ID: W-5121

CONTRACT: C202614

NOTE: SEE SHEET 2A FOR PLAN SHEET LAYOUT AT TIME OF INVESTIGATION

CONTENTS

LINE	STATION	PLAN	PROFILE
-L-	11+76 TO 28+01	4 - 5	7
-Y1-	11+00 TO 29+17	4 & 6	8
-Y2-	10+00 TO 19+82	5 & 6	9
-Y3-	11+54 TO 14+66	4 & 6	9

CROSS SECTIONS

LINE	STATION	SHEET NO.
-L-	12+00 TO 28+00	10 - 20
-Y1-	11+00 TO 29+00	21 - 33
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-Y3-	11+00 TO 14+50	35 - 37

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL ENGINEERING UNIT

ROADWAY SUBSURFACE INVESTIGATION

PROJ. REFERENCE NO. 41885.1.1 (W-5121) F.A. PROJ. STPHRR-0041(28)

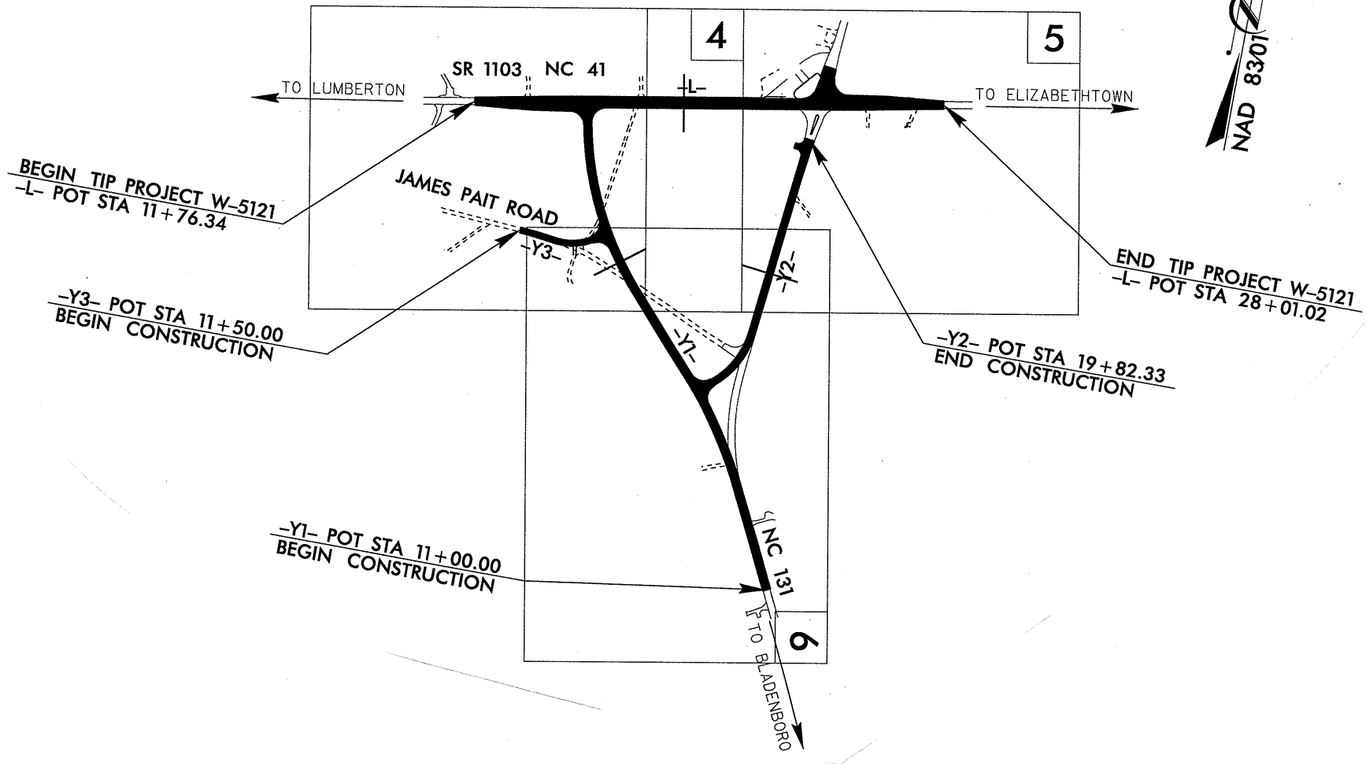
COUNTY BLADEN

PROJECT DESCRIPTION WIDENING & RE-ALIGNMENT OF NC 131 AT NC 41

INVENTORY

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOT. AL SHEETS
N.C.	W-5121	1	37

STATE PROJ. NO.	F.A. PROJ. NO.	DESCRIPTION
41885.1.1	STPHRR-0041(28)	P.E.
41885.2.1	STP-0041(28)	R/W & UTIL.
41885.3.1	STP-0041(28)	CONSTR.



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THE SUBSURFACE INFORMATION AND THE SUBSURFACE INVESTIGATION ON WHICH IT IS BASED WERE 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 ENGINEERING UNIT AT (919) 250-4088. NEITHER THE SUBSURFACE PLANS AND REPORTS, NOR THE FIELD BORING LOGS, ROCK CORES, OR SOIL TEST DATA ARE PART OF THE CONTRACT.

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SUBMITTED BY DON DEWEY

DATE JUNE 2009

NORTH CAROLINA PROFESSIONAL SEAL 031022 ENGINEER ANDREW A. NASH 6/12/09

DRAWN BY: M.T. BRANDON

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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.

PROJECT REFERENCE NO.	SHEET NO.
41885.1.1 (W-5121)	2

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL ENGINEERING UNIT

SUBSURFACE INVESTIGATION

SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

SOIL DESCRIPTION

SOIL IS CONSIDERED TO BE THE UNCONSOLIDATED, SEMI-CONSOLIDATED, OR WEATHERED EARTH MATERIALS THAT CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER, AND YIELD LESS THAN 100 BLOWS PER FOOT ACCORDING TO STANDARD PENETRATION TEST (AASHTO T206, ASTM D-1586). SOIL CLASSIFICATION IS BASED ON THE AASHTO SYSTEM. BASIC DESCRIPTIONS GENERALLY SHALL INCLUDE: CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. EXAMPLE:

VERY STIFF, GRAY, SILTY CLAY, MOIST WITH INTERBEDDED FINE SAND LAYERS, HIGHLY PLASTIC, A-7-6

SOIL LEGEND AND AASHTO CLASSIFICATION

GENERAL CLASS.	GRANULAR MATERIALS (≤ 35% PASSING #200)							SILT-CLAY MATERIALS (> 35% PASSING #200)				ORGANIC MATERIALS		
GROUP CLASS.	A-1		A-3	A-2				A-4	A-5	A-6	A-7	A-1, A-2 A-3	A-4, A-5 A-6, A-7	
	A-1-a	A-1-b		A-2-4	A-2-5	A-2-6	A-2-7				A-7-5, A-7-6			
SYMBOL														
% PASSING #10 #40 #200	50 Mx 30 Mx 15 Mx	50 Mx 25 Mx	51 Mn 10 Mx	35 Mx	35 Mx	35 Mx	35 Mx	36 Mn	36 Mn	36 Mn	36 Mn	GRANULAR SOILS	SILT-CLAY SOILS	MUCK, PEAT
LIQUID LIMIT	6 Mx		NP	40 Mx	41 Mn	40 Mx	41 Mn	40 Mx	41 Mn	40 Mx	41 Mn	SOILS WITH LITTLE OR MODERATE AMOUNTS OF ORGANIC MATTER		HIGHLY ORGANIC SOILS
PLASTIC INDEX				10 Mx	10 Mx	11 Mx	11 Mx	10 Mx	10 Mx	11 Mx	11 Mx			
GROUP INDEX	0		0	0		4 Mx		8 Mx	12 Mx	16 Mx	No Mx			
USUAL TYPES OF MAJOR MATERIALS	STONE FRAGS. GRAVEL, AND SAND		FINE SAND	SILTY OR CLAYEY GRAVEL AND SAND				SILTY SOILS		CLAYEY SOILS				
GEN. RATING AS A SUBGRADE	EXCELLENT TO GOOD							FAIR TO POOR				FAIR TO POOR	POOR	UNSUITABLE

PI OF A-7-5 SUBGROUP IS ≤ LL - 30 ; PI OF A-7-6 SUBGROUP IS > LL - 30

CONSISTENCY OR DENSENESS

PRIMARY SOIL TYPE	COMPACTNESS OR CONSISTENCY	RANGE OF STANDARD PENETRATION RESISTENCE (N-VALUE)	RANGE OF UNCONFINED COMPRESSIVE STRENGTH ($TONS/FT^2$)
GENERALLY GRANULAR MATERIAL (NON-COHESIVE)	VERY LOOSE	<4	N/A
	LOOSE	4 TO 10	
	MEDIUM DENSE	10 TO 30	
	DENSE	30 TO 50	
	VERY DENSE	>50	
GENERALLY SILT-CLAY MATERIAL (COHESIVE)	VERY SOFT	<2	<0.25
	SOFT	2 TO 4	0.25 TO 0.50
	MEDIUM STIFF	4 TO 8	0.5 TO 1.0
	STIFF	8 TO 15	1 TO 2
	VERY STIFF	15 TO 30	2 TO 4
	HARD	>30	>4

TEXTURE OR GRAIN SIZE

U.S. STD. SIEVE SIZE	4	10	40	60	200	270
OPENING (MM)	4.75	2.00	0.42	0.25	0.075	0.053

BOULDER (BLDR.)	COBBLE (COB.)	GRAVEL (GR.)	COARSE SAND (CSE. SD.)	FINE SAND (F SD.)	SILT (SL.)	CLAY (CL.)

GRAIN SIZE	MM	305	75	2.0	0.25	0.05	0.005
	IN.	12	3				

SOIL MOISTURE - CORRELATION OF TERMS

SOIL MOISTURE SCALE (ATTERBERG LIMITS)	FIELD MOISTURE DESCRIPTION	GUIDE FOR FIELD MOISTURE DESCRIPTION
	- SATURATED - (SAT.)	USUALLY LIQUID; VERY WET, USUALLY FROM BELOW THE GROUND WATER TABLE
LL — LIQUID LIMIT		
PLASTIC RANGE (PI)	- WET - (W)	SEMISOLID; REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE
PL — PLASTIC LIMIT		
OM — OPTIMUM MOISTURE	- MOIST - (M)	SOLID; AT OR NEAR OPTIMUM MOISTURE
SL — SHRINKAGE LIMIT		
	- DRY - (D)	REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE

PLASTICITY

	PLASTICITY INDEX (PI)	DRY STRENGTH
NONPLASTIC	0-5	VERY LOW
LOW PLASTICITY	6-15	SLIGHT
MED. PLASTICITY	16-25	MEDIUM
HIGH PLASTICITY	26 OR MORE	HIGH

COLOR

DESCRIPTIONS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YELLOW-BROWN, BLUE-GRAY), MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE.

GRADATION

WELL GRADED - INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM FINE TO COARSE.
UNIFORM - INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE. (ALSO POORLY GRADED)
GAP-GRADED - INDICATES A MIXTURE OF UNIFORM PARTICLES OF TWO OR MORE SIZES.

ANGULARITY OF GRAINS

THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS IS DESIGNATED BY THE TERMS: ANGULAR, SUBANGULAR, SUBROUNDED, OR ROUNDED.

MINERALOGICAL COMPOSITION

MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC. ARE USED IN DESCRIPTIONS WHENEVER THEY ARE CONSIDERED OF SIGNIFICANCE.

COMPRESSIBILITY

SLIGHTLY COMPRESSIBLE	LIQUID LIMIT LESS THAN 31
MODERATELY COMPRESSIBLE	LIQUID LIMIT EQUAL TO 31-50
HIGHLY COMPRESSIBLE	LIQUID LIMIT GREATER THAN 50

PERCENTAGE OF MATERIAL

ORGANIC MATERIAL	GRANULAR SOILS	SILT - CLAY SOILS	OTHER MATERIAL	
TRACE OF ORGANIC MATTER	2 - 3%	3 - 5%	TRACE	1 - 10%
LITTLE ORGANIC MATTER	3 - 5%	5 - 12%	LITTLE	10 - 20%
MODERATELY ORGANIC	5 - 10%	12 - 20%	SOME	20 - 35%
HIGHLY ORGANIC	>10%	>20%	HIGHLY	35% AND ABOVE

GROUND WATER

- WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING
- STATIC WATER LEVEL AFTER 24 HOURS
- PW — PERCHED WATER, SATURATED ZONE, OR WATER BEARING STRATA
- SPRING OR SEEP

MISCELLANEOUS SYMBOLS

- ROADWAY EMBANKMENT (RE) WITH SOIL DESCRIPTION
- SOIL SYMBOL
- ARTIFICIAL FILL (AF) OTHER THAN ROADWAY EMBANKMENT
- INFERRED SOIL BOUNDARY
- INFERRED ROCK LINE
- ALLUVIAL SOIL BOUNDARY
- 25/025 — DIP & DIP DIRECTION OF ROCK STRUCTURES
- SOUNDING ROD
- SPT — TEST BORING
- AUGER BORING
- CORE BORING
- MW — MONITORING WELL
- PIEZOMETER INSTALLATION
- SLOPE INDICATOR INSTALLATION
- SPT N-VALUE
- REF — SPT REFUSAL

SAMPLE DESIGNATIONS:
S - BULK SAMPLE
SS - SPLIT SPOON SAMPLE
ST - SHELBY TUBE SAMPLE
RS - ROCK SAMPLE
RT - RECOMPACTED TRIAXIAL SAMPLE
CBR - CALIFORNIA BEARING RATIO SAMPLE

ABBREVIATIONS

AR - AUGER REFUSAL
BT - BORING TERMINATED
CL. - CLAY
CPT - CONE PENETRATION TEST
CSE. - COARSE
DMT - DILATOMETER TEST
DPT - DYNAMIC PENETRATION TEST
e - VOID RATIO
F - FINE
FOSS. - FOSSILIFEROUS
FRAC. - FRACTURED, FRACTURES
FRAGS. - FRAGMENTS
HI. - HIGHLY
MED. - MEDIUM
MICA. - MICACEOUS
MOD. - MODERATELY
NP - NON PLASTIC
ORG. - ORGANIC
PMT - PRESSUREMETER TEST
SAP. - SAPROLITIC
SD. - SAND, SANDY
SL. - SILT, SILTY
SLI. - SLIGHTLY
TCR - TRICONE REFUSAL
w - MOISTURE CONTENT
V - VERY
VST - VANE SHEAR TEST
WEA. - WEATHERED
γ - UNIT WEIGHT
γ_d - DRY UNIT WEIGHT

EQUIPMENT USED ON SUBJECT PROJECT

DRILL UNITS:
- [ ] MOBILE B-__
- [ ] BK-51
- [ ] CME-45C
- [ ] CME-550
- [ ] PORTABLE HOIST
- [X] D-50
- [ ] _____

ADVANCING TOOLS:
- [ ] CLAY BITS
- [ ] 6" CONTINUOUS FLIGHT AUGER
- [X] 8" HOLLOW AUGERS
- [ ] HARD FACED FINGER BITS
- [ ] TUNG.-CARBIDE INSERTS
- [ ] CASING [ ] W/ ADVANCER
- [ ] TRICONE ____" STEEL TEETH
- [ ] TRICONE ____" TUNG.-CARB.
- [ ] CORE BIT
- [ ] _____

HAMMER TYPE:
- [X] AUTOMATIC
- [ ] MANUAL

CORE SIZE:
- [ ] -B-____
- [ ] -N-____
- [ ] -H-____

HAND TOOLS:
- [ ] POST HOLE DIGGER
- [X] HAND AUGER
- [ ] SOUNDING ROD
- [ ] VANE SHEAR TEST
- [ ] _____

ROCK DESCRIPTION

HARD ROCK IS NON-COASTAL PLAIN MATERIAL THAT IF TESTED, WOULD YIELD SPT REFUSAL. AN INFERRED ROCK LINE INDICATES THE LEVEL AT WHICH NON-COASTAL PLAIN MATERIAL WOULD YIELD SPT REFUSAL. SPT REFUSAL IS PENETRATION BY A SPLIT SPOON SAMPLER EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS. IN NON-COASTAL PLAIN MATERIAL, THE TRANSITION BETWEEN SOIL AND ROCK IS OFTEN REPRESENTED BY A ZONE OF WEATHERED ROCK.
ROCK MATERIALS ARE TYPICALLY DIVIDED AS FOLLOWS:

WEATHERED ROCK (WR)	NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT N VALUES > 100 BLOWS PER FOOT IF TESTED.
CRYSTALLINE ROCK (CR)	FINE TO COARSE GRAIN IGNEOUS AND METAMORPHIC ROCK THAT WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES GRANITE, GNEISS, GABBRO, SCHIST, ETC.
NON-CRYSTALLINE ROCK (NCR)	FINE TO COARSE GRAIN METAMORPHIC AND NON-COASTAL PLAIN SEDIMENTARY ROCK THAT WOULD YEILD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES PHYLLITE, SLATE, SANDSTONE, ETC.
COASTAL PLAIN SEDIMENTARY ROCK (CP)	COASTAL PLAIN SEDIMENTS CEMENTED INTO ROCK, BUT MAY NOT YIELD SPT REFUSAL. ROCK TYPE INCLUDES LIMESTONE, SANDSTONE, CEMENTED SHELL BEDS, ETC.

WEATHERING

FRESH	ROCK FRESH, CRYSTALS BRIGHT. FEW JOINTS MAY SHOW SLIGHT STAINING. ROCK RINGS UNDER HAMMER IF CRYSTALLINE.
VERY SLIGHTLY (V SLI.)	ROCK GENERALLY FRESH, JOINTS STAINED, SOME JOINTS MAY SHOW THIN CLAY COATINGS IF OPEN, CRYSTALS ON A BROKEN SPECIMEN FACE SHINE BRIGHTLY. ROCK RINGS UNDER HAMMER BLOWS IF OF A CRYSTALLINE NATURE.
SLIGHT (SLI.)	ROCK GENERALLY FRESH, JOINTS STAINED AND DISCOLORATION EXTENDS INTO ROCK UP TO 1 INCH. OPEN JOINTS MAY CONTAIN CLAY. IN GRANITOID ROCKS SOME OCCASIONAL FELDSPAR CRYSTALS ARE DULL AND DISCOLORED. CRYSTALLINE ROCKS RING UNDER HAMMER BLOWS.
MODERATE (MOD.)	SIGNIFICANT PORTIONS OF ROCK SHOW DISCOLORATION AND WEATHERING EFFECTS. IN GRANITOID ROCKS, MOST FELDSPARS ARE DULL AND DISCOLORED, SOME SHOW CLAY. ROCK HAS DULL SOUND UNDER HAMMER BLOWS AND SHOWS SIGNIFICANT LOSS OF STRENGTH AS COMPARED WITH FRESH ROCK.
MODERATELY SEVERE (MOD. SEV.)	ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. IN GRANITOID ROCKS, ALL FELDSPARS DULL AND DISCOLORED AND A MAJORITY SHOW KAOLINIZATION. ROCK SHOWS SEVERE LOSS OF STRENGTH AND CAN BE EXCAVATED WITH A GEOLOGIST'S PICK. ROCK GIVES "CLUNK" SOUND WHEN STRUCK. *IF TESTED, WOULD YIELD SPT REFUSAL*
SEVERE (SEV.)	ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC CLEAR AND EVIDENT BUT REDUCED IN STRENGTH TO STRONG SOIL. IN GRANITOID ROCKS ALL FELDSPARS ARE KAOLINIZED TO SOME EXTENT. SOME FRAGMENTS OF STRONG ROCK USUALLY REMAIN. *IF TESTED, YIELDS SPT N VALUES > 100 BPF*
VERY SEVERE (V SEV.)	ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC ELEMENTS ARE DISCERNIBLE BUT THE MASS IS EFFECTIVELY REDUCED TO SOIL STATUS, WITH ONLY FRAGMENTS OF STRONG ROCK REMAINING. SAPROLITE IS AN EXAMPLE OF ROCK WEATHERED TO A DEGREE SUCH THAT ONLY MINOR VESTIGES OF THE ORIGINAL ROCK FABRIC REMAIN. *IF TESTED, YIELDS SPT N VALUES < 100 BPF*
COMPLETE	ROCK REDUCED TO SOIL. ROCK FABRIC NOT DISCERNIBLE, OR DISCERNIBLE ONLY IN SMALL AND SCATTERED CONCENTRATIONS. QUARTZ MAY BE PRESENT AS DIKES OR STRINGERS. SAPROLITE IS ALSO AN EXAMPLE.

