CONTRACT: ID: R-2707C

NOTE: SEE SHEET 1A FOR PLAN SHEET LAYOUT AT TIME OF INVESTIGATION

CONTENTS

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

ROADWAY SUBSURFACE INVESTIGATION

PROJ. REFERENCE NO. 34497.1.2 (R-2707C) F.A. PROJ. NHF-74(14)

COUNTY CLEVELAND

PROJECT DESCRIPTION US 74 SHELBY BYPASS FROM WEST OF NC 226 TO EAST OF NC 150

INVENTORY

This Report is for R-2707C but attached information is relevant to R-2707B. Please see attached information in addition to Subsurface Investigation for R-2707B.

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	R-2707C	1	277

STATE PROJ. NO.	F. A. PROJ. NO.	DESCRIPTION
34497.1.4	NHF-74(14)	P.E.
		R/W & UTIL.

CAUTION NOTICE

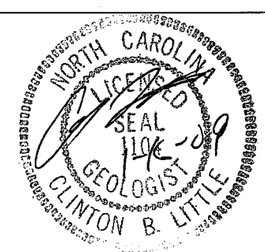
THE SUBSURFACE INFORMATION AND THE SUBSURFACE INVESTIGATION ON WHICH IT IS BASED WERE MADE FOR THE PURPOSE OF STUDY, PLANNING, AND DESIGN, AND NOT FOR CONSTRUCTION OR PAY PURPOSES. THE VARIOUS FIELD BORING LOGS, ROCK CORES, AND SOIL TEST DATA AVAILABLE MAY BE REVIEWED OR INSPECTED IN RALEIGH BY CONTACTING 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.

GENERAL SOIL AND ROCK STRATA DESCRIPTIONS AND INDICATED BOUNDARIES ARE BASED ON A GEOTECHNICAL 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 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.

PERSONNEL
R. W. TODD
J. P. ROGERS
M. L. SMITH
C. E. BURRIS
A. C. SMITH

INVESTIGATED BY J. P. ROGERS
CHECKED BY C. B. LITTLE
SUBMITTED BY C. B. LITTLE
DATE NOVEMBER 2008



DRAWN BY: J. P. ROGERS & C.E. BURRIS

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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.
R-2707C	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, SETY 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 PLASTIC INDEX	6 MX		NP	40 MX 10 MX	41 MN 10 MX	40 MX 11 MN	41 MN 11 MN	40 MX 10 MX	41 MN 10 MX	40 MX 11 MN	41 MN 11 MN	SOILS WITH LITTLE OR MODERATE AMOUNTS OF ORGANIC MATTER		HIGHLY ORGANIC SOILS
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)	4.76	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, FELOSPAR, 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, CPT, OPT, DMT, VST, PMT - 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:
- [X] MOBILE B- 57
- [ ] BK-51
- [ ] CME-45C
- [X] CME-550
- [ ] PORTABLE HOIST
- [ ] _____
- [ ] _____

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

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

CORE SIZE:
- [ ] -B_____
- [X] -N Q
- [ ] -H_____

HAND TOOLS:
- [X] POST HOLE DIGGER
- [X] HAND AUGER
- [X] 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 SLIGHT (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 FELOSPARS 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 FELOSPARS 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 FELOSPARS 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 PEICES 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:

ELEVATION: FT.

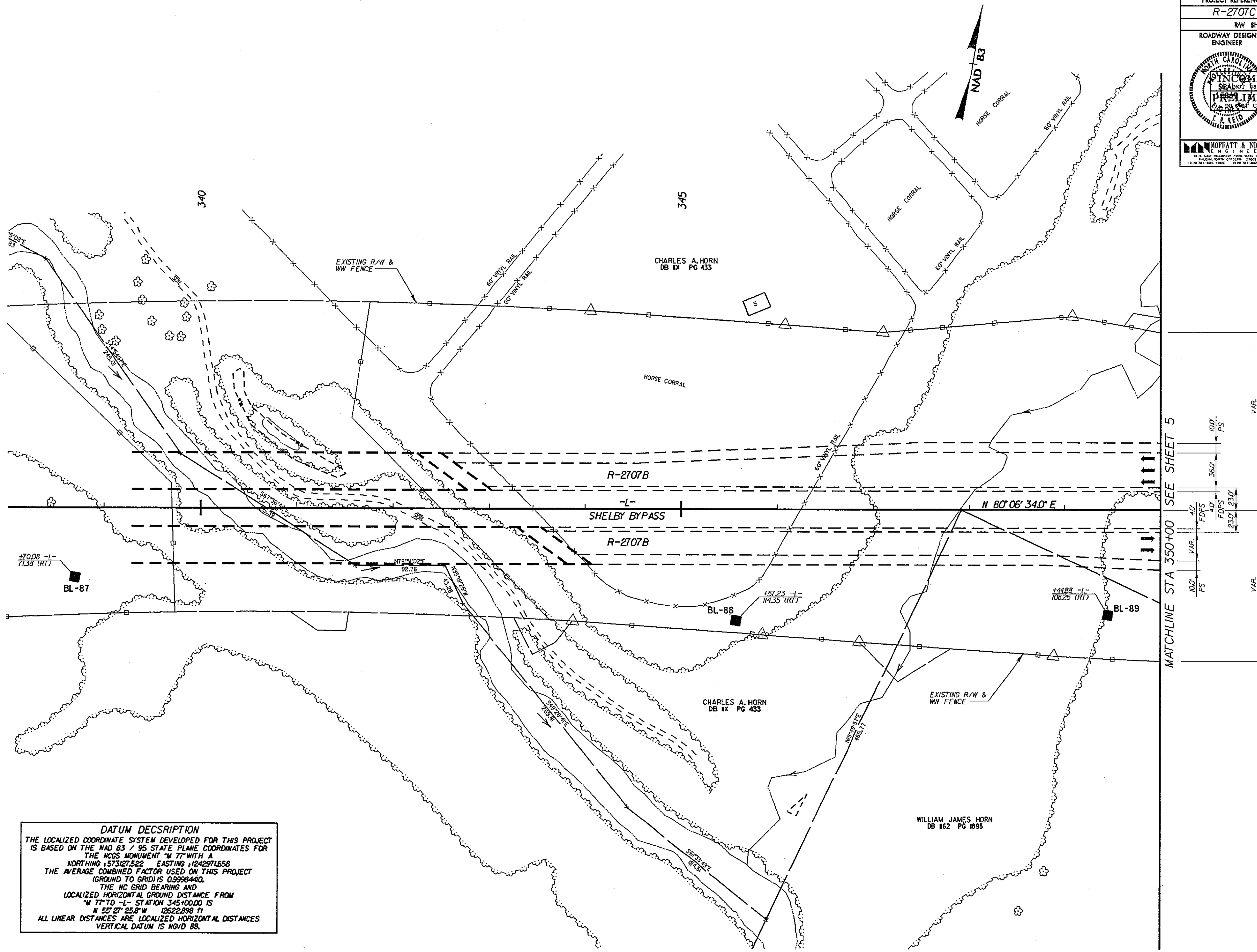
NOTES:

REVISED 02/23/06

Pages 3, 3A, 3B, and 3C were intentionally removed.

PROJECT REFERENCE NO.	SHEET NO.
R-2707C	4
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
NORTH CAROLINA PROFESSIONAL SEAL ENGINEER T. R. REID	NORTH CAROLINA PROFESSIONAL SEAL ENGINEER HENRY WELLS, JR.
MOFFATT & NICHOL ENGINEERS	SDG Sungate Design Group, P.A.

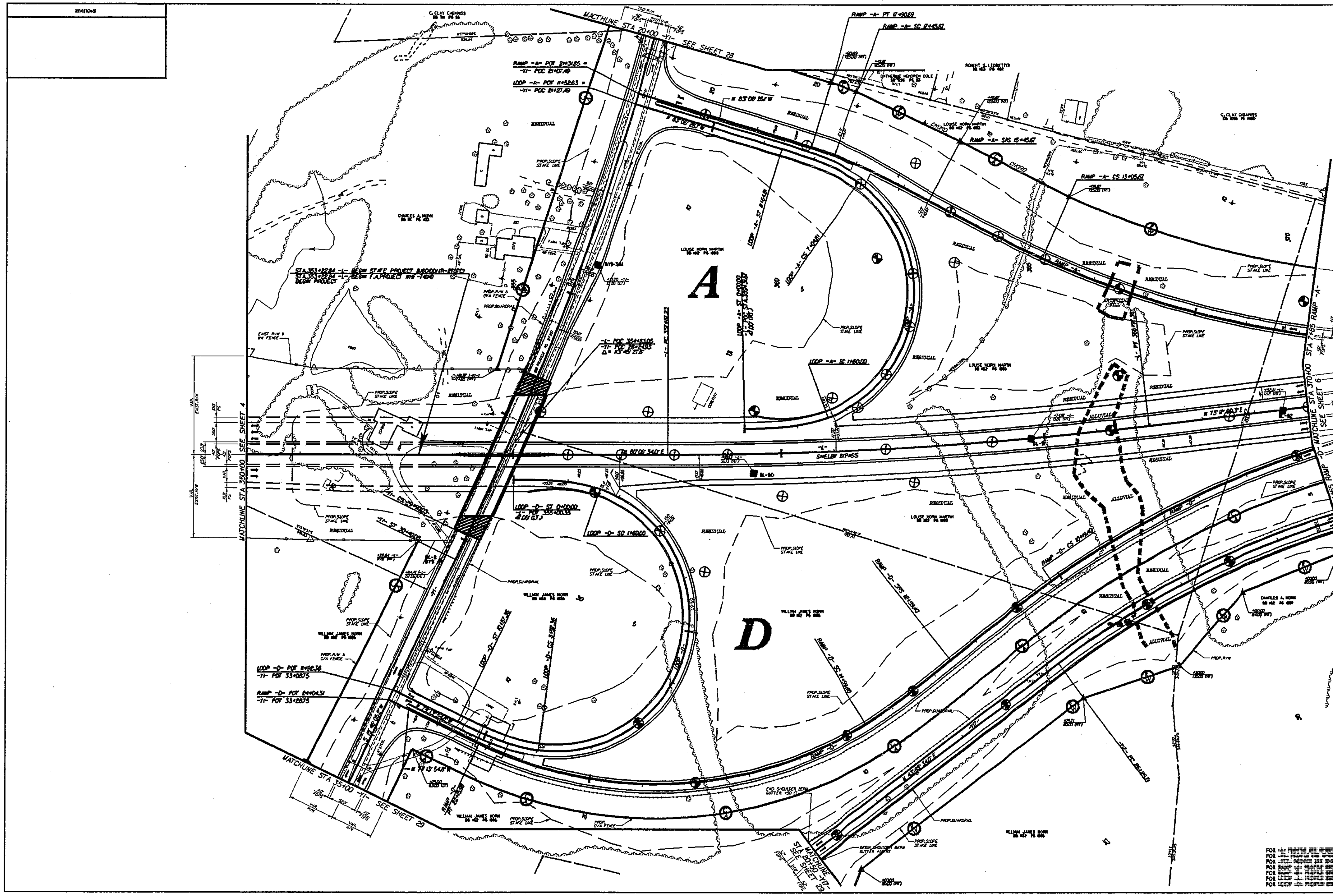
INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION



DATUM DECSRIPTION

THE LOCALIZED COORDINATE SYSTEM DEVELOPED FOR THIS PROJECT IS BASED ON THE NAD 83 / 95 STATE PLANE COORDINATES FOR THE NCGS MONUMENT "M 77" WITH A
NORTHING : 573127.522 EASTING : 1242971.658
THE AVERAGE COMBINED FACTOR USED ON THIS PROJECT (GROUND TO GRID) IS 0.99984410.
THE NC GRID BEARING AND LOCALIZED HORIZONTAL GROUND DISTANCE FROM "M 77" TO -L- STATION 345+00.00 IS
N 55° 27' 25.8" W 12622.898 ft
ALL LINEAR DISTANCES ARE LOCALIZED HORIZONTAL DISTANCES
VERTICAL DATUM IS NGVD 88.

FOR -L- PROFILE SEE SHEET 47



PROJECT REFERENCE NO.	SHEET NO.
R-2707C	5

RW SHEET NO.

ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER

INCOMPLETE PLANS — PRELIMINARY PLANS

RAMP -A-

LOOP -A-

RAMP -D-

LOOP -D-

-Y1-

-L-

GRAPHIC SCALE: 50 25 0 50 100 — PLANS

LOCATION:	INTERCHANGE AT -L- US 74 BYPASS AND -Y1- NC 226		
TIP NO.:	R-2707C	COUNTY:	CLEVELAND
DESIGNED BY:	T. HUFFMAN		
CHECKED BY:	T. REID	DATE:	5/29/02

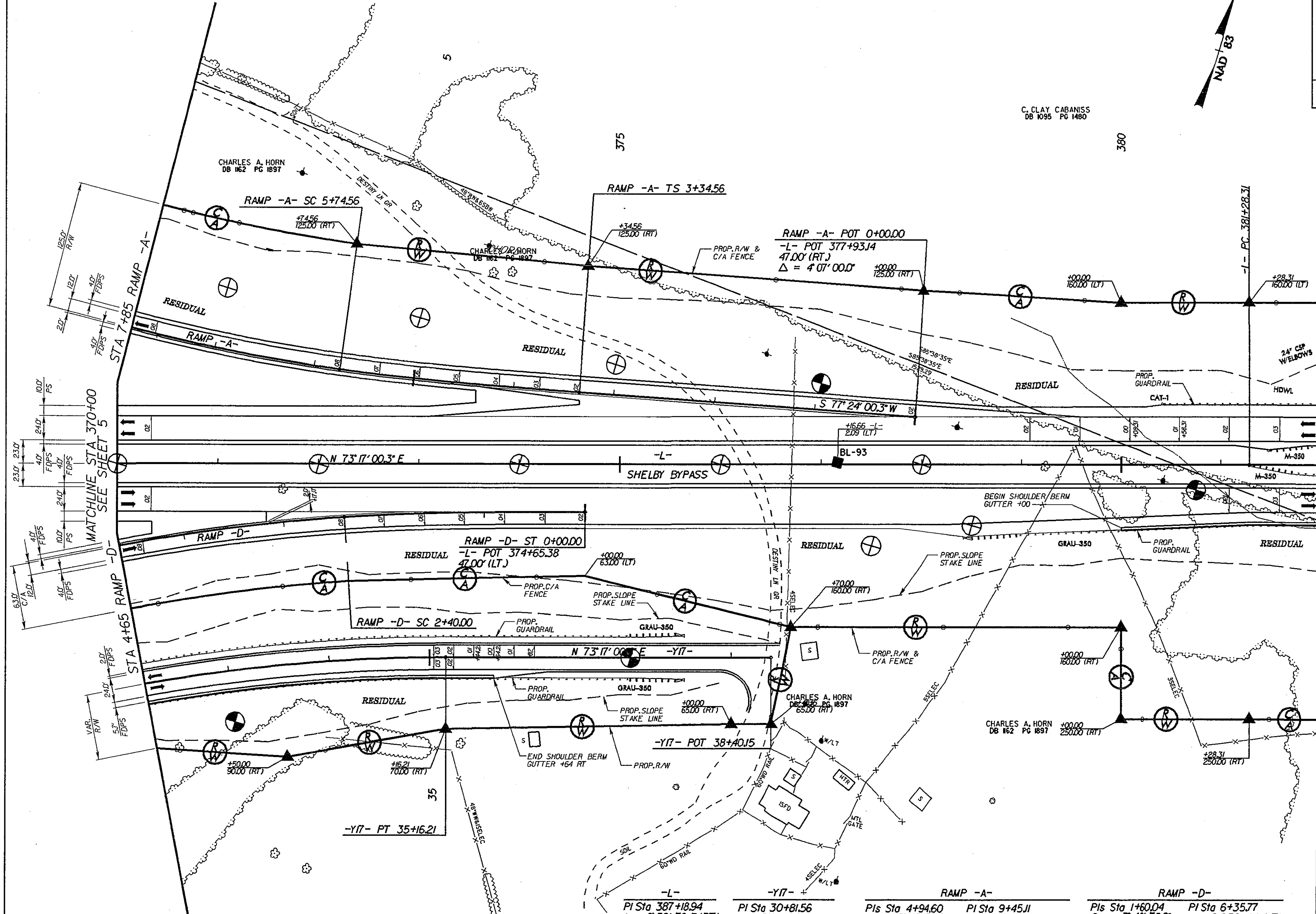
PROJECT REFERENCE NO.	SHEET NO.
R-2707C	6
R/W SHEET NO.	

ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
NORTH CAROLINA PROFESSIONAL ENGINEER SEAL T. R. REID	NORTH CAROLINA PROFESSIONAL ENGINEER SEAL HENRY WELLS, JR.

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

MOFFATT & NICHOL ENGINEERS

SDG Sungate Design Group, P.A.



NAD 83
C. CLAY CABANISS DB 1095 PG 1480
CHARLES A. HORN DB 1162 PG 1897
RAMP -A- SC 5+74.56
RAMP -A- TS 3+34.56
RAMP -A- POT 0+00.00
-L- POT 377+93.14
47.00' (RT.)
Δ = 4°07'00.0"
-L- PC 381+28.31
RESIDUAL
RAMP -A-
S 77°24'00.3" W
N 73°17'00.3" E
-L-
SHELBY BYPASS
BL-93
MATCHLINE STA 370+00 SEE SHEET 5
MATCHLINE STA 382+00 SEE SHEET 7
STA 7+85 RAMP -A-
STA 4+65 RAMP -D-
RAMP -D-
RAMP -D- ST 0+00.00
-L- POT 374+65.38
47.00' (LT.)
RAMP -D- SC 2+40.00
-Y17-
-Y17- POT 38+40.15
-Y17- PT 35+16.21
PROP. R/W & C/A FENCE
PROP. SLOPE STAKE LINE
PROP. GUARDRAIL
BEGIN SHOULDER BERM GUTTER +00
END SHOULDER BERM GUTTER +64 RT
24" CSP W/ELBOWS
HDWL
GRAU-350
CAT-1
M-350
ISFD

-L-	-Y17-	RAMP -A-		RAMP -D-	
PI Sta 387+18.94	PI Sta 30+81.56	PIs Sta 4+94.60	PI Sta 9+45.11	PIs Sta 1+60.04	PI Sta 6+35.77
Δ = 8°50'30.4" (RT)	Δ = 30°11'26.3" (RT)	θs = 3°46'39.9"	Δ = 23°00'57.7" (RT)	θs = 3°46'39.9"	Δ = 24°32'11.4" (LT)
D = 0°45'00.0"	D = 3°23'25.0"	Ls = 240.00'	D = 3°08'53.2"	Ls = 240.00'	D = 3°08'53.2"
L = 1,178.90'	L = 890.51'	LT = 160.04'	L = 731.10'	LT = 160.04'	L = 779.40'
T = 590.62'	T = 455.85'	ST = 80.03'	T = 370.55'	ST = 80.03'	T = 395.77'
R = 7,639.44'	R = 1,690.00'		R = 1,820.00'		R = 1,820.00'
SE = .03	SE = .03		SE = .08		SE = .08
RO = 150'	RO = 60'		RO = 240'		RO = 240'

FOR -L- PROFILE SEE SHEET 48
FOR RAMP -A- PROFILE SEE SHEET 65
FOR RAMP -D- PROFILE SEE SHEET 66
FOR -Y17- PROFILE SEE SHEETS 94 & 95

Pages 7 - 46 were intentionally removed.

