

DATA SCREENING FOR SCOUR EVALUATIONS OF ALABAMA BRIDGES

PREPARED BY

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ABSTRACT

This report presents a compilation of bridge sites in Alabama which have experienced large floods with recurrence intervals of 100 years or larger. The purpose of the study was to identify existing bridges in Alabama with a sufficient amount and quality of hydraulic, hydrologic, geotechnical and structural information that would allow a comparative study of actual pier foundation depths and calculated scour depths during actual past floods based on available scour formulas.

ACKNOWLEDGMENTS

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I. INTRODUCTION

In a recent review of Alabama highway research needs, one of the topics identified was titled "Evaluation of the Effects of Scour Models on Required Pile Lengths" (HRC, 1998). It was concluded in that review that "more research needs to be conducted on foundation requirements," and that "current scour models require minimum pile tip elevations that are often beyond reasonably obtained limits." Similar observations are also made in the Federal Highway Administration's (FHWA) Hydraulic Engineering Circular No. 18 (HEC-18), "Evaluating Scour at Bridges (Richardson and Davis, 1995). In particular, it is noted in that publication that "adequate consideration must be given to the limitations and gaps in existing knowledge when using currently available formulas for scour. The designer needs to apply engineering judgment in comparing results obtained from scour computations with available hydrologic and hydraulic data to achieve a prudent design." It is further stated that such data should include "performance of existing structures during past floods."

PURPOSE AND SCOPE:

In view of a definite need for a better understanding of the utility of available scour formulas, this project was undertaken to identify existing bridges in Alabama in the data base of the Alabama Department of Transportation (ALDOT) with a sufficient amount and quality of hydraulic, hydrologic, geotechnical and structural information that would allow a comparative study of actual pier foundation depths and calculated scour depths during actual past floods experienced by the bridges based on available scour formulas. Particular attention was given to bridges which have experienced floods with

recurrence intervals (return periods) of 100 years or more.

This study has been limited to the screening of the available information to simply identify the bridge sites in Alabama which have experienced large floods and to compile some basic preliminary information about these sites. It is hoped that this project will lead to a larger study in which more detailed information will be documented about these bridge sites and the scour performance of these bridges will actually be evaluated by an intensive research effort.

METHODS OF THE STUDY:

A recent report by Atkins (1996) was used as the starting point in our search for bridge sites in Alabama which have experienced large floods. This report includes a list of the U.S. Geological Survey stream gaging stations in Alabama with a record of observed peak discharges and the corresponding recurrence intervals. From this list, we identified the gaging station sites which have experienced flood flows with recurrence intervals of 100 years or more. Following this, we searched the Alabama Bridge Information Management System (ABIMS) data base for bridges which are located at or near these sites, and determined the bridge identification numbers (BIN) for the bridges which had been built before these large floods occurred at these sites. This search was conducted with a great deal of help from ALDOT.

ORGANIZATION OF THE REPORT:

A compilation of the bridge sites which have been identified in this study is presented in Section II. This is followed by a presentation and discussion of the type and extent of the available information for these bridge sites in Section III. The main conclusions and a discussion of possible future studies are presented in Section IV.

II. SELECTED BRIDGE SITES

The bridge sites which have been identified are listed in Table 1. This table gives the U. S. Geological Survey gage station number for each site, followed by the station name, the construction date (year) of the main bridge at the site, the date (year) of the most extreme flood experienced by the bridge, an approximate lower-bound estimate of the recurrence interval of the flood (as 100, 200, or 500 years) as determined with the flood frequency (regression equation) method of Atkins (1995), and the bridge identification numbers of the bridges at the site. The locations of the selected bridge sites, along with their U.S. Geological Survey Station numbers, are indicated in Figure 1.

There are 18 sites identified in Table 1 which have all experienced an extreme flood of a recurrence interval of at least 100 years or more, and 6 of these sites have experienced a flood of a recurrence interval of 500 years or more. These bridges all appear to have withstood these large floods without any major damage. However, a more detailed examination of the routine bridge inspection reports for these bridges, if available, and/or site visits to the specific sites may be needed in order to evaluate the possible effects of these floods on these structures.

Table 1. Selected bridge sites in Alabama

Gage Station	Station Name	*Built Date	Flood Date	Recurrence Interval	Main Channel Bridges BIN	Relief Bridges BIN
3576250	Limestone Creek near Athens	1952	1973	200	463; 6544	
3574500	Paint Rock River near Woodville	1985	1990	100	13564; 11960	
2367500	Lightwood Knot Creek at Babbie	1982	1990	100	12968	12969
2361000	Choctawhatchee River near Newton	1976	1990	500	11857	
2363000	Pea River near Arifton	1970	1990	100	10355	10354; 5572; 5573
2450000	Mulberry Fork near Garden City	1960	1990	200	6914	
2364000	Pea River at Elba	1959	1990	100	6434	
3575830	Indian Creek near Madison	1965	1973	100	5509; 8735	
2438000	Buttahatchee River below Hamilton	1953	1973	500	4202	13690
2467500	Sucarnoochee River at Livingston	1946	1979	200	2911	2912
2439000	Buttahatchee River near Sulligent	1940	1973	500	2561	2560; 2559; 2558; 2557
2343275	Abbie Creek near Abbeville	1941	1953	100	2540	
2427700	Turkey Creek at Kimbrough	1940	1961	200	2264	2265; 2266
2360000	West Fork Choctawhatchee River at Blue Springs	1938	1990	500	1731	
2451750	Vest Creek near Baldwin	1934	1964	200	1127	
2469500	Tuckabum Creek near Butler	1934	1964	200	1095	1096; 1097; 970
2340750	Osanippa Creek near Fairfax	1929	1961	500	615	
2406000	Talladega Creek near Talladega	1928	1951	500	537	
*some relief bridges may have been built at different years						

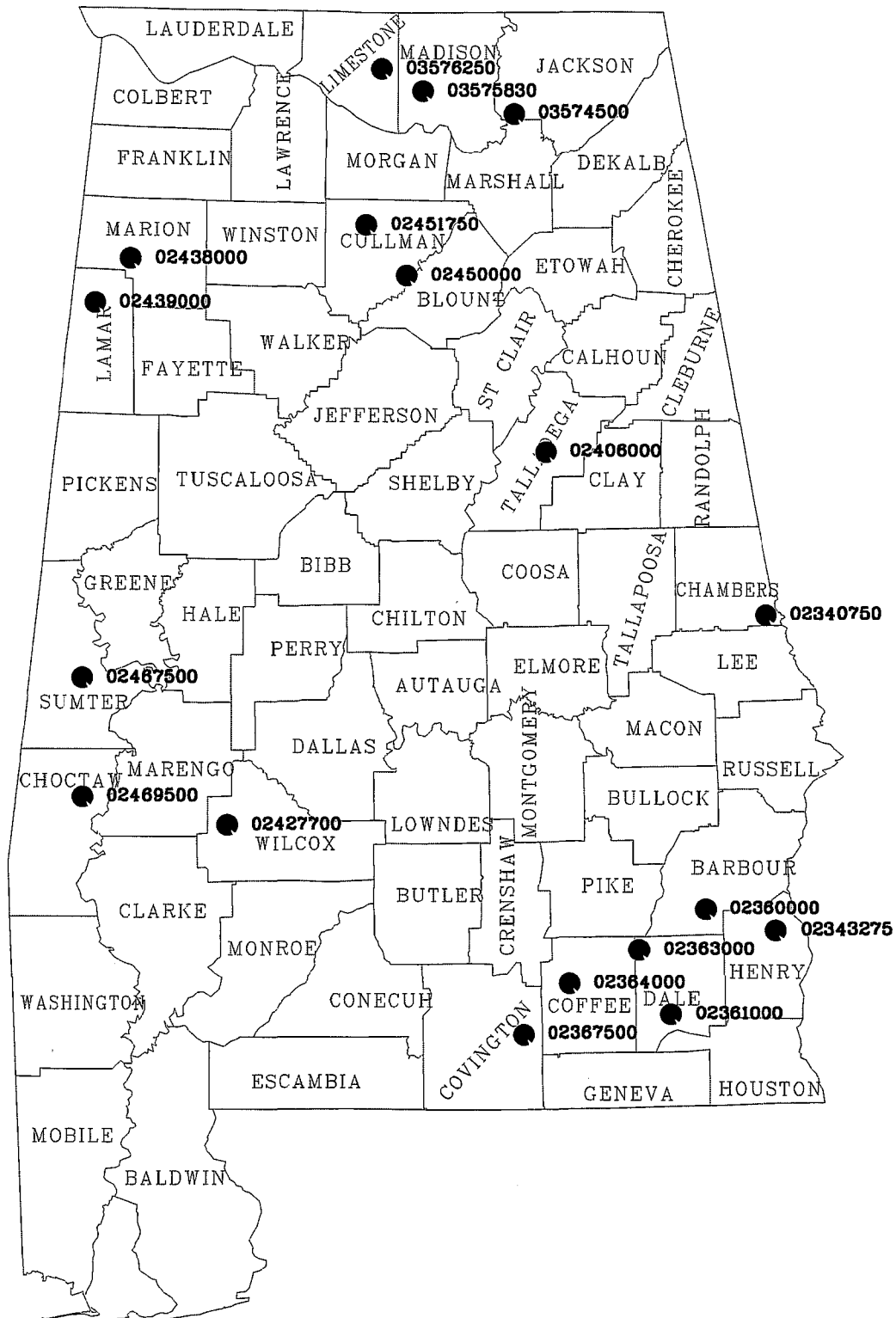


Figure 1. Locations of selected bridge sites in Alabama

III. AVAILABLE INFORMATION

The data base of the Alabama Bridge Information Management System (ABIMS) contains information about Alabama's bridges which includes profiles of the bridge structures, the original ground level and periodic sounding profiles, bridge foundation footing and piling types and elevations, and in some cases results of scour evaluation calculations performed using the scour formulas of HEC - 18. A typical ABIMS information sheet (reproduced from the corresponding MicroStation file provided by ALDOT) is shown in Figure 2.

Figure 2 shows the ABIMS information sheet for the Buttahatchee River bridge below Hamilton in Marion County, Alabama. The information sheet includes the bridge identification number (BIN) and the location of the bridge. The profile of the bridge is shown along with the depths and the types of the foundations of the bridge and the original ground level at the time of the construction of the bridge. Also included are the ground (bottom) levels determined from soundings obtained at various times after the construction of the bridge. Estimated scour depths, obtained by ALDOT engineers using the HEC - 18 formulas for sand-bed streams, for flood flows of recurrence intervals of 100 and 500 years are also indicated on the information sheet. The scour estimates include the depths of contraction scour (or, contractual scour, as denoted on the sheet), pier scour, and total scour, which is the sum of contraction scour and pier scour depths. Abutment scour estimates are not included.

ABIMS information sheets which are available for the bridges listed in Table 1 are presented in Appendix 1 in the order they appear in Table 1. There are 36 bridges (21 main bridges and 15 relief bridges) at 18 sites included in Table 1 and Appendix 1. Scour calculations, performed by ALDOT engineers, are available for four of these sites; namely, Buttahatchee River below Hamilton in Marion County, Buttahatchee River near Sulligent in

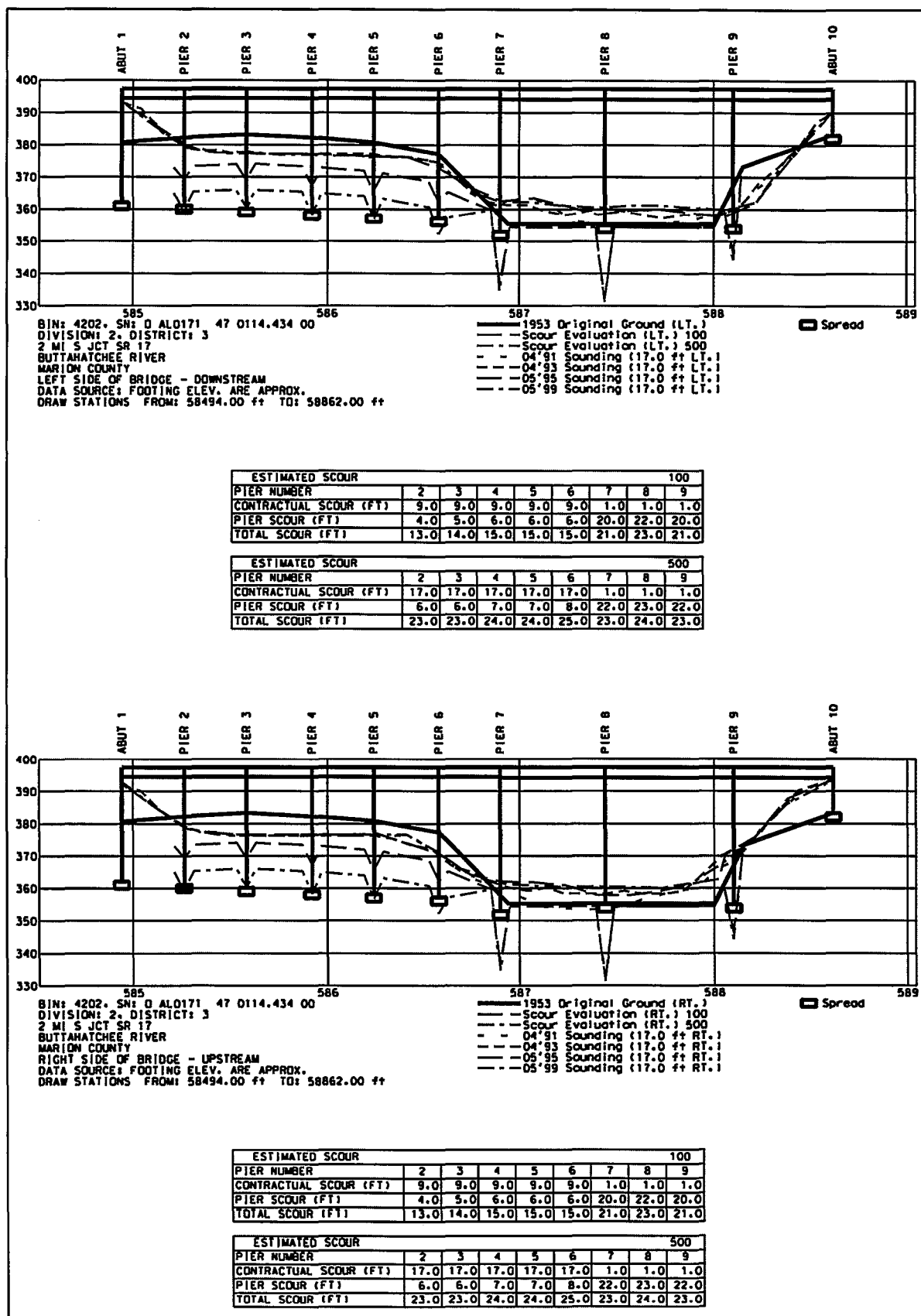


Figure 2. ABIMS information sheet for the Buttahatchee River bridge below Hamilton in Marion County (BIN:4202, Gage Station:2438000)

Lamar County, Abbie Creek near Abbeville in Henry County, and Limestone Creek near Athens in Limestone County. The ABIMS information sheets for the main bridges at two of these sites, namely the Buttahatchee River in Lamar County (BIN:2561) and the Limestone Creek in Limestone County (BIN:463), are reproduced in Figures 3 and 4 for easy reference.

More detailed information is available at ALDOT for each bridge, which includes the design and construction drawings, site plans, soil borings, periodic bridge inspection reports as well as hydrologic data for each site including stream discharge and cross section information from USGS. This information may be used in an investigation of the scour performance of these bridges.

A striking example of the kind of information available from ALDOT and USGS is presented in Figure 5. This figure shows a profile of the Buttahatchee River bridge in Marion County (BIN: 4202) together with information on the foundation materials based on soil borings. The soil borings information has been obtained from ALDOT's bridge folder for this bridge. The figure also shows the 1953 original ground level and the 05/99 sounding profiles, both reproduced from the ABIMS information sheet for this bridge (see Figure 2), as well as the 03/73 sounding profile obtained by USGS personnel during the 500-year flood event which occurred in March 1973. This USGS sounding is particularly significant since actual soundings during such large flood events are quite rare. It should be noted also that this sounding profile has been prepared from the raw depth data provided by USGS and is presented for the first time in this report.

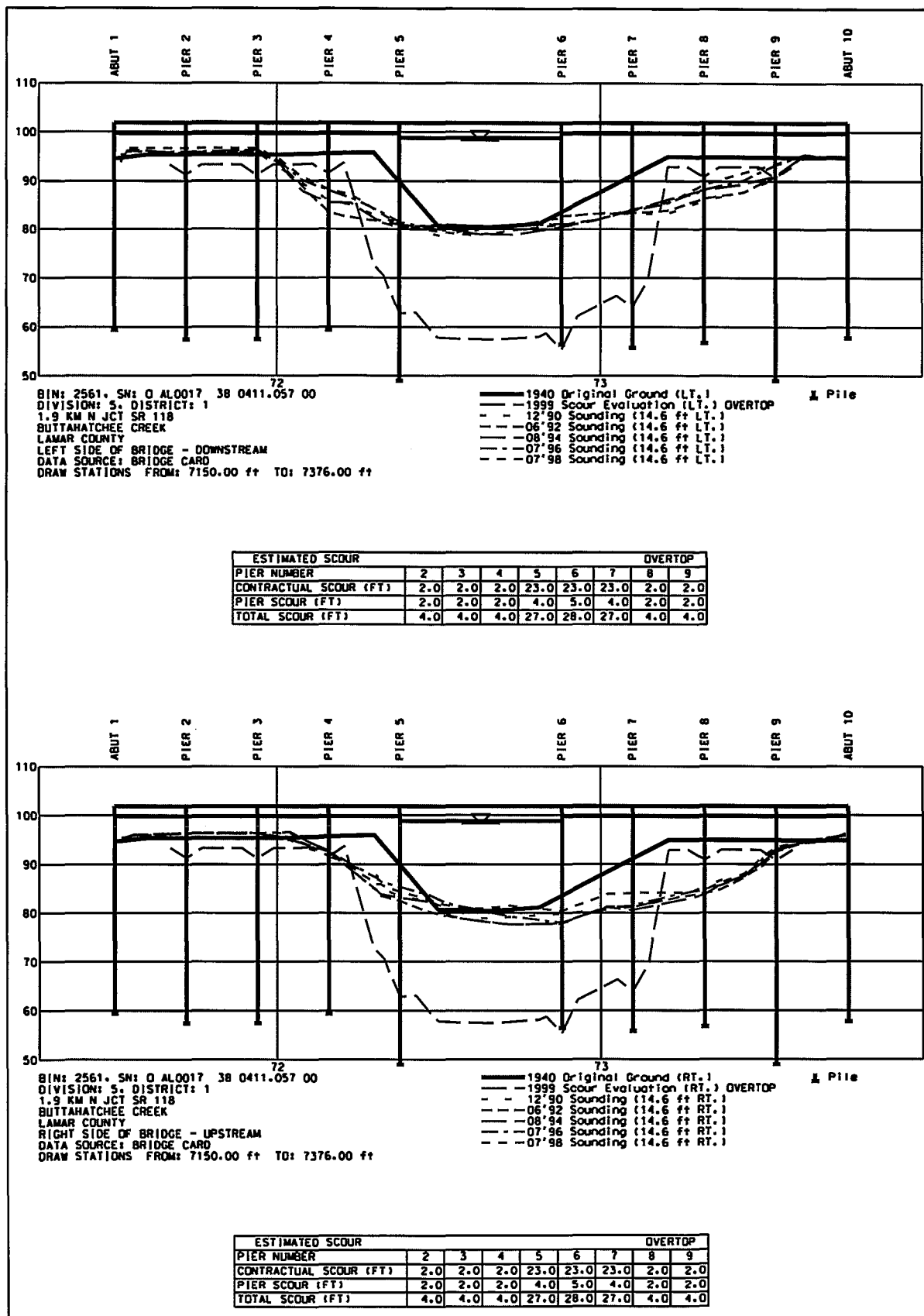


Figure 3. ABIMS information sheet for the Buttahatchee River bridge near Sulligent in Lamar County (BIN:2561, Gage Station:2439000)

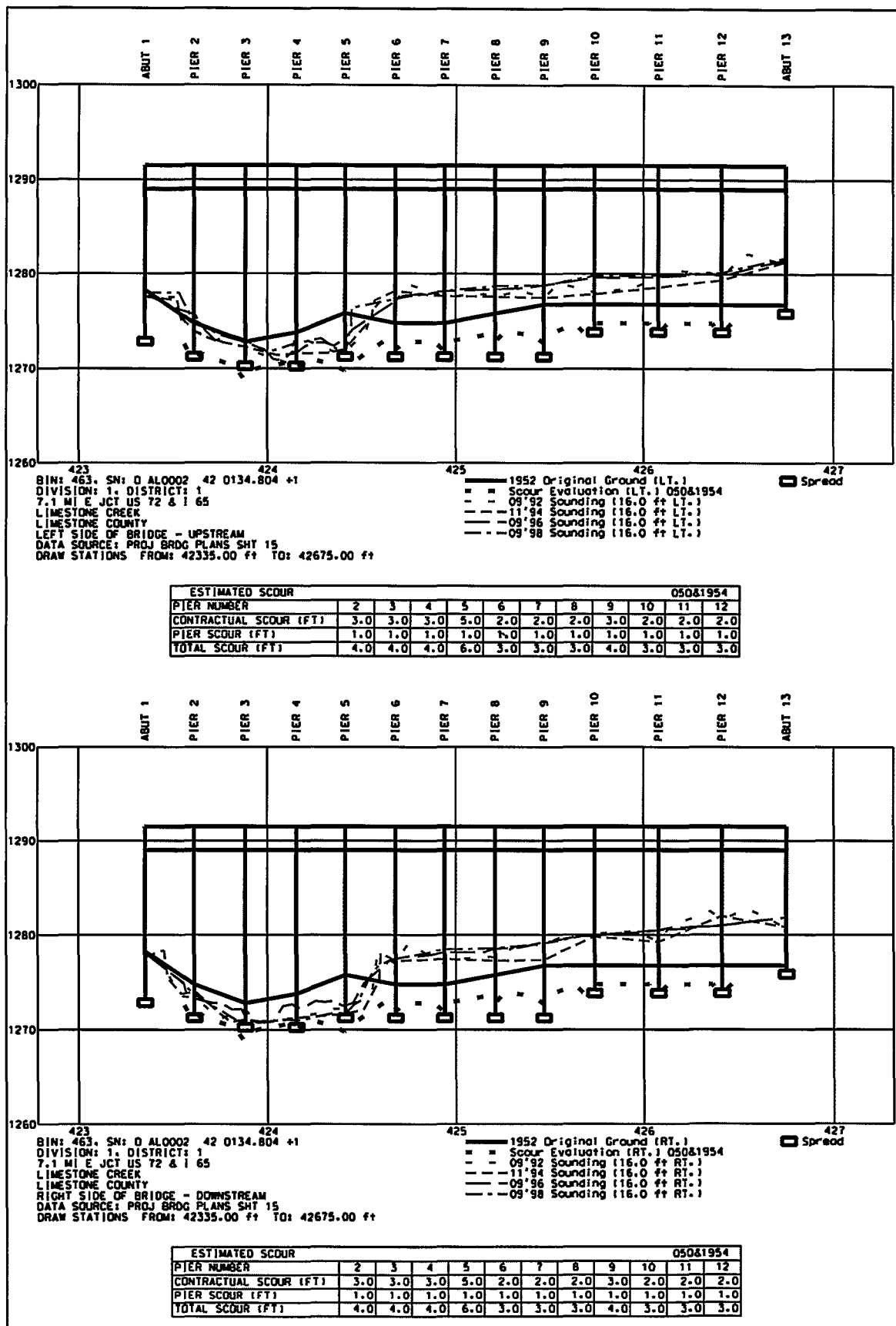


Figure 4. ABIMS information sheet for the Limestone Creek bridge near Athens in Limestone County (BIN:463, Gage Station:3576250)

