing and maintaining such support shall be at the Contractor's expense and at no additional cost to the department.

SECTION ALONG ℄ LANE

The number of plans per ft. shown at borings was obtained with a 140 lb. hammer falling 30" driving a 2" O.D. split spoon sampler.

SAME @ 80' BORING

3917+00 +50 3918+00 +50 3919+00 3920+00 +50 3921+00 +50 3921+00

490 480 470 460 450 440 430

REV.		
REV.	EMT	RLK 9-77
	Bent 3, 4 & 5	
REV.	EMT	JWB 9-77
	BORINGS ADDED	
REV.	RLK	RGR 10-75
	COMPLETED	

REVIEWED RGR IN CHARGE

	BY	CHK'D	DATE
QUAN.	RLK	RGR	12-75
TR.			
DR.	JWG	WHH	3-75
DES.			

S. C. STATE HIGHWAY DEPARTMENT
BRIDGE DIVISION
COLUMBIA S. C.

PLAN AND PROFILE
FOR TWIN BRIDGES OVER
SOUTH FORK FISHING CR.
(SOUTHBOUND LANE)

FILE NO.	COUNTY	ROUTE NO.	DATE
12.477.3	CHESTER	I-77	3-75

APPROVED BY — ASST. BRIDGE ENGINEER-DESIGN
APPROVED BY — BRIDGE ENGINEER-DESIGN

PILE RECORD ON FILE NO. 12.477.3

NORTH BOUND LANE

FED ROAD DIV. NO	STATE	COUNTY	FILE NO.	ROUTE NO.	SHEET NO.	TOTAL SHEETS
3	S.C.	CHESTER	12.477.3	I-77	19	28

WEIGHT OF HAMMER 2500# TYPE MCKST. DE-30

FOOTING	PILE NO.	DIAM. AT BUTT	DIAM. AT TIP	ORIG. LENGTH	BUILD-UP OR SPLICE	TOTAL LENGTH	LENGTH C. O.	NET LENGTH	ELEV. C. O.	ELEV. OF TIP WHEN PLAN BEARING VALUE IS OBTAINED	ELEV. PILE TIP	ELEV. ORIG. GROUND OR BOTTOM OF FOOTING	PEN. IN GROUND OR BELOW FOOTING	PEN. PER BLOW	FALL OF HAMMER	BEARING VALUE	PAY LENGTH	C.O. @ 40 %
NORTH BOUND LANE																		
	1			40.0	0	40.0	22.0	18.0	485.722	468.722	467.722	466.722	17.0	*R	-	R	18.0	
	2						23.2	16.8		470.422	468.922		15.9		-		16.9	
	3						23.4	16.6		470.622	469.122		15.6		-		16.6	
	4						23.3	16.7		470.022	469.022		15.7		-		16.7	
	5			40.0	0	40.0	24.7	13.3	485.722	472.422	468.722	466.722	17.3	R	-	R	13.3	
SUB-TOTAL				200.0	0	200.0	116.6	81.4									81.4	
							1/2				1/2							
							1/2											
	1			40.0	0	40.0	13.9	26.1	485.477	459.377	459.377	459.477	16.1	R	-	R	26.1	
	2						11.0	28.1		485.377	457.377	457.477	16.4		-		28.1	
	3						16.6	23.4		462.977	446.077	446.177	16.1		-		23.4	
	4						19.0	21.0		446.977	446.477	436.477	10.0		-		21.0	
	5						19.5	20.5		467.477	446.977	436.477	9.7	R	-	R	20.5	
	6						16.8	23.2		463.777	440.577	426.577	14.0	.1	6.0	24.0	23.2	
	7			40.0		40.0	17.2	22.8		499.677	476.877	426.577	17.8	.15	6.0	22.2	22.8	
	8			24.7	0	24.7	30.7	23.1	485.477	462.377	461.377	426.577	16.2	R	-	R	23.1	
SUB-TOTAL				304.7	0	304.7	168.9	191.8									191.8	
							1/2				1/2							
							1/2											
	1			40.0	0	40.0	12.4	27.6	485.177	457.577	448.977	448.977	11.3	R	-	R	27.6	
	2						13.0	27.0		457.777	457.777	448.777	13.5		-		27.0	
	3						11.6	28.4		457.577	456.877	448.777	17.9		-		28.4	
	4						12.3	26.7		459.077	458.877	470.577	11.6		-		26.7	
	5						13.1	26.9		459.877	459.377	470.577	12.3		-		26.9	
	6						16.0	24.0		461.777	461.277	470.577	9.3		-		24.0	