ROCK HARDNESS

VERY HARD	CANNOT BE SCRATCHED BY KNIFE OR SHARP PICK. BREAKING OF HAND SPECIMENS REQUIRES SEVERAL HARD BLOWS OF THE GEOLOGIST'S PICK.
HARD	CAN BE SCRATCHED BY KNIFE OR PICK ONLY WITH DIFFICULTY. HARD HAMMER BLOWS REQUIRED TO DETACH HAND SPECIMEN.
MODERATELY HARD	CAN BE SCRATCHED BY KNIFE OR PICK. GOUGES OR GROOVES TO 0.25 INCHES DEEP CAN BE EXCAVATED BY HARD BLOW OF A GEOLOGIST'S PICK. HAND SPECIMENS CAN BE DETACHED BY MODERATE BLOWS.
MEDIUM HARD	CAN BE GROOVED OR GOUGED 0.05 INCHES DEEP BY FIRM PRESSURE OF KNIFE OR PICK POINT. CAN BE EXCAVATED IN SMALL CHIPS TO PIECES 1 INCH MAXIMUM SIZE BY HARD BLOWS OF THE POINT OF A GEOLOGIST'S PICK.
SOFT	CAN BE GROVED OR GOUGED READILY BY KNIFE OR PICK. CAN BE EXCAVATED IN FRAGMENTS FROM CHIPS TO SEVERAL INCHES IN SIZE BY MODERATE BLOWS OF A PICK POINT. SMALL, THIN PIECES CAN BE BROKEN BY FINGER PRESSURE.
VERY SOFT	CAN BE CARVED WITH KNIFE. CAN BE EXCAVATED READILY WITH POINT OF PICK. PIECES 1 INCH OR MORE IN THICKNESS CAN BE BROKEN BY FINGER PRESSURE. CAN BE SCRATCHED READILY BY FINGERNAIL.

FRACTURE SPACING

TERM	SPACING
VERY WIDE	MORE THAN 10 FEET
WIDE	3 TO 10 FEET
MODERATELY CLOSE	1 TO 3 FEET
CLOSE	0.16 TO 1 FEET
VERY CLOSE	LESS THAN 0.16 FEET

BEDDING

TERM	THICKNESS
VERY THICKLY BEDDED	> 4 FEET
THICKLY BEDDED	1.5 - 4 FEET
THINLY BEDDED	0.16 - 1.5 FEET
VERY THINLY BEDDED	0.03 - 0.16 FEET
THICKLY LAMINATED	0.008 - 0.03 FEET
THINLY LAMINATED	< 0.008 FEET

INDURATION

FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF THE MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.

FRIABLE	RUBBING WITH FINGER FREES NUMEROUS GRAINS; GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE.
MODERATELY INDURATED	GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE; BREAKS EASILY WHEN HIT WITH HAMMER.
INDURATED	GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE; DIFFICULT TO BREAK WITH HAMMER.
EXTREMELY INDURATED	SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE; SAMPLE BREAKS ACROSS GRAINS.

TERMS AND DEFINITIONS

ALLUVIUM (ALLUV.) - SOILS THAT HAVE BEEN TRANSPORTED BY WATER.

AQUIFER - A WATER BEARING FORMATION OR STRATA.

ARENACEOUS - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND.

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.

ARTESIAN - GROUND WATER THAT IS UNDER SUFFICIENT PRESSURE TO RISE ABOVE THE LEVEL AT WHICH IT IS ENCOUNTERED, BUT WHICH DOES NOT NECESSARILY RISE TO OR ABOVE THE GROUND SURFACE.

CALCAREOUS (CALC.) - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE.

COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM OF SLOPE.

CORE RECOVERY (REC.) - TOTAL LENGTH OF ALL MATERIAL RECOVERED IN THE CORE BARREL DIVIDED BY TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE.

DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT ROCKS OR CUTS MASSIVE ROCK.

DIP - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE HORIZONTAL.

DIP DIRECTION (DIP AZIMUTH) - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH.

FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE.

FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES.

FLOAT - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLODGED FROM PARENT MATERIAL.

FLOOD PLAIN (FP) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM.

FORMATION (FM.) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE FIELD.

JOINT - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED.

LEDGE - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO ITS LATERAL EXTENT.

LENS - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS.

MOTTLED (MOT.) - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS. MOTTLING IN SOILS USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE.

PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE OF AN INTERVENING IMPERVIOUS STRATUM.

RESIDUAL (RES.) SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK.

ROCK QUALITY DESIGNATION (RQD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE.

SAPROLITE (SAP.) - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT ROCK.

SILL - AN INTRUSIVE BODY OF IGNEOUS ROCK OF APPROXIMATELY UNIFORM THICKNESS AND RELATIVELY THIN COMPARED WITH ITS LATERAL EXTENT, THAT HAS BEEN EMPLACED PARALLEL TO THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS.

SLICKENSIDE - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE.

STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT) - NUMBER OF BLOWS (N OR BPF) OF 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 PENETRATION EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS.

STRATA CORE RECOVERY (SREC.) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE.

STRATA ROCK QUALITY DESIGNATION (SRQD) - A MEASURE OF ROCK QUALITY DESCRIBED 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.

TOPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.

BENCH MARK: YELLOW PLASTIC CAP "-BL-2"
NORTHING: 323921.2358; EASTING: 2072041.6129
ELEVATION: 124.698 FT.

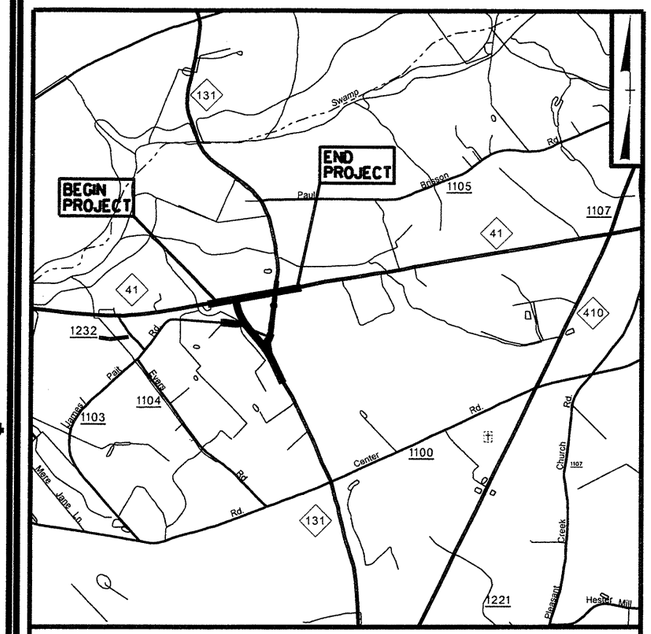
NOTES:
-

REVISED 02/23/06

TIP PROJECT: W-5121

CONTRACT:

SEE SHEET 1-B FOR CONVENTIONAL SYMBOLS



VICINITY MAP

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

BLADEN COUNTY

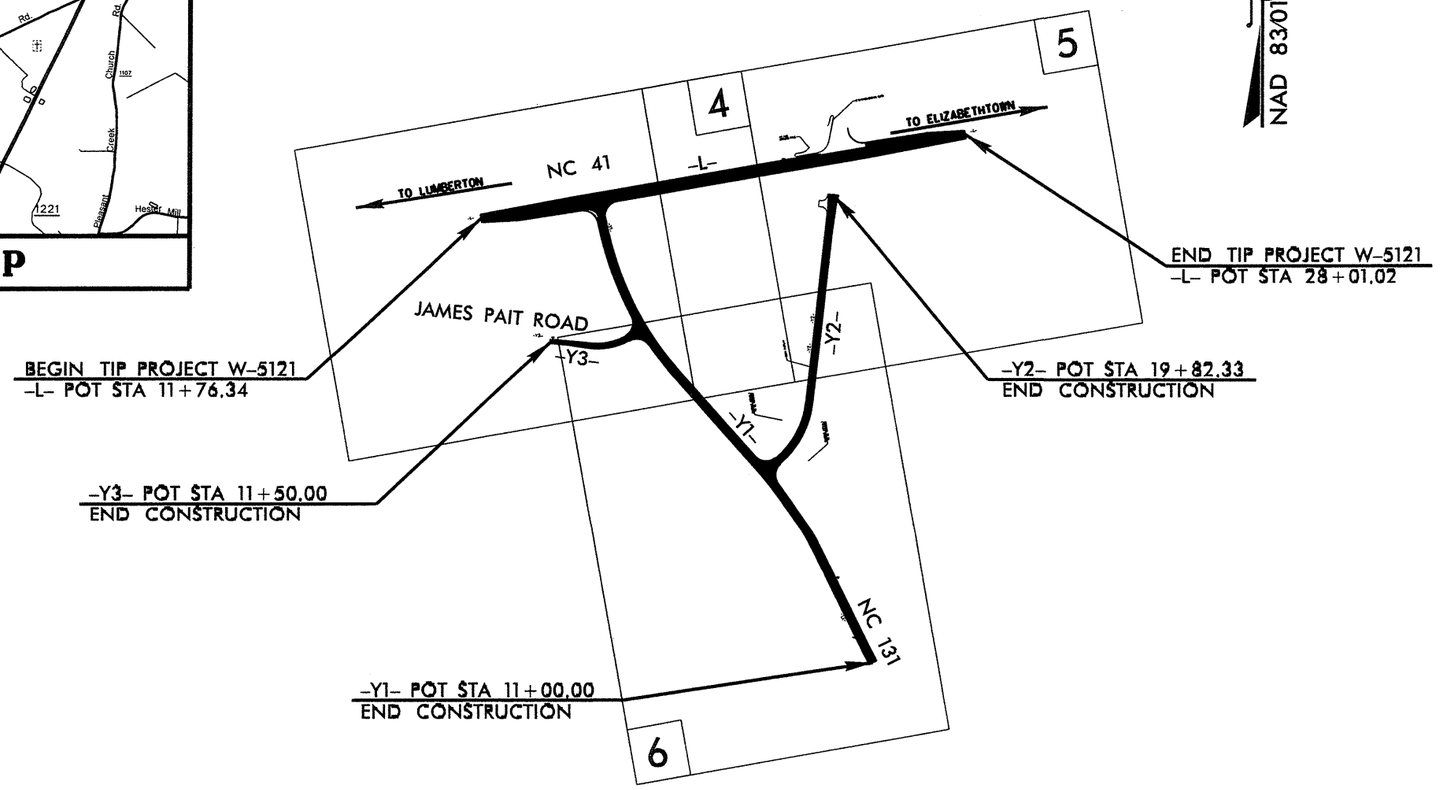
STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	W-5121	2A	

STATE PROJ. NO.	F.A. PROJ. NO.	DESCRIPTION

LOCATION: NC 131 AT NC 41

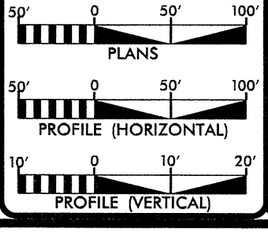
TYPE OF WORK: WIDENING, GRADING, PAVING, DRAINAGE, SIGNING

NAD 83/01 — NC GRID



CLEARING ON THIS PROJECT SHALL BE PERFORMED TO THE LIMITS ESTABLISHED BY METHOD III.

GRAPHIC SCALES



DESIGN DATA

-L-
DS = 60 MPH

-Y1-
DS = 60 MPH

-Y2-

-Y3-

PROJECT LENGTH

-L- = 0.304 MILE

TOTAL LENGTH TIP PROJECT I-5010 = 0.304 MILE

ARCADIS G&I of North Carolina, PC
801 Corporate Center Drive, Suite 300
Raleigh, NC 27607-5073
Tele 919/854-1282 Fax 919/854-5448
www.ARCADIS-US.COM

2006 STANDARD SPECIFICATIONS

ARCADIS CONTACT:

LAURA FISHER, P.E.
PROJECT ENGINEER

R/W DATE:

LETTING DATE:

HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

P.E.

SIGNATURE:

ROADWAY DESIGN ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

P.E.

SIGNATURE:

DIVISION OF HIGHWAYS
STATE OF NORTH CAROLINA

P.E.
STATE HIGHWAY DESIGN ENGINEER

ARCADIS G&M
Date=$DATE$ Time: $TIME$
Filename=$FILE$

SUMMIT CONSULTING
ENGINEERING ■ ARCHITECTURE ■ SURVEYING

505 Meadowland Drive, Suite 107
Hillsborough, NC 27278
www.summit-engineer.com

June 12, 2009

State of N.C. Department of Transportation
Division of Highways
Geotechnical Engineering Unit
P.O. Box 25201
Raleigh, North Carolina 27611-5201

Attention: Mr. Mohammed A. Mulla, PE, CPM
Assistant State Geotechnical Engineer

Reference: **Geotechnical Report – Inventory**
NC 41 at NC 131
Bladen County, North Carolina
Project No. 41885.1.1
Tip Number: W-5121
FA Number: STPHRR-0041(28)

Project Description

The proposed project consists of widening, including two turn lanes of NC 41 (-L-) at the intersection with NC 131 (-Y1-) in Bladen County. The work on NC 41 begins at Station 11+76.34 and ends at Station 28+01.02. Also included in the project is the realignment of NC 131 (-Y1-) including intersection reconfigurations at -Y2- (former NC 131) and -Y3- (James Pait Road). The work on NC 131 (-Y1-) begins at Station 11+00 and ends at Station 29+17.09, its new intersection with NC 41 (-L-). The realignment work for the intersection of -Y1- and -Y2- begins at Station 10+00 (-Y2-) and ends at Station 14+00 (-Y2-) where the remainder of -Y2- will be improved with an overlay. The intersection realignment work at James Pait Road (-Y3-) begins at Station 11+53.56 (-Y3-) and ends at Station 14+65.75 (-Y3-), where it intersects with -Y1-. No culverts or bridges are associated with the proposed project.

Summit Consulting's field investigation was performed in May, 2009. A Diedrich D-50, rubber-tracked, all-terrain drill rig was utilized to advance auger borings. Standard Penetration tests, utilizing a calibrated 140 pound automatic hammer, were conducted at each boring with the exception of Station 14+00, 19 ft. RT, -Y1-, where a hand auger was advanced due to excessive underground and overhead utilities. Soil samples were retrieved and field classified, with representative samples submitted to our Hillsborough laboratory for analysis.

Soil borings were generally drilled at 200 foot intervals with the following base lines being investigated:

Line	Station
-L-	11+76 to 28+01
-Y1-	11+00 to29+17
-Y2-	10+00 to 14+00
-Y3-	11+54 to 14+66

Areas of Special Geotechnical Interest

1) The following sections contain relatively soft, slightly organic soils, which have the potential for subgrade problems during construction.

Line	Station (+/-)
-Y1-	17+25 to 29+00
-Y2-	10+00 to 12+00
-Y3-	11+54 to 14+50

2) The entire project was found to exhibit seasonal high ground water.

Physiography and Geology

The proposed project is located in Bladen County, approximately five miles east of the Robeson County line. Topography along the project is nearly flat, interrupted only by roadway embankment of NC 41 and NC 131.

The area of the project site is located in the Coastal Plain Physiographic Province and specifically within the Black Creek Formation. In western Bladen County, the Black Creek Formation is considered nonmarine in origin, but related to deltaic systems of sedimentation. (The Geology of the Carolinas; Horton and Zullo). The soils of this formation are characterized by thin, interbedded, dark clays and light colored sands. Surface waters from this area flow to nearby low-lying areas which can be best characterized as isolated swamps. None of these swamps are located within the project corridor. Excessive surficial runoff will flow

westward to Bear Ford Swamp which is drained by a Marsh Canal into a myriad of tributaries within Big Swamp which eventually collect into the Lumber River.

The project site is very rural and with the exception of approximately Station 15+00 to Station 17+00 (-Y1-) which traverses a residential property, the new alignment of -Y1-, -Y2- and -Y3- traverse a yet to be seasonally cultivated agricultural field.

Groundwater

Groundwater data was collected from each boring after a period of 24 hours with the exception of Station 12+10, 14+00 and 16+22, -Y1- which were located on or near a residential property with many children. These borings were abandoned upon completion of drilling. Twenty-four hour groundwater readings collected from the remaining borings ranged from 2.8 ft. below ground surface at Station 22+57, 16 ft. RT, -L- to 6.6 ft. below ground surface at Station 15+00, 25 ft. RT, -L-.

Soils

Soils within the project area include embankment fill and formational soils derived from weathering of the original depositional material. No alluvial soils were encountered within the project corridor.

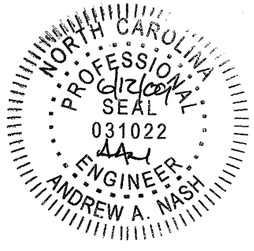
Roadway embankment material was generally encountered along existing NC 41 and consists of approximately 2.5 to 5.5 ft. of loose to medium dense, silty fine sand (A-2-4) with some organics; and to a lesser degree, soft to medium stiff, fine sandy silt (A-4).

Formational soils encountered belong to the Black Creek Formation. This material is composed of very loose to medium stiff silty fine sand (A-2-4) with some grading as A-3 material. Some layers of soft to very stiff, fine sandy silt (A-4) were encountered within the A-2-4 material. In six of the twenty-two borings at depths of 5.5 ft. or greater soft to stiff, highly plastic (LL = 84, PI = 53), silty clay (A-7-5) was encountered.

Sincerely,
SUMMIT CONSULTING – ENGINEERING, ARCHITECTURE, & SURVEYING, PLLC

Andrew A. Nash, P.E.
Geotechnical Engineer
N.C. Registration No. 31022

Don Dewey, P.E
Geotechnical Engineering Department Manager
N.C. Registration No. 20140



EARTHWORK BALANCE SHEET

SUMMARY SHEET

PROJECT NAME NC 41/NC 131 COMPUTED BY STS DATE August 2, 2010

PROJECT NUMBER W-5121 CHECKED BY LCF SHEET 38 OF 37

STATION	STATION	TOTAL EXCAV. (UNCL.)	ROCK EXCAV.	UNDERCUT EXCAV.	UNSUIT. EXCAV.	SUITABLE EXCAV.	TOTAL EMB.	ROCK EMB.	EARTH EMB.	EMB. + 25%	BORROW	SUITABLE WASTE	UNSUIT. WASTE	TOTAL WASTE
SUMMARY #1														
-L-														
11+76.34	28+00.00	2238				2238	1023		1023	1279	0	960	0	960
TOTAL SUMMARY #1		2238		0		2238	1023		1023	1279	0	960	0	960
SUMMARY #2														
-Y1-														
11+00.00	28+85.00	2608		1847	519	2089	4965		4965	6206	4117	0	2366	2366
-Y2-														
10+12.00	19+50.00	667				667	1169		1169	1461	794	0	0	0
-Y2-														
TURN-AROUND		26				26	5		5	7	0	19	0	19
-Y3-														
10+00.00	14+53.00	306				306	851		851	1064	758	0	0	0
TOTAL SUMMARY #2		3608		1847	519	3088	6990		6990	8738	5669	19	2366	2386
TOTAL SUMMARY #1,2		5846		1847	519	5327	8013		8013	10016	5669	979	2366	3346
EST. SHOULDER MATERIAL							5000		5000	6250	6250			
EST. SELECT GRANULAR MATERIAL, CLASS III							-1847		-1847	-2309	-2309			
LOSS DUE TO CLEAR. & GRUB.		-100									100			
WASTE TO REPLACE BORROW											-979	-979		-979
PROJECT TOTALS		5746		1847	519	5327	11166		11166	13958	8731	0		2366
EST. TO REPLACE TOPSOIL FOR BORROW PIT											437			
GRAND TOTALS		5746		1847							9167	0		2366
SAY		6000		2200							10000			

Estimated Shallow Undercut = 250 CY
Estimated DDE = 170 CY

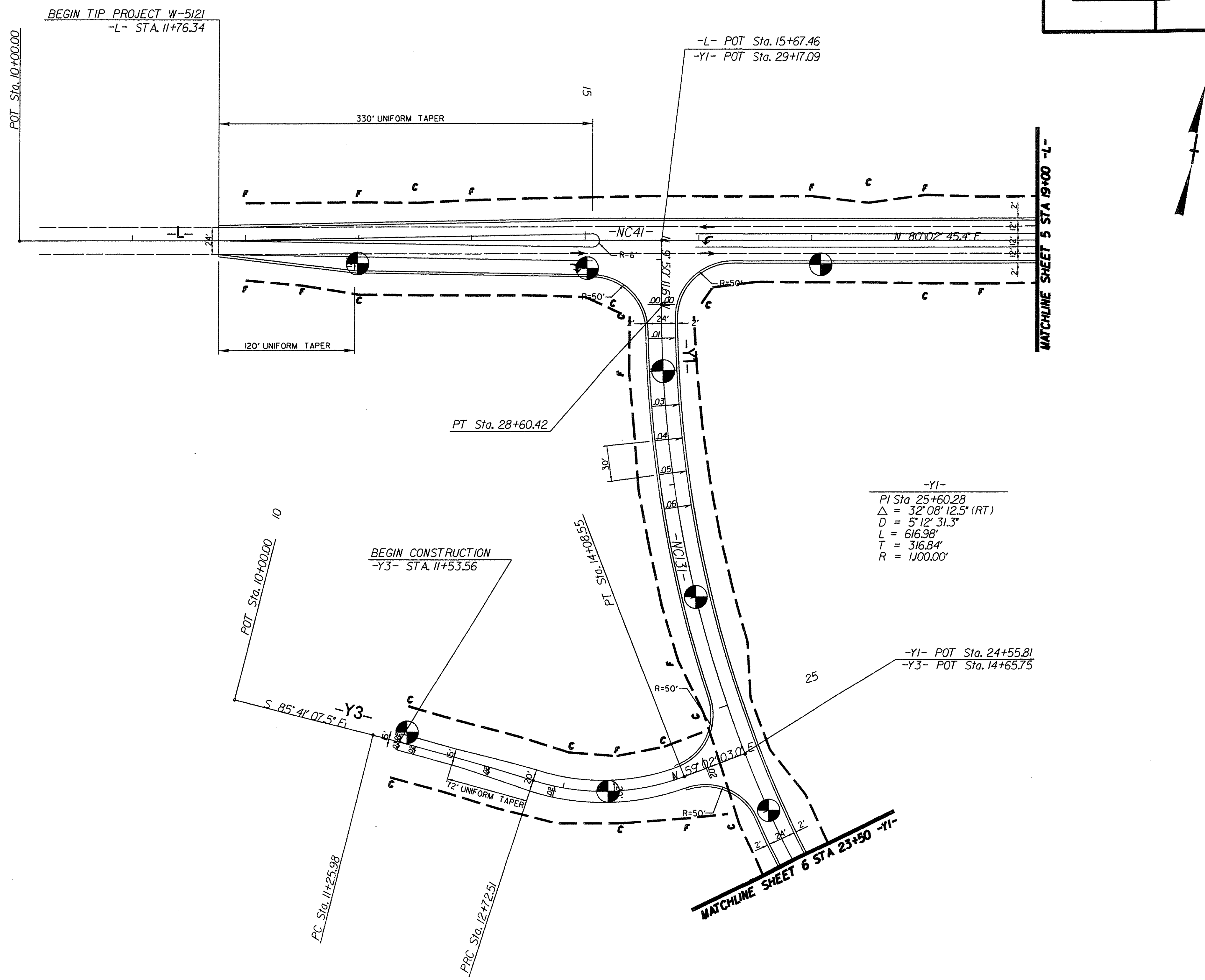
Earthwork quantities are calculated by Division 6. . These earthwork quantities are based in part on the subsurface data provided by the Geotechnical Unit.