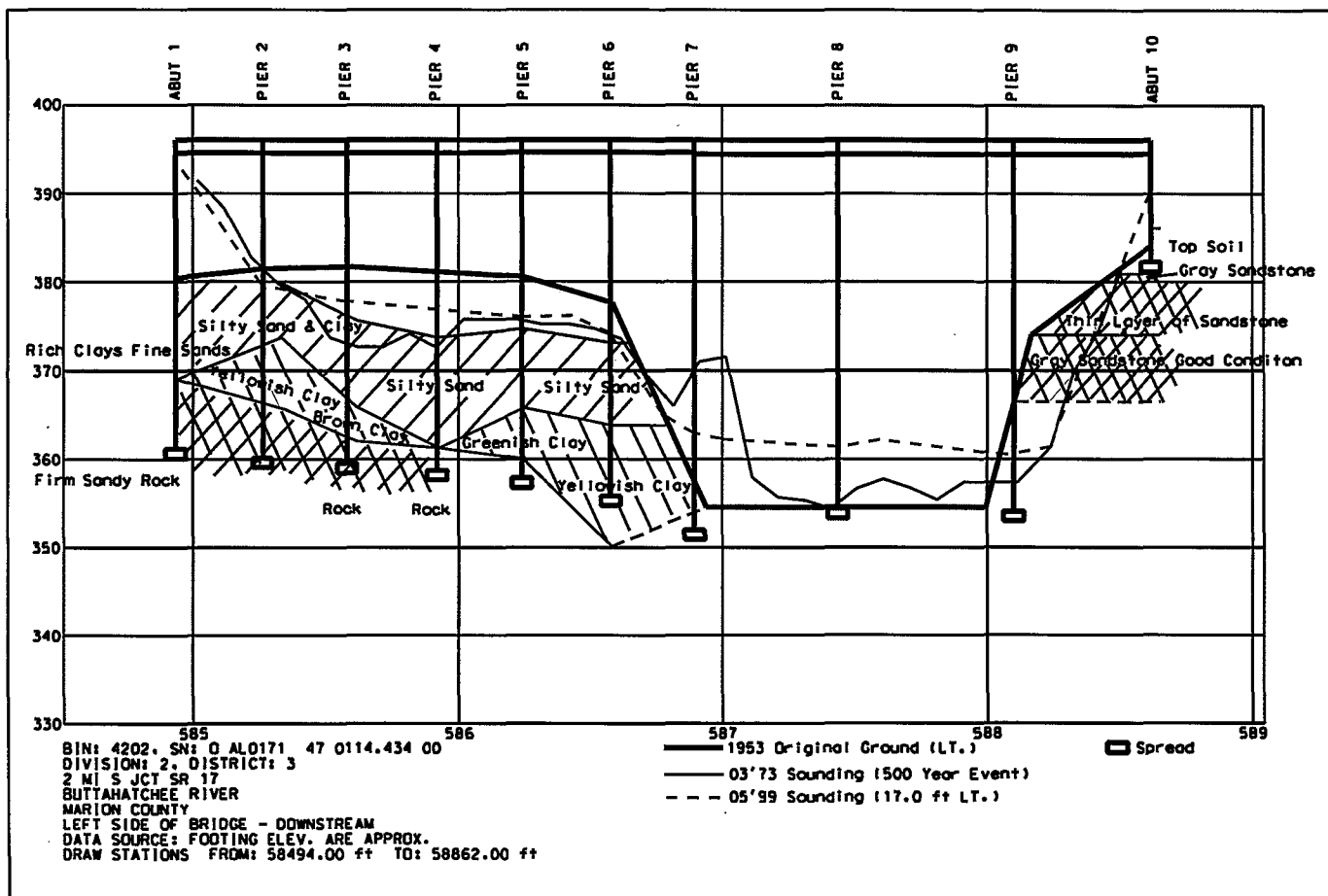


Figure 5. Buttahatchee River bridge (BIN:4202) foundation information and sounding profiles

For comparison purposes, some of the information available for the Buttahatchee River bridge (BIN:4202), presented previously in Figures 2 and 5, is reproduced in Figure 6. This figure shows the scour evaluations performed by ALDOT engineers for this bridge together with the actual depth soundings, including the 500-year-flood event sounding, for this site. It is significant that the excessive scour predicted by the calculations did not occur at this site even under the severe conditions of the actual 500-year flood event. We suspect that the main reason why the scour formulas predict excessive scour in this case is because the scour calculations are based on the assumption of a noncohesive sandy foundation whereas the soil borings indicate layers of silty sand and clay at the site (see Figure 5) which may be cohesive and hence more resistant to scour. The reasons, however, are not entirely clear and more work would be needed for a definitive conclusion.

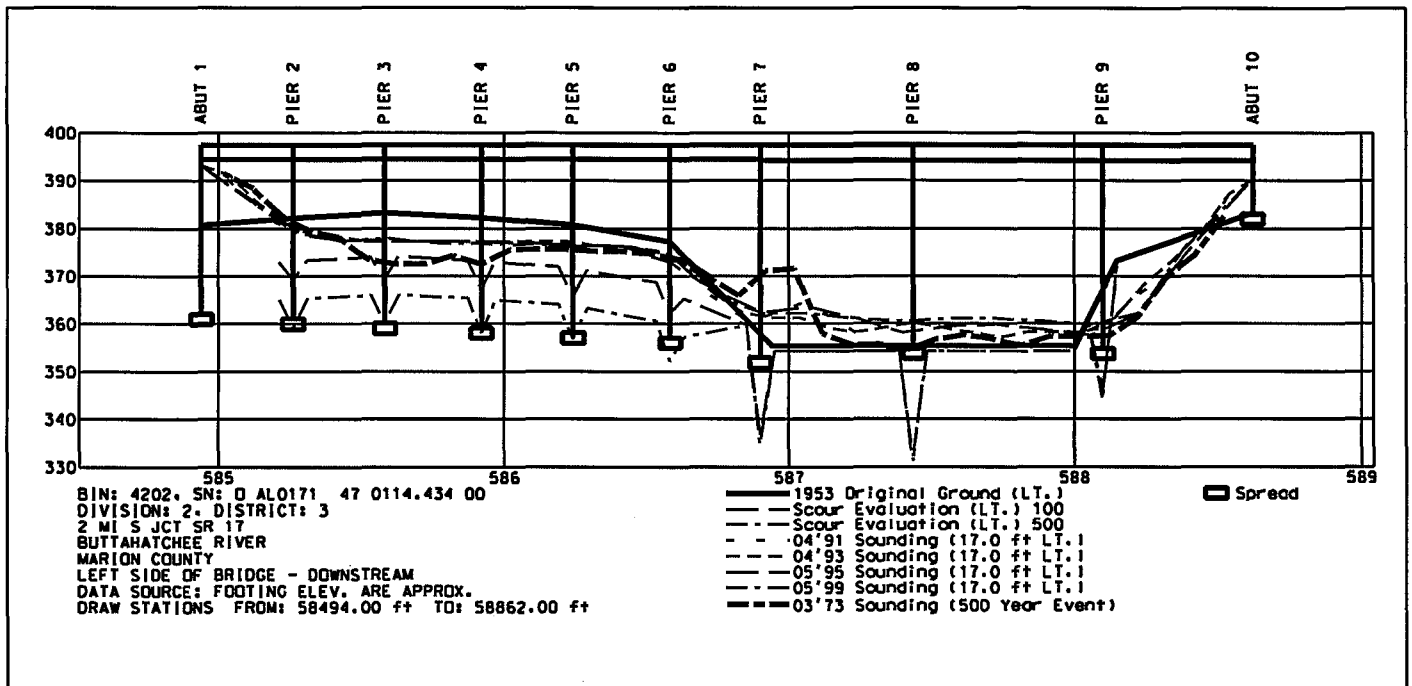


Figure 6. Buttahatchee River bridge (BIN:4202) scour evaluations and sounding profiles

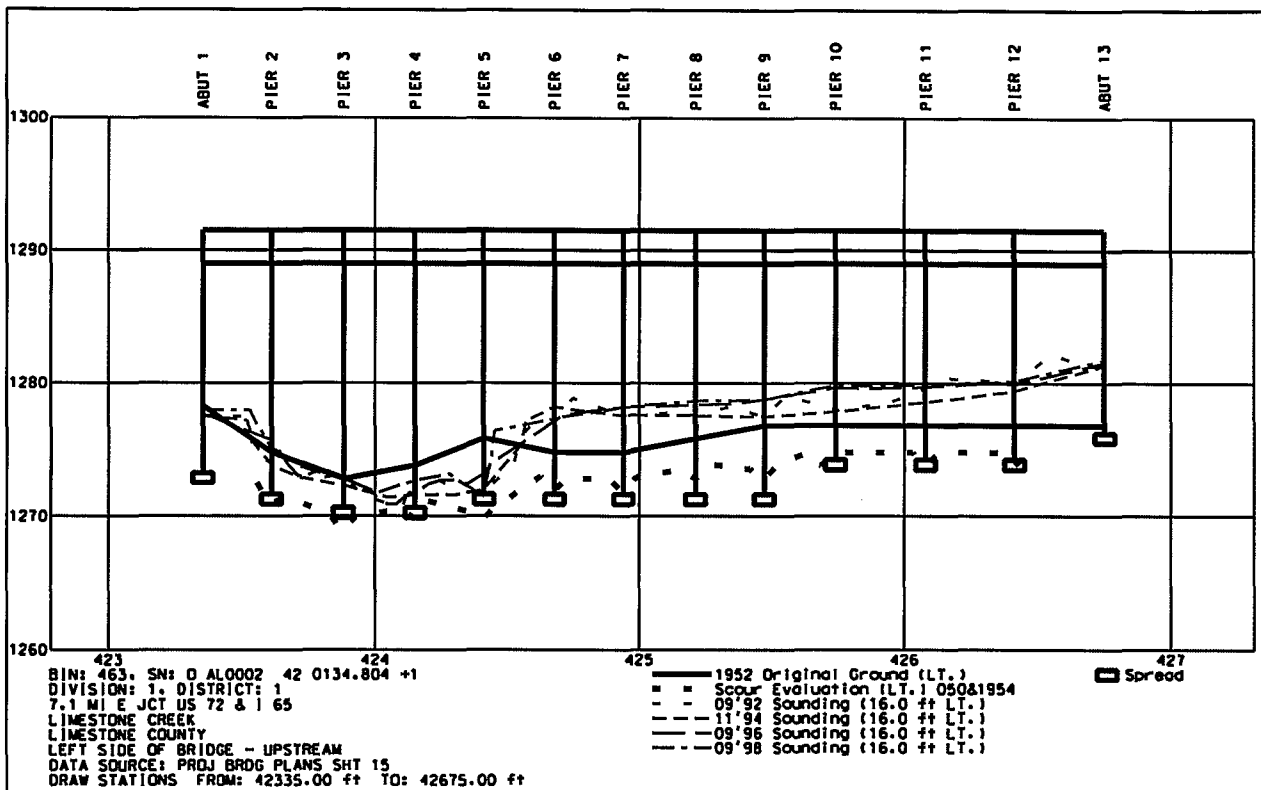
IV. CONCLUDING REMARKS

The information available from ALDOT and USGS should allow a comparative study of the calculated scour depths based on the HEC - 18 formulas and the actual pier foundation depths or the sounding depths. The bridges identified in this report are particularly suitable for such a study since they all have experienced flood events with recurrence intervals of 100 years or larger and six of these bridges have experienced a 500-year flood. A detailed study which may include detailed two-dimensional hydraulic calculations for some of the bridge sites performed with an advanced numerical model, as well as the development of a new approach for predicting scour for cohesive foundation materials may improve our understanding of bridge scour and eventually lead to better design procedures.

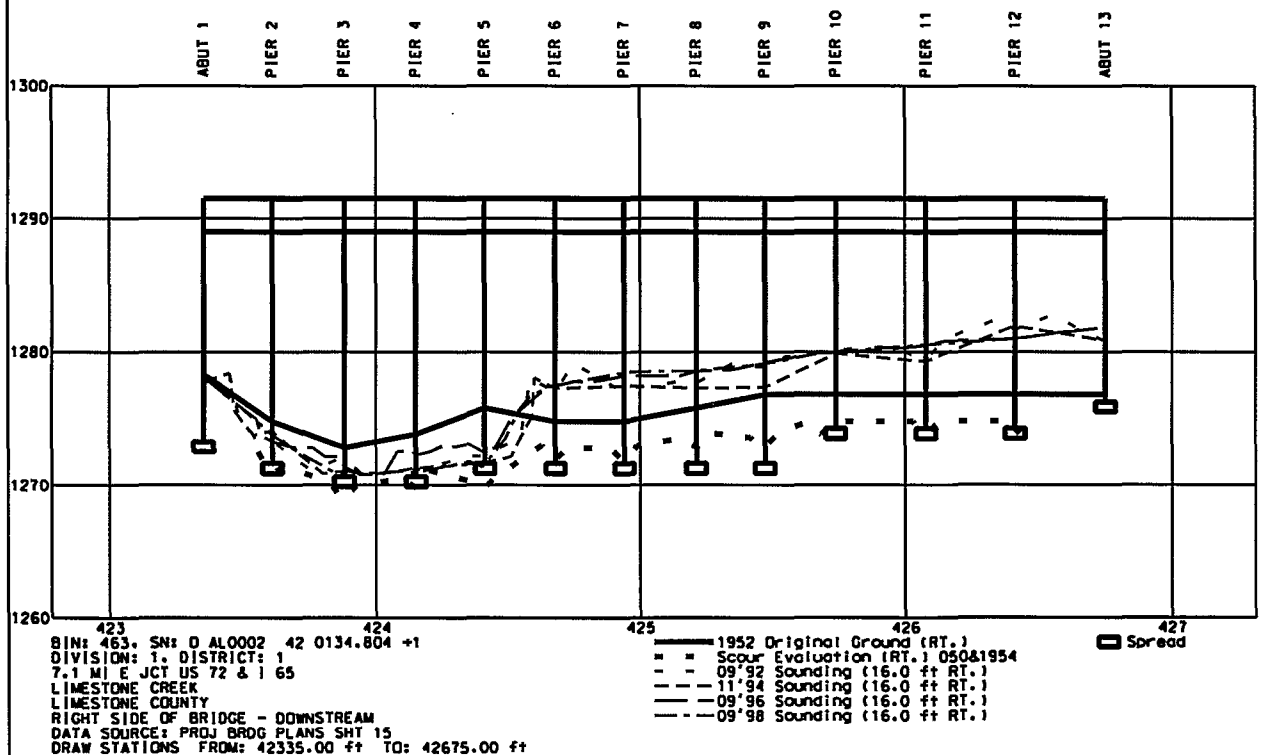
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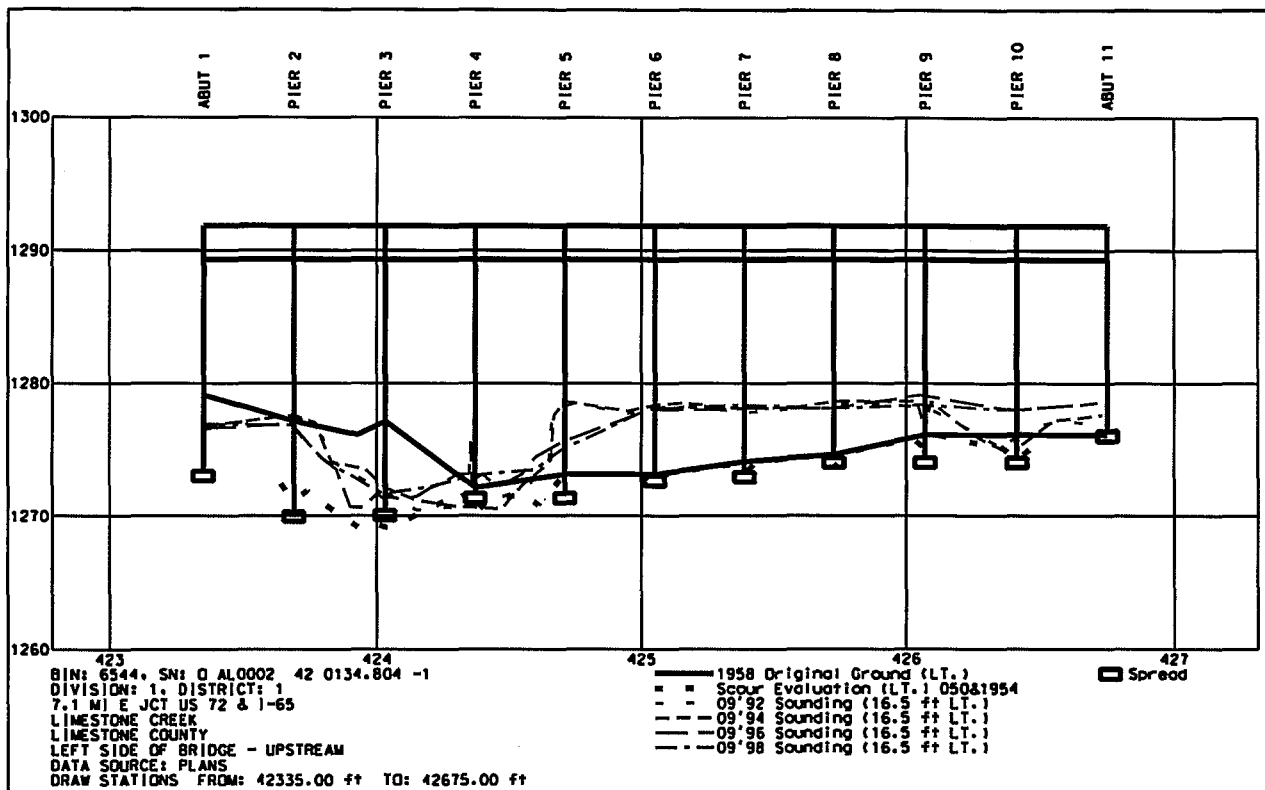
APPENDIX
BRIDGE INFORMATION SHEETS



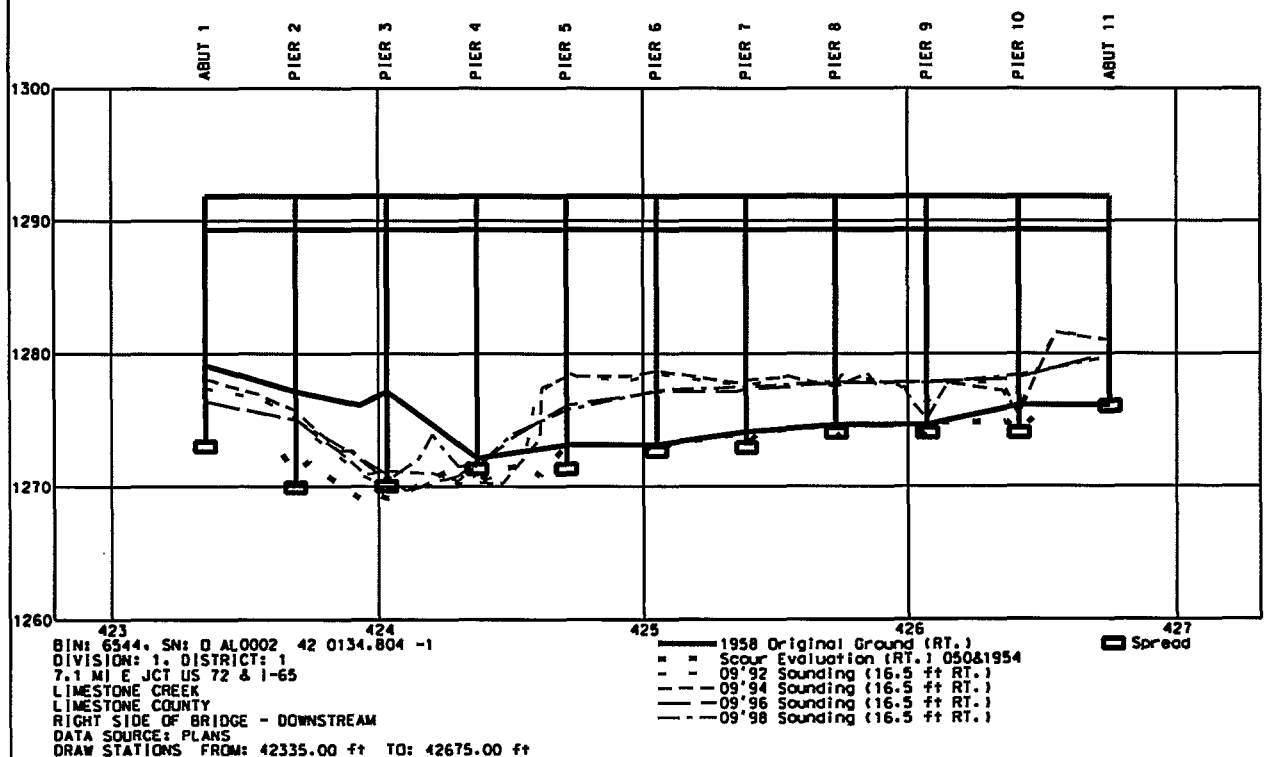
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PIER SCOUR (FT)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	
TOTAL SCOUR (FT)	4.0	4.0	4.0	6.0	3.0	3.0	3.0	4.0	3.0	3.0	3.0	



