

CACHE

FOUNDATIONS

Memorandum

UTAH DEPARTMENT OF TRANSPORTATION

DATE: May 19, 1981

TO : Those Listed Below T.12N. R.1W.
SEC.9Q

FROM : Heber A. Vlam, P.E., Engineer of Materials and Research H.V.
1154

SUBJECT: Little Bear River Bridge at Benson Marina. Cache County Road
Over Little Bear River, County Road Station 8+75.00

SITE CONDITIONS

A single span prestressed beam structure is proposed to carry a Cache County Road over the Little Bear River. The structure will be 115 feet long and 38 feet wide with a crossing angle of 90 degrees. The approach embankments are approximately 29 feet high.

Surface drainage at the structure site is good.

SUBSURFACE EXPLORATION

Two test holes were drilled at this site with depths of 72 feet and 102 feet. Correlation between test holes is fair and a general description of the subsurface materials is as follows: in Hole #1 from the ground surface to 16 feet - silty clay with a trace to some sand; from 16 feet to 54 feet - silty fine sand with some lenses of silty clay; from 54 feet to the maximum depth of exploration - silty clay with a few thin lenses of sandy silt. In Hole #2 from the ground surface to 17 feet - clayey silt with some sandy silt; from 17 feet to 35 feet - silty fine sand with lenses of clayey silt and silty clay; from 35 feet to 60 feet - silty clay with lenses of sand; from 60 feet to the maximum depth of exploration - silty fine sand with occasional layers of silty clay and clayey silt. Refer to the Drilling Log, Fig. 1, for more detailed descriptions of subsurface materials and test hole locations.

The ground water table was measured at an approximate elevation of 4407 feet, but it will fluctuate with the water level of the reservoir.

FOUNDATION RECOMMENDATIONS

One-foot diameter steel pipe piles are recommended to support this structure. The piles may be loaded to 120 Kips per pile. The estimated tip elevations for 120 Kip piles are as follows:

<u>Location</u>	<u>Est. Pile Tip Elev., Ft.</u>	<u>Piles Length ft.</u>
West Abut. #1	4360	44
East Abut. #2	4345	39

LL-PL=PI

UTAH STATE DEPARTMENT OF TRANSPORTATION

MATERIALS AND RESEARCH

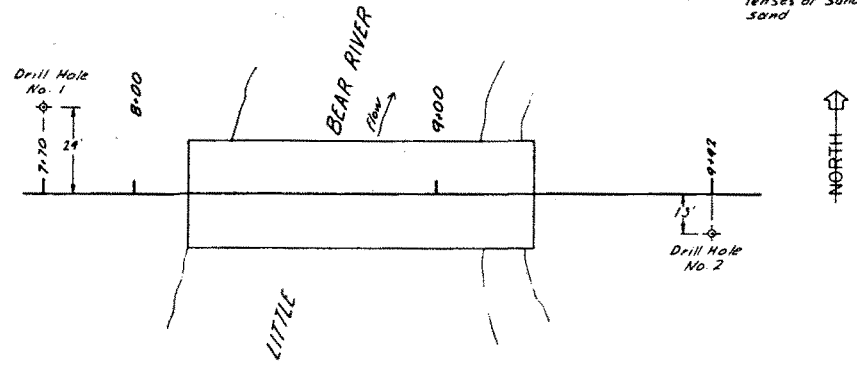
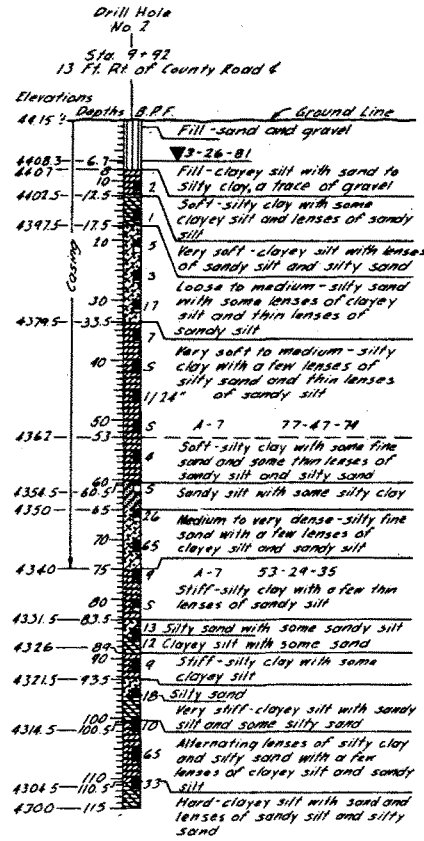
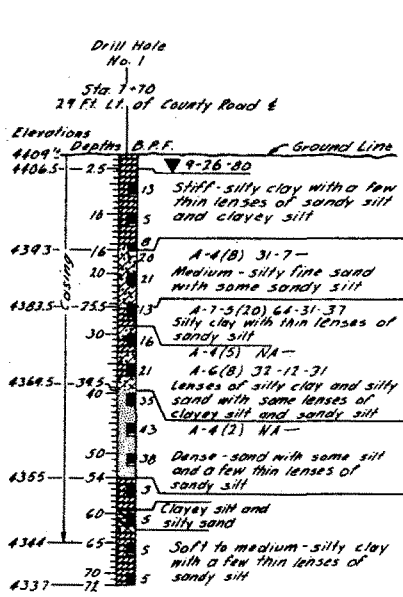
Project Number Little Bear River Bridge
 Project Name Benson Marina

