

STATE HIGHWAY DEPARTMENT OF GEORGIA

INTERDEPARTMENT CORRESPONDENCE

FILE OFFICE Cartersville
 DATE April 9, 1965

FROM W. H. Jackson, Field Division Engineer

TO C. A. Marmelstein, State Highway Bridge Engineer

SUBJECT I-24-1 (3) 00 CT. 2, DADE COUNTY

Submitted herewith is test pile data for Pile No. 5, Abutment No. 1, and Pile No. 3, Pier No. 2, of the bridge on SR-299 over I-24 on the above named project.

This office recommends the following order lengths:

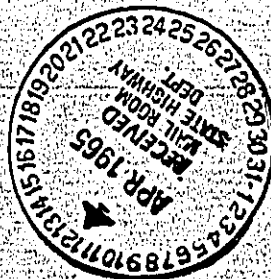
<u>Abutment No.</u>	<u>Length</u>	<u>Pier No.</u>	<u>Length</u>
1	20'	2	17'
2	41'	3	18'

W. H. Jackson
 W. H. Jackson
 Field Division Engineer

whj/jpa/hfb

attachments

cc: S. A. Reed
 Joseph N. Amis



MF 612

TEST PILE DATA SHEET

FILE NO. 5

PROJECT NO. I-24-1 (3) 00 Ct. 2

BENT NO. Abut. # 1

LOCATION Sr 299 over I-24

COUNTY Dade

WT. OF HAMMER 5000 Lb. #1 Vulcan

TYPE PILE Steel "H" SIZE 12 H 53 TIP 754.70 BUTT 772.91 LENGTH 18 2 1/2

HT. Of Hammer Fall	No. Blows	Total Pen. Inches	Avg. Pen. Per Blow	Elev. Tip	Bearing Tons	Ground Elev.	Remarks
3	10	6	.6	758.64	18.75	771.91	
3	10	4 3/4	.475	758.24	22.22		
3	20	6	.3	757.74	30.00		
3	20	4 3/4	.2375	757.34	34.28		
3	20	4	.2	757.01	37.50		
3	20	2 3/4	.1375	756.78	44.44		
3	20	2 1/2	.150	756.58	42.85		
3	20	2	.1	756.41	50.00		
3	20	2	.1	756.24	50.00		
3	20	1 1/2	.075	756.12	54.54		
3	20	1 1/4	.0625	756.01	57.14		
3	20	1	.05	755.93	60.00		
3	20	1	.05	755.85	60.00		
3	20	1	.05	755.76	60.00		
3	20	1	.05	755.68	60.00		
3	20	1 1/4	.0625	755.58	57.25		
3	40	2 1/2	.0625	755.37	57.25		
3	40	2 1/4	.0562	755.18	58.54		
3	40	2	.05	755.01	48.00		
3	40	1 1/2	.0375	754.89	63.15		
3	40	1	.0250	754.80	66.66		
3	40	1/2	.0125	754.76	70.58		
3	40	3/8	.009	754.73	71.77		
3	40	3/8	.009	754.70	71.77		

ECCICAW

MF 612

TEST PILE DATA SHEET

PILE NO. Lt. Footing P. 3

PROJECT NO. I-24-1 (3) 00 Ct. 2

BENT NO. Pier # 2

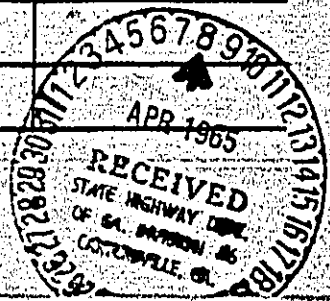
LOCATION SR 299 over I-24

COUNTY Dade

WT. OF HAMMER 4040

TYPE FILE Steel "H" SIZE 12 H 53 TIP 733.49 BUTT 733.48 LENGTH 14' - 6" 748.00

HT. Of Hammer Fall	No. Blows	Total Pen. Inches	Avg. Pen. Per Blow	Elev. Tip	Bearing Tons	Ground Elev.	Remarks
5	10	44	4.4	740.30	7.481		
10	5	21	4.2	738.55	7.769		
10	5	14 1/2	2.9	737.34	10.35		
10	10	16 1/2	1.65	735.97	15.24		
10	10	8 1/4	.825	735.28	22.13		
10	10	5 1/2	.555	734.82	25.98		
10	10	4 1/8	.412	734.48	28.61		
10	10	3 1/2	.35	734.19	29.92		
10	10	2 3/4	.275	733.96	31.68		
10	10	3	.3	733.71	31.07		
10	10	2 1/4	.225	733.52	32.97		
10	5	1/2	.1	733.48	36.72		To Rock (Broke
							Leads and Crimped
							Pile)