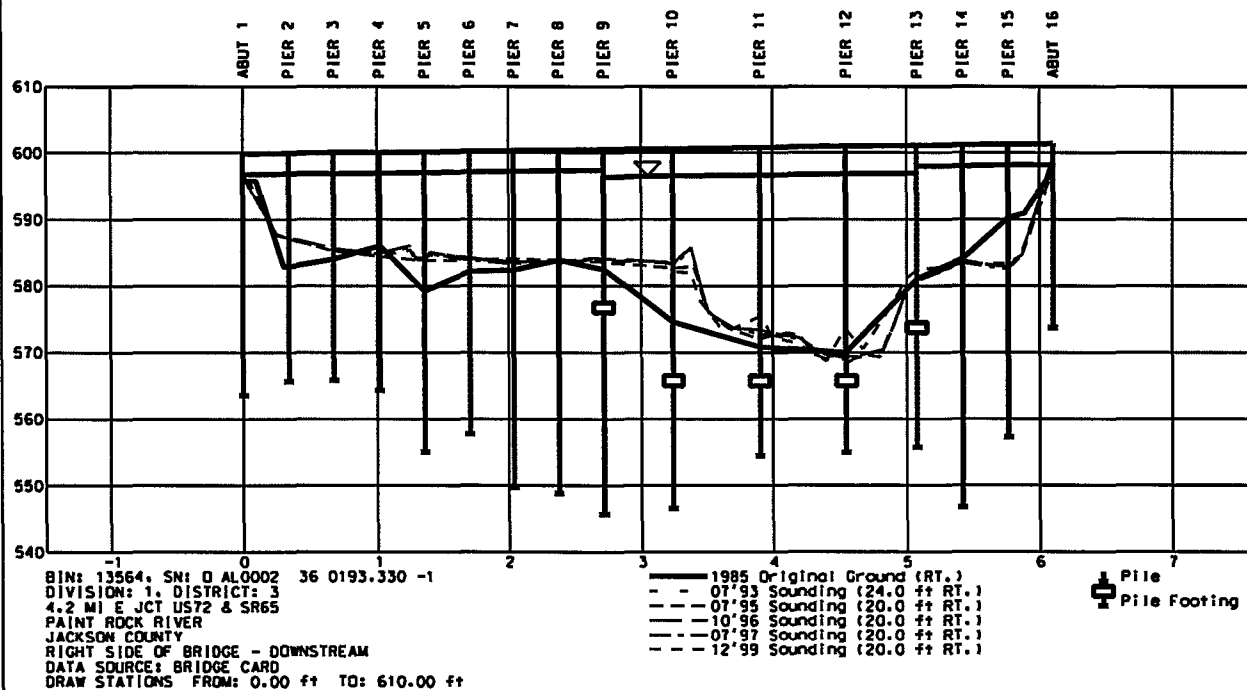
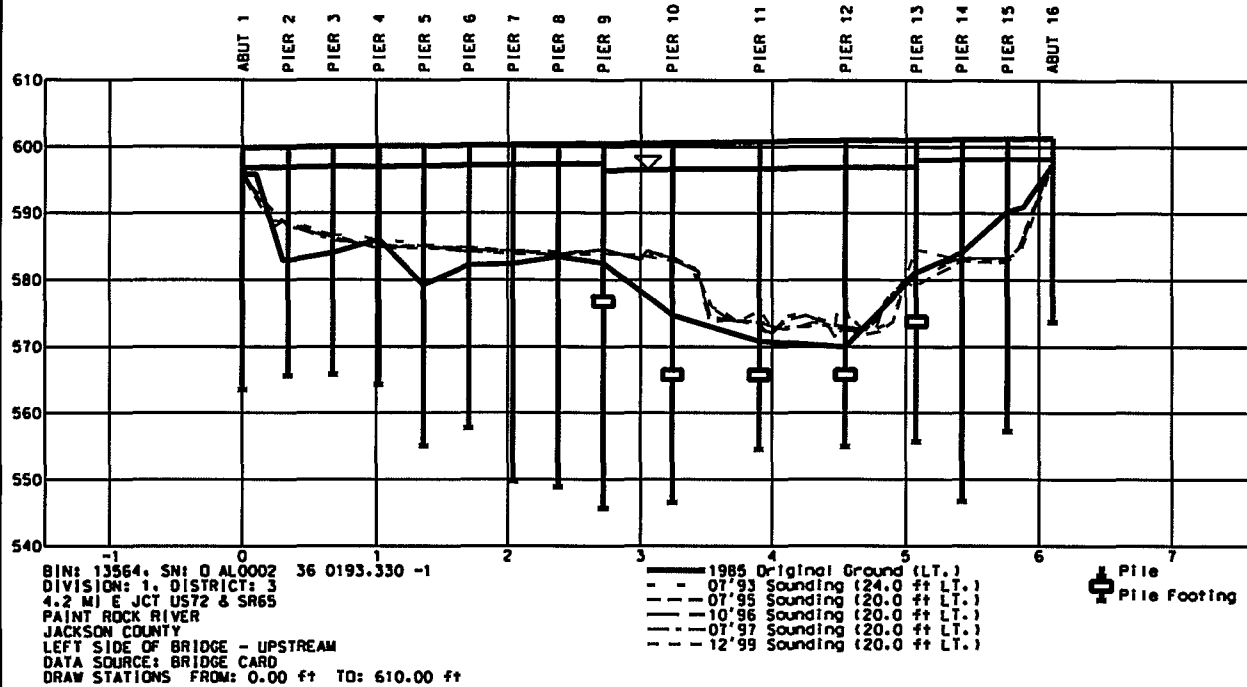
ESTIMATED SCOUR											050&1954	
PIER NUMBER	2	3	4	5	6	7	8	9	10	11	12	
CONTRACTUAL SCOUR (FT)	3.0	3.0	3.0	5.0	2.0	2.0	2.0	3.0	2.0	2.0	2.0	
PIER SCOUR (FT)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	
TOTAL SCOUR (FT)	4.0	4.0	4.0	6.0	3.0	3.0	3.0	4.0	3.0	3.0	3.0	

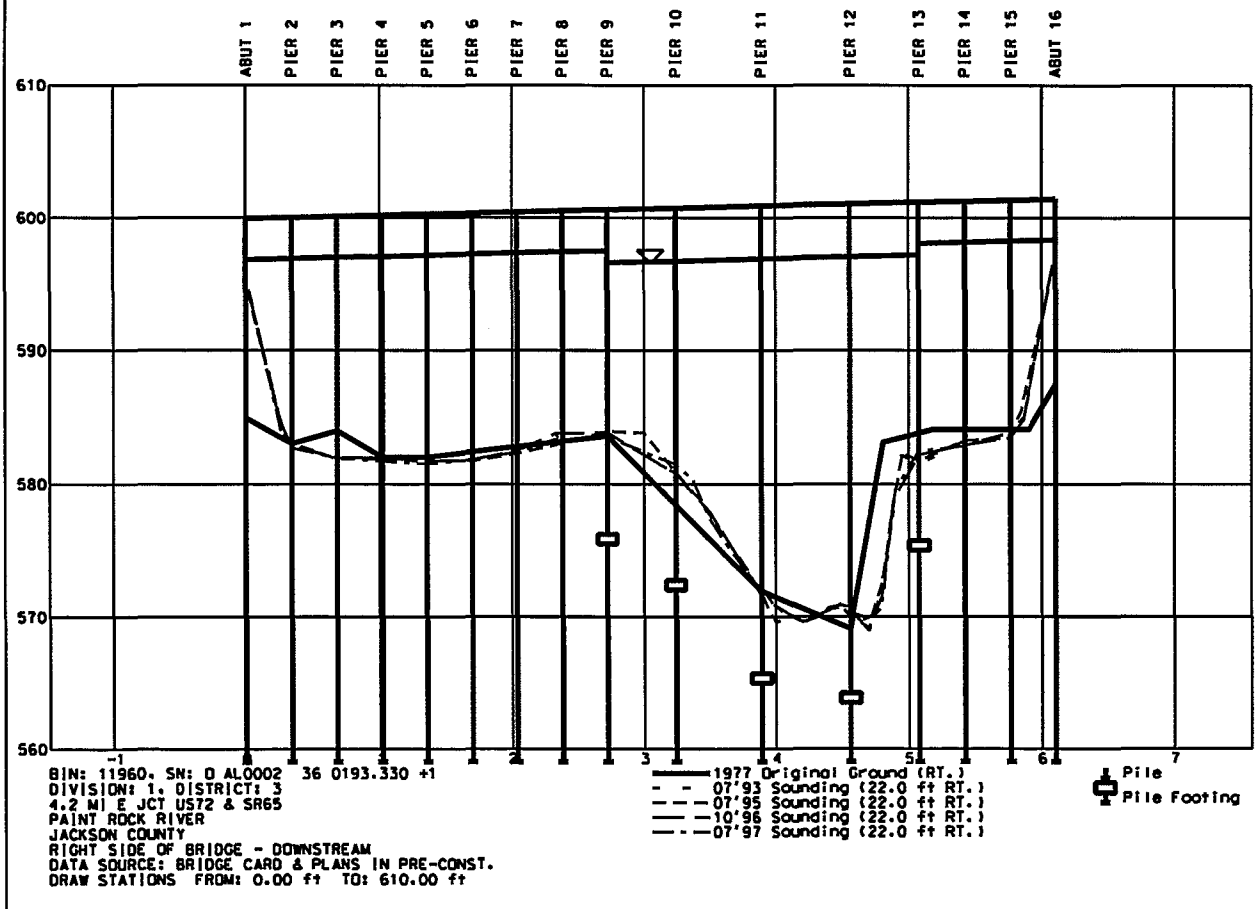
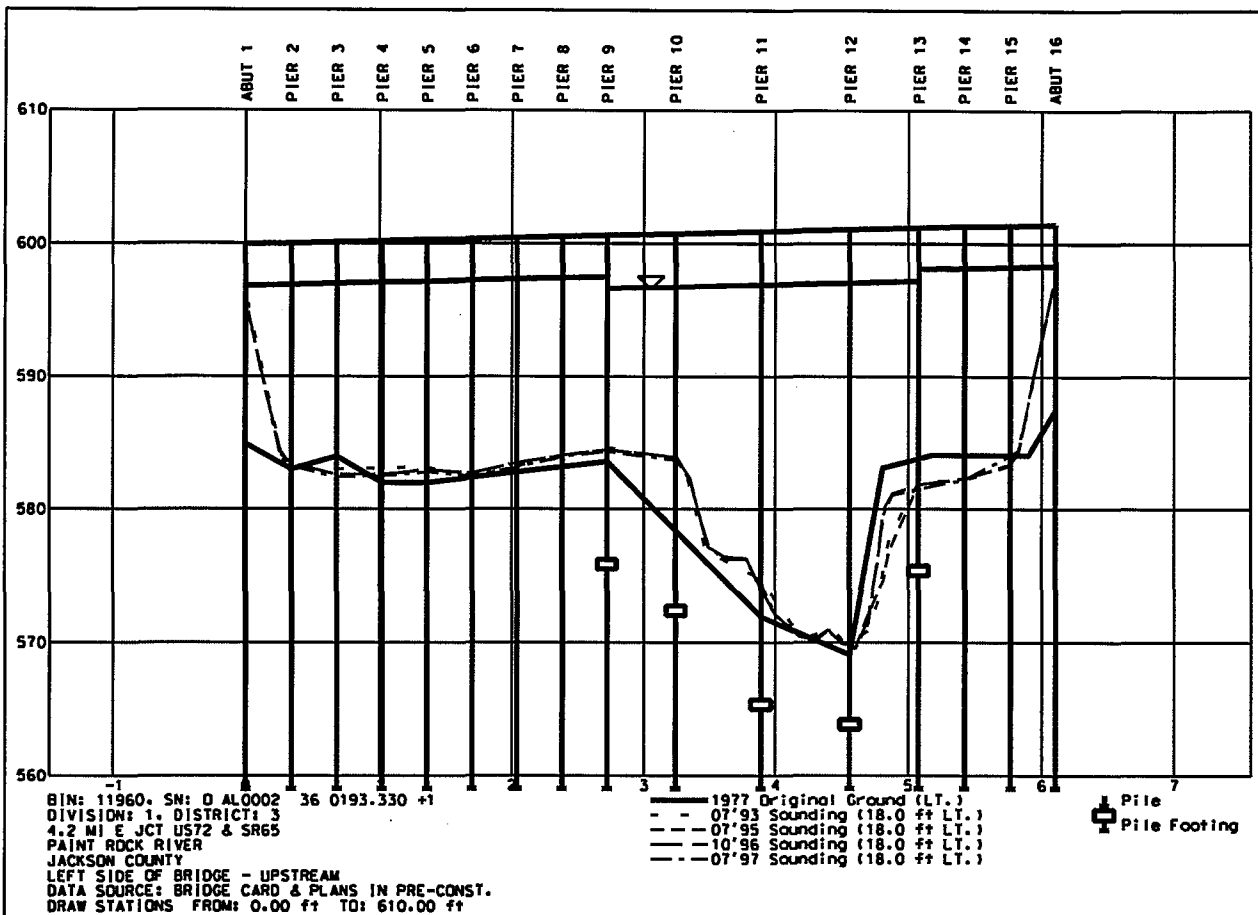


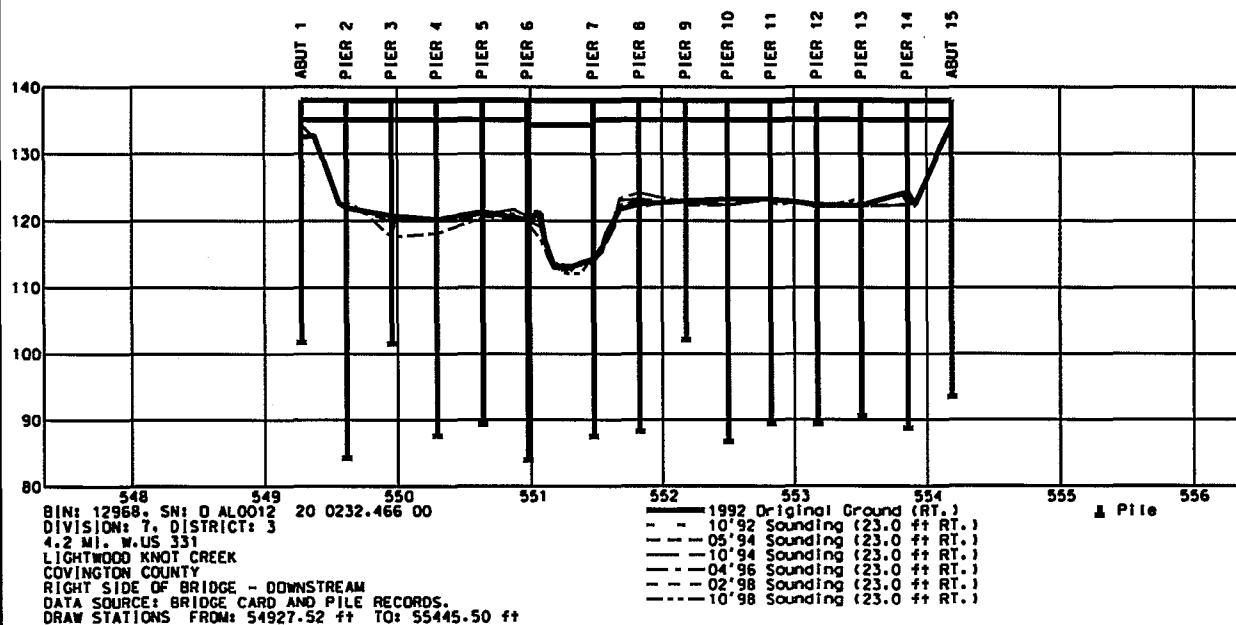
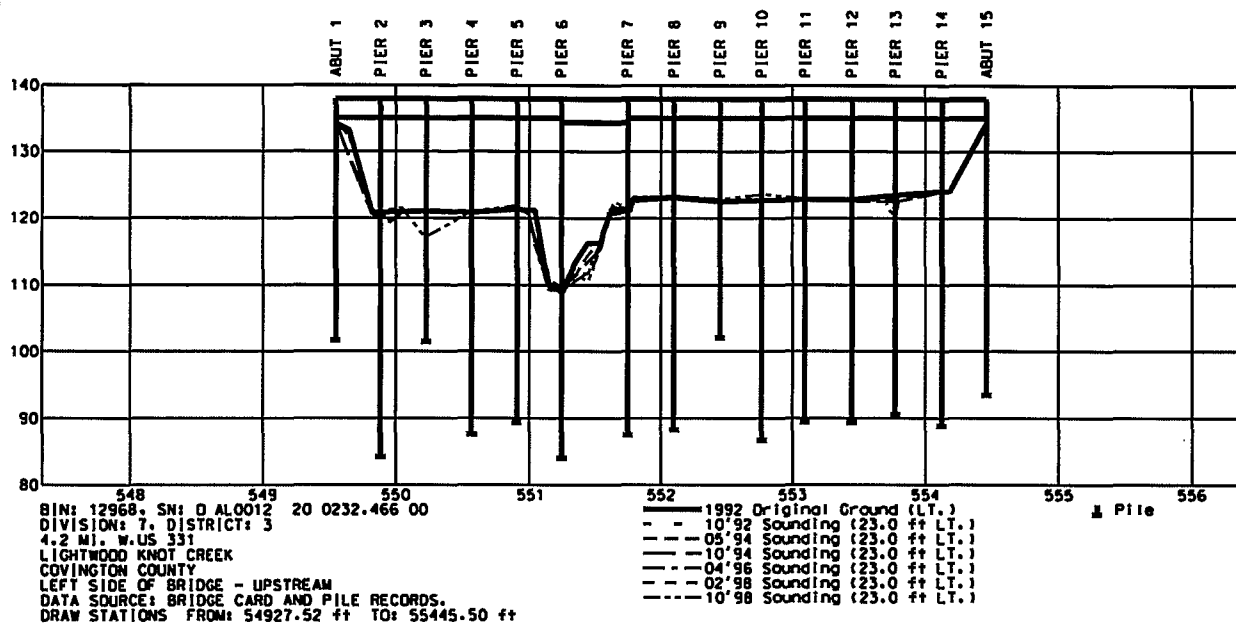
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PIER SCOUR (FT)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	
TOTAL SCOUR (FT)	6.0	8.0	2.0	2.0	1.0	1.0	1.0	1.0	2.0	

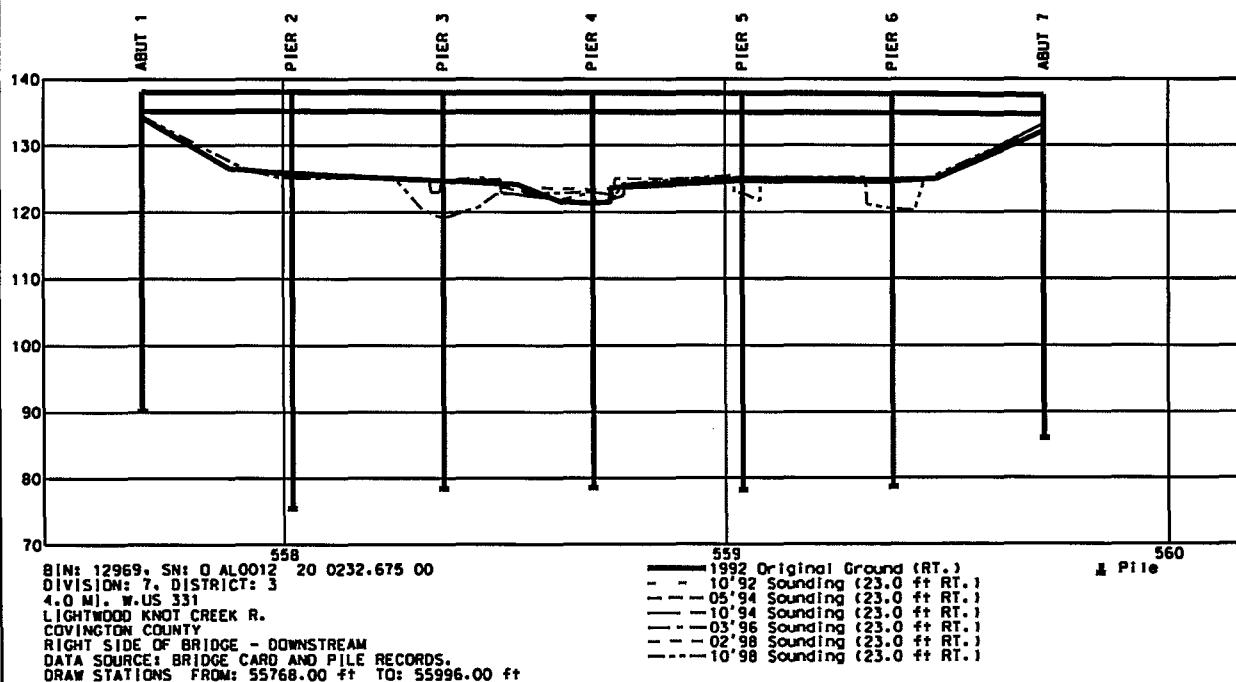
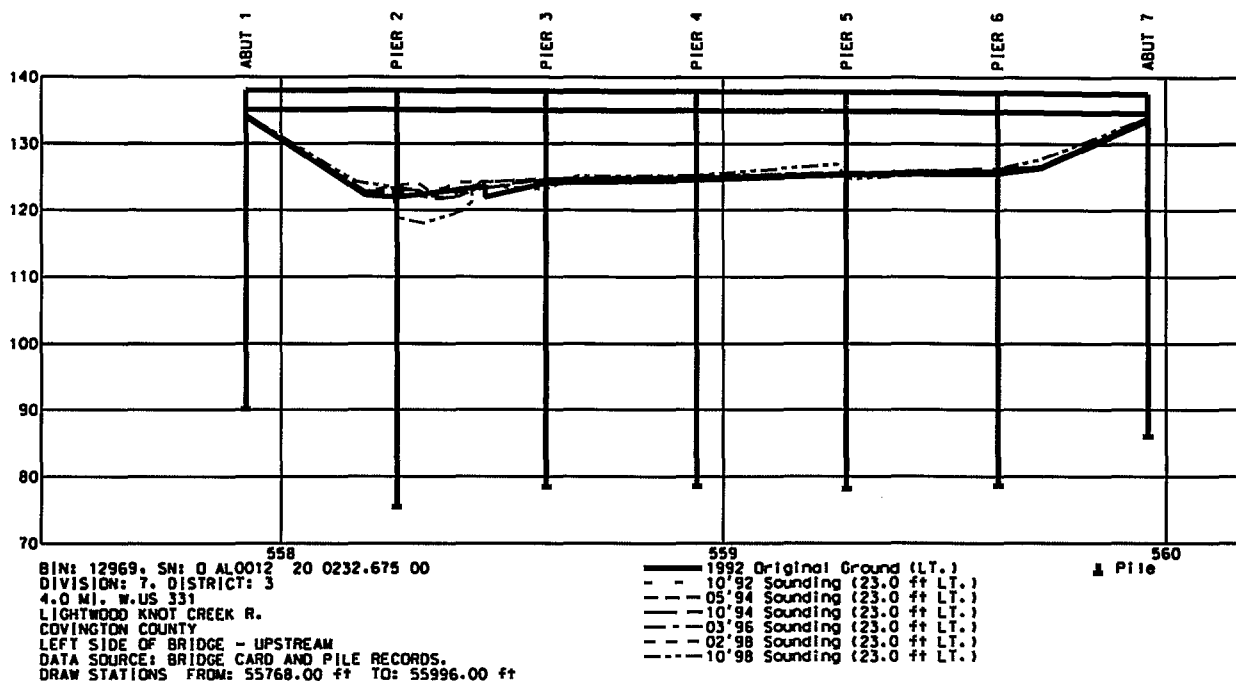


