## PROJECT: 3783

STATE OF NORTH CAROLINA

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N.C. 37831 GU/ 1 STATE PROJ.NO. F.A.PROJ.NO. DESCRIPTION P.E. CONST.

CONTENTS:

RETAINING WALL LEFT

OF -L- STATION INTERVAL

24+50 TO 29+00

DEPARTMENT OF TRANSPORTATION

DIVISION OF HIGHWAYS
GEOTECHNICAL UNIT

## STRUCTURE SUBSURFACE INVESTIGATION

TATE PROJECT378	31 I.D. NO
.A. PROJECT OUNTYBUNCOMBE	
ROJECT DESCRIPTION -	RETAINING WALL STATION INTERVAL
24+50 TO 29+	
ITE DESCRIPTION	

TOUTHER CAUTION NOTICE

THE SUBSURFACE INFORMATION AND THE SUBSURFACE INVESTIGATION ON WHICH IT IS BASED WAS MADE FOR THE PURPOSE OF STUDY, PLANNING AND DESIGN, AND NOT FOR CONSTRUCTION OR PAY PURPOSES. THE VARIOUS FIELD BORING LOGS, ROCK CORES, AND SOIL TEST DATA AVAILABLE MAY BE REVIEWED OR INSPECTED IN RALEIGH BY CONTACTING THE N.C. DEPARTMENT OF TRANSPORTATION, GEOTECHNICAL UNIT 0 1919: 250-4088. NEITHER THE SUBSURFACE PLANS AND REPORTS, NOR THE FIELD BORING LOGS, ROCK CORES, OR SOIL TEST DATA IS PART OF THE CONTRACT.

GENERAL SOIL AND ROCK STRATA DESCRIPTIONS AND INDICATED BOUNDARIES ARE BASED ON A CECTECHNICAL INTERPRETATION OF ALL AVAILABLE SUBSURFACE DATA AND MAY NOT NECESSARILY REFLECT THE ACTUAL SUBSURFACE CONDITIONS BETWEEN BORINGS OR BETWEEN SAMPLED STRATA WITHIN THE BOREHOLE. THE LABORATORY SAMPLE DATA AND THE IN SITU (IN-PLACE) TEST DATA CAN BE RELIED ON ONLY TO THE DEGREE OF RELIABILITY INHERENT IN THE STANDARD TEST METHOD. THE OBSERVED WATER LEVELS OR SOIL MOISTURE CONDITIONS INDICATED IN THE SUBSURFACE INVESTIGATIONS ARE AS RECORDED AT THE TIME OF THE INVESTIGATION. THESE WATER LEVELS OR SOIL MOISTURE CONDITIONS DICHAFLIC CONDITIONS MAY VARY CONSIDERABLY WITH TIME ACCORDING TO CLIMATIC CONDITIONS INCLUDING TEMPERATURES, PRECIPITATION AND WIND, AS WELL AS OTHER NON-CLIMATIC FACTORS.

THE BIDDER OR CONTRACTOR IS CAUTIONED THAT DETAILS SHOWN ON THE SUBSURFACE PLANS ARE PRELIMINARY ONLY AND IN MANY CASES THE FINAL DESIGN DETAILS ARE DIFFERENT, FOR BIDDING AND CONSTRUCTION PURPOSES. REFER TO THE CONSTRUCTION PLANS AND DOCUMENTS FOR FINAL DESIGN INFORMATION ON THIS PROJECT, THE DEPARTMENT DOES NOT WARRANT OR GUARANTEE THE SUFFICIENCY OR ACCURACY OF THE INVESTIGATION MADE, NOR THE INTERPRETATIONS MADE OR OPINION OF THE DEPARTMENT AS TO THE TYPE OF MATERIALS AND CONDITIONS TO BE ENCOUNTERED. THE BIDDER OR CONTRACTOR IS CAUTIONED TO MAKE SUCH INDEPENDENT SUBSURFACE INVESTIGATIONS AS HE DEEMS NECESSARY TO SATISFY HIMSELF AS TO CONDITIONS TO BE ENCOUNTERED ON THIS PROJECT. THE CONTRACTOR SHALL HAVE NO CLAIM FOR ADDITIONAL COMPENSATION OR FOR AN EXTENSION OF TIME FOR ANY REASON RESULTING FROM THE ACTUAL CONDITIONS ENCOUNTERED AT THE SITE DIFFERING FROM THOSE INDICATED IN THE SUBSURFACE INFORMATION.

INVESTIGATED BY C A DUNNAGAN PERSONNEL T B DANIEL

CHECKED BY W D FRYE, JR J T WILLIAMS

SUBMITTED BY W D FRYE, JR C K ROSE

DATE SEPTEMBER 2004



SICHETURE

NOTE - THE INFORMATION CONTAINED HEREIN IS NOT IMPLIED OR GUARANTEED BY THE N. C. DEPARTMENT
OF TRANSPORTATION AS BEING ACCURATE NOR IT IS CONSIDERED TO BE PART OF THE PLANS.
OF TRANSPORTATION AS BEING ACCURATE NOR IT
SPECIFICATIONS, OR CONTRACT FOR THE PROJECT.

NOTE - BY HAVING REQUESTED THIS INFORMATION THE CONTRACTOR SPECIFICALLY WAIVES ANY CLAIMS FOR INCREASED COMPENSATION OR EXTENSION OF TIME BASED ON DIFFERENCES BETWEEN THE CONDITIONS INDICATED HEREIN AND THE ACTUAL CONDITIONS AT THE PROJECT SITE.

DRAWN BY: \_\_\_\_\_C A DUNNAGAN

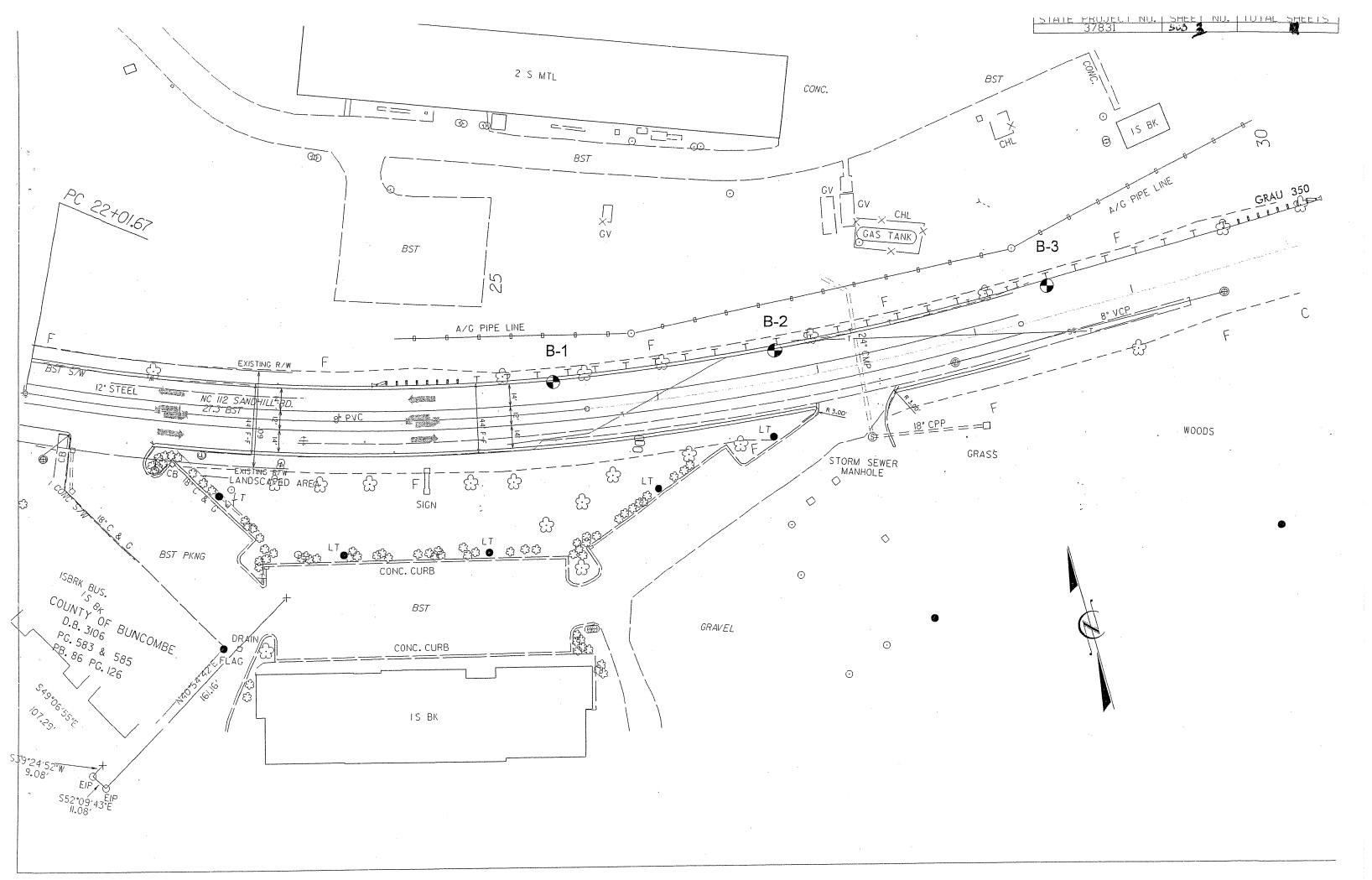
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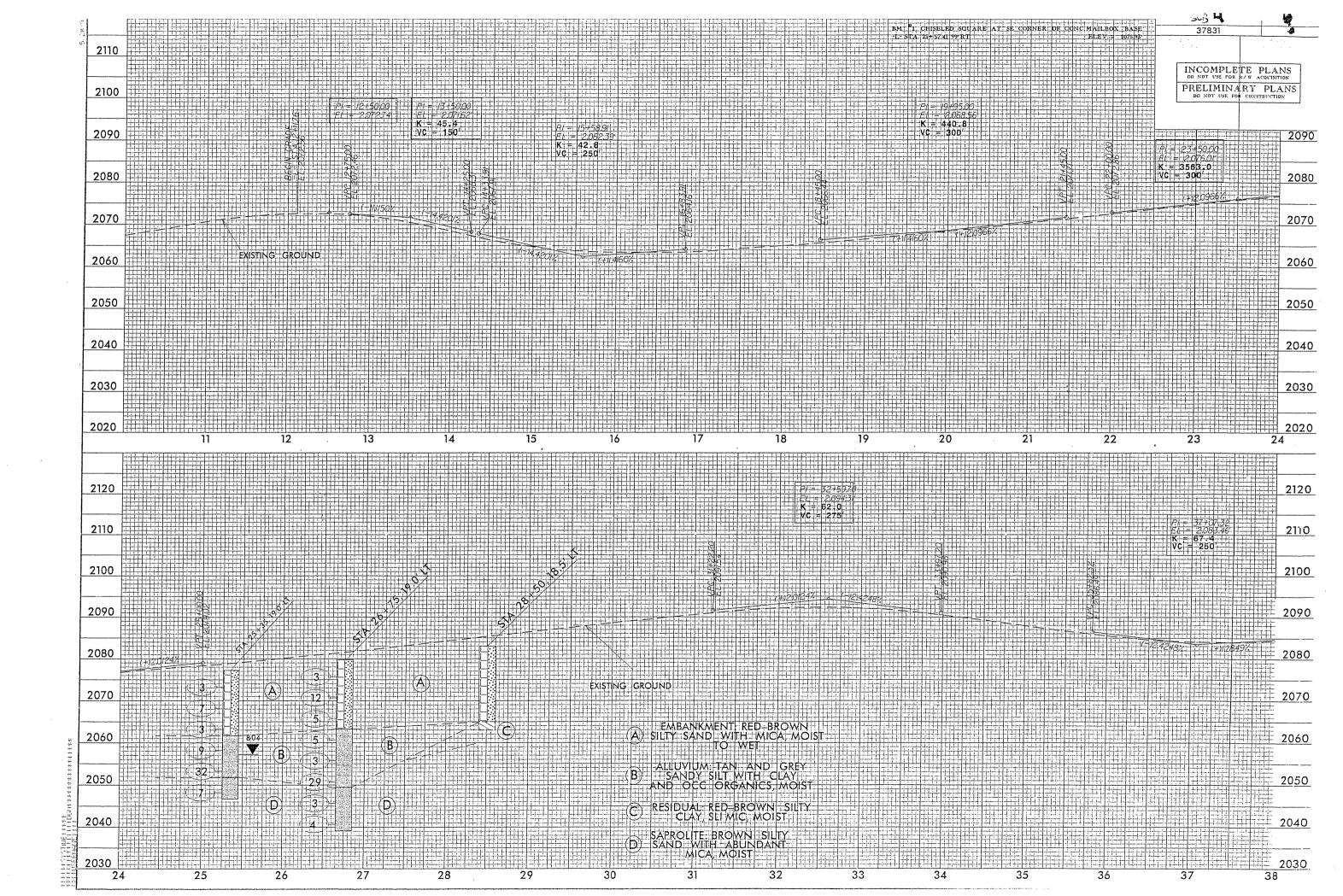
## DIVISION OF HIGHWAYS GEOTECHNICAL UNIT

