

111-41408
 T. 12 N. R. 2 W.
 SEC. 7 F

1159

Memorandum

UTAH STATE DEPARTMENT OF HIGHWAYS

DATE: February 21, 1968

TO : Those Listed Below
W. J. Liddle
 FROM : W. J. Liddle, Engineer, Materials and Tests
 SUBJECT: S-0521(1), Collinston to Fielding
 Preliminary Investigation on Proposed U-154
 Alignments between U-154 Stations 81 & 137

FOUNDATIONS

Filed February 21, 1968
P.W.P.

Enclosed are: Summary of Test Data, Location Map, and Generalized Soil profiles.

SUMMARY OF RECOMMENDATIONS

Three alignments were considered on the basis of embankment and cut stability, embankment settlement, quantity of unsuitable material to be removed, and water problems. On this basis it is recommended that alignment C be used. Alignment C also allows a considerable length of the present U-69 right of way to be utilized. Table I summarizes the problems and the recommendations for each alignment. Refer to Fig. 1 for a plan view of each alignment.

TABLE I

Station (U-154)	Road Section Description	Recommendations	Comments
81-93	30' cut	1.5:1 slopes	No stability problems
93-108	10'-60' Fill	2:1 slopes	No stability or settlement problems
108-121+46 87+58-109 (3488')	6'-15' Fill	2:1 slopes 7100 cu. yds. of Subexcavation and back filling.	Unstable foundations between stations 93-96. (See equation on Fig. 1)
109-126	60' Fill 25-35' cut	1.5:1 slopes for cut, 2:1 slopes for fill, 31,000 cu. yds. of sub- excavation and back filling.	Unstable foundations between 111-115.

Alignment (A)

UTAH STATE DEPARTMENT OF HIGHWAYS

MATERIALS AND RESEARCH

Project Name Collinston to Fielding
 Project No. S-0521(1)

Summary of Test Data

Sheet 1 of 4 Sheets

Boring No	Depth	Grading Analysis				Group Classification	Atterberg Limits		Water Cont. w %	Wet Unit Weight γ P.C.F.	Dry Unit Weight γ_s P.C.F.	Specific Gravity Gs	Permeability $k \cdot 10^{-4}$ cm/sec		Unconfined Strength q_u T.S.F.	Shear Strength				
		Percent					Liquid Limit w_L	Plastic Limit w_p					Unconsolidated			Consolidated				
		Gravel	Coarse Sand	Fine Sand	Silt and Clay								ϕ°	C T.S.F.		ϕ°	C T.S.F.	Time hrs.	Press PSI.	
P 2	02	1	3	22	74	A-7-5	47	33												
P	07	0	7	85	8	A-3	19	-	25	117	94				61	.04				
P	12	0	0	11	89	A-4(8)	26	21	29	123	95				25	0.12				
P	17	Gravel																		
P	22	Gravel																		
P	30.5	Fine sand																		
P	32	0	0	59	41	A-4(1)	19													
S	36	Sand																		
P	41.5	Sand and gravel																		
P	19	Organic silty clay							88	86	46				0.16					
P	20	Clay with peat							74	98	56				0.21					
P	23	Silty sand																		
P	17	Clayey silt																		
P	27	Clayey silt																		
P	42	Fine sand with silt																		

UTAH STATE DEPARTMENT OF HIGHWAYS

MATERIALS AND RESEARCH

Project Name Collinston to Fielding

Summary of Test Data

Project No. S-0521(1)

Sheet 2 of 4 Sheets

Boring No.	Depth	Grading Analysis				Group Classification	Atterberg Limits		Water Cont. w %	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						
		Percent					Liquid Limit w_L	Plastic Limit w_p					Hor.	Vert.		Unconsolidated		Consolidated				
		Gravel	Coarse Sand	Fine Sand	Silt and Clay											ϕ°	C T.S.F.	ϕ°	C T.S.F.	Time hrs.	Press PSI.	
18	12	0	0	5	95	A-6(9)	39	26	25	110	88			0.96								
	22	0	1	5	94	A-6(10)	39	25														
	32								36	110	81			0.64								
	41.5	0	0	8	92	A-7-6(16)	51	26	44	103	72			0.88								
27	6	Fine sand																				
	15	1	1	24	74	A-4(8)	37	-	45	102	70				6	0.16						
	21	Fine sand																				
	22	Gravel w/sand							35	108	80				0.60							
	26	Gravel w/sand																				
	31.5	Sand w/gravel																				
	37	Gravel																				
	46.5	Fine sand																				