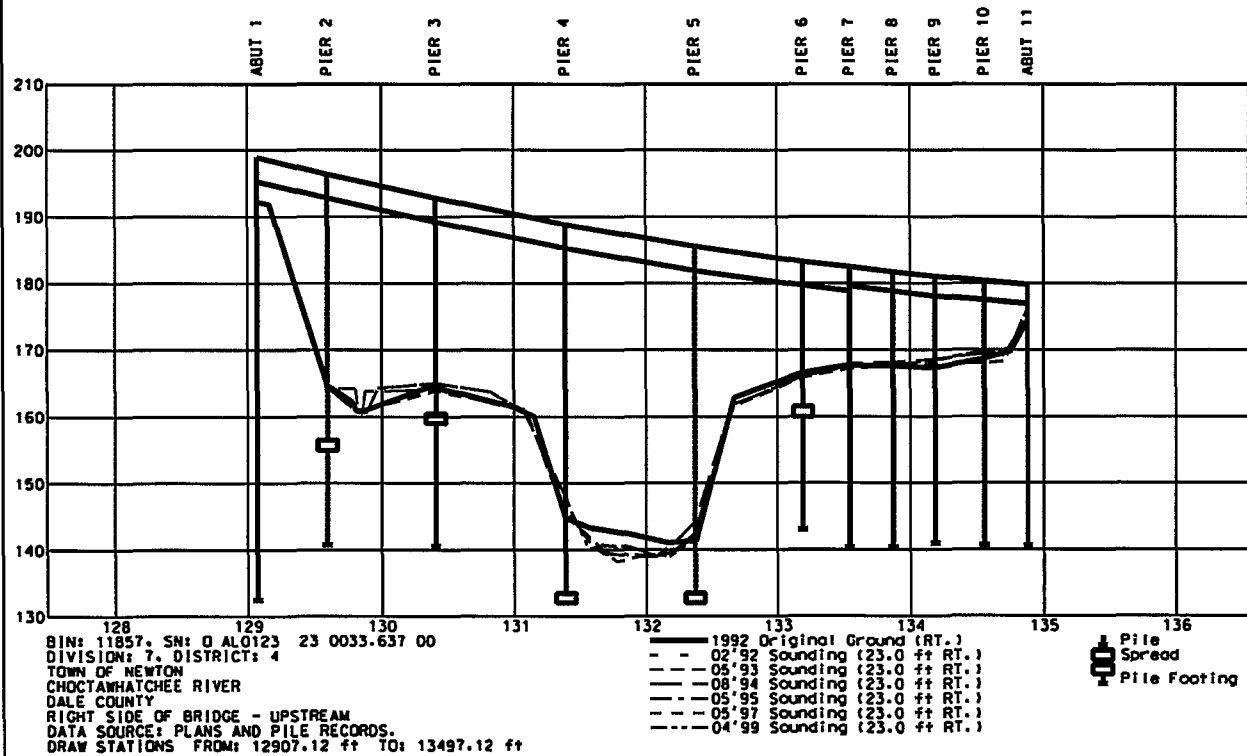
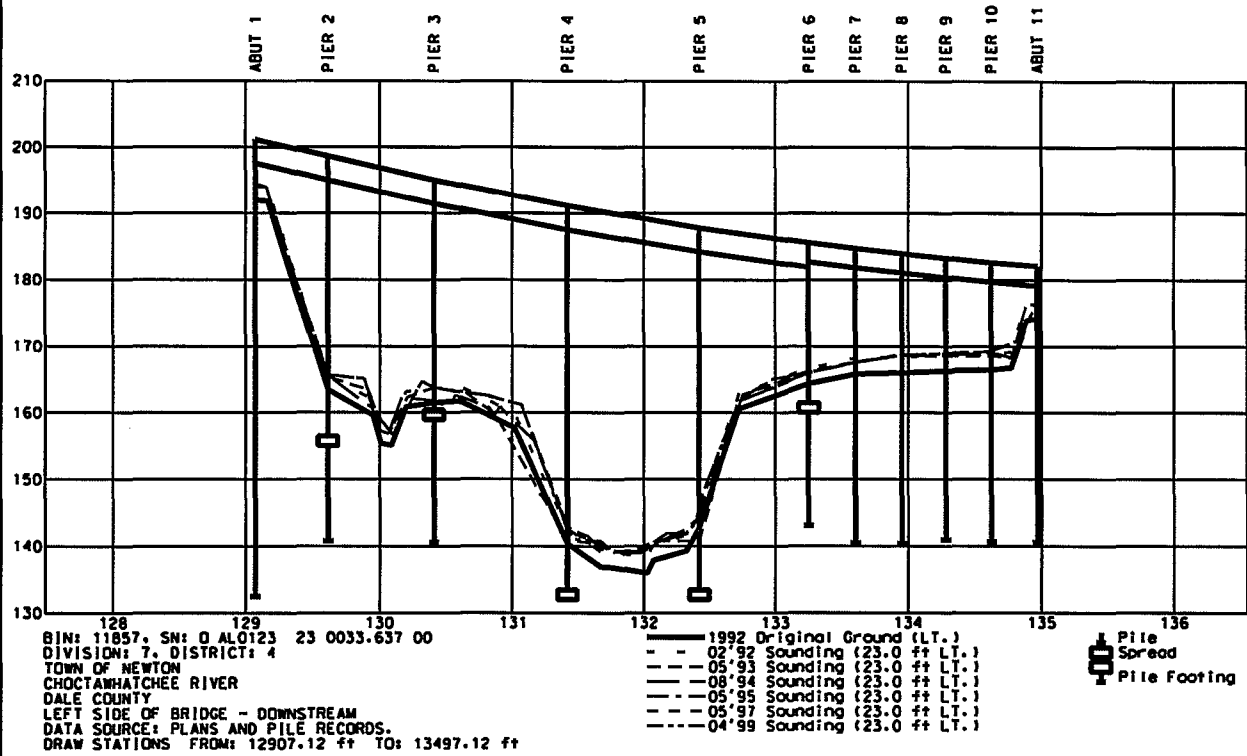
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PIER SCOUR (FT)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	
TOTAL SCOUR (FT)	6.0	8.0	2.0	2.0	1.0	1.0	1.0	1.0	2.0	

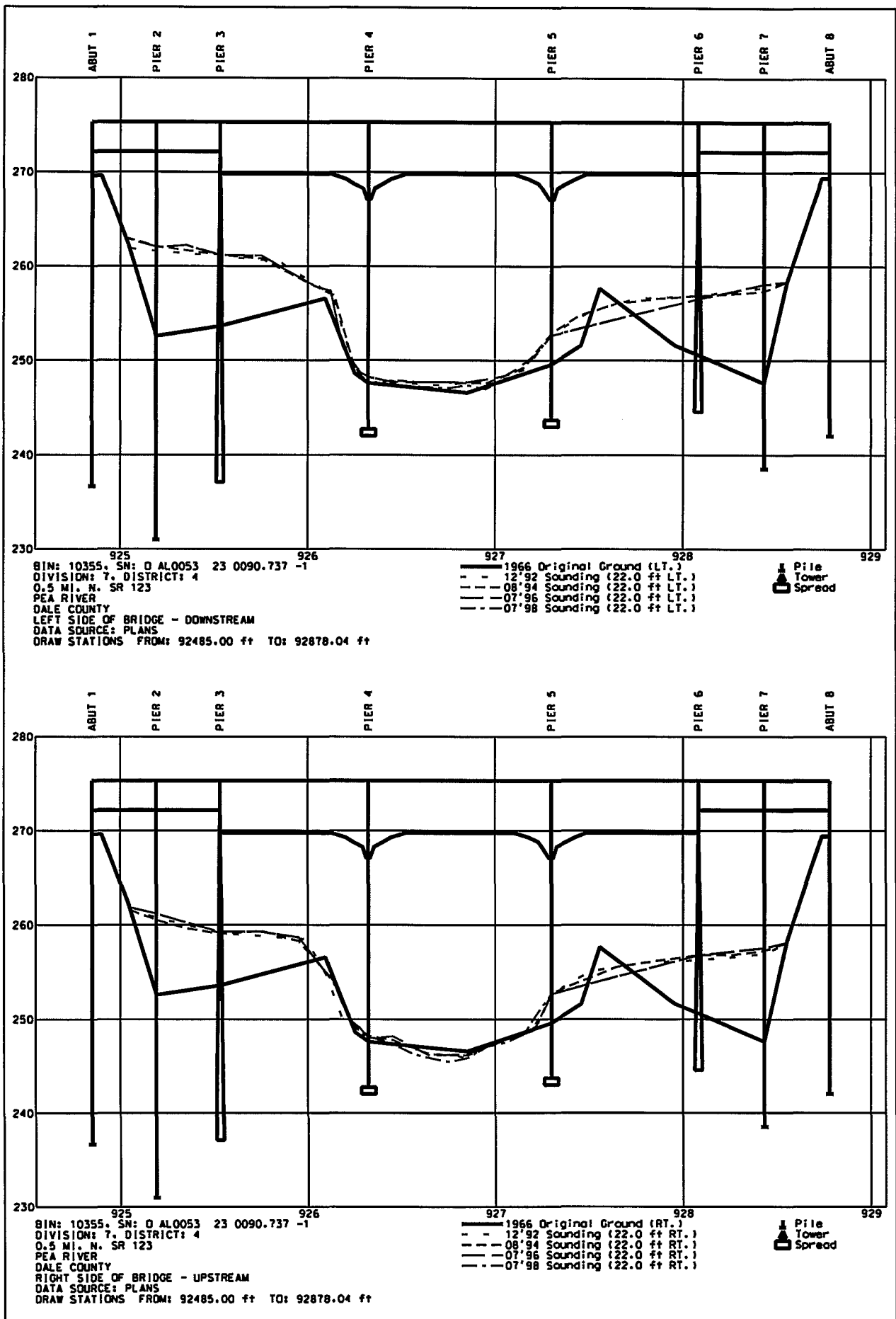


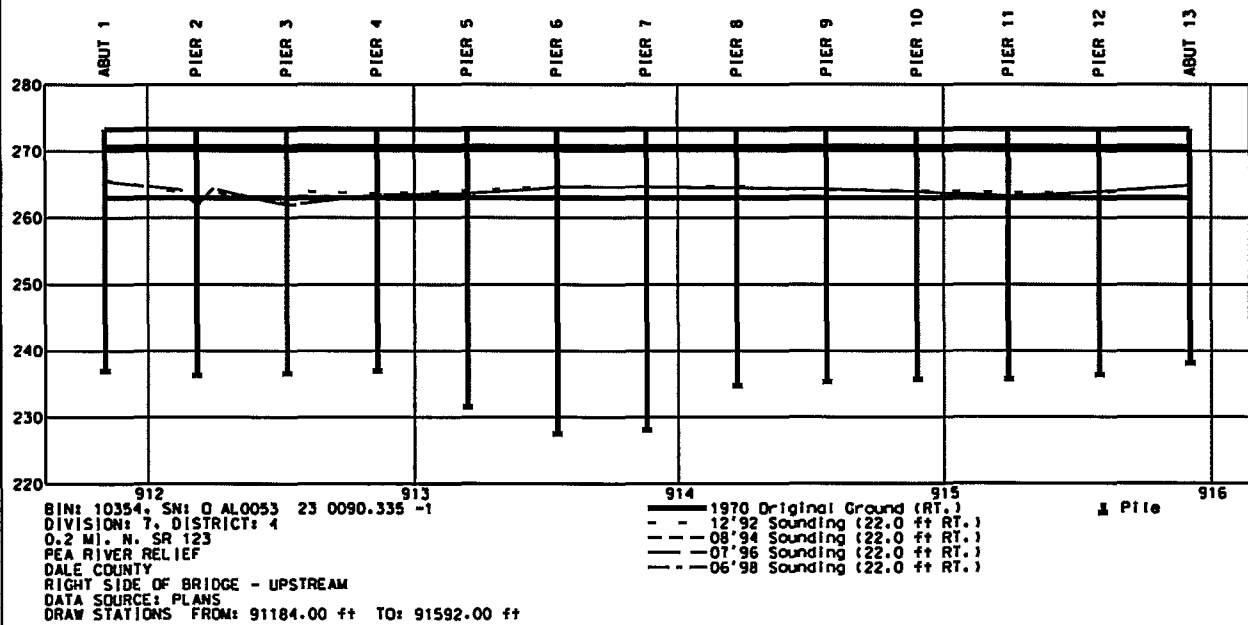
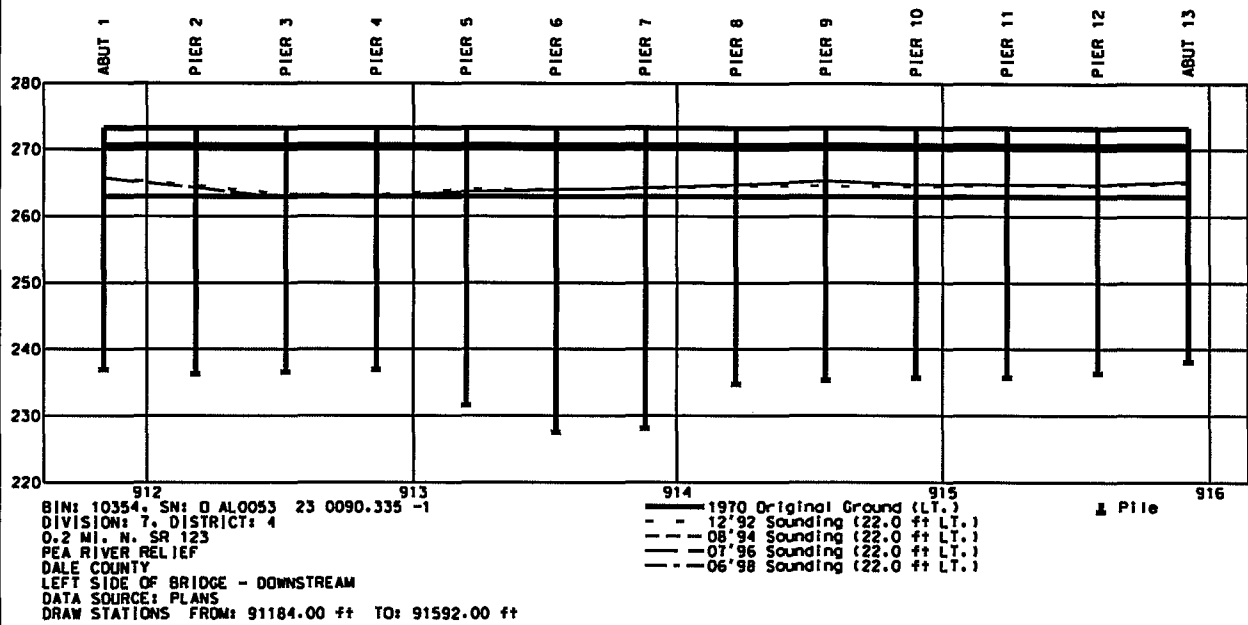


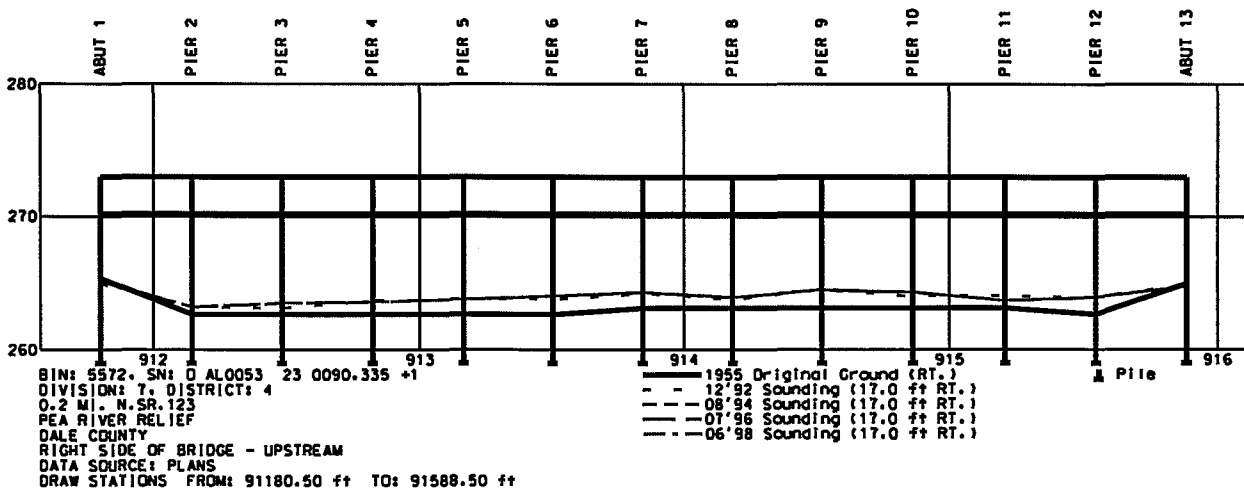
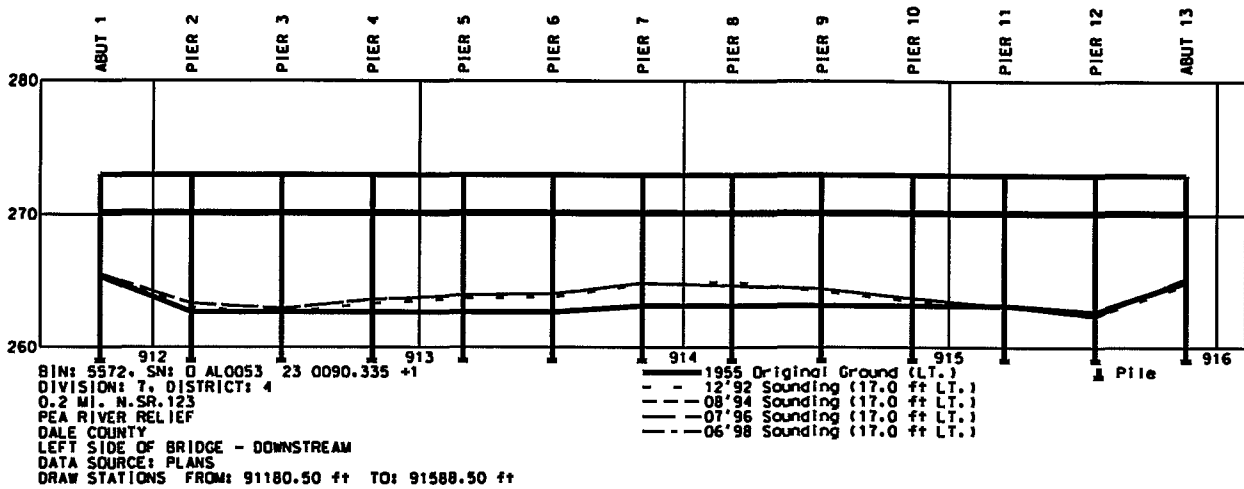


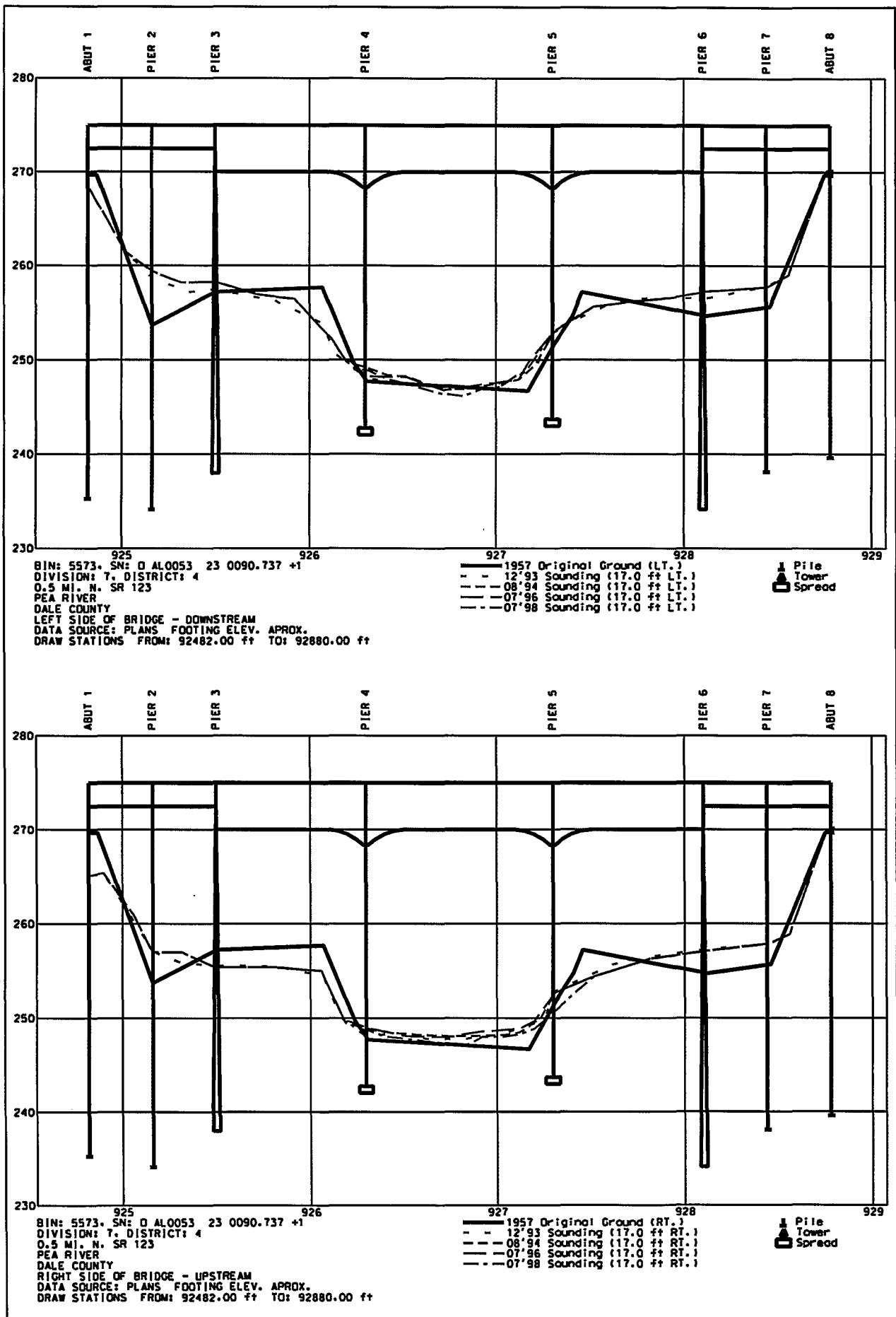


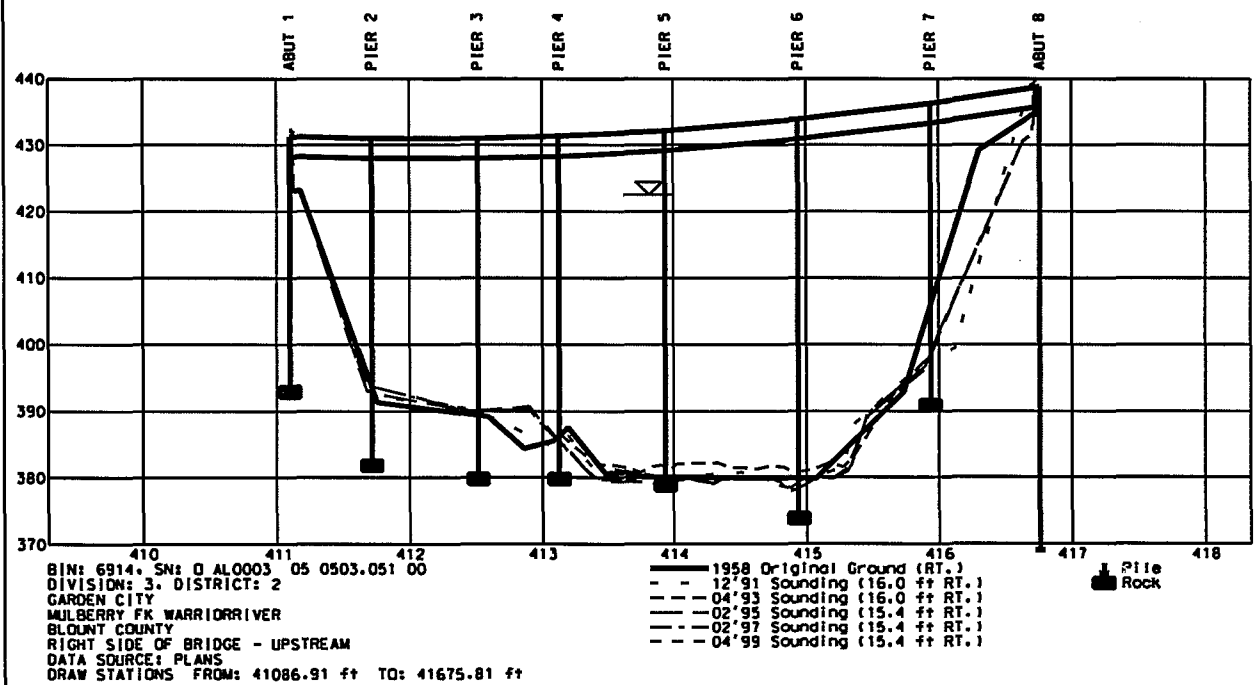
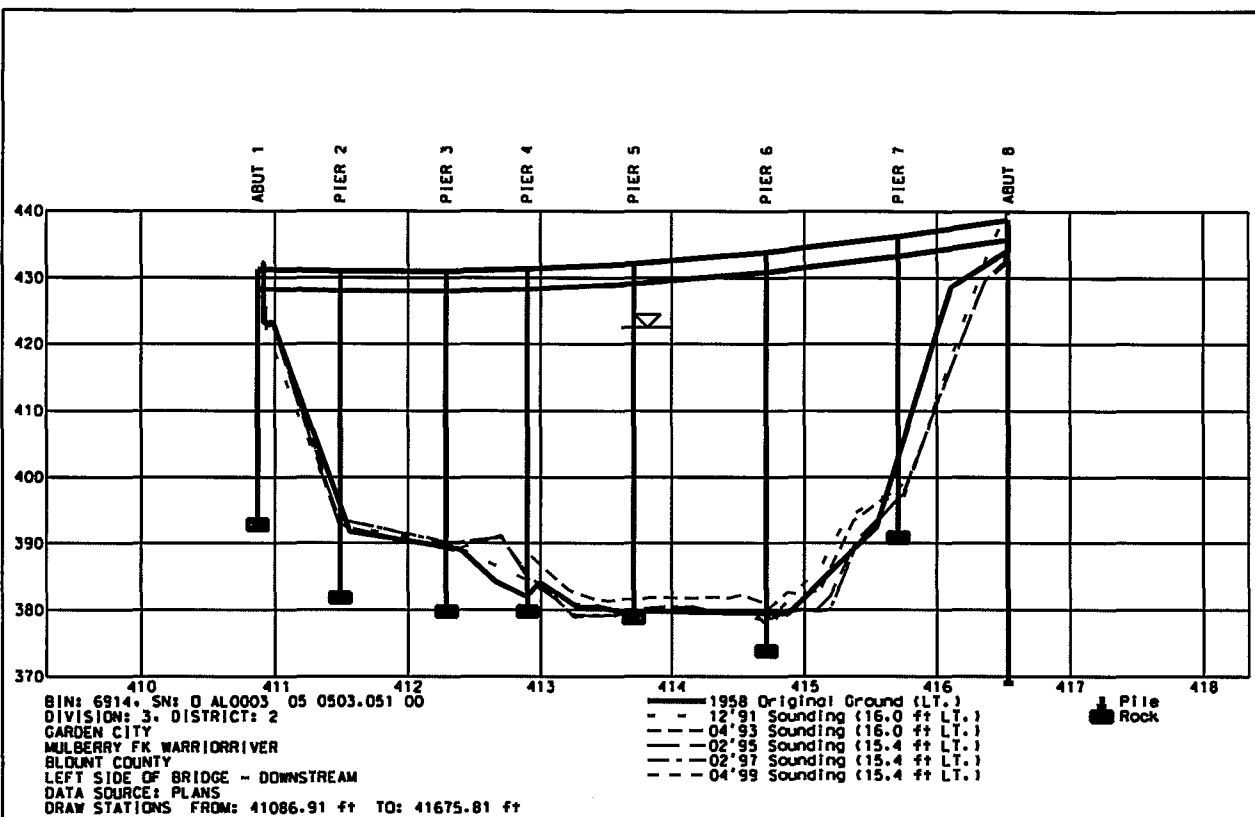