PROJECT REFERENCE NO.	SHEET NO.
41885JJ (W-5121)	4
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

5/14/99



-Y3-

PI Sta 11+99.27	PI Sta 13+43.28
Δ = 3° 41' 25.3" (RT)	Δ = 38° 58' 14.9" (LT)
D = 2° 31' 06.6"	D = 28° 38' 52.4"
L = 146.53'	L = 136.03'
T = 73.29'	T = 70.77'
R = 2,275.00'	R = 200.00'

SEE SHEET 7 FOR -L- PROFILE.
SEE SHEET 8 FOR -Y1- PROFILE.
SEE SHEET 9 FOR -Y3- PROFILE.

$$$$$$SYSTIME$$$$$
$$$$$$$$$$$DGN$$$$$$$$$$$$$$$$$$
$$$$$USERNAME$$$$

PROJECT REFERENCE NO.	SHEET NO.
41885.1.1 (W-5121)	5

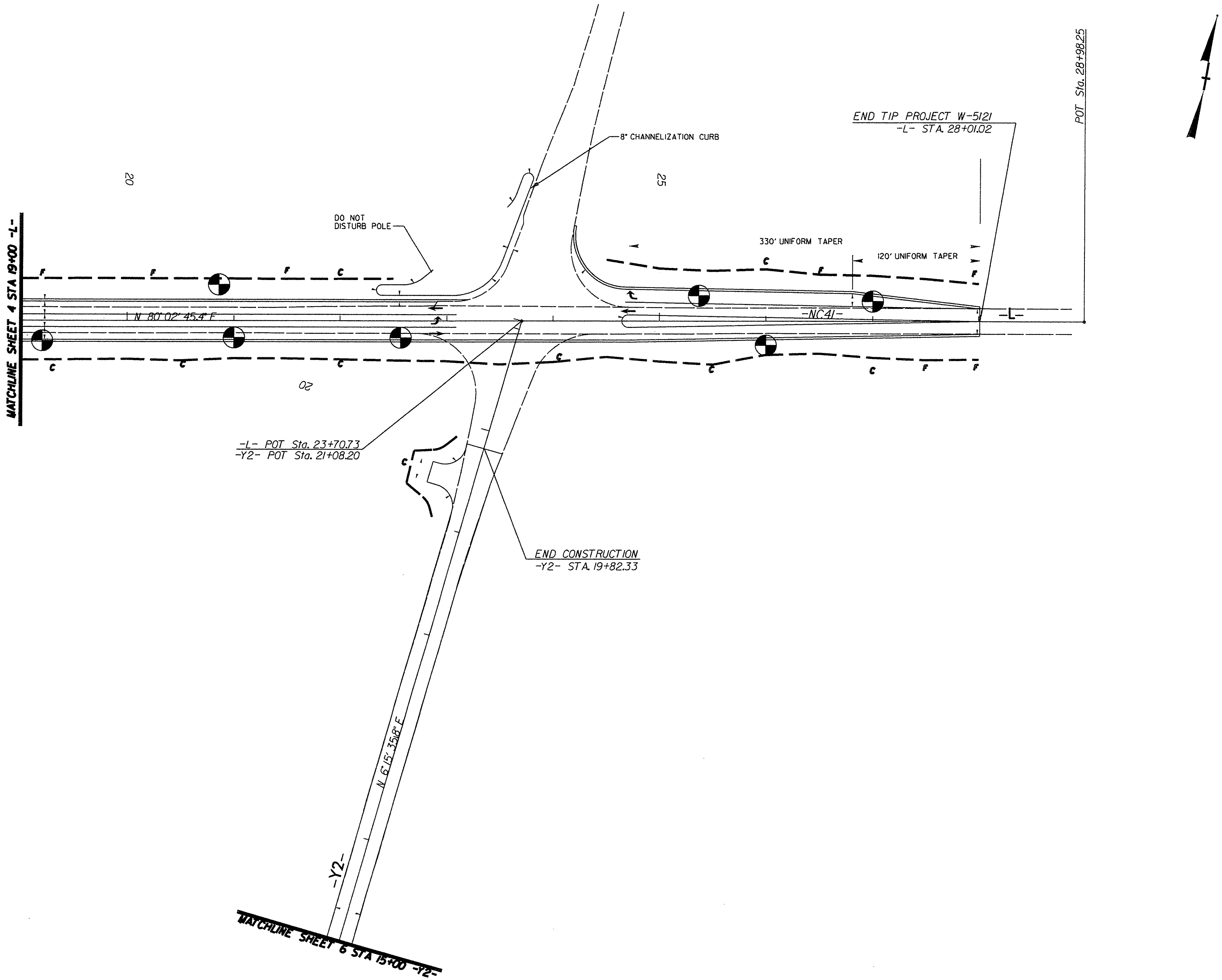
R/W SHEET NO.

ROADWAY DESIGN ENGINEER

HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION



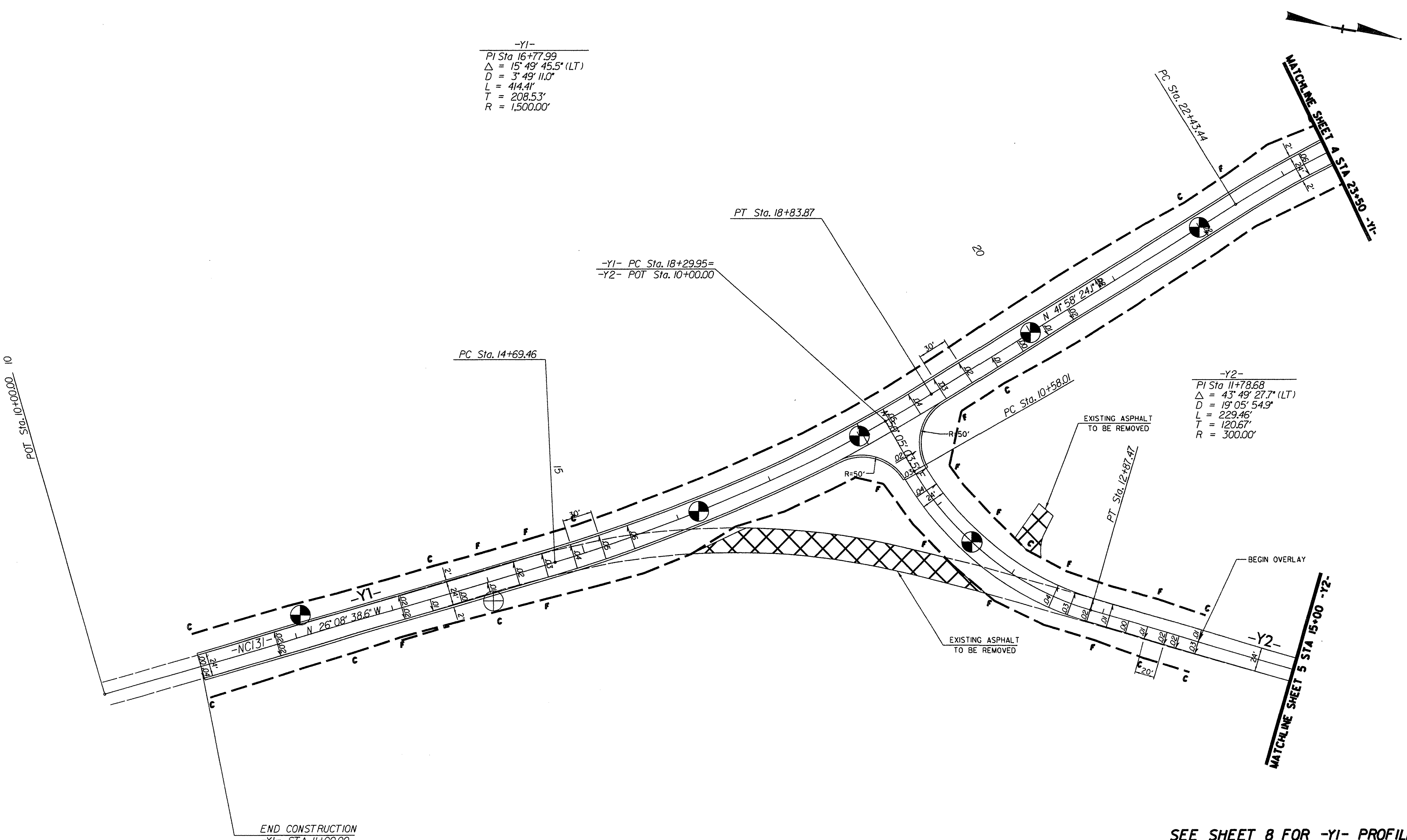
SEE SHEET 7 FOR -L- PROFILE.
SEE SHEET 9 FOR -Y2- PROFILE.
SEE SHEET 9 FOR -Y4- PROFILE.

5/14/99
$$$$$$SYSTIME$$$$$
$$$$$$$$$$$$DGN$$$$$$$$$$$$$$$$$
$$$$$$USERNAME$$$$

PROJECT REFERENCE NO.	SHEET NO.
41885JJ (W-5121)	6
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION



SEE SHEET 8 FOR -Y1- PROFILE.
SEE SHEET 9 FOR -Y2- PROFILE.

5/14/99

$$$$$$SYSTIME$$$$$
$$$$$$$$$$DGN$$$$$$$$$$$$$$$$$$$$
$$$$$$USERNAME$$$$$

5/28/99

PROJECT REFERENCE NO.	SHEET NO.
41885.1.1 (W-5121)	7
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS DO NOT USE FOR R/W ACQUISITION

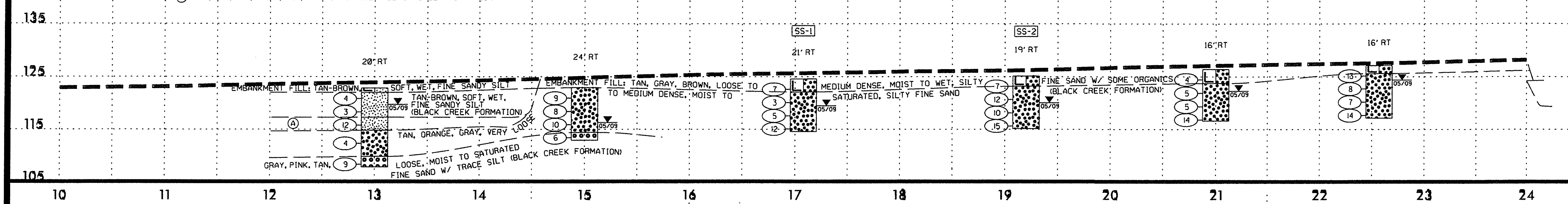
PRELIMINARY PLANS DO NOT USE FOR CONSTRUCTION

-L-

SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
SS-1	21' RT	17+08	3.5-5.0	A-2-4(0)	21	4	4.7	65.3	6.1	23.9	100	99	32	-	
SS-2	19' RT	19+20	3.5-5.0	A-2-4(0)	15	NP	9.0	70.2	9.1	11.7	100	98	23	-	

Ⓐ GRAY, RED, TAN, STIFF, WET, FINE SANDY SILT (BLACK CREEK FORMATION)



-L-

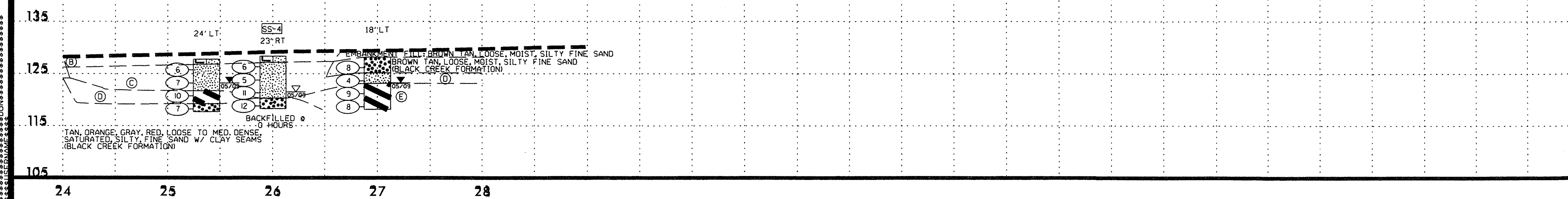
SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
SS-4	23' RT	26+00	1.0-2.5	A-4(0)	23	7	10.1	48.7	15.1	26.1	100	98	42	17.0	

Ⓑ EMBANKMENT FILL: BROWN, TAN, MEDIUM STIFF, MOIST TO WET, FINE SANDY SILT

Ⓒ TAN, BROWN, ORANGE, SOFT TO MED. STIFF, MOIST TO WET, FINE SANDY-SILT (BLACK CREEK FORMATION)

Ⓓ GRAY-TAN, STIFF, WET, HIGHLY PLASTIC SILTY CLAY (BLACK CREEK FORMATION)



$$$$$SYSTIME$$$$ $$$$$$$$DGN$$$$$$$$ $$$$USERNAME$$$$

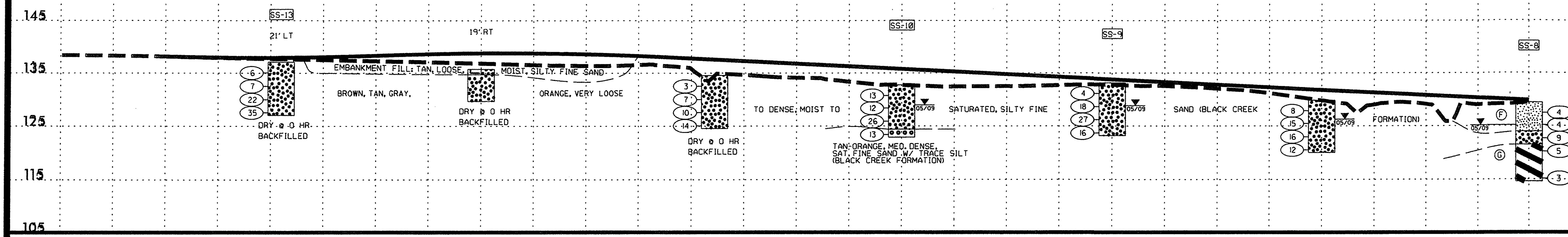
5/28/99

-Y1-

SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT C. SAND	F. SAND	SILT	CLAY	% PASSING (SIEVES) 10	40	200	% MOISTURE	% ORGANIC
SS-13	21' LT	12+10	3.5-5.0	A-2-4(0)	28	NP	10.8	67.6	4.1	17.5	100	97	23	-	
SS-10	C/L	18+00	5.9-7.4	A-2-4(0)	25	NP	1.7	86.2	2.2	9.9	100	100	13	-	
SS-9	C/L	20+00	1.0-2.5	A-2-4(0)	27	7	6.0	65.0	7.9	21.1	100	94	30	-	
SS-8	C/L	24+00	1.0-2.5	A-4(0)	32	NP	5.9	39.9	7.2	47.0	100	98	56	34.6	

(F) BROWN, ORANGE, GRAY VERY SOFT TO VERY STIFF MOIST TO SATURATED, FINE SANDY SILT (BLACK CREEK FORMATION)
(G) GRAY, PINK, RED, SOFT TO STIFF, WET, HIGHLY PLASTIC SILTY CLAY (BLACK CREEK FORMATION)

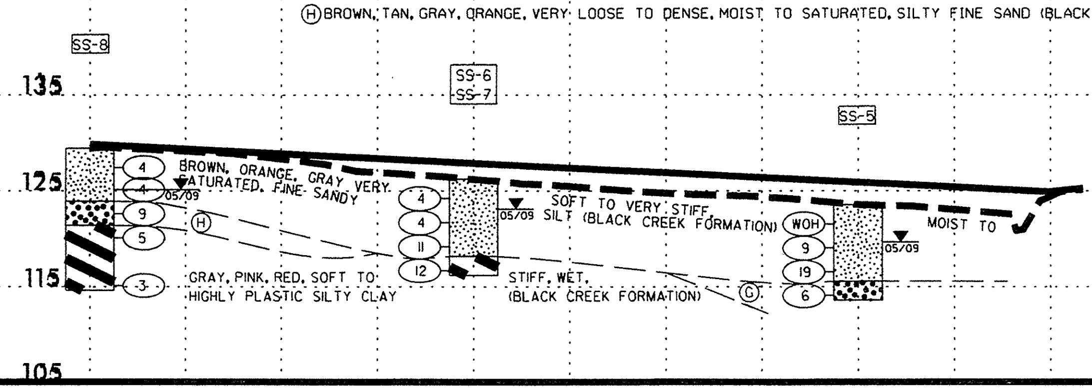


-Y1-

SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT C. SAND	F. SAND	SILT	CLAY	% PASSING (SIEVES) 10	40	200	% MOISTURE	% ORGANIC
SS-8	C/L	24+00	1.0-2.5	A-4(0)	32	NP	5.9	39.9	7.2	47.0	100	98	56	34.6	
SS-6	C/L	26+00	3.5-5.0	A-4(1)	29	12	7.6	55.4	6.6	30.4	100	98	38	25.4	
SS-7	C/L	26+00	8.5-10.0	A-7-5(53)	84	53	1.0	13.6	10.5	74.9	100	100	87	33.2	
SS-5	C/L	28+00	6.0-7.5	A-4(2)	29	7	4.1	33.3	50.6	12.0	100	100	63	19.0	

(H) BROWN, TAN, GRAY, ORANGE, VERY LOOSE TO DENSE, MOIST TO SATURATED, SILTY FINE SAND (BLACK CREEK FORMATION)



$$$$$SYSTIME$$$$$ $$$$$DGN$$$$$ $$$$$USERNAME$$$$$

5/28/99

PROJECT REFERENCE NO.	SHEET NO.
41885.1.1 (W-5121)	9
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

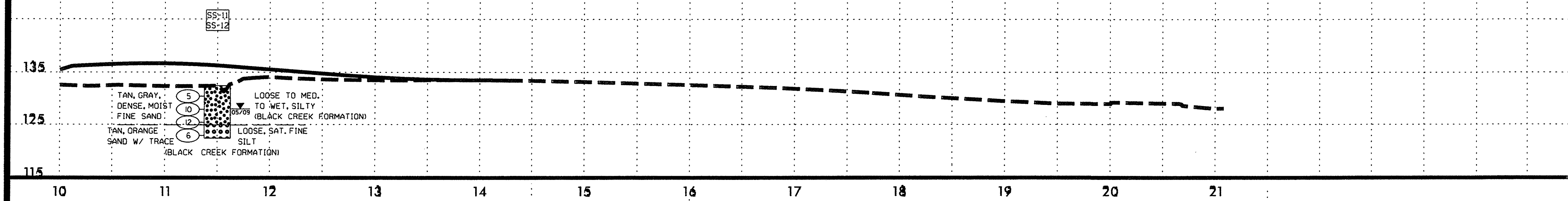
INCOMPLETE PLANS DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS DO NOT USE FOR CONSTRUCTION