SOIL AND FOUNDATION REPORT
GEORGIA INTERSTATE
PROJECTS I-59 and I-24

Relocated S. R. - 299 over I-24
at Station 177 + 05
DADE COUNTY, GEORGIA

BEISWENGER, HOCH & ASSOCIATES, INC.
CONSULTING ENGINEERS
1006 GRANT STREET
AKRON 11, OHIO

CLEVELAND, OHIO OFFICE
TERMINAL TOWER
CHERRY 1-5450

JACKSONVILLE, FLORIDA OFFICE
PRUDENTIAL BUILDING
EXBROOK 8-5745

NASHVILLE, TENN. OFFICE
LIFE AND CASUALTY TOWER
CHAPEL 2-1581

July 1, 1959

Mr. John M. Wilkerson, Jr.
State Road Design Engineer
State Highway Department of Georgia
Atlanta, Georgia

Re: I-24-1-(1)-00 (I-409-1-(1) "old")
Dade County

Dear Sir:

We are enclosing herewith the Soil & Foundation Report of the structure carrying Relocated SR 299 over Project I-24. The enclosed report was prepared by G. K. Jewell & Associates and contains a complete outline of the boring and testing program of subsurface soils investigation.

The enclosed report has been reviewed during its preparation and in its final form by the Design Engineers of Beiswenger, Hoch and Associates and we concur with the findings set forth with the following exception:

- (1) The abutments have been extended using piling to bed rock in conformance with Georgia Highway Department practice.

Very truly yours,

BEISWENGER, HOCH, & ASSOCIATES

W. K. DeHaven
W. K. DeHaven

WKD:dv
enc.

G. K. JEWELL AND ASSOCIATES
Soil and Foundation Engineers

195 CHITTENDEN AVENUE

COLUMBUS 1, OHIO

June 19, 1959

73

G. K. JEWELL, P. E.

AXMINSTER 4-3745

Beiswenger, Hoch and Associates
Consulting Engineers
1006 Grant Street
Akron 11, Ohio

Attention: Mr. W. K. DeHaven

Re: Soil and Foundation Report
Georgia Interstate Projects I-59 and I-24
Relocated SR-299 over I-59 and I-24
Dade County, Georgia

Gentlemen:

Submitted here is our soil and foundation report for
Relocated SR-299 over I-59 and I-24 of your Georgia
Interstate Projects I-59 and I-24.

Please do not hesitate to call upon us if there are any
questions concerning the contents of this report or the
area it describes.

Yours very truly,

Trevor P. Craig

Trevor P. Craig

G. K. Jewell

TPC:GKJ:pd

Submitted: 6 copies

SOIL AND FOUNDATION REPORT
GEORGIA INTERSTATE PROJECTS I-59 and I-24
RELOCATED SR-299 OVER I-59 and I-24
DADE COUNTY, GEORGIA

Report to
BEISWENGER, HOCH AND ASSOCIATES, INC.
CONSULTING ENGINEERS
Akron, Ohio

Prepared by
G. K. JEWELL AND ASSOCIATES
Columbus, Ohio

June 1959

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INTRODUCTION

Relocated SR-299 will cross proposed Georgia Interstate I-59 and I-24 on a single steel beam structure at approximately Station 177+03. The two end spans, 29.0 and 32.5 feet long will be simply supported; the two central spans, 84.5 and 90.0 feet long, will be continuous members. The proposed structure will be superelevated 0.08 foot/foot on a 7 degree curve, and skewed approximately 67 degrees left-forward. The substructure will consist of two stub abutments and three intermediate piers.

Georgia Interstate I-59 and I-24 will be a combined cut and fill section at this intersection. The east and west abutments of the proposed structure will be in a 15 foot cut and a 16 foot fill respectively. The west abutment fill will increase to a height of approximately 45 feet immediately to the west of the proposed structure site. North of the structure, I-59 and I-24 fill will be 60 to 90 feet in height. The outside piers will be below the existing ground surface; the center pier will be in fill.

Structural loads were estimated as follows:

<u>Loads</u>	<u>Abutments</u>	<u>Center Piers</u>	<u>End Piers</u>
Dead Load	85 kips	518 kips	250 kips
Live Load	105 kips	196 kips	140 kips
Weight of Unit	75 kips	127 kips	136 kips
Total Load	265 kips	841 kips	526 kips

FIELD INVESTIGATION

Six borings, located in the field by the personnel of Beiswenger, Hoch and Associates, were made to investigate the

foundation conditions at this site. Boring 1409 was a secondary exploratory boring drilled because of the hillside location of the proposed structure, and to further investigate the extensiveness of the very-soft silty clay encountered in Boring 1408 at Elevation 740.

A plan of borings is shown on Plate 1 in the Appendix of this report. Rotary drilling truck-mounted and skid rigs were used. The walls of the boring were maintained during drilling and sampling by using bentonitic drilling fluid or "mud" in place of casing. Soil samples were obtained with 2-inch and 3-inch O.D. split-barrel and 3-inch O.D. Shelby tube samplers. NX core-barrels were used to core the consolidated bedrock. Soil samples were identified and logged in the field, and preserved for shipment to the soil laboratory in glass jars. A Shelby tube sample was shipped sealed in the tube with petrowax.

