T.5N. R.1W. SEC. 20 R

1027

Memorandum: UTAH STATE DEPARTMENT OF HIGHWAYS

DATE: Sept. 12, 1973

FOUNDATIONS
Filed 9-17-73 LL

TO : Those Listed Below

FROM : V. J. Stephenson, Engineer of Materials & Tests
by David T. Price

SUBJECT: I-80N-6(7)46 - South Weber Interchange; Foundation Report on Connection Road over I-80N at Station 138+54 EBL I-80N

72-7-FS-77

SITE CONDITIONS

A three span continuous beam structure 476 feet long and 60 feet wide is proposed at this site. Interstate 80N will pass under this structure at a 120° skew angle. The structure approach embankments will be approximately 25 to 32 feet high.

Surface drainage is good and follows the slope of the terrain northerly.

SUBSOIL EXPLORATION

Three test holes were drilled to depths of 70, 60 and 60 feet at this site. Correlation between drill holes was good and in general, the subsoils are: from the ground surface to nine feet - medium to very dense gravel and silty sand or sandy silt with some cobbles overlain with topsoil; from nine feet to the limits of exploration - medium to very dense silty sand and sandy silt with lenses of clayey silt and silty clay. An exception to this generalized profile is Drill Hole 2 which has 4.5 feet of road fill placed on the surface. In addition there is a layer of very stiff, silty clay with some fine sand from 11 to 18 feet.

An artesian flow of one gallon per minute was encountered in Drill Hole 3 at a depth of 37 feet. The ground water table was encountered at an elevation of 4417 feet in Drill Hole 1 and 4420 feet in Drill Hole 2.

Refer to the attached Drilling Logs (Figure 1) for further details.

FOUNDATION RECOMMENDATIONS

A review of the boring log data indicates that the potential load supporting soils begin approximately 20' to 30' below the natural ground surface and extend to the full depth of exploration. The boring logs also show that the load supporting soils vary considerably in relative density (N=29 to refusal) and description (silty sand, sandy silt, and silty clay lenses). Shear strength test data indicate that the angle of internal friction (Ø) varies between 35 and 40 degrees for these soils.

It is recommended that piles be used as the structure foundation supports because of the relatively high structure loads and poor surface soils. The load carrying capacity of the piles was determined by several methods of computation which included side friction and end bearing. All methods indicated that for pile loads of 50 tons, as requested by the Structures Department, the piles should be driven to a depth of approximately 50' below the natural ground surface. To attain this depth