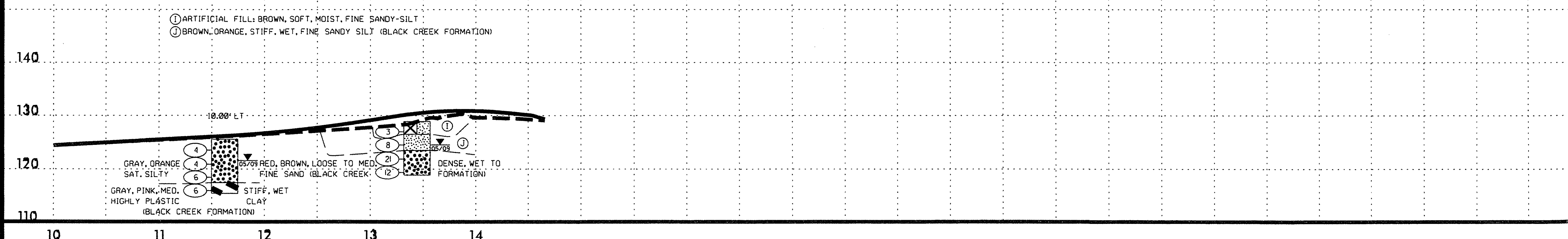
-Y2-

SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
SS-11	C/L	11+50	3.5-5.0	A-2-4(0)	26	NP	7.6	79.0	1.5	11.9	100	98	14	-	
SS-12	C/L	11+50	8.5-10.0	A-3(0)	26	NP	4.0	93.7	0.5	1.8	100	100	3	-	



-Y3-



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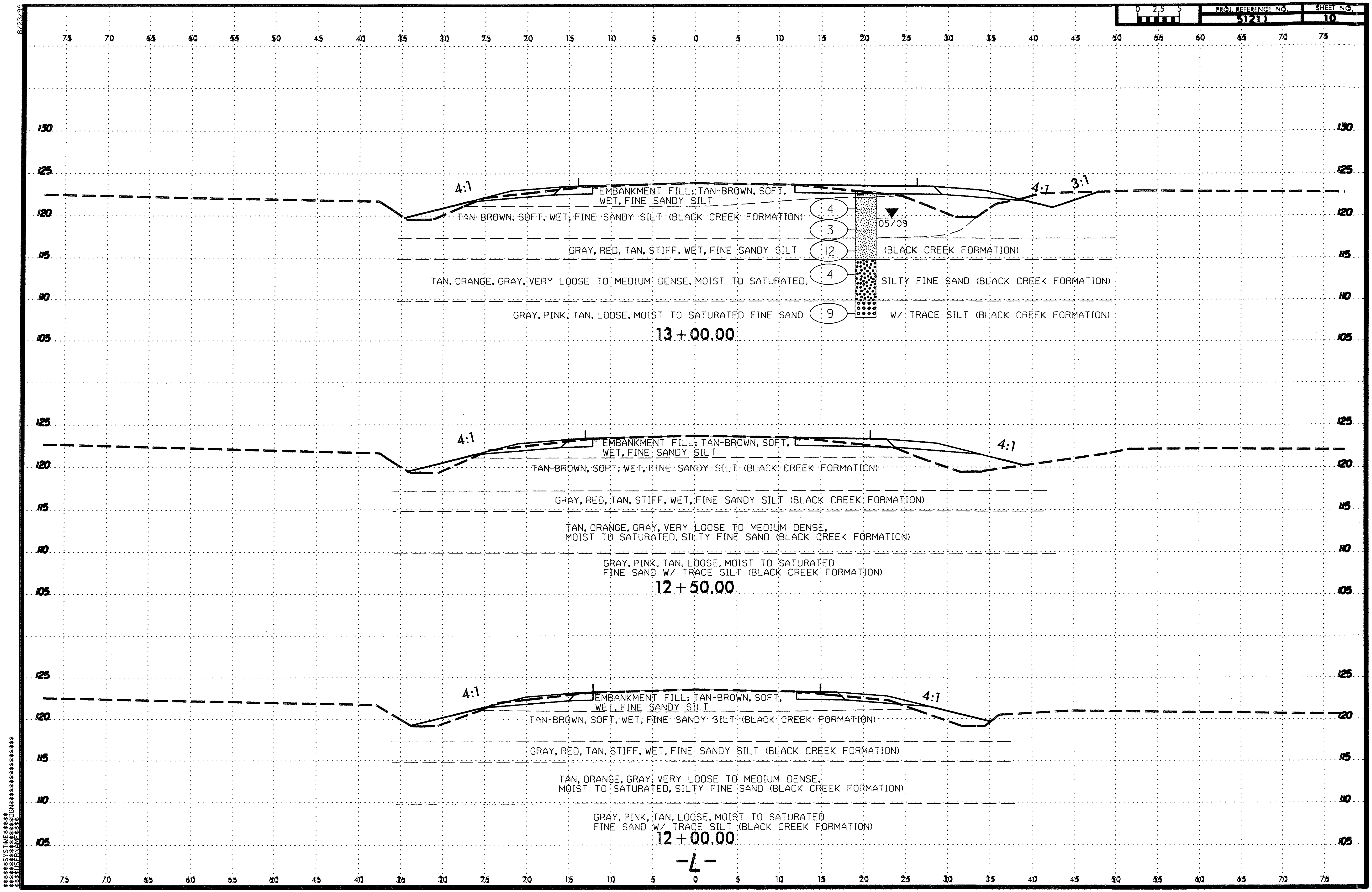
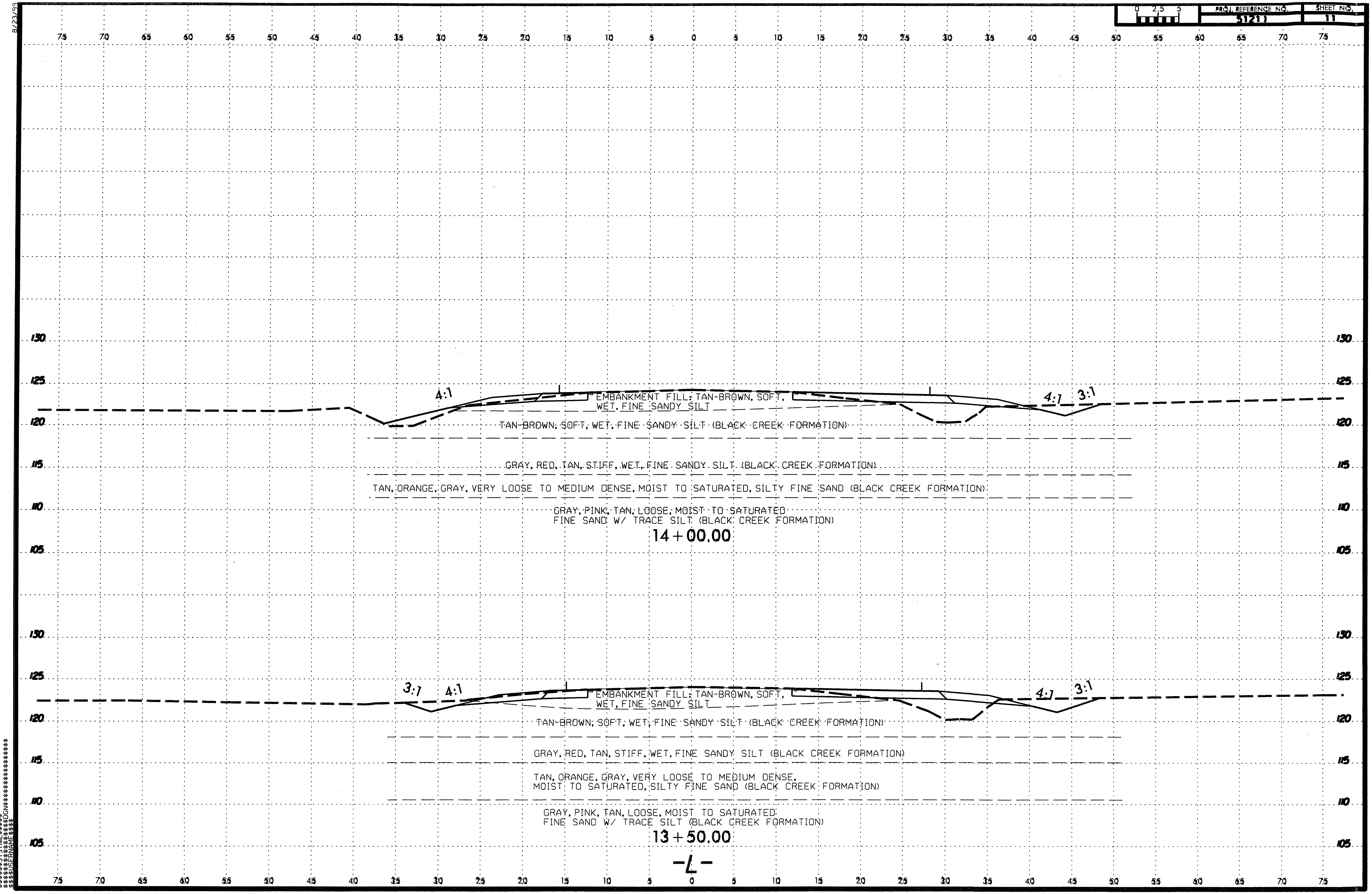
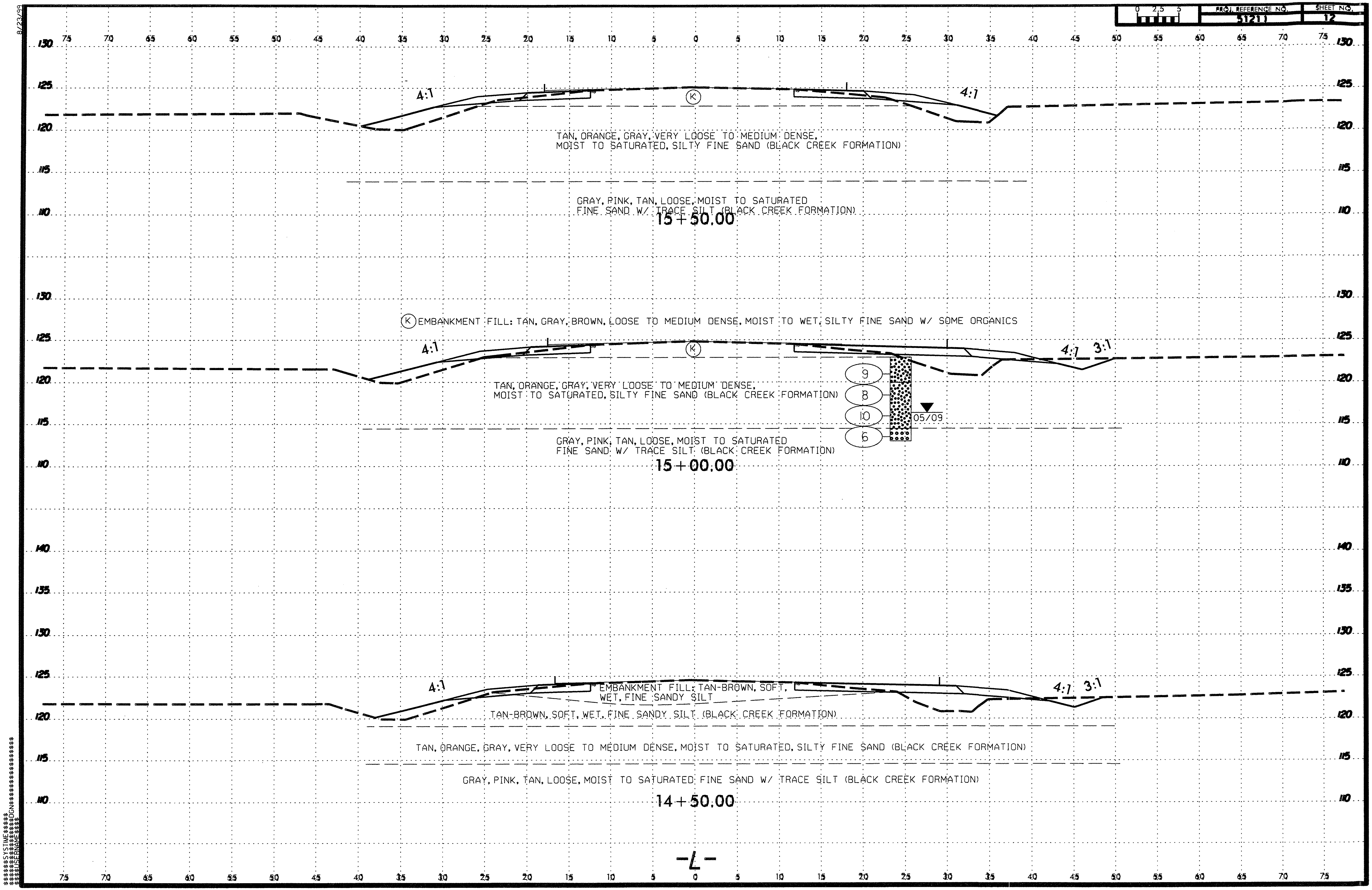

PROJ. REFERENCE NO.
51211
SHEET NO.
10
0 2.5 5
8/23/99
4:1
3:1
EMBANKMENT FILL: TAN-BROWN, SOFT, WET, FINE SANDY SILT
TAN-BROWN, SOFT, WET, FINE SANDY SILT (BLACK CREEK FORMATION)
4
3
12
4
9
05/09
GRAY, RED, TAN, STIFF, WET, FINE SANDY SILT (BLACK CREEK FORMATION)
TAN, ORANGE, GRAY, VERY LOOSE TO MEDIUM DENSE, MOIST TO SATURATED, SILTY FINE SAND (BLACK CREEK FORMATION)
GRAY, PINK, TAN, LOOSE, MOIST TO SATURATED FINE SAND W/ TRACE SILT (BLACK CREEK FORMATION)
13+00.00
4:1
4:1
EMBANKMENT FILL: TAN-BROWN, SOFT, WET, FINE SANDY SILT
TAN-BROWN, SOFT, WET, FINE SANDY SILT (BLACK CREEK FORMATION)
GRAY, RED, TAN, STIFF, WET, FINE SANDY SILT (BLACK CREEK FORMATION)
TAN, ORANGE, GRAY, VERY LOOSE TO MEDIUM DENSE, MOIST TO SATURATED, SILTY FINE SAND (BLACK CREEK FORMATION)
GRAY, PINK, TAN, LOOSE, MOIST TO SATURATED FINE SAND W/ TRACE SILT (BLACK CREEK FORMATION)
12+50.00
4:1
4:1
EMBANKMENT FILL: TAN-BROWN, SOFT, WET, FINE SANDY SILT
TAN-BROWN, SOFT, WET, FINE SANDY SILT (BLACK CREEK FORMATION)
GRAY, RED, TAN, STIFF, WET, FINE SANDY SILT (BLACK CREEK FORMATION)
TAN, ORANGE, GRAY, VERY LOOSE TO MEDIUM DENSE, MOIST TO SATURATED, SILTY FINE SAND (BLACK CREEK FORMATION)
GRAY, PINK, TAN, LOOSE, MOIST TO SATURATED FINE SAND W/ TRACE SILT (BLACK CREEK FORMATION)
12+00.00
-L-
$$$$$$SYSTIME$$$$$
$$$$$$$$$$$$$$$$DGN$$$$$$$$$$$$$$$$$
$$$$USERNAME$$$$

8/23/99



$$$$$$SYSTIME$$$$
$$$$$$$$$$$$$DGN$$$$$$$$$$$$$$$$$
$$$$USERNAME$$$$

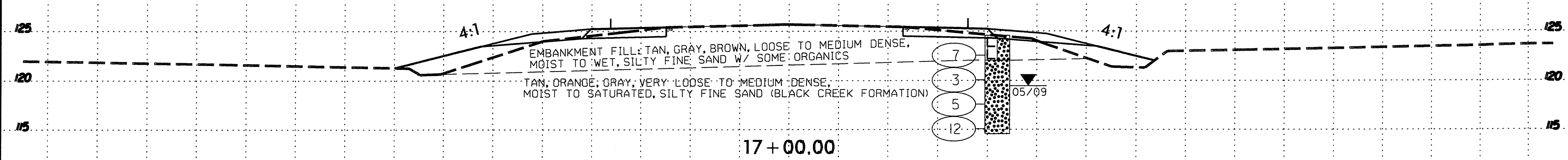


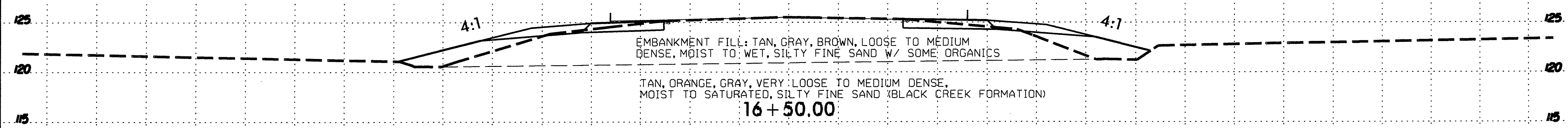
8/23/99
0 2.5 5
PROJ. REFERENCE NO.
5121)
SHEET NO.
12
4:1
4:1
K
TAN, ORANGE, GRAY, VERY LOOSE TO MEDIUM DENSE, MOIST TO SATURATED, SILTY FINE SAND (BLACK CREEK FORMATION)
GRAY, PINK, TAN, LOOSE, MOIST TO SATURATED FINE SAND W/ TRACE SILT (BLACK CREEK FORMATION)
15+50.00
K EMBANKMENT FILL: TAN, GRAY, BROWN, LOOSE TO MEDIUM DENSE, MOIST TO WET, SILTY FINE SAND W/ SOME ORGANICS
4:1
4:1 3:1
9
8
10
6
05/09
TAN, ORANGE, GRAY, VERY LOOSE TO MEDIUM DENSE, MOIST TO SATURATED, SILTY FINE SAND (BLACK CREEK FORMATION)
GRAY, PINK, TAN, LOOSE, MOIST TO SATURATED FINE SAND W/ TRACE SILT (BLACK CREEK FORMATION)
15+00.00
4:1
4:1 3:1
EMBANKMENT FILL: TAN-BROWN, SOFT, WET, FINE SANDY SILT
TAN-BROWN, SOFT, WET, FINE SANDY SILT (BLACK CREEK FORMATION)
TAN, ORANGE, GRAY, VERY LOOSE TO MEDIUM DENSE, MOIST TO SATURATED, SILTY FINE SAND (BLACK CREEK FORMATION)
GRAY, PINK, TAN, LOOSE, MOIST TO SATURATED FINE SAND W/ TRACE SILT (BLACK CREEK FORMATION)
14+50.00
-L-
$$$$$SYSTIME$$$$$
$$$$$$$DGN$$$$$$$$$$$$$$$$$$$$$
$$$$USERNAME$$$$

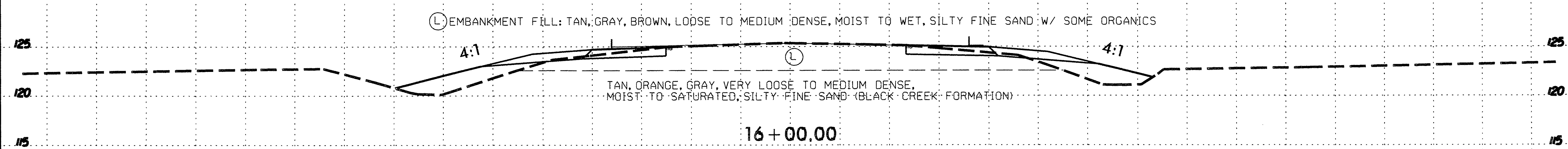
PROJ. REFERENCE NO.	SHEET NO.
51211	13

SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
SS-1	21' RT	17+08	3.5-5.0	A-2-4(0)	21	4	4.7	65.3	6.1	23.9	100	99	32	-	







-L-

8/23/99

0 2.5 5

PROJ. REFERENCE NO. 5121J

SHEET NO. 14

75 70 65 60 55 50 45 40 35 30 25 20 15 10 5 0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75

130
125
120
115

4:1

EMBANKMENT FILL: TAN, GRAY, BROWN, LOOSE TO MEDIUM DENSE, MOIST TO WET, SILTY FINE SAND W/ SOME ORGANICS

TAN, ORANGE, GRAY, VERY LOOSE TO MEDIUM DENSE, MOIST TO SATURATED, SILTY FINE SAND (BLACK CREEK FORMATION)