	7						16.0	26.0		459.777	459.277	471.077	11.8		-		26.0	
	8			40.0	0	40.0	13.1	26.9	485.277	458.377	458.377	472.877	14.4	R	-	R	26.9	
SUB-TOTAL				320.0	0	320.0	166.5	216.5									216.5	
							1/2				1/2							
							1/2											
	1			40.0	0	40.0	10.0	30.0	485.122	455.122	448.322	448.322	13.2	.1	6.0	30.0	30.0	
	2						15.8	24.2		459.922	457.922	447.822	9.9	R	-	R	24.2	
	3						15.0	27.0		458.622	455.122	448.022	9.9	R	-	R	27.0	
	4						13.0	27.0		458.622	458.122	447.922	9.8	.1	6.0	34.0	27.0	
	5						13.7	26.3		458.322	458.022	447.922	9.6	R	-	R	26.3	
	6						10.6	28.4		458.722	458.122	447.922	12.9	.15	6.0	34.0	28.4	
	7						12.0	28.0		457.922	457.122	447.922	10.9	R	-	R	28.0	
	8			40.0	0	40.0	13.6	26.4	485.122	458.722	458.722	448.822	10.1	R	-	R	26.4	
SUB-TOTAL				320.0	0	320.0	99.7	221.3									221.3	
							1/2				1/2							
							1/2											
	1			40.0	0	40.0	11.4	28.6	484.980	456.380	448.380	448.380	12.0	1.05	6.0	34.0	28.6	
	2						16.3	23.7		460.280	459.280	448.280	9.7	.05	!	112.0	23.7	
	3						13.9	26.1		459.280	459.280	448.180	9.9	.09	!	112.0	26.1	
	4						13.3	26.7		459.780	459.280	448.280	9.8	.078	!	34.0	26.7	
	5						13.0	27.0		459.480	459.280	448.480	10.5	.05	!	112.0	27.0	
	6						12.2	27.8		458.180	457.180	447.880	10.7	.13	!	62.2	27.8	
	7						12.8	27.2		458.780	457.780	447.880	9.8	.13	!	62.2	27.2	
	8			40.0	0	40.0	13.2	26.8	484.980	458.180	458.180	447.080	8.9	.1	6.0	34.0	26.8	
SUB-TOTAL				320.0	0	320.0	103.5	216.5									216.5	
							1/2				1/2							
							1/2											
	1			40.0	0	40.0	10.4	29.6	484.884	454.784	447.184	447.184	6.9	R	-	R	29.6	
	2						8.1	31.9		463.084	447.084	441.084	6.1	R	-	R	31.9	
	3						7.4	32.6		447.784	447.284	441.084	5.7	R	-	R	32.6	
	4						9.0	30.1		455.284	454.784	441.384	6.6	R	-	R	30.1	
	5						10.2	29.8		464.884	455.084	440.784	5.7	.079	6.0	34.0	29.8	
	6						10.1	29.9		464.884	454.984	440.684	5.7	R	-	R	29.9	
	7						8.4	31.6		464.784	453.784	441.084	7.8	R	-	R	31.6	
	8			40.0	0	40.0	9.1	30.9	484.884	454.884	453.884	441.384	7.4	R	-	R	30.9	
SUB-TOTAL				320.0	0	320.0	73.6	246.4									246.4	
							1/2				1/2							
							1/2											
	1			40.0	0	40.0	7.1	32.9	484.847	452.047	451.047	441.647	9.7	.08	5.0	102.7	32.9	
	2						4.1	35.9		448.947	448.947	441.347	12.4	.1	6.0	34.0	35.9	
	3						9.8	30.2		455.647	454.647	441.547	6.6	R	-	R	30.2	
	4						9.0	30.1		455.747	454.747	441.647	6.9	R	-	R	30.1	
	5						5.2	34.6		451.747	450.747	441.447	11.2	.1	6.0	34.0	34.6	
	6						9.1	30.9		455.947	455.947	441.147	7.2	R	-	R	30.9	
	7						5.8	34.2		457.147	456.147	441.047	10.4	R	-	R	34.2	
	8			40.0	0	40.0	4.7	35.3	484.847	451.047	448.547	441.247	11.8	R	-	R	35.3	
SUB-TOTAL				320.0	0	320.0	59.9	266.1									266.1	
							1/2				1/2							
							1/2											
				214.7	0	214.7	64.2	150.5									150.5	