Rock cores were identified by the field personnel of G. K. Jewell and Associates, preserved in wooden core boxes, and stored at the office of Beiswenger, Hoch and Associates in Wildwood, Georgia.

Individual logs of borings are shown on Plates 5 through 10 in the Appendix of this report. The logs are preceded by an explanation of notes used on the boring logs and presented as Plate 4.

LABORATORY TESTING

All soil testing was performed in the soil laboratory of

G. K. Jewell and Associates in Columbus, Ohio. Samples were visually identified, and classified according to the results of Atterberg Limits, and natural moisture content determinations. A natural unit weight determination was made on the undisturbed sample to further evaluate the condition of the deep deposit of very-soft to firm silty clay at the east end of the structure. The shearing strength and compressibility characteristics of the in-place soils were evaluated on the basis of undisturbed test results of similar materials sampled at other structure sites on this project.

Natural moisture contents and Atterberg Limit and unit weight determination results were recorded on the individual boring logs, as were several hand penetrometer readings obtained in the field.

The classification of soil, as shown on the boring logs, is in accordance with the Highway Research Board System.

GENERAL SOIL CONDITIONS

The center-line of Relocated SR-299 will cross over a gulley draining into the Wauhatchie Creek Valley. A difference of 35 feet in elevation existed in the ground surface along the boring profile.

The unconsolidated overburden consisted of soft to stiff brown silty clay containing variable percentages of sand and shale fragments, and soft to very-soft gray, green, and brown shale which was quite similar in appearance to a hard, dense soil. The shale was present near the ground surface at the

extremities of the location and was overlain by 4 to 8 feet of silty clay elsewhere. The very-soft shale was underlain by 7 to 15 feet of very-soft to stiff silty clay containing shale fragments and fine sand at the east end of the proposed structure.

The consolidated bedrock varied in type and consistency throughout the site. Medium-hard to hard gray limestone and shaley limestone was interbedded with medium-hard to hard shale and calcareous shale. Beneath the west end of the proposed structure, the interbedded thin shale layers were soft to very-soft, and hard brown silty clay was intermixed with the bedrock.

The surface of the bedrock varied somewhat similar to the existing ground surface.

GROUND-WATER TABLE

The average level at which the ground-water table stabilized in most of the borings was Elevation 740. This was approximately the elevation of the bottom of the gully where it crossed the proposed centerline of SR-299.

ANALYSIS AND RECOMMENDATIONS

West Abutment and Embankment

The fill at the west abutment will vary in height; however, a settlement analysis based on the combined loads of the abutment and a 16-foot embankment indicated that less than $\frac{1}{4}$ inch of settlement should occur at this location.

The ground surface drops off to the west and to the north. The overburden was soft shale and stiff to hard silty clay at a low moisture content, however, and should be adequately safe with respect to foundation shearing failure. Surficial soft zones encountered within the grading limits should be removed to prevent the possibility of local failures beneath the down-hill slopes.

A continuous abutment approximately 35 feet by 6 feet set 8 feet into a controlled fill compacted to 100 percent of "Standard" density at the optimum moisture content or slightly on the dry side will have an allowable unit load of at least 2 tsf with a factor of safety of 3.

If it is mandatory that the abutment load be supported on the consolidated bedrock it is recommended that cast-in-place concrete supports be considered, drilled to medium-hard limestone at about Elevation 750. The allowable load for the limestone will be at least 20 tsf.

East Abutment

The east abutment footing will be at about Elevation 767 in very-soft to soft shale. A layer of firm silty clay "and" coarse to fine sand, gravel and shale fragments was found approximately 4 feet below the footing elevation.

The settlement beneath a continuous footing approximately 40 feet by 6 feet set at the above elevation will be negligible because of the removal of in-place soil and soft shale for the approach cut. It is recommended that the allowable unit

load for such an abutment footing not exceed 3 tsf.

The medium-hard limestone here will be at Elevation 748 and cast-in-place concrete supports could be considered drilled to this depth for the abutment.

West Pier

The west pier footing should be extended uniformly to bedrock which will be encountered at Elevation 751 or slightly lower. The footing should be keyed into the hard shaley limestone and medium-hard brown shale.

An allowable unit load of 20 tsf will produce only minor settlements beneath the footing. The medium-hard brown shale occurs in very thin interbedded layers and should not greatly affect the footing design.

Center Pier

Placed at Elevation 746, the center pier footing would be at or near the existing ground surface at the southwest or up-hill end, and on 5 feet of I-59 and I-24 fill at the northeast or down-hill end.

It would be feasible to place the center pier on a spread footing at this location if the footing excavation were extended in depth, and carefully backfilled, such that the footing at no point directly contacted the upper 3 to 4 feet of soil in the "active" weathered zone. It was estimated that the maximum settlement for such a condition would be approximately 3/4-inch, but that the settlement beneath the down-hill end would be greater than beneath the up-hill end.