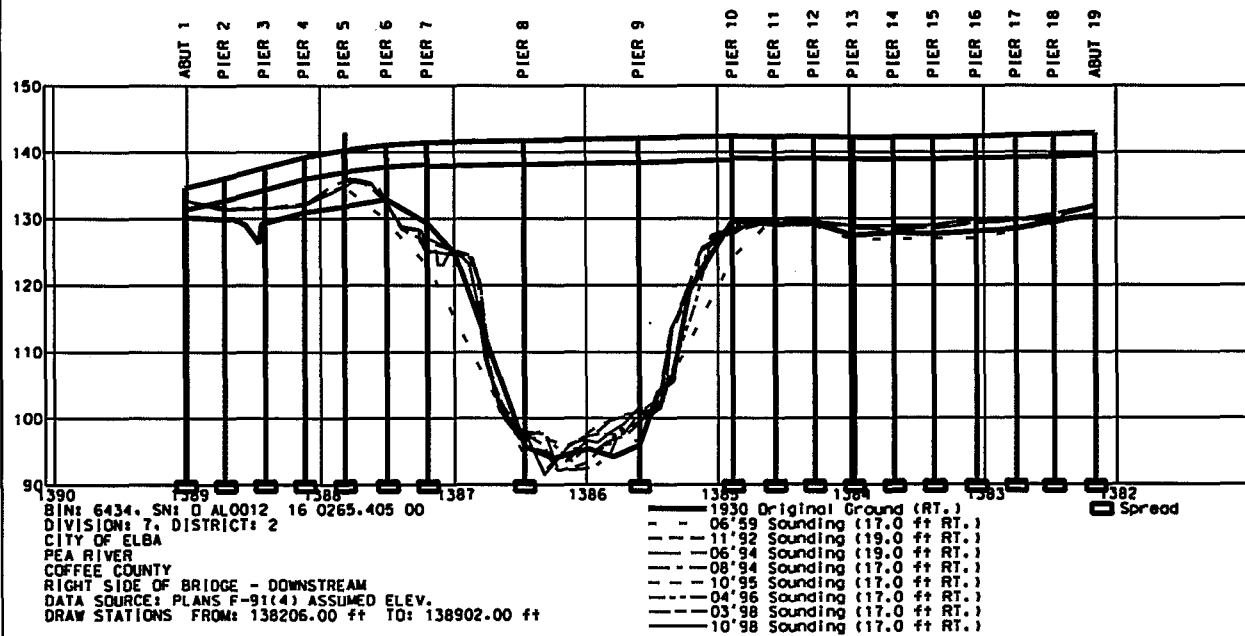
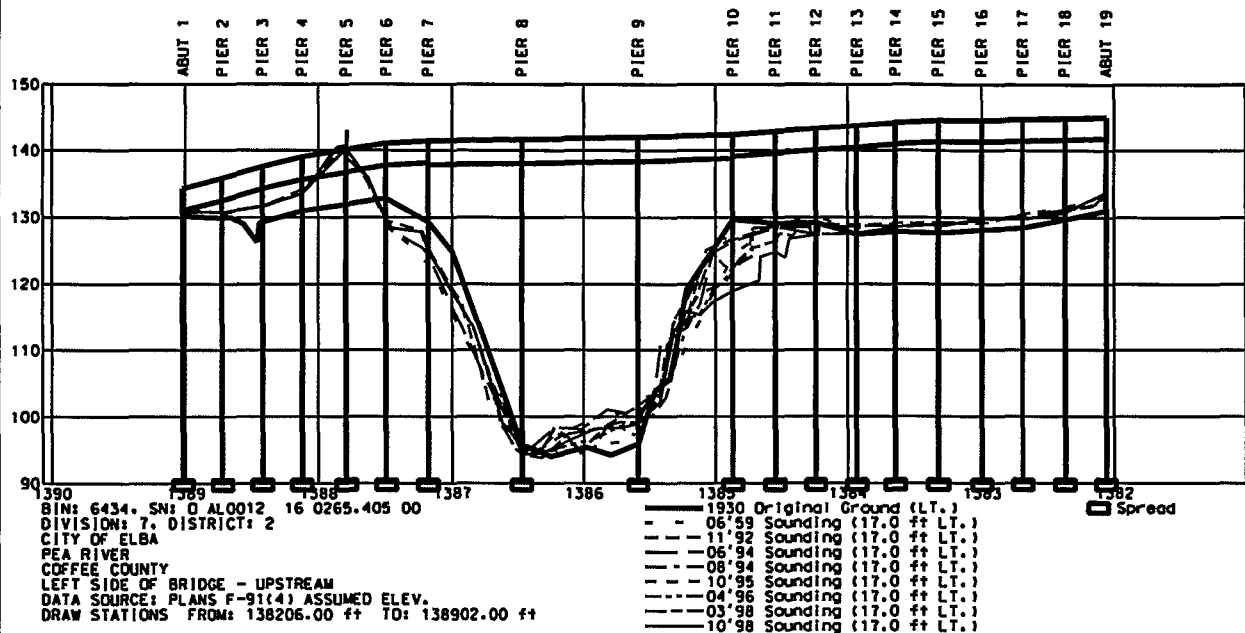


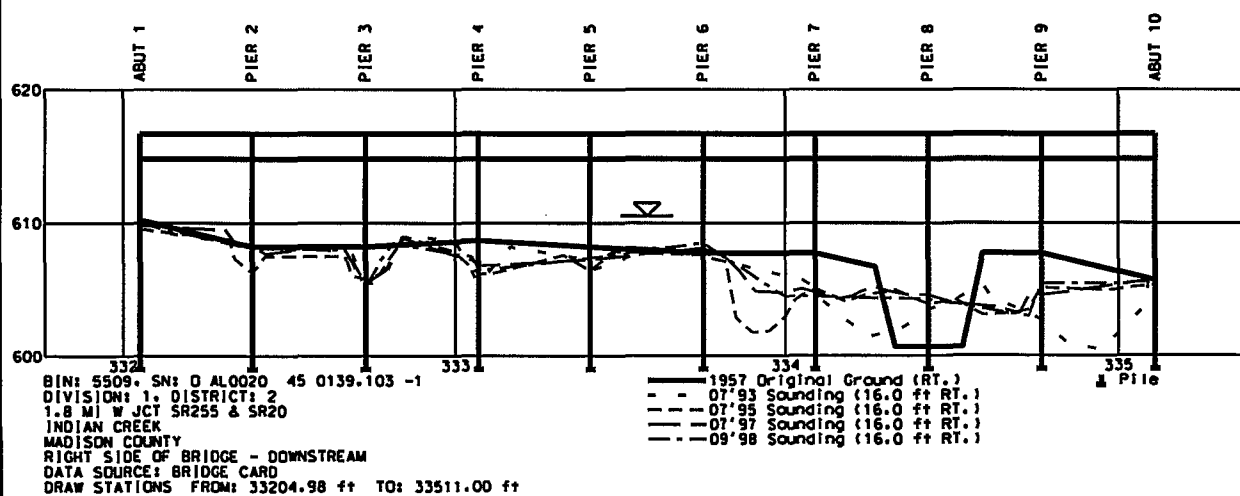
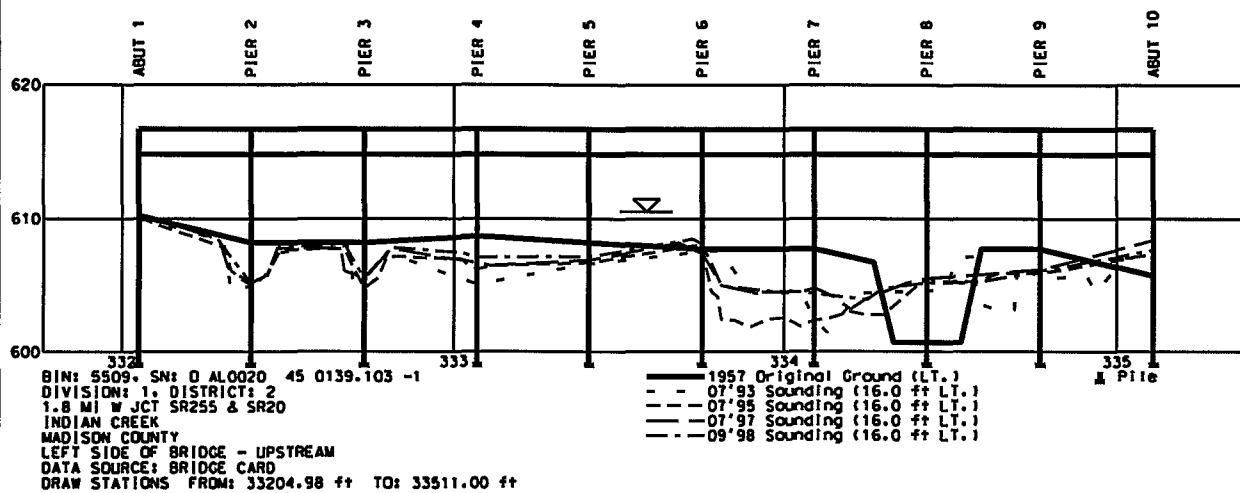


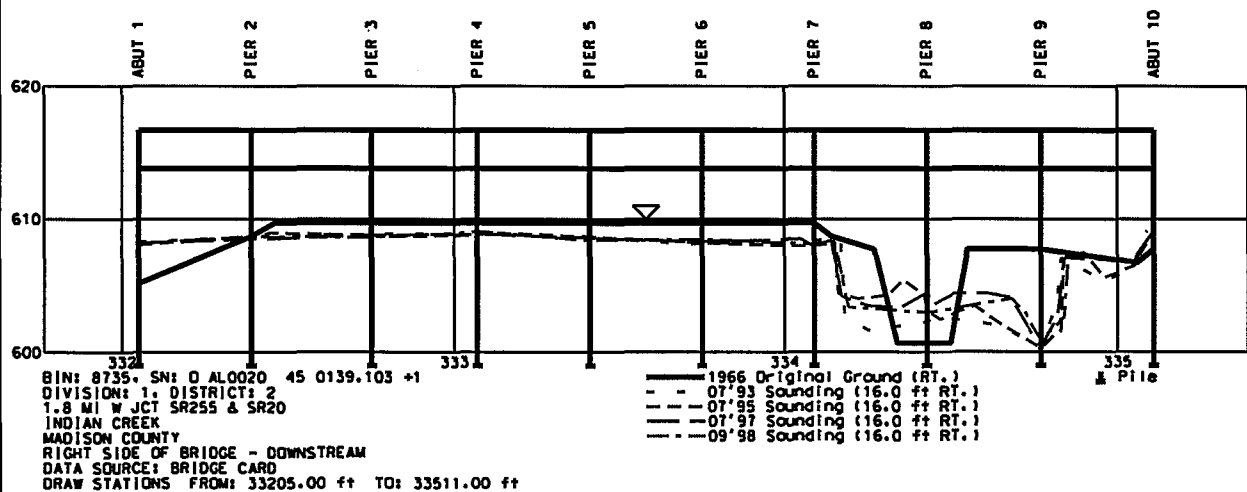
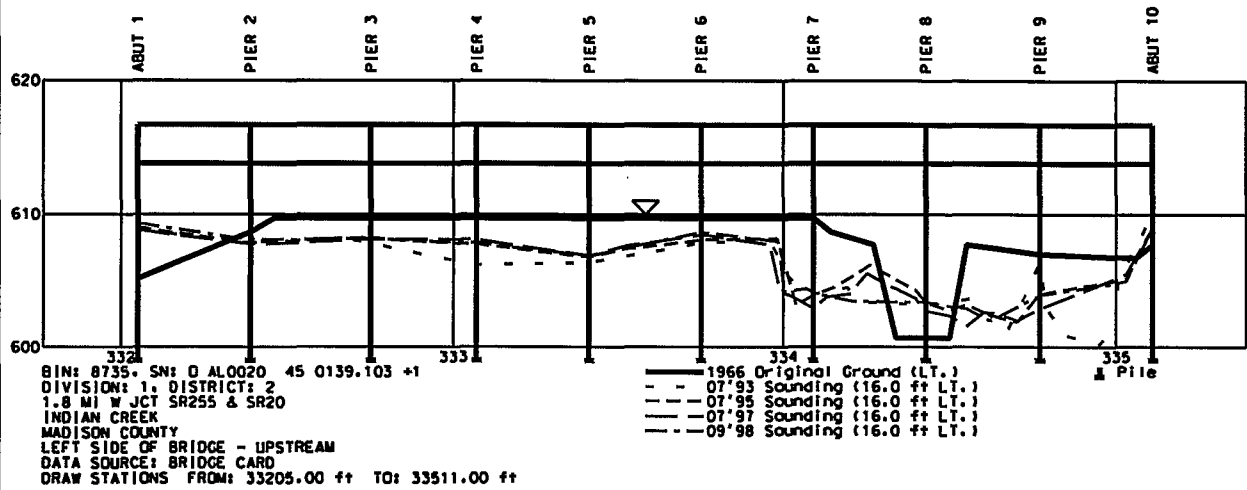


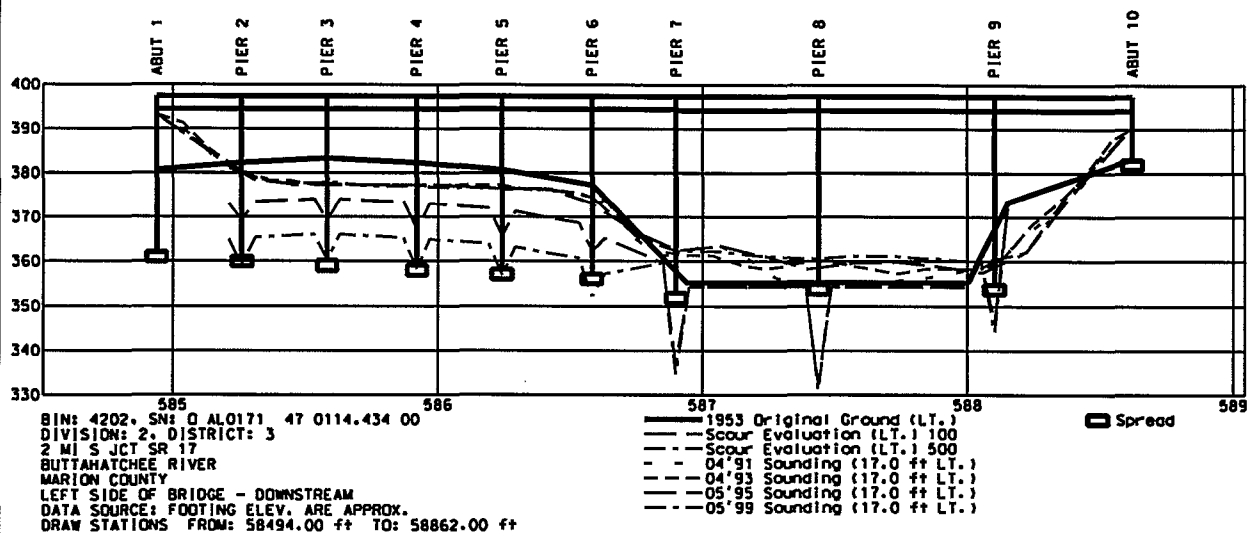






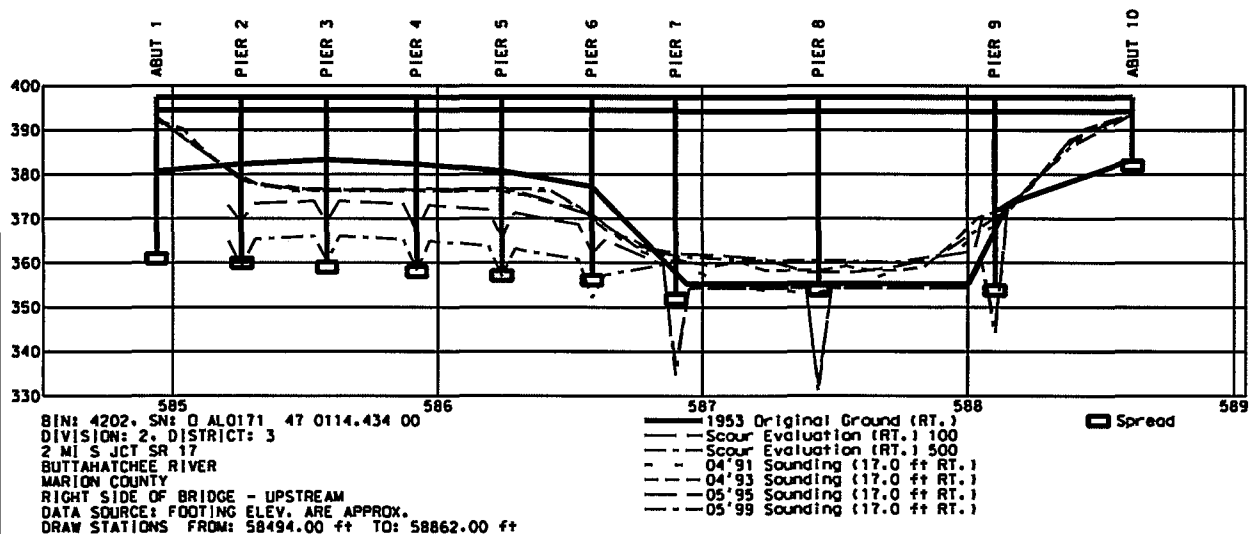






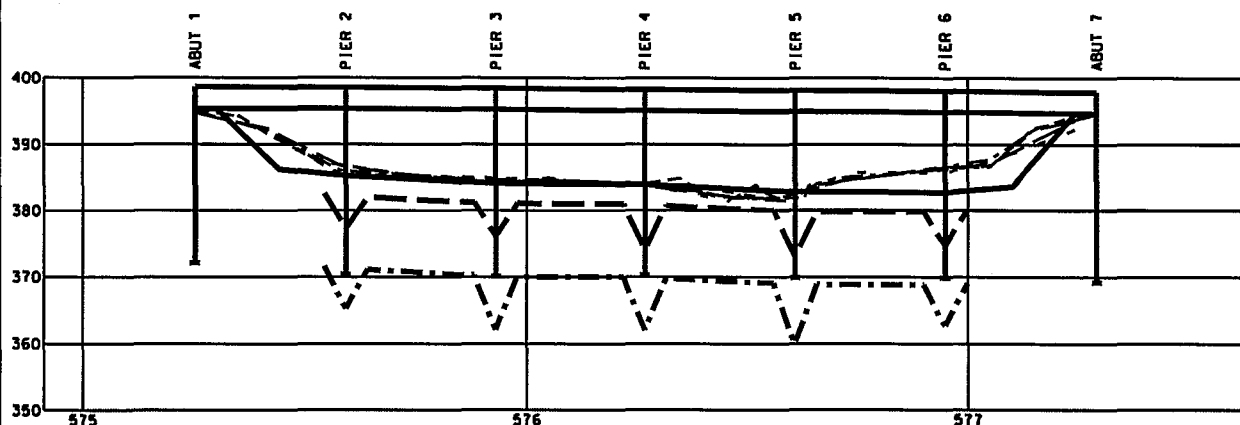
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TOTAL SCOUR (FT)	13.0	14.0	15.0	15.0	15.0	21.0	23.0	21.0

ESTIMATED SCOUR								
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PIER SCOUR (FT)	6.0	6.0	7.0	7.0	8.0	22.0	23.0	22.0
TOTAL SCOUR (FT)	23.0	23.0	24.0	24.0	25.0	23.0	24.0	23.0



ESTIMATED SCOUR								
PIER NUMBER	2	3	4	5	6	7	8	9
CONTRACTUAL SCOUR (FT)	9.0	9.0	9.0	9.0	9.0	1.0	1.0	1.0
PIER SCOUR (FT)	4.0	5.0	6.0	6.0	6.0	20.0	22.0	20.0
TOTAL SCOUR (FT)	13.0	14.0	15.0	15.0	15.0	21.0	23.0	21.0

ESTIMATED SCOUR								
PIER NUMBER	2	3	4	5	6	7	8	9
CONTRACTUAL SCOUR (FT)	17.0	17.0	17.0	17.0	17.0	1.0	1.0	1.0
PIER SCOUR (FT)	6.0	6.0	7.0	7.0	8.0	22.0	23.0	22.0
TOTAL SCOUR (FT)	23.0	23.0	24.0	24.0	25.0	23.0	24.0	23.0



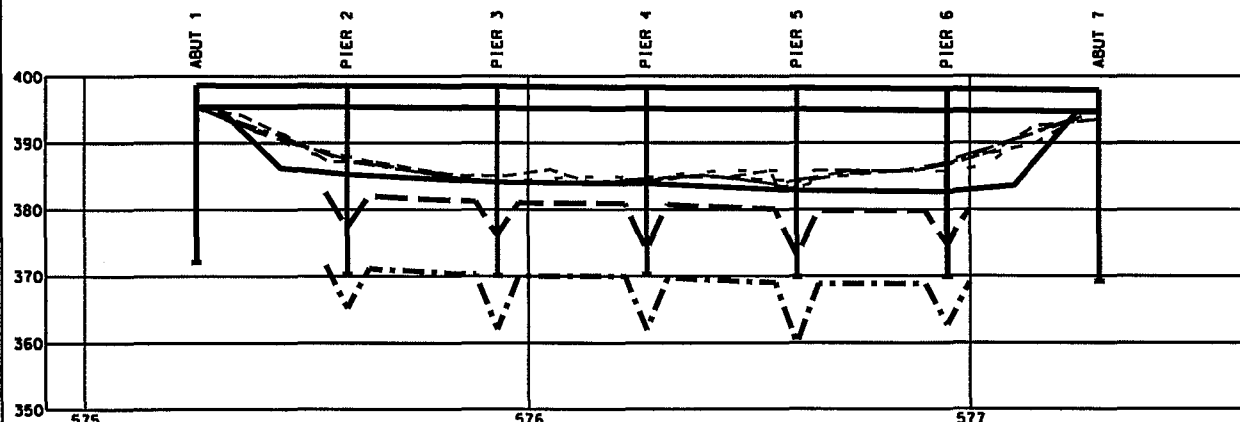
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 DIVISION: 2, DISTRICT: 3
 2.2 MI S JCT SR 17
 BUTTAHATCHEE RV RELIEF
 MARION COUNTY
 LEFT SIDE OF BRIDGE - DOWNSTREAM
 DATA SOURCE: FM
 DRAW STATIONS FROM: 57525.00 ft TO: 57729.00 ft

— 1985 Original Ground (LT.)
 — Scour Evaluation (LT.) 100
 - - - Scour Evaluation (LT.) 500
 - - - 04'91 Sounding (24.0 ft LT.)
 - - - 04'93 Sounding (24.0 ft LT.)
 - - - 05'95 Sounding (24.0 ft LT.)
 - - - 05'97 Sounding (24.0 ft LT.)
 - - - 05'99 Sounding (24.0 ft LT.)

