

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

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

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	P-5201	1	41

CONTENTS

LINE	STATION	PLAN	PROFILE	XSECT
-MI-	3548+00 TO 3629+00	4-10	4-10	11-30

	SHEET
TITLE SHEET	1
LEGEND	2
RDWY TITLE SHEET	2A
INVENTORY TEXT	3A-3B
EARTHWORK BALANCE SHEET	3C
BORING LOGS	3I-4I

ROADWAY
SUBSURFACE INVESTIGATION

PROJ. REFERENCE NO. 52100.1.STR03TIB (P-5201) F.A. PROJ. N/A
COUNTY WAKE
PROJECT DESCRIPTION NSNCRR (-MI-) RAILROAD FROM EAST OF CRABTREE CREEK (MP H69.0) TO EAST OF NW CARY PARKWAY (MP H70.6)

INVENTORY

CAUTION NOTICE

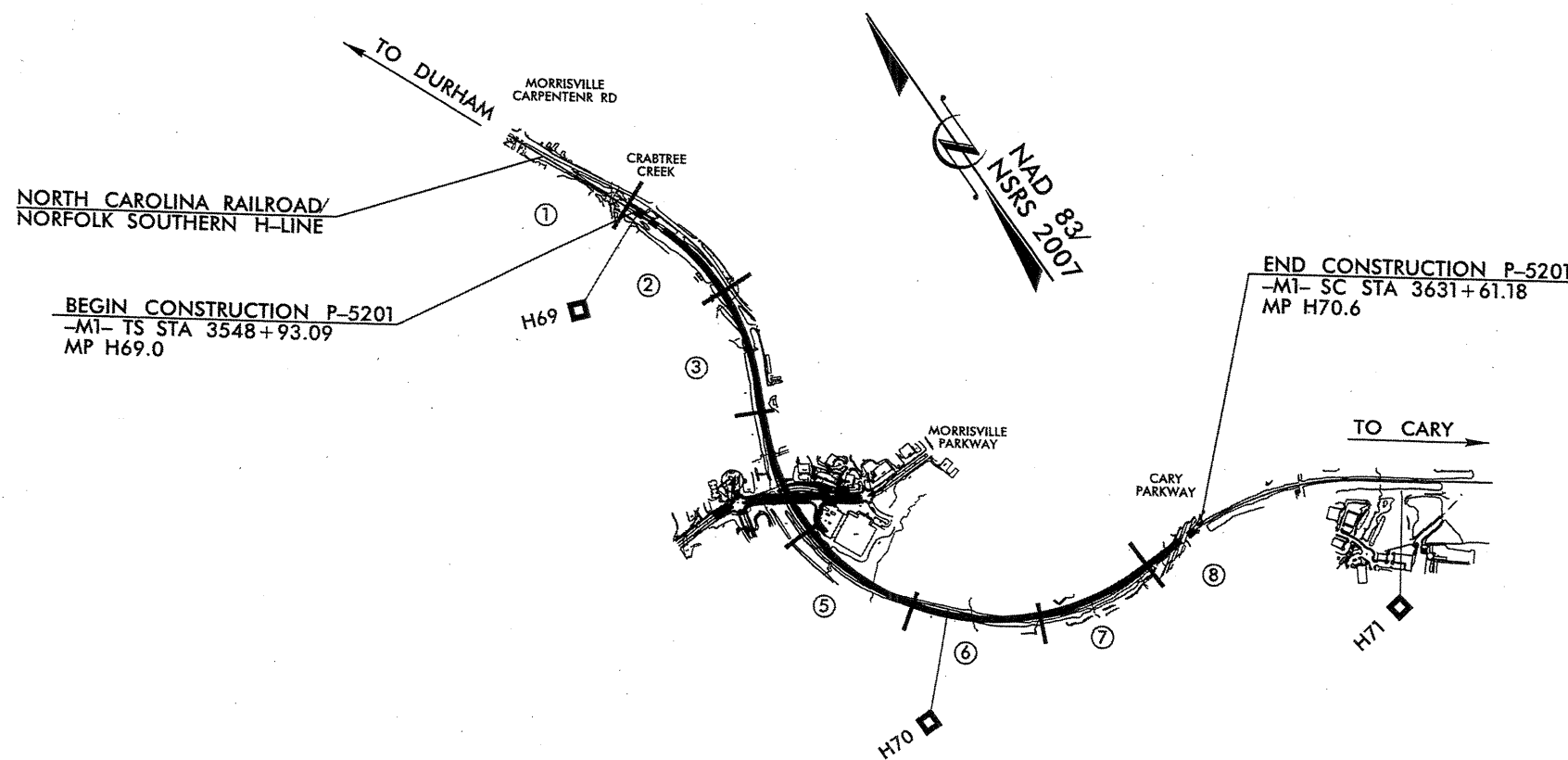
THE SUBSURFACE INFORMATION AND THE SUBSURFACE INVESTIGATION ON WHICH IT IS BASED WERE MADE FOR THE PURPOSE OF PREPARING THE SCOPE OF WORK TO BE INCLUDED IN THE REQUEST FOR PROPOSAL. THE VARIOUS FIELD BORING LOGS, ROCK CORES, AND SOIL TEST DATA AVAILABLE MAY BE REVIEWED OR INSPECTED IN RALEIGH BY CONTACTING THE N.C. DEPARTMENT OF TRANSPORTATION, GEOTECHNICAL ENGINEERING UNIT AT (919) 707-6650. THE SUBSURFACE PLANS, FIELD BORING LOGS, ROCK CORES, AND SOIL TEST DATA ARE NOT PART OF THE CONTRACT.