5/28/99

PROJECT REFERENCE NO.	SHEET NO.
R-2707C	47
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

-L-

BM # 16
EL.= 735.98
N = 581328.8 E = 1232383.5
8 INCH NAIL IN BASE OF 24 INCH RED OAK
-L- STA. 342+75.40 178.25 (RT.)

PROPOSED GRADE (R-2707B)

(+)1.3143%

PROPOSED GRADE (R-2707B)

EXISTING GRADE

810 800 790 780 770 760 750 740 730 720

339+00 340+00 341+00 342+00 343+00 344+00 345+00 346+00 347+00 348+00 349+00 350+00 351+00

-L-

PI = 355+00.00
EL = 794.00'
K = 568
VC = 1,900'
DS = 70 MPH

RESIDUAL
BROWN STIFF TO VERY STIFF MOIST MICA SANDY SILT (A-4)

WEATHERED ROCK (BIOTITEMICA GNEISS)

(+)1.3143%

(-)2.0323%

15H

PROPOSED GRADE

STA. 353+22.84 -L- BEGIN CONSTRUCTION
EL.= 786.41

356+00.0 -L- C/L

RESIDUAL
BROWN STIFF TO VERY STIFF MOIST MICA SANDY SILT (A-4)

AR
DRY 10/05

357+00.0 -L- C/L

RESIDUAL
BROWN STIFF TO VERY STIFF MOIST MICA SANDY SILT (A-4)

AR
DRY 10/05

HARD CRYSTALLINE ROCK (BIOTITEMICA GNEISS)

S-1
S-2

358+00.0 -L- C/L

RESIDUAL
BROWN STIFF TO VERY STIFF MOIST MICA SANDY SILT (A-4)

BT
10/05

BRN/GRAY V. DENSE MOIST SILTY SAND (A-2-4)

359+00.0 -L- C/L

RESIDUAL
BROWN STIFF TO VERY STIFF MOIST SANDY SILT (A-4)

BT
10/05

WEATHERED ROCK (BIOTITEMICA GNEISS)

360+00.0 -L- 80.0 RT

RESIDUAL
BROWN STIFF TO VERY STIFF MOIST SANDY SILT (A-4)

AR
8/05

HARD CRYSTALLINE ROCK (BIOTITEMICA GNEISS)

BROWN VERY STIFF MOIST MICA SANDY SILT W/ ALTERNATING LAYERS OF WR STARTING AT 18'-19' (A-4)

S-8

361+00.0 -L- 100.0 LT

AR
8/05

361+50.0 -L- 80.0 LT

AR
8/05

362+00.0 -L- C/L
WR @ 2'

AR
8/05

830 820 810 800 790 780 770 760 750 740

351+00 352+00 353+00 354+00 355+00 356+00 357+00 358+00 359+00 360+00 361+00 362+00 363+00

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5/28/99

PROJECT REFERENCE NO.	SHEET NO.
R-2707C	48
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

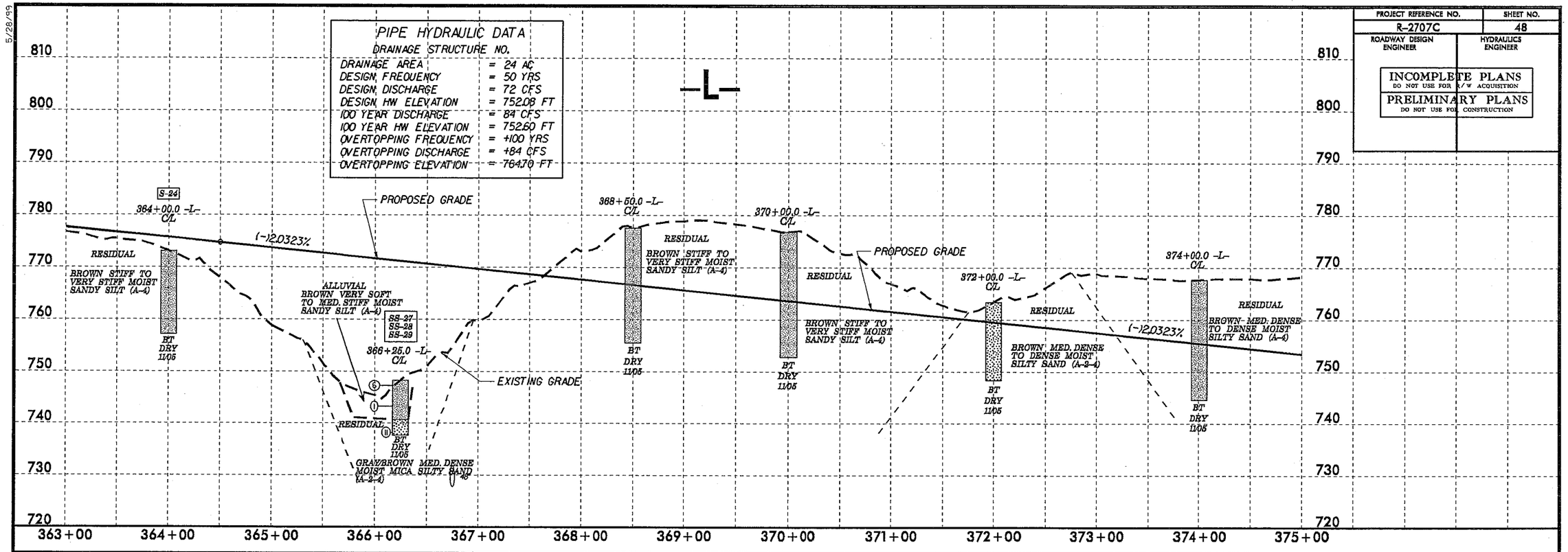
INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

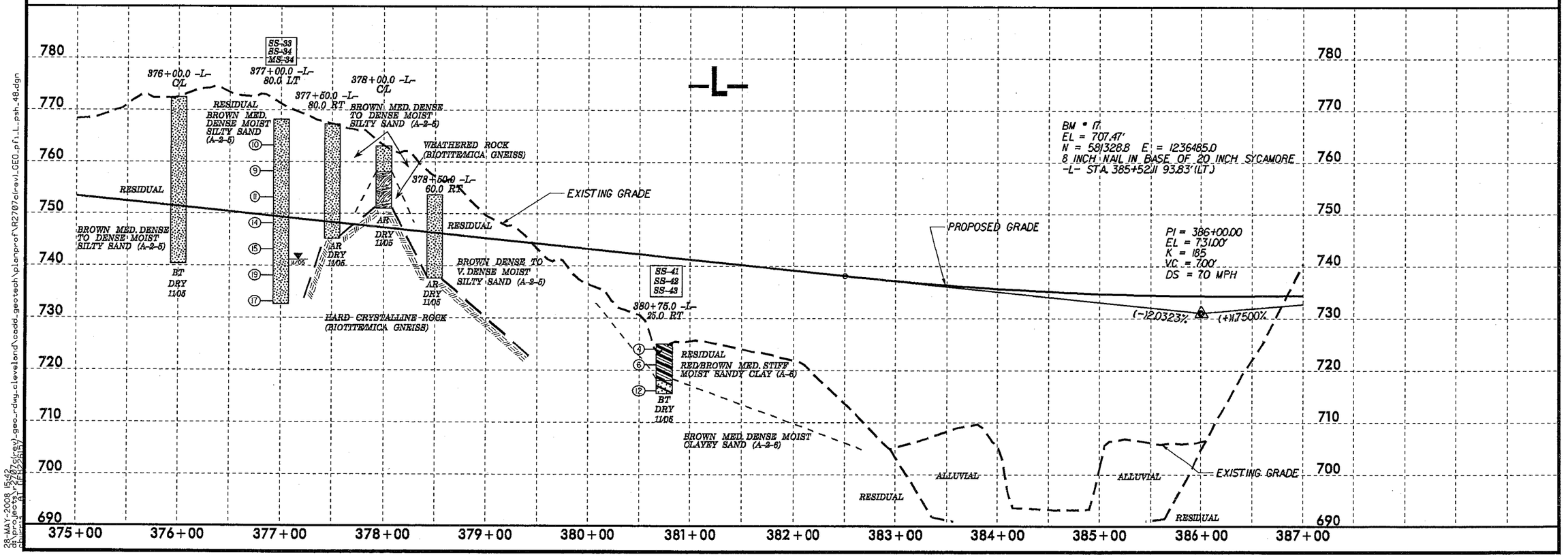
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

PIPE HYDRAULIC DATA

DRAINAGE STRUCTURE NO.

DRAINAGE AREA	= 24 AC
DESIGN FREQUENCY	= 50 YRS
DESIGN DISCHARGE	= 72 CFS
DESIGN HW ELEVATION	= 752.08 FT
100 YEAR DISCHARGE	= 84 CFS
100 YEAR HW ELEVATION	= 752.60 FT
OVERTOPPING FREQUENCY	= +100 YRS
OVERTOPPING DISCHARGE	= +84 CFS
OVERTOPPING ELEVATION	= 764.70 FT





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Pages 49 - 64 were intentionally removed.

PROJECT REFERENCE NO.	SHEET NO.
R-2707C	65

ROADWAY DESIGN ENGINEER

HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

MOFFATT & NICHOL ENGINEERS

SDG Sungate Design Group, P.A.

RAMP A @ -Y1- (NC 226)

BEGIN GRADE STA. 0+00.00
EL = 746.92

-L- EOP STA. 377+93.14
47.00' (RT)

SS-33
SS-34
MS-34

0+95.27 -RPA1-
26.2288 RT
=
377+00.0 -L-
80.0 LT

1+89.27 -RPA1-
60.7436 LT
=
376+00.0 -L-
C/L

3+00.0 -RPA1-
30.0 RT

EXISTING GRADE

5+00.0 -RPA1-
60.0 RT

5+81.69 -RPA1-
95.4480 LT
=
372+00.0 -L-
C/L

7+00.0 -RPA1-
60.0 RT

HIGHLY PLASTIC

S-30
SS-31
MS-1
SS-32

8+00.0 -RPA1-
60.0 RT

BROWN STIFF MOIST MICA, HIGHLY PLASTIC SANDY CLAY (A-7-6)

PI = 11+25.00
EL = 767.50'
K = 192
VC = 500'
DS = 70 mph

13+00.0 -RPA1-
C/L

SS-21
SS-22
SS-23

(+)4.4327%

(+)11.8293%

11+50.0 -RPA1-
C/L

RESIDUAL
BROWN MED. DENSE MOIST MICA SILTY SAND (A-2-5, A-2-4)

RESIDUAL
BROWN MED. DENSE MOIST MICA SILTY SAND (A-2-4)

RESIDUAL
BROWN LOOSE TO DENSE MOIST TO WET MICA SILTY SAND (A-2-5)

RESIDUAL
BROWN MED DENSE TO DENSE MOIST SILTY SAND (A-2-5)

RESIDUAL
BROWN LOOSE TO DENSE MOIST MICA SILTY SAND (A-2-5)

PROPOSED GRADE

RESIDUAL
BRN. MED. STIFF WET CLAYEY SAND (A-2-5)

RESIDUAL
RED-BROWN STIFF MOIST MICA SANDY SILT (A-4)

ARTIFICIAL FILL
BROWN- STIFF- MOIST SANDY SILT (A-4)

BROWN SOFT MOIST SANDY CLAY (A-7-6)

RESIDUAL
BRN. LOOSE WET CLAYEY SAND (A-2-5)

BT
DRY 11/06

(PI=26)

FOR PLAN SEE SHEET 5 & 6

RAMP A @ -Y1- (NC 226)

PI = 19+80.00
EL = 805.40'
K = 30
VC = 250'
DS = 35 mph

EXISTING GRADE

END GRADE STA. 21+11.85
EL = 800.20 (-Y1- EOP)

S-16

13+00.0 -RPA1-
C/L

14+00.0 -RPA1-
C/L

14+50.0 -RPA1-
80.0 LT

15+00.0 -RPA1-
C/L

16+00.0 -RPA1-
60.0 RT

18+00.0 -RPA1-
C/L

20+00.0 -RPA1-
C/L

(+)4.4327%

(-)13.9439%

RESIDUAL
RED-BROWN STIFF MOIST MICA SANDY SILT (A-4)

RESIDUAL
BROWN STIFF MOIST MICA SANDY SILT (A-4)

RESIDUAL
BROWN STIFF TO VERY STIFF MOIST MICA SANDY SILT (A-4)

RESIDUAL
BROWN STIFF TO VERY STIFF MOIST MICA SANDY SILT (A-4)

RESIDUAL
BROWN STIFF TO VERY STIFF MOIST MICA SANDY SILT (A-4)

SEVERELY WEATHERED CRYSTALLINE ROCK (BIOTITE/MICA GNEISS)

PROPOSED GRADE

HARD CRYSTALLINE ROCK (BIOTITE/MICA GNEISS)

AR
DRY 11/06

BT
DRY 11/06

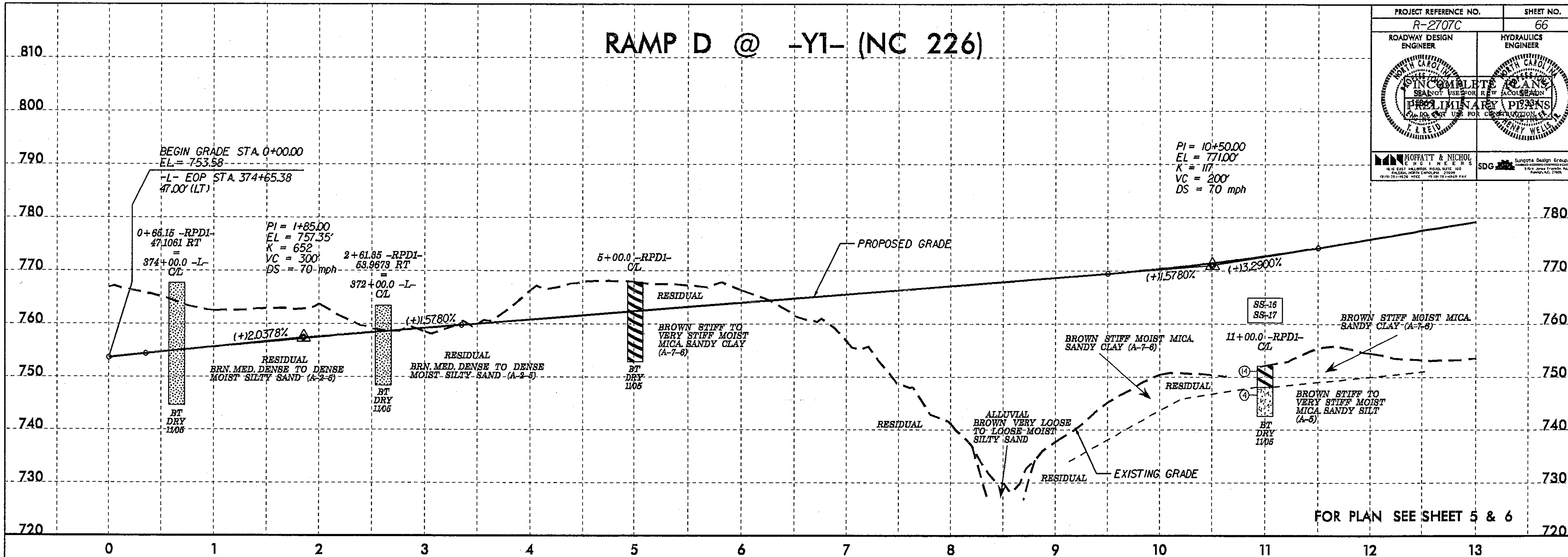
FOR PLAN SEE SHEET 5

PROJECT REFERENCE NO.	SHEET NO.
R-2707C	66
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

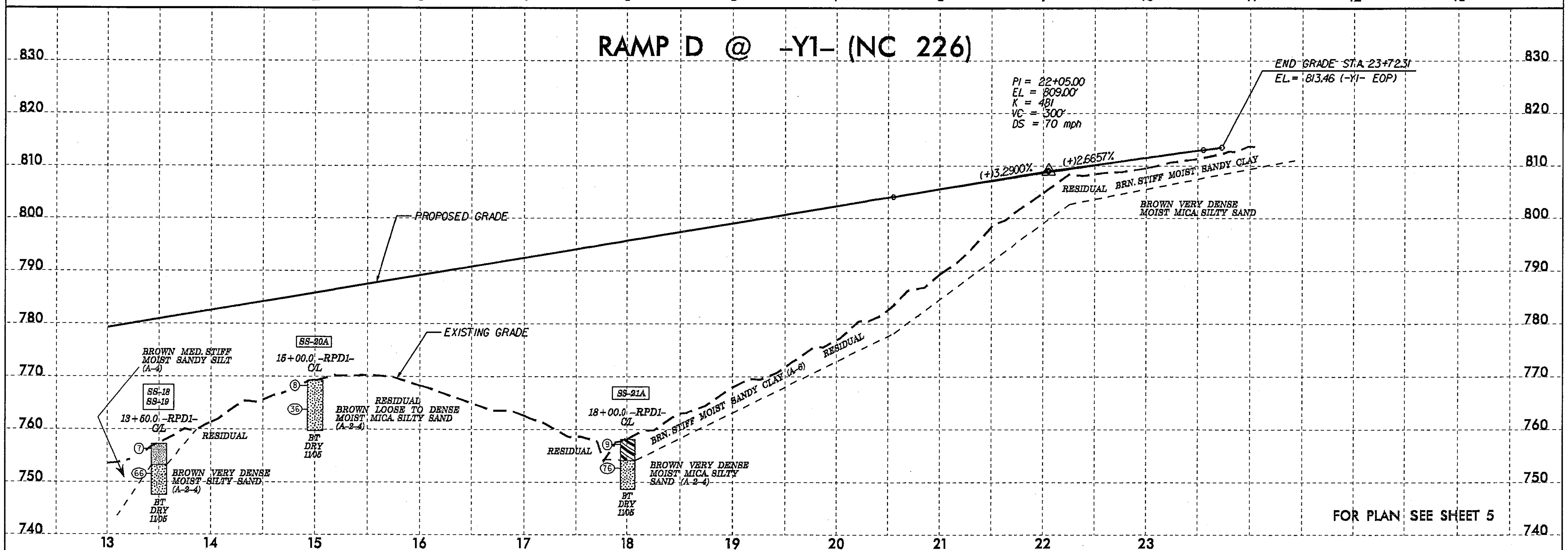
INCOMPLETE PLANS
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

MOFFATT & NICHOL ENGINEERS

SDG Sungate Design Group, P.A.