4:1

18+50.00

4:1

EMBANKMENT FILL: TAN, GRAY, BROWN, LOOSE TO MEDIUM DENSE, MOIST TO WET, SILTY FINE SAND W/ SOME ORGANICS

TAN, ORANGE, GRAY, VERY LOOSE TO MEDIUM DENSE, MOIST TO SATURATED, SILTY FINE SAND (BLACK CREEK FORMATION)

4:1

18+00.00

3:1

4:1

EMBANKMENT FILL: TAN, GRAY, BROWN, LOOSE TO MEDIUM DENSE, MOIST TO WET, SILTY FINE SAND W/ SOME ORGANICS

TAN, ORANGE, GRAY, VERY LOOSE TO MEDIUM DENSE, MOIST TO SATURATED, SILTY FINE SAND (BLACK CREEK FORMATION)

4:1

17+50.00

-L-

$$$$$$$$SYSTIME$$$$$
$$$$$$$$$$$$$$$$$$$$DGN$$$$$$$$$$$$$$$$$$$$
$$$$$$USERNAME$$$$

8/23/99

0 2.5 5	RGT. REFERENCE NO. 51211	SHEET NO. 15

75 70 65 60 55 50 45 40 35 30 25 20 15 10 5 0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75

130 125 120 115

4:1 EMBANKMENT FILL: TAN, GRAY, BROWN, LOOSE TO MEDIUM DENSE, MOIST TO WET, SILTY FINE SAND W/ SOME ORGANICS 4:1

TAN, ORANGE, GRAY, VERY LOOSE TO MEDIUM DENSE, MOIST TO SATURATED, SILTY FINE SAND (BLACK CREEK FORMATION)

20+00.00

130 125 120 115

4:1 EMBANKMENT FILL: TAN, GRAY, BROWN, LOOSE TO MEDIUM DENSE, MOIST TO WET, SILTY FINE SAND W/ SOME ORGANICS 4:1

TAN, ORANGE, GRAY, VERY LOOSE TO MEDIUM DENSE, MOIST TO SATURATED, SILTY FINE SAND (BLACK CREEK FORMATION)

19+50.00

SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
SS-2	19' RT	19+20	3.5-5.0	A-2-4(0)	15	NP	9.0	70.2	9.1	11.7	100	98	28	-	

135 130 125 120 115 110

SS-2

19+20

(M) EMBANKMENT FILL: TAN, GRAY, BROWN, LOOSE TO MEDIUM DENSE, MOIST TO WET, SILTY FINE SAND W/ SOME ORGANICS

4:1 (M) 4:1

TAN, ORANGE, GRAY, VERY LOOSE TO MEDIUM DENSE, MOIST TO SATURATED, SILTY FINE SAND (BLACK CREEK FORMATION)

7 12 10 15

05/09

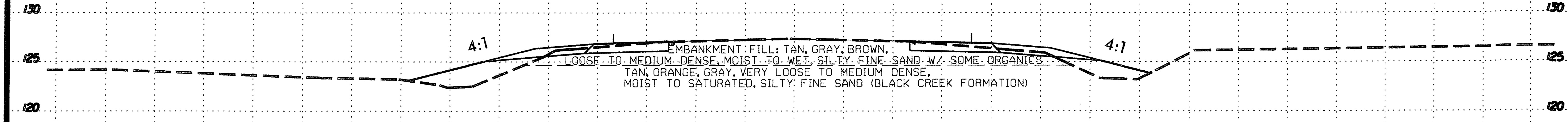
19+00.00

-L-

75 70 65 60 55 50 45 40 35 30 25 20 15 10 5 0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75

$$$$$$$$SYSTIME$$$$$$
$$$$$$$$$$$$$$$$$$$$DGN$$$$$$$$$$$$$$$$$$$$
$$$$$$USERNAME$$$$$

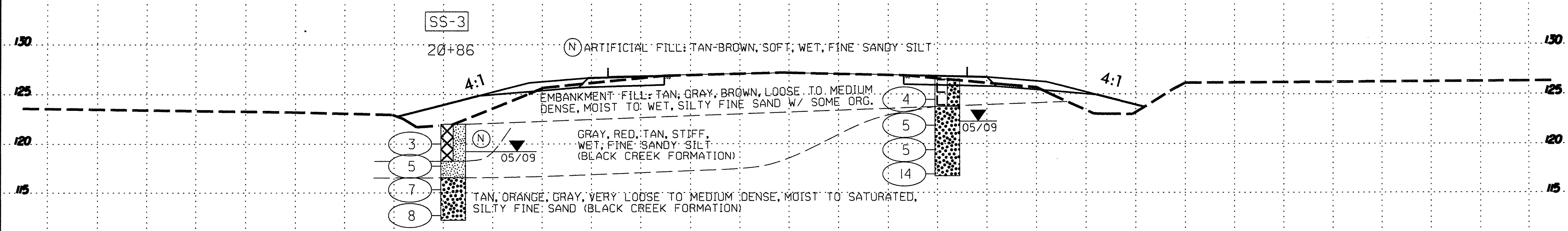
PROJ. REFERENCE NO.	SHEET NO.
51211	16



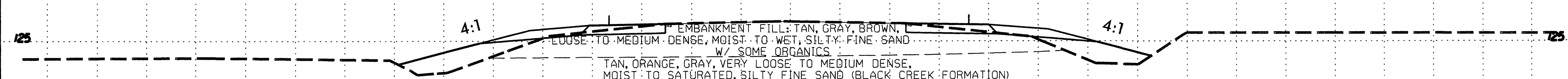
21+50.00

SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
SS-3	34' RT	20+86	5.7-7.7	A-2-4(0)	28	NP	0.7	83.2	2.1	14.0	100	100	18	-	



21+00.00



20+50.00

-L-

8/23/99

0 2.5 5

PROJ. REFERENCE NO. 5121 J

SHEET NO. 17

75 70 65 60 55 50 45 40 35 30 25 20 15 10 5 0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75

135 130 125 120 115

3:1 4:1

EMBANKMENT FILL: TAN, GRAY, BROWN, LOOSE TO MEDIUM DENSE, MOIST TO WET, SILTY FINE SAND W/ SOME ORGANICS
TAN, ORANGE, GRAY, VERY LOOSE TO MEDIUM DENSE, MOIST TO SATURATED, SILTY FINE SAND (BLACK CREEK FORMATION)

4:1 3:1

23+50.00

3:1 4:1

EMBANKMENT FILL: TAN, GRAY, BROWN, LOOSE TO MEDIUM DENSE, MOIST TO WET, SILTY FINE SAND W/ SOME ORGANICS
TAN, ORANGE, GRAY, VERY LOOSE TO MEDIUM DENSE, MOIST TO SATURATED, SILTY FINE SAND (BLACK CREEK FORMATION)

4:1 3:1

23+00.00

22+57

(0) EMBANKMENT FILL: TAN, GRAY, BROWN, LOOSE TO MEDIUM DENSE, MOIST TO WET, SILTY FINE SAND W/ SOME ORGANICS

4:1

(0)

TAN, ORANGE, GRAY, VERY LOOSE TO MEDIUM DENSE, MOIST TO SATURATED, SILTY FINE SAND (BLACK CREEK FORMATION)

13
8
7
14

05/09

4:1

22+50.00

4:1

EMBANKMENT FILL: TAN, GRAY, BROWN, LOOSE TO MEDIUM DENSE, MOIST TO WET, SILTY FINE SAND W/ SOME ORGANICS
TAN, ORANGE, GRAY, VERY LOOSE TO MEDIUM DENSE, MOIST TO SATURATED, SILTY FINE SAND (BLACK CREEK FORMATION)

4:1

22+00.00

-L-

$$$$$$SYSTIME$$$$$
$$$$$$$$$$$$$$$$$$DGN$$$$$$$$$$$$$$$$$$
$$$$$USERNAME$$$

8/23/99

0 2.5 5

PROJ. REFERENCE NO. 51211

SHEET NO. 18

75 70 65 60 55 50 45 40 35 30 25 20 15 10 5 0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75

135 130 125 120 115

3:1 4:1 4:1 3:1

EMBANKMENT FILL: BROWN, TAN, MEDIUM STIFF, MOIST TO WET, FINE SANDY SILT (BLACK CREEK FORMATION)

TAN, BROWN, ORANGE, SOFT TO MED. STIFF, MOIST TO WET, FINE SANDY-SILT (BLACK CREEK FORMATION)

GRAY-TAN, STIFF, WET, HIGHLY PLASTIC SILTY CLAY (BLACK CREEK FORMATION)

TAN, ORANGE, GRAY, VERY LOOSE TO MEDIUM DENSE, MOIST TO SATURATED, SILTY FINE SAND (BLACK CREEK FORMATION)

25+00.00

3:1 4:1 4:1

EMBANKMENT FILL: BROWN, TAN, MEDIUM STIFF, MOIST TO WET, FINE SANDY SILT (BLACK CREEK FORMATION)

TAN, BROWN, ORANGE, SOFT TO MED. STIFF, MOIST TO WET, FINE SANDY-SILT (BLACK CREEK FORMATION)

GRAY-TAN, STIFF, WET, HIGHLY PLASTIC SILTY CLAY (BLACK CREEK FORMATION)

TAN, ORANGE, GRAY, VERY LOOSE TO MEDIUM DENSE, MOIST TO SATURATED, SILTY FINE SAND (BLACK CREEK FORMATION)

24+50.00

3:1 4:1 4:1 3:1

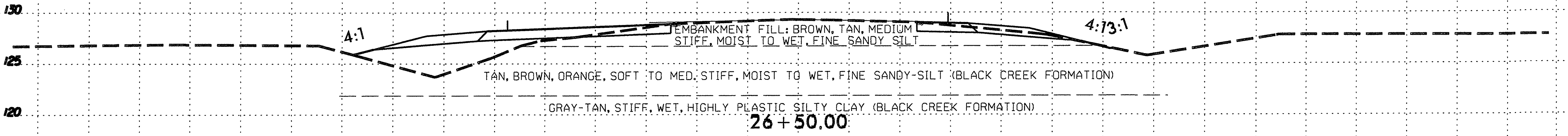
EMBANKMENT FILL: TAN, GRAY, BROWN, LOOSE TO MEDIUM DENSE, MOIST TO WET, SILTY FINE SAND W/ SOME ORGANICS

TAN, ORANGE, GRAY, VERY LOOSE TO MEDIUM DENSE, MOIST TO SATURATED, SILTY FINE SAND (BLACK CREEK FORMATION)

24+00.00

-L-

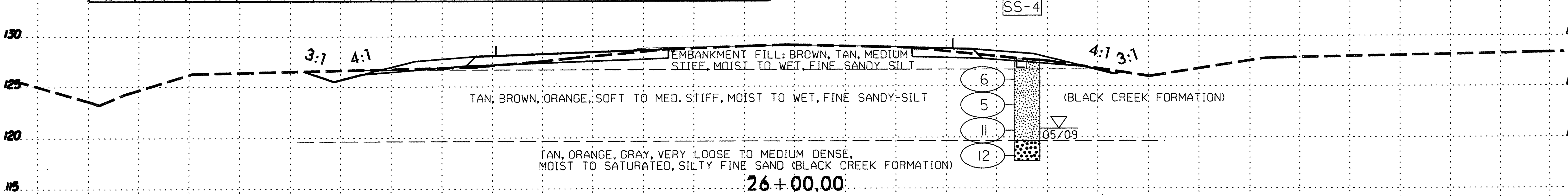
$$$$SYSTIME$$$$
$$$$SYSTIME$$$$DGN$$$$$$$$$$$$$$$$$$$$
$$$$USERNAME$$$$



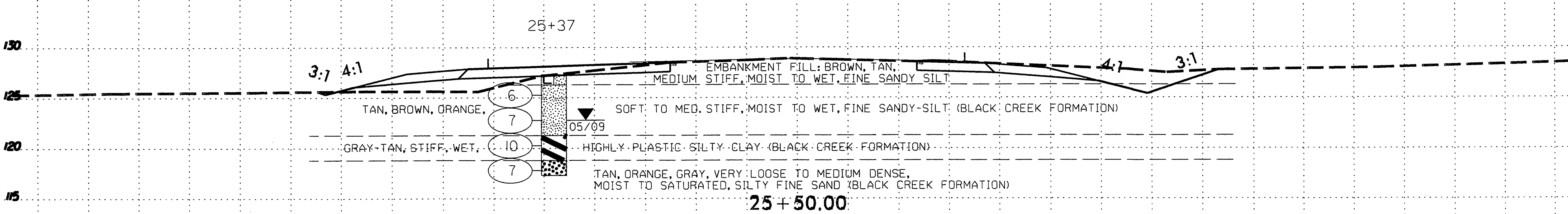
26+50.00

SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
SS-4	23' RT	26+00	1.0-2.5	A-4(0)	28	7	10.1	48.7	15.1	26.1	100	98	42	17.0	