Because of the hillside location of the proposed structure, the nearness of the footing location to a natural drainage passage, and the proximity of sound rock (from 10 to 15 feet below normal footing elevation), it is recommended that the center pier be placed on an extended footing drilled into bedrock. The medium-hard shaley limestone will be encountered at Elevation 731 under the northeast end and should be found at a slightly higher elevation toward the southwest end of the footing.

An allowable unit load of 20 tsf for this type of footing would cause negligible settlement.

East Pier

It would be feasible to place the east pier on a spread footing. The eventual settlement because of the consolidation of the underlying in-place soils would be approximately 1/2-inch. The footing, however, would be in very-soft shale underlain by soft silty clay at one end and in firm silty clay at the other end, and a uniform footing contact pressure would produce slight additional, but unpredictable differential deformations beneath the footing with a normal six-foot surcharge above the contact surface.

It would not be feasible to lower the spread footing because of the soft silty clay underlying the southwest end of the footing. It is recommended, therefore, that the east pier be supported on an extended footing drilled into bedrock.

Medium-hard calcareous shale and hard limestone will be encountered between Elevation 737 and 731 (south to north end), and will sustain allowable loads of 20 tsf resulting in negligible settlement.

Summary of Recommended Design

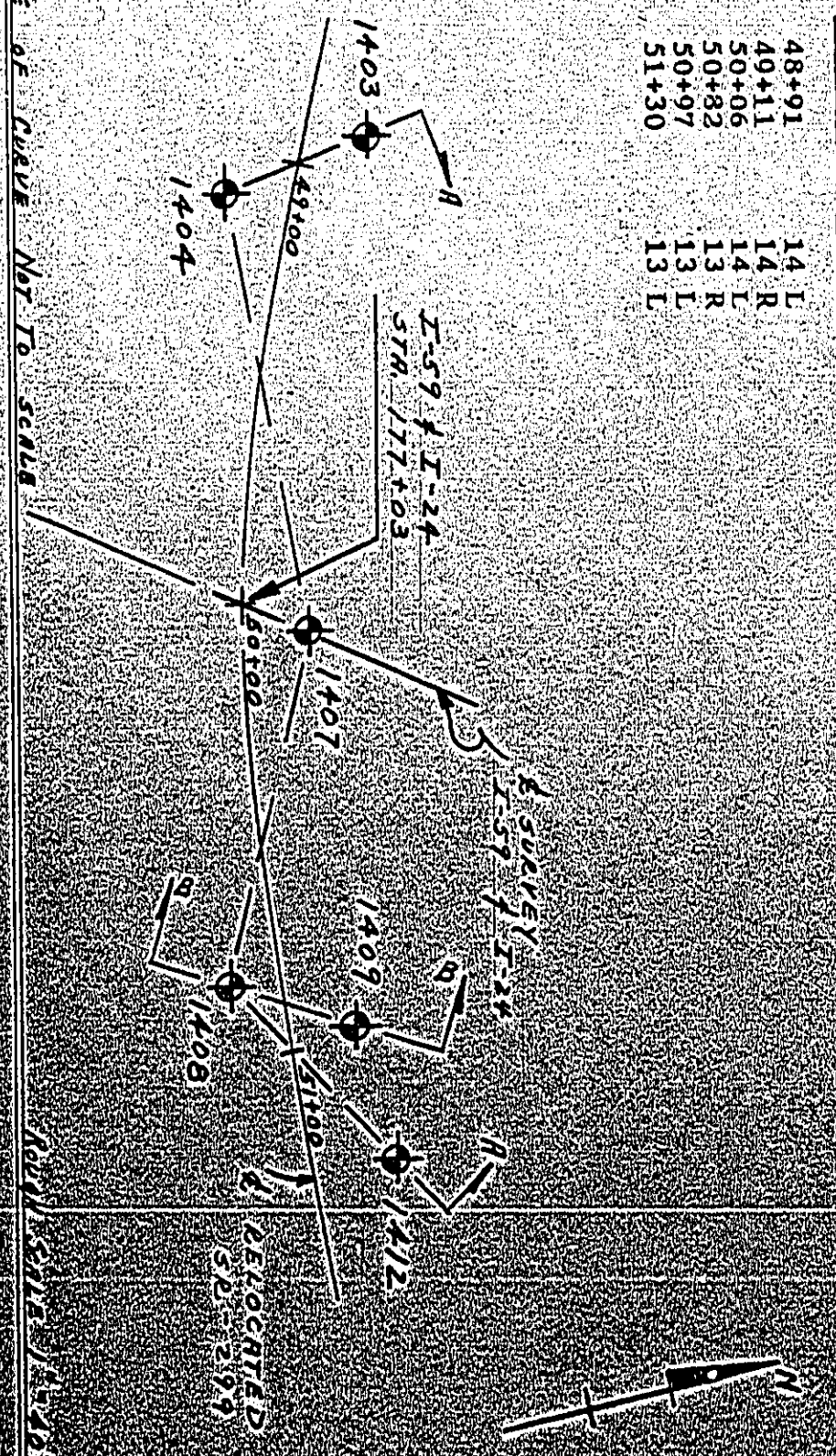
1. West Abutment - spread footing approximately 35 feet by 6 feet set 8 feet into the approach embankment, or a cast-in-place and drilled-in unit to Elevation 750.
2. West Pier - footing lowered to and keyed into hard shaley limestone at approximately Elevation 751.
3. Center Pier - extended footing drilled into bedrock at approximately Elevation 731.
4. East Pier - extended footing drilled into bedrock at Elevations 737 to 731 (south to north end).
5. East Abutment - spread footing approximately 40 feet by 6 feet set 8 feet below grade in soft to very-soft shale at approximately Elevation 767, or drilled-in footing to Elevation 748.