RAMP D @ -Y1- (NC 226)
BEGIN GRADE STA. 0+00.00
EL = 753.58
-L- EOP STA. 374+65.38
47.00' (LT)
0+66.15 -RPD1-
47.1061 RT
=
374+00.0 -L-
C/L
PI = 1+85.00
EL = 757.35'
K = 652
VC = 300'
DS = 70 mph
2+61.85 -RPD1-
63.9673 RT
=
372+00.0 -L-
C/L
5+00.0 -RPD1-
C/L
(+)2.0378%
(+)1.5780%
RESIDUAL
BRN. MED. DENSE TO DENSE
MOIST SILTY SAND (A-2-5)
BT
DRY
11/05
BROWN STIFF TO
VERY STIFF MOIST
MICA. SANDY CLAY
(A-7-6)
PROPOSED GRADE
PI = 10+50.00
EL = 771.00'
K = 117
VC = 200'
DS = 70 mph
(+)1.5780%
(+)3.2900%
SS-16
SS-17
11+00.0 -RPD1-
C/L
BROWN STIFF MOIST MICA.
SANDY CLAY (A-7-6)
BROWN STIFF TO
VERY STIFF MOIST
MICA. SANDY SILT
(A-5)
ALLUVIAL
BROWN VERY LOOSE
TO LOOSE MOIST
SILTY SAND
EXISTING GRADE
FOR PLAN SEE SHEET 5 & 6



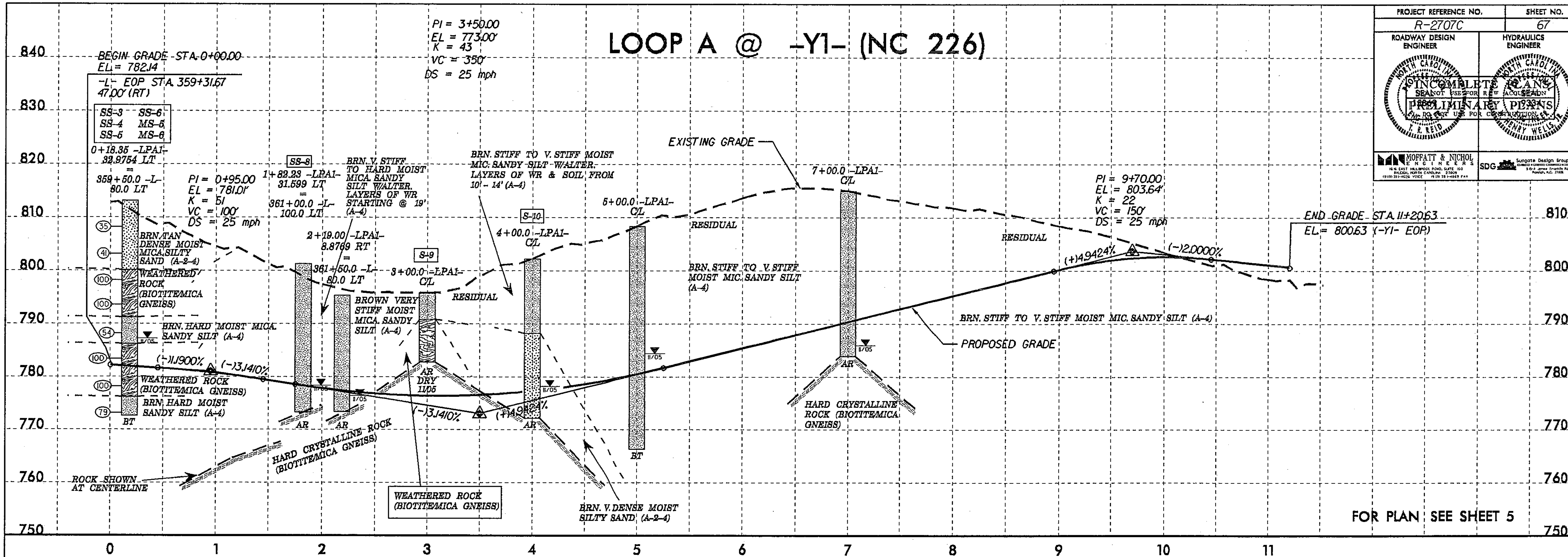
RAMP D @ -Y1- (NC 226)
END GRADE STA. 23+72.31
EL = 813.46 (-Y1- EOP)
PI = 22+05.00
EL = 809.00'
K = 481
VC = 300'
DS = 70 mph
(+)3.2900%
(+)2.6657%
BRN. STIFF MOIST SANDY CLAY
BROWN VERY DENSE
MOIST MICA. SILTY SAND
PROPOSED GRADE
EXISTING GRADE
BROWN MED. STIFF
MOIST SANDY SILT
(A-4)
SS-18
SS-19
13+50.0 -RPD1-
C/L
BROWN VERY DENSE
MOIST SILTY SAND
(A-2-4)
SS-20A
15+00.0 -RPD1-
C/L
RESIDUAL
BROWN LOOSE TO DENSE
MOIST MICA. SILTY SAND
(A-2-4)
SS-21A
18+00.0 -RPD1-
C/L
BRN. STIFF MOIST SANDY CLAY (A-6)
BROWN VERY DENSE
MOIST MICA. SILTY
SAND (A-2-4)
BT
DRY
11/05
FOR PLAN SEE SHEET 5

ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER

INCOMPLETE PLANS — DO NOT USE FOR R/W ACQUISITION
PRELIMINARY PLANS — DO NOT USE FOR CONSTRUCTION

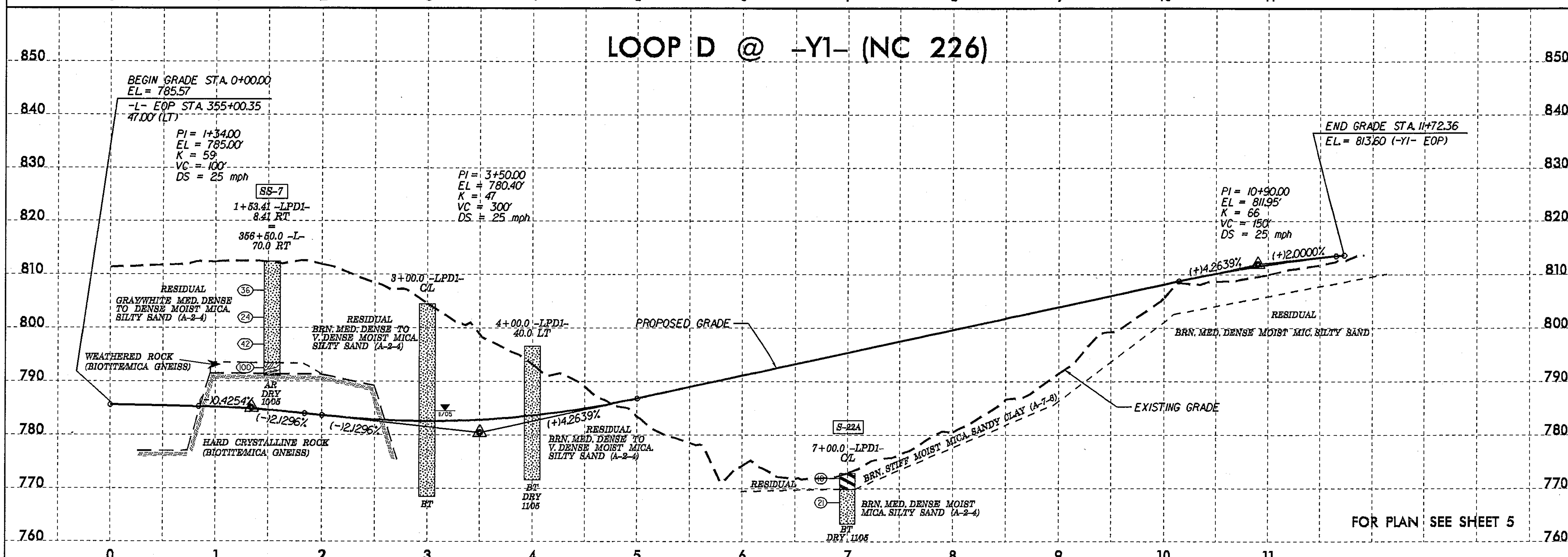
MOFFATT & NICHOL ENGINEERS | SDG Sungate Design Group, P.A.

LOOP A @ -Y1- (NC 226)



BEGIN GRADE STA. 0+00.00
EL = 782.14
-L- EOP STA. 359+31.67
47.00' (RT)
SS-3 SS-6
SS-4 MS-5
SS-5 MS-6
0+18.35 -LPA1-
32.9754 LT
359+50.0 -L-
80.0 LT
PI = 0+95.00
EL = 781.01'
K = 51
VC = 100'
DS = 25 mph
SS-8
1+82.23 -LPA1-
31.599 LT
361+00.0 -L-
100.0 LT
BRN. V. STIFF TO HARD MOIST MICA. SANDY SILT W/ALTER. LAYERS OF WR STARTING @ 19' (A-4)
2+19.00 -LPA1-
8.8769 RT
361+50.0 -L-
80.0 LT
PI = 3+50.00
EL = 773.00'
K = 43
VC = 350'
DS = 25 mph
S-9
3+00.0 -LPA1-
C/L
BROWN VERY STIFF MOIST MICA. SANDY SILT (A-4)
RESIDUAL
BRN. STIFF TO V. STIFF MOIST MIC. SANDY SILT W/ALTER. LAYERS OF WR & SOIL FROM 10' - 14' (A-4)
S-10
4+00.0 -LPA1-
C/L
5+00.0 -LPA1-
C/L
EXISTING GRADE
RESIDUAL
7+00.0 -LPA1-
C/L
BRN. STIFF TO V. STIFF MOIST MIC. SANDY SILT (A-4)
PI = 9+70.00
EL = 803.64'
K = 22
VC = 150'
DS = 25 mph
RESIDUAL
END GRADE STA. 11+20.63
EL = 800.63 (-Y1- EOP)
(+)4.9424%
(-)2.0000%
BRN. STIFF TO V. STIFF MOIST MIC. SANDY SILT (A-4)
PROPOSED GRADE
BRN./TAN DENSE MOIST MICA. SILTY SAND (A-2-4)
WEATHERED ROCK (BIOTITE/MICA GNEISS)
BRN. HARD MOIST MICA. SANDY SILT (A-4)
(-)1.1900%
(-)3.1410%
WEATHERED ROCK (BIOTITE/MICA GNEISS)
BRN. HARD MOIST SANDY SILT (A-4)
BT
AR
AR
AR DRY 11/05
(-)3.1410%
(+)4.9424%
AR
BT
AR
HARD CRYSTALLINE ROCK (BIOTITE/MICA GNEISS)
HARD CRYSTALLINE ROCK (BIOTITE/MICA GNEISS)
ROCK SHOWN AT CENTERLINE
WEATHERED ROCK (BIOTITE/MICA GNEISS)
BRN. V. DENSE MOIST SILTY SAND (A-2-4)
FOR PLAN SEE SHEET 5

LOOP D @ -Y1- (NC 226)



BEGIN GRADE STA. 0+00.00
EL = 785.57
-L- EOP STA. 355+00.35
47.00' (LT)
PI = 1+34.00
EL = 785.00'
K = 59
VC = 100'
DS = 25 mph
SS-7
1+53.41 -LPD1-
8.41 RT
356+50.0 -L-
70.0 RT
PI = 3+50.00
EL = 780.40'
K = 47
VC = 300'
DS = 25 mph
3+00.0 -LPD1-
C/L
4+00.0 -LPD1-
40.0 LT
PI = 10+90.00
EL = 811.95'
K = 66
VC = 150'
DS = 25 mph
END GRADE STA. 11+72.36
EL = 813.60 (-Y1- EOP)
(+)4.2639%
(+)2.0000%
RESIDUAL
GRAY/WHITE MED. DENSE TO DENSE MOIST MICA. SILTY SAND (A-2-4)
RESIDUAL
BRN. MED. DENSE TO V. DENSE MOIST MICA. SILTY SAND (A-2-4)
PROPOSED GRADE
RESIDUAL
BRN. MED. DENSE MOIST MIC. SILTY SAND
WEATHERED ROCK (BIOTITE/MICA GNEISS)
AR DRY 10/05
(-)0.4254%
(-)2.1296%
(-)2.1296%
(+)4.2639%
RESIDUAL
BRN. MED. DENSE TO V. DENSE MOIST MICA. SILTY SAND (A-2-4)
EXISTING GRADE
HARD CRYSTALLINE ROCK (BIOTITE/MICA GNEISS)
BT
BT DRY 11/05
S-22A
7+00.0 -LPD1-
C/L
BRN. STIFF MOIST MICA. SANDY CLAY (A-7-6)
RESIDUAL
BRN. MED. DENSE MOIST MICA. SILTY SAND (A-2-4)
BT DRY 11/05
FOR PLAN SEE SHEET 5

Pages 68 - 79 were intentionally removed.

PROJECT REFERENCE NO.	SHEET NO.
R-2707C	80

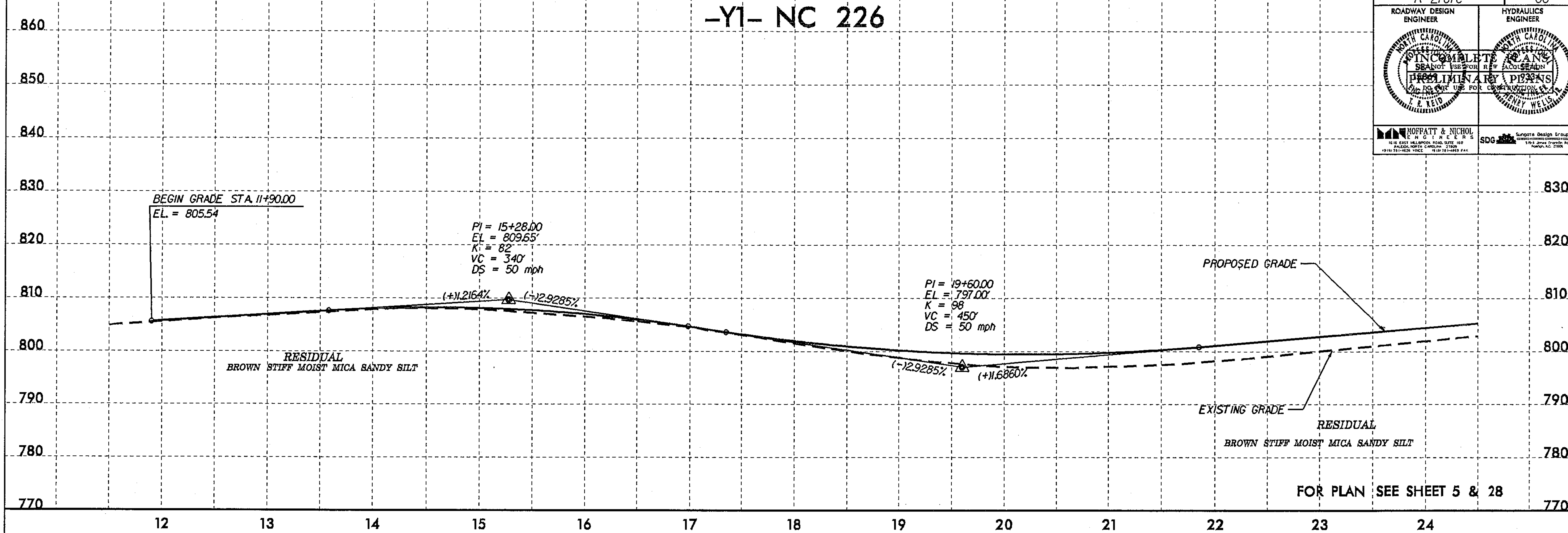
ROADWAY DESIGN ENGINEER — HYDRAULICS ENGINEER

INCOMPLETE PLANS — DO NOT USE FOR R/W ACQUISITION

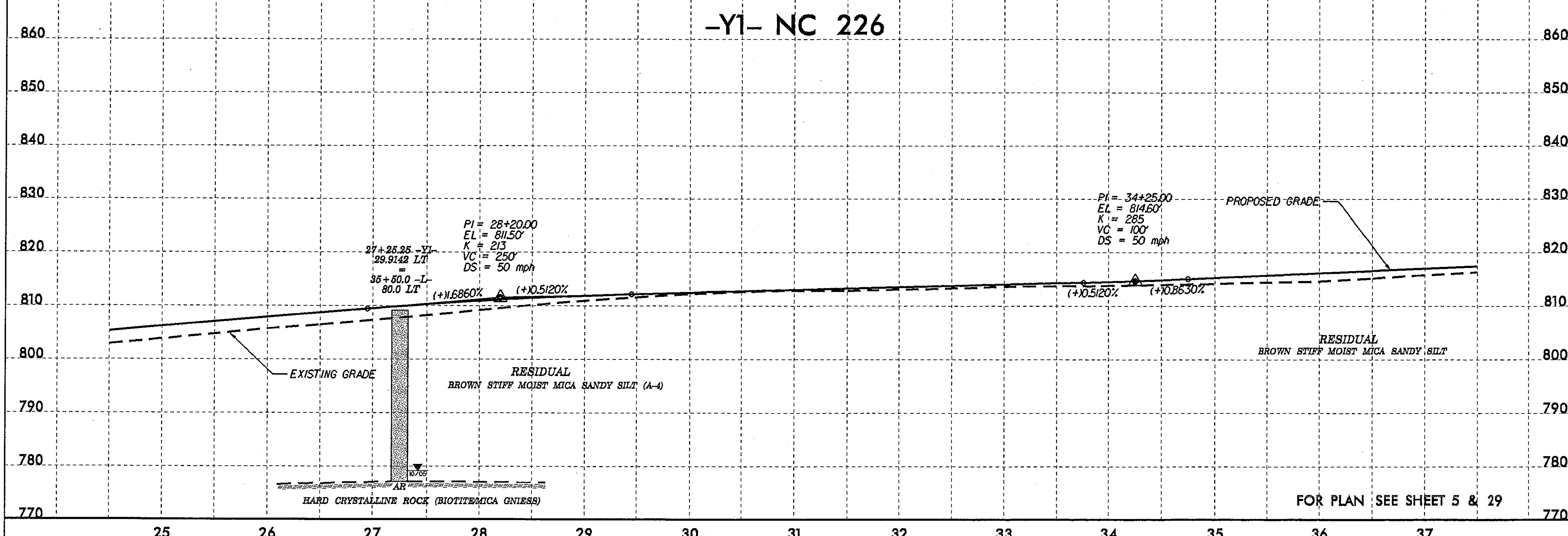
PRELIMINARY PLANS — DO NOT USE FOR CONSTRUCTION

MOFFATT & NICHOL ENGINEERS — SDG Sungate Design Group, P.A.