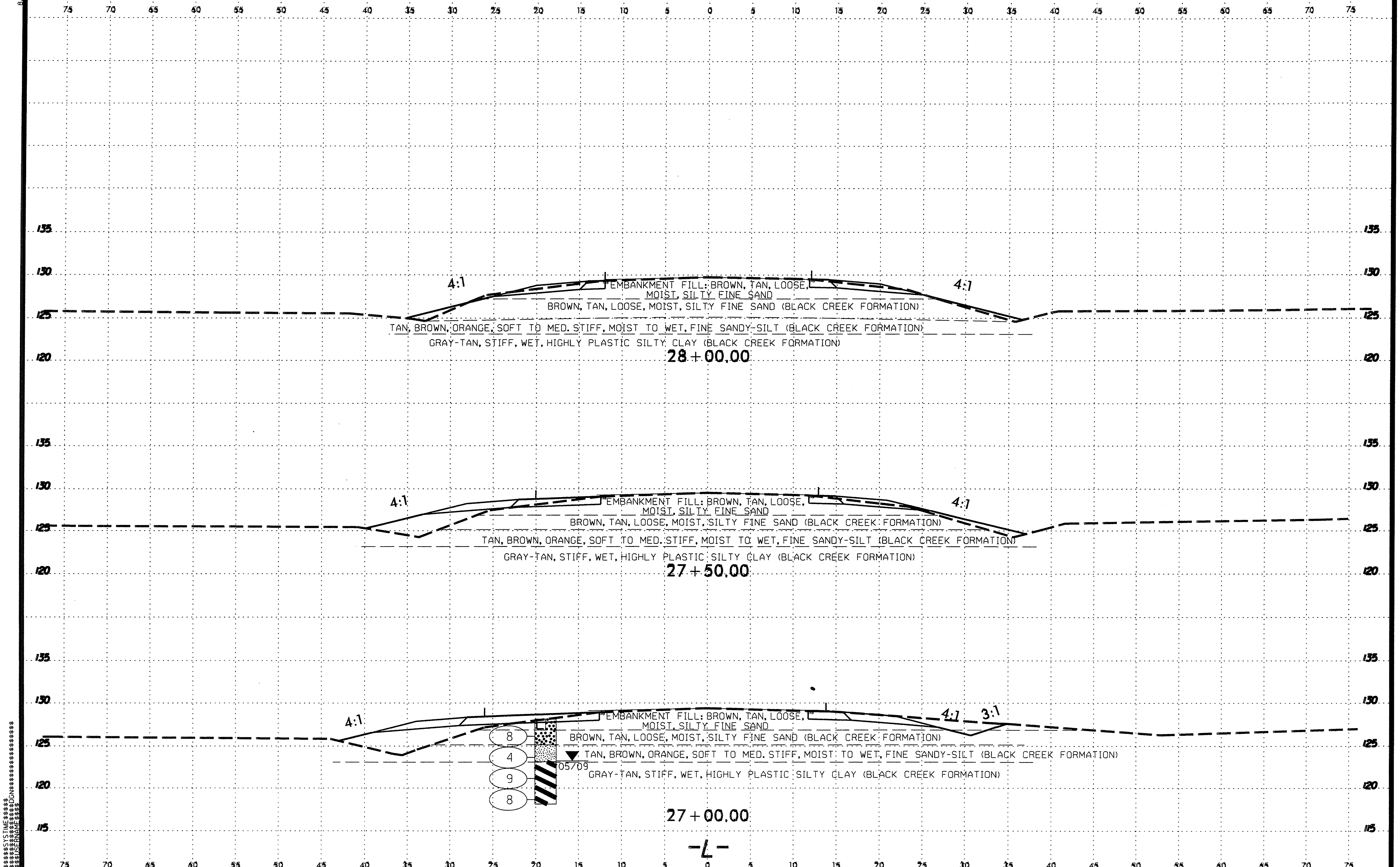
26+00.00



25+50.00

-L-

PROJ. REFERENCE NO.	SHEET NO.
51211	20



8/23/99

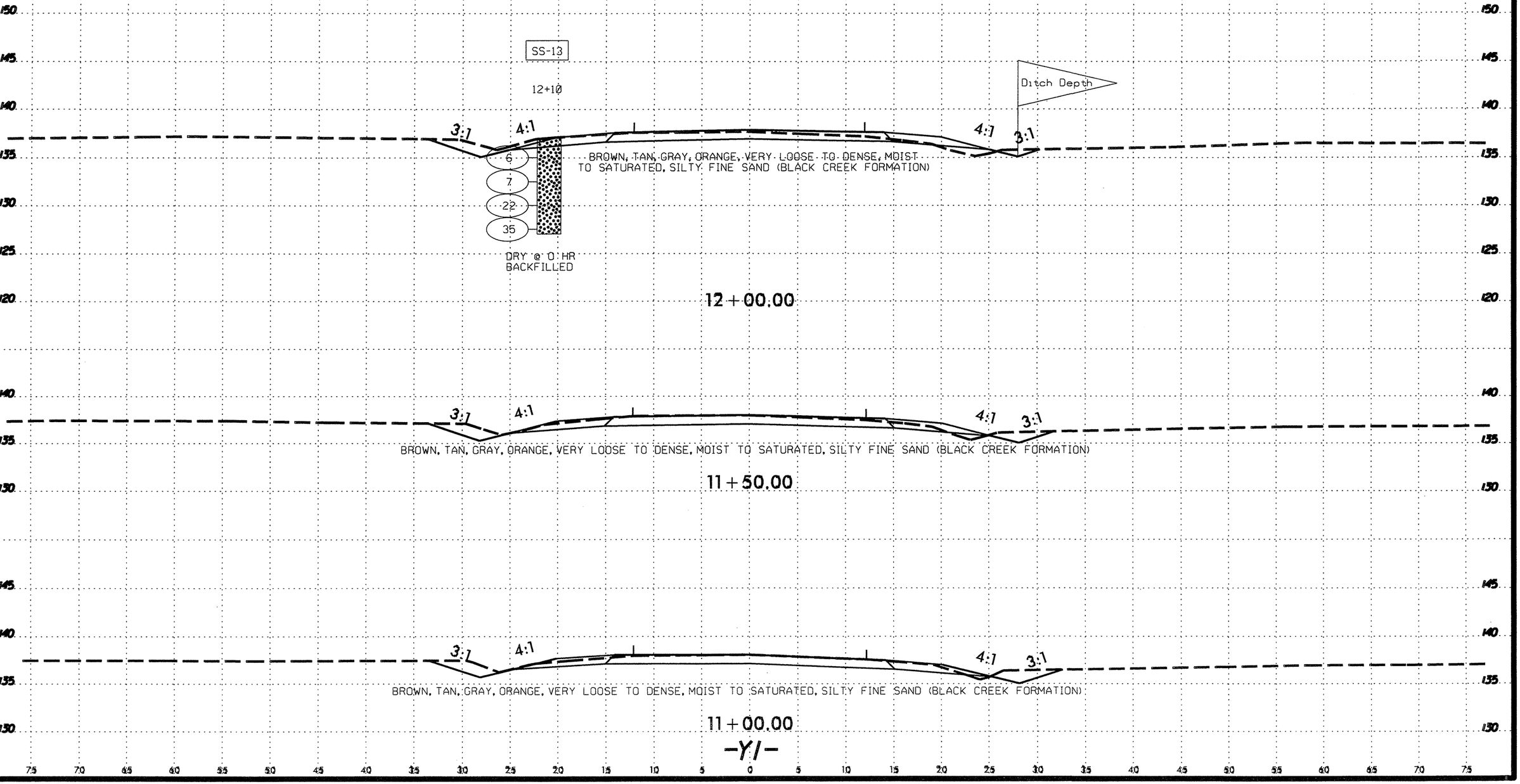
0 2.5 5

PROJ. REFERENCE NO. 1885.1.111-5121

SHEET NO. 21

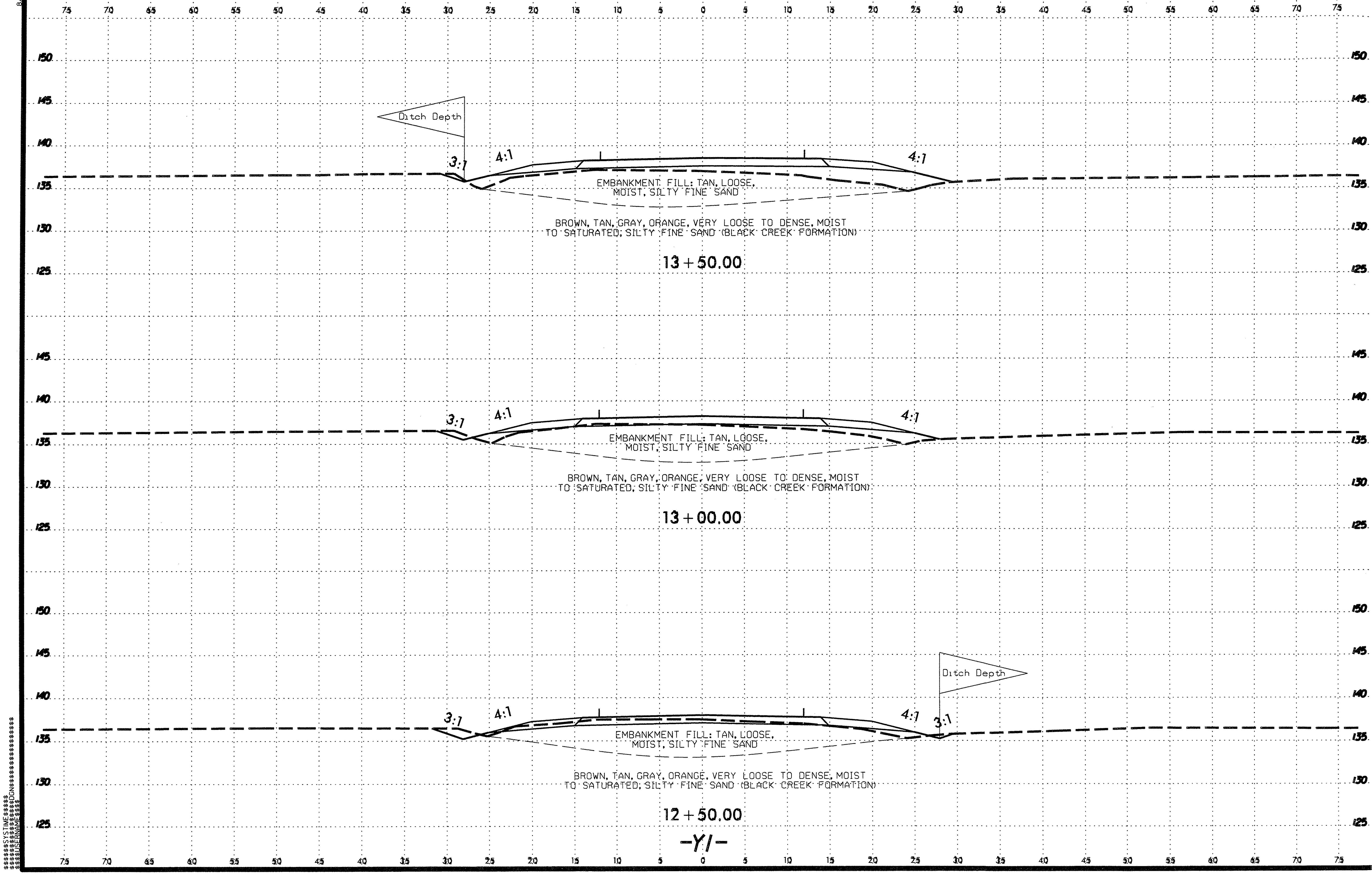
SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
SS-13	21' LT	12+10	3.5-5.0	A-2-4(0)	28	NP	10.8	67.6	4.1	17.5	100	97	23	-	



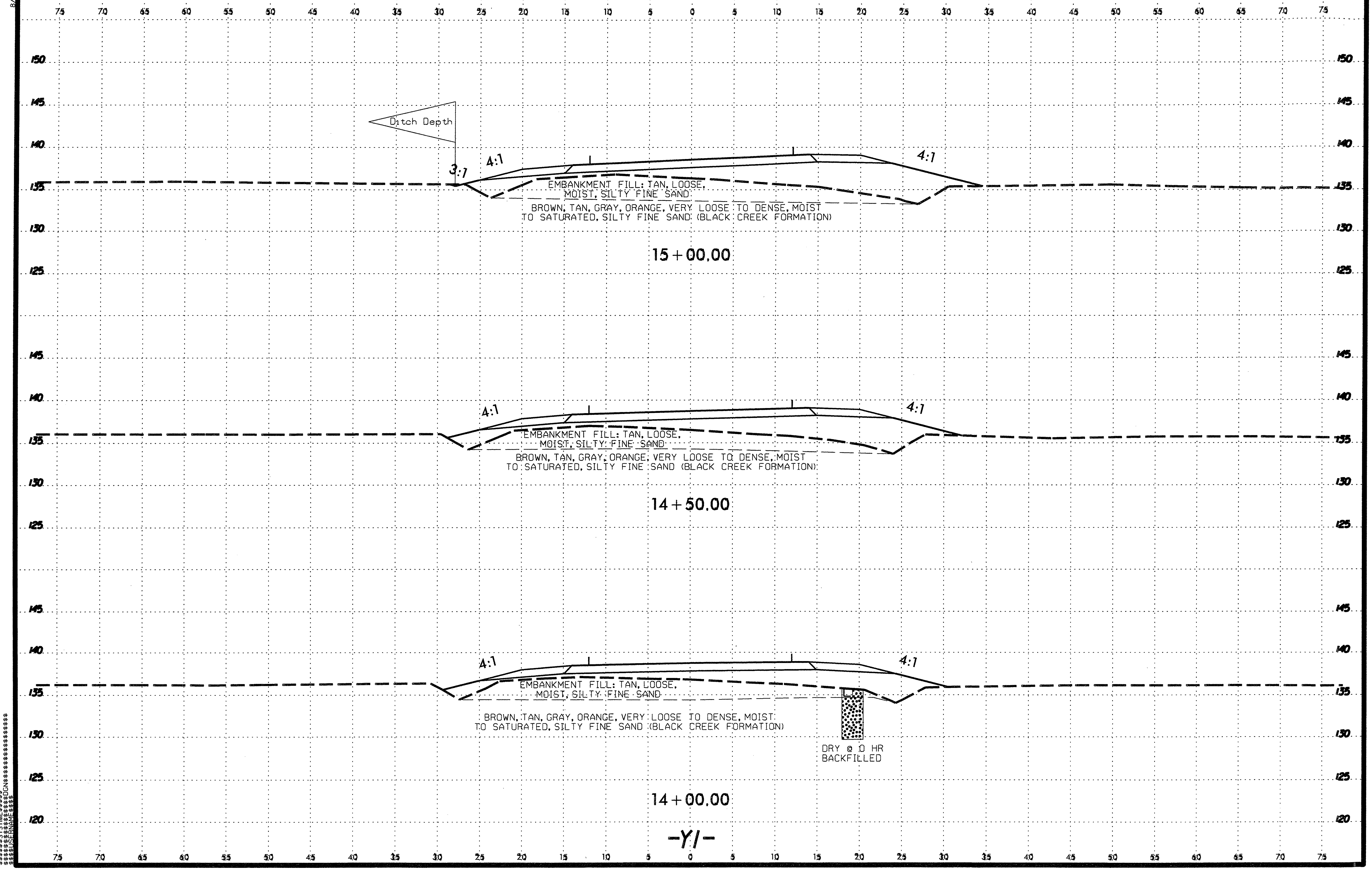
$$$$$$$$SYSTIME$$$$$$
$$$$$$$$$$$$$$$$$$$$DGN$$$$$$$$$$$$$$$$$$$$
$$$$$$$$USERNAME$$$$

PROJ. REFERENCE NO.	SHEET NO.
31885.1.1(V-5121)	22



8/23/99

PROJ. REFERENCE NO.	SHEET NO.
11885.1.1(Y-5121)	23



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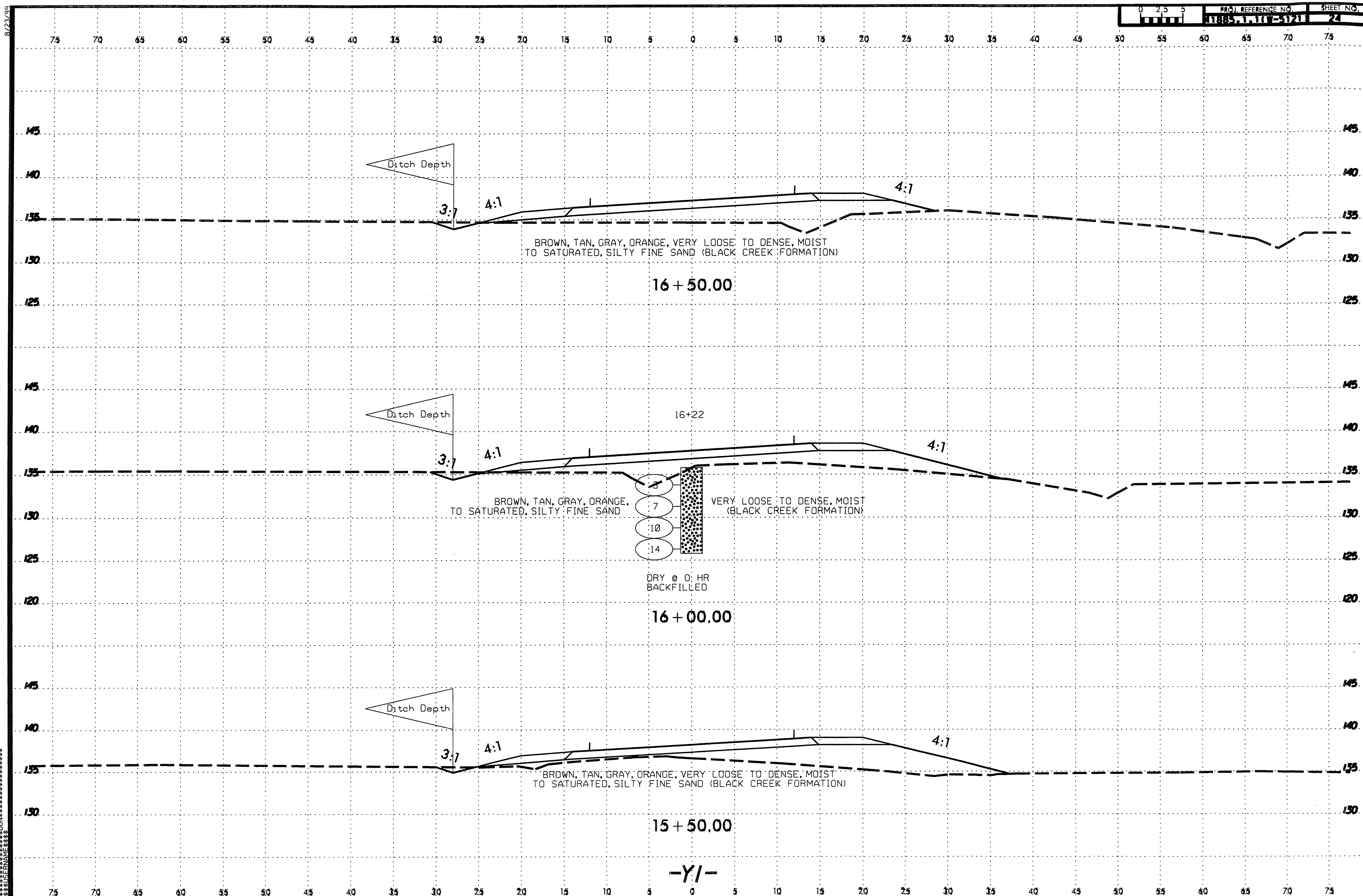
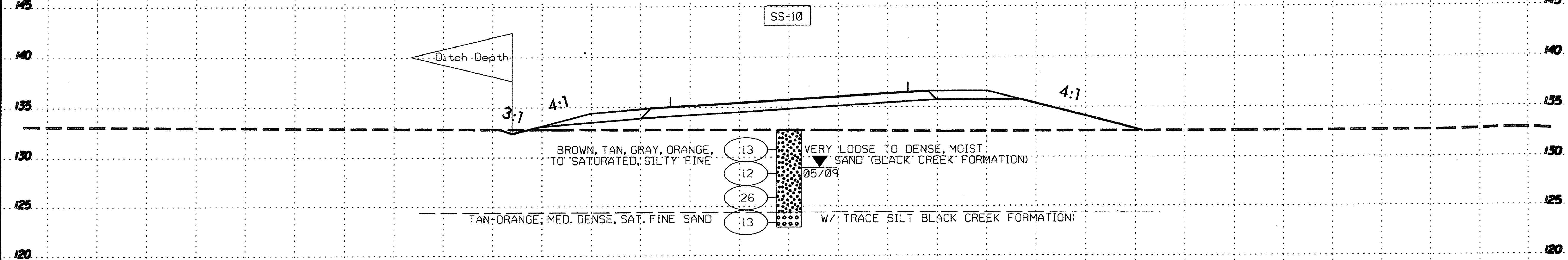


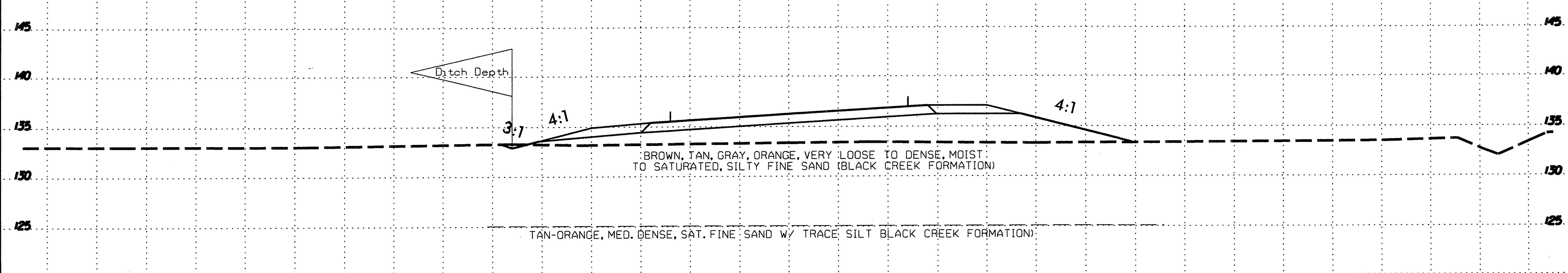
$$$$$$SYSTIME$$$$$$
$$$$$$$$$DGN$$$$$$$$$$$$$$$$$
$$$USERNAME$$$$

SOIL TEST RESULTS

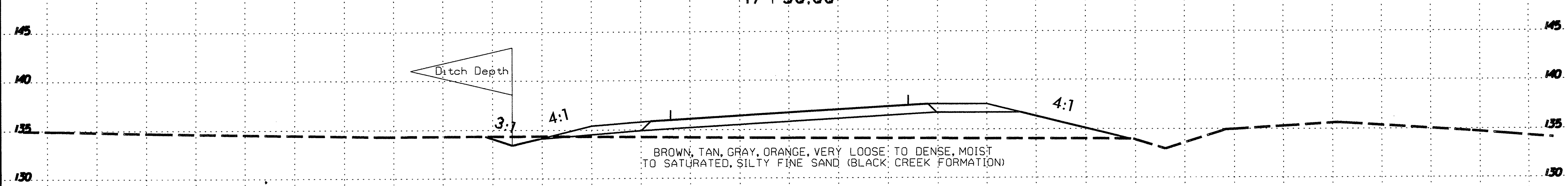
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
SS-10	C/L	18+00	5.9-7.4	A-2-4(0)	25	NP	1.7	86.2	2.2	9.9	100	100	13	-	



18+00.00



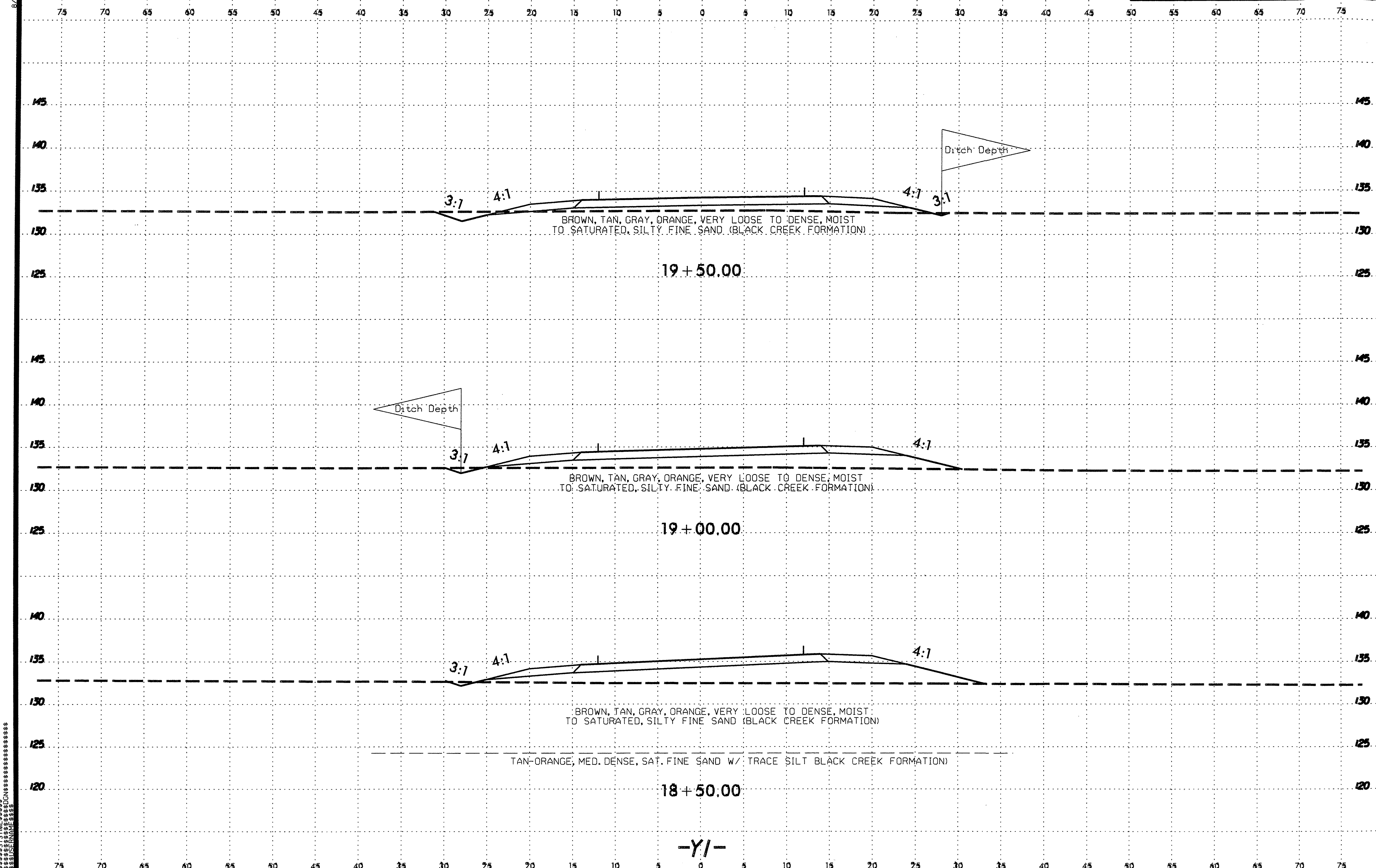
17+50.00



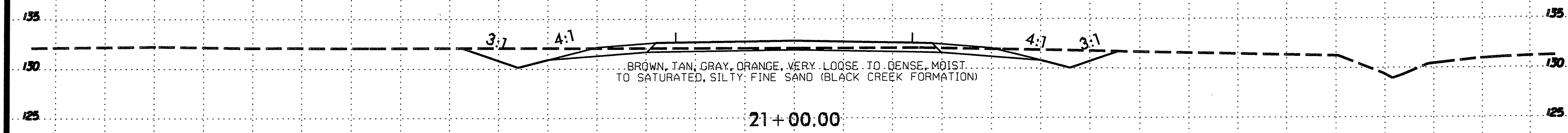
17+00.00

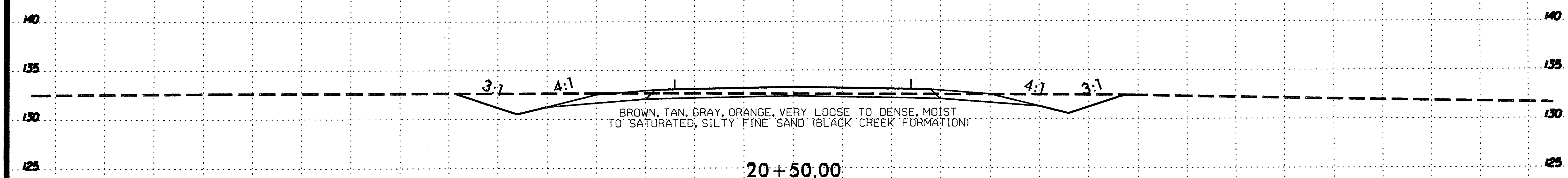
-Y1-

PROJ. REFERENCE NO.	SHEET NO.
31885.1.1 (W-5121)	26



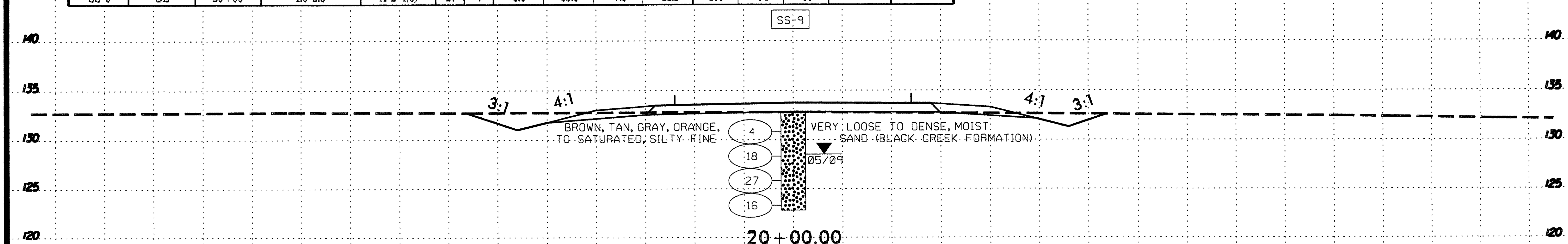
PROJ. REFERENCE NO.	SHEET NO.
11885.1.1 ([illegible]-5121)	27





SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
SS-9	C/L	20+00	1.0-2.5	A-2-4(0)	27	7	6.0	65.0	7.9	21.1	100	94	30	-	



-Y1-

8/23/99

0 2.5 5

HGL REFERENCE NO. 1885.1.111.5121

SHEET NO. 28

75 70 65 60 55 50 45 40 35 30 25 20 15 10 5 0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75

140 135 130 125 120

Ditch Depth

4:1 4:1 3:1

BROWN, TAN, GRAY, ORANGE, VERY LOOSE TO DENSE, MOIST TO SATURATED, SILTY FINE SAND (BLACK CREEK FORMATION)

22+50.00

140 135 130 125 120 115

Ditch Depth

3:1 4:1 4:1 3:1

8
15
16
12

05/09

BROWN, TAN, GRAY, ORANGE, TO SATURATED, SILTY FINE

VERY LOOSE TO DENSE, MOIST SAND (BLACK CREEK FORMATION)

22+00.00

135 130 125

3:1 4:1 4:1 3:1

BROWN, TAN, GRAY, ORANGE, VERY LOOSE TO DENSE, MOIST TO SATURATED, SILTY FINE SAND (BLACK CREEK FORMATION)

21+50.00

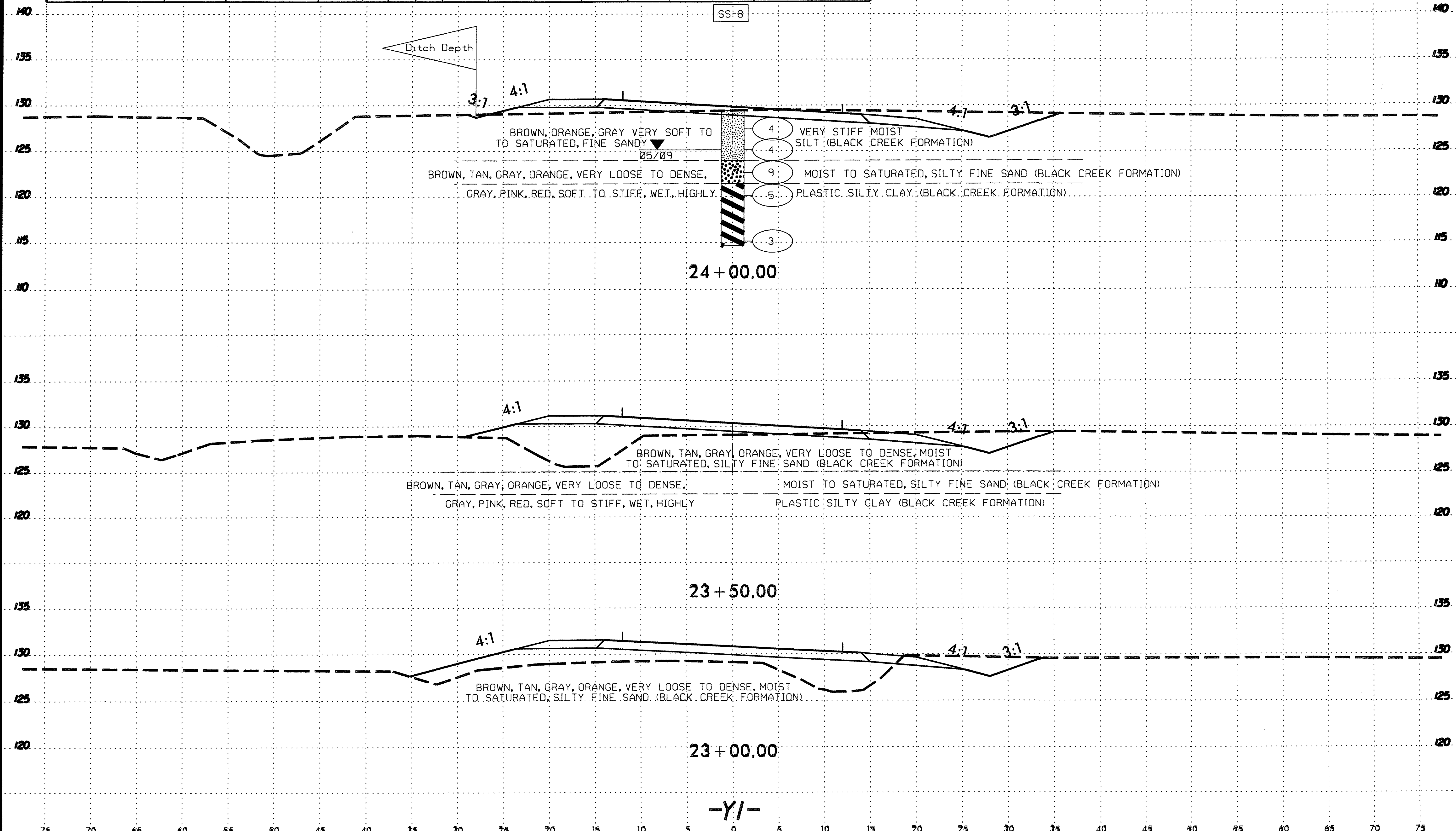
-Y/-

$$$$$$SYSTIME$$$$$
$$$$$$$$$$TIME$$$$$$DGN$$$$$$$$$$$$$$$$$$$$
$$$$$USERNAME$$$$

PROJ. REFERENCE NO.	SHEET NO.
11885.1.1(T-5121)	29

SOIL TEST RESULTS

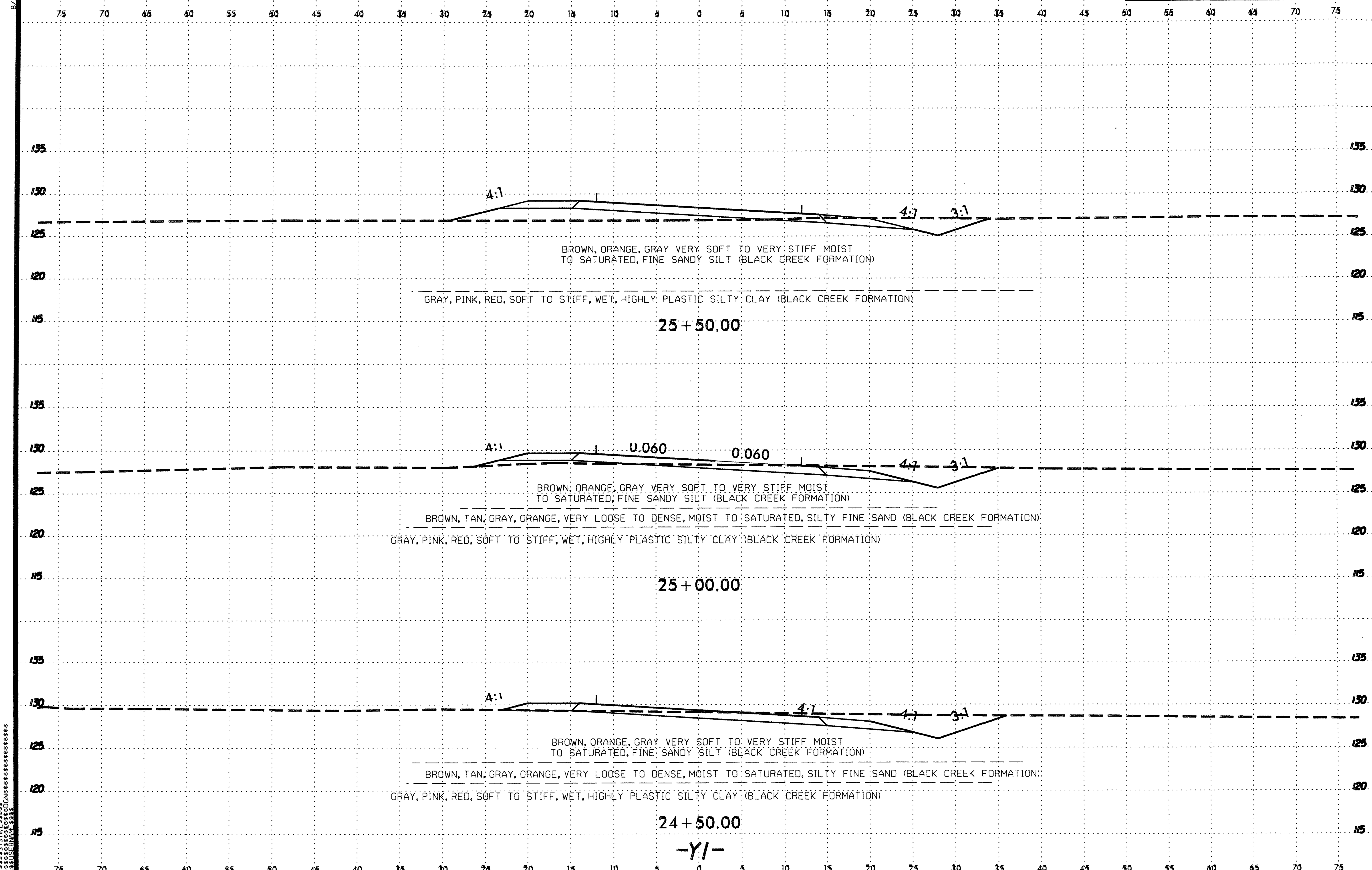
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
SS-8	C/L	24+00	1.0-2.5	A-4(0)	32	NP	5.9	39.9	7.2	47.0	100	98	56	34.6	

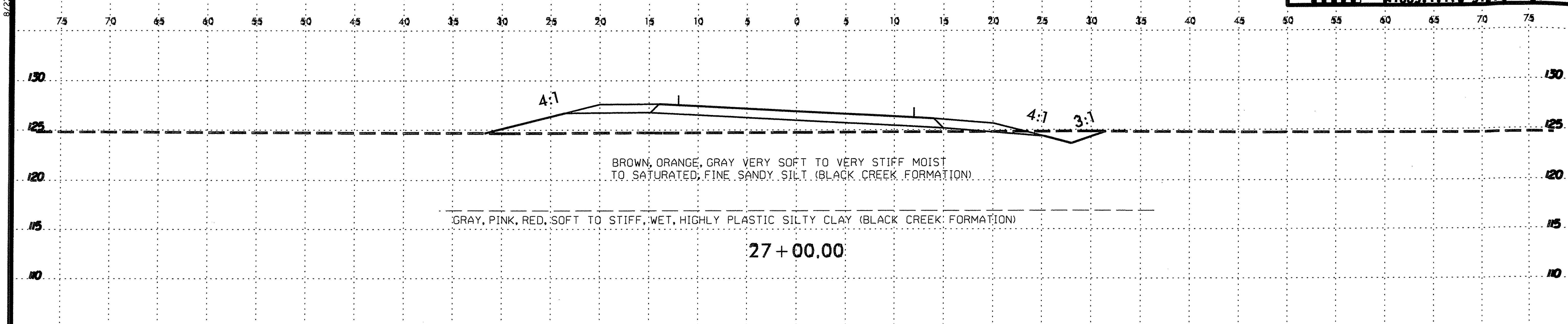


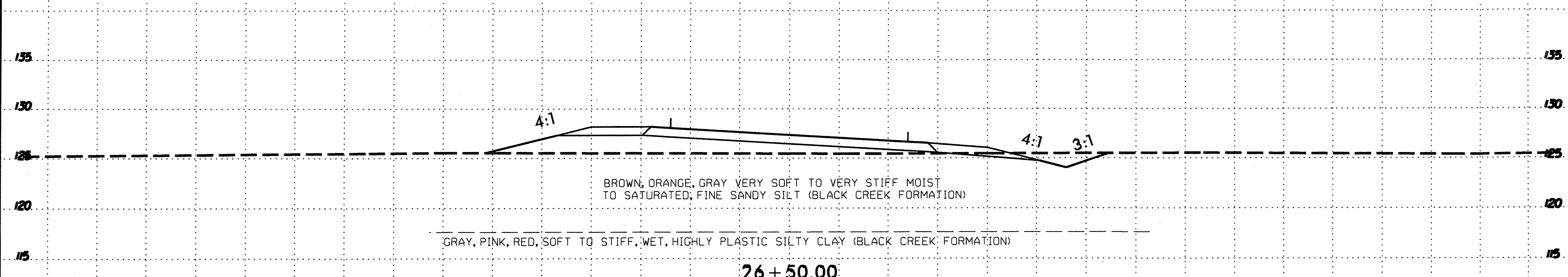
8/23/99

$$$$$SYSTIME$$$$
$$$$$$DGN$$$$$$$$$$$$$$$$
$$$$USERNAME$$$$

PROJ. REFERENCE NO.	SHEET NO.
11885.1.1 (U-5121)	30

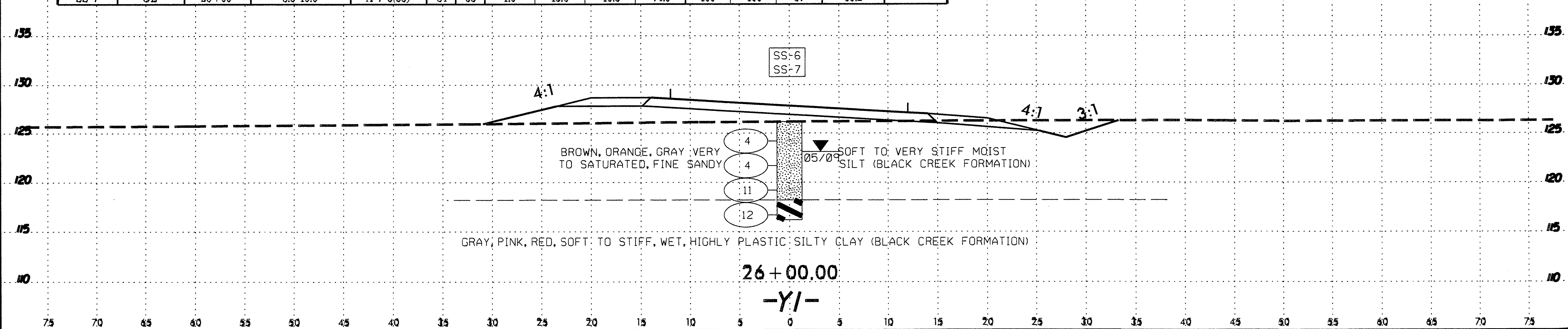






SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT C. SAND	F. SAND	SILT	CLAY	% PASSING (SIEVES) 10	40	200	% MOISTURE	% ORGANIC
SS-6	C/L	26+00	3.5-5.0	A-4(1)	29	12	7.6	55.4	6.6	30.4	100	98	38	25.4	
SS-7	C/L	26+00	8.5-10.0	A-7-5(53)	84	53	1.0	13.6	10.5	74.9	100	100	87	33.2	



$$$$$$SYSTIME$$$$$
$$$$$$$$$$$$DGN$$$$$$$$$$$$$$$$$$
$$$$$USERNAME$$$$

8/23/99

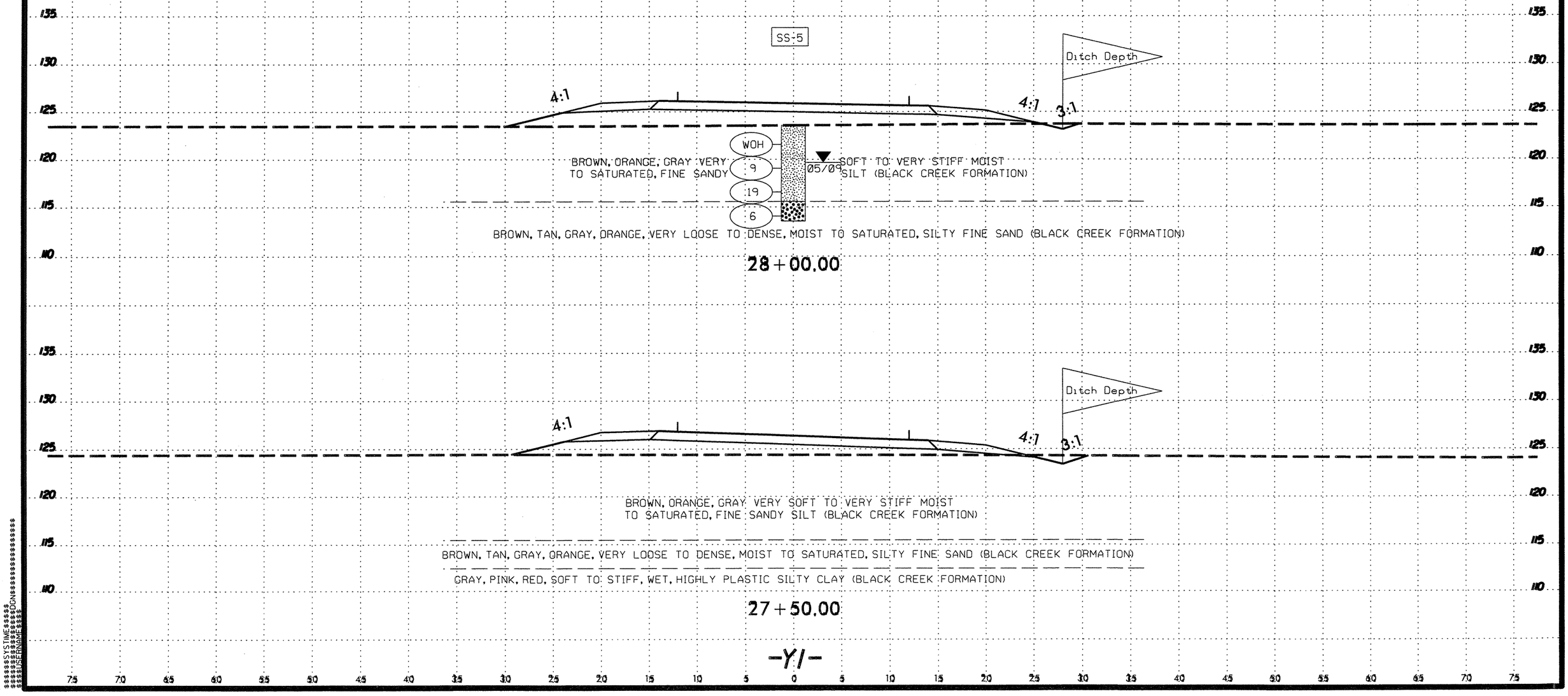
0 2.5 5

PROJECT REFERENCE NO. 11885.1.111E-5121

SHEET NO. 32

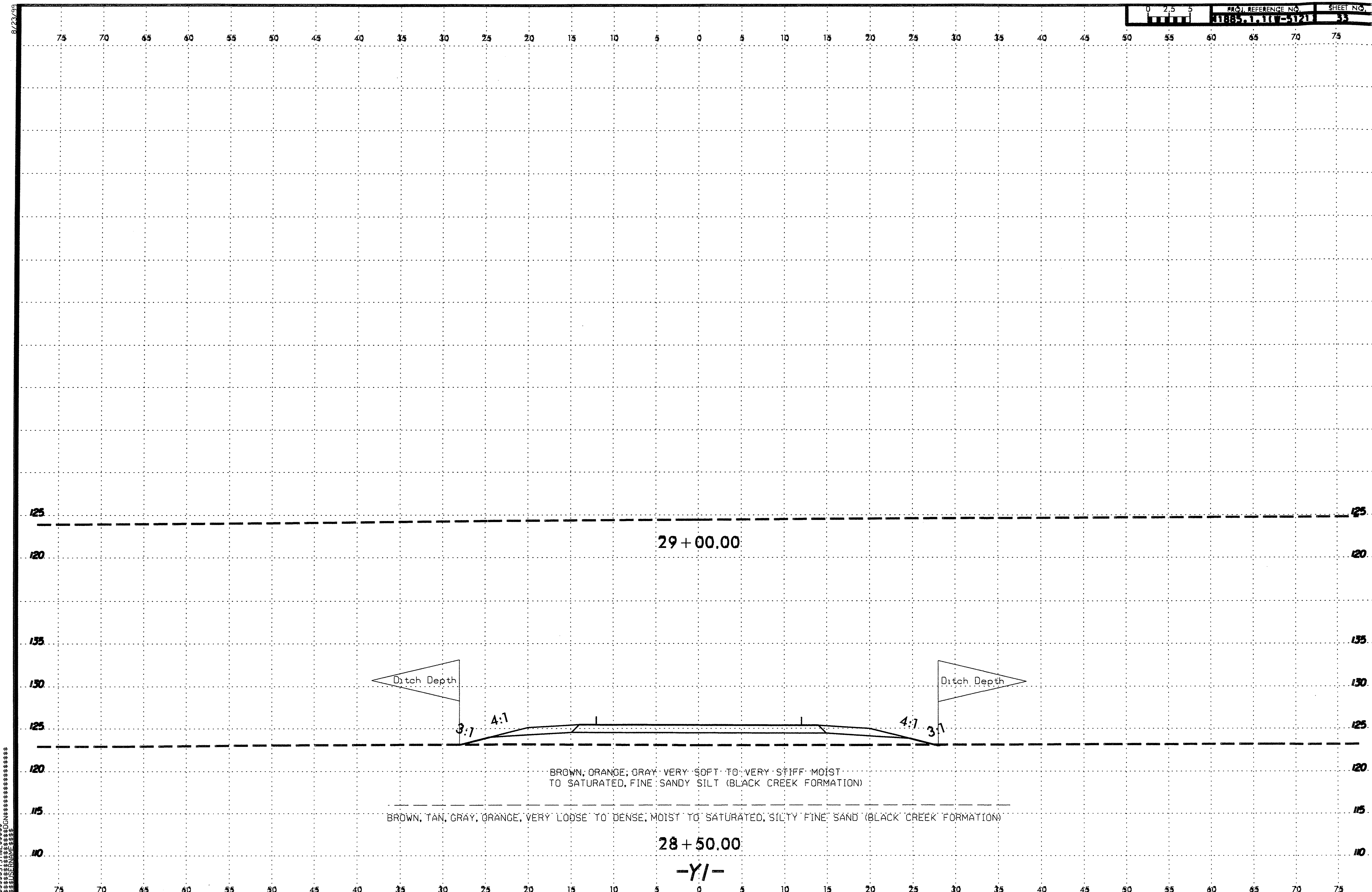
SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
SS-5	C/L	28+00	6.0-7.5	A-4(2)	29	7	4.1	33.3	50.6	12.0	100	100	63	19.0	