SOIL AND ROCK BOUNDARIES WITHIN A BOREHOLE ARE BASED ON GEOTECHNICAL INTERPRETATION UNLESS ENCOUNTERED IN A SAMPLE. INTERPRETED BOUNDARIES MAY NOT NECESSARILY REFLECT ACTUAL SUBSURFACE CONDITIONS BETWEEN SAMPLED STRATA, AND BOREHOLE INFORMATION MAY NOT NECESSARILY REFLECT ACTUAL SUBSURFACE CONDITIONS BETWEEN BORINGS. THE LABORATORY SAMPLE DATA AND THE IN SITU UN-PLACED 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 DEPARTMENT DOES NOT WARRANT OR GUARANTEE THE SUFFICIENCY OR ACCURACY OF THE INVESTIGATION MADE, OR THE 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 THE 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.

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

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

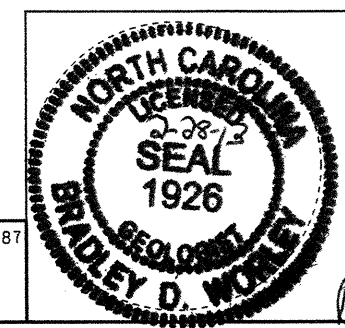


- PERSONNEL
- B. SMITH, GIT
 - L. GONZALEZ
 - C. HUSKETH
 - R. FLICK
 - B. WORLEY, PG

- DRAWN BY B. WORLEY, PG
DRAWN BY M. BRANDON
INVESTIGATED BY B. WORLEY, PG
CHECKED BY D. DEWEY, PE
SUBMITTED BY Summit Design and Engineering
DATE FEBRUARY, 2013

CONTRACT: ID: P-5201

Prepared in the Office of: **SUMMIT** DESIGN AND ENGINEERING SERVICES
NC FIRM LICENSE No: P-0339 and C-487
504 Meadowlands Drive
Hillsborough, NC 27278
(919) 732-3883
(919) 732-6676 (FAX)



Bradley D. Worley

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION DIVISION OF HIGHWAYS GEOTECHNICAL ENGINEERING UNIT SUBSURFACE INVESTIGATION

SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

Main content area containing SOIL DESCRIPTION, GRADATION, ROCK DESCRIPTION, TERMS AND DEFINITIONS, SOIL LEGEND AND AASHTO CLASSIFICATION, MINERALOGICAL COMPOSITION, COMPRESSIBILITY, PERCENTAGE OF MATERIAL, WEATHERING, GROUND WATER, MISCELLANEOUS SYMBOLS, CONSISTENCY OR DENSENESS, TEXTURE OR GRAIN SIZE, SOIL MOISTURE - CORRELATION OF TERMS, PLASTICITY, COLOR, ABBREVIATIONS, EQUIPMENT USED ON SUBJECT PROJECT, FRACTURE SPACING, BEDDING, INDURATION, and BENCH MARK.