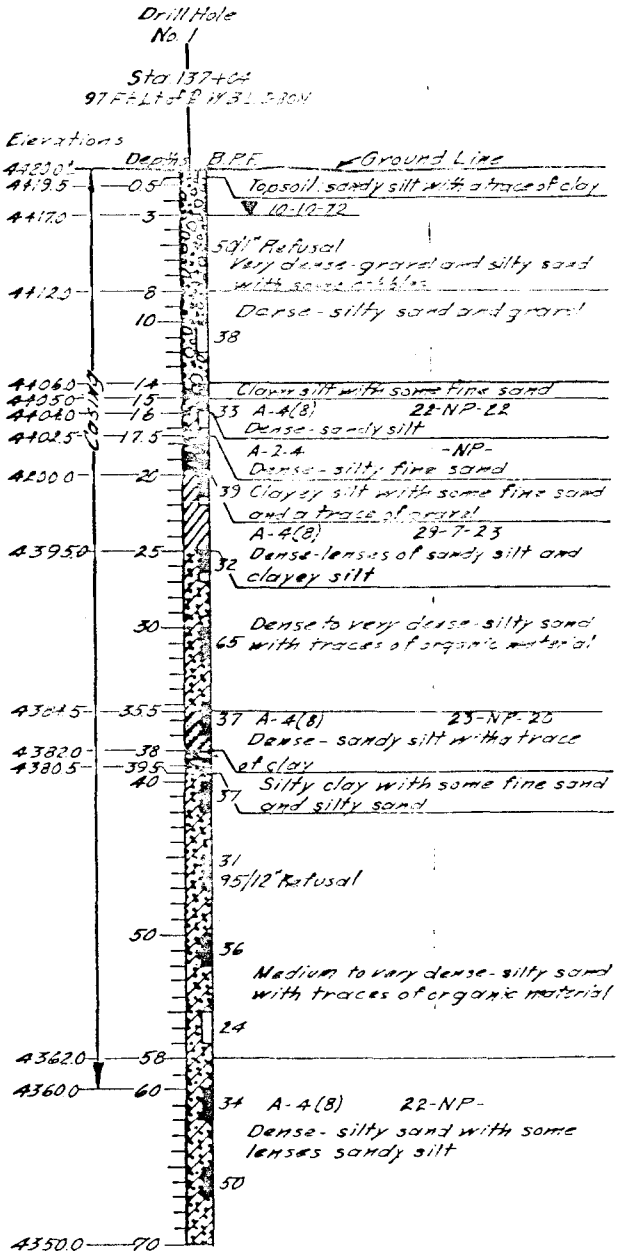
MATERIALS AND RESEARCH

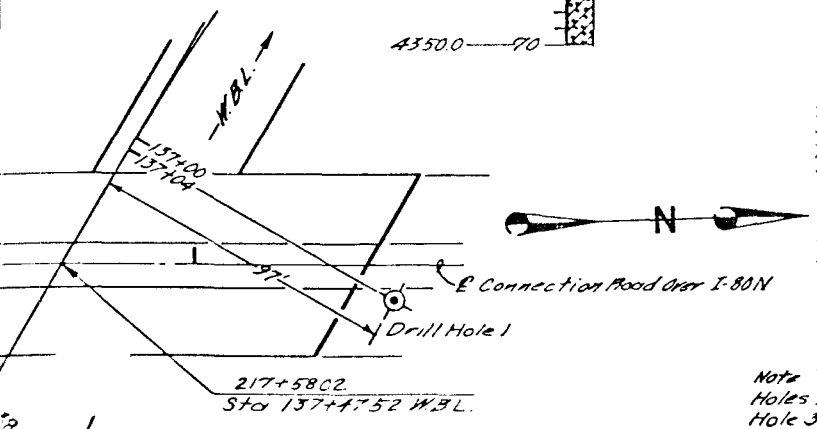
Project Name Connection Road over I-80N Summary Test Data

Project No. I-80N-6(7)46 Sheet 1 of 1 Sheets

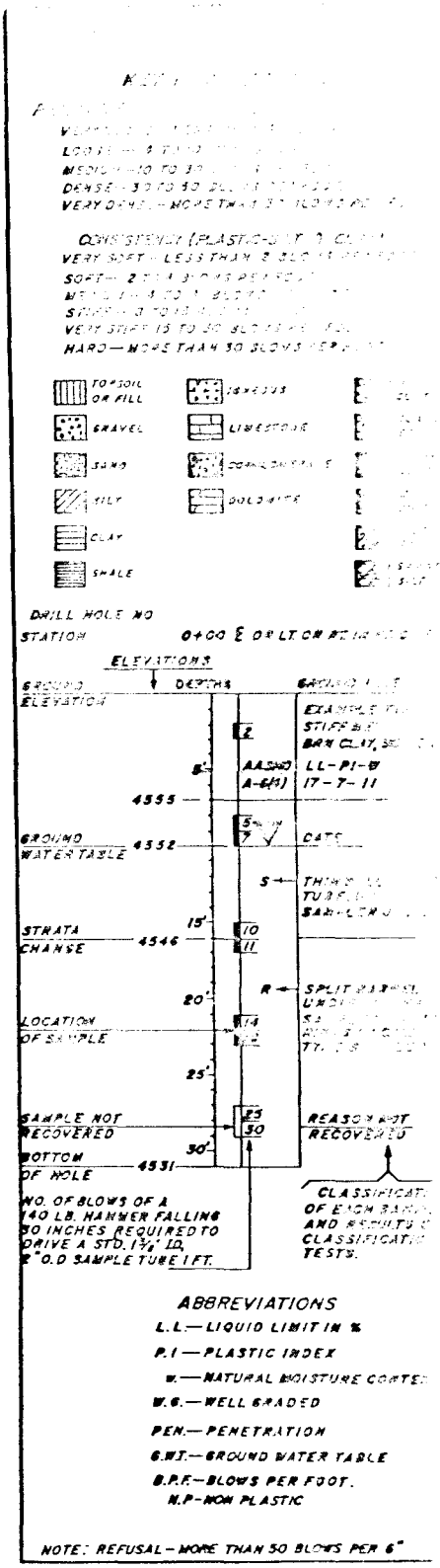
Boring No.	Depth	Grading Analysis Percent				Group Classification	Atterberg Limits		Water Cont. ω %	Wet Unit Weight γ P.C.F.	Dry Unit Weight γ_s P.C.F.	Specific Gravity Gs	Permeability k 10^{-4} cm/sec.		Unconfined Strengh c_u T.S.F.	Shear Strength					
																Unconsolidated		Consolidated			
		Gravel	Coarse Sand	Fine Sand	Silt and Clay		Liquid Limit ω_L	Plastic Limit ω_P					Hor.	Vert.		ϕ°	C T.S.F.	ϕ°	C T.S.F.	Time hrs.	Pressure PSI
1	15.5	0	0	16	84	A-4(8)	22	NP	22	113						37	0.06				
1	17	0	0	76	24	A-2-4	-	NP													
1	22	0	0	18	82	A-4(8)	29	22	23												
1	37	0	0	11	89	A-4(8)	23	NP	20	141	118				4.5						
1	62	0	0	21	79	A-4(8)	22	NP	18	110						36	0.23				
2	22	0	0	21	79	A-4(8)	-	NP	29	122						38	0.37				
2	37	1	0	30	69	A-4(7)	20	NP	16												
2	51.4	1	18	76	5	A-3	-	NP	20												
3	17	0	0	16	84	A-4(8)	22	NP	26												
3	27	0	33	59	8	A-3	-	NP	20												
3	36.8	Silty fine sand							22	113						40	0.02				
3	46.4	0	7	60	33	A-2-4	-	NP	23												
3	51.4	Silty fine sand								112						35	0.43				