APPENDIX

PLAN OF BORINGS
GEORGIA INTERSTATE PROJECTS I-59 and I-24
RELOCATED SR-299 OVER I-59 and I-24
DADE COUNTY, GEORGIA

Boring	Station	Offset
1403	48+91	14 L
1404	49+11	14 R
1407	50+06	14 L
1408	50+82	13 R
1409	50+97	13 L
1412	51+30	13 L

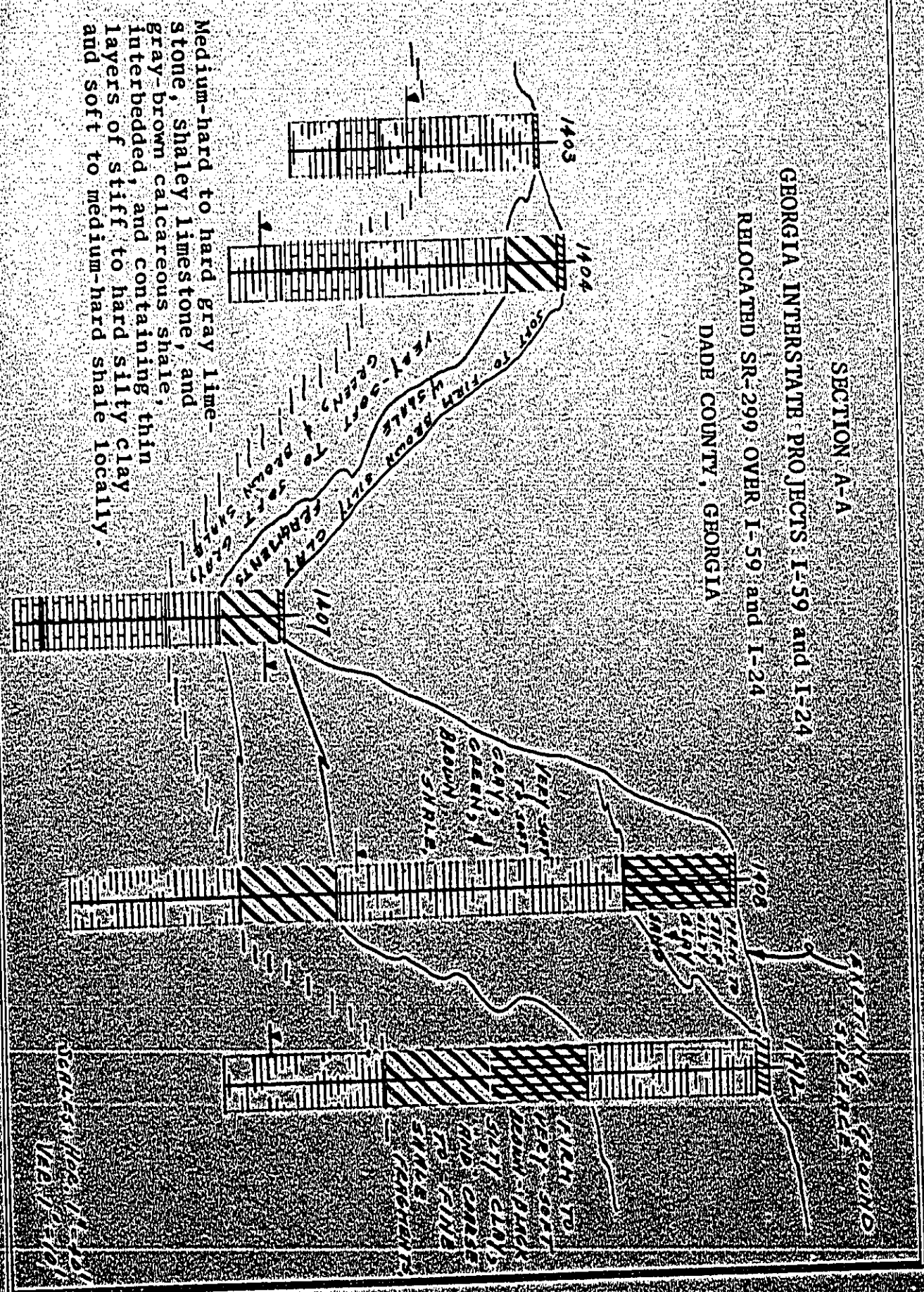
NOTE: DEGREE OF CURVE NOT TO SCALE



RELOCATED SR-299

ELEVATION - FEET

710
720
730
740
750
760
770



SECTION A-A

GEORGIA INTERSTATE PROJECTS I-59 and I-24

RELOCATED SR-299 OVER I-59 and I-24

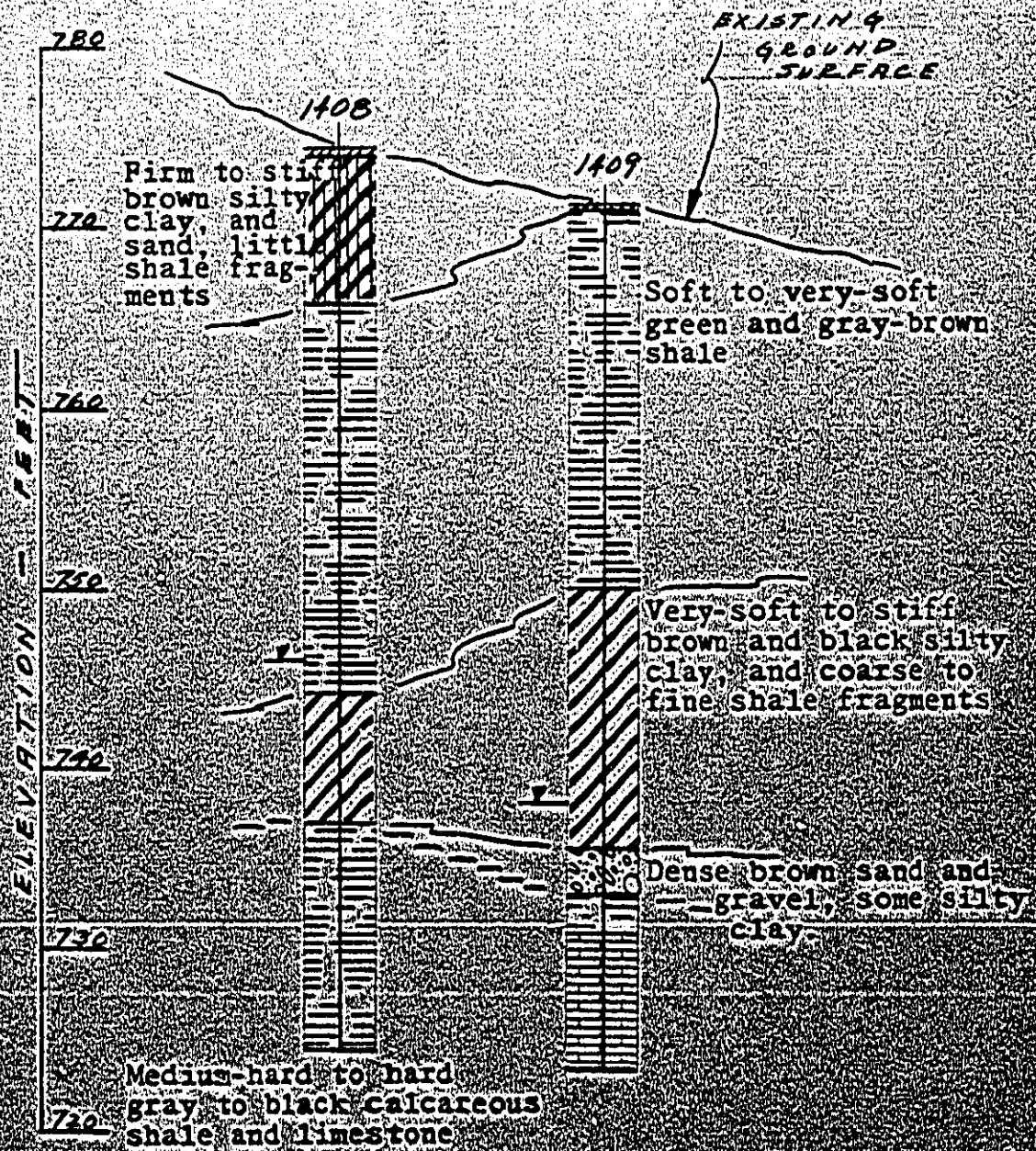
DADE COUNTY, GEORGIA

SECTION B-B

GEORGIA INTERSTATE PROJECTS I-59 and I-24

RELOCATED SR-299 OVER I-59 and I-24

DADE COUNTY, GEORGIA



G. K. JEWELL AND ASSOCIATES
SOIL AND FOUNDATION ENGINEERS

SCALE: HORIZ. 1" = 40'
VERT. 1" = 10'

EXPLANATION OF NOTES ON BORING LOGS



Sample recovered.



Sample not recovered.

9/9/9 - The number of blows 9/9/9/ of a 140-pound hammer falling 30 inches to drive a "standard" split-barrel sampler (1 3/8" I.D., 2" O.D.) for each 6 inches of penetration.