DATE	BENT NO.	FOOTING	PILE NO.	DIAM. AT BUTT	DIAM. AT TIP	ORIG. LENGTH	BUILD-UP OR SPLICE	TOTAL LENGTH	LENGTH C. O.	NET LENGTH	ELEV. C. O.	ELEV. OF TIP WHEN PLAN BEARING VALUE IS OBTAINED	ELEV. PILE TIP	ELEV. ORIG. GROUND OR BOTTOM OF FOOTING	PEN. IN GROUND OR BELOW FOOTING	PEN. PER BLOW	FALL OF HAMMER	BEARING VALUE	PAY LENGTH	C.O. @ 40 %
1978																				
		NORTH BOUND LANE																		
4-21	9		1			40.0	0	40.0	18.5	33.5	484.372	445.372	439.772	34.0	.03	5.5	102.7	33.5		
4-21			2						15.5	36.5		445.672	439.772	439.772	29.7	.2	5.5	51.3	36.5		
4-21			3						3.0	36.1		448.772	448.772	439.772	29.6	.125	6.0	78.7	36.1		
4-21			4						1.5	38.9		446.872	446.872	439.772	29.5	.125	5.5	68.4	38.5		
4-21			7						3.3	36.7		448.172	448.172	442.172	17.0	.1	6.0	34.0	36.7		
4-21			6						7.0	33.0		453.372	451.872	444.372	12.5	R	-	R	33.0		
4-21			7						8.7	34.3		454.872	453.372	444.572	11.0	R	-	R	34.3		
4-21			8			40.0	0	40.0	8.9	33.1	484.872	451.972	448.772	443.672	13.9	.078	5.5	88.0	33.1		
	9	SUB-TOTAL				320.0	10.5	330.5	70.1	291.4								70.1	291.4		
									1/2									1/2			
									1/2												
4-28	10		1			40.0	0	40.0	2.2	37.8	484.944	447.144	447.144	421.444	24.3	.1	6.0	34.0	37.8		
4-28			2			40.0	0	40.0	3.3	36.7		448.244	448.244	421.344	23.1	.1	6.0	34.0	36.7		
4-28			3			40.0	0	40.0	3.8	36.2		448.744	448.744	421.644	21.9	.075	5.5	88.0	36.2		
5-1			4			40.0	12.4	27.4	0	27.4		443.544	443.544	421.544	23.0	.1	6.5	77.0	44.4		
4-28			5			40.0	0	40.0	1.6	38.4		447.644	446.944	421.044	23.4	.2	7.5	51.3	38.4		
4-28	10		6			40.0	0	40.0	1.6	38.4		447.644	446.944	420.994	23.4	.2075	5.5	30.7	38.4		
5-2			7			40.0	8.4	48.4	0	48.4		447.344	446.744	419.744	23.2	.133	5.5	68.4	50.6		
4-28			8			40.0	0	40.0	1.7	38.3		447.844	446.644	419.644	22.0	.2	5.5	51.3	38.3		
	10	SUB-TOTAL				320.0	16.0	336.0	10.2	316.8									316.8		
									1/2									1/2			
									1/2												
4-25	11		1			40.0	0	40.0	10.1	29.9	485.096	457.196	448.196	426.696	21.5	R	-	R	29.9		
4-25			2						4.3	39.7		459.396	448.396	426.096	26.7	.2	5.5	51.3	39.7		
4-25			3						4.1	38.9		458.196	448.196	426.896	26.9	.1	5.5	77.0	39.9		
4-25			4						4.0	36.0		448.296	448.096	426.496	26.4	.1	5.5	77.0	36.0		
4-25			5						3.7	36.3		450.296	448.796	426.496	26.7	.075	5.5	88.0	36.3		
4-25			6						3.6	36.4		448.696	448.196	426.196	26.9	.125	5.5	68.4	36.4		
4-25			7						3.3	36.7		448.896	448.396	426.196	26.9	.075	5.5	88.0	36.7		
4-25			8			40.0	0	40.0	3.6	36.4	485.096	448.696	448.196	426.196	26.9	.1	5.5	77.0	36.4		
	11	SUB-TOTAL				320.0	0	320.0	36.1	293.9									293.9		
									1/2									1/2			
5-10	12		1			19.1	13.4	44.9	11.8	33.1	485.207	457.607	456.107	434.207	20.1	.1	5.5	77.0	33.1		
5-3			2			7.8	15.5	38.4	3.9	34.5		454.707	454.707	434.207	20.0	.1	5.5	77.0	30.0		
5-10			3			14.2	16.4	40.3	11.6	28.7		447.407	445.907		38.3	.13	5.5	66.6	29.3		
5-3			4			13.8	13.5	40.1	6.9	33.2		453.307	451.007		32.2	.125	6.0	76.7	33.2		
5-10			5			13.7	14.2	41.4	9.4	32.0	485.207	451.507	445.007	434.207	38.2	.1	5.5	77.0	36.3		
	12	SUB-TOTAL				68.6	14.4	200.9	43.1	170.9									170.9		
									1/2									1/2			
TOTAL						1342.6	163.9	1506.5	188.6	1317.9									1376.9		
GRAND TOTAL						3442.3	163.9	3606.2	849.8	2763.4									2776.4		

NOTES CONCERNING ANY UNUSUAL FOUNDATION CONDITIONS

BENT NO.	FOOTING	PILE NO.	REMARKS
			*R - REFUSAL
7		3	PILES END BEARED BEFORE TO REFUSAL - 5' MIN. PENETRATION REQUIRED INTO ROCK
7		4	PILES END BEARED BEFORE TO REFUSAL - 15' MIN. PENETRATION REQUIRED INTO ROCK

NOTES:

PAY LENGTH SHOULD INCLUDE ALLOWANCE FOR SPLICING STEEL PILES AND ANY OTHER AUTHORIZED ALLOWANCES.

NUMBERING PILES:
A SKETCH OF BENT OR FOOTING TO BE DRAWN ON THIS SHEET AND PILES TO BE NUMBERED, ALSO FLOW OF STREAM TO BE SHOWN.

PENETRATION PER BLOW:
GIVE THIS INFORMATION IN DECIMALS OF AN INCH.