-Y1- NC 226



-Y1- NC 226



PROJECT REFERENCE NO.	SHEET NO.
R-2707C	81

ROADWAY DESIGN ENGINEER — HYDRAULICS ENGINEER

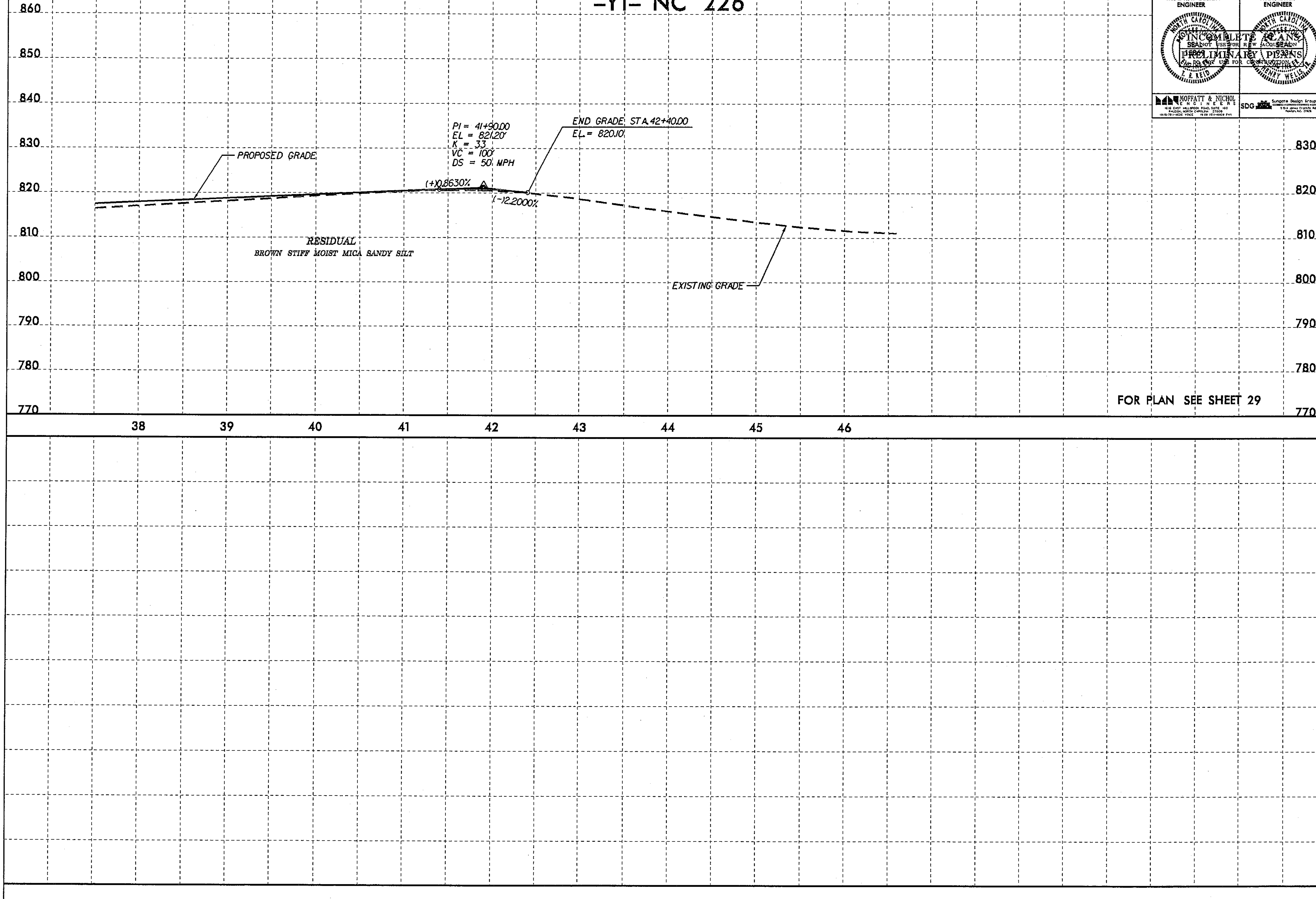
INCOMPLETE PLANS — DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS — DO NOT USE FOR CONSTRUCTION

MOFFATT & NICHOL ENGINEERS
1616 EAST MILLBROOK ROAD, SUITE 160
RALEIGH, NORTH CAROLINA 27609
(919) 781-4626 VOICE (919) 781-4869 FAX

SDG Sungate Design Group, P.A.

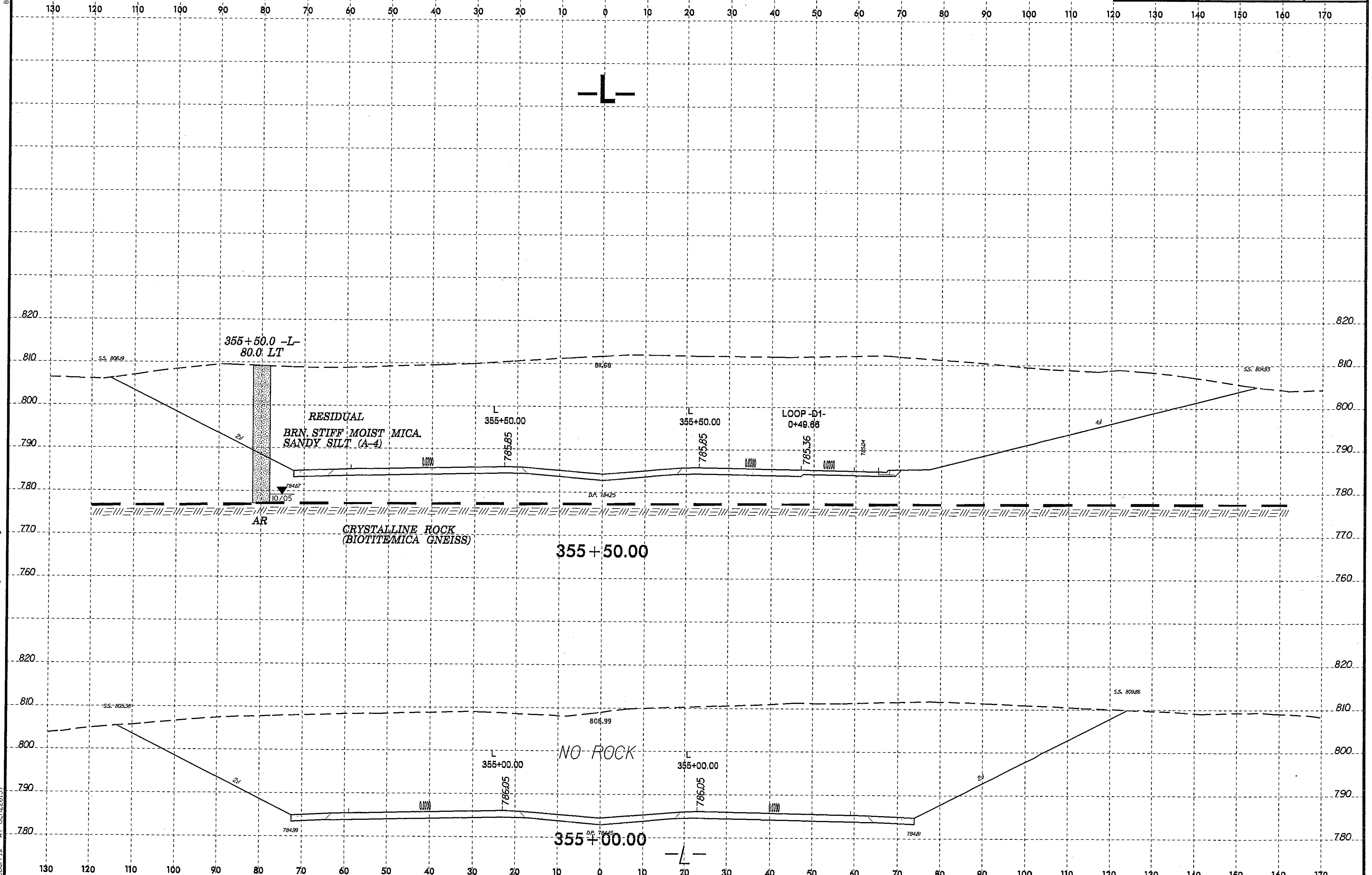
-Y1- NC 226



FOR PLAN SEE SHEET 29

Pages 82 - 96 were intentionally removed.

PROJ. REFERENCE NO.	SHEET NO.
R-2707C	77



8/23/99

14-MAY-2008 13:10
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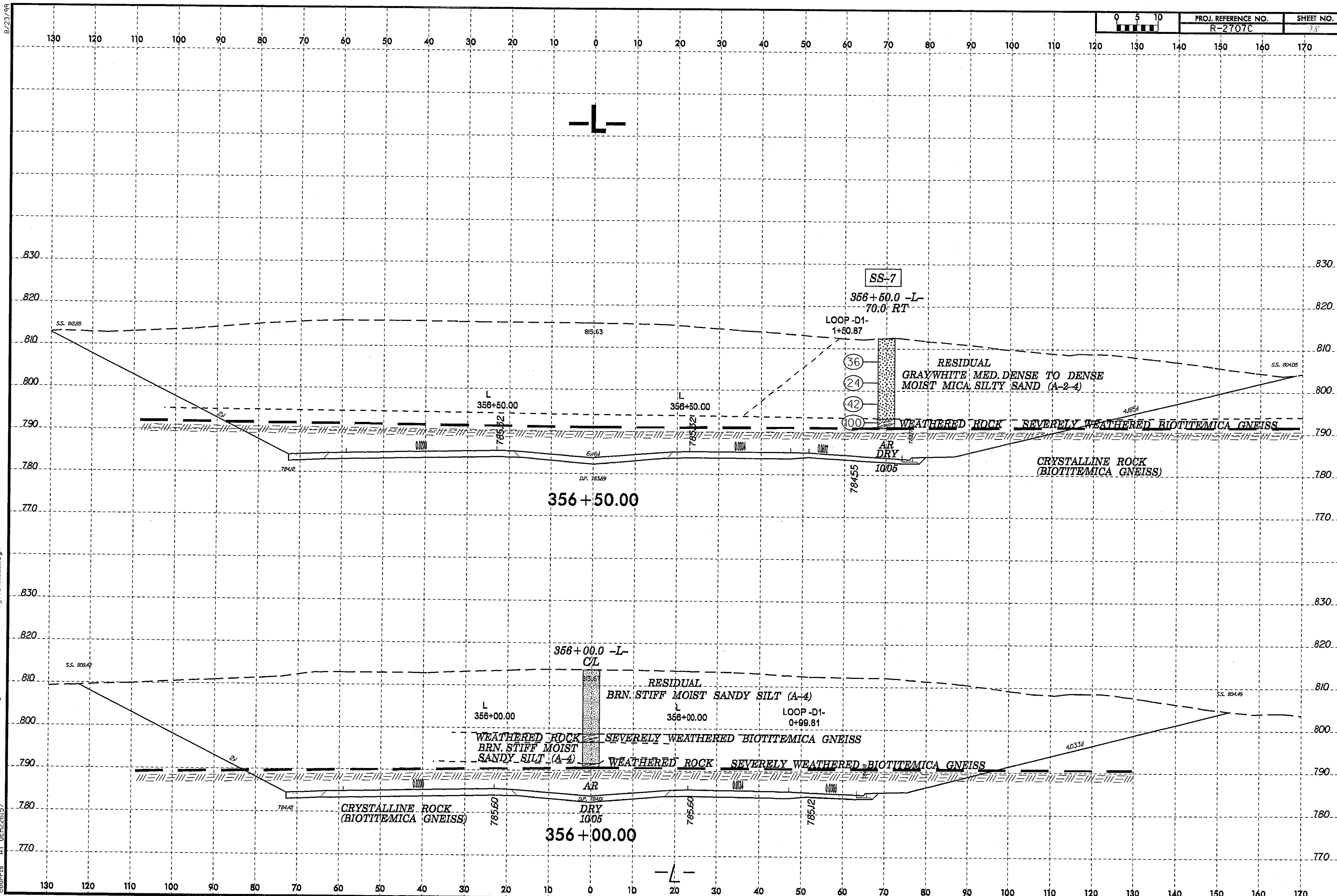
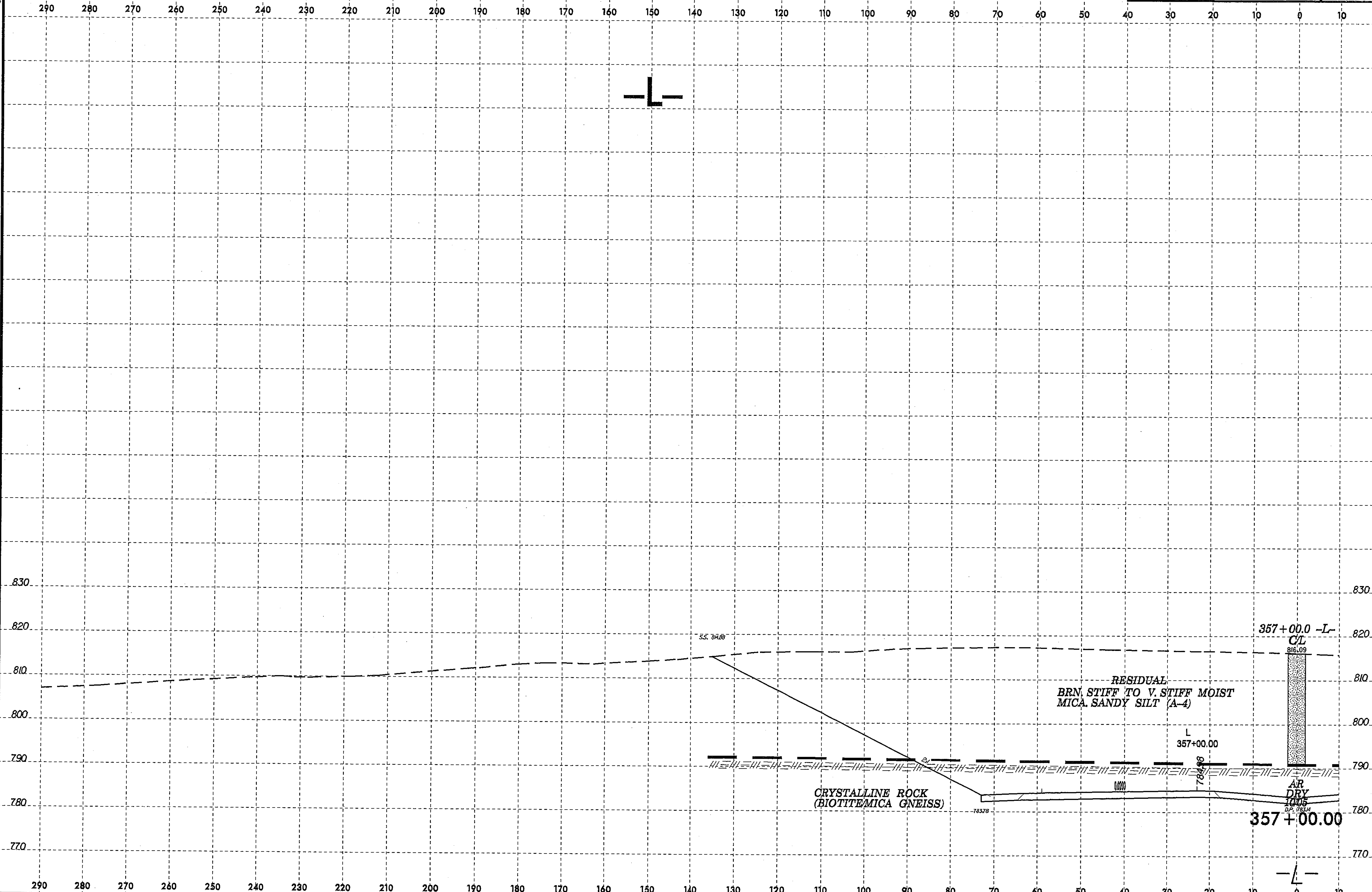
cburris AT GEH226157



PROJ. REFERENCE NO.
R-2707C
SHEET NO.
-L-
SS-7
356+50.0 -L-
70.0' RT
LOOP -D1-
1+50.87
RESIDUAL
GRAY/WHITE MED. DENSE TO DENSE
MOIST MICA SILTY SAND (A-2-4)
WEATHERED ROCK SEVERELY WEATHERED BIOTITE/MICA GNEISS
AR
DRY
10/05
CRYSTALLINE ROCK
(BIOTITE/MICA GNEISS)
356+50.00
356+00.0 -L-
C/L
RESIDUAL
BRN. STIFF MOIST SANDY SILT (A-4)
LOOP -D1-
0+99.81
WEATHERED ROCK SEVERELY WEATHERED BIOTITE/MICA GNEISS
BRN. STIFF MOIST
SANDY SILT (A-4)
WEATHERED ROCK SEVERELY WEATHERED BIOTITE/MICA GNEISS
AR
DRY
10/05
CRYSTALLINE ROCK
(BIOTITE/MICA GNEISS)
356+00.00
-L-

PROJ. REFERENCE NO.	SHEET NO.
R-2707C	99



8/23/99

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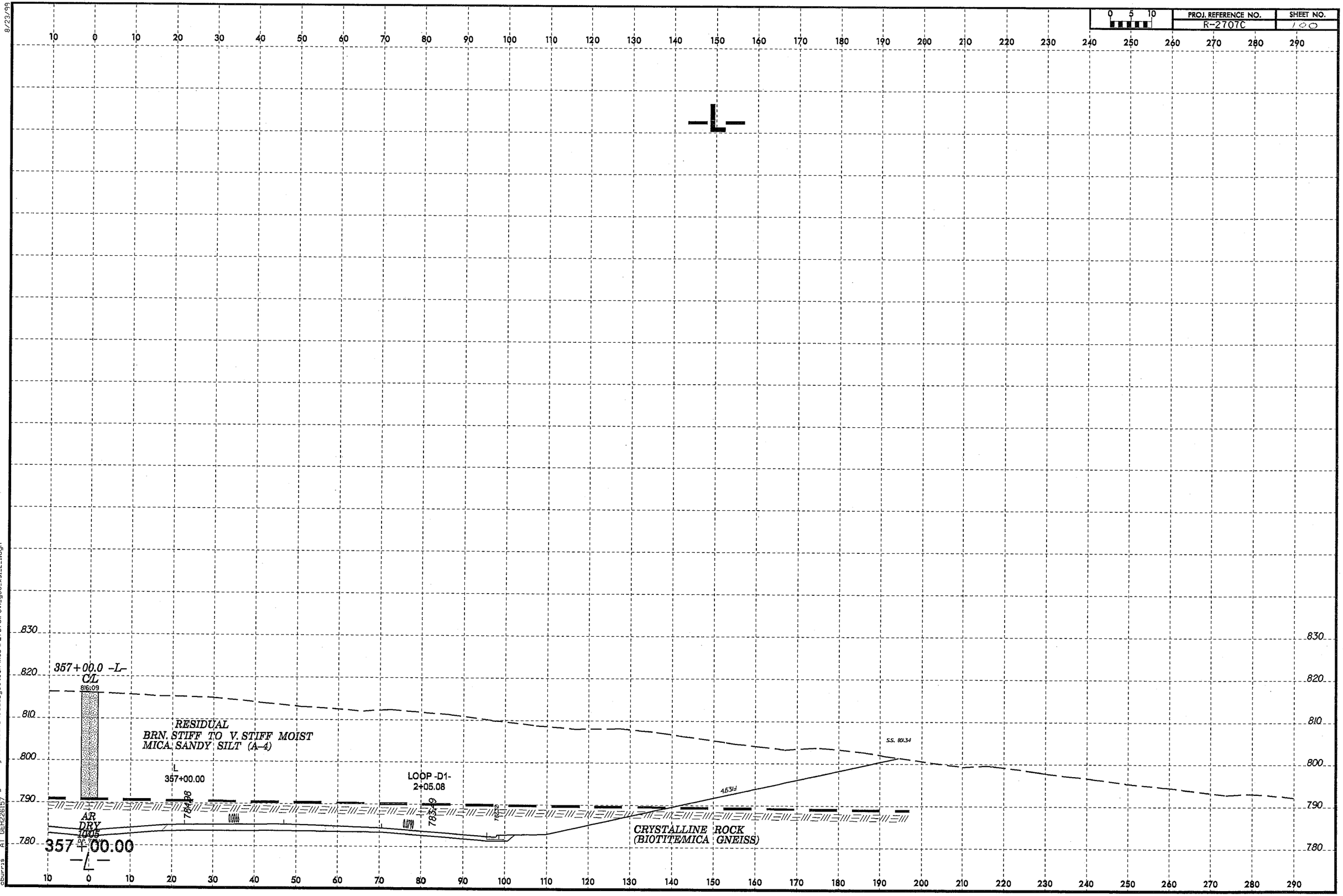
cburris AT GEH226157