S - Split-barrel sampler - 1 3/8" I.D. - (standard)

2S - Split-barrel sampler - 2" I.D.

3S - Split-barrel sampler - 3" I.D.

9/9/9 - The number of blows 9/9/9 to drive a split-barrel sampler other than the "standard" split-barrel sampler.

2S

P - Shelby tube sampler - 3" O.D.

R - Refusal - sampler could not be advanced further.

30-2" - Number of blows (30) to drive a "standard" split-barrel sampler a certain number of inches (2).

P/400 - Hydraulic pressure (400) in pounds per square inch to push a Shelby tube (P) for the last foot of penetration.

P/400 - Sampler (P) pushed for a certain number of inches (10)
10"R and then could not be advanced further (R) hydraulically.

P/D - Sampler (P) advanced by the weight of the drill rods (D).

S/H - Sampler (S) advanced by the weight of the drill rods and 140-pound hammer.

Pist. - Piston sampler - using 3" O.D. Shelby tube.

NX - Rock core attempted with NX-M double tube core barrel. Approximate diameter of core 2 1/8 inches.

BX - Rock core attempted with BX core barrel. Approximate diameter of core 1 5/8 inches.

AX - Rock core attempted with AX core barrel. Approximate diameter of core 1 1/8 inches.

50% - Percentage (50) of rock core recovered.

LOG OF BORING NO. 1403
 GEORGIA INTERSTATE PROJECTS I-59 and I-24

DATE 4/13-14/59 TYPE 3" O.D. Split-barrel NX core

LOC See Plate 1

DEPTH, FEET	SAMPLE NO.	SAMPLES	BLOWS PER	DESCRIPTION	UNIT DRY WT. LB/FT ³	SHEARING STRENGTHS/FT ²		MOISTURE CONTENT %		PENETROMETER P.S.F.
						0	0.5	1.0	1.5	
				SURFACE ELEVATION 761.2						
				Topsoil						
0				Very-soft to soft brown to gray weathered shale						
5			32/45-5							
10			NX 67%	Hard light gray limestone, vertical fractures filled with hard brown silty clay.						
15			45	Very-soft to soft brown shale.						
20				Medium-hard to hard light gray limestone, mostly sound, @ 11.5' to 13' shaley						
25				Soft to medium-hard dark gray calcareous shale, horizontally bedded, @ 18.4' to 18.5' shaley limestone						
30										
35										
40										
45										
				Used Aquagel and no casing.						

65 No 73

COMPLETION DEPTH 18.5' WATER DEPTH 10.5' DATE 4/15/59
 APPLIED ENERGY 4200 INCH POUNDS PER BLOW

LOG OF BORING NO. 1404
 GEORGIA INTERSTATE PROJECTS I-59 and I-24

DATE 4/13/59 TYPE 3" O.D. Split-barrel NX core LOC See Plate 1

DEPTH, FEET	SAMPLE NO.	SAMPLES	BLOWS PER	DESCRIPTION	UNIT DRY WT. LB/FT ³	SHEARING STRENGTH TONS/FT ²		MOISTURE CONTENT %		PENETROMETER T.S.F.
						0	0.5	1.0	1.5	
				SURFACE ELEVATION 763.0						
				Topsoil						
5	1	65		Soft brown silty clay, little shale fragments. Est. A-7-6						
10	2	15/17/37		Very-soft to soft brown shale little coarse to fine sand.						
15		36								
20	3	17X 98%		Hard gray shaley limestone, sound - @ 17.0' to 17.2' medium-hard brown shale. - @ 19.7' to 20.0' medium-hard brown shale.						
25	4	90		Hard interbedded gray limestone and shale, about 1/8" bedding planes.						
30										
35										
40										
45										
50										
55										
60										
65										
70										
75										
80										
85										
90										
95										
100										
				Used Aquagel and no casing						

Job No. 73

COMPLETION DEPTH 25.20' WATER DEPTH 22.5' DATE 4/14/59
 APPLIED ENERGY 4200 INCH POUNDS PER BLOW

LOG OF BORING NO. 1407
 GEORGIA INTERSTATE PROJECTS I-59 and I-24

DATE 4/11/59 TYPE 3" O.D. Split-barrel NX core LOC See Plate 1

DEPTH, FEET	SAMPLE NO.	SAMPLES BLOWS PER	DESCRIPTION	UNIT DRY WT. LB./FT ³	SHEARING STRENGTH-TONS/FT ²		MOISTURE CONTENT %		PENETROMETER T.S.F.
					0	0.5	1.0	1.5	
0			SURFACE ELEVATION 741.0						
0			Topsoil						
0			Soft brown silty clay.						
0			Est. A-7-6						
5	1	30/45	Very-soft to soft dark gray-brown shale.						
10	2	36R	Medium-hard to hard blue-gray shaley limestone, mostly sound						
10	2	NX	- @ 16.7' to 17.0' vertical fracture.						
10	2	91%							
15	3	100	Medium-hard to hard gray limestone, strolitic structure, sound.						
15	3		- @ 19.7' to 20.0' medium-hard gray shaley limestone						
20									
25									
30									
35									
40									
45									
50									
55									
60									
65									
70									
75									
80									
85									
90									
95									
100									

Used Aquagel and no casing.