▲ Pile

ESTIMATED SCOUR					
PIER NUMBER	2	3	4	5	6
CONTRACTUAL SCOUR (FT)	3.0	3.0	3.0	3.0	3.0
PIER SCOUR (FT)	5.0	5.0	7.0	7.0	5.0
TOTAL SCOUR (FT)	8.0	8.0	10.0	10.0	8.0

ESTIMATED SCOUR					
PIER NUMBER	2	3	4	5	6
CONTRACTUAL SCOUR (FT)	14.0	14.0	14.0	14.0	14.0
PIER SCOUR (FT)	6.0	8.0	8.0	9.0	6.0
TOTAL SCOUR (FT)	20.0	22.0	22.0	23.0	20.0



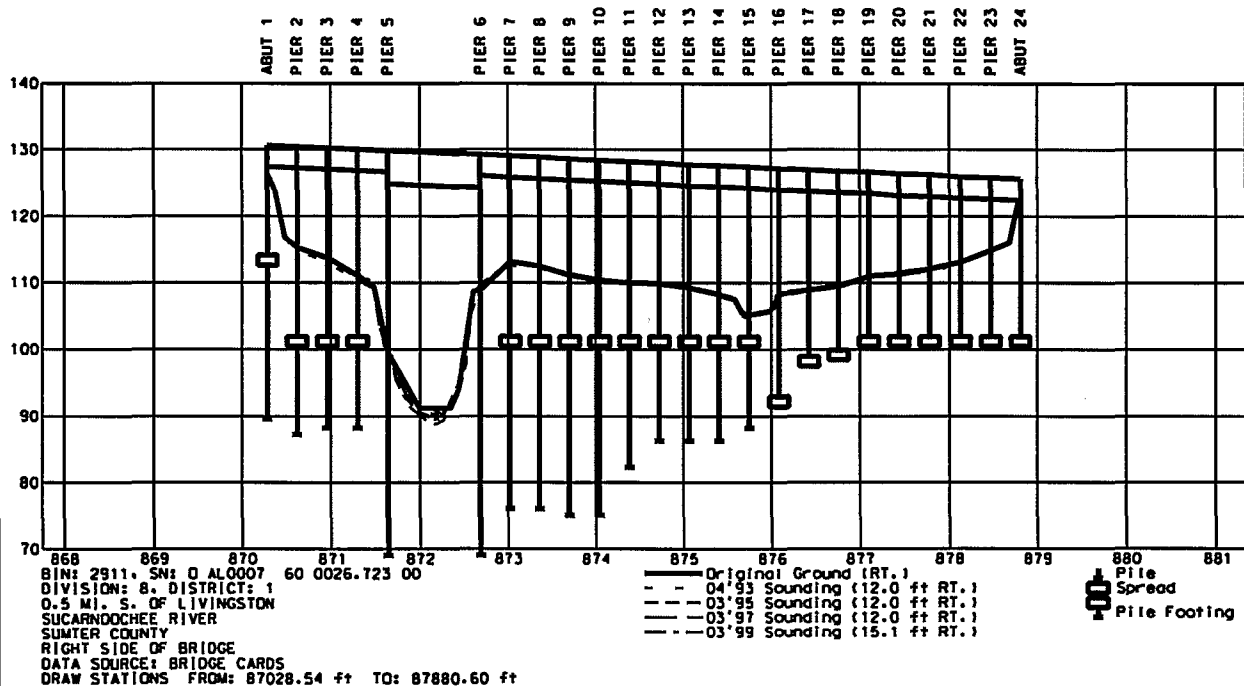
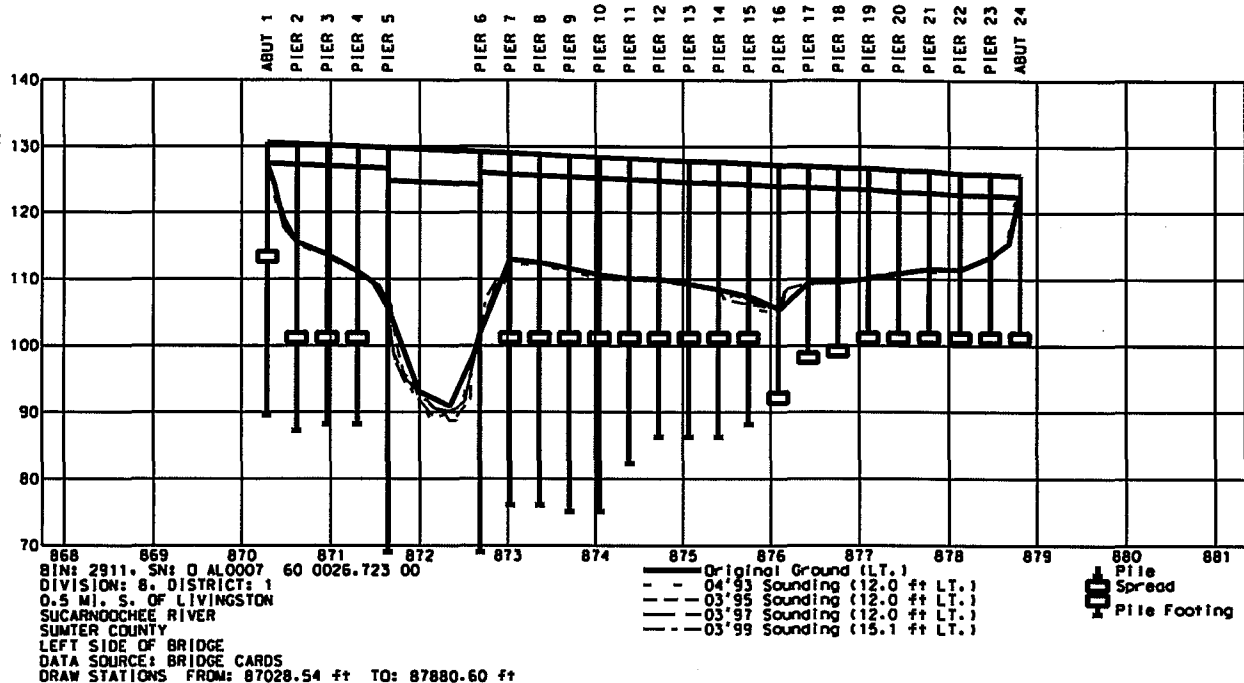
BIN: 13690, SN: 0 ALO171 47 0114.177 00
 DIVISION: 2, DISTRICT: 3
 2.2 MI S JCT SR 17
 BUTTAHATCHEE RV RELIEF
 MARION COUNTY
 RIGHT SIDE OF BRIDGE - UPSTREAM
 DATA SOURCE: FM
 DRAW STATIONS FROM: 57525.00 ft TO: 57729.00 ft

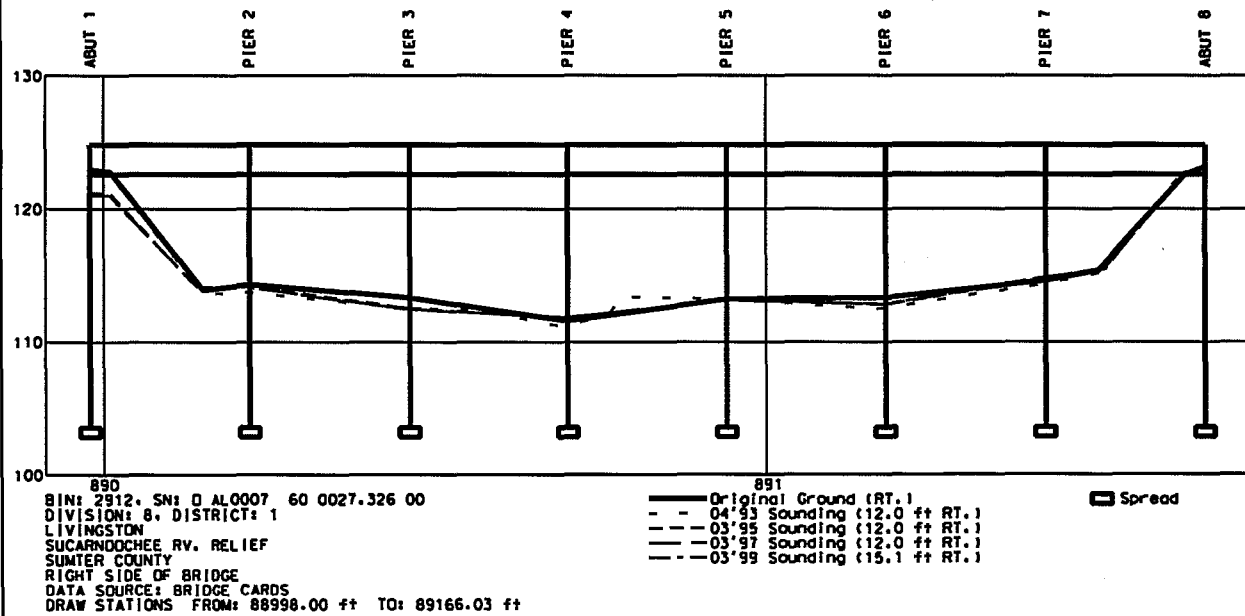
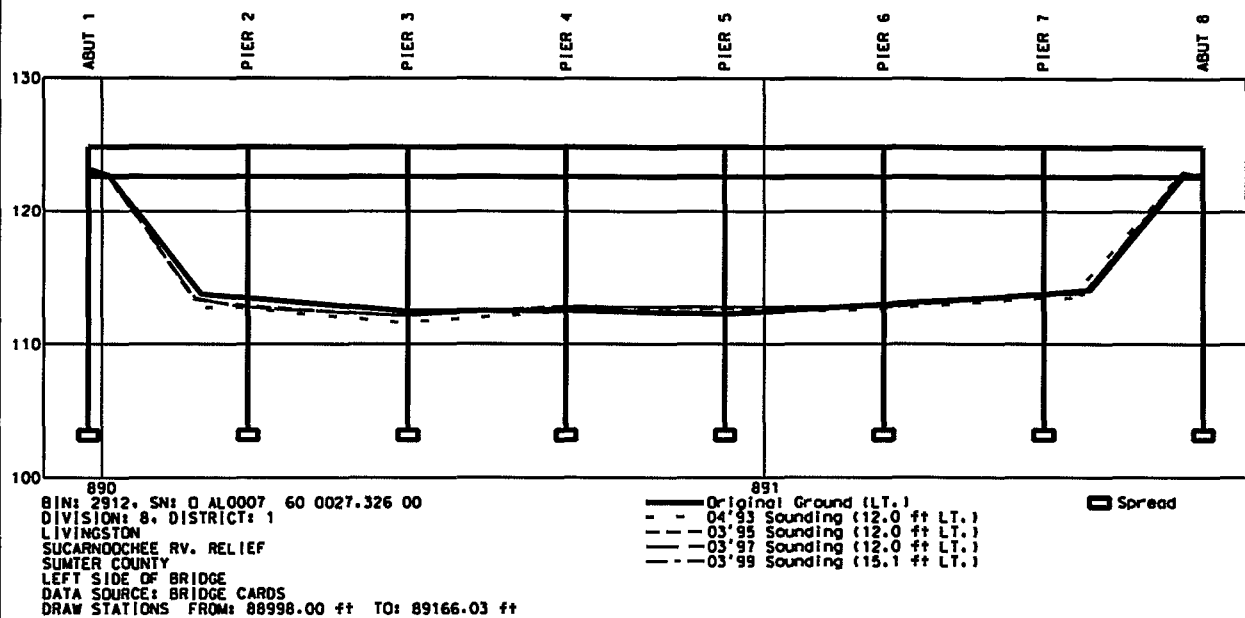
— 1985 Original Ground (RT.)
 — Scour Evaluation (RT.) 100
 - - - Scour Evaluation (RT.) 500
 - - - 04'91 Sounding (24.0 ft RT.)
 - - - 04'93 Sounding (24.0 ft RT.)
 - - - 05'95 Sounding (24.0 ft RT.)
 - - - 05'97 Sounding (24.0 ft RT.)
 - - - 05'99 Sounding (24.0 ft RT.)

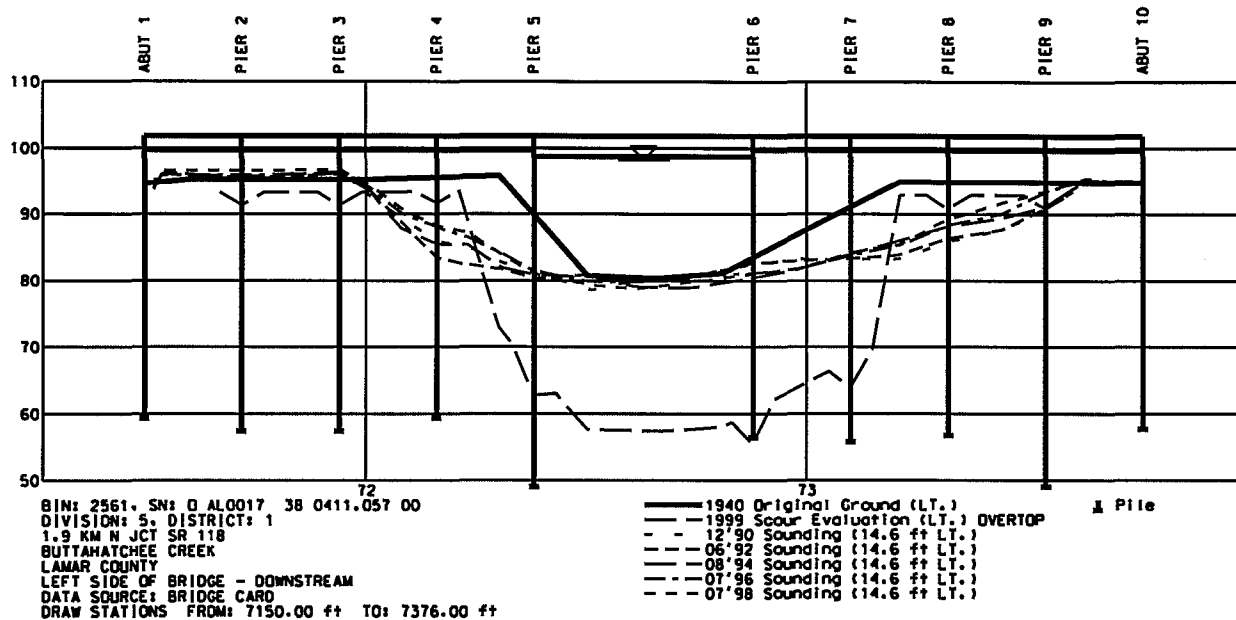
▲ Pile

ESTIMATED SCOUR					
PIER NUMBER	2	3	4	5	6
CONTRACTUAL SCOUR (FT)	3.0	3.0	3.0	3.0	3.0
PIER SCOUR (FT)	5.0	5.0	7.0	7.0	5.0
TOTAL SCOUR (FT)	8.0	8.0	10.0	10.0	8.0

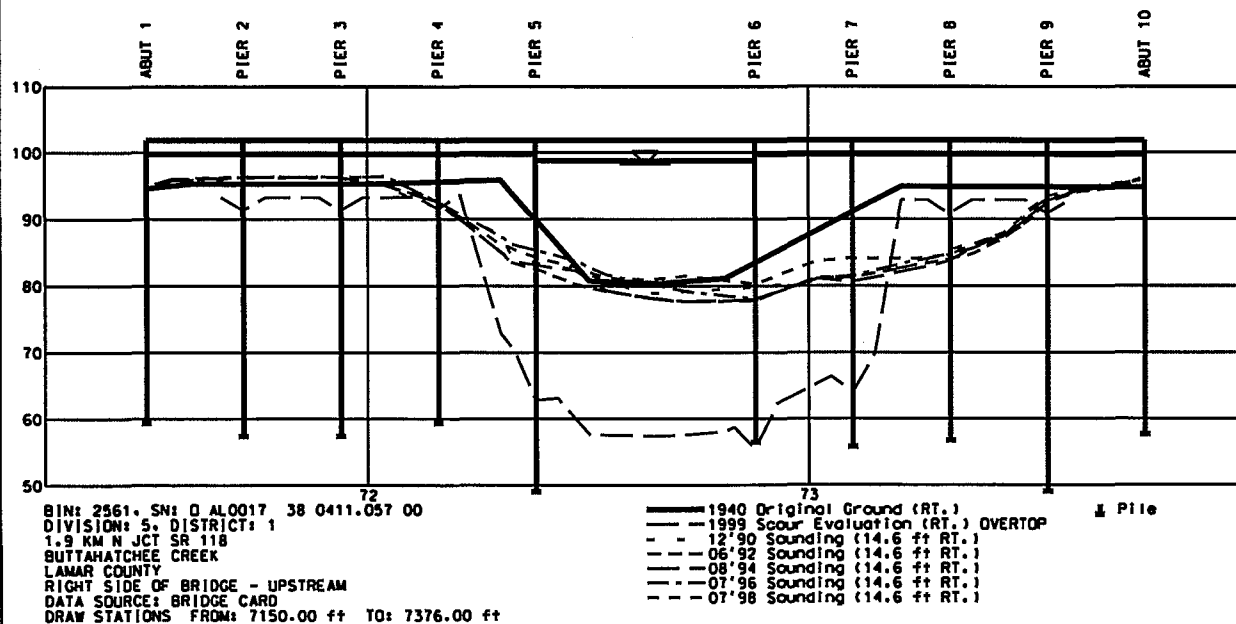
ESTIMATED SCOUR					
PIER NUMBER	2	3	4	5	6
CONTRACTUAL SCOUR (FT)	14.0	14.0	14.0	14.0	14.0
PIER SCOUR (FT)	6.0	8.0	8.0	9.0	6.0
TOTAL SCOUR (FT)	20.0	22.0	22.0	23.0	20.0



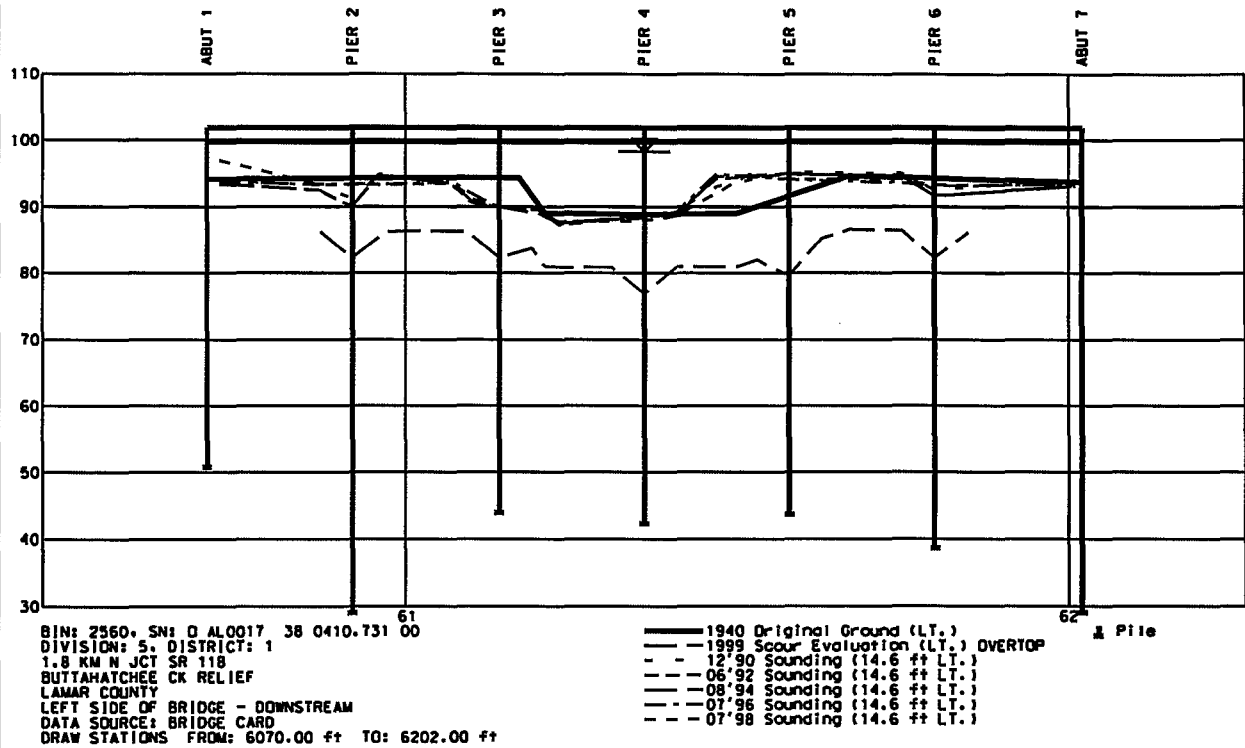




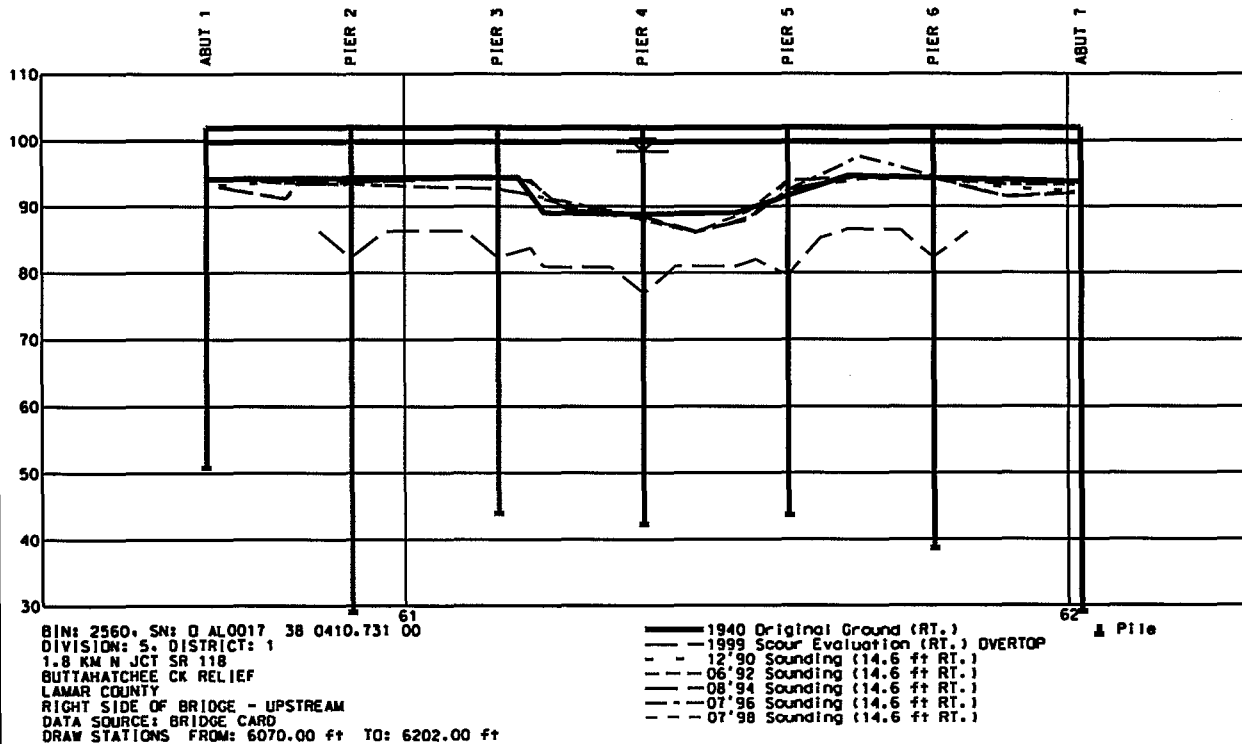
ESTIMATED SCOUR						OVERTOP		
PIER NUMBER	2	3	4	5	6	7	8	9
CONTRACTUAL SCOUR (FT)	2.0	2.0	2.0	23.0	23.0	23.0	2.0	2.0
PIER SCOUR (FT)	2.0	2.0	2.0	4.0	5.0	4.0	2.0	2.0
TOTAL SCOUR (FT)	4.0	4.0	4.0	27.0	28.0	27.0	4.0	4.0