8/23/99

0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	R-2707C	100



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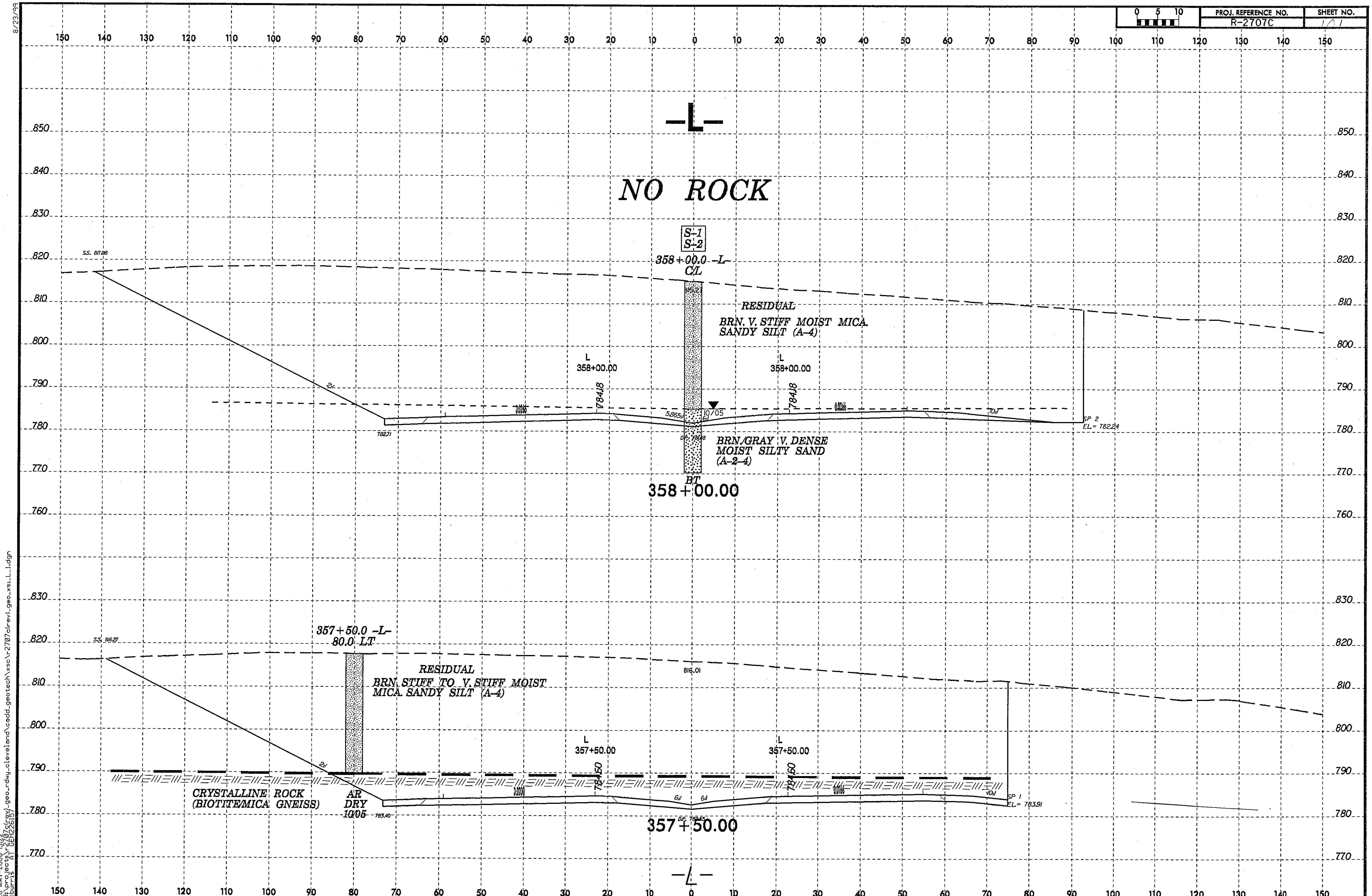
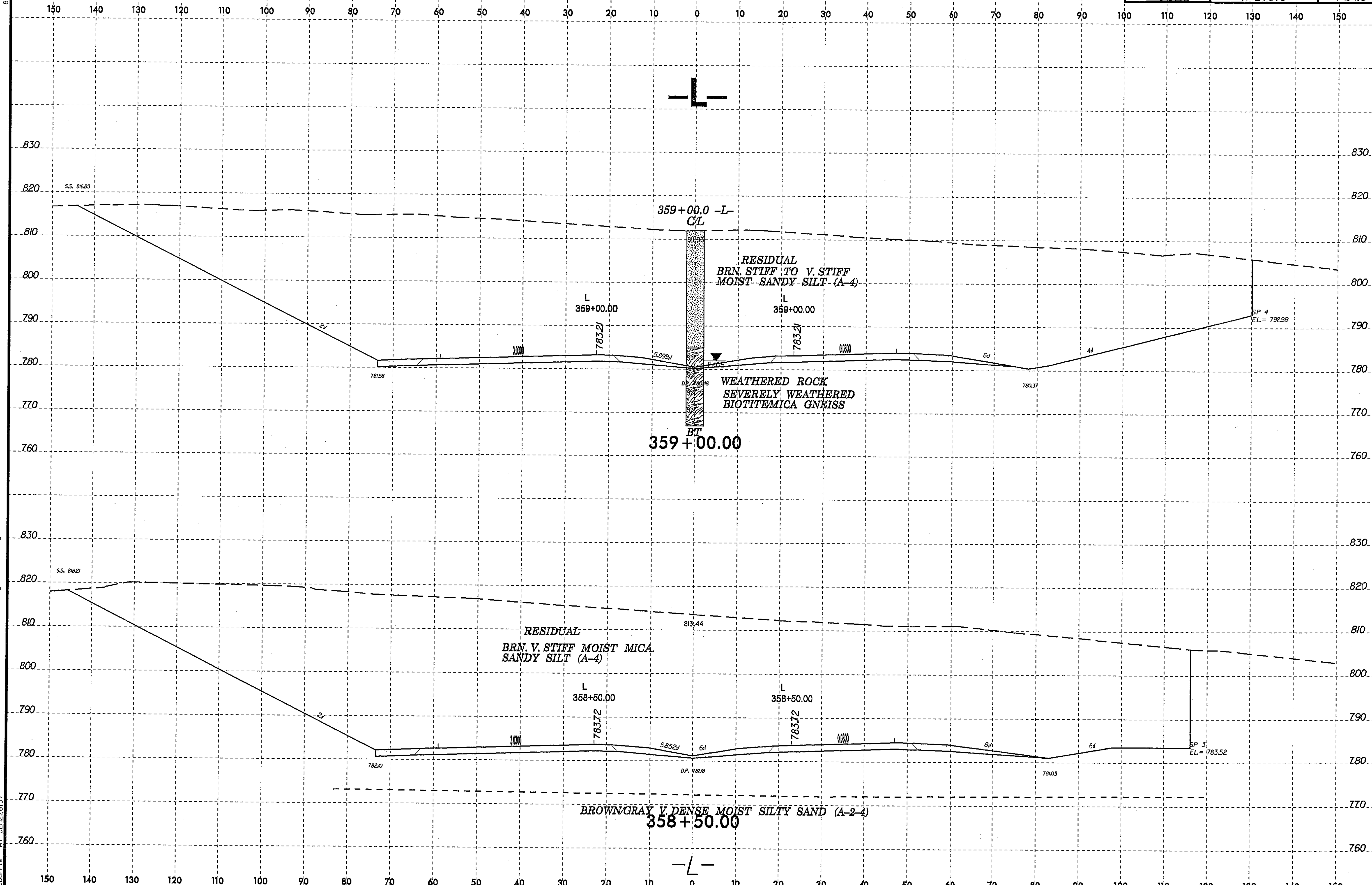

PROJ. REFERENCE NO.
R-2707C
SHEET NO.
-L-
NO ROCK
S-1
S-2
358+00.0 -L-
C/L
RESIDUAL
BRN. V. STIFF MOIST MICA. SANDY SILT (A-4)
L
358+00.00
784.18
10/05
BRN/GRAY V. DENSE MOIST SILTY SAND (A-2-4)
BT
SP 2
EL= 782.24
358+00.00
357+50.0 -L-
80.0 LT
RESIDUAL
BRN. STIFF TO V. STIFF MOIST MICA. SANDY SILT (A-4)
816.01
L
357+50.00
784.60
CRYSTALLINE ROCK (BIOTITE/MICA GNEISS)
AR
DRY
10/05
SP 1
EL= 783.91
357+50.00
-L-

PROJ. REFERENCE NO. R-2707C
SHEET NO. 102



8/23/99

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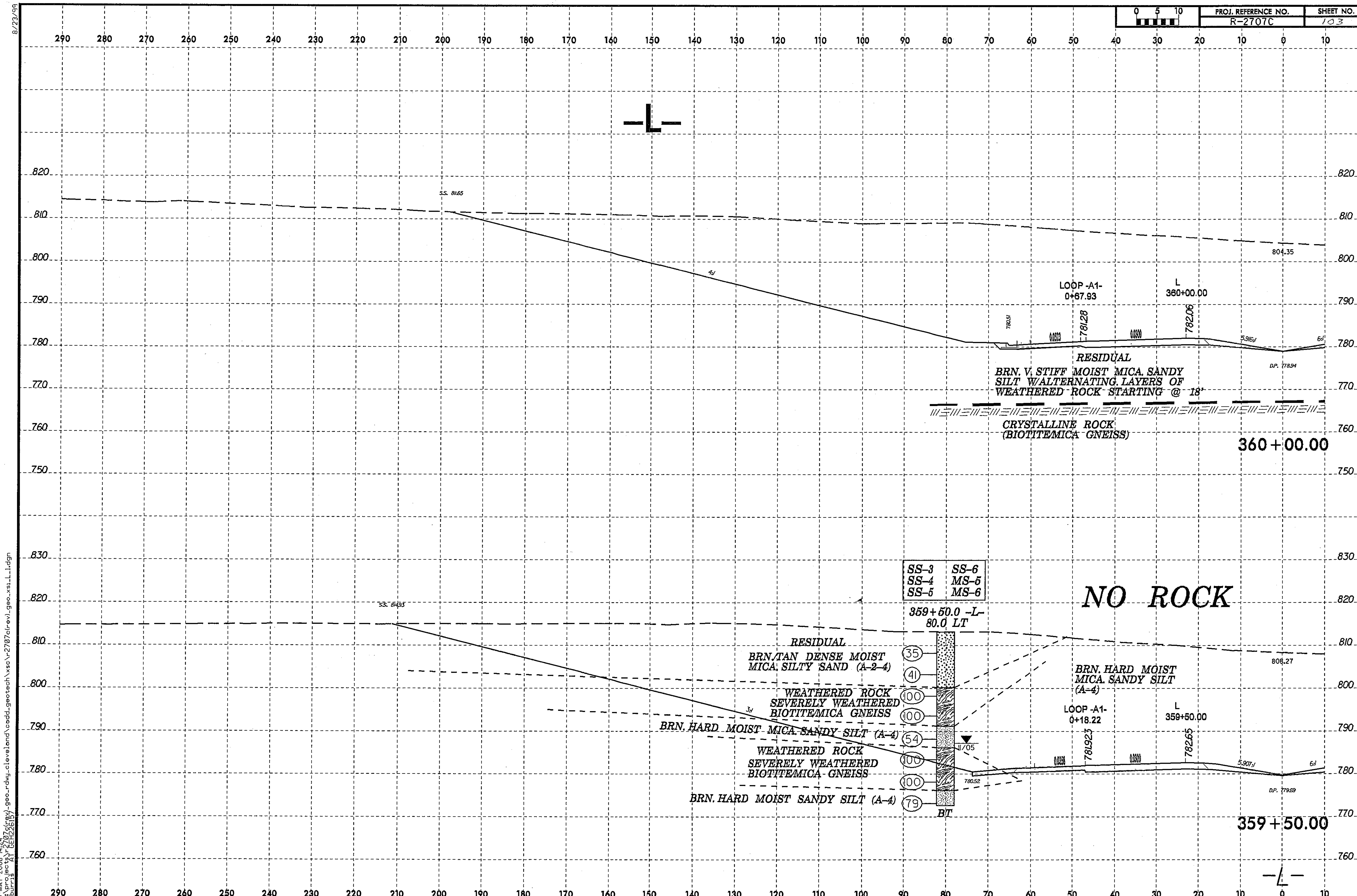
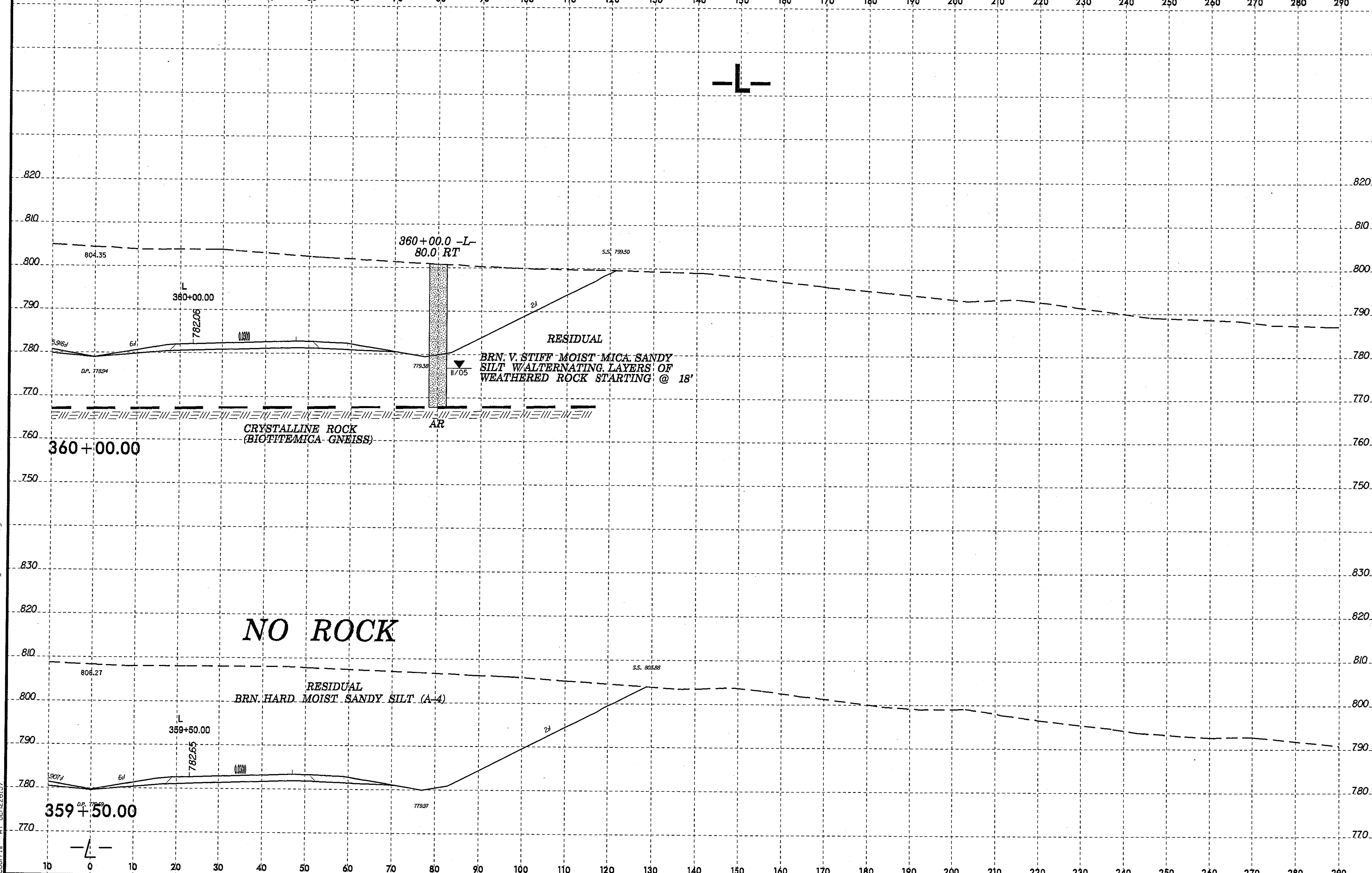
cburris AT DEH22615


PROJ. REFERENCE NO.
R-2707C
SHEET NO.
103
-L-
LOOP -A1-
0+67.93
L
360+00.00
804.35
RESIDUAL
BRN. V. STIFF MOIST MICA. SANDY SILT W/ALTERNATING LAYERS OF WEATHERED ROCK STARTING @ 18'
CRYSTALLINE ROCK
(BIOTITE/MICA GNEISS)
360+00.00
SS-3 SS-6
SS-4 MS-5
SS-5 MS-6
359+50.0 -L-
80.0 LT
NO ROCK
RESIDUAL
BRN./TAN DENSE MOIST MICA. SILTY SAND (A-2-4)
WEATHERED ROCK
SEVERELY WEATHERED BIOTITE/MICA GNEISS
BRN. HARD MOIST MICA. SANDY SILT (A-4)
WEATHERED ROCK
SEVERELY WEATHERED BIOTITE/MICA GNEISS
BRN. HARD MOIST SANDY SILT (A-4)
35
41
100
100
54
100
100
100
79
BT
BRN. HARD MOIST MICA. SANDY SILT (A-4)
LOOP -A1-
0+18.22
L
359+50.00
808.27
359+50.00
-L-
8/23/99
15-MAY-2008 14:24