### SUBSURFACE INVESTIGATION

SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

r x					T	· · · · · · · · · · · · · · · · · · ·		ROCK DESCRIPTION		TERMS AND DEFINITIONS
SOIL DESCRIPT	TION	WELL COADED HIDICATES A CO	GRADATION OR DEPRESENTATION OF PARTICLE SIZES FR	OM FINE TO COARSE	HARD ROCK IS	NON-COAS	TAL PLAIN MATE	BIAL THAT WHEN TESTED, WOULD YIELD	SPT REFUSAL. AM INFERRED	ALLUVIUM (ALLUV.) - SOILS WHICH HAVE BEEN TRANSPORTED BY WATER.
SOIL IS CONSIDERED TO BE THE UNCONSOLIDATED, SEMI-CONSOLI	DATED OR WEATHERED EARTH MATERIALS		OD REPRESENTATION OF PARTICLE SIZES FR PARTICLES ARE ALL APPROXIMATELY THE	SAME SIZE. (ALSO	ROCK LINE IND	DICATES TH	E LEVEL AT WE	HICH NON-COASTAL PLAIN MATERIAL WUUL TT SPOON SAMPLER FOUNT TO OR LESS	THAN 0.1 FOOT PER 60 BLOWS.	AQUIFER - A WATER BEARING FORMATION OR STRATA.
WHICH CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER A 180 BLOWS PER FOOT ACCORDING TO STANDARD PENETRATION TES	ATTIFITE AND WHILE TIELDS LESS THAN	POORLY GRADED) GAP-GRADED- INDICATES A MIXTU	URE OF UNIFORM PARTICLES OF TWO OR MC	ORE SIZES.	IN NON-COASTA	AL PLAIN N	MATERIAL, THE	TRANSITION BETWEEN SOIL AND ROCK IS	OFTEN REPRESENTED BY A ZONE	ARENACEOUS - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND.
CLASSIFICATION IS BASED ON THE AASHTO SYSTEM AND BASIC DI COSSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION.	ESCRIPTIONS DEMERALLY SHALL INCLUDE:		ANGULARITY OF GRAINS		OF WEATHERED ROCK MATERIAL	LS ARE TY	PICALLY DIVIDE	D AS FOLOWS:		ARGILLACEOUS - APPLIED TO ALL ROCKS OR SUBSTANCES COMPOSED OF CLAY MINERALS.
AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTIC	CITY, ETC. EXAMPLE:		OF SOIL GRAINS ARE DESIGNATED BY THE	TERMS: ANGULAR,	WEATHERED	2	NON-C	OASTAL PLAIN MATERIAL THAT YIELDS S	PT N VALUES > 100 BLOWS	OR HAVING A NOTABLE PROPORTION OF CLAY IN THEIR COMPOSITION, AS SHALE, SLATE, ETC.  ARTESIAN - GROUND WATER THAT IS UNDER SUFFICIENT PRESSURE TO RISE ABOVE THE LEVEL
VERY STIFF, GRAY SILTY CLAY, MOIST WITH INTERBEDDED FINE		SUBANGULAR, SUBROUNDED, OR R	MINERALOGICAL COMPOSITION	IN .	ROCK (WR)		PER F	TOOT. TO COARSE GRAIN IGHEOUS AND METAMOR	PHIC ROCK THAT	AT WHICH IS IS ENCOUNTERED, BUT WHICH DOES NOT MECESSARILY RISE TO OR ABOVE THE
SOIL LEGEND AND AASHTO			Z. FELDSPAR, MICA, TALC, KAOLIN, ETC. ARE U		CRYSTALLINE ROCK (CR)		WOULD	) YIELD SPT REFUSAL IF TESTED. ROCK	TYPE INCLUDES GRANITE,	GROUND SURFACE.  CALCAREOUS (CALC.) - SOILS WHICH CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE.
	IY MATERIALS ORGANIC MATERIALS ISSING *200)	WHENEVER THEY ARE CONSIDERED	D OF SIGNIFICANCE.	/			FINE	S.GABBRO, SCHIST. ETC. TO COARSE GRAIN METAMORPHIC AND NON	-COASTAL PLAIN	COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM
CC-105.	-5 A-6 A-7 A-1, A-2 A-4, A-5		COMPRESSIBILITY		NON-CRYSTALLINE   ROCK (NCR)	• ==		ENTARY ROCK THAT WOULD YEILD SPT RI DES PHYLLITE, SLATE, SANDSTONE, ETC.	FUSAL IF TESTED. ROCK TYPE	OF SLOPE.
CLASS. A-1-a A-1-b A-2-4 A-2-5 A-2-6 A-2-7	A-7-5 A-7-6 A-3 A-6, A-7	SLIGHTLY COMPRESSIE MODERATELY COMPRES		LESS THAN 30 31-50	COASTAL PLAIN		COAST	AL PLAIN SEDIMENTS CEMENTED INTO RO	CK, BUT MAY NOT YIELD	CORE RECOVERY (REC.) - TOTAL LENGTH OF ALL MATERIAL RECOVERED IN THE CORE BARREL DIVIDED BY TOTAL
SAMBOL 000000000000000000000000000000000000		HIGHLY COMPRESSIBLE	LIQUID LIMIT	GREATER THAN 50	SEDIMENTARY ROC (CP)	X		EFUSAL. ROCK TYPE INCLUDES LIMESTON BEDS, ETC.	., SANDSTONE, CEMENTED	LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE.
Z PASSING	SILT		PERCENTAGE OF MATERIAL  GRANULAR SILT- CLAY					WEATHERING		<u>DIKE</u> - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT ROCKS OR CUTS MASSIVE ROCK.
# 10 50 MX	GRANULAR CLAY PEAT SOILS	ORGANIC MATERIAL	SOILS SOILS	OTHER MATERIAL	FRESH RO	CK FRESH.	CRYSTALS BRICE	HT. FEW JOINTS MAY SHOW SLIGHT STAIL	ING. ROCK RINGS UNDER	DIP - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE
# 200 15 MX 25 MX 10 MX 35 MX 35 MX 35 MX 35 MX 36 MN 36			2 - 3% 3 - 5% TRA 3 - 5% 5 - 12% LIT				RYSTALLINE.	NTS STAINED, SOME JOINTS MAY SHOW T	HIN CLAY COATINGS IF OPEN.	HORIZONTAL.  DIP DIRECTION (DIP AZIMUTH) - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF
LIQUID LIMIT 40 MX 41 MN 40 MX 41 MN 40 MX 41		MODERATELY ORGANIC	5 - 10% 12 - 20% SOM	IE 20 - 35%	(V. SLI.) CR	YSTALS ON	I A BROKEN SPE	CIMEN FACE SHINE BRIGHTLY, ROCK RING	S UNDER HAMMER BLOWS IF	THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH.
PLASTIC INDEX 6 MX N.P. 10 MX 10 MX 11 MN 11 MN 10 MX 10	MODERATE	HIGHLY ORGANIC	SROUND WATER	HLY 35% AND ABOVE			LLINE NATURE.	NTS STAINED AND DISCOLORATION EXTEN	OS INTO BOCK UP TO	FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE
0/00/ 1/100	AMOUNTS OF SOILS		EVEL IN BORE HOLE IMMEDIATELY AFTER	DRILL ING.	(5) 1 1	NCH. OPEN	JOINTS MAY CO	INTAIN CLAY. IN GRANITOID ROCKS SOME	OCCASIONAL FELDSPAR	SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE.  FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES.
USUAL TYPES STONE FRAGS. FINE SILTY OR CLAYEY SILTY OF MAJOR GRAVEL AND SAND GRAVEL AND SAND SOILS	CLAYEY ORGANIC SOILS MATTER		TER LEVEL AFTER 24 HOURS.		CR:	YSTALS AR	RE DULL AND DI	SCOLORED. CRYSTALLINE ROCKS RING UN DCK SHOW DISCOLORATION AND WEATHER!	EH HAMMEH BLUWS.	FLOAT - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLOGGED FROM
MATERIALS . SAND SAND GRAVEL AND SAND SOLES					CR.	ONITOID BC	ncks MOST FELT	ISPARS ARE DULL AND DISCOLORED, SUME	SHOW CLAY, HUCK HAS	PARENT MATERIAL.
GEN. RATING AS A EXCELLENT TO GOOD FAIR	R TO POOR FAIR TO POOR UNSUITABLE	<u>∇PW</u> PERCHED I	WATER, SATURATED ZONE OR WATER BEAR	ING STRAIR	DUI	LL SOUND TH FRESH I		BLOWS AND SHOWS SIGNIFICANT LOSS OF	STRENGTH AS COMPARED	FLOOD PLAIN (F.P.) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY
SUBGRADE .	0.7.5 - 11 - 20	OM SPRING OR	SEEPAGE	٠,	MODERATELY ALL	BULK EX	CEPT OUARTZ D	ISCOLORED OR STAINED. IN GRANITOID R	OCKS. ALL FELDSPARS DULL	THE STREAM.  FORMATION (FM.) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN
P.I. OF A-7-5 ≤ L.L 30 : P.I. OF CONSISTENCY OR DE			MISCELLANEOUS SYMBOLS		CEVEDE AM	n niscoror	LAM A DNA DAR	ORITY SHOW KAOLINIZATION. ROCK SHOWS H A GEOLOGIST'S PICK. ROCK GIVES "CLU	SEVERE LOSS OF STRENGTH	THE FIELD.
COMPACTNESS OR RANGE C	OF STANDARO RANGE OF UNCONFINED	ROADWAY EMBANKM	ENT SPT CON TEST BORIN	G SAMPLE	<u>IF</u>	TESTED, W	<u>OULD YIELD SP1</u>	T REFUSAL	•	JOINT - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED.
PRIMARY SUIL TIPE   CONCLETENCY   FEREINATIO	N RESISTENCE COMPRESSIVE STRENGTH (TONS/FT <sup>2</sup> )	WITH SOIL DESCRIP	PTION TSI MIT	DESIGNATIONS		L ROCKS E	XCEPT QUARTZ	DISCOLORED OR STAINED ROCK FABRIC C IL. IN GRANITOID ROCKS ALL FELDSPARS		LEDGE - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO
	<4	SOIL SYMBOL	AUGER BORING	S- BULK SAMPLE	EX	TENT. SOM	E FRAGMENTS O	F STRONG ROCK USUALLY REMAIN.		ITS LATERAL EXTENT.  LENS - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS.
GRANULAR MEDIUM DENSE 10	TO 10 TO 30 N/A	ARTIFICIAL FILL O	THER THAN - CORE BORING	SS- SPLIT SPOON				ALUES > 100 BPF	,	MOTTLED (MOT.) - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS MOTILING IN
	10 50	ROADWAY EMBANKME	ENTS Cont. Bontino	SAMPLE ST-SHELBY TUBE	(V SEV) THE	F MASS IS	EFFECTIVELY P	ISCOLORED OR STAINED. ROCK FABRIC EL REDUCED TO SOIL STATUS, WITH ONLY FR	RUMENTS OF STRUNG ROCK	SOILS USUALLY INDICATES POOR AFRATION AND LACK OF GOOD DRAINAGE.
	>50 <2 <0.25	INFERRED SOIL BO	UNDARIES ** MONITORING WEL	. SAMPLE	1 000	HATHING C	ADDOLLITE IC AN	I EXAMPLE OF ROCK WEATHERED TO A DE ROCK FABRIC REMAIN. <i>IF TESTED. YIEL</i>	GREE SUCH THAT DNLY MINUR	<u>PERCHED WATER</u> - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE OF AN INTERVENING IMPERVIOUS STRATUM.
GENERALLY SOFT 2	TO 4 0.25 TO 0.5	SUFERED ROCK LIN	NE PIEZOMETER	RS- ROCK SAMPLE	COMPLETE BOO	CK BEDITCE	n to soul Roc	K FABRIC NOT DISCERNIBLE, OR DISCERNI	BLE ONLY IN SMALL AND	RESIDUAL SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK.
	TO 8 0.5 TO 1 TO 15 1 TO 2	TTTTT ALLUVIAL SOIL BOI	UNDARY INSTALLATION	RT- RECOMPACTED	SCA	ATTERED C	ONCENTRATIONS.	QUARTZ MAY BE PRESENT AS DIKES OR	STRINGERS, SAPROLITE IS	ROCK QUALITY DESIGNATION (R.Q.D.) - A MEASURE OF ROCK QUALITY DESCRIBED BY: TOTAL LENGTH OF
(COHESIVE) VERY STIFF 15	TO 30 2 TO 4 >30 >4	25/025 DIP/DIP DIRECTION	OF SLOPE INDICATO	R TRIAXIAL SAMPLE  CBR - CBR SAMPLE	ALS	SO AN EXAL	MPLE.	ROCK HARDNESS		ROCK SEGMENTS EQUAL TO OR GREATER THAN 4 INCHES DIVIDEO BY THE TOTAL LENGTH OF CORE RUN ANI EXPRESSED AS A PERCENTAGE.
TEXTURE OR GRAI		ROCK STRUCTURES		•••		AUDIOT DE	CCDATCHED BY	KNIFE OR SHARP PICK. BREAKING OF HAN	D SPECIMENS REQUIRES	SAPROLITE (SAP.) - RESIDUAL SOIL WHICH RETAINS THE RELIC STRUCTURE OR FABRIC OF THE
		• - SOUNDING ROD	REF - SPT REFUSAL		VERY HARD C	ANNUT BE EVERAL HA	RD BLOWS OF T	HE GEOLOGISTS PICK.	o ar Ecriteria Regardes	PARENT ROCK. <u>SILL</u> - AN INTRUSIVE BODY OF IGNEOUS ROCK OF APPROXIMATELY UNIFORM THICKNESS AND
U.S. STD. SIEVE SIZE 4 10 40 OPENING (MH) 4.76 2.0 0.42	60 200 270 0.25 0.075 0.053		ABBREVIATIONS		HARD CA	AN BE SCR	ATCHED BY KNIF	FE OR PICK ONLY WITH DIFFICULTY, HAR	HAMMER BLOWS REQUIRED	RELATIVELY THIN COMPARED WITH ITS LATERAL EXTENT, WHICH HAS BEEN EMPLACED PARALLEL
COARSE	FINE			DENETED TEST	1		HAND SPECIMEN.	FE OR PICK. GOUGES OR GROOVES TO 0.3	5 INCHES DEED CAN BE	TO THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS
BOULDER COBBLE GRAVEL SAND (BLDR.) (COB.) (GR.) (CSE. SD	SAND (SL) (CL)	AR - AUGER REFUS BT - BORING TERM			MODERATELY CA	XCAVATED	BY HARD BLOW	OF A GEOLOGISTS PICK. HAND SPECIMEN	CAN BE DETACHED	SLICKENSIDE - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE.
GRAIN MM 305 75 2.0	0.25 0.05 0.005	CL CLAY	SL SILT, SIL			Y MODERAT		D A OF INCHES PEED BY FIRM PRESSURE	DE KNIEE OD BICK POINT	STANDARO PENETRATION TEST (PENETRATION RESISTANCE) (SPT) - NUMBER OF BLOWS (N OR B.P.F.) OF
SIZE IN 15, 3,		CPT - CONE PENET CSE COARSE	TCR - TRICOHE		MEDIUM C	AN BE EXC	AVATED IN SMAL	D 0.05 INCHES DEEP BY FIRM PRESSURE LL CHIPS TO PEICES I INCH MAXIMUM SI	E BY HARD BLOWS OF THE	A 140 LB. HAMMER FALLING 30 INCHES REQUIRED TO PRODUCE A PENETRATION OF 1 FOOT INTO SOIL WITH A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER. SPT REFUSAL IS LESS THAN 0.1 FOOT PENETRATION
SOIL MOISTURE - CORRELA	TION OF TERMS	DMT - DILATOMETE DPT - DYNAMIC PEI	, , , , , , , , , , , , , , , , , , , ,	EIGHT			GEOLOGISTS PI			WITH 60 BLOWS.
SOIL MOISTURE SCALE FIELD MOISTURE (ATTERBERG LIMITS) DESCRIPTION	GUIDE FOR FIELD MOISTURE DESCRIPTION	e - VOID RATIO	NETRATION TEST /d - DRY UN W - MOISTURE		FI	ROM CHIPS	TO SEVERAL IN	READILY BY KNIFE OR PICK. CAN BE E) NCHES IN SIZE BY MODERATE BLOWS OF	A DICK DOINT CHALL THIN	STRATA CORE RECOVERY (SREC.) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE.
		F FINE FOSS FOSSILIFER	ROUS V. ~ VERY		;			FINGER PRESSURE.		STRATA ROCK QUALITY DESIGNATION (S.R.Q.D.) - A MEASURE OF ROCK QUALITY DESCRIBED BY:
- SATURATED - (SAT.)	USUALLY LIOUID: VERY WET, USUALLY FROM BELOW THE GROUND WATER TABLE	FRAC FRACTURED FRAGS FRAGMENT	VST - VANE S	HEAR TEST	VERY CA	AN BE CAR' R MORF IN	VED WITH KNIFE THICKNESS CAN	. CAN BE EXCAVATED READILY WITH POI I BE BROKEN BY FINGER PRESSURE. CAN	BE SCRATCHED READILY BY	TOTAL LENGTH OF ROCK SEGMENTS WITHIN A STRATUM EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE.
LL _ LIOUID LIMIT		MED MEDIUM	3		, FI	INGERNAIL.				TOPSOIL (T.S.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.
PLASTIC   RANGE < - WET - (W)	SEMISOLID; REDUIRES DRYING TO ATTAIN OPTIMUM MOISTURE	EQUI	PMENT USED ON SUBJECT F	ROJECT	FRAC	CTURE	SPACING	<u>TERM</u>	DING THICKNESS	
(PI) PL PLASTIC LIMIT	ATTHIS OF THIS TOTAL	DRILL UNITS:	ADVANCING TOOLS:	HAMMER TYPE:	TERM		SPACING MORE THAN 10	ALDA TRICKLA BEDDED	> 4 FEET	BENCH MARK:
DETIMUS MOISTURE - MOIST - (M)	SOLID: AT OR NEAR OPTIMUM MOISTURE	DATEL ONLY		X AUTOMATIC MANUAL	VERY WIDE WIDE		3 TO 10 FEET	THICKLY BEDDED THINLY BEDDED	1.5 - 4 FEET 0.16 - 1.5 FEET	ELEVATION:
OM OPTIMUM MOISTURE - MOIST - (4)		MOBILE B	CLAY BITS		MODERATELY CLOSE		1 TO 3 FEET 0.16 TO 1 FEET	VERY THINLY BEDDED	0.03 - 0.16 FEET	NOTES:
	REQUIRES ADDITIONAL WATER TO		6' CONTINUOUS FLIGHT AUGER	CORE SIZE:	VERY CLOSE		LESS THAN 0.16	FEET THICKLY LAMINATED THINLY LAMINATED	0.008 - 0.03 FEET < 0.008 FEET	NOTES.
- DRY - (D)	ATTAIN OPTIMUM MOISTURE	BK-51	X 8. HOLLOW AUGERS					INDURATION		
PLASTICIT'	Υ	CME-45	HARD FACED FINGER BITS		FOR SEDIMENTARY	ROCKS, IN	DURATION IS TH	E HARDENING OF THE MATERIAL BY CEME	NTING, HEAT, PRESSURE, ETC.	
PLASTICITY INDEX (			X TUNGCARBIDE INSERTS		FRIABL			RUBBING WITH FINGER FREES NUMEROUS	GRAINS:	
NONPLASTIC 0-5 LOW PLASTICITY 6-15	VERY LOW SLIGHT	X CME-550	CASING W/ ADVANCER	HAND TOOLS:	FRIABL			GENTLE BLOW BY HAMMER DISINTEGRAT		
MED. PLASTICITY 16-25	MEDIUM HIGH	FORTABLE HOIST	TRICONE STEEL TEETH	POST HOLE DIGGER	MODERA	ATELY INDL	JRATED	CRAINS CAN BE SEPARATED FROM SAMP BREAKS EASILY WHEN HIT WITH HAMMEI		
HIGH PLASTICITY 26 OR MORE	nien		TRICONE TUNGCARB.	HAND AUGER		TCD		GRAINS ARE DIFFICULT TO SEPARATE W		
COLOR		OTHER	CORE BIT	SOUNDING ROD	INDURA	1160		DIFFICULT TO BREAK WITH HAMMER.		
DESCRIPTIONS MAY INCLUDE COLOR OR COLOR COHBINA	ATIONS (TAN. RED. YEL-BRN. BLUE-GRAY)	OTHER	OTHER	VALUE SHEAR TEST	EXTREM	4ELY INDUR	ATED	SHARP HAMMER BLOWS REQUIRED TO BE SAMPLE BREAKS ACROSS GRAINS.	EAK SAMPLE:	
MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE L	DOED TO DESCRIBE HEFERRANCE.			OTHER				SHALE DUCHES HOURS OUBLINS.		REVISED 09/I5/00