PILE RECORD ON FILE NO. 12477.3

SOUTH BOUND LANE

FED. ROAD DIV. NO.	STATE	COUNTY	FILE NO.	ROUTE NO.	SHEET NO.	TOTAL SHEETS
3	S.C.	Chester	12477.3	I-77	6	28

WEIGHT OF HAMMER 2500# TYPE McKS. DE-30

FOOTING	PILE NO.	DIAM. AT BUTT	DIAM. AT TIP	ORIG. LENGTH	BUILD-UP OR SPLICE	TOTAL LENGTH	LENGTH C.O.	NET LENGTH	ELEV. C.O.	ELEV. OF TIP WHEN PLAN BEARING VALUE IS OBTAINED	ELEV. PILE TIP	ELEV. ORIG. GROUND OR BOTTOM OF FOOTING	PEN. IN GROUND OR BELOW FOOTING	PEN. PER BLOW	FALL OF HAMMER	BEARING VALUE	PAY LENGTH	C.O. @ 40 %
South Bound Lane																		
	1			11.0	[illegible]	33.6	9.6	23.8	496.006	463.206	462.206	485.006	22.9	*R	-	R	[illegible]	
	2			9.8	[illegible]	41.1	14.7	26.4		461.106	459.606		25.4	.075	5.5	99.0	[illegible]	
	3			11.1	[illegible]	33.6	10.2	23.4		464.106	462.606		22.4	.1	5.5	77.0	[illegible]	
	4			12.8	[illegible]	36.9	8.1	28.8		458.706	457.206		27.9	.1	5.5	77.0	[illegible]	
	5			11.8	[illegible]	35.1	12.1	23.0	496.006	464.506	463.006	485.006	22.0	.05	6.0	112.0	[illegible]	
Sub-Total				56.5	123.7	180.1	54.7	125.4									[illegible]	
					21.7		10.9				460.1					97		
	1			40.0	0	40.0	14.2	25.8	495.722	460.922	459.922	475.622	15.7	.1	6.0	84.0	[illegible]	
	2						14.4	25.6		461.122	460.122	476.422	16.3	.15	6.0	67.2	[illegible]	
	3						14.4	25.6		461.622	460.122	476.622	16.5	.1	6.0	84.0	[illegible]	
	4						14.2	25.8		460.922	459.922	476.822	16.9	.15	5.5	61.6	[illegible]	
	5						14.6	25.4		462.322	460.322	477.722	17.4	.15	6.0	67.2	[illegible]	
	6						14.7	25.3		462.422	460.422	478.222	17.8	.1	6.5	91.0	[illegible]	
	7						13.8	26.2		461.022	459.522	478.222	18.7	.175	5.5	56.0	[illegible]	
	8			40.0	0	40.0	15.5	24.5	495.722	462.722	461.222	478.222	17.5	.15	5.5	61.6	[illegible]	
Sub-Total				320.0	0	320.0	115.8	204.2									[illegible]	
							14.5				460.17					71		
	1			40.0	0	40.0	13.4	26.6	495.477	459.877	457.977	470.477	12.6	.0625	6.0	103.3	[illegible]	
	2						13.4	26.6		460.377	458.877	470.377	12.0	.125	6.0	74.7	[illegible]	
	3						13.1	26.9		459.577	458.577	470.577	12.0	.075	5.5	88.0	[illegible]	
	4						13.2	26.8		459.677	458.677	470.577	11.9	.1	5.5	77.0	[illegible]	
	5						12.9	27.1		459.377	459.377	470.477	12.1	.125	6.5	104.0	[illegible]	
	6						13.2	26.8		460.177	458.677	470.477	11.8	.075	6.0	96.0	[illegible]	
	7						12.7	27.3		459.177	458.177	470.477	12.3	.05	6.5	121.3	[illegible]	
	8			40.0	0	40.0	13.3	26.7	495.477	459.777	458.777	470.477	11.7	.05	6.5	121.3	[illegible]	
Sub-Total				320.0	0	320.0	104.2	215.8									[illegible]	
							13.0				[illegible]					[illegible]		
	1			40.0	0	40.0	4.0	36.0	495.272	453.272	449.772	469.372	22.1	.15	5.5	61.6	[illegible]	
	2						7.8	32.2		454.072	453.072	469.372	16.3	.05	6.0	112.0	[illegible]	
	3						7.0	33.0		453.772	452.772	469.272	17.0	.15	5.5	61.6	33.0	
	4						8.4	31.6		454.672	453.672	469.272	15.6	.125	5.5	68.4	31.6	
	5						12.4	27.6		458.672	457.672	469.272	11.6	.1	6.0	84.0	[illegible]	
	6						10.4	29.6		456.672	455.672	469.372	13.7	.1	5.5	77.0	[illegible]	
	7						12.7	27.3		458.472	457.972	469.272	11.3	.075	5.5	88.0	[illegible]	
	8			40.0	0	40.0	7.5	32.5	495.272	453.272	452.772	469.372	16.6	.2	5.5	51.3	32.5	
Sub-Total				320.0	0	320.0	70.2	249.8									249.8	
	1			40.0	0	40.0	2.4	37.6	495.106	449.506	447.506	468.606	21.1	.0625	5.5	94.5	[illegible]	
	2						3.3	36.7		449.706	448.406	468.606	20.2	.1	5.5	77.0	[illegible]	
	3						5.9	34.1		452.006	451.006	468.806	17.8	.075	5.5	88.0	[illegible]	
	4						3.2	36.8		449.306	448.306	468.806	20.5	.175	5.5	56.0	[illegible]	
	5						2.6	37.4		449.706	447.706	469.106	21.4	.125	5.5	68.4	[illegible]	
	6						9.7	30.3		455.306	454.806	469.106	14.3	R	-	R	[illegible]	
	7			40.0	0	40.0	11.2	28.8		457.306	456.306	469.106	12.8	.05	5.5	102.7	[illegible]	
	8			13.2	19.7	32.9	3.9	29.0	495.106	458.106	456.106	469.106	13.0	R	-	R	[illegible]	
Sub-Total				293.2	19.7	312.9	42.2	270.7									[illegible]	
	1			40.0	0	40.0	4.3	35.7	494.980	451.280	449.280	461.780	12.5	.05	5.0	93.3	[illegible]	
	2			40.0	2.4	42.4	0	42.4		444.080	442.580	461.580	19.0	.1	5.5	77.0	[illegible]	
	3			40.0	0	40.0	1.5	38.5		447.780	446.480	461.280	14.8	.1	5.5	77.0	[illegible]	
	4			40.0	0	40.0	1.4	38.6		448.380	446.380	461.480	15.1	.15	5.5	61.6	[illegible]	
	5			40.0	0	40.0	1.5	38.5		448.480	446.480	462.980	16.5	.25	5.5	44.0	[illegible]	
	6			14.2	[illegible]	42.8	0	42.8		443.680	442.180	463.580	21.4	.15	5.5	61.6	[illegible]	
	7			12.8	[illegible]	46.6	0	46.6		439.880	438.380	464.880	26.5	.15	6.0	67.2	[illegible]	
	8			15.9	[illegible]	41.8	0	41.8	494.980	444.680	443.180	465.980	22.8	.05	5.0	93.3	[illegible]	
Sub-Total				240.5	93.1	333.6	8.7	324.9									[illegible]	
	1			40.0	0	40.0	6.5	33.5	494.894	453.094	451.394	462.894	11.5	R	-	R	[illegible]	
	2						6.4	33.6		454.294	451.294	462.194	10.9	R	-	R	[illegible]	
	3						6.9	33.1		453.794	451.794	461.794	9.5	R	-	R	[illegible]	
	4						5.3	34.7		452.194	450.194	461.394	11.2	.075	6.0	96.0	[illegible]	
	5						2.8	37.2		449.694	447.694	461.294	13.6	.1	5.5	77.0	[illegible]	
	6						3.4	36.6		449.794	448.294	461.294	13.0	.15	5.5	61.6	[illegible]	
	7						1.6	38.4		447.994	446.494	461.394	14.9	.175	5.5	56.0	[illegible]	
	8			40.0	0	40.0	7.0	33.0	494.894	449.394	446.894	461.894	15.0	.15	5.0	56.0	[illegible]	
Sub-Total				320.0	0	320.0	34.9	285.1								67	285.1	
				1870.2	236.4	2106.6	430.7	1675.9									1683.9	