Summary of Test Data

Sheet 1 Of 1
 Structure 30-F

Boring No.	Depth	Grading Analysis				Group Classification	Atterberg Limits		Water Cont. ω %	Wet Unit Weight γ P.C.F.	Dry Unit Weight γ_s P.C.F.	Specific Gravity Gs	Permeability k 10^{-4} cm/sec.		Unconfined Strength q_u T.S.F.	Shear Strength			
		Gravel	Coarse Sand	Fine Sand	Silt and Clay		Liquid Limit L.L.	Plastic Index P.I.					Total Stress			Effective Stress		Type Of Test	
													ϕ^o	C T.S.F.		ϕ^o	C' T.S.F.		
1	12							38	116	84				1.01					
1	17	0	0	11	89	A-4(8)	31	7 ^{PL-24}											
1	27	0	0	4	96	A-7-5(20)	64	31 ³³	37	120	87			1.11					
1	32	0	4	37	59	A-4(5)	NA												
1	37	0	5	24	71	A-6(8)	32	12 ²⁰	31	128	98			.87					
1	47	0	10	43	47	A-4(2)	NA												
1	62							60	98	61				2.71					
2	52						77	47 ³⁰	74	98	56			.72					
2	77						53	29 ²⁴	35	108	81			.93					

S - Shelby Sample P - Penetration Sample T - Triaxial Shear Test C - Consolidation DIR - Direct Shear Test UU - Unconsolidated, Undrained
 CU - Consolidated, Undrained C_u - Consolidated, Drained



KEY TO DRILLING LOG

RELATIVE DENSITY (NON-PLASTIC SANDS & SILT)
 VERY LOOSE - LESS THAN 4 BLOWS PER FOOT
 LOOSE - 4 TO 10 BLOWS PER FOOT
 MEDIUM - 10 TO 30 BLOWS PER FOOT
 DENSE - 30 TO 50 BLOWS PER FOOT
 VERY DENSE - MORE THAN 50 BLOWS PER FOOT

CONSISTENCY (PLASTIC SILT & CLAY)
 VERY SOFT - LESS THAN 2 BLOWS PER FOOT
 SOFT - 2 TO 4 BLOWS PER FOOT
 MEDIUM - 4 TO 8 BLOWS PER FOOT
 STIFF - 8 TO 15 BLOWS PER FOOT
 VERY STIFF - 15 TO 30 BLOWS PER FOOT
 HARD - MORE THAN 30 BLOWS PER FOOT

TOPSOIL OR FILL	LOESS	SANDY CLAY
GRAVEL	LIMESTONE	CLAYEY SAND
SAND	CONGLOMERATE	SILTY SAND
SILT	DOLomite	SILTY SILT
CLAY		SANDY SILT
SHALE		

DRILL HOLE NO. 0400 E OR LT OR RT IN FT. OFFSET.