STATE OF NORTH CAROLINA
NCDOT RAIL DIVISION

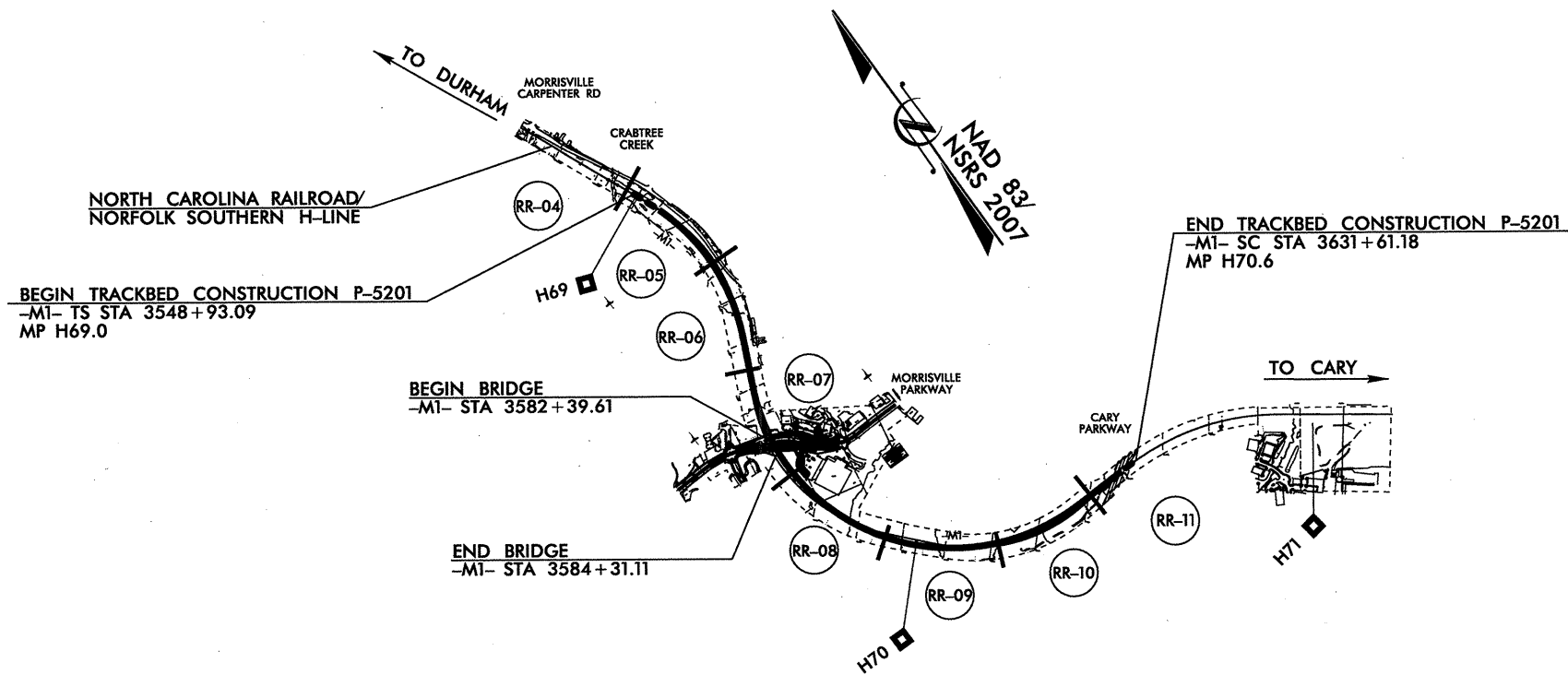
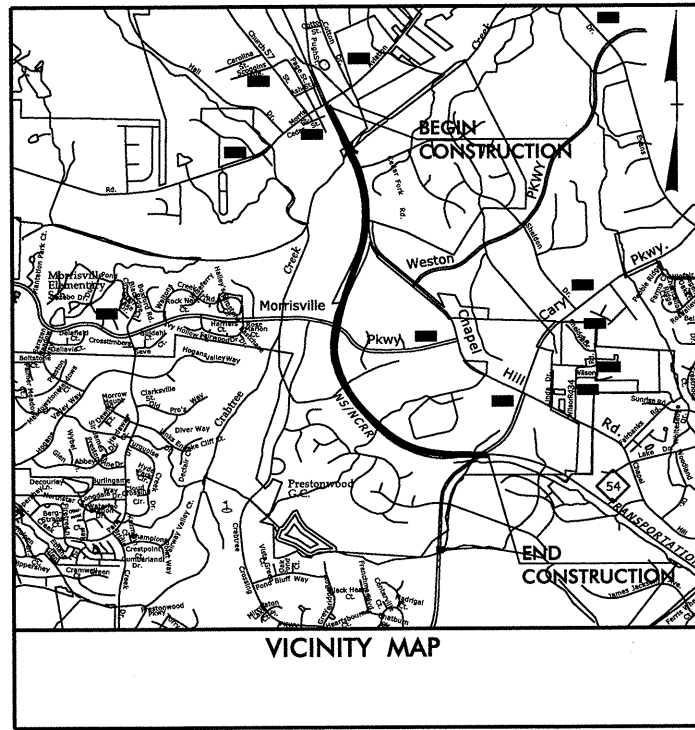


STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	P-5201	2A	41
STATE PROJ. NO.	P.A. PROJ. NO.	DESCRIPTION	
52100.1.STR03T1B	FR-HSR-0006-10-01-00	UTIL PE, PE	
43219.2.STR05P5201		RW	
52100.3.STR01T4		UTIL CONST	

WAKE COUNTY

**LOCATION: FROM EAST OF CRABTREE CREEK (MP H69.0)
TO EAST OF NW CARY PARKWAY (MP H70.6)
ON THE NORTH CAROLINA RAILROAD /
NORFOLK SOUTHERN H-LINE**

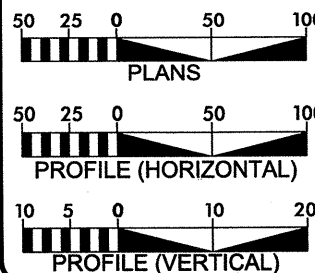
**TYPE OF WORK: RAIL TRACKBED CONSTRUCTION FOR RAILROAD
CURVE IMPROVEMENTS AND TRACKBED WIDENING
FOR FUTURE SECOND MAIN LINE TRACK.
(INCLUDES GRADING, DRAINAGE, PAVING, STRUCTURES,
WALLS, SIGNALS AND TRACKBED)**



PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

SUBMITTAL: PRE-100%
DATE: JUNE 18, 2013

GRAPHIC SCALES



PROJECT LENGTH

LENGTH OF RAIL TIP PROJECT P-5201 = 1.528 MILES
LENGTH OF STRUCTURE = 0.037 MILES
TOTAL LENGTH OF MAIN TRACK = 1.565 MILES

Prepared In the Office of:



NC FIRM LICENSE No: F-0342
701 Corporate Center Drive, Suite 475
Raleigh, NC 27607
(919) 854-6200 - (919) 854-6259(FAX)

2012 STANDARD SPECIFICATIONS

RIGHT OF WAY DATE:
SEPTEMBER 2012

LETTING DATE:
OCTOBER 15, 2013

RILEY BIRMINGHAM, PE
RAIL PROJECT ENGINEER
TOM HILDEBRAND, PE
ROADWAY PROJECT ENGINEER
MARK KAMPRATH, PE
HYDRAULICS PROJECT ENGINEER
MARK PEARSON, PE
STRUCTURE PROJECT ENGINEER
SANDRA STEPNEY, PE
NCDOT PROJECT MANAGER

RAIL ENGINEER

SIGNATURE: _____

P.E.

HYDRAULICS ENGINEER

SIGNATURE: _____

P.E.