PROJ. REFERENCE NO.	SHEET NO.
R-2707C	104



8/23/99

14-MAY-2008 13:35
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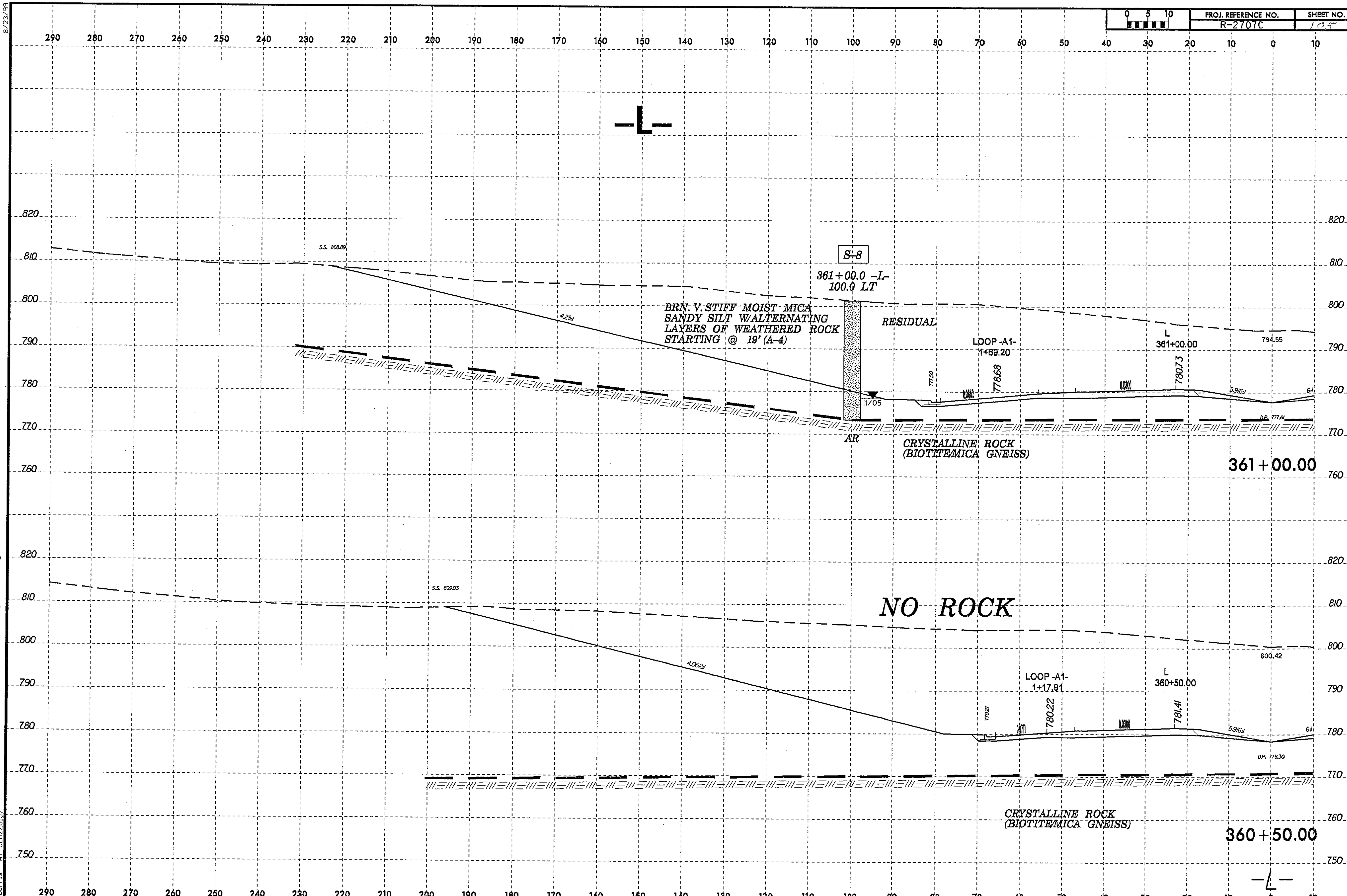
cburris AT DEH22615?



8/23/99

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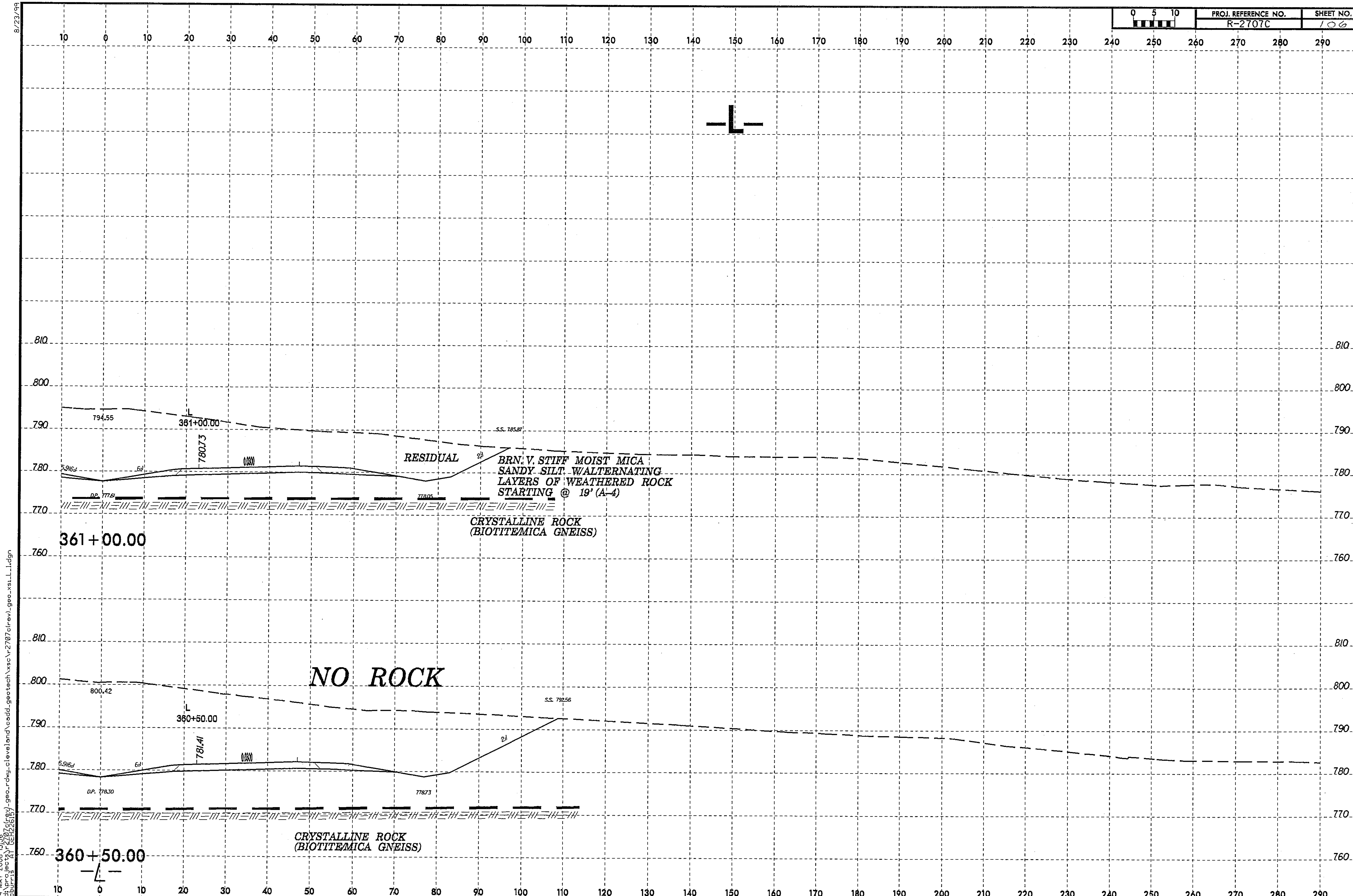
cburris AT GEH226157



8/23/99

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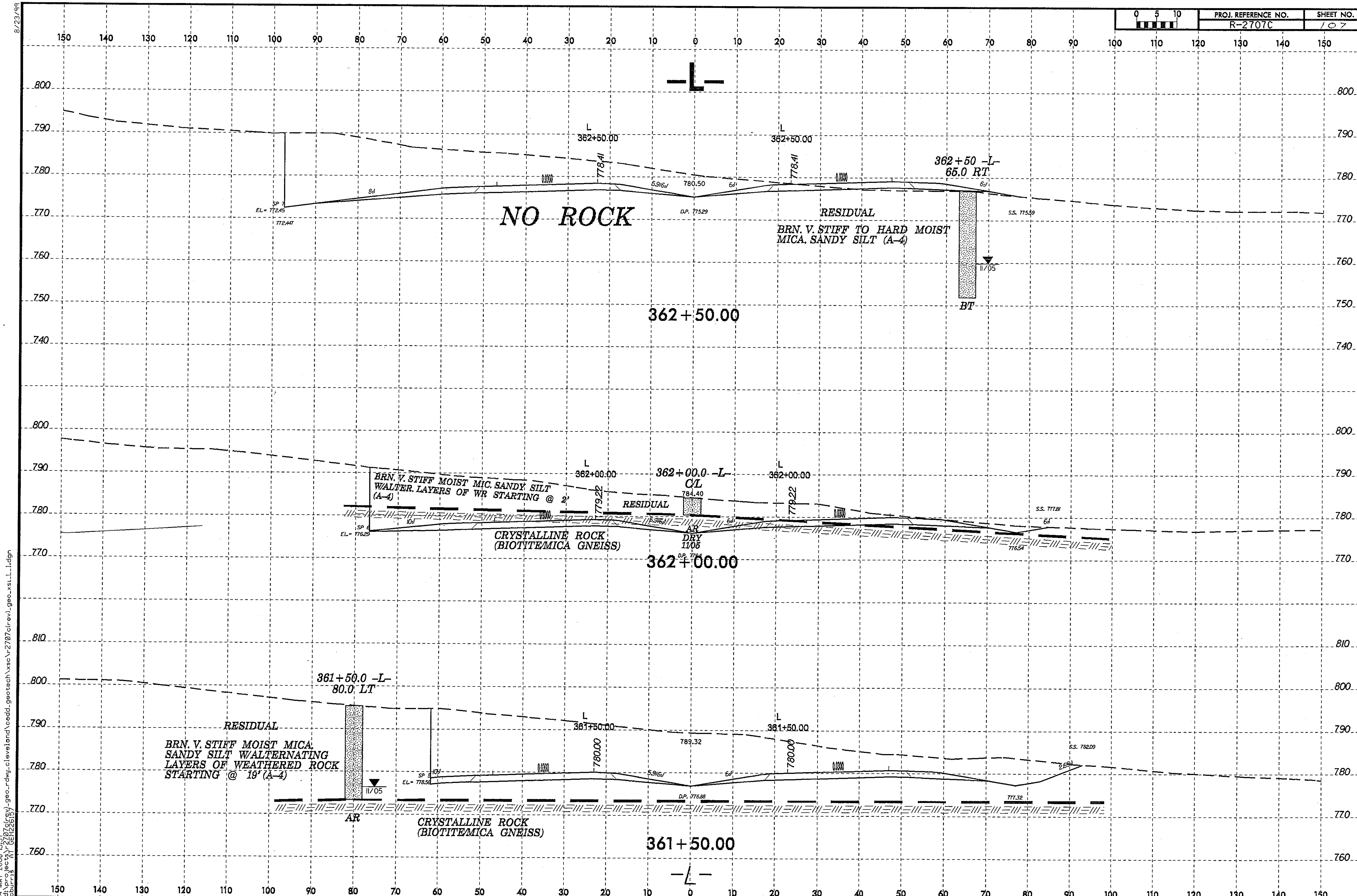
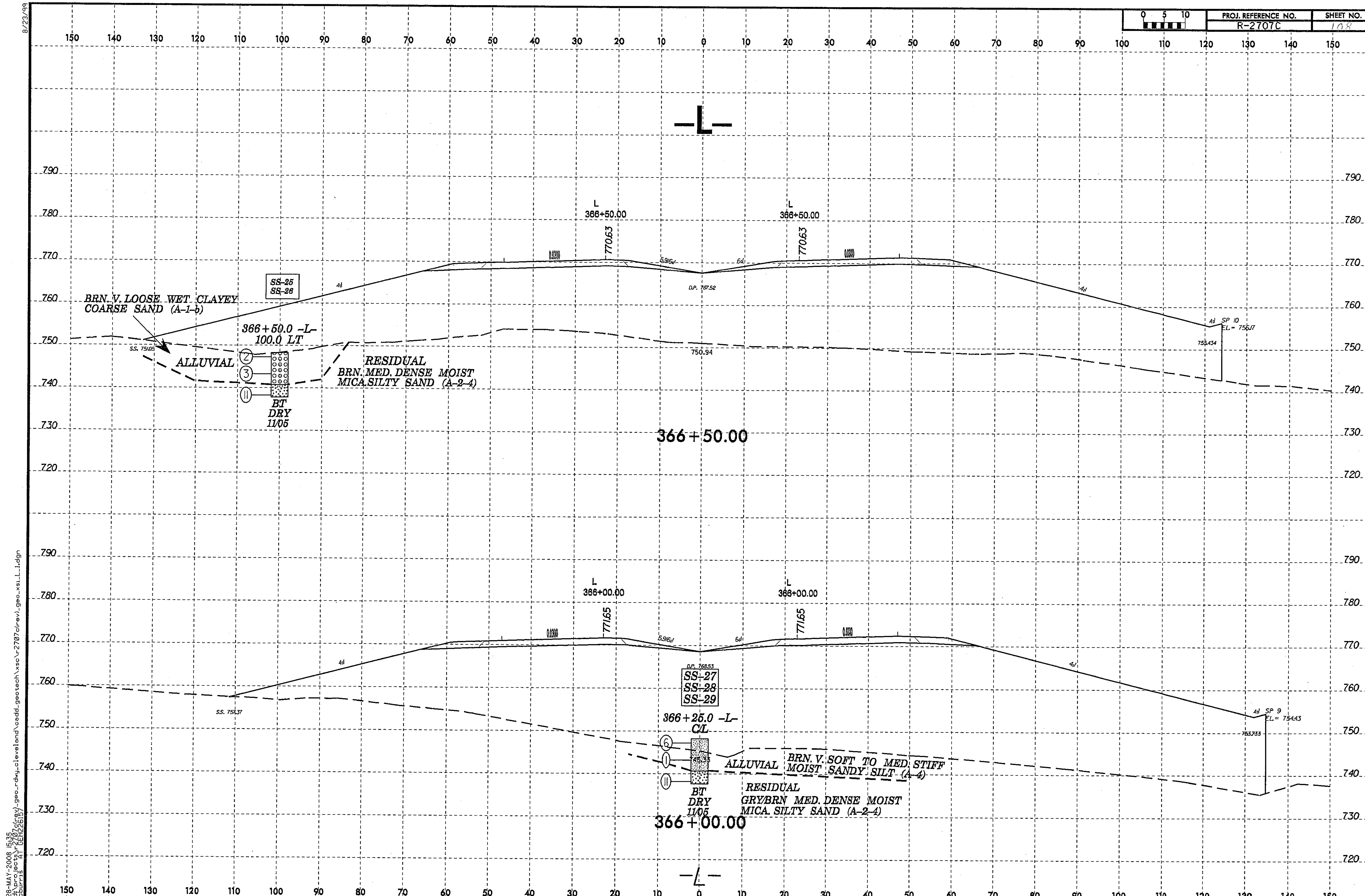
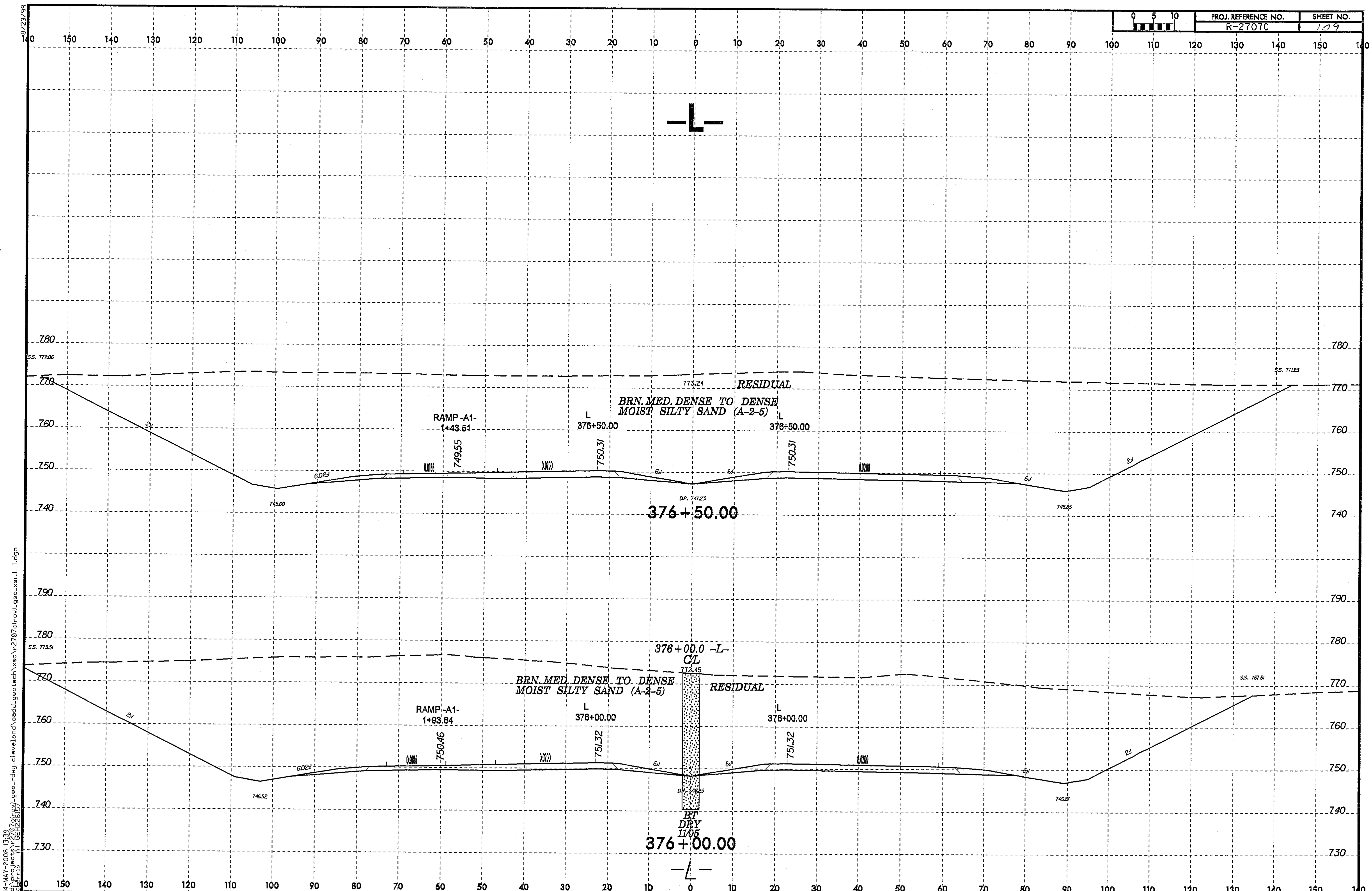
cburris AT GEH226157