GROUND ELEVATION	DEPTHS	GROUND LINE
4833	5'	EXAMPLE TYPICAL STIFF MEDIUM PLASTIC SILTY CLAY, SOME SILT
		AASHO LL-PI-W
		A-6M 17-7-11
		DATE
GROUND WATER TABLE	4832	
		S - THIN WALL SHELBY TUBE, UNDISTURBED SAMPLER USED.
STRATA CHANGE	4846	
		R - SPLIT BARREL UNDISTURBED SAMPLER WITH LINER PINS OR CALIFORNIA TYPE SAMPLER
LOCATION OF SAMPLE		
SAMPLE NOT RECOVERED		REASON NOT RECOVERED
BOTTOM OF HOLE	4831	
		CLASSIFICATION OF EACH SAMPLE AND RESULTS OF CLASSIFICATION TESTS.

NO. OF BLOWS OF A 140 LB. HAMMER FALLING 30 INCHES REQUIRED TO DRIVE A STD. 1 1/2 IN. DIA. 2.5 FT. SAMPLE TUBE 1 FT.

ABBREVIATIONS
 LL - LIQUID LIMIT IN %
 PI - PLASTIC INDEX
 N - NATURAL MOISTURE CONTENT IN %
 W.R. - WELL GRADED
 PEN. - PENETRATION
 B.W.T. - GROUND WATER TABLE
 B.P.F. - BLOWS PER FOOT
 N.P. - NON PLASTIC

NOTE: REFUSAL = 50 OR MORE BLOWS PER 6"

UTAH DEPARTMENT OF TRANSPORTATION
 STATE LABORATORY
 MATERIALS AND RESEARCH SECTION
 LITTLE BEAR RIVER AT BENSON MARINA
 COUNTY ROAD OVER LITTLE BEAR RIVER

DESIGNED BY: K. STIFF	CHECKED BY: B. S. SMITH	PREPARED BY: B. S. SMITH
CONDUCTED BY: P. J. SCHMIDT	CHECKED BY: F. PAUL	DATE: 8-75
COMPILED BY: L. H. BOWMAN	CHECKED BY:	SCALE: CAL. 1"
APPROVED:		

Date Drilled: Sept 1980 and March 1981

NO.	DATE	REVISIONS

AREA NUMBER 1154, LOCATION= 421200N, 4626000E UTM coordinates

BORING NUMBER 1

BORING DEPTH= 72.00 ft. GROUND WATER DEPTH= 2.50 ft.

DEPTH (ft.)	CRITICAL ACCELERATION (a/g)	SOIL TYPE	N	N1	SILT CORRECTION
16.25	0.7241	A4	20.0	26.6	7.5
21.00	0.5996	A4	21.0	25.1	7.5
31.25	0.2969	A4	16.0	16.3	7.5
36.00	0.3838	A4	21.0	20.1	7.5
41.00	0.9845	A24	35.0	31.4	5.0
46.00	2.0016	A24	43.0	36.4	5.0
51.25	0.9697	A24	38.0	30.4	5.0

MINIMUM CRITICAL ACCELERATION FOR BORING= 0.2969

BORING NUMBER 2

BORING DEPTH=115.00 ft. GROUND WATER DEPTH= 6.75 ft.

DEPTH (ft.)	CRITICAL ACCELERATION (a/g)	SOIL TYPE	N	N1	SILT CORRECTION
21.00	0.1905	A4	5.0	5.5	7.5
26.25	0.1487	A4	3.0	3.1	7.5
31.25	0.3367	A4	17.0	16.3	7.5
66.25	0.4712	A4	26.0	17.3	7.5
71.25	7.5998	A4	65.0	41.7	7.5
85.50	0.2626	A4	13.0	7.5	7.5
96.25	0.2282	A4	18.0	9.7	7.5

MINIMUM CRITICAL ACCELERATION FOR BORING= 0.1487

MINIMUM CRITICAL ACCELERATION FOR AREA= 0.1487