DATE	BENT NO.	FOOTING	PILE NO.	DIAM. AT BUTT	DIAM. AT TIP	ORIG. LENGTH	BUILD-UP OR SPLICE	TOTAL LENGTH	LENGTH C.O.	NET LENGTH	ELEV. C.O.	ELEV. OF TIP WHEN PLAN BEARING VALUE IS OBTAINED	ELEV. PILE TIP	ELEV. ORIG. GROUND OR BOTTOM OF FOOTING	PEN. IN GROUND OR BELOW FOOTING	PEN. PER BLOW	FALL OF HAMMER	BEARING VALUE	PAY LENGTH	C.O. @ 40 %
1978																				
	South Bound Lane																			
5-23	8		1			40.0	0	40.0	11.3	28.7	494.947	460.647	456.647	463.747	6.6	R	-	R	28.7	
5-23			2						11.0	29.0		457.947	455.947	463.747	7.4	R	-	R	29.0	
5-23			3						8.1	31.9		454.947	452.947	463.747	10.5	.1	5.5	77.0	31.9	
5-23			4						6.6	33.4		453.447	451.447	462.947	11.4	.075	5.5	88.0	33.4	
5-23			5						5.5	34.5		451.847	450.347	462.347	12.0	.1	5.5	77.0	34.5	
5-23			6						5.7	34.3		452.047	450.547	461.347	10.8	.1	5.5	77.0	34.3	
5-23			7						6.6	33.4		452.447	451.447	461.347	9.9	.125	5.5	68.4	33.4	
5-23			8			40.0	0	40.0	3.0	37.0	494.947	449.947	447.947	461.347	13.5	.1	6.0	84.0	37.0	
	8	Sub-Total				320.0	0	320.0	58.3	261.7			452.135					79	261.7	
									7.3											
5-19	9		1			40.0	0	40.0	2.7	37.3	494.840	443.540	447.540	469.540	22.0	.2	6.0	56.0	37.3	
5-10			2						4.0	36.0		452.340	450.840	469.340	19.5	.1	6.0	84.0	36.0	
5-19			3						4.0	36.0		449.340	448.840	468.840	20.0	.2	6.0	56.0	36.0	
5-18			4						8.1	31.9		454.440	452.940	468.840	15.9	.1	5.0	70.0	31.9	
5-19			5						6.3	33.7		452.640	451.140	468.340	17.2	.2	5.5	51.3	33.7	
5-19			6						11.4	28.6		457.740	456.240	467.340	11.1	.125	5.5	68.4	28.6	
5-19			7						11.0	29.0		457.840	455.840	466.340	10.5	.125	6.0	74.7	29.0	
5-18			8			40.0	0	40.0	6.7	33.3	494.840	453.040	451.540	464.840	13.4	.125	5.5	68.4	33.3	
	9	Sub-Total				320.0	0	320.0	56.7	263.3			451.965					66.1	263.3	
5-17	10		1			40.0	0	40.0	2.5	37.5	494.377	448.877	447.377	471.877	24.5	.175	5.5	56.0	37.5	
5-17			2						2.9	37.1		449.777	447.777	471.877	24.1	.1	6.0	84.0	37.1	
5-17			3						3.6	36.4		449.977	448.477	471.522	23.2	.1	5.5	77.0	36.4	
5-17			4						4.9	35.1		450.777	449.777	471.672	21.9	.15	5.0	56.0	35.1	
5-17			5						2.1	37.9		453.977	451.977	471.877	16.9	.125	5.5	68.4	37.9	
5-17			6						3.0	37.0		448.377	447.877	472.077	24.2	.1	6.0	84.0	37.0	
5-17			7						2.4	37.6		448.277	447.277	472.172	24.9	.2	5.5	51.3	37.6	
5-17			8			40.0	0	40.0	6.9	33.1	494.377	452.777	451.777	472.172	20.4	.075	7.5	99.0	33.1	
	10	Sub-Total				320.0	0	320.0	33.3	286.7			449.025					71	286.7	
5-16	11		1			40.0	0	40.0	3.3	36.7	494.944	449.744	448.744	474.644	26.4	.1	5.5	77.0	36.7	
5-16			2						1.9	38.1		447.944	446.944	473.944	27.1	.175	6.0	61.1	38.1	
5-16			3						2.0	38.0		447.944	446.944	474.044	27.1	.175	6.0	61.1	38.0	
5-16			4						1.9	38.1		447.944	446.844	473.944	27.1	.2	6.0	56.0	38.1	
5-16			5						2.1	37.9		448.944	447.044	474.744	27.2	.1	6.0	84.0	37.9	
5-16			6						5.3	34.7		451.744	450.244	474.644	24.4	.15	6.0	67.2	34.7	
5-16			7						0	40.0		446.944	444.944	474.444	29.5	.125	5.5	68.4	40.0	
5-16			8			40.0	0	40.0	7.4	32.6	494.944	454.344	452.344	474.744	22.4	.15	5.5	61.6	32.6	
	11	Sub-Total				320.0	0	320.0	23.9	296.1			447.937					67	296.1	
									3.0											
5-11	12		1			12.1	[illegible]	37.2	1.9	35.3	485.056	450.756	449.756	484.056	34.3	.1625	5.5	58.7	35.3	
5-11			2			13.3	[illegible]	37.0	5.8	31.2		454.356	453.356		30.7	.1	5.5	77.0	31.2	
5-11			3			13.8	[illegible]	40.1	4.6	35.5		451.056	449.556		34.5	.15	5.5	61.6	35.5	
5-11			4			11.9	[illegible]	37.4	2.9	34.5		452.556	450.556		33.5	.15	5.5	61.6	34.5	
5-11			5			14.7	[illegible]	38.4	3.9	34.5	485.056	452.056	450.556	484.056	33.5	.1	5.5	77.0	34.5	
	12	Sub-Total				65.7	124.4	190.1	19.1	171.0			450.556					67	171.0	
									3.0											
TOTAL						1345.7	124.4	1470.1	190.8	1279.3									1279.3	
GRAND TOTAL						3215.9	360.8	3576.7	621.5	2955.2									2963.2	