S-Shelby Sample P-Penetration Sample T-Triaxial Shear Test D-Direct Shear Test C-Consolidation Test



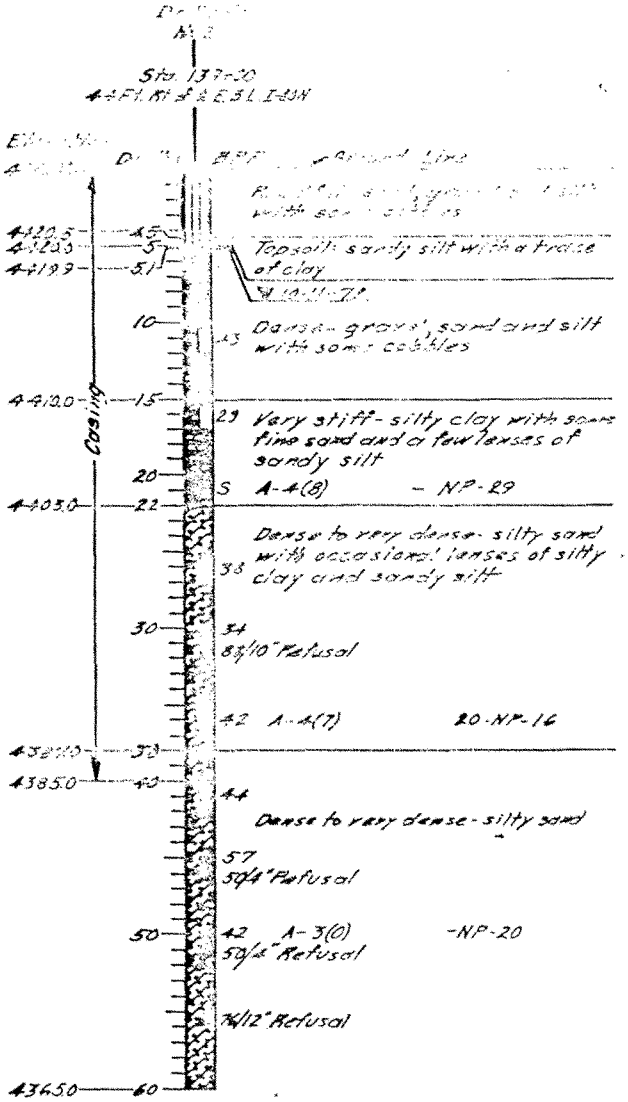


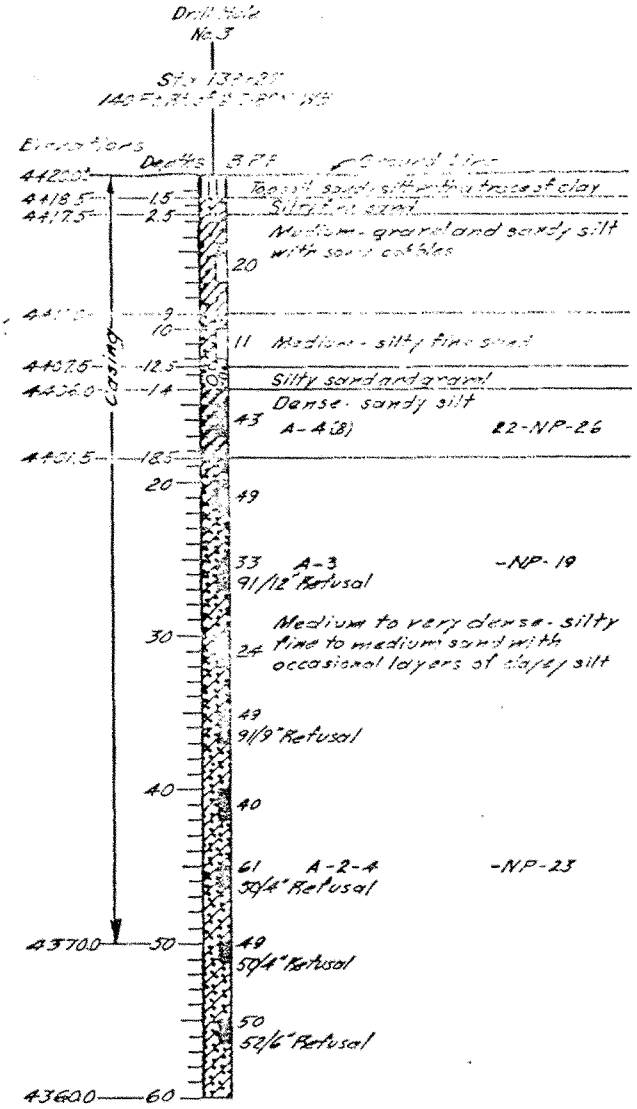
Note
Holes 1 and 2 Drilled November 1972
Hole 3 Drilled February 1973



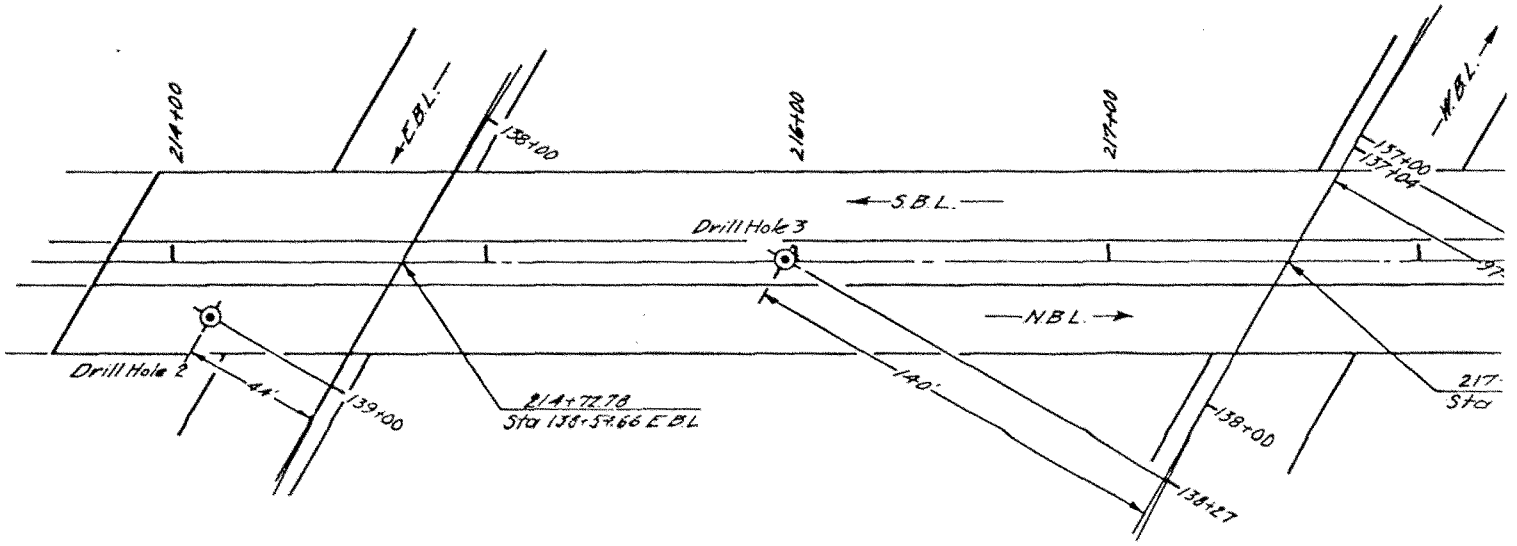
UTAH STATE DEPARTMENT OF HIGH
SALT LAKE CITY, UTAH
MATERIALS AND TESTS DIVISIO
SOUTH WEBER INTERCHANGE
CONNECTION ROAD OVER I-80N
DRAWN BY Ed Sawin — CHECKED BY B.K.S.E.C. — I-80N-
CHECKED BY L.D. Bunn — CHECKED BY D.K.P. Smith
CHECKED BY D.M.L.E.A. — CHECKED BY A.C. Fraughton — 137+4
APPROVED BY Dan T. Rice
RECEIVED — DATE