UTAH STATE DEPARTMENT OF HIGHWAYS

MATERIALS AND RESEARCH

Project Name Collinston to Fielding

Summary of Test Data

Project No. S-0521(1)

Sheet 3 of 4 Sheets

Boring No	Depth	Grading Analysis				Group Classification	Atterberg Limits		Water Cont. w %	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							
		Percent					Liquid Limit w_L	Plastic Limit w_p					Unconsolidated			Consolidated							
		Gravel	Coarse Sand	Fine Sand	Silt and Clay								ϕ°	C T.S.F.		ϕ°	C T.S.F.	Time hrs.	Press PSI				
P 24	07	Fine sand																					
P	12	Gravel with fine sand																					
P	17	Sand & gravel																					
P	22	Sand & gravel																					
P	27	Sand & gravel																					
P	31	Silty clay																					
P	32	Fine sandy silt with clay						19	126	66				1.85									
P	42	Fine sand																					
P	28	1	9	22	68	A-5(10)	91	-															
P	09	Clayey silt with fine sand & peat						120	83	38					7	.08							
P	11	0	14	7	79	A-4(8)	40	-	37	108	86			32	.05								

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

UTAH STATE DEP. MENT OF HIGHWAYS

MATERIALS AND RESEARCH

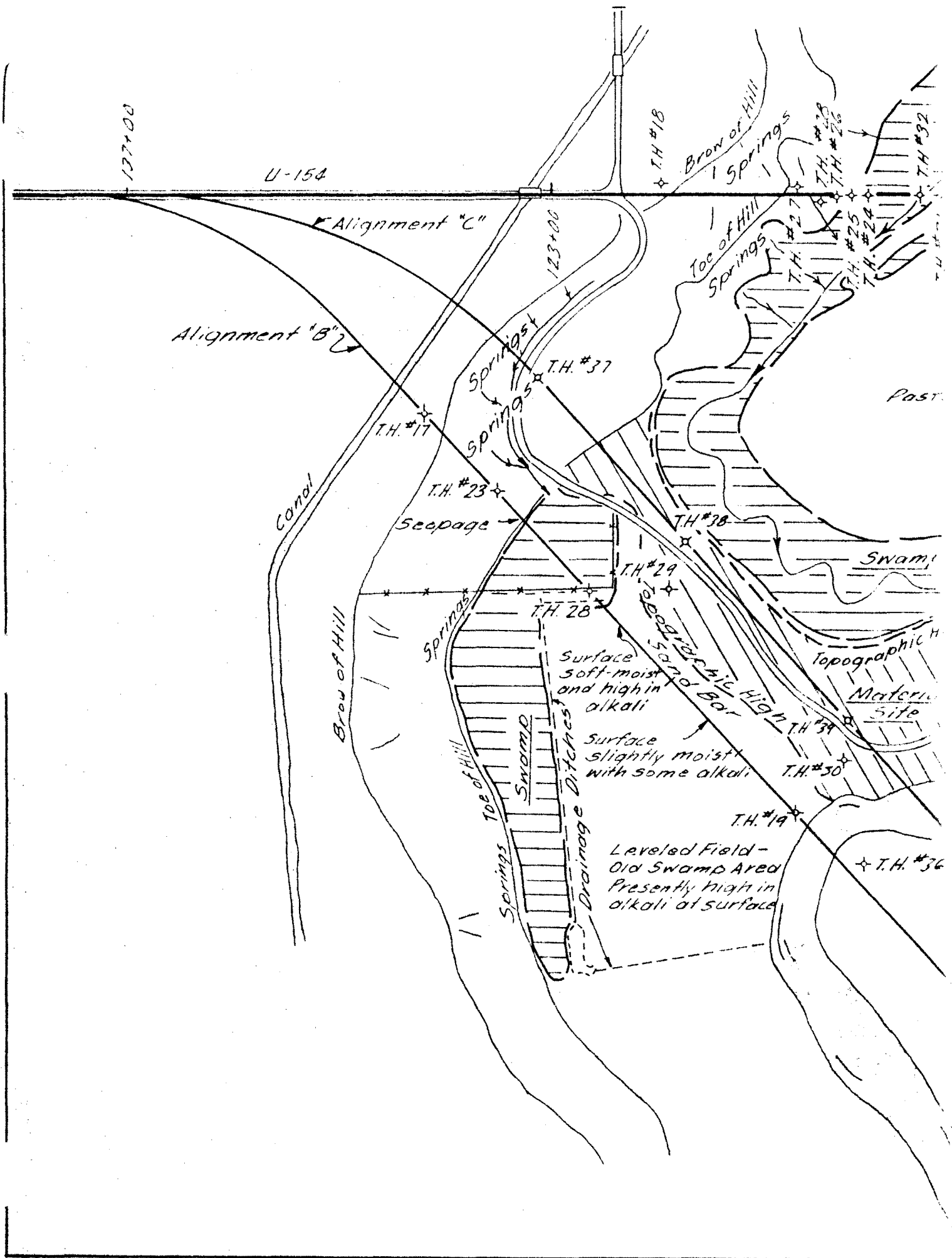
Project Name Collinston To Fielding

Summary of Test Data

Project No. S-0521(1)

Sheet 4 of 4 Sheets

Boring No.	Depth	Grading Analysis				Group Classification	Atterberg Limits		Water Cont. w %	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						
		Percent					Liquid Limit w_L	Plastic Limit w_p					Unconsolidated			Consolidated						
		Gravel	Coarse Sand	Fine Sand	Silt and Clay								ϕ°	C T.S.F.		ϕ°	C T.S.F.	Time hrs.	Press PSL			
S 34	12	0	0	5	95	A-6(9)	37	24				2.64										
P	17	Clayey silt							33	106	80				1.56							
S 35	17	0	0	1	99	A-7-6(14)	43	19	29	122	95				1.93							
P 36	17	0	1	2	97	A-4(8)	30	20	30	115	88				0.47							
S	22	0	0	6	94	A-6(10)	32	16	20	124	103	2.81				27	0.65					
P 37	7	0	6	9	85	A-4(8)	26	20														
P	12	0	1	13	86	A-4(8)	26	16														
P	17	0	1	8	91	A-6(10)	35	20														
P 38	12	0	0	23	77	A-4(8)	20	-														
P	17	0	0	3	97	A-7-6(14)	43	18														



177+00

U-154

Alignment "C"

Alignment "B"