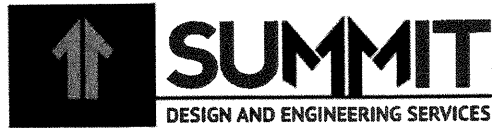


NC DEPARTMENT OF
TRANSPORTATION
RAIL DIVISION
PLANNING AND DEVELOPMENT



25-JUN-2013 14:48 C:\Users\bdw\Desktop\Projects\Rail\Inventory\P-5201_RR_TSH.dgn

CONTRACT: C203255 TIP PROJECT: P-5201



919.732.3883 SUMMIT-ENGINEER.COM
504 Meadowland Drive, Hillsborough, NC 27278

February 20, 2012

STATE PROJECT: P-5201
 F.A. PROJECT: N/A
 COUNTY: Wake
 DESCRIPTION: NS/NCRR (-M1-) Railroad from east of Crabtree Creek (MP H69.0) to east of NW Cary Parkway (MP H70.6)
 SUBJECT: Geotechnical Report - Inventory

Project Description

The project consists of constructing 1.6 miles of NS/NCRR roadbed curve improvements and roadbed widening for the proposed second main line track. The majority of the project lies between Crabtree Crossings Parkway and Cary Parkway. This overall project also includes the construction of a grade separation railroad bridge over Morrisville Parkway. The structure subsurface inventory was turned in under separate cover in December of 2012.

The geotechnical investigation was originally conducted in 2012 utilizing Summit personnel and equipment. Borings were advanced using CME-450 drill machine equipped with automatic hammers. Standard Penetration Tests were performed at specific locations to provide subsurface information for roadbed design and construction. Representative soil samples were collected and submitted to the Summit's soils laboratory for analysis. All investigation and reporting was performed in accordance with the NCDOT Geotechnical Engineering Unit's 1994 "Geotechnical Investigation Requirements, Procedures and Guidelines" and the American Railway Engineering and Maintenance-of-Way Association (AREMA) manual.

The following alignments were investigated for this project:

<u>Line</u>	<u>Station(±)</u>
-M1-	3548+00 to 3629+00

Areas of Special Geotechnical Interest

1) Plastic Soils- Medium plastic clays occur near surface, in both residual and artificial fill, throughout the length of the project.

2) Artificial Fill- Artificial fill was encountered at the following locations

<u>Line</u>	<u>Station (±)</u>
-M1-	3581+50 to 3584+60
-M1-	3601+25 to 3603+50

3) Non-Crystalline Rock – Triassic non-crystalline rock was not encountered within 6 feet of proposed grade during the investigation of the -M1- alignment.

4) Weathered Rock- Triassic weathered rock outcrops were observed along proposed grade at the following locations. The weathered rock outcrops have the appearance of non-crystalline rock, but when SPT drilling was done in this material the N-values show that the material is weathered rock by NCDOT Geotechnical Legend criteria.

<u>Line</u>	<u>Station (±)</u>
-M1-	3579+00 to 3573+00
-M1-	3584+50 to 3589+00

Physiography, Geology and Surface Water

The project corridor is located in the central eastern portion of the Piedmont Physiographic Province near the towns of Cary and Morrisville, NC. Topography in the area is generally gently rolling. The project area is comprised of small pine forest and residential/commercial development.

Geologically the project area lies within the Durham Triassic Basin and consists of Triassic age sediments, weather rock, and non-crystalline rock.

Surface water is drained from the corridor by several smaller unnamed creeks and tributaries that generally trend east-southeast across the project.

Soils Properties

Residual soils encountered along the project corridor are primarily derived from the weathering of Triassic age non-crystalline rock. Typically, these Triassic are laterally discontinuous and vary in thickness. Residual soils consist of gray to red-brown and orange brown, stiff to hard, fine sandy clay (A-6); orange brown, very dense, silty sand (A-2-4); red-brown, hard, sandy silt (A-4), and orange-brown, hard, sandy clay (A-6);

Artificial Fill soils were encountered from -M1- 3581+50 to 3584+60 and -M1- 3584+50 to 3589+00. The artificial fill is underlain by residual soils. Artificial fill soils encountered consist of dark brown to black, sandy clay (A-6), with rip-rap; and brown to red-brown, stiff, sandy silt (A-4) and hard, sandy clay (A-6). The artificial fill soils are associated with the industrial development on the north side of the proposed alignment and with the existing rail roadbed embankment near existing Morrisville Parkway.

Rock Properties

Triassic weathered rock was encountered during the investigation. It originates from the underlying Triassic conglomeratic mudstone. Refer to the "Areas of Geotechnical Interest" for areas of weathered rock outcrops near the proposed -M1-.

Triassic non-crystalline rock was encountered at depth during the investigation and consists primarily of conglomeratic mudstone. Non-crystalline rock was not encountered within 6 feet of the proposed grade of the -M1- alignment.


Ground Water

During the geotechnical field investigation of the -M1- alignment, only one boring encountered ground water. All other borings were dry at the time of investigation. Ground water data was collected during below average to average rainfall conditions. Ground water may fluctuate with seasonal precipitation.

BULK SAMPLES

There were no bulk samples collected during the geotechnical investigation.