# ROJECT: 37831

CONTENTS:

RETAINING WALL RIGHT

OF -L- STATION INTERVAL

29+50 TO 35+50

## STATE OF NORTH CAROLINA

DEPARTMENT OF TRANSPORTATION

DIVISION OF HIGHWAYS

GEOTECHNICAL UNIT

STRUCTURE

SUBSURFACE INVESTIGATION

## J. Furgher

STATE STATE	PROJECT REFERENCE	NO.	MEET	SHEETS		
N.C.	578 <b>3</b> 1	SUB	5			
STATE PROJ. NO.	F. A. PROJ. NO.		DESCRIP	TION		
			P.E.			
			CONST.			

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GENERAL SOIL AND ROCK STRATA DESCRIPTIONS AND INDICATED BOUNDARIES ARE BASED ON A GEOTECHNICAL INTERPRETATION OF ALL AVAILABLE SUBSUFFACE DATA AND MAY NOT NECESSARILY REFLECT THE ACTUAL SUBSURFACE CONDITIONS BETWEEN BORNICS OR BETWEEN SAMPLED STRATA WITHIN THE BOREHOLE. THE LABORATORY SAMPLE DATA AND THE IN SITU ON-PLACED TEST DATA CAN BE RELIED ON ONLY TO THE DEGREE OF RELIBILITY INHERENT IN THE STANDARD TEST METHOD. THE OBSERVED WATER LEVELS OR SOIL MOISTURE CONDITIONS INDICATED IN THE SUBSURFACE INVESTIGATIONS ARE AS RECORDED AT THE TIME OF THE INVESTIGATION. THESE WATER LEVELS OR SOIL MOISTURE CONDITIONS MOISTURE CONDITIONS MOISTURE CONDITIONS AND VARY CONSIDERABLY WITH TIME ACCORDING TO CLIMATIC CONDITIONS INCLUDING TEMPERATURES, PRECIPITATION AND WIND, AS WELL AS OTHER NON-CLIMATIC FACTORS.

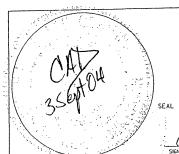
THE BIDDER OR CONTRACTOR IS CAUTIONED THAT DETAILS SHOWN ON THE SUBSURFACE PLANS ARE PRELIMINARY ONLY AND IN MANY CASES THE FINAL DESIGN DETAILS ARE DIFFERENT. FOR BIDDING AND CONSTRUCTION PURPOSES, REFER TO THE CONSTRUCTION PLANS AND DOCUMENTS FOR FINAL DESIGN INFORMATION ON THIS PROJECT. THE DEPARTMENT DOES NOT WARRANT OR GUARANTEE THE SUFFICIENCY OR ACCURACY OF THE INVESTIGATION MADE, NOR THE INTERPRETATIONS MADE OR OPINION OF THE DEPARTMENT AS TO THE TYPE OF MATERIALS AND CONDITIONS TO BE ENCOUNTERED. THE BIDDER OR CONTRACTOR IS CAUTIONED TO MAKE SUCH INDEPENDENT SUBSURFACE INVESTIGATIONS AS HE DEEMS NECESSARY TO SATISFY HIMSELF AS TO CONDITIONS TO BE ENCOUNTERED ON THIS PROJECT. THE CONTRACTOR SHALL HAVE NO CLAIM FOR ADDITIONAL COMPENSATION OR FOR AN EXTENSION OF TIME FOR ANY REASON RESULTING FROM THE ACTUAL CONDITIONS ENCOUNTERED AT THE SITE DIFFERING FROM THE ACTUAL CONDITIONS ENCOUNTERED AT THE SITE DIFFERING FROM THEM.

	STATE PROJECT37831I.D. NO
	F.A. PROJECT
·	COUNTY_BuncombePROJECT DESCRIPTIONRETAINING WALL
	RIGHT OF -L- STATION INTERVAL
	29+50 TO 35+50

SITE DESCRIPTION \_

NOTE - THE INFORMATION CONTAINED HEREIN IS NOT IMPLIED OR GUARANTEED BY THE N.C. DEPARTMENT OF TRANSPORTATION AS BEING ACCURATE NOR IT IS CONSIDERED TO BE PART OF THE PLANS, SPECIFICATIONS, OR CONTRACT FOR THE PROJECT.

NOTE - BY HAVING REQUESTED THIS INFORMATION THE CONTRACTOR SPECIFICALLY WAIVES ANY CLAIMS
FOR INCREASED COMPENSATION OR EXTENSION OF TIME BASED ON DIFFERENCES BETWEEN THE
CONDITIONS INDICATED HEREIN AND THE ACTUAL CONDITIONS AT THE PROJECT SITE.