NOTES CONCERNING ANY UNUSUAL FOUNDATION CONDITIONS

BENT NO.	FOOTING	PILE NO.	REMARKS
			*R - Refusal

NOTES:

PAY LENGTH SHOULD INCLUDE ALLOWANCE FOR SPLICING STEEL PILES AND ANY OTHER AUTHORIZED ALLOWANCES.

NUMBERING PILES: A SKETCH OF BENT OR FOOTING TO BE DRAWN ON THIS SHEET AND PILES TO BE NUMBERED, ALSO FLOW OF STREAM TO BE SHOWN.

PENETRATION PER BLOW: GIVE THIS INFORMATION IN DECIMALS OF AN INCH.

PILE RECORD SBL FILE NO 12477.3

CONSTRUCTION RECORD DATA

CHESTER County

I-77

ROAD Plan & Profile

Including Bridge over

Southfork Fishing Creek

DOCKET No. 12.486

Docket No. 15,489

FED. ROAD DIV. NO.	STATE	COUNTY	DOC. NO.	PROJECT NO.	ROUTE NO.
3	S. C.	CHESTER	12.466	I-77-1(12)	I-77

Tracts 36 & 36A Revised

121.33Ac.

(36-A)

WILLIAM N. GASTON
F.S.C.8.8.75

Const Sediment Basin as Directed By Engineer

End 5 Str. R (W) & Begin 4 Str. R/W

℄ = P.I.

175' R/W

Const. 47" Woven Wire Fence With 3 Strs. B.W.

Construction Line

3910

3915

3920

3925

SOUTH FORK

℄ Channel Change

60' R/W

See Sheet 89 For Detail of Channel Change

460.91Ac.