COMPLETION DEPTH 20.0' WATER DEPTH 1.2' DATE 4/13/59
 APPLIED ENERGY 4200 INCH POUNDS PER BLOW

LOG OF BORING NO. 1408
 GEORGIA INTERSTATE PROJECTS I-59 and I-24

2" O.D. Split-barrel
 DATE 4/8-9/59 TYPE NX core LOC See Plate 1

DEPTH, FEET	SAMPLE NO.	SAMPLES	BLOWS PER	DESCRIPTION	UNIT DRY WT. LB/FT ³	SHEARING STRENGTH TONS/FT ²		MOISTURE CONTENT %		PENETROMETER T.S.F.
						0	0.5	1.0	1.5	
SURFACE ELEVATION 774.4										
0				Topsoil						
5	1	7/11/58		Firm to stiff brown silty clay and coarse to fine sand, little shale fragments.						
				A-6						
10	2	17/19/58		Soft to very-soft gray-brown shale.						
15	3	14/18/58								
20	4	19/24/58								
25	5	12/15/50								
30	6	6/8		Very-soft to firm brown silty clay, and coarse to fine shale fragments.						
				A-7-6						0.5
35	7	3/1/50		Medium-hard gray calcareous shale						
40	8	7/10		becoming dark gray with depth						
45	9	9/3		@ 44" to 50", breccia structure with surrounded limestone fragments.						
				@ 46" to 48", 2" to 1" cavities.						
				Used Aquagel and no casing						
COMPLETION DEPTH 50.0				WATER DEPTH 28.3		DATE 4/10/59				
APPLIED ENERGY 4200				INCH POUNDS PER BLOW						

Job No. 73

LOG OF BORING NO. 1409
 GEORGIA INTERSTATE PROJECTS I-59 and I-24
 3" O.D. Split-barrel
 3" O.D. Shelby tube
 DATE 4/28-29/59 TYPE NX core

LOC See Plate 1

DEPTH, FEET	SAMPLE NO.	SAMPLES	BLOWS PER SAMPLE	DESCRIPTION	UNIT DRY WT. LB./FT ³	SHEARING STRENGTH TONS/FT ²		MOISTURE CONTENT %		PENETROMETER T.S.F.	
						0	0.5	1.0	1.5		2.0
				SURFACE ELEVATION 771.5							
				Topsoil							
5	1	1	14	Very-soft to soft green and gray-brown shale.							
10	2	1	17								
15	3	1	17								
20	4	1	17								
25	5	1	100	Firm to stiff brown to black silty clay, little coarse to fine sand, trace shale fragments.							
30	6	1	100								
35	7	1	300								
40	8	1	100	Dense gray-brown coarse gravel little coarse to fine sand							
45	9	1	107	Soft to medium-hard gray to black shale, broken							
50	10	1	85	Hard gray to black limestone from 44.5' to 45.6' solution cavities from 1/8" to 1/2" diameter.							
55	11	1	74								
60	12	1	93								
				Used Aquagel, no casing.							
COMPLETION DEPTH				47.8'	WATER DEPTH		33.0'	DATE		5/5/59	
APPLIED ENERGY				4200	INCH POUNDS PER BLOW						

Job No. 73

LOG OF BORING NO. 1412
 GEORGIA INTERSTATE PROJECTS I-59 and I-24

DATE 4/9-10/59 TYPE 3" O.D. Split-barrel NX core LOC See Plate 1

DEPTH, FEET	SAMPLE NO.	SAMPLES	BLOWS PER	DESCRIPTION	UNIT DRY WT. LB/FT ³	SHEARING STRENGTH TONS/FT ²		MOISTURE CONTENT %		PENETROMETER T.S.F.
						0	0.5	1.0	1.5	
SURFACE ELEVATION 776.6'				Topsoil						
0				Very-soft green-brown shale.						
5	1	24	30							
10	2	24	35							
15	3	15	11	Firm brown silty clay, and coarse to fine sand, little coarse to fine gravel, trace shale fragments.						
20	4	14	18	- becoming stiff with depth						
25	5	10	19	- @ 29.0' lost drilling fluid						
30	6	36R		A-6 becoming A-7-6						
35	7	87		Interbedded: medium-hard light gray limestone and medium-hard dark gray to dark brown calcareous shale, from 30.0' to 33.8' limestone fragments, appear cemented by brown shale matrix fragments sub-rounded.						
40	8	48								
45				Used Aquagel and no casing.						

Job No. 73

COMPLETION DEPTH 41.0' WATER DEPTH 37.7' DATE 4/11/59
 APPLIED ENERGY 4200 INCH POUNDS PER BLOW