INVESTIGATED BY\_C A Dunnagan

SUBMITTED BY W D Frye, JR

W D Frye, JR

SEPTEMBER 2004

SIGNATURE

J T Williams

DRAWN BY: C A DUNNAGAN

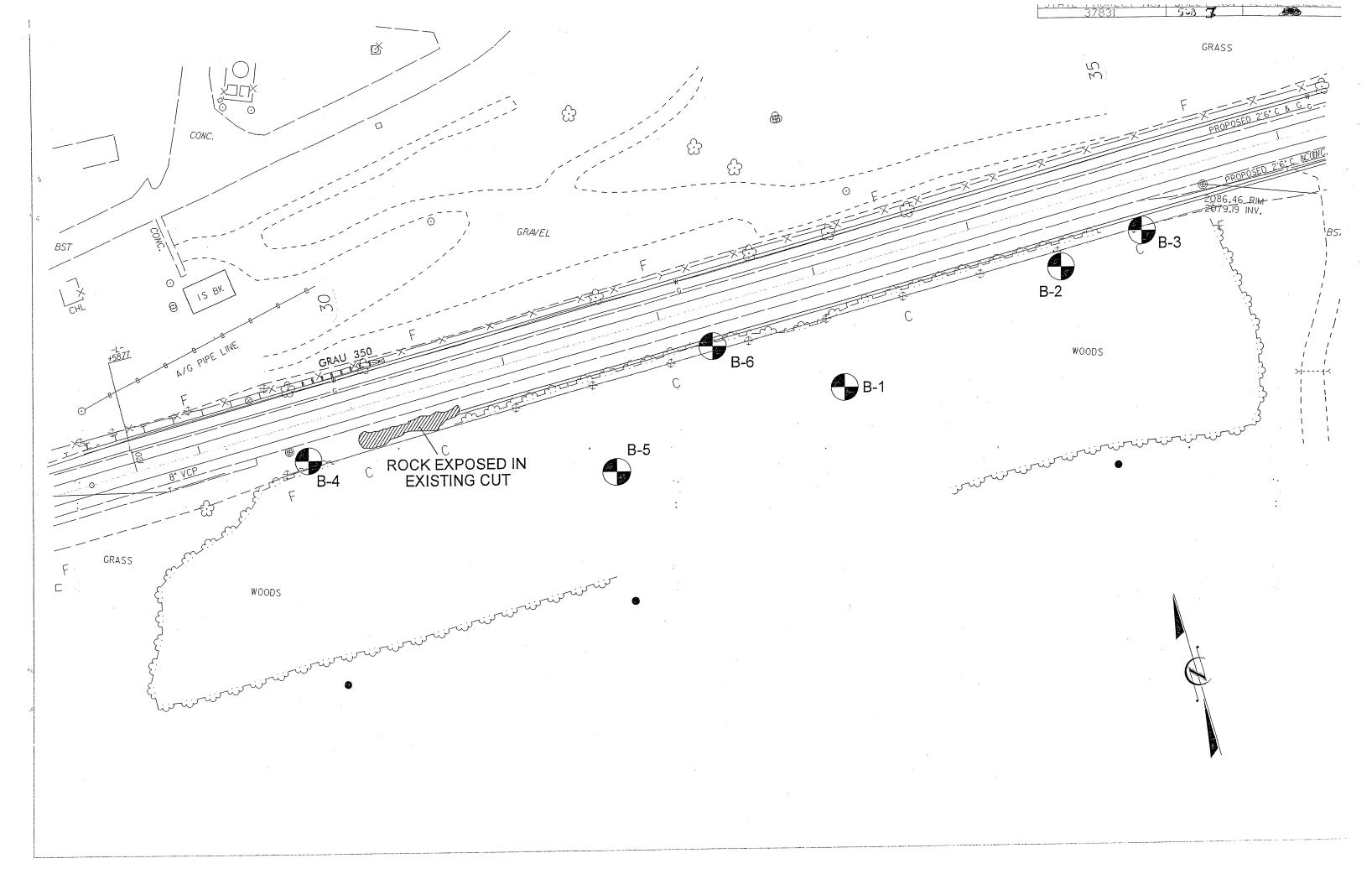
DIVISION OF HIGHWAYS

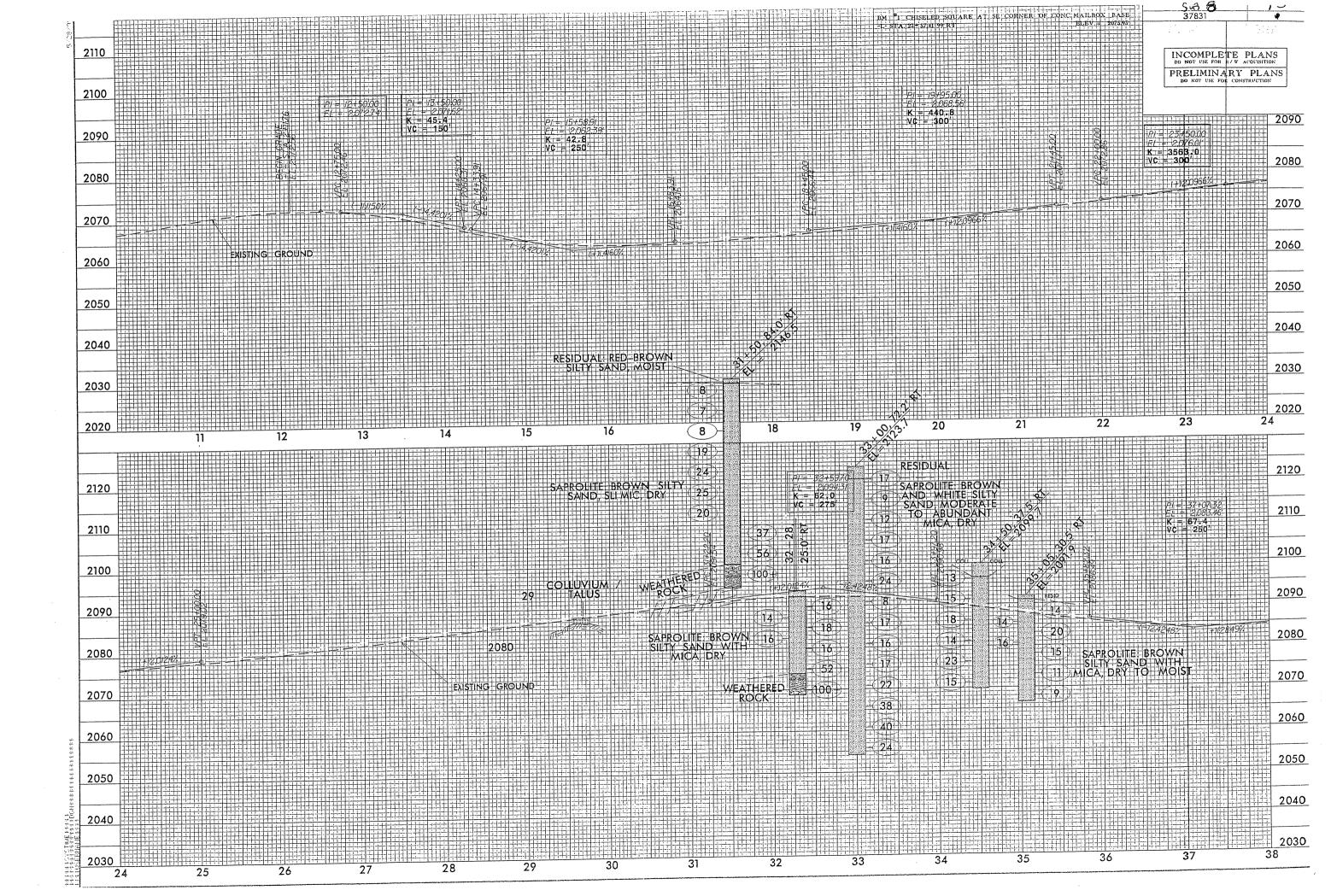
GEOTECHNICAL UNIT

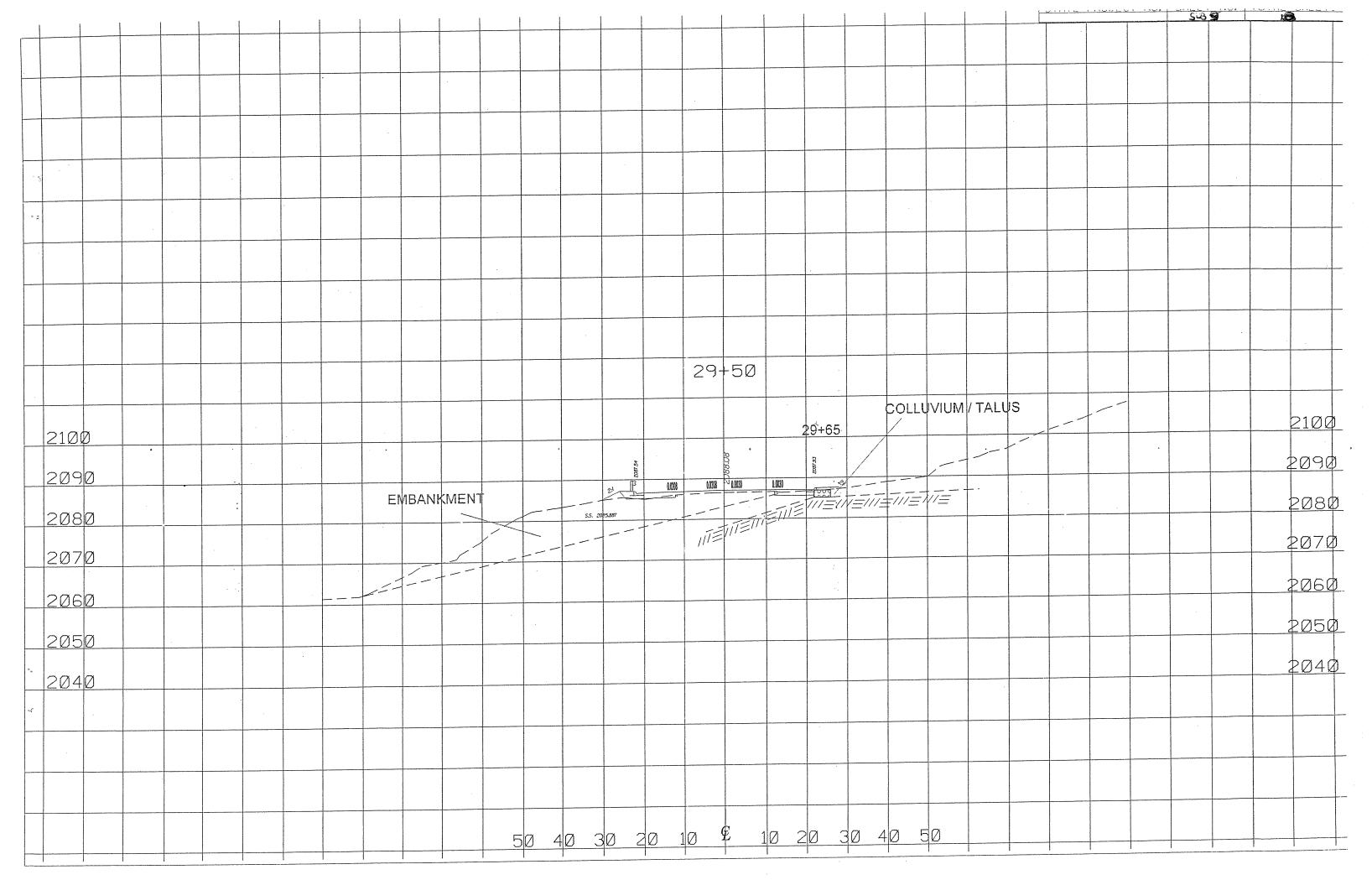
## SUBSURFACE INVESTIGATION

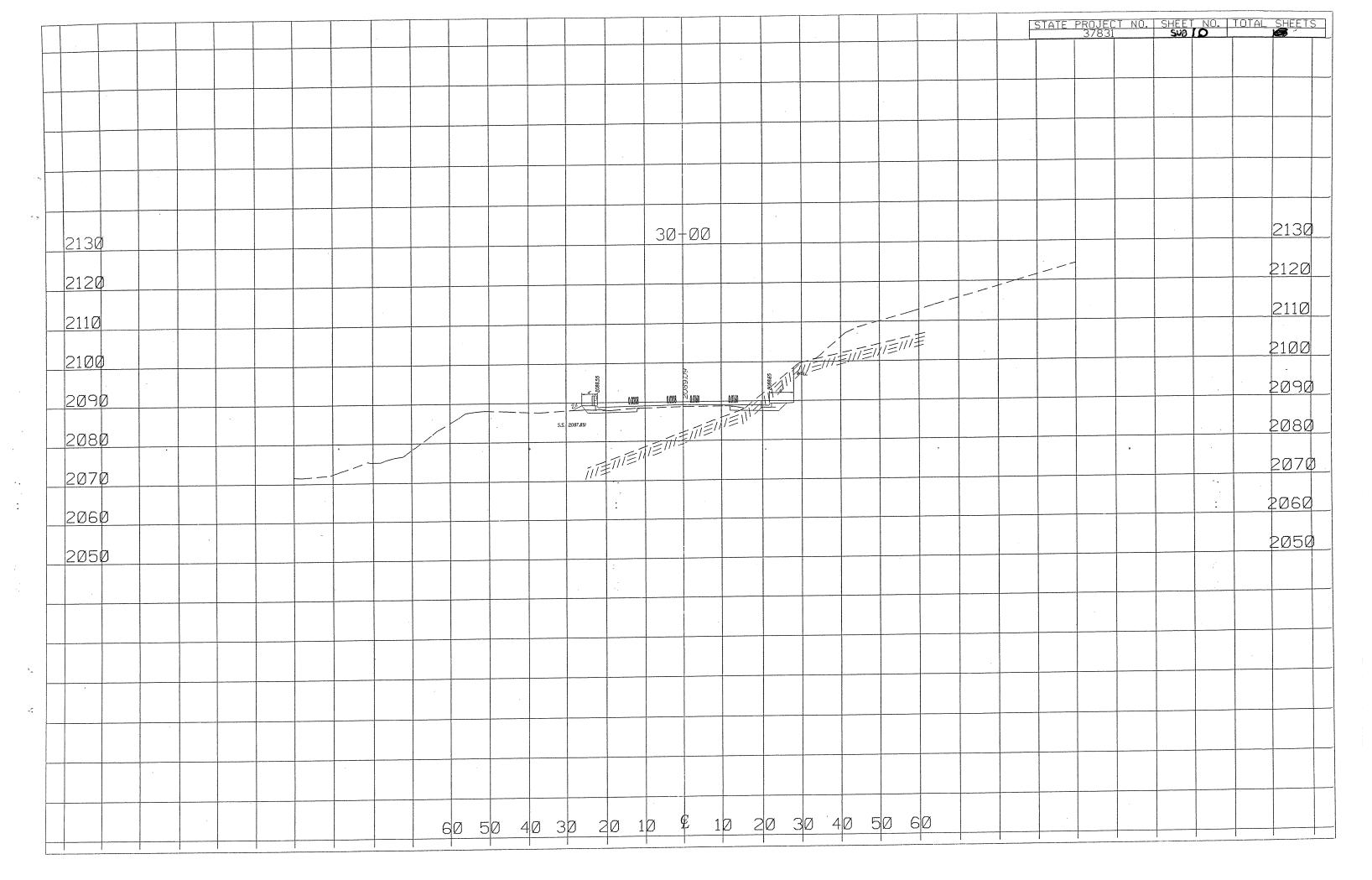
					•
	SOIL AND ROC	K LEGEND, TERMS	S, SYMBOLS, AND ABBR	EVIATIONS	TERMS AND DEFINITIONS
			D	OCV DESCRIPTION	
SOIL DESCRIPTION	GRADATION GRADATION	EINE TO COARSE	HARD ROCK IS NON-COASTAL PLAIN MATER	IAL THAT WHEN TESTED. WOULD YIELD SPT REFUSAL, AN INFERRED	ALLUVIUM (ALLUV.) - SOILS WHICH HAVE BEEN TRANSPORTED BY WATER.
	WELL GRADED- INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM UNIFORM: INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SA	ME SIZE. (ALSO	ROCK LINE INDICATES THE LEVEL AT WHILE	TO DE LESS THAN OLIFORT PER 60 BLOWS.	ADUIFER - A WATER BEARING FORMATION OR STRATA.
SOIL IS CONSIDERED TO BE THE UNCONSOLIDATED, SEMI-CONSOLIDATED OR WEATHERED EARTH MATERIALS STAIN STAIL OF THE UNCONSOLIDATED, SEMI-CONSOLIDATED OF THE UNCONSOLIDATED WITH A CONTINUOUS FLIGHT POWER AUGER, AND WHICH YIELDS LESS THAN STAIL OF THE UNCONSOLIDATED OF T	POORLY GRADEDI GAP-GRADED- INDICATES A MIXTURE OF UNIFORM PARTICLES OF TWO OR MORE	SIZES.	IN NON-COASTAL PLAIN MATERIAL. THE IF	RANSITION BETWEEN SOIL AND ROCK IS OFTEN REPRESENTED BY A ZONE	ARENACEOUS - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND.
SMICH CAN BE PENETRATED WITH A CUNTINOUS FLIGHT FORCH ASHTO T206, ASTM D-1586), SDIL 100 BLOWS PER FOOT ACCORDING TO STANDARD PENETRATION TEST (AASHTO T206, ASTM D-1586), SDIL	ANGULARITY OF GRAINS		OF WEATHERED ROCK. ROCK MATERIALS ARE TYPICALLY DIVIDED		ARGILLACEOUS - APPLIED TO ALL ROCKS OR SUBSTANCES COMPOSED OF CLAY MINERALS.  OR HAVING A NOTABLE PROPORTION OF CLAY IN THEIR COMPOSITION, AS SHALE, SLATE, ETC.
CLASSIFICATION IS BASED ON THE ABOUT STREET AND OTHER PERTINENT FACTORS SUCH	THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS ARE DESIGNATED BY THE T	ERMS: ANGULAR.	WEATHERED PLAZE NON-COA	ASTAL PLAIN MATERIAL THAT YIELDS SPT N VALUES > 100 BLOWS	PRESSURE TO RISE ABOVE THE LEVEL
AC MINICIPAL OCICAL COMPOSITION, ANGULARLIT, STRUCTURE, FLASTICITY, C.	SUBANGULAR, SUBROUNDED, OR ROUNDED.		ROCK (WR) PER FOL	OT.	AT WHICH IS IS ENCOUNTERED, BUT WHICH DOES NOT NECESSARILY RISE TO UK ABOVE THE
VERY STIFF, GRAY SILTY CLAY, MOIST WITH INTERBEDOED FINE SAND LAYERS, HIGHLY PLASTA, A 41 76	MINFRAL OGICAL COMPOSITION		CRYSTALLINE FINE TO	O COARSE GRAIN IGNEOUS AND METAMORPHIC ROCK THAT YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES GRANITE.	GROUND SURFACE.
SOIL LEGEND AND AASHTO CLASSIFICATION	MINISTRAL MANCE SUCH AS DUARTZ FELDSPAR, MICA, TALC, KADLIN, ETC. ARE USE	D IN DESCRIPTIONS	KULK ILKI I I I I I CHETCO	CARRO SCHIST, FTC.	CALCAREOUS (CALC.) - SOILS WHICH CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE.
GENERAL GRANULAR MATERIALS SILTURAL MATERIALS ORGANIC MATERIALS	WHENEVER THEY ARE CONSIDERED OF SIGNIFICANCE.		NON-CRYSTALLINE FINE TO	COARSE CRAIN METAMORPHIC AND NON-COASTAL PLAIN ITARY ROCK THAT WOULD YEILD SPT REFUSAL IF TESTED. ROCK TYPE	COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM OF SLOPE.
LLASS. 123. 77.00 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	COMPRESSIBILITY	700 7000 20	ROCK (NCR)	C DUVILITE SLATE SANDSTONE, ETC.	CORE RECOVERY (REC.) - TOTAL LENGTH OF ALL MATERIAL RECOVERED IN THE CORE BARREL DIVIDED BY TOTAL
GROUP A-1 A-3 A-2 A-4 A-5 A-6 A-7	SLIGHTLY COMPRESSIBLE LIQUID LIMIT LIQUID LIMIT 3			PLAIN SEDIMENTS CEMENTED INTO ROCK, BUT MAY NOT YIELD CUSAL, ROCK TYPE INCLUDES LIMESTONE, SANDSTONE, CEMENTED	LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE.
000000000000000000000000000000000000000	HIGHLY TO MODERATELY COMPRESSIBLE LIQUID LIMIT GO	REATER THAN 50	SEDIMENTARY ROCK SPT REF	BEDS, ETC.	DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT
SYMBOL B00000000000000000000000000000000000	PERCENTAGE OF MATERIAL			WEATHERING	ROCKS OR CUTS MASSIVE ROCK.  DIP - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE
% PASSING GRANULAR SILT- MUCK, CLAY PRAT	ORGANIC MG SOILS SOILS Q	THER MATERIAL	FRESH ROCK FRESH, CRYSTALS BRIGHT	F. FEW JOINTS MAY SHOW SLIGHT STAINING, ROCK RINGS UNDER	HORIZONTAL.
- 40 30 MX 50 MX 51 MN SOILS FEAT	TRACE OF ORGAN 2 - 3% 3 - 5% TRACE		WAMMED IF CRYSTALLINE.	:	DIP DIRECTION (DIP AZIMUTH) - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF
# 200 15 MX 25 MX 0 MX 25 MX 35 MX 35 MX 35 MX 36 MN 36 MN 36 MN 36 MN	LITTLE ORGANIC MAN 3 - 5% 5 - 12% LITTL		VERY SLIGHT ROCK GENERALLY FRESH, JOINT	IS STAINED.SOME JOINTS MAY SHOW THIN CLAY COATINGS IF OPEN. IMEN FACE SHINE BRIGHTLY.ROCK RINGS UNDER HAMMER BLOWS IF	THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH.
LIQUID LIMIT 40 MX 41 MN 40 MX 41 MN 40 MX 41 MN SOILS WITH PLASTIC INDEX E MX N.P. 110 MX 110 MX 111 MN 110 MX 110 MX 111 MN 111 MN LITTLE OR HIGHLY	MODERATELY ORGANIC 5 - 10% 12 - 20% 30% HIGHLY ORGANIC >10% >20% HIGHLY		OF A CRYSTALLINE NATURE.		FAULI - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE.
O MULE MY ME MY MODERATE OPERANCE	GROUND WATER		SLIGHT ROCK GENERALLY FRESH, JOINT	IS STAINED AND DISCOLORATION EXTENDS INTO ROCK UP TO ITAIN CLAY, IN GRANITOID ROCKS SOME OCCASIONAL FELDSPAR ITAIN CLAY, IN GRANITOID ROCKS BONG INFO ROMER BY INFO	FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES.
GROUP INDEX 0 0 4 MX 8 HA 12 HA 15 HA 15 HA 12 HA 15 HA 12 HA 15 HA 12 HA 15 H	WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER D	RILLING.	CRYSTALS ARE DULL AND DISC	COLORED. CRYSTALLINE HOCKS HIND UNDER HARMEN DESIGN	FISSILE - A PROPERTY OF SPECIFING ALGORIC CEOSEER SPECIFICAL POSITION AND DISLONGED FROM
USUAL TYPES STONE FRAGS. FINE SILTY OR CLAYEY SILTY CLAYEY ORGANIC OF MAJOR GRAVEL AND SAND SOILS SOILS MATTER	STATIC WATER LEVEL AFTER 24 HOURS.			CHOIL DISCOLOBATION AND WEATHERING EFFELIS. IN	FLOAT - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLODGED FROM PARENT MATERIAL.
OF MAJOR GRAVEL AND SAND GRAVEL AND SAND SOILS SOILS PHILES		r STRATA		PRANS ARE DULL AND DISCOLORED, SOME SHOW CLAY, ROCK HAS BLOWS AND SHOWS SIGNIFICANT LOSS OF STRENGTH AS COMPARED	FLOOD PLAIN (F.P.) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY
GEN. RATING AS A EXCELLENT TO GOOD FAIR TO POOR POOR UNSUITABLE	√PW  PERCHED WATER, SATURATED ZONE OR WATER BEARIN  PERCHED WATER BE		WITH ERESH ROCK.		THE STREAM.
SUBGRADE	SPRING OR SEEPAGE		MODERATELY ALL ROCK EXCEPT DUARTZ DIS	SCOLORED OR STAINED. IN GRANITOID ROCKS, ALL FELDSPARS DULL RITY SHOW KAOLINIZATION. ROCK SHOWS SEVERE LOSS OF STRENCTH ROCK SHOWS SEVER LOSS OF STRENCTH	FORMATION (FM.) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN
P.I. OF A-7-5 ≤ L.L 30 : P.I. OF A-7-6 > L.L 30	MISCELLANEOUS SYMBOLS			A GEOLOGIST'S PICK. ROCK GIVES 'CLUNK' SOUND WHEN STRUCK.	THE FIELD.  JOINT - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED.
CONSISTENCY OR DENSENESS  RANGE OF STANDARD   RANGE OF UNCONFINED		SAMPLE	IE TESTEN WOULD YIELD SPT	REFUSAL ·	
PRIMARY SOIL TYPE COMPACTNESS OR PENETRATION RESISTENCE COMPRESSIVE STRENGTH	ROADWAY EMBANKMENT WITH SOIL DESCRIPTION  ROADWAY EMBANKMENT WITH SOIL DESCRIPTION	DESIGNATIONS	SEVERE ALL ROCKS EXCEPT DUARTZ D	ISCOLORED OR STAINED. ROCK FABRIC CLEAR AND EVIDENT BUT REDUCE IN GRANITOID ROCKS ALL FELDSPARS ARE KAOLINIZED TO SOME	D LEDGE - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO ITS LATERAL EXTENT.
CONSISTENCY (N-VALUE) (10N3/17)	AUCER BORING	S- BULK SAMPLE	EVIENT COME FRAGMENTS OF	STRONG HULK USUALLI REPHIN.	A RODY OF SOIL OR BOCK THAT THINS OUT IN ONE OR MORE DIRECTIONS.
VERY LOOSE	SUIL STMBUL .	SS- SPLIT SPOON ·	IE TESTED VIELDS SPT N VAL	UES > 100 BPF	WOTT TO MOTE TOPECHIARLY MARKED WITH SPOTS OF DIFFERENT COLORS, MUTICING IN