NO.	BY	DATE	REMARKS
REVISIONS			





Artesian flow of 1 Gal/Min. encountered at a depth of 37'. The ground water table was not determined in Drill Hole No. 3.



AREA NUMBER 1027, LOCATION= 418900N, 4555650E UTM coordinates

BORING NUMBER 1
BORING DEPTH= 70.00 ft. GROUND WATER DEPTH= 3.00 ft.

DEPTH (ft.)	CRITICAL ACCELERATION (a/g)	SOIL TYPE	N	N1	SILT CORRECTION
15.25	1.1521	A4	33.0	44.5	7.5
15.75-17.25	A24 SOIL BELOW WATER TABLE NOT TESTED				
20.25	1.2963	A4	39.0	46.9	7.5
25.25	0.6116	A4	32.0	35.3	7.5
30.50	3.8042	A4	65.0	66.4	7.5
35.00	0.6291	A4	37.0	35.6	7.5
40.25	0.5619	A4	37.0	33.3	7.5
44.75	0.3924	A4	31.0	26.4	7.5
50.75	0.4786	A4	36.0	28.8	7.5
55.75	0.2994	A4	24.0	18.2	7.5
60.75	0.4296	A4	34.0	24.6	7.5
66.00	0.8095	A4	50.0	34.6	7.5

MINIMUM CRITICAL ACCELERATION FOR BORING= 0.2994

BORING NUMBER 2
BORING DEPTH= 60.00 ft. GROUND WATER DEPTH= 5.25 ft.

DEPTH (ft.)	CRITICAL ACCELERATION (a/g)	SOIL TYPE	N	N1	SILT CORRECTION
16.00	0.7560	A4	29.0	36.2	7.5
25.75	0.9028	A4	38.0	40.1	7.5
30.00	0.5950	A4	34.0	33.8	7.5
35.75	0.8234	A4	42.0	38.8	7.5
40.75	0.8154	A4	44.0	38.2	7.5
44.75	1.5066	A4	57.0	47.3	7.5
49.75	0.6407	A4	42.0	33.1	7.5

MINIMUM CRITICAL ACCELERATION FOR BORING= 0.5950

BORING NUMBER 3
BORING DEPTH= 59.50 ft. GROUND WATER DEPTH= 0.00 ft.

DEPTH (ft.)	CRITICAL ACCELERATION (a/g)	SOIL TYPE	N	N1	SILT CORRECTION
15.50	2.8620	A4	43.0	63.7	7.5
20.50	1.8433	A3	49.0	62.8	0.0
24.75	0.4198	A3	33.0	38.8	0.0
30.75	0.2172	A3	24.0	25.6	0.0
34.75	0.8614	A3	49.0	49.4	0.0

40.75	0.5723	A24	40.0	37.2	5.0
44.50	1.7403	A24	61.0	54.2	5.0
49.50	0.8162	A24	49.0	41.1	5.0
55.00	0.7918	A24	50.0	39.5	5.0

MINIMUM CRITICAL ACCELERATION FOR BORING= 0.2172

MINIMUM CRITICAL ACCELERATION FOR AREA= 0.2172