Canal

Brow of Hill

T.H. #18

Brow of Hill
Springs

Toe of Hill
Springs

T.H. #27
T.H. #28
T.H. #26

T.H. #25
T.H. #24

T.H. #32

T.H. #17

Springs
T.H. #37

Springs

T.H. #23

Seepage

T.H. #38

Springs

T.H. #29

T.H. #28

Surface soft-moist and high in alkali

Surface slightly moist with some alkali

Topographic High

Material Site

T.H. #39

T.H. #19

T.H. #36

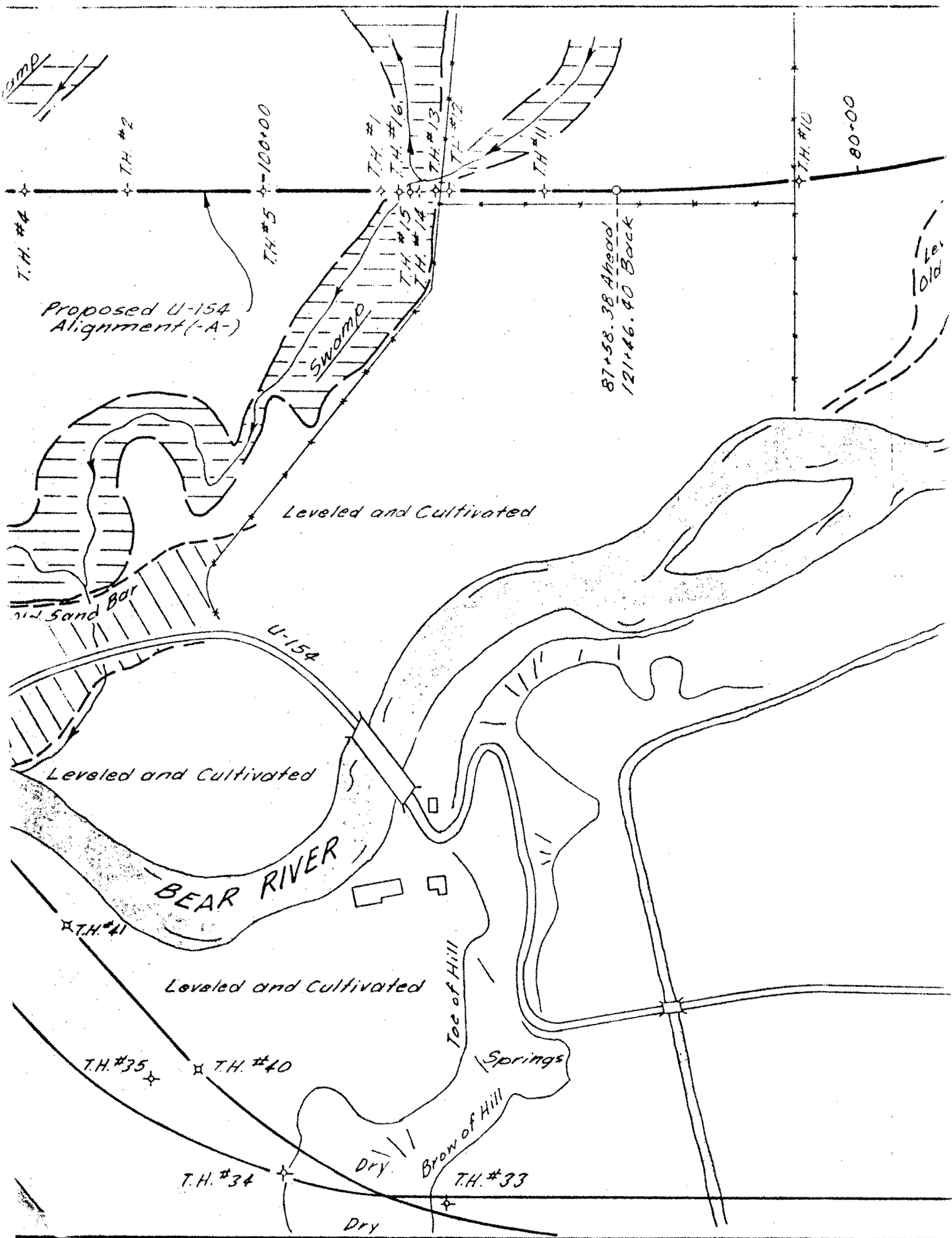
Swamp

Drainage Ditches

Levelled Field - Old Swamp Area Presently high in alkali at surface

Past

Swamp



Proposed U-154 Alignment (-A-)