GRANULAR MEDIUM DENSE 10 TO 30 N/A	ARTIFICIAL FILL OTHER THAN CORE BORING	SAMPLE	VERY SEVERE ALL ROCK EXCEPT QUARTZ DIS	SCOLORED OR STAINED. ROCK FABRIC ELEMENTS ARE DISCERNIBLE BUT EDUCED TO SOIL STATUS, WITH ONLY FRAGMENTS OF STRONG ROCK	SOILS USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE.  PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE OF
MATERIAL DENSE 30 TO 50 (NON-COHESIVE) VERY DENSE >50	ROADWAY EMBANKMENTS	ST- SHELBY TUBE	(V. SEV.) THE MASS IS EFFELTIVELY HE	DUCED TO SOIL STATISTICEDED TO A DEGREE SUCH THAT ONLY MINOR	INTERVENING IMPERVIOUS STRATUM.
VERY SOFT <2 <0.25	INFERRED SOIL BOUNDARIES MONITORING WELL	SAMPLE	VESTIGES OF THE ORIGINAL R	OCK FABRIC REMAIN. IF TESTED, TIELDS S	RESIDUAL SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK.
GENERALLY SOFT 2 TO 4 0.25 TO 0.5	TITEITE INFERRED ROCK LINE A PIEZOMETER	RS- ROCK SAMPLE	COMPLETE ROCK REDUCED TO SOIL. ROCK	FABRIC NOT DISCERNIBLE OR DISCERNIBLE ONLY IN SMALL AND	A MEASURE OF BOOK OHALTY DESCRIBED BY TOTAL LENGTH UP
SILT-CLAY MEDIUM STIFF 4 TO 8 0.5 TO 1	INSTALLATION  TTTTT ALLUVIAL SOIL BOUNDARY	RT- RECOMPACTED TRIAXIAL SAMPLE	SCATTERED CONCENTRATIONS. ALSO AN EXAMPLE.	QUARTZ MAY BE PRESENT AS DIKES OR STRINGERS. SAPROLITE IS	ROCK SEGMENTS EDUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE
MATERIAL STIFF 8 TO 15 1 TO 2 (COHESIVE) VERY STIFF 15 TO 30 2 TO 4	SLOPE INDICATOR	CBR - CBR SAMPLE	ALSO AN EXAMILE.	ROCK HARDNESS	FXPRESSED AS A PERCENTAGE.
HARD >30 >4	BOCK STRUCTURES	CON Self-transfer	and an account of the same	NIFE OR SHARP PICK. BREAKING OF HAND SPECIMENS REQUIRES	SAPROLITE (SAP.) - RESIDUAL SOIL WHICH RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT ROCK.
TEXTURE OR GRAIN SIZE	SPT N-VALUE		SEVERAL HARD BLOWS OF TH	#E GEOLOGISTS PILK.	TOTAL OF TOUR OF TOUR DE APPROXIMATELY UNIFORM THICKNESS AND
U.S. STD. SIEVE SIZE 4 10 40 60 200 270	• - SOUNDING ROD REF SPT REFUSAL		HARD CAN BE SCRATCHED BY KNIFT	E OR PICK ONLY WITH DIFFICULTY. HARD HAMMER BLOWS REQUIRED	SILL - AN INTRUSIVE BUDY OF IGNED ROLE AND AN ANALYSIS OF THE RELATIVELY THIN COMPARED WITH ITS LATERAL EXTENT, WHICH HAS BEEN EMPLACED PARALLEL TO THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS
OPENING (MM) 4.76 2.0 0.42 0.25 0.075 0.053	ABBREVIATIONS		TO DETACH HAND SPECIMEN.		TO THE BEDDING OR SCHISTOSTY OF THE BRINGS THAT RESULTS FROM FRICTION ALONG A FAULT OR SLICKENSIDE - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR
BOULDER COORLE GRAVEL COARSE FINE SILT CLAY	AR - AUGER REFUSAL PMT - PRESSUR		MODERATELY CAN BE SCRATCHED BY KNIF	E OR PICK, GOUGES OR GROOVES TO 0.25 INCHES DEEP CAN BE OF A GEOLOGISTS PICK, HAND SPECIMENS CAN BE DETACHED	CLID PLANE
BOULDER	BT - BORING TERMINATED SD SAND, SAN		DV MODEDATE BLOWS		I NUMBER OF BLOWS (N OR E.P.F.) UP
CRAIN MM 305 75 2.0 0.25 0.05 0.005	CUT - CONE PENETRATION TEST SLI SLIGHTLY	•		0.05 INCHES DEEP BY FIRM PRESSURE OF KNIFE OR PICK POINT.	STANDARD PENETRATION TEST (PENETRATION RESISTANCE/S)  A 140 LB. HAMMER FALLING 30 INCHES REQUIRED TO PRODUCE A PENETRATION OF 1 FOOT INTO SOIL WI A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER, SPT REFUSAL IS LESS THAN 0.1 FOOT PENETRATION  A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER, SPT REFUSAL IS LESS THAN 0.1 FOOT PENETRATION  A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER, SPT REFUSAL IS LESS THAN 0.1 FOOT PENETRATION  A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER, SPT REFUSAL IS LESS THAN 0.1 FOOT PENETRATION  A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER, SPT REFUSAL IS LESS THAN 0.1 FOOT PENETRATION  A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER, SPT REFUSAL IS LESS THAN 0.1 FOOT PENETRATION  A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER, SPT REFUSAL IS LESS THAN 0.1 FOOT PENETRATION  A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER, SPT REFUSAL IS LESS THAN 0.1 FOOT