Respectfully Submitted,


Bradley D. Worley, PG
Senior Transportation Geologist
Summit Design and Engineering, PLLC

EARTHWORK BALANCE SHEET

Volumes in Cubic Yards

Rock Swell:

PROJECT: Morrisville Parkway

COUNTY: WAKE

DATE

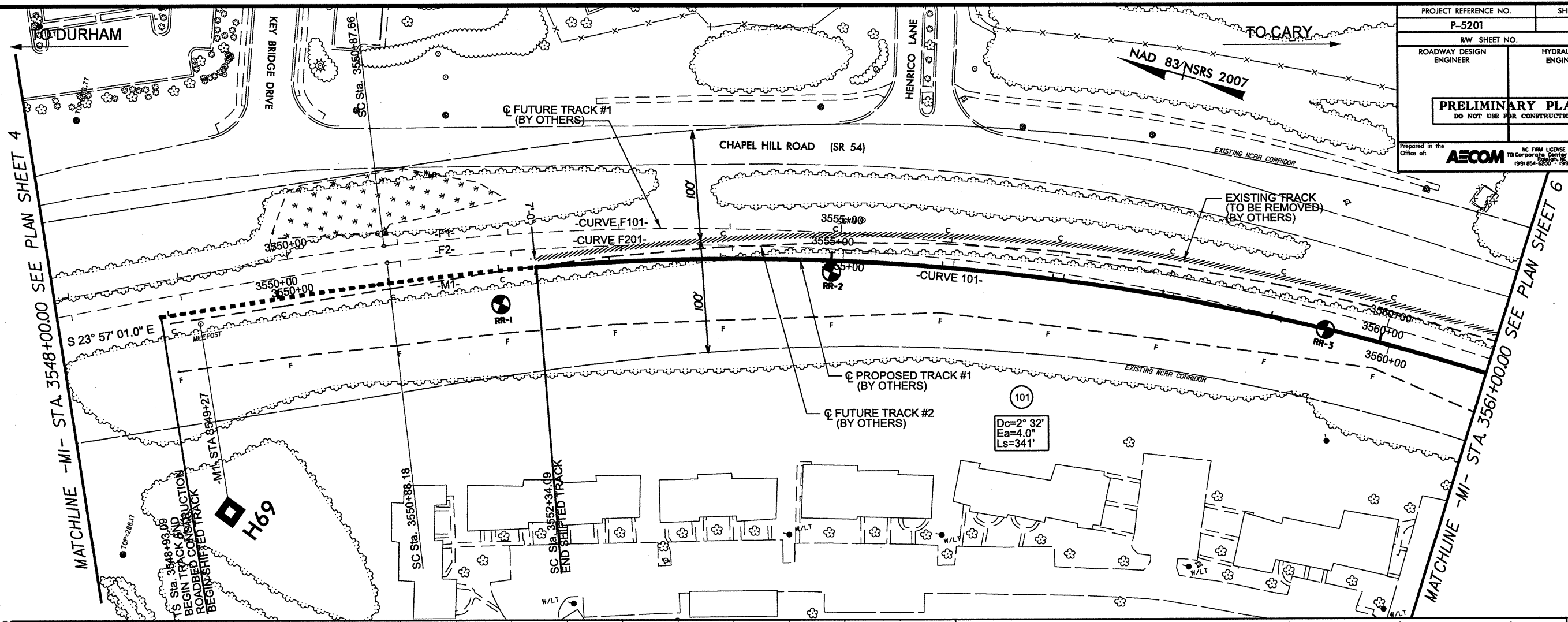
7/12/2013

SHEET 1 OF 1

LINE	STATION	STATION	TOTAL EXCAV. (UNCL.)	ROCK EXCAV.	UNDERCUT EXCAV.	UNSUIT. EXCAV. (ROCK)	SUITABLE EXCAV.	TOTAL EMB.	ROCK EMB.	UNDERCUT EMB.	EARTH EMB.	EMBANK. +20%	BORROW	ROCK WASTE	SUITABLE WASTE	UNSUIT. WASTE (ROCK)	TOTAL WASTE
Davis Dr.			156														
L2	10+41.89	16+00.00	540				540	107			107	128			411		411
Subtotal No. 1			696				540	107			107	128			411		411
L	17+85.00	30+00.00	73,663			6,750	66,913	488			488	586			66,327	6,750	73,077
L XOVER	21+50.00	24+50.00	429				429	6			6	7			422		422
Y1	10+00.00	13+52.08	7,685				7,685	32			32	38			7,647		7,647
Y2	10+38.00	12+37.25	996				996	8			8	10			986		986
DR1	10+00.00	11+60.00	570				570	0			0	0			570		570
Subtotal No. 2			83,343			6,750	76,593	534			534	641			75,953	6,750	82,703
M1	3549+00.00	3582+39.61	23,352				23,352	36,935			36,935	44,322	20,971				
Subtotal No. 3			23,352				23,352	36,935			36,935	44,322	20,971				
M1	End Bridge	3584+31.11	3614+00.00	40,729			40,729	24,256			24,256	29,107			11,622		11,622
Subtotal No. 4			40,729				40,729	24,256			24,256	29,107			11,622		11,622
M1		3614+00.00	3630+00.00	20,666			20,666	3,826			3,826	4,592			16,074		16,074
Subtotal No. 5			20,666				20,666	3,826			3,826	4,592			16,074		16,074
PROJECT TOTAL			168,707			6,750	161,879	65,658			65,658	78,790	20,971		104,060	6,750	110,810
LOSS DUE TO CLEARING AND GRUBBING - Grade Separation			-9550				-9550								-9550		-9550
WASTE TO REPLACE BORROW													-20,971		-20,971		-20,971
GRAND TOTAL			159,157			6,750	152,329	65,658			65,658	78,790	0		73,539	6,750	80,289
SAY			160,000														