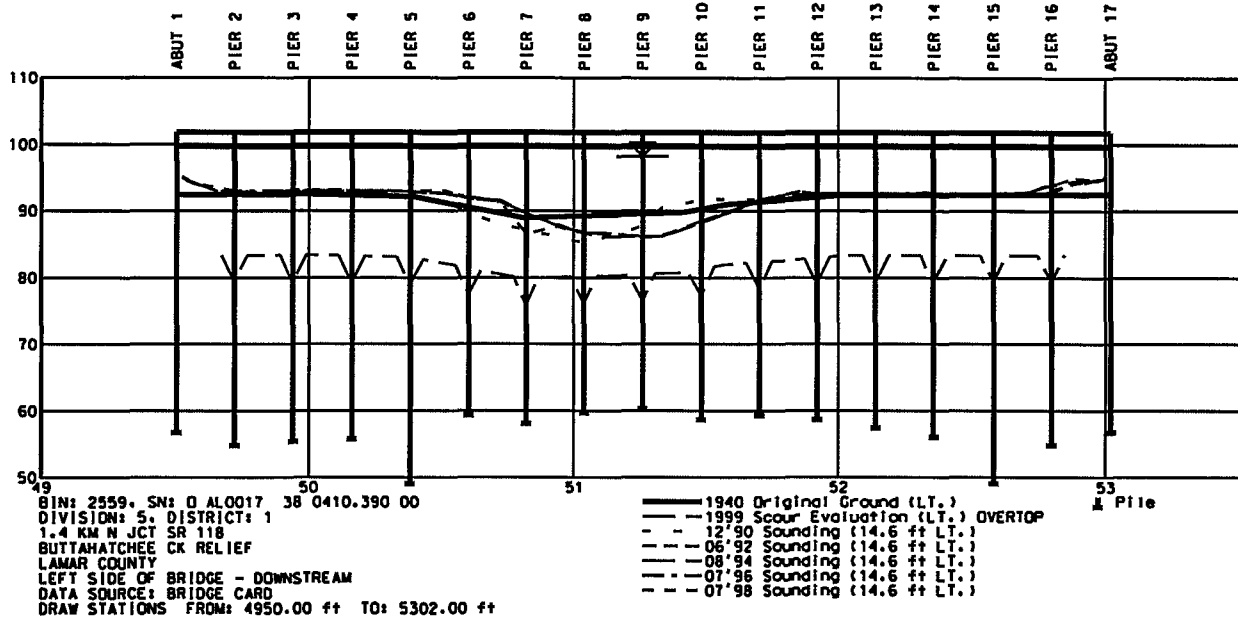
ESTIMATED SCOUR						OVERTOP		
PIER NUMBER	2	3	4	5	6	7	8	9
CONTRACTUAL SCOUR (FT)	2.0	2.0	2.0	23.0	23.0	23.0	2.0	2.0
PIER SCOUR (FT)	2.0	2.0	2.0	4.0	5.0	4.0	2.0	2.0
TOTAL SCOUR (FT)	4.0	4.0	4.0	27.0	28.0	27.0	4.0	4.0



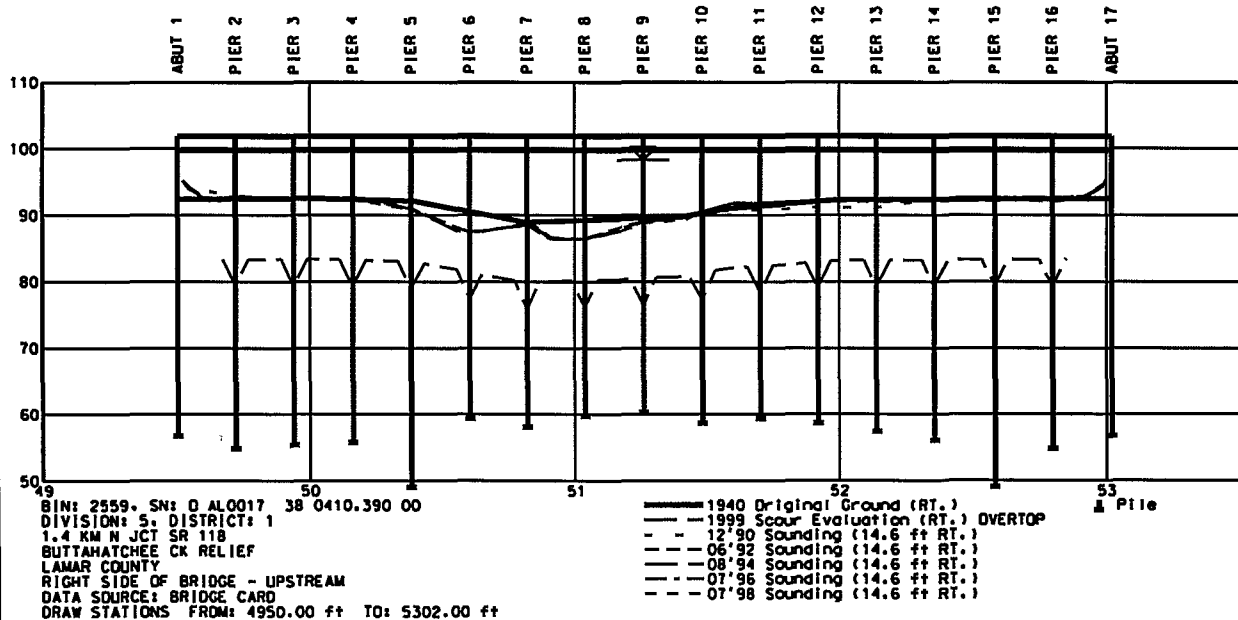
ESTIMATED SCOUR		OVERTOP				
PIER NUMBER		2	3	4	5	6
CONTRACTUAL SCOUR (FT)		8.0	8.0	8.0	8.0	8.0
PIER SCOUR (FT)		4.0	4.0	4.0	4.0	4.0
TOTAL SCOUR (FT)		12.0	12.0	12.0	12.0	12.0



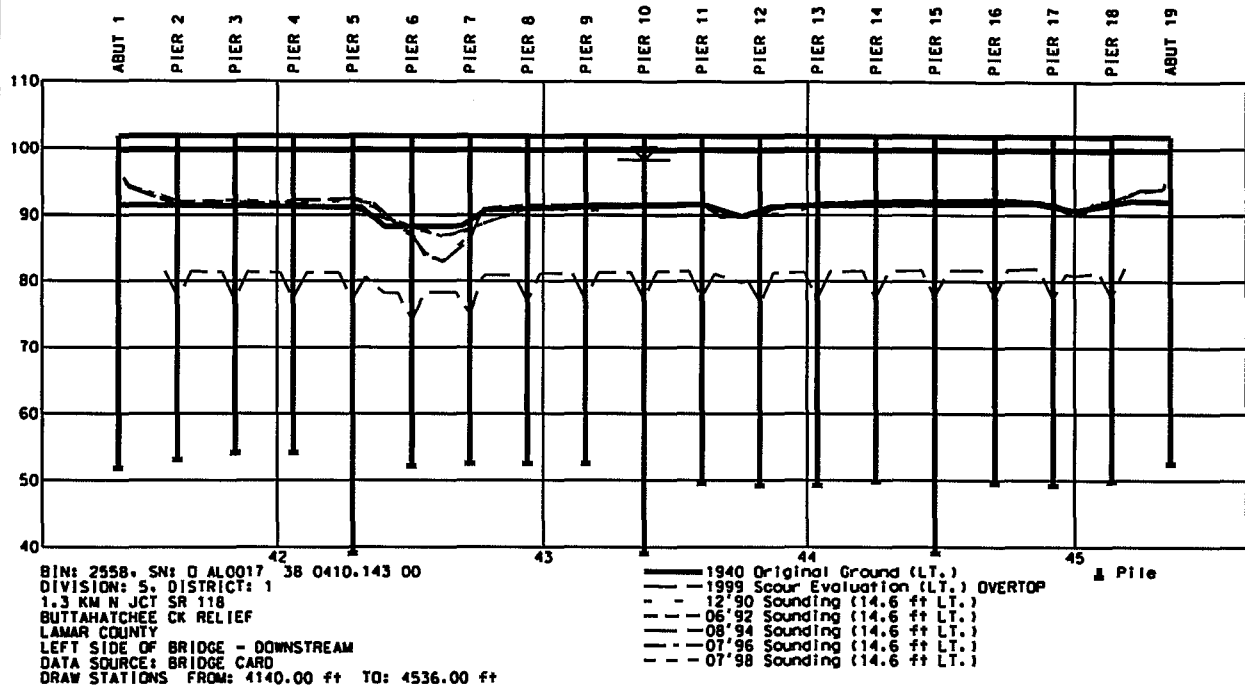
ESTIMATED SCOUR		OVERTOP				
PIER NUMBER		2	3	4	5	6
CONTRACTUAL SCOUR (FT)		8.0	8.0	8.0	8.0	8.0
PIER SCOUR (FT)		4.0	4.0	4.0	4.0	4.0
TOTAL SCOUR (FT)		12.0	12.0	12.0	12.0	12.0



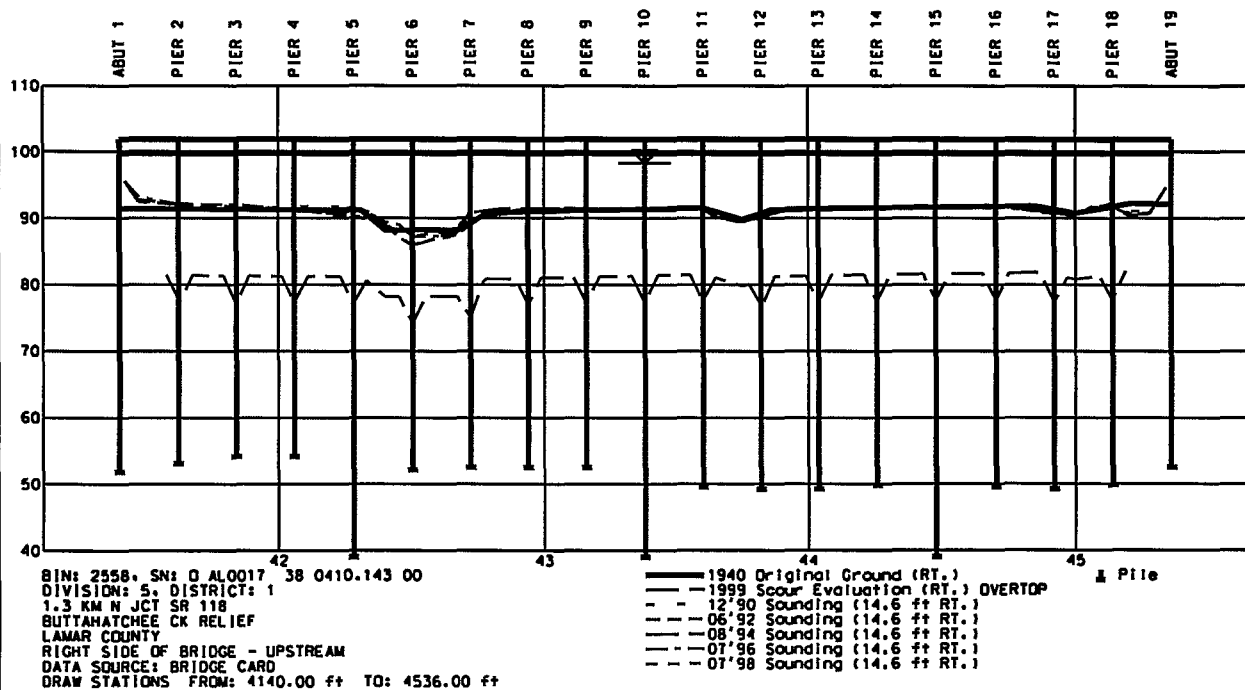
ESTIMATED SCOUR																OVERTOP
PIER NUMBER	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	
CONTRACTUAL SCOUR (FT)	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0
PIER SCOUR (FT)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
TOTAL SCOUR (FT)	13.0	13.0	13.0	13.0	13.0	13.0	13.0	13.0	13.0	13.0	13.0	13.0	13.0	13.0	13.0	13.0



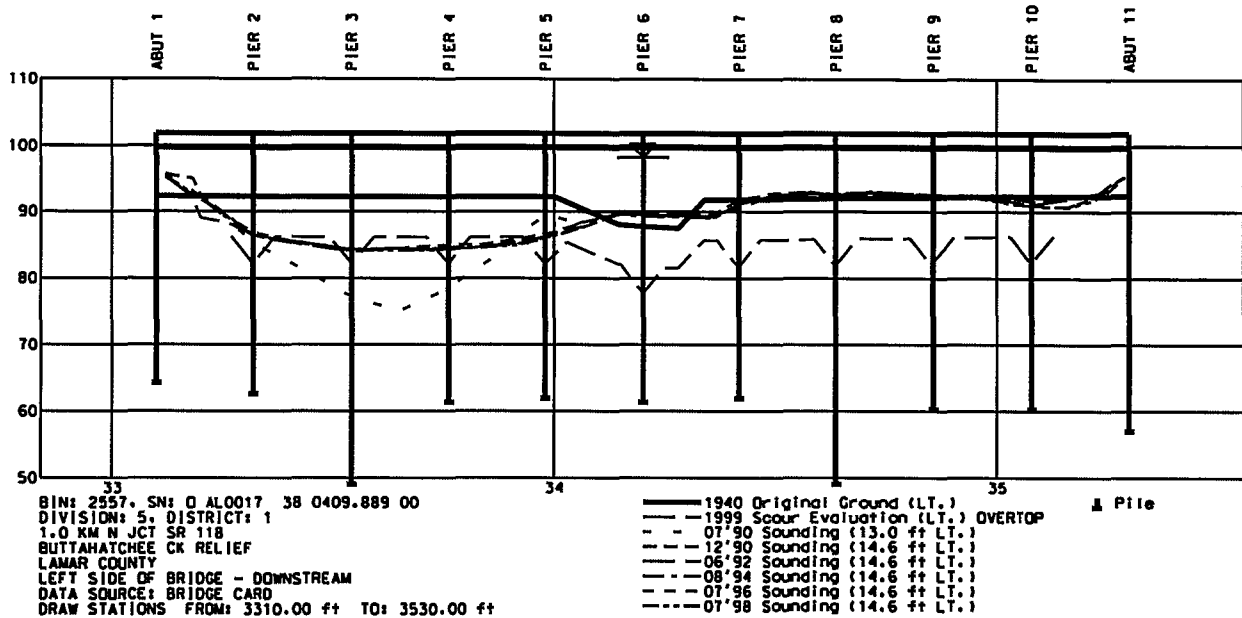
ESTIMATED SCOUR																OVERTOP
PIER NUMBER	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	
CONTRACTUAL SCOUR (FT)	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0
PIER SCOUR (FT)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
TOTAL SCOUR (FT)	13.0	13.0	13.0	13.0	13.0	13.0	13.0	13.0	13.0	13.0	13.0	13.0	13.0	13.0	13.0	13.0



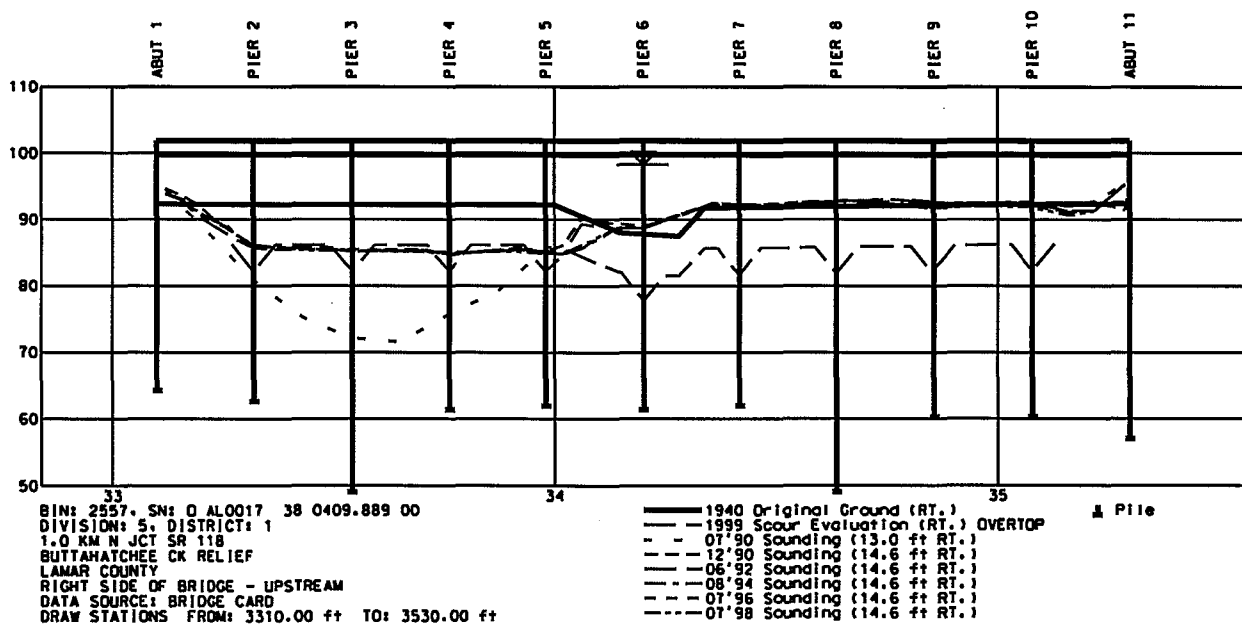
ESTIMATED SCOUR																	OVERTOP
PIER NUMBER	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
CONTRACTUAL SCOUR (FT)	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
PIER SCOUR (FT)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
TOTAL SCOUR (FT)	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0



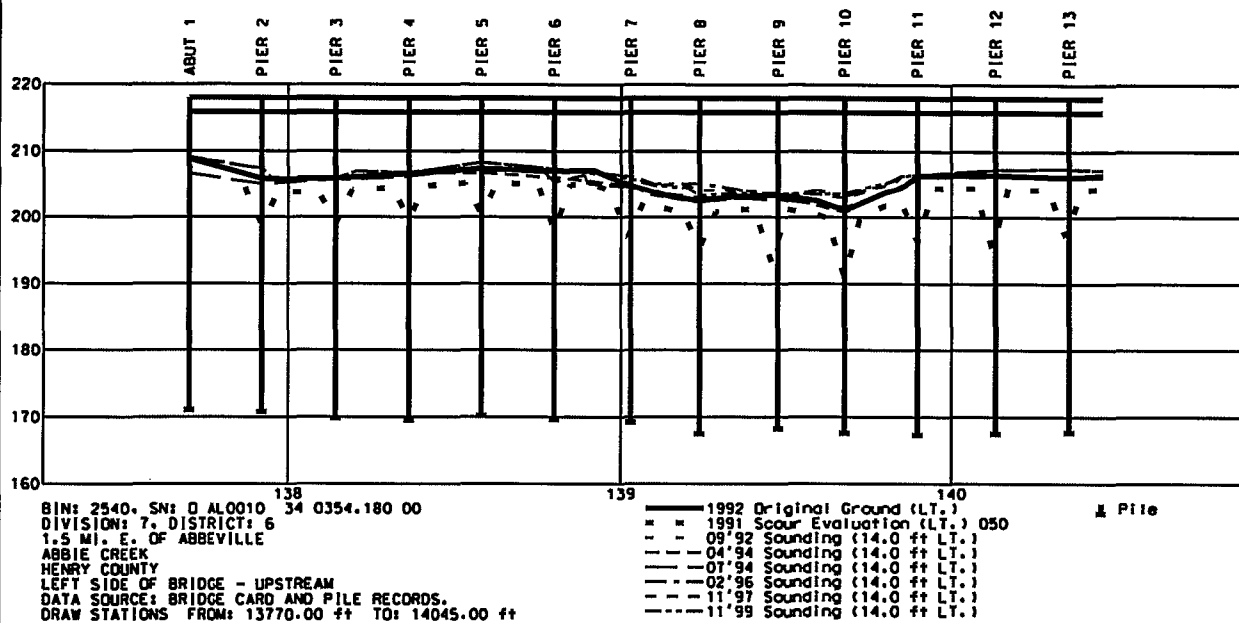
ESTIMATED SCOUR																	OVERTOP
PIER NUMBER	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
CONTRACTUAL SCOUR (FT)	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
PIER SCOUR (FT)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
TOTAL SCOUR (FT)	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0



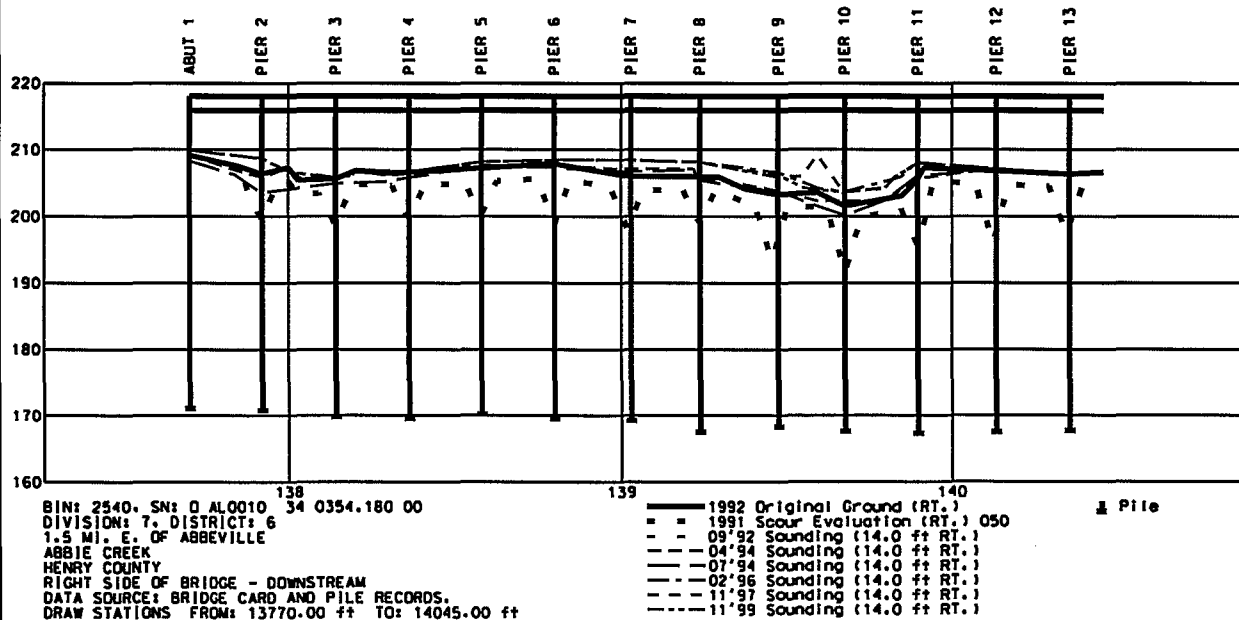
ESTIMATED SCOUR									
PIER NUMBER	2	3	4	5	6	7	8	9	10
CONTRACTUAL SCOUR (FT)	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
PIER SCOUR (FT)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
TOTAL SCOUR (FT)	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0