PENETRATION  A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER, SPT REFUSAL IS LESS THAN 0.1 FOOT PENETRATION  A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER, SPT REFUSAL IS LESS THAN 0.1 FOOT PENETRATION  A 3 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER, SPT REFUSAL IS LESS THAN 0.1 FOOT PENETRATION  A 4 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER, SPT REFUSAL IS LESS THAN 0.1 FOOT PENETRATION  A 4 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER, SPT REFUSAL IS LESS THAN 0.1 FOOT PENETRATION SPECIAL SPOON SAMPLER, SPT REFUSAL IS LESS THAN 0.1 FOOT PENETRATION SPECIAL SPOON SPECIAL
SIZE IN. 12' 3'	CSE COARSE		DOINT OF A CEDI OCISTS PIC	L CHIPS TO PEICES I INCH MAXIMUM SIZE BY HARD BLOWS OF THE	LITTLE CA DI OUC
SOIL MOISTURE - CORRELATION OF TERMS	DMT - DILATOMETER TEST $\gamma$ - UNIT WE DPT - DYNAMIC PENETRATION TEST $\gamma_d$ - DRY UNI			DEADLY DY MILE OF PICK CAN BE EXCAVATED IN FRAGMENTS	STRATA CORE RECOVERY (SREC.) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENG
SOIL MOISTURE SCALE FIELD MOISTURE GUIDE FOR FIELD MOISTURE DESCRIPTION	e - VOID RATIO		FROM CHIPS TO SEVERAL IN	CHES IN SIZE BY MODERATE BLOWS OF A TIEN TOTAL	OF STRATUM AND EXPRESSED AS A PERCENTAGE.
(ATTERBERG LIMITS) DESCRIPTION	F FINE V VERY		PIECES CAN BE BROKEN BY	THE PURPLE DEADLY WITH POINT OF PICK, PIECES I INCH	TOTAL LENGTH OF POCK SEGMENTS WITHIN A STRATUM EDUAL TO ON GREATER WAS
- SATURATED - USUALLY LIQUID: YERY WET, USUALLY	FRAC FRACTURED VST - VANE SP	EAR TEST	SOFT OR MORE IN THICKNESS CAN	BE BROKEN BY FINGER PRESSURE. CAN BE SCRATCHED READILY BY	I TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE.
(SAT.) FROM BELOW THE GROUND WATER TABLE	FRAGS FRAGMENTS  MED MEDIUM		FINGERNAIL.	BEDDING	10PSOIL (T.S.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.
PLASTIC SEMISOLID: REQUIRES DRYING TO	EQUIPMENT USED ON SUBJECT P	ROJECT	FRACTURE SPACING	TERM THICKNESS	BENCH MARK:
RANGE \ - WET - (W) ATTAIN OPTIMUM MOISTURE	EGOIFMENT OSED ON DOSTE	HAMMER TYPE:	TERM SPACING	VERY THICKLY BEDDED > 4 FEET	
PLL + PLASTIC LIMIT	DRILL UNITS: ADVANCING TOOLS:	X AUTOMATIC MANUAL	VERY WIDE MORE THAN 10 F	THICKLY BEDDED 1.5 - 4 FEET	ELEVATION:
OM OPTIMUM MOISTURE - MOIST - (M) SOLID; AT OR NEAR OPTIMUM MOISTURE	CLAY BITS	X. Adversion	WIDE 3 TO 10 FEET	THINLY BEDDED 0.03 - 0.16 FEET	NOTEC
OM LOPINOM MOISTORE SL SHRINKAGE LIMIT	MOBILE B- 6 CONTINUOUS FLIGHT AUGER	CORE SIZE:	CLOSE 9.16 TO 1 FEET	THICKLY LAMINATED 0.008 - 0.03 FEET	NOTES:
REQUIRES ADDITIONAL WATER TO			VERY CLOSE LESS THAN 0.16	THE STATE OF THE S	
- DRY - (D) ATTAIN OPTIMUM MOISTURE				INDURATION	<b>-</b>
PLASTICITY	CME-45 HARD FACED FINGER BITS		FOR SEDIMENTARY ROCKS, INDURATION IS THE	E HARDENING OF THE MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.	
PLASTICITY INDEX (PI) DRY STRENGTH	X TUNGCARBIDE INSERTS	H	FRIABLE	RUBBING WITH FINGER FREES NUMEROUS GRAINS:	
NONPLASTIC 0-5 VERY LOW	X CME-550 CASING W/ ADVANCER	HAND TOOLS:	- Innec	GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE.	
LOW PLASTICITY 6-15 SLIGHT		POST HOLE DIGGER	MODERATELY INDURATED	CRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE: BREAKS EASILY WHEN HIT WITH HAMMER.	
MED. PLASTICITY	Toninott nois.	HAND AUGER		GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE:	
COLOR	TRICONE TUNGCARB.	SOUNDING ROD	INDURATED ,	DIFFICULT TO BREAK WITH HAMMER.	
	. CORE BIT	VANE SHEAR TEST		SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE:	
DESCRIPTIONS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN. RED. YEL-BRN. BLUE-GRAY)	OTHER	OTHER	EXTREMELY INDURATED	SAMPLE BREAKS ACROSS GRAINS.	REVISED 09/15/00
MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE.			<u> </u>		
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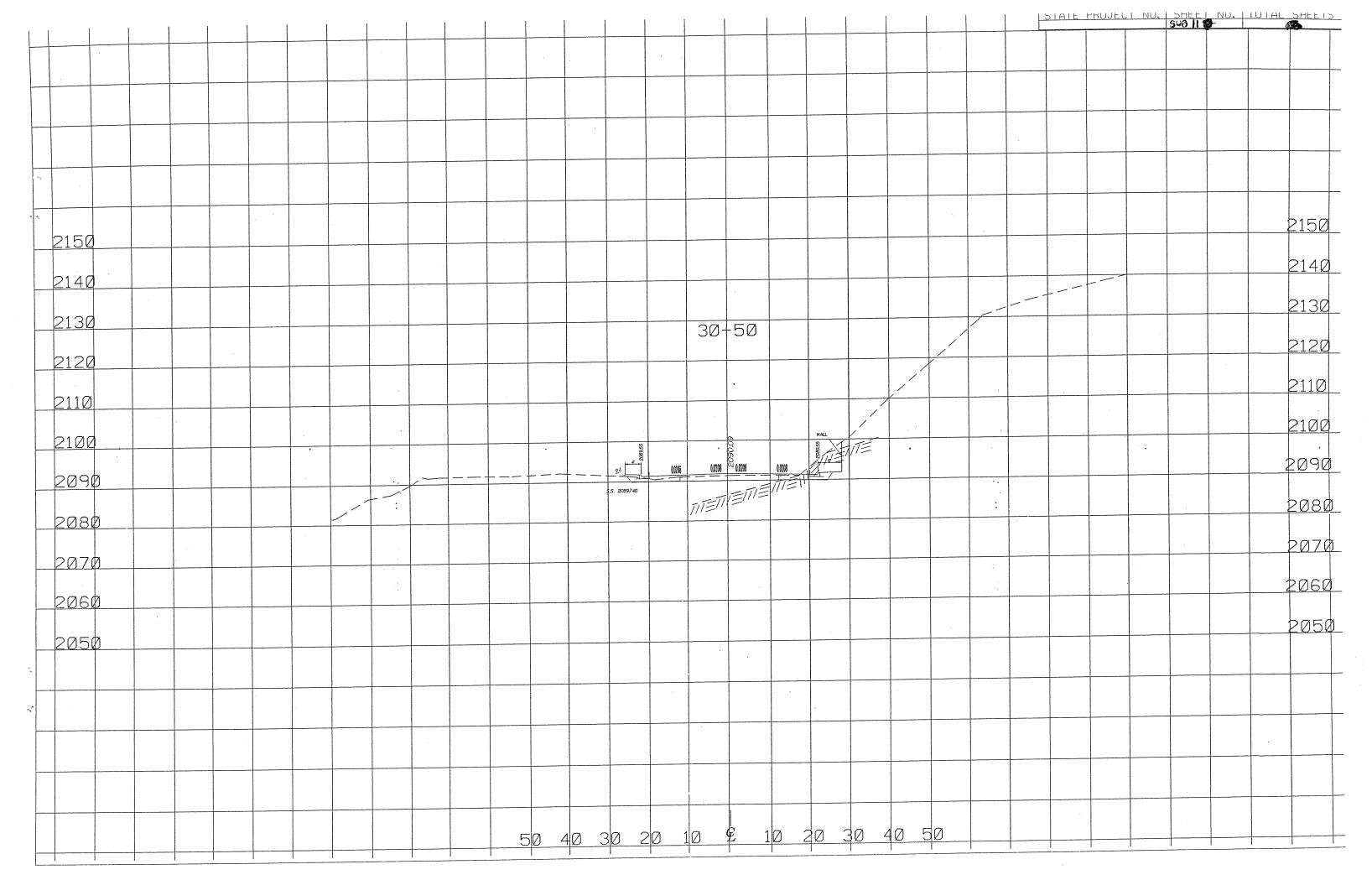
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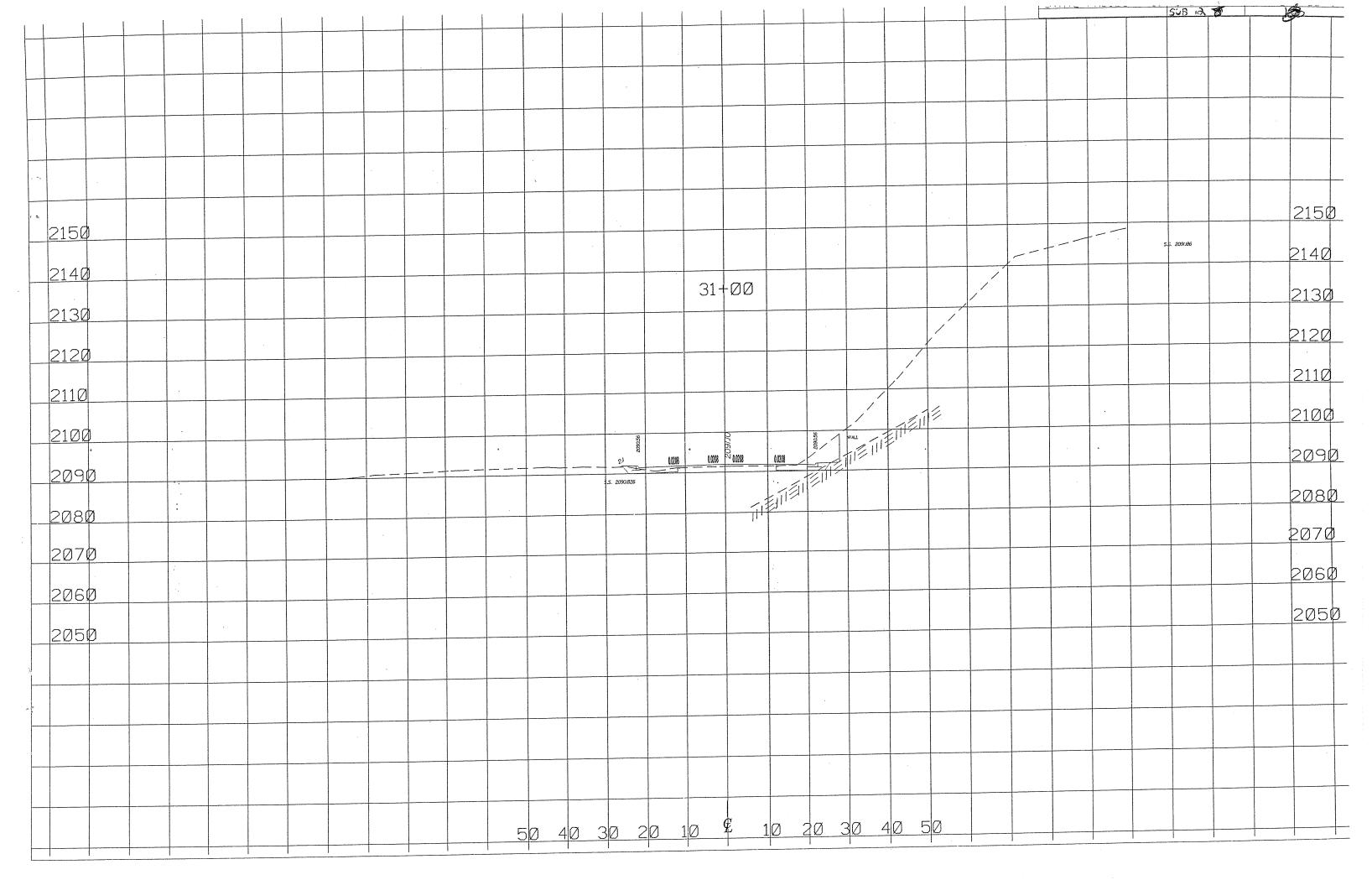