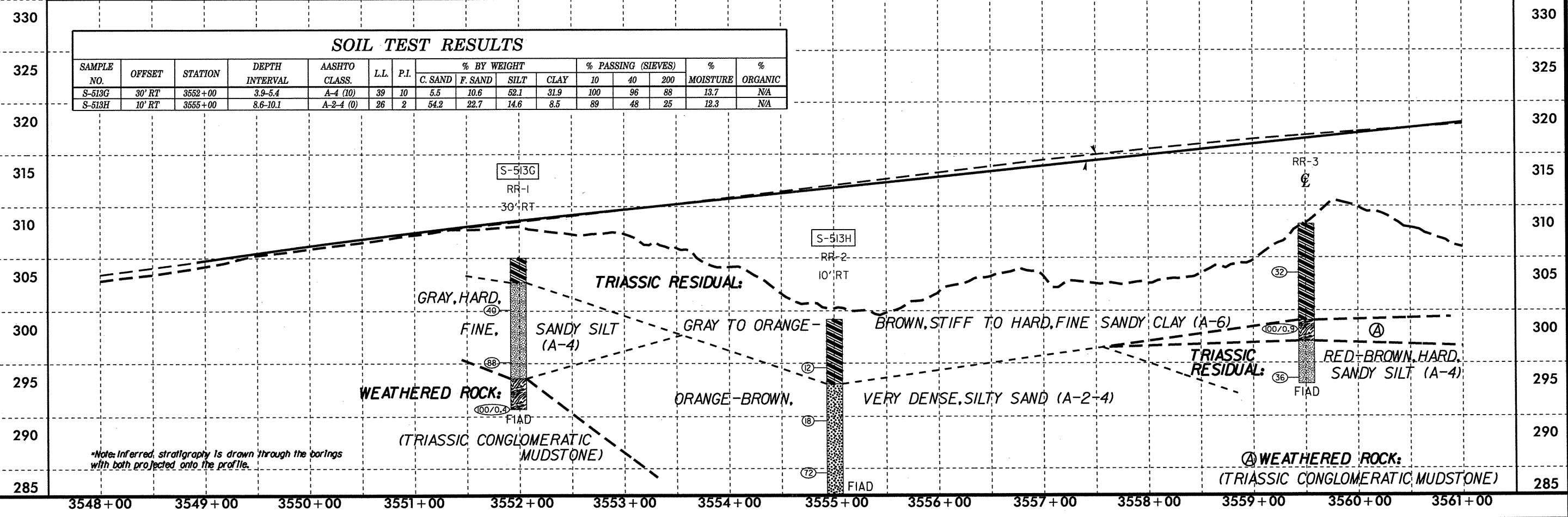
ESTIMATED DDE	1890 CY
SHALLOW UNDERCUT	300 CY
ADDITIONAL UNDERCUT	2050 CY
SELECT GRANULAR MATERIAL CLASS III	800 CY
SUBGRADE STABILIZATION CLASS IV	600 TONS
SHOULDER BORROW	100 CY
PAVEMENT STRUCTURE VOLUME	5110 CY

PROJECT REFERENCE NO. P-5201	SHEET NO. 4
RW SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
PRELIMINARY PLANS DO NOT USE FOR CONSTRUCTION	
<small>Prepared in the Office of:</small> AECOM	



SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	LL	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
S-513G	30' RT	3552+00	3.9-5.4	A-4 (10)	39	10	5.5	10.6	52.1	31.9	100	96	88	13.7	N/A
S-513H	10' RT	3555+00	8.6-10.1	A-2-4 (0)	26	2	54.2	22.7	14.6	8.5	89	48	25	12.3	N/A



Note: Inferred stratigraphy is drawn through the borings with both projected onto the profile.