Levelled and Cultivated

Levelled and Cultivated

BEAR RIVER

Levelled and Cultivated

Toe of Hill

Springs

Brow of Hill

DRY

DRY

87+58.38 Ahead
121+46.40 Back

80+00

Lev. Old

T.H. #4

T.H. #2

T.H. #5

T.H. #1

T.H. #16

T.H. #13

T.H. #12

T.H. #11

T.H. #10

Swamp

Sand Bar

U-154

T.H. #41

T.H. #35

T.H. #40

T.H. #34

T.H. #33

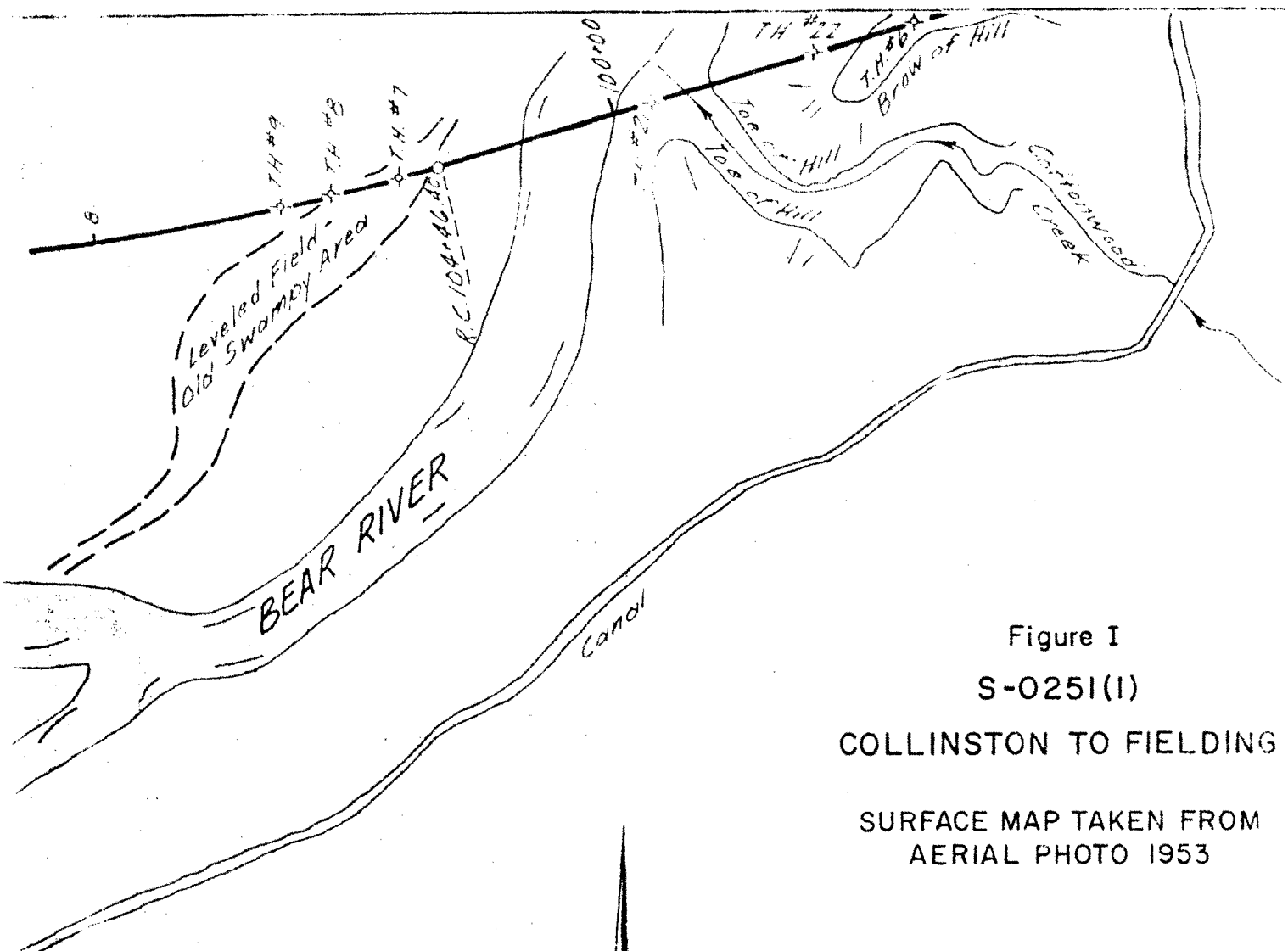
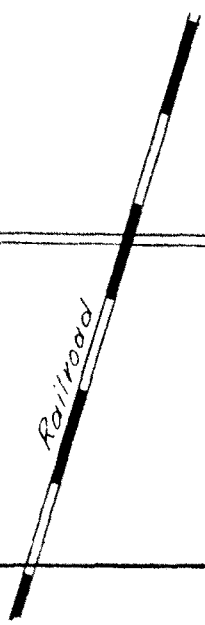


Figure I
 S-0251(I)
 COLLINSTON TO FIELDING
 SURFACE MAP TAKEN FROM
 AERIAL PHOTO 1953



Scale: 1" = 400'

U-154



U-69