FRED. R. HAMBRIGHT
F.S.C. 8.14.75

330' R.C. Bridge to be Constructed from Sta. 3917+65 ℄ to Sta. 3920+95 ℄ (South Bound Lane) By Others

165' R/W

Controlled Access Line

Const. Sediment Basin as Directed By Engineer

12' 12' 24' 4'

℄ = P.L.

(36-B) (SEE ABOVE) (SEE BELOW) (36)

Const Catch Basin Type 12 Place 116'-18" R.C. Pipe

N A°39'W

3919+40

86°41'

94°

3920+00

Const. Catch Basin Type 12

Const. Catch Basin Type 12 Place 120'-18" R.C. Pipe

P.I.

OF FISHING CREEK

Channel Change

Construction Line

Const. 47" Woven Wire Fence with 3 Strs. B.W.

175' R/W

Controlled Access Line

Place 248'-48" R.C. Pipe On 30° Skew

JAMES M. GASTON
F.S.C.8.8.75
217.16Ac. (36)

3918+75

330' R.C. Bridge to be Constructed from Sta. 3917+95 ℄ to Sta. 3921+25 ℄ (North Bound Lane) By Others

3916+50

Const. Sediment Basin as Directed By Engineer

Const. Special Ditch See Cross Sections

Transition R/W

E. L. & MRS. LAURA MAE RATTERREE
F.S.C.8.8.75 (37)

Obtain 1.76 Ac.

165' R/W (38)

Const Sediment Basin as Directed By Engineer

FRED. R. HAMBRIGHT
F.S.C. 8.14.75

454.91 Ac.

B.M. No. 30 Nail in base of 10" Oak
210° Lt. Sta. 3915+50 El. = 487.03

B.M. No. 31 Nail in 30" Gum 3.0' Above ground
210° Rt. Sta. 3923+40 El. = 473.07

300' R/W

138

178

800' V.C.

-1.74%

+1.78%

Finished Grade

A=1.5
A=4(2)

DA = 24 Ac.
Q = 109 cfs

100' V. Hill Vol. El. = 478.37

50' Hor. Vol. El. = 476.60

P.I. = 3920+00
El. = 484.99

Toe of Fill Sta. 3920+78

A=2
A=6(3)

Channel Change

Toe of Fill Sta. 3918+30

DA = 66. Sq. Mi.
Q50 = 11,500 cfs
Area Permitted Under = El. 476.6 = 2630 Sq. Ft.
Vel. = 4.29 Ft/sec
Qmax = 15000 cfs
Area Permitted Under El. = 478.3 = 3110 Sq. Ft.
Vel. = 4.82 Ft/sec

Toe of Fill Sta. 3923+40

Const. Ditch (South Bound Lane)

Const. Ditch (North Bound Lane)

490
480
470
460

3910 1 2 3 4 3915 6 7 8 9 3920 1 2 3 4 3925

PLATE 1, PLAN-PROFILE
K-E KUFFEL & ESSER CO.

FED. RD. DIV. NO.	STATE	COUNTY
3	S.C.	CHESTERFIELD

FRED. R. WILDRICK
E.S.C. 4-1975

FLOW

SOUTH FORK FISHING CREEK

WILLIAM NEWTON C.E.-O.I.C.

FRED. R. WILDRICK
E.S.C. 4-1975

FLOW

SOUTH FORK FISHING CREEK

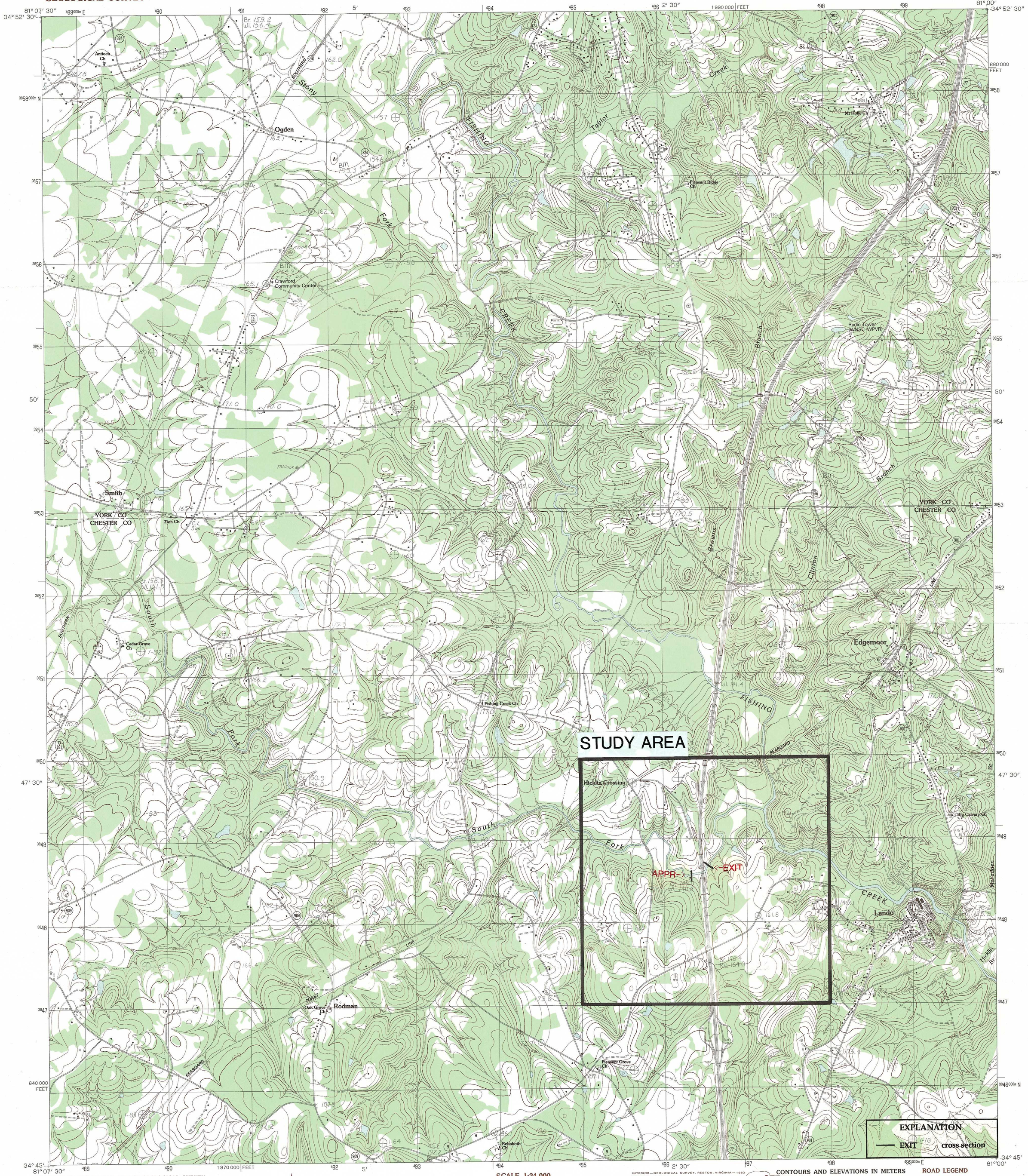
WILLIAM NEWTON C.E.-O.I.C.