TO DURHAM

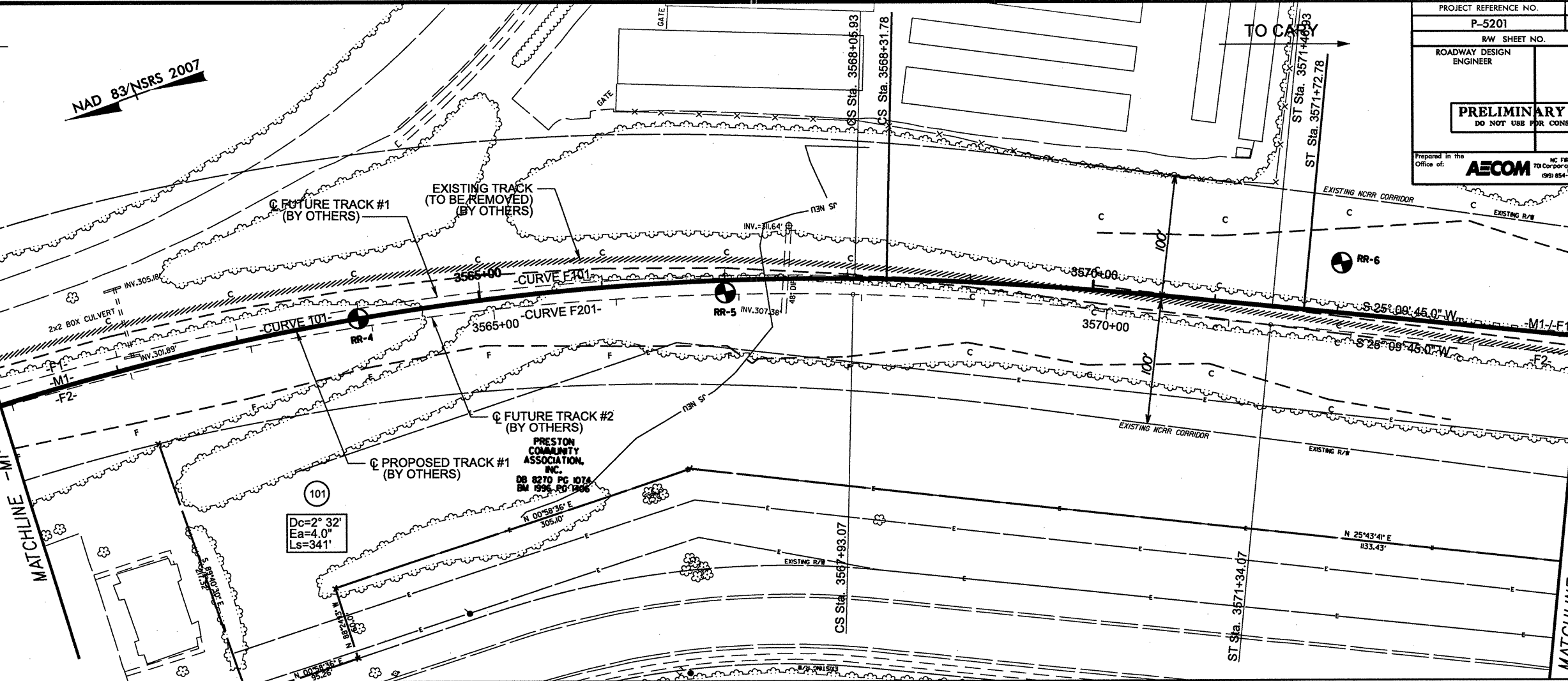
NAD 83/NRS 2007

TO CARY

PROJECT REFERENCE NO. P-5201	SHEET NO. 5
RW SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
PRELIMINARY PLANS DO NOT USE FOR CONSTRUCTION	
<small>Prepared in the Office of:</small> AECOM	
<small>NC FIRM LICENSE No F-0342 70 Corporate Center Drive, Suite 415 Raleigh, NC 27601 (919) 854-6200 • (919) 854-6299 FAX</small>	

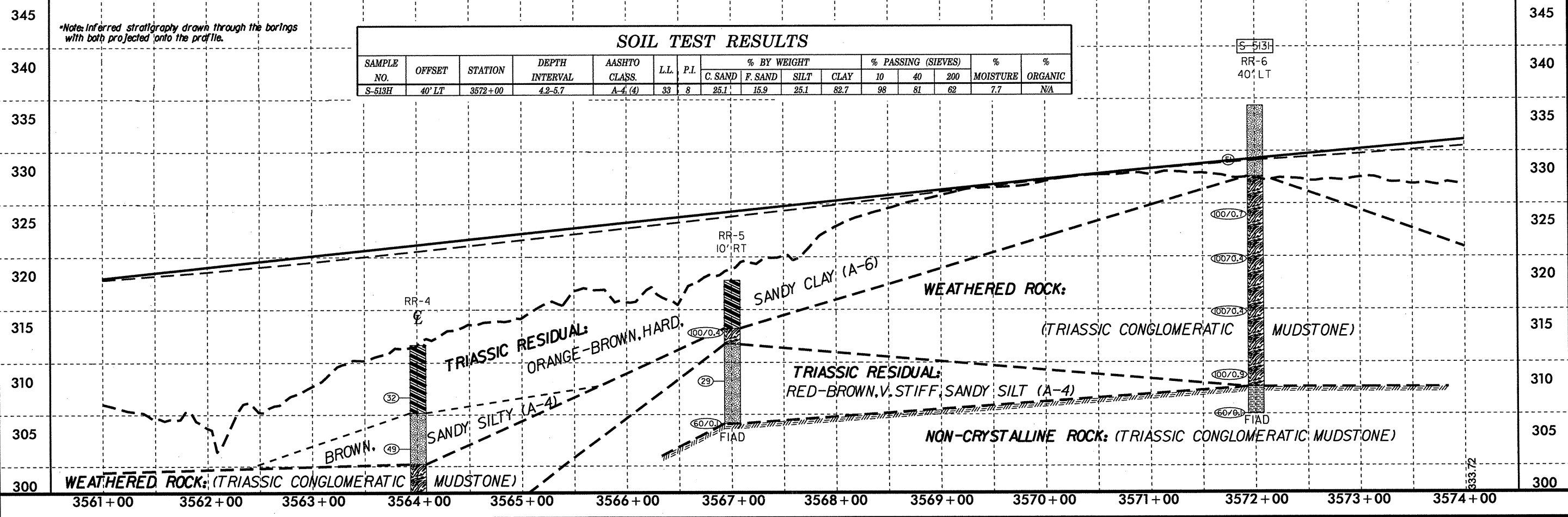
MATCHLINE -M1- STA 3561+00.00 SEE PLAN SHEET 5