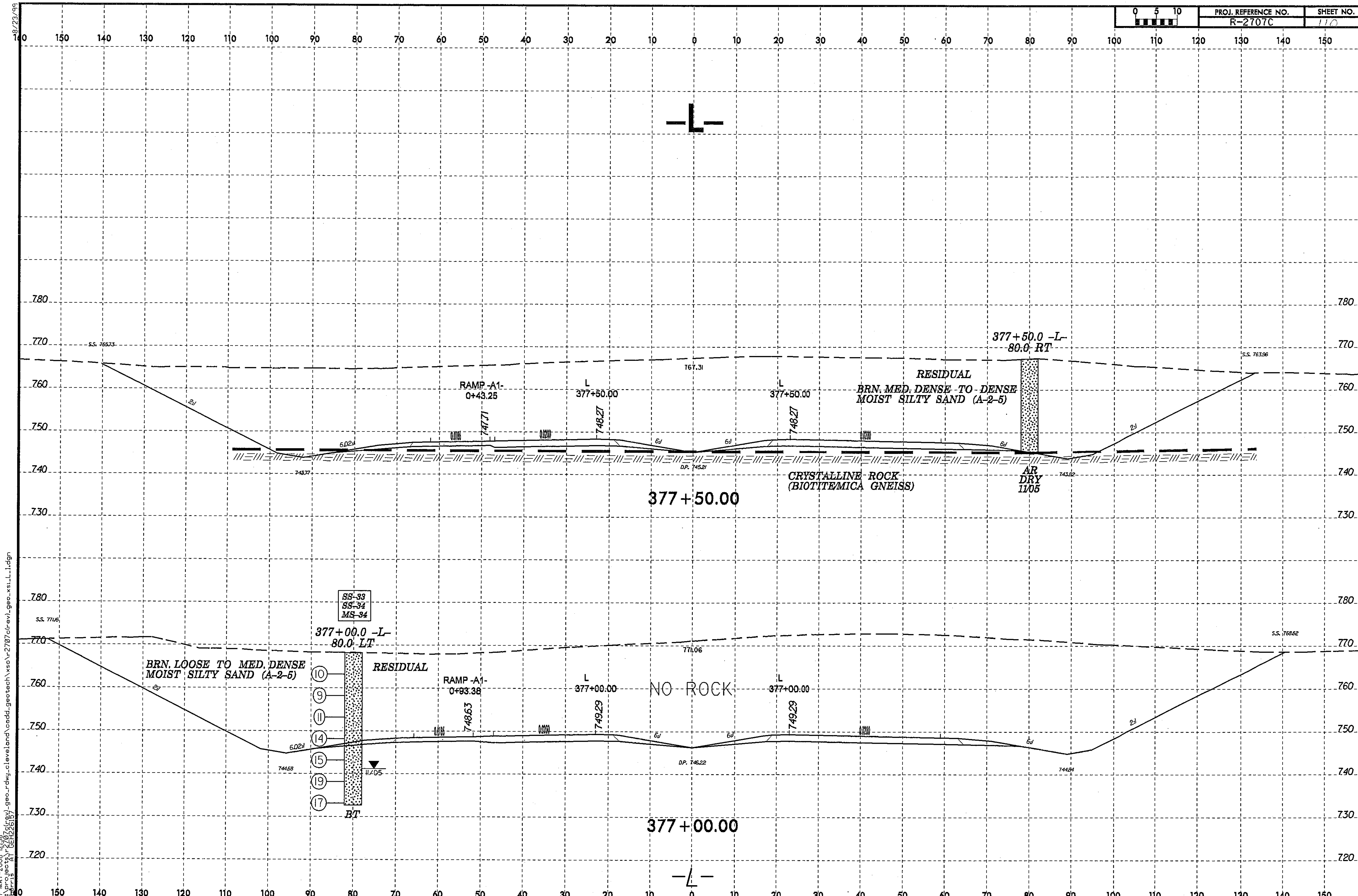
PROJ. REFERENCE NO.
R-2707C
SHEET NO.
107
-L-
362+50.00
362+50 -L-
65.0 RT
NO ROCK
RESIDUAL
BRN. V. STIFF TO HARD MOIST MICA. SANDY SILT (A-4)
BT
362+00.00
362+00.0 -L-
C/L
BRN. V. STIFF MOIST MIC. SANDY SILT W/ALTER. LAYERS OF WR STARTING @ 2' (A-4)
RESIDUAL
CRYSTALLINE ROCK (BIOTITE/MICA GNEISS)
AR
DRY
11/05
361+50.00
361+50.0 -L-
80.0 LT
RESIDUAL
BRN. V. STIFF MOIST MICA. SANDY SILT W/ALTERNATING LAYERS OF WEATHERED ROCK STARTING @ 19' (A-4)
AR
CRYSTALLINE ROCK (BIOTITE/MICA GNEISS)
-L-



8/23/99
PROJ. REFERENCE NO.
R-2707C
SHEET NO.
108
0 5 10
-L-
L
366+50.00
770.63
5.916:1
6:1
4:1
D.P. 767.52
SS-25
SS-26
BRN. V. LOOSE WET CLAYEY COARSE SAND (A-1-b)
366+50.0 -L-
100.0 LT
SS. 751.05
ALLUVIAL
RESIDUAL
BRN. MED. DENSE MOIST MICA.SILTY SAND (A-2-4)
750.94
SP 10
EL= 756.17
BT
DRY
11/05
366+50.00
366+00.00
771.65
D.P. 768.53
SS-27
SS-28
SS-29
SS. 757.37
366+25.0 -L-
C/L
ALLUVIAL
BRN. V. SOFT TO MED. STIFF MOIST SANDY SILT (A-4)
RESIDUAL
GRY/BRN MED. DENSE MOIST MICA. SILTY SAND (A-2-4)
SP 9
EL= 754.43
BT
DRY
11/05
366+00.00
-L-
28-MAY-2008 15:35


PROJ. REFERENCE NO.
R-2707C
SHEET NO.
109
-L-
RESIDUAL
BRN. MED. DENSE TO DENSE
MOIST SILTY SAND (A-2-5)
RAMP -A1-
1+43.61
749.55
L
376+50.00
750.31
L
376+50.00
750.31
376+50.00
376+00.0 -L-
C/L
BRN. MED. DENSE TO DENSE
MOIST SILTY SAND (A-2-5)
RESIDUAL
RAMP -A1-
1+93.84
750.46
L
376+00.00
751.32
L
376+00.00
751.32
BT
DRY
11/05
376+00.00
-L-

PROJ. REFERENCE NO.	SHEET NO.
R-2707C	110



27-MAY-2008 12:38

0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	R-2707C	1 / 1

-L-

L 379+00.00 — L 379+00.00

NO ROCK

745.23 — 749.59 — 745.23

SS. 752.255 — 2:1 — 6.0:1 — 0.020 — 6:1 — 6:1 — 0.020 — 4.75:1 — 6:1 — SS. 743.243

741.259 — D.P. 742.810 — 741.038

379+00.00

L 378+50.00 — L 378+50.00

746.24 — 757.02 — 746.24

SS. 757.226 — 2:1 — 6:1 — 6:1 — 0.020 — 6:1 — 2:1 — SS. 750.465

741.818 — D.P. 743.560 — 741.858

378+50.0 -L- 60.0 RT

BRN. DENSE TO V. DENSE MOIST SILTY SAND (A-2-5) RESIDUAL

CRYSTALLINE ROCK (BIOTITE/MICA GNEISS)

AR DRY 11/05

378+50.00

378+00.0 -L- C/L

BRN. MED. DENSE TO DENSE MOIST SILTY SAND (A-2-5)

763.03

L 378+00.00 — L 378+00.00

SS. 764.02 — 2:1 — 6:1 — 6:1 — 2:1 — SS. 758.77

747.26 — AR DRY 11/05 D.P. 744.41 — 747.26

742.82 — CRYSTALLINE ROCK (BIOTITE/MICA GNEISS) — 742.20

378+00.00

-L-

14-MAY-2008 13:40
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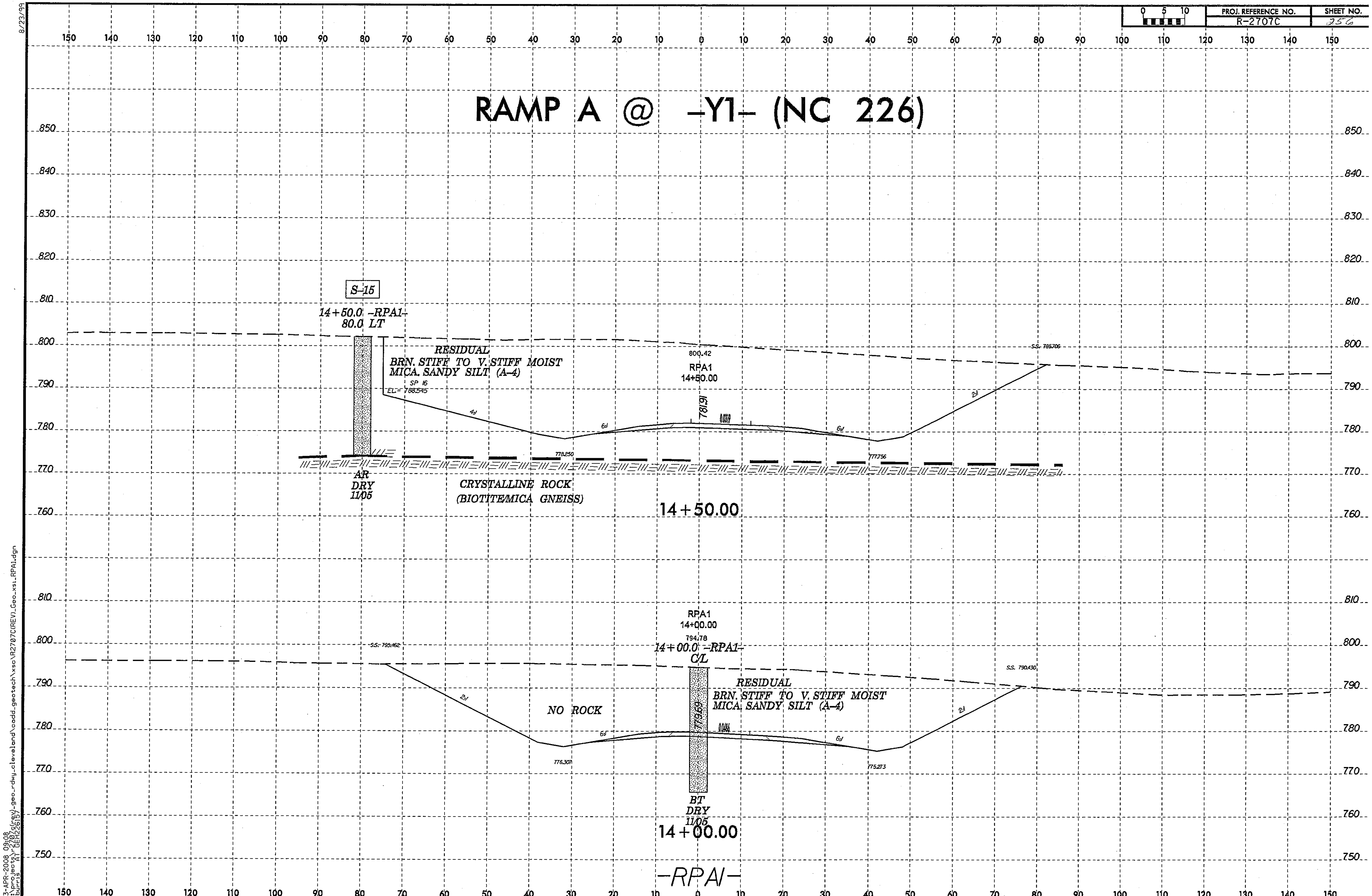
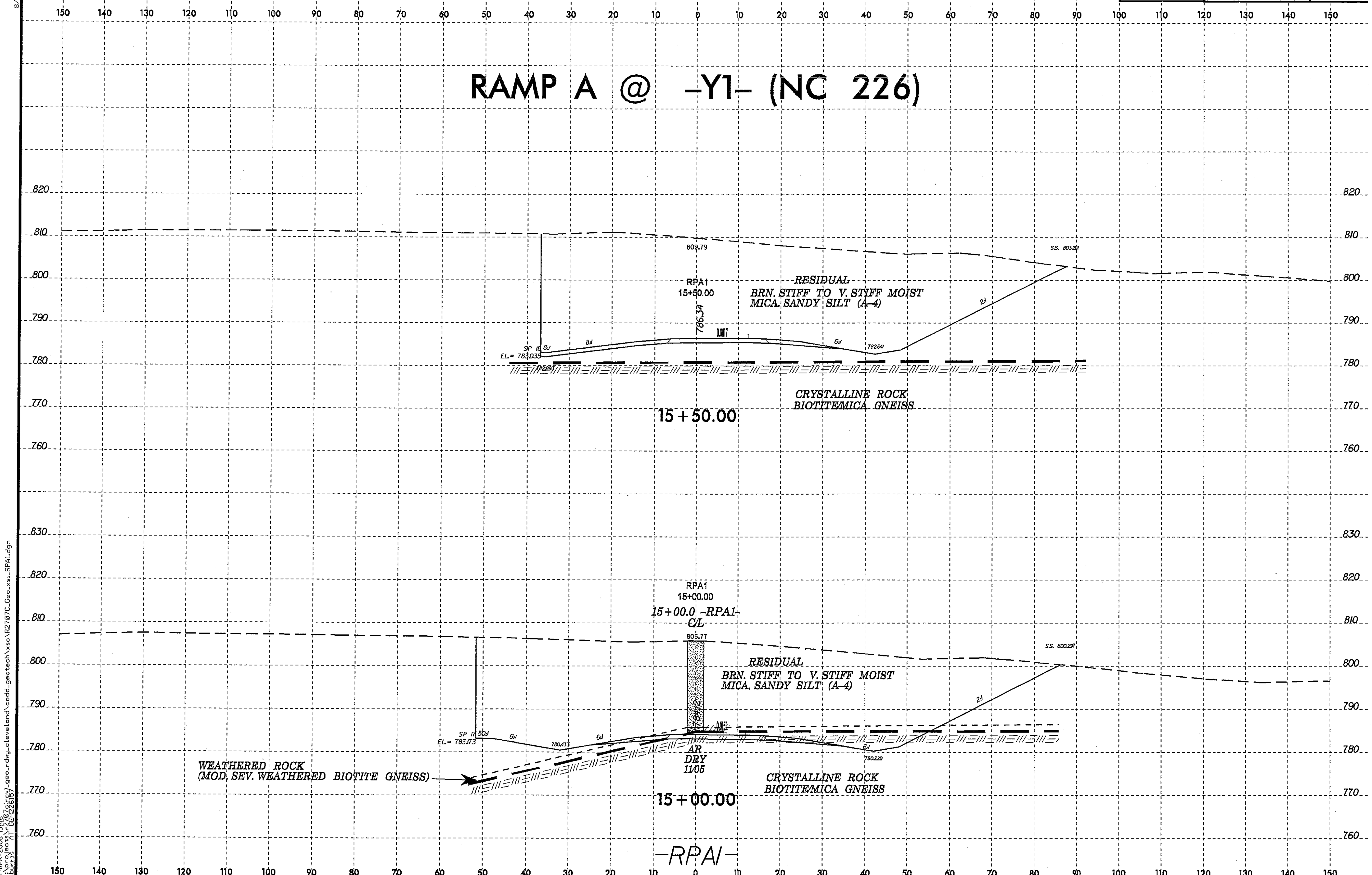
cferrell

Pages 112 - 255 were intentionally removed.


PROJ. REFERENCE NO.
R-2707C
SHEET NO.
RAMP A @ -Y1- (NC 226)
S-15
14+50.0 -RPA1-
80.0 LT
RESIDUAL
BRN. STIFF TO V. STIFF MOIST
MICA SANDY SILT (A-4)
800.42
RPA1
14+50.00
AR
DRY
11/05
CRYSTALLINE ROCK
(BIOTITE/MICA GNEISS)
14+50.00
RPA1
14+00.00
794.78
14+00.0 -RPA1-
C/L
RESIDUAL
BRN. STIFF TO V. STIFF MOIST
MICA SANDY SILT (A-4)
NO ROCK
BT
DRY
11/05
14+00.00
-RPA1-
23-APR-2008 09:08
8/23/99

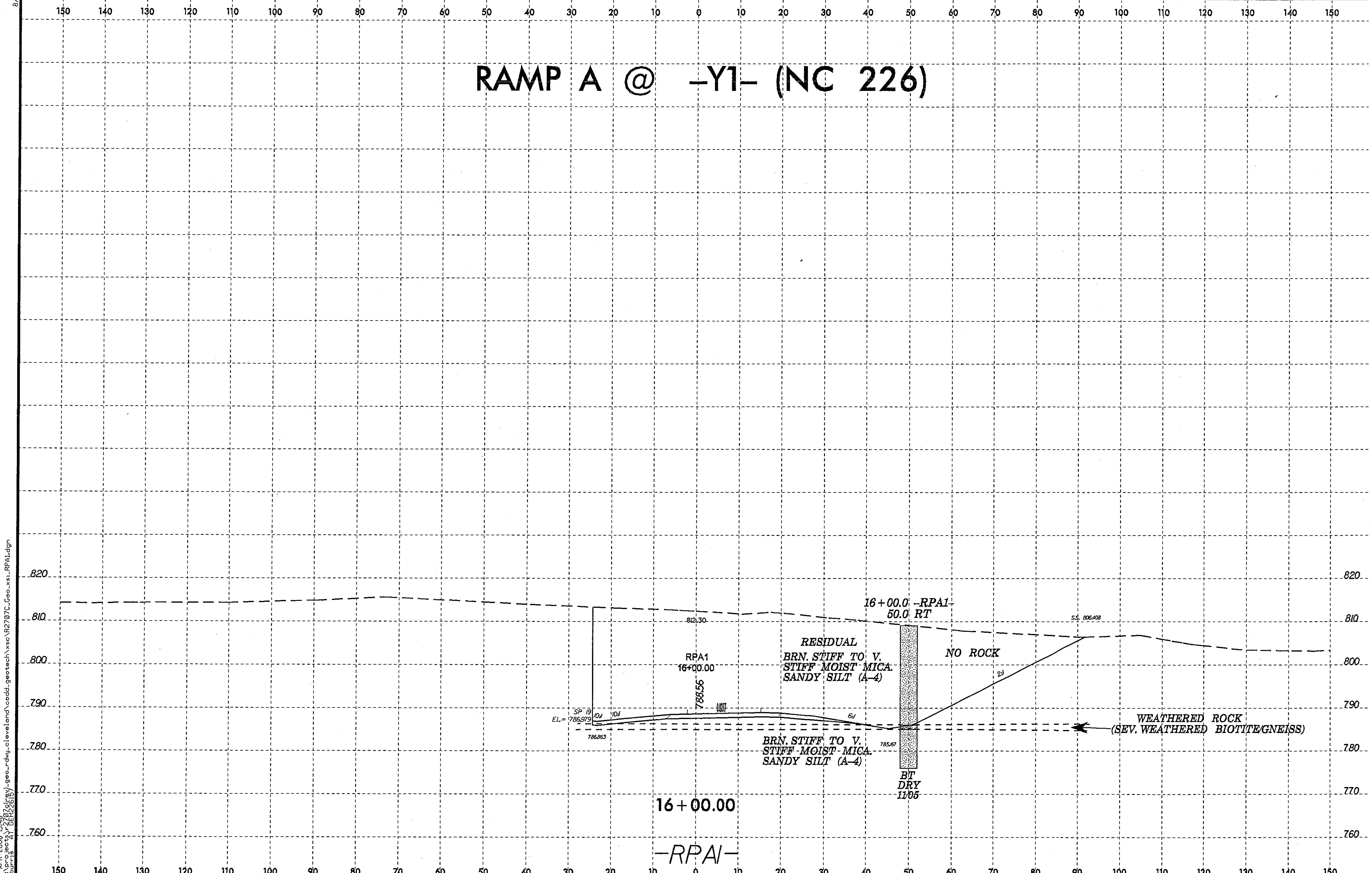
PROJ. REFERENCE NO.	SHEET NO.
R-2707C	257