REV.			
REV.			
REV.			
REV.			
REVIEWED			
QUAN.		IN CHARGE	
TR.			
DES.			
CK.		CHECKED	DATE

S. C. STATE HIGH
COLUM
PI
FORK CHANN
SOUTH FORK
FILE NO. COUN
CHESTE

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

EDGEMOOR QUADRANGLE
SOUTH CAROLINA
7.5 MINUTE SERIES (TOPOGRAPHIC)



81°07′30″ 489000m E 490 491 492 5′ 493 494 495 496 2′30″ 1 990 000 FEET 498 499 81°00′

34°52′30″ 3858000m N 3857 3856 3855 50′ 3854 3853 3852 3851 3850 47′30″ 3849 3848 3847 640 000 FEET 34°45′

81°07′30″ 489 490 1 970 000 FEET 492 5′ 493 494 495 496 2′30″ 497 498 499000m E 81°00′

680 000 FEET

34°52′30″ 3858 3857 3856 3855 50′ 3854 3853 3852 3851 3850 47′30″ 3849 3848 3847 3846000m N 34°45′

PRODUCED BY THE UNITED STATES GEOLOGICAL SURVEY
CONTROL BY..... USGS AND NOS/NOAA
COMPILED FROM AERIAL PHOTOGRAPHS TAKEN 1979
FIELD CHECKED..... 1980 MAP EDITED 1982
PROJECTION..... LAMBERT CONFORMAL CONIC
GRID: 1000-METER UNIVERSAL TRANSVERSE MERCATOR ..... ZONE 17
10,000-FOOT STATE GRID TICKS .... SOUTH CAROLINA, NORTH ZONE
UTM GRID DECLINATION ..... 0°02′ WEST
1982 MAGNETIC NORTH DECLINATION..... 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 (11 meters south and 17 meters west)

There may be private inholdings within the boundaries of any Federal and State Reservations shown on this map

NORTH

PROVISIONAL MAP
Produced from original manuscript drawings. Information shown as of date of field check

3

SCALE 1:24 000

1 .5 0 KILOMETERS 1 2
1000 0 METERS 1000 2000
1 .5 0 1
MILES
1000 0 1000 2000 3000 4000 5000 6000 7000 8000 9000 10 000
FEET

CONTOUR INTERVAL 3 METERS
CONTROL AND OTHER ELEVATIONS SHOWN TO THE NEAREST 0.1 METER

To convert meters to feet multiply by 3.2808
To convert feet to meters multiply by .3048

INTERIOR—GEOLOGICAL SURVEY, RESTON, VIRGINIA—1983

CONTOURS AND ELEVATIONS IN METERS

ROAD LEGEND

Improved Road .....
Unimproved Road .....
Trail .....
Interstate Route U. S. Route State Route

S.C.
QUADRANGLE LOCATION

1	2	3	1 Tirzah 2 Rock Hill West 3 Rock Hill East 4 Lowrys 5 Catawba 6 Chester 7 Richburg 8 Fort Lawn
4		5	
6	7	8	

ADJOINING 7.5′ QUADRANGLE NAMES

EDGEMOOR, S. C.
PROVISIONAL EDITION 1982
34081-G1-TM-024

Figure 1.--Topography of study area and location of cross sections used in WSPRO analysis for structure 121007710500/7730500 on Interstate 77, crossing South Fork Fishing Creek in Chester County, South Carolina.