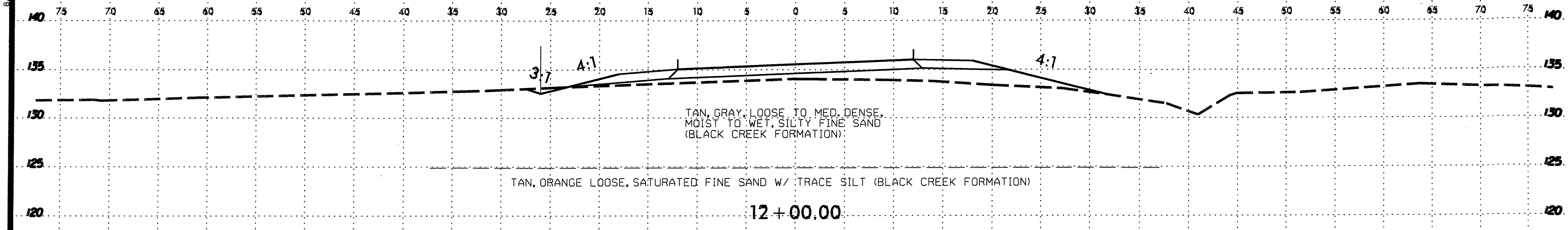
-Y1-

$$$$$$$$SYSTIME$$$$$
$$$$$$$$$$$$$$$$$$$$DON$$$$$$$$$$$$$$$$$$$$
$$$
$$$$$$$$USERNAME$$$$

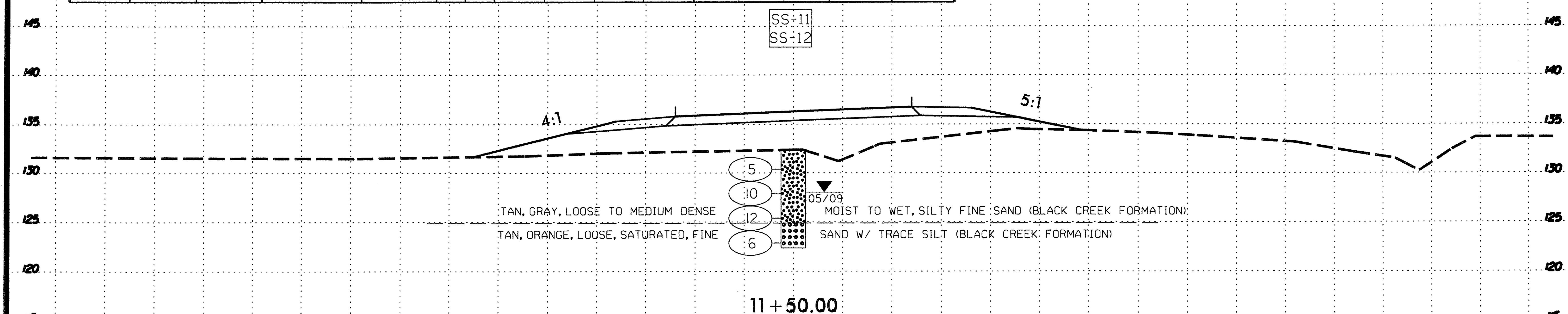


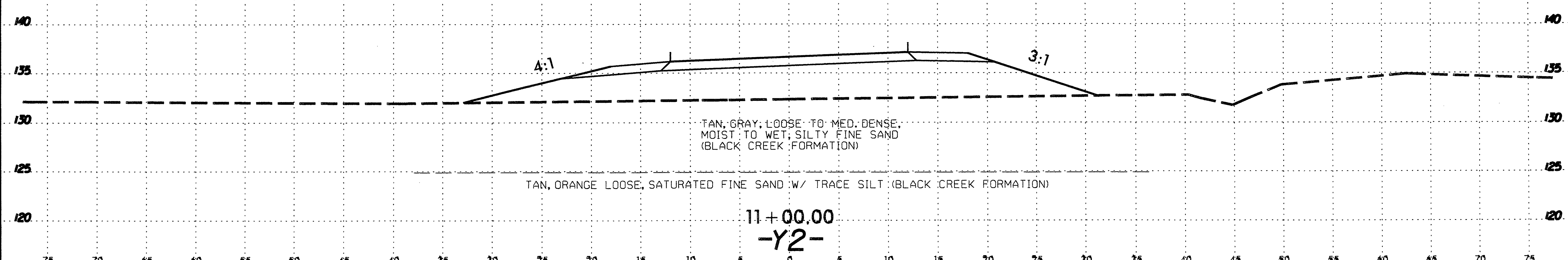
PROJ. REFERENCE NO.
11885.1.1(V-5121)
SHEET NO.
33
29 + 00.00
Ditch Depth
Ditch Depth
3:1
4:1
4:1
3:1
BROWN, ORANGE, GRAY VERY SOFT TO VERY STIFF MOIST
TO SATURATED, FINE SANDY SILT (BLACK CREEK FORMATION)
BROWN, TAN, GRAY, ORANGE, VERY LOOSE TO DENSE, MOIST TO SATURATED, SILTY FINE SAND (BLACK CREEK FORMATION)
28 + 50.00
-Y1-

PROJ. REFERENCE NO.	SHEET NO.
31885.1.1(W-5121)	34

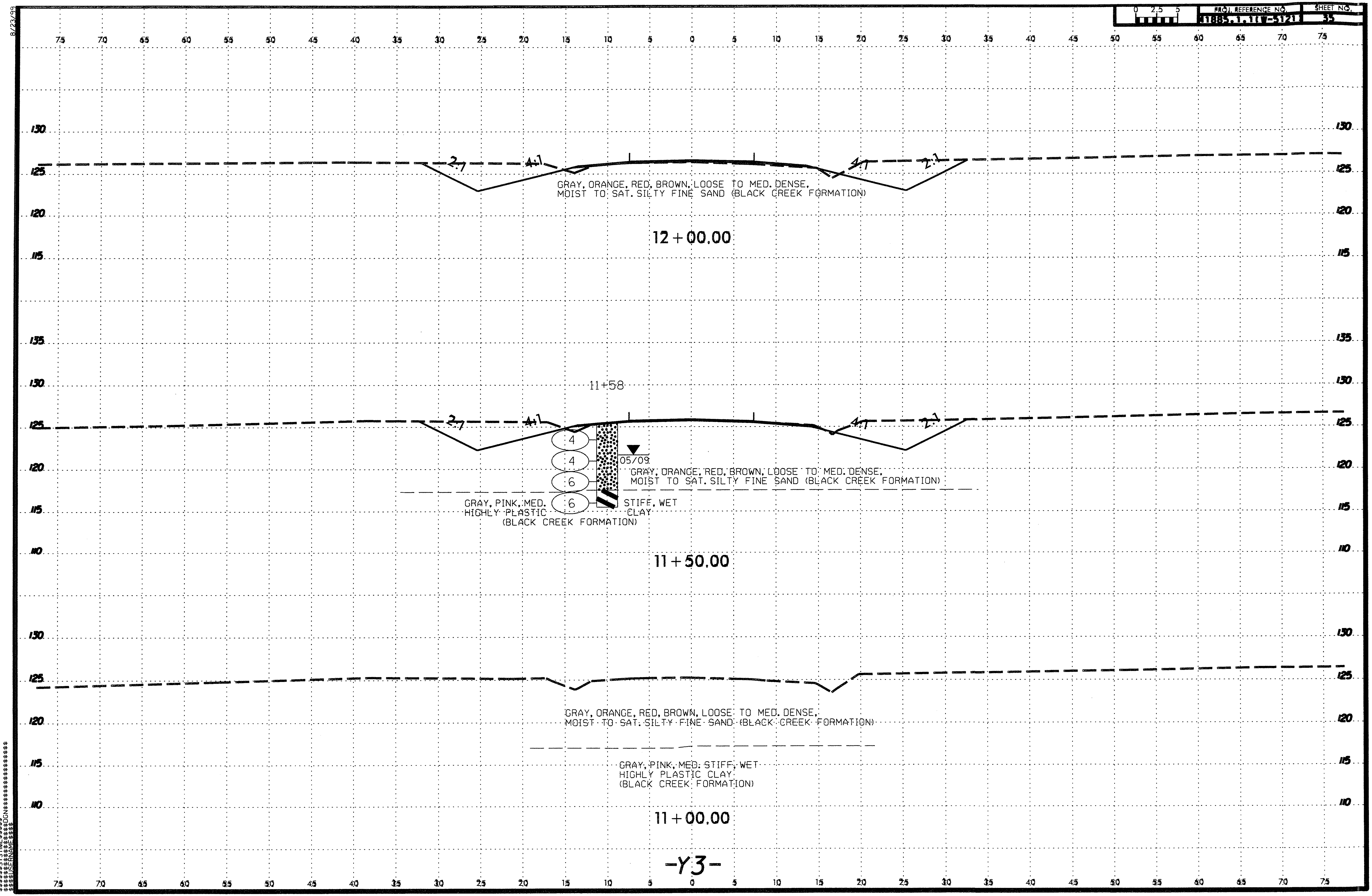


SOIL TEST RESULTS															
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
SS-11	C/L	11+50	3.5-5.0	A-2-4(0)	26	NP	7.6	79.0	1.5	11.9	100	98	14	-	
SS-12	C/L	11+50	8.5-10.0	A-3(0)	26	NP	4.0	93.7	0.5	1.8	100	100	3	-	

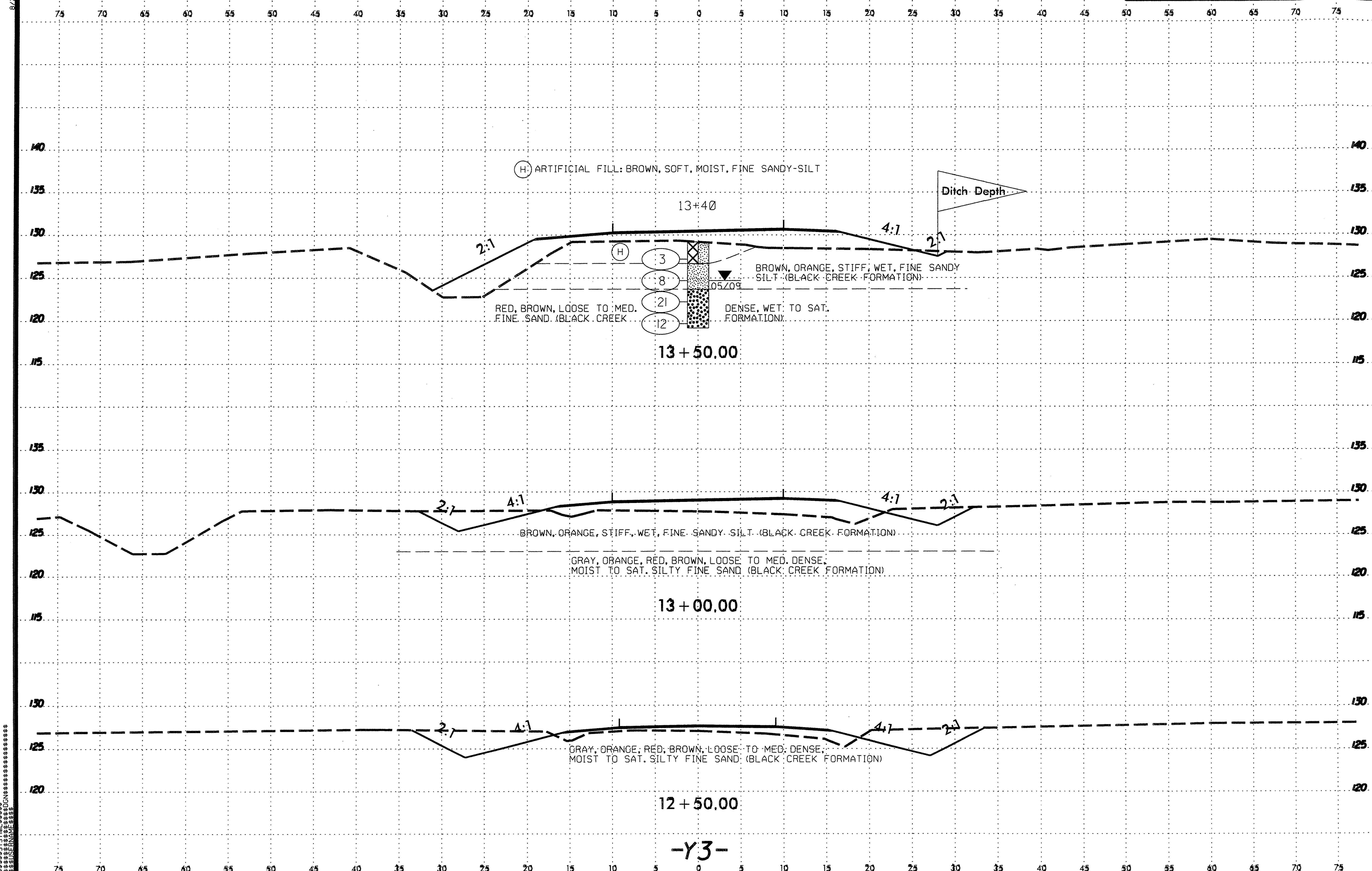




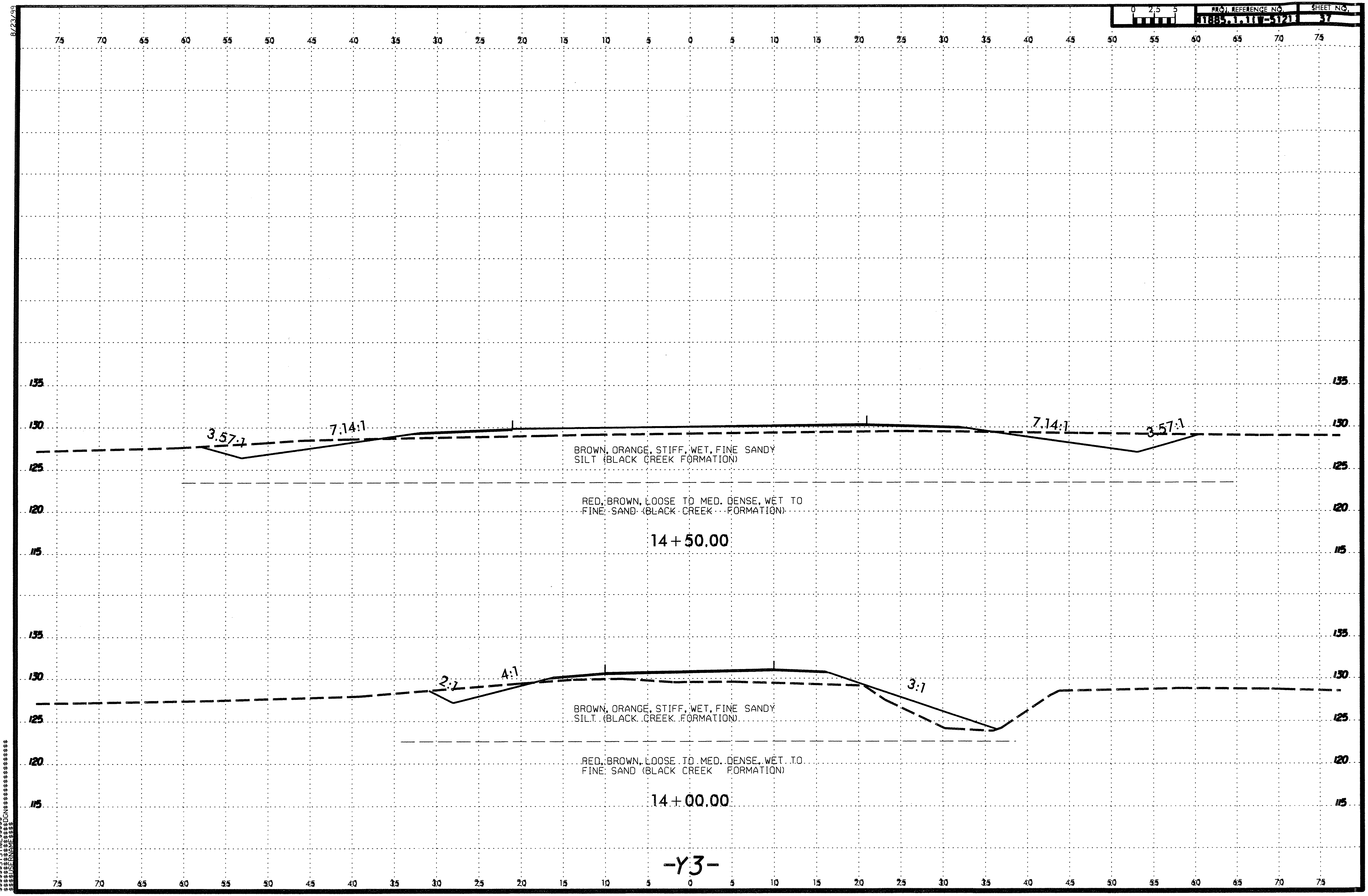
-Y2-


PROJ. REFERENCE NO.
31885.1.1 (Y-5121)
SHEET NO.
35
8/23/99
2:1
4:1
GRAY, ORANGE, RED, BROWN, LOOSE TO MED. DENSE,
MOIST TO SAT. SILTY FINE SAND (BLACK CREEK FORMATION)
12 + 00.00
11+58
05/09
GRAY, ORANGE, RED, BROWN, LOOSE TO MED. DENSE,
MOIST TO SAT. SILTY FINE SAND (BLACK CREEK FORMATION)
GRAY, PINK, MED. STIFF, WET
HIGHLY PLASTIC CLAY
(BLACK CREEK FORMATION)
11 + 50.00
GRAY, ORANGE, RED, BROWN, LOOSE TO MED. DENSE,
MOIST TO SAT. SILTY FINE SAND (BLACK CREEK FORMATION)
GRAY, PINK, MED. STIFF, WET
HIGHLY PLASTIC CLAY
(BLACK CREEK FORMATION)
11 + 00.00
-Y3-

PROJ. REFERENCE NO.	SHEET NO.
11885.1.1(Y-5121)	36



8/23/99



$$$$$$SYSTIME$$$$$
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