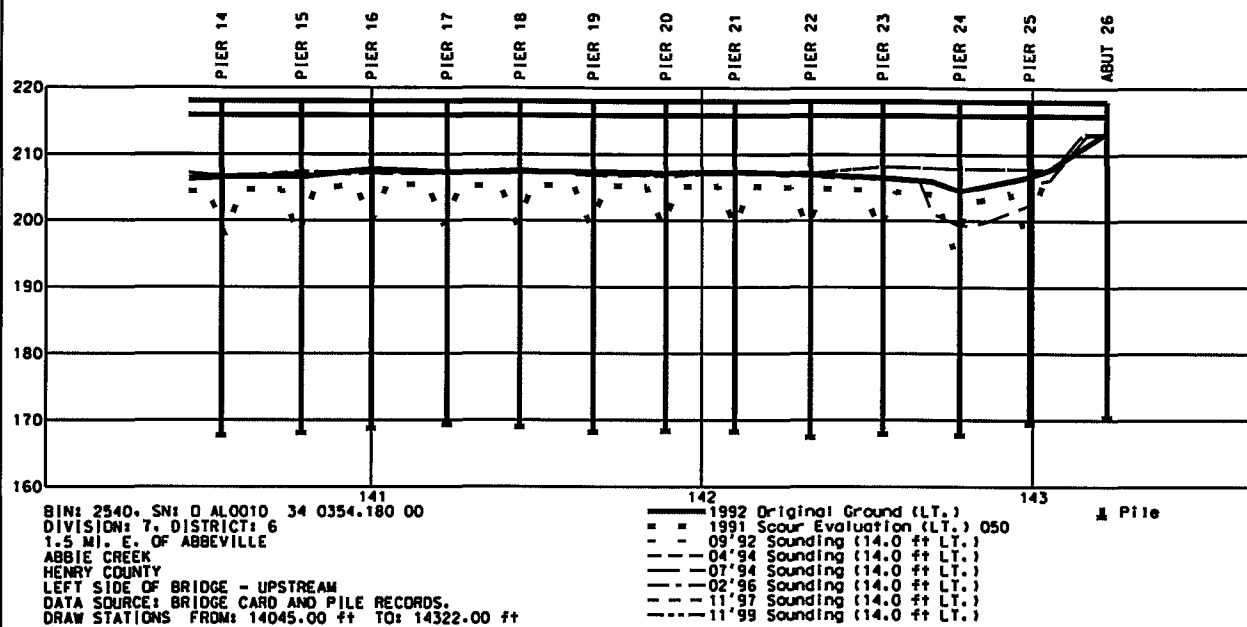
ESTIMATED SCOUR									
PIER NUMBER	2	3	4	5	6	7	8	9	10
CONTRACTUAL SCOUR (FT)	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
PIER SCOUR (FT)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
TOTAL SCOUR (FT)	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0



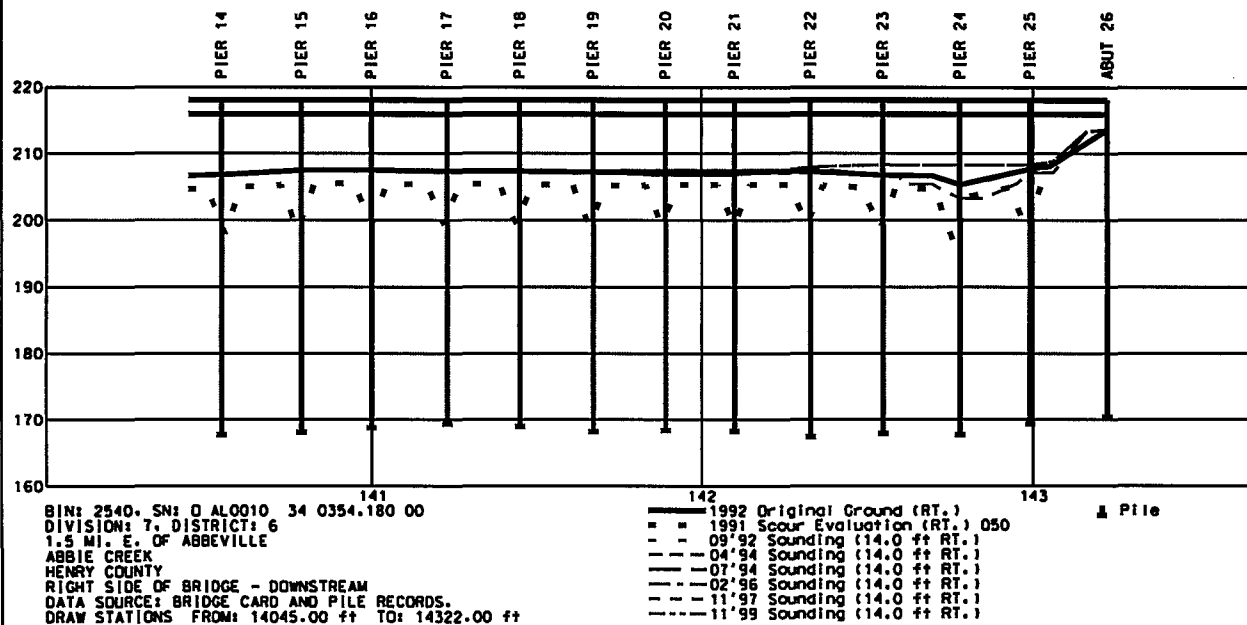
ESTIMATED SCOUR													050
PIER NUMBER	2	3	4	5	6	7	8	9	10	11	12	13	
CONTRACTUAL SCOUR (FT)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
PIER SCOUR (FT)	5.0	5.0	5.0	5.0	7.0	6.0	5.0	8.0	8.0	8.0	9.0	7.0	
TOTAL SCOUR (FT)	7.0	7.0	7.0	7.0	9.0	8.0	7.0	10.0	10.0	10.0	11.0	9.0	



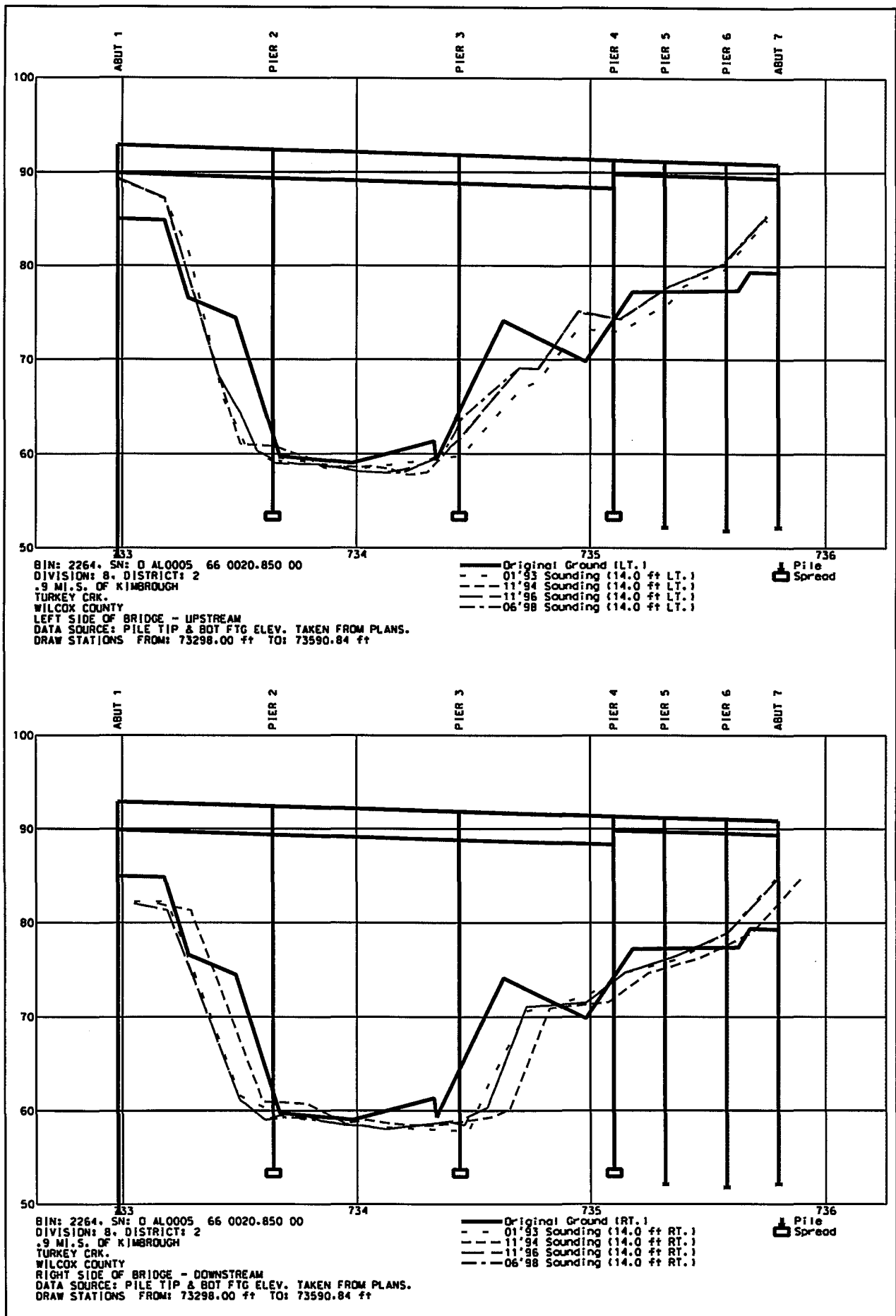
ESTIMATED SCOUR													050
PIER NUMBER	2	3	4	5	6	7	8	9	10	11	12	13	
CONTRACTUAL SCOUR (FT)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
PIER SCOUR (FT)	5.0	5.0	5.0	5.0	7.0	6.0	5.0	8.0	8.0	8.0	9.0	7.0	
TOTAL SCOUR (FT)	7.0	7.0	7.0	7.0	9.0	8.0	7.0	10.0	10.0	10.0	11.0	9.0	

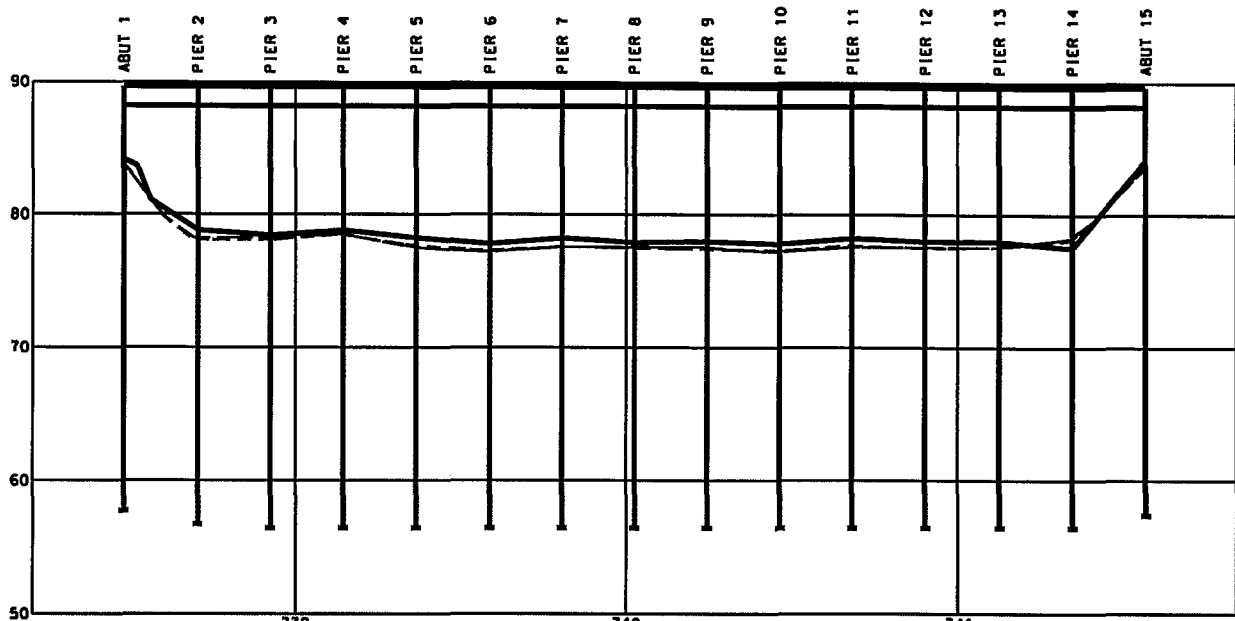


ESTIMATED SCOUR												050
PIER NUMBER	14	15	16	17	18	19	20	21	22	23	24	25
CONTRACTUAL SCOUR (FT)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
PIER SCOUR (FT)	7.0	7.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	7.0	7.0
TOTAL SCOUR (FT)	9.0	9.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	9.0	9.0



ESTIMATED SCOUR												050
PIER NUMBER	14	15	16	17	18	19	20	21	22	23	24	25
CONTRACTUAL SCOUR (FT)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
PIER SCOUR (FT)	7.0	7.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	7.0	7.0
TOTAL SCOUR (FT)	9.0	9.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	9.0	9.0





BIN: 2265, SN: 0 ALO005 66 0021.011 00

DIVISION: 8, DISTRICT: 2

0.8 MI. S. OF KIMBROUGH

TURKEY CREEK REL.

WILCOX COUNTY

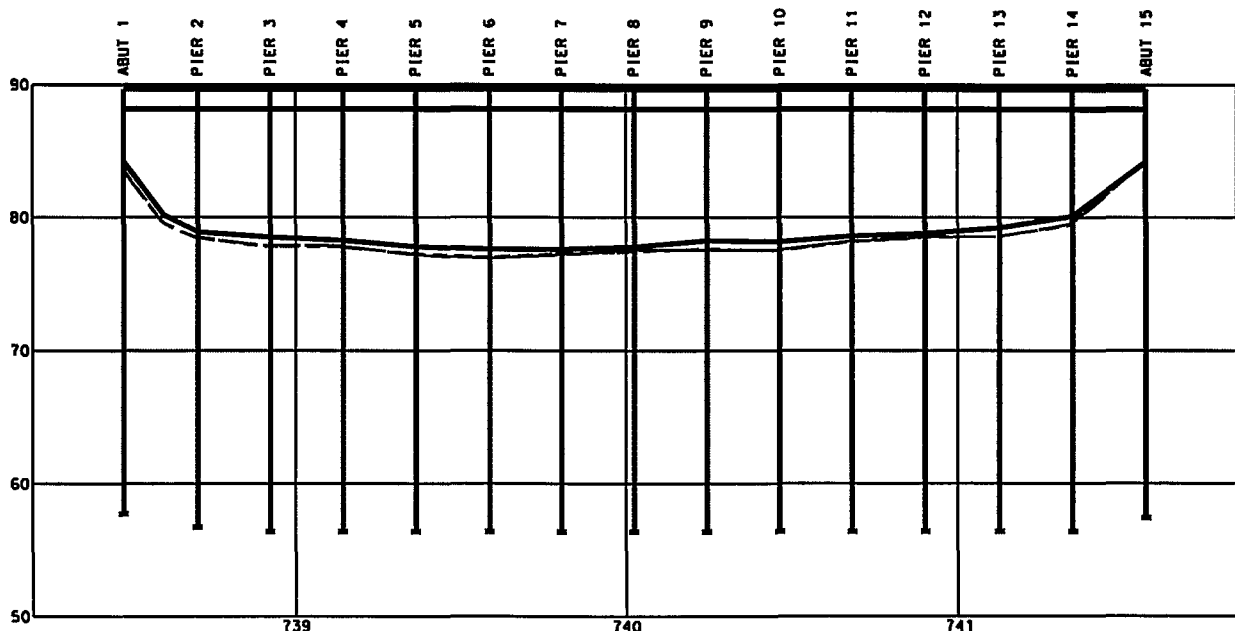
LEFT SIDE OF BRIDGE - UPSTREAM

DATA SOURCE: PILE TIP ELEV. FROM PILE DRIVING RECORDS AND

DRAW STATIONS FROM: 73848.43 ft TO: 74156.42 ft

— 1940 Original Ground (LT.)
 - - 01'93 Sounding (14.0 ft LT.)
 - - 12'94 Sounding (45.9 ft LT.)
 - - 11'96 Sounding (14.0 ft LT.)
 - - 07'98 Sounding (14.0 ft LT.)

▲ Pile



BIN: 2265, SN: 0 ALO005 66 0021.011 00

DIVISION: 8, DISTRICT: 2

0.8 MI. S. OF KIMBROUGH

TURKEY CREEK REL.

WILCOX COUNTY

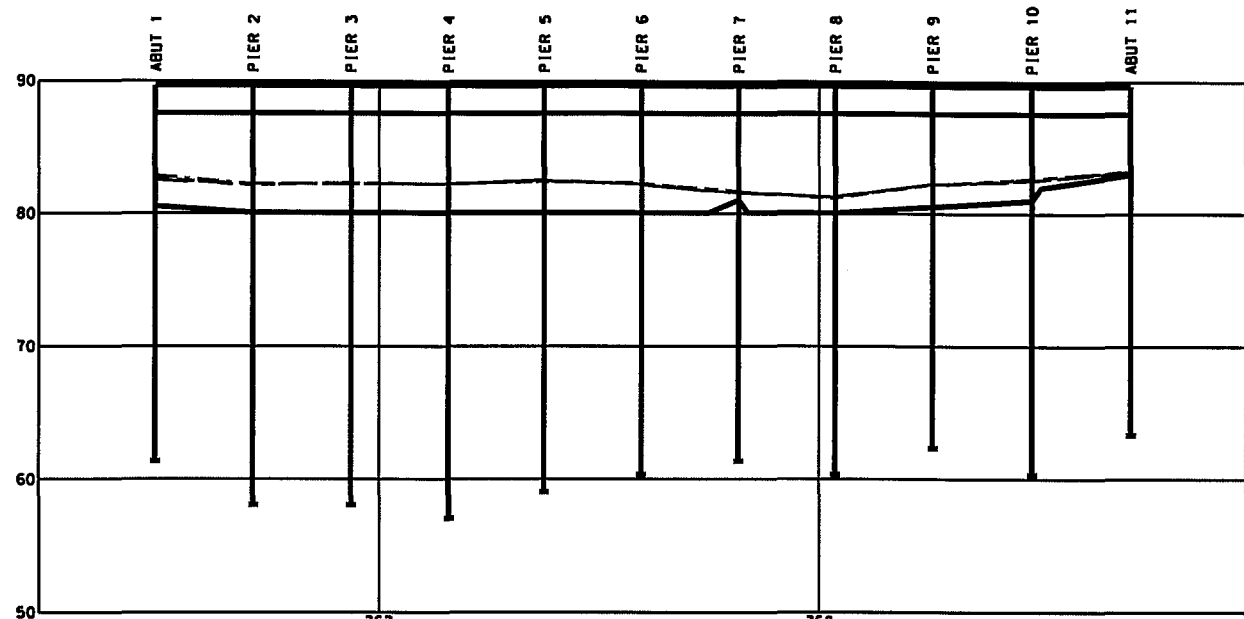
RIGHT SIDE OF BRIDGE - DOWNSTREAM

DATA SOURCE: PILE TIP ELEV. FROM PILE DRIVING RECORDS AND

DRAW STATIONS FROM: 73848.43 ft TO: 74156.42 ft

— 1940 Original Ground (RT.)
 - - 01'93 Sounding (14.0 ft RT.)
 - - 12'94 Sounding (45.9 ft RT.)
 - - 11'96 Sounding (14.0 ft RT.)
 - - 07'98 Sounding (14.0 ft RT.)

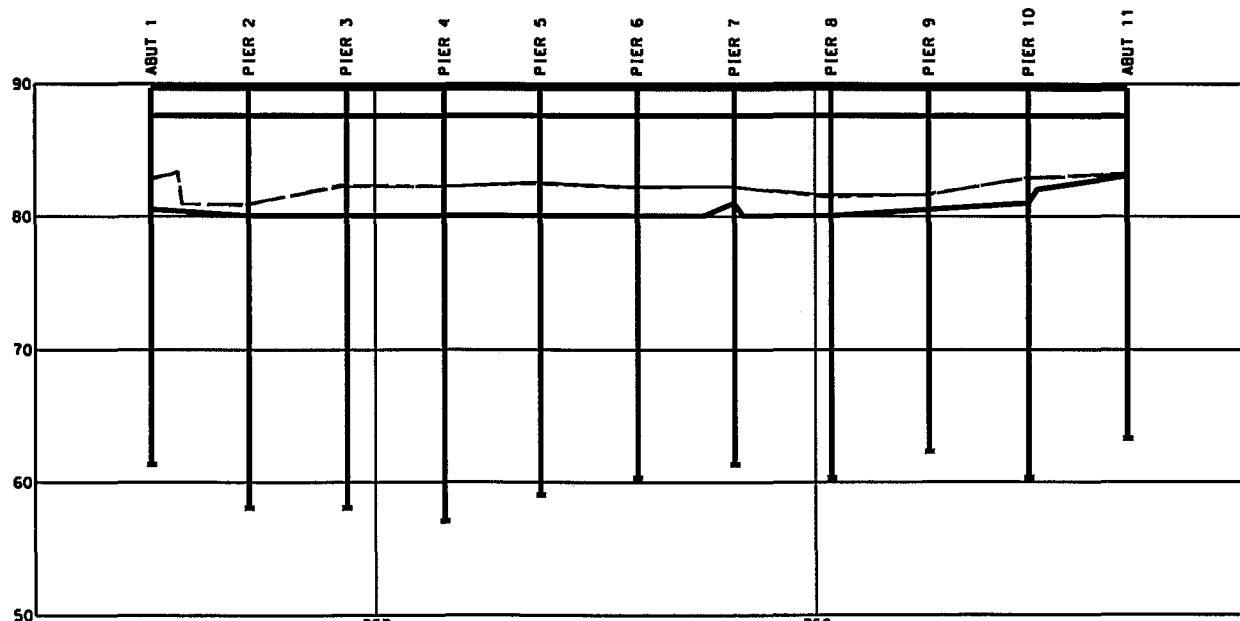
▲ Pile



BIN: 2266, SN: 0 AL0005 66 0021.494 00
 DIVISION: 8, DISTRICT: 2
 0.6 MI. S. OF KIMBROUGH
 TURKEY CREEK REL.
 WILCOX COUNTY
 LEFT SIDE OF BRIDGE - UPSTREAM
 DATA SOURCE: PILE TIP ELEV. FROM PLANS AND PILE DRIVING RE
 DRAW STATIONS FROM: 75649.61 ft TO: 75869.61 ft

— 1940 Original Ground (LT.)
 - - 01'93 Sounding (14.0 ft LT.)
 - - 12'94 Sounding (45.9 ft LT.)
 - - 10'96 Sounding (14.0 ft LT.)
 - - 07'98 Sounding (14.0 ft LT.)

▲ Pile



BIN: 2266, SN: 0 AL0005 66 0021.494 00
 DIVISION: 8, DISTRICT: 2
 0.6 MI. S. OF KIMBROUGH
 TURKEY CREEK REL.
 WILCOX COUNTY
 RIGHT SIDE OF BRIDGE - DOWNSTREAM
 DATA SOURCE: PILE TIP ELEV. FROM PLANS AND PILE DRIVING RE
 DRAW STATIONS FROM: 75649.61 ft TO: 75869.61 ft

— 1940 Original Ground (RT.)
 - - 01'93 Sounding (14.0 ft RT.)
 - - 12'94 Sounding (45.9 ft RT.)
 - - 10'96 Sounding (14.0 ft RT.)
 - - 07'98 Sounding (14.0 ft RT.)

▲ Pile