RAMP A @ -Y1- (NC 226)



PROJ. REFERENCE NO.	SHEET NO.
R-2707C	258

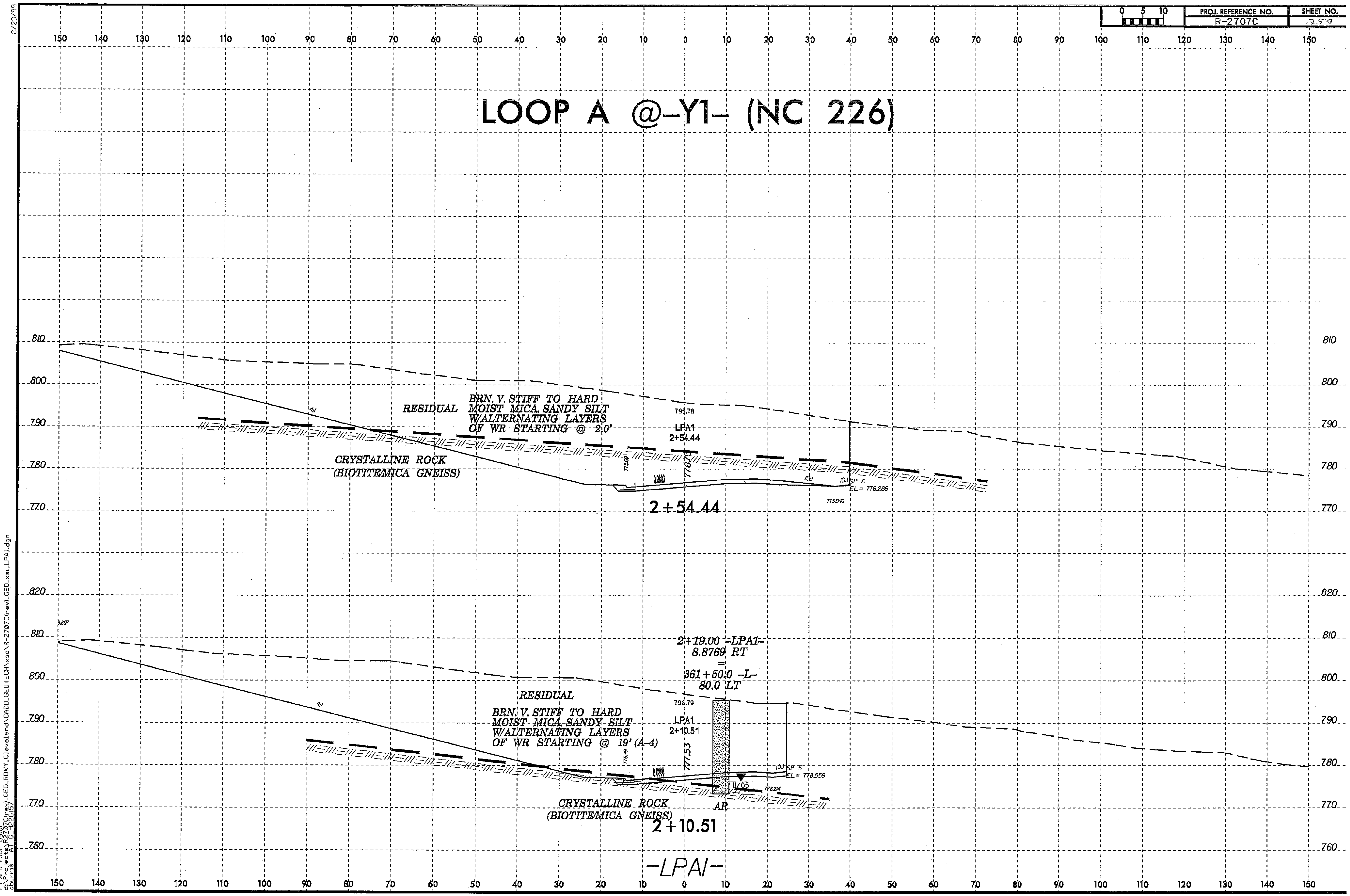
RAMP A @ -Y1- (NC 226)



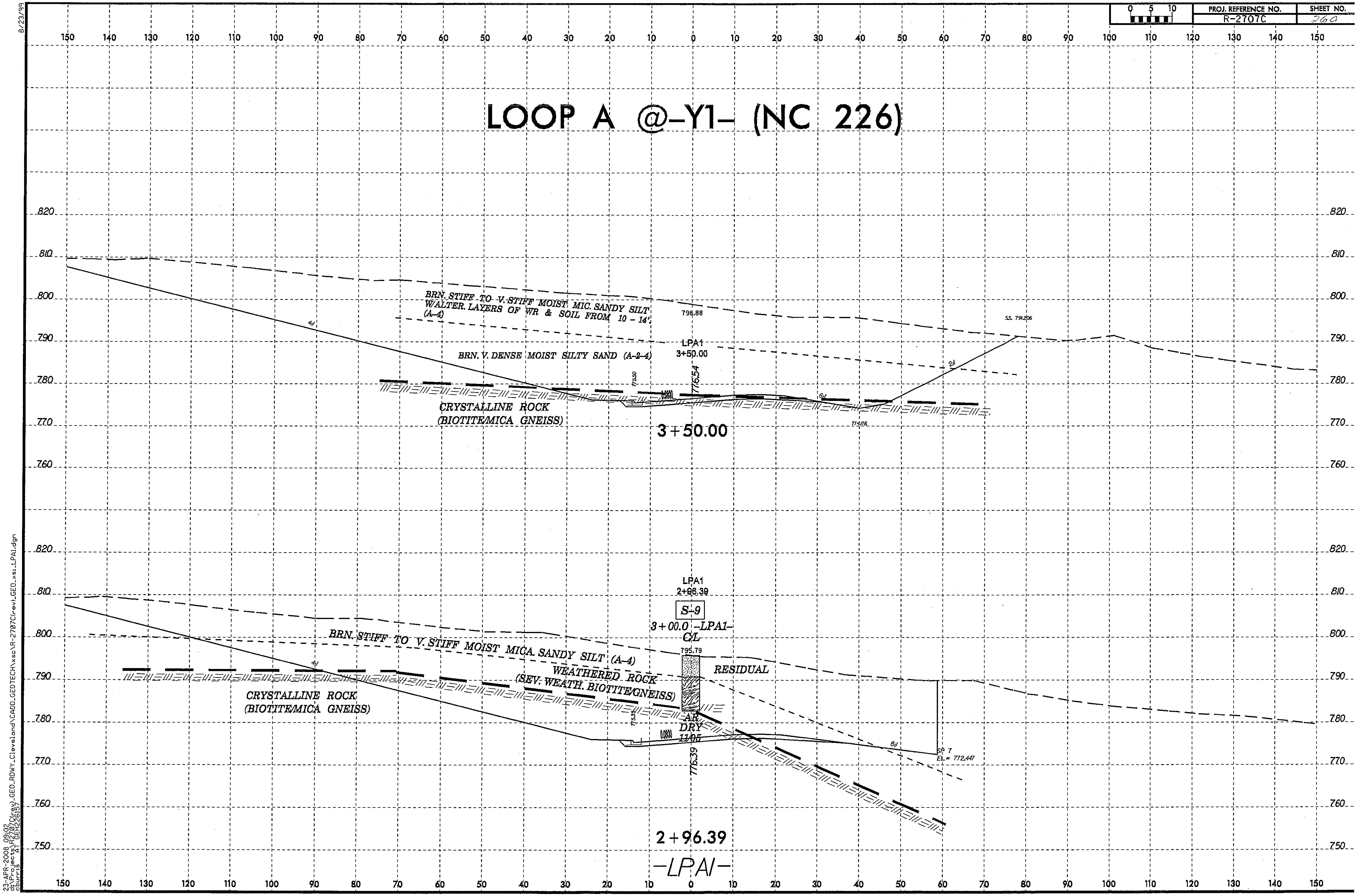
16+00.00

-RPA1-

21-APR-2008 13:46
8/23/99


PROJ. REFERENCE NO.
R-2707C
SHEET NO.
LOOP A @-Y1- (NC 226)
RESIDUAL
BRN. V. STIFF TO HARD
MOIST MICA. SANDY SILT
W/ALTERNATING LAYERS
OF WR STARTING @ 2.0'
795.78
LPA1
2+54.44
CRYSTALLINE ROCK
(BIOTITE/MICA GNEISS)
SP 6
EL= 776.286
2+54.44
2+19.00 -LPA1-
8.8769 RT
=
361+50.0 -L-
80.0 LT
RESIDUAL
BRN. V. STIFF TO HARD
MOIST MICA. SANDY SILT
W/ALTERNATING LAYERS
OF WR STARTING @ 19' (A-4)
796.79
LPA1
2+10.51
777.53
SP 5
EL= 778.559
AR
CRYSTALLINE ROCK
(BIOTITE/MICA GNEISS)
2+10.51
-LPAI-

LOOP A @-Y1- (NC 226)



PROJ. REFERENCE NO.
R-2707C
SHEET NO.
260
8/23/99
BRN. STIFF TO V. STIFF MOIST MIC. SANDY SILT W/ALTER. LAYERS OF WR & SOIL FROM 10 - 14' (A-4)
798.88
LPA1
3+50.00
BRN. V. DENSE MOIST SILTY SAND (A-2-4)
776.54
CRYSTALLINE ROCK
(BIOTITE/MICA GNEISS)
3+50.00
LPA1
2+96.39
S-9
3+00.0 -LPA1-
C/L
795.79
RESIDUAL
BRN. STIFF TO V. STIFF MOIST MICA SANDY SILT (A-4)
WEATHERED ROCK
(SEV. WEATH. BIOTITE/GNEISS)
CRYSTALLINE ROCK
(BIOTITE/MICA GNEISS)
AR
DRY
11/05
776.39
SP 7
EL= 772.447
2+96.39
-LPAI-
23-APR-2008 09:02

8/23/99

0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	R-2707C	261

LOOP A @–Y1– (NC 226)

RESIDUAL

BRN. STIFF TO V. STIFF MOIST MICA. SANDY SILT WALTER. LAYERS OF WR & SOIL FROM 10' – 14' (A–4)

BRN. V. DENSE MOIST SILTY SAND (A–2–4)

805.08

LPA1
4+50.00

SS. 797.90

778.59

776232

4+50.00

LPA1
4+00.00

S–10

4+00.0 –LPA1– C/L

802.17

RESIDUAL

BRN. STIFF TO V. STIFF MOIST MICA. SANDY SILT WALTER. LAYERS OF WR & SOIL FROM 10' – 14' (A–4)

BRN. V. DENSE MOIST SILTY SAND (A–2–4)

SS. 795.96

776.24

772.28

767.05

774.98

CRYSTALLINE ROCK (BIOTITE MICA GNEISS)

AR

4+00.00

–LPA1–

23-APR-2008 09:03
User:cburrg
A1_GEN22x36(v)
C:\Projects\2707C(rev)_GEO_ROWY_Cleveland\CADD_GEOTECH\xsecR-2707C(rev)_GEO_xs_LPA1.dgn

8/23/99

0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	R-2707C	262

LOOP A @–Y1– (NC 226)

SS–11
SS–12
SS–13
SS–14
MS–14

5+50.0 –LPA1–
60.0 LT

RED/BRN. STIFF MOIST HIGHLY PLASTIC SANDY CLAY (A–7–6) (PI=29)
BRN. V. STIFF MOIST SANDY CLAY (A–6) 17
WEATHERED ROCK (SEV. WEATH. BIOTITEGNEISS) 100
BRN. HARD MOIST V. MICA. SANDY SILT (A–4) 58
WEATHERED ROCK (SEV. WEATH. BIOTITEGNEISS) 100
BRN. HARD MOIST V. MIC. SANDY SILT (A–4) 46
100
WEATHERED ROCK (SEV. WEATH. BIOTITE GNEISS) 100
100
BT

11/05

810.52
LPA1
5+50.00
782.88
7884
6d
6d
50:1
SP 17
EL= 783.73
780525

5+50.00

LPA1
5+10.06
5+00.0 –LPA1–
C/L
809.26

BRN. STIFF TO V. STIFF MOIST
MICA. SANDY SILT (A–4)

7939
786.54
11/05
6d
4:1
SP 16
EL= 788.545
785516

BT

5+10.06
–LPA1–

840 830 820 810 800 790 780 770 760

150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150

23-APR-2008 09:04
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A1 GEH226157

8/23/99

0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	R-2707C	263

LOOP A @–Y1– (NC 226)

150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150

830 820 810 800 790 780

SS. BI5076

4H

815.13

LPA1
6+33.80

786.99

787.03

10d

SP 19
EL= 786.979

6+33.80

SS. BI4850

812.99

4d

LPA1
5+90.27

783.94

784.87

8d

SP 18
EL= 783.035

5+90.27
–LPA1–

23-APR-2008 09:05
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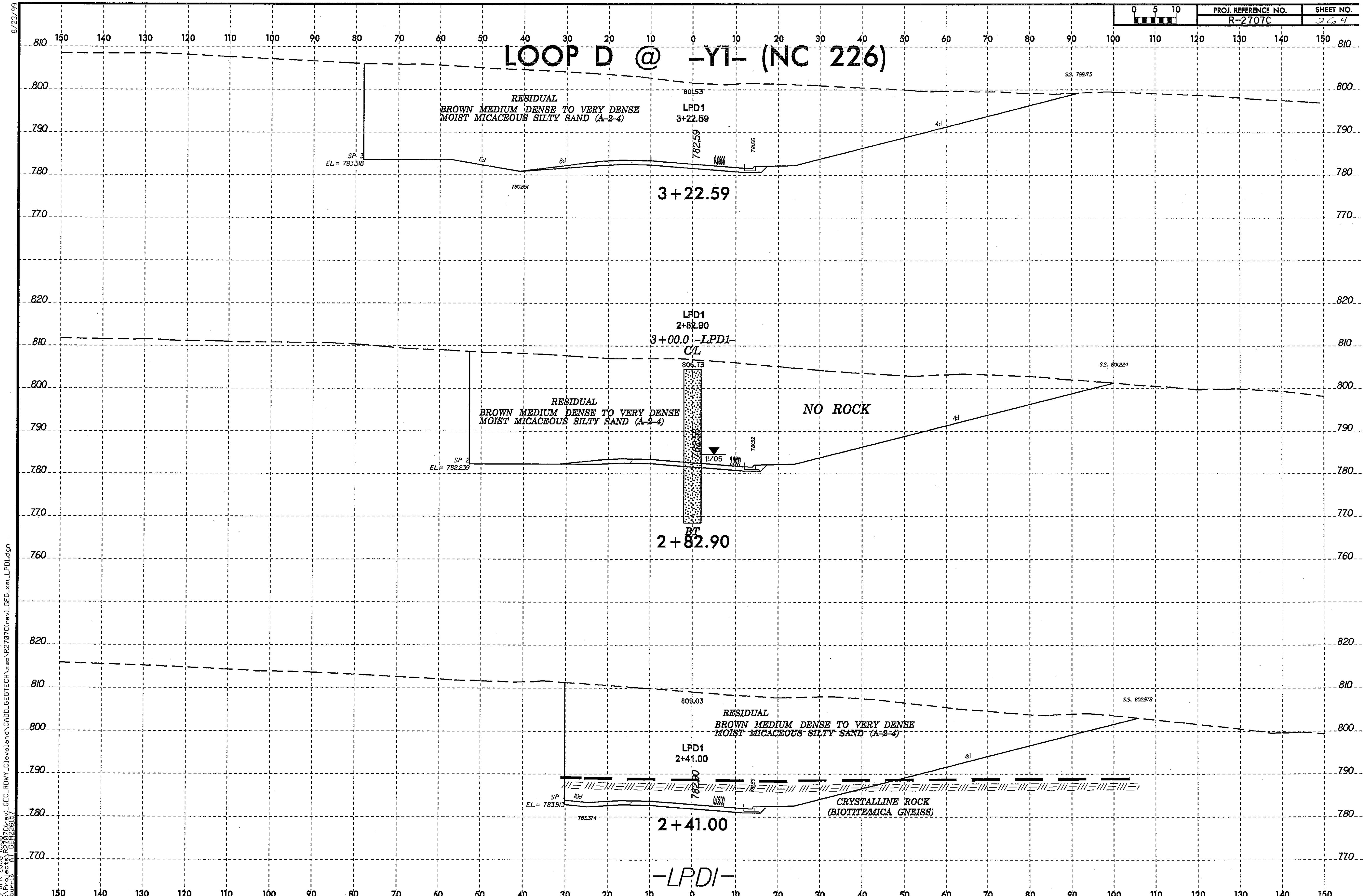
cburris
GEH226157



PROJ. REFERENCE NO.
R-2707C
SHEET NO.
LOOP D @ -Y1- (NC 226)
RESIDUAL
BROWN MEDIUM DENSE TO VERY DENSE
MOIST MICACEOUS SILTY SAND (A-2-4)
LPD1
3+22.59
3+22.59
LPD1
2+82.90
3+00.0 -LPD1-
C/L
NO ROCK
RESIDUAL
BROWN MEDIUM DENSE TO VERY DENSE
MOIST MICACEOUS SILTY SAND (A-2-4)
11/05
BT
2+82.90
RESIDUAL
BROWN MEDIUM DENSE TO VERY DENSE
MOIST MICACEOUS SILTY SAND (A-2-4)
LPD1
2+41.00
CRYSTALLINE ROCK
(BIOTITE/MICA GNEISS)
2+41.00
-LPDI-

Pages 265 - 277 were intentionally removed.