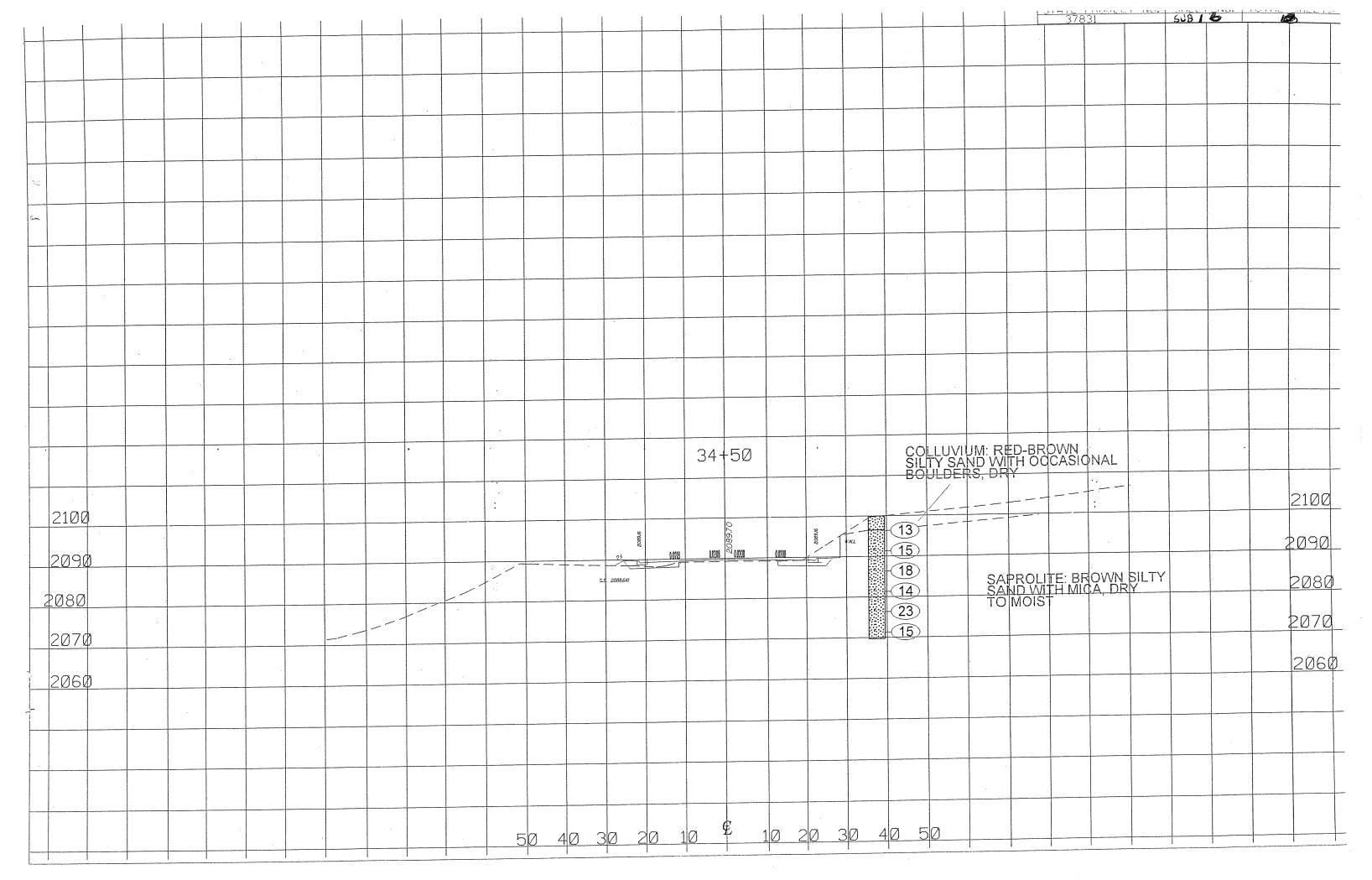




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								RESIDUAL: SILTY SAND	RED BROWN , MOIST	2150
2150										
2140								8		2140
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2130				31+50				19 SAPRO 24 SAND	OLITE: BROWN WITH MICA DE	RY D120
2120								DE DE	l l	1 1
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2090  2080  2080  SAPROLITE BROWN  SILTY SAND WITH  16 18 MICA, DRY  2070  100	2086
2080 THERED ROCK STATHERED ROCK	2070
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50 40 30 20 10 4 10 20 30 40 50	

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70					
in a					2150
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2140				RESIDUAL: RED-BROWN	2140
				RESIDUAL: RED-BROWN SILTY SAND WITH OCCASIONAL BOULDERS, DRY	2130
2130		33+00			2120
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