MATCHLINE -M1- STA 3574+00.00 SEE PLAN SHEET 7

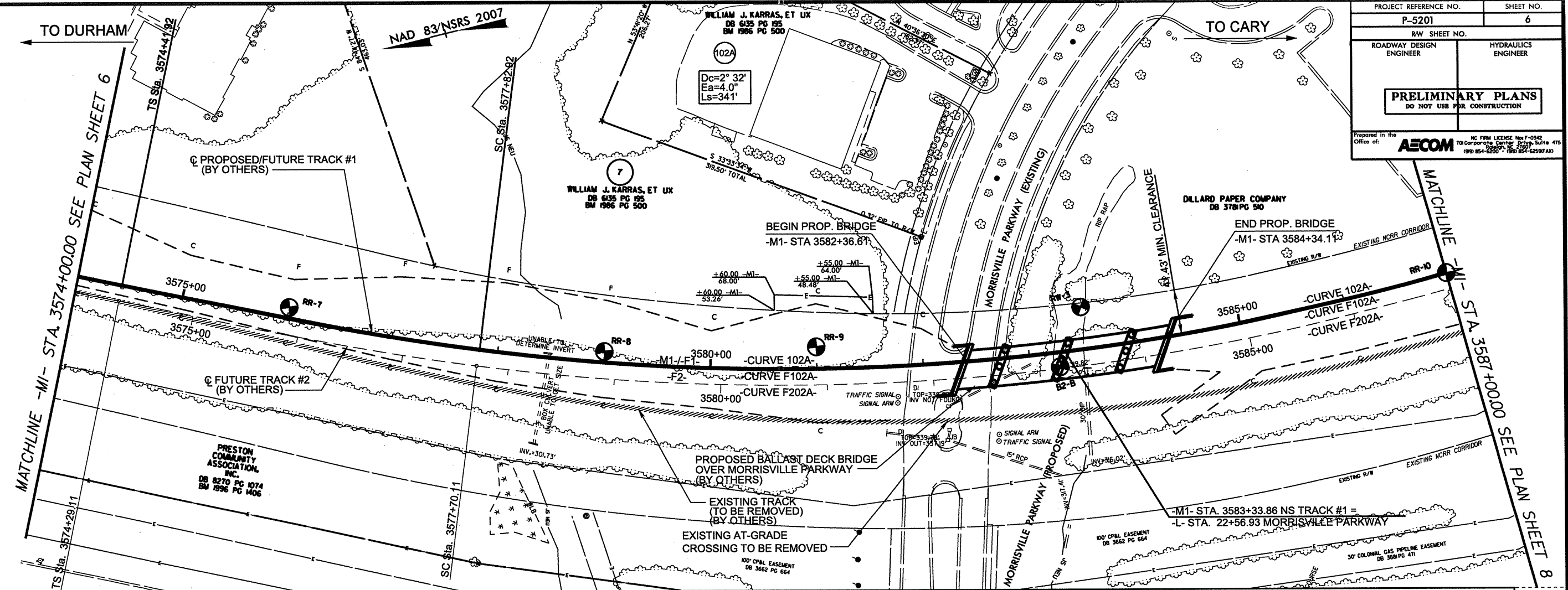


*Note: Inferred stratigraphy drawn through the borings with both projected onto the profile.

SOIL TEST RESULTS															
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	LL	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
S-513H	40' LT	3572+00	4.2-5.7	A-4 (4)	33	8	25.1	15.9	25.1	82.7	98	81	62	7.7	N/A

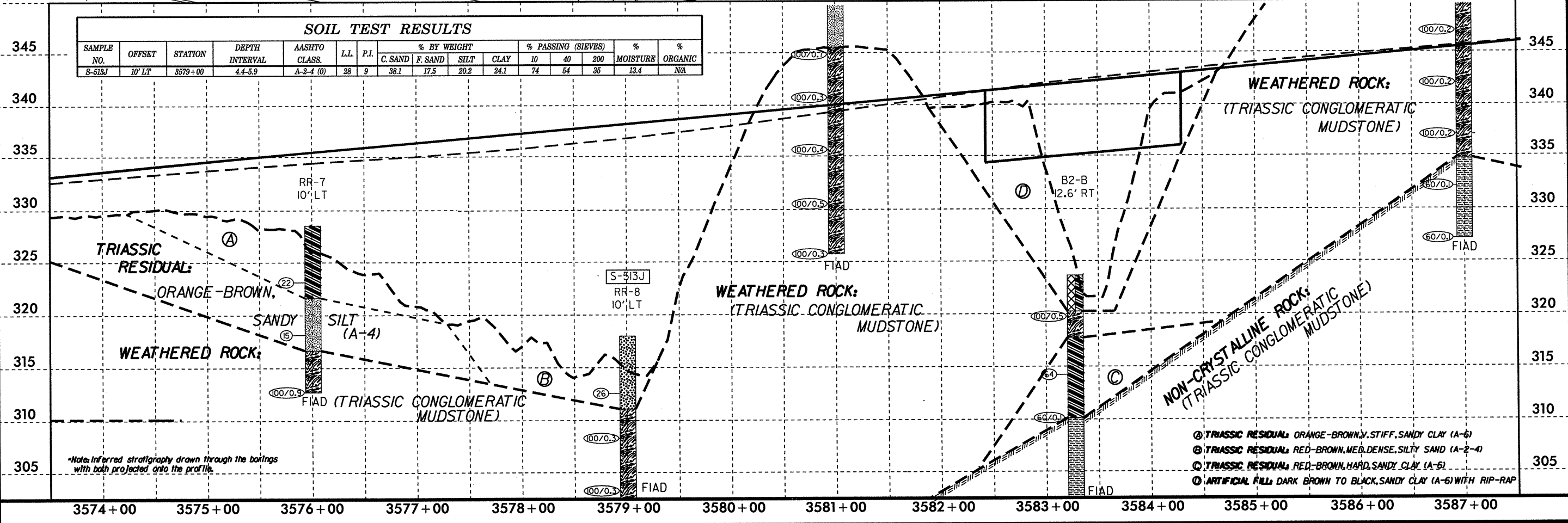


PROJECT REFERENCE NO. P-5201	SHEET NO. 6
RW SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
PRELIMINARY PLANS DO NOT USE FOR CONSTRUCTION	
<small>Prepared in the Office of:</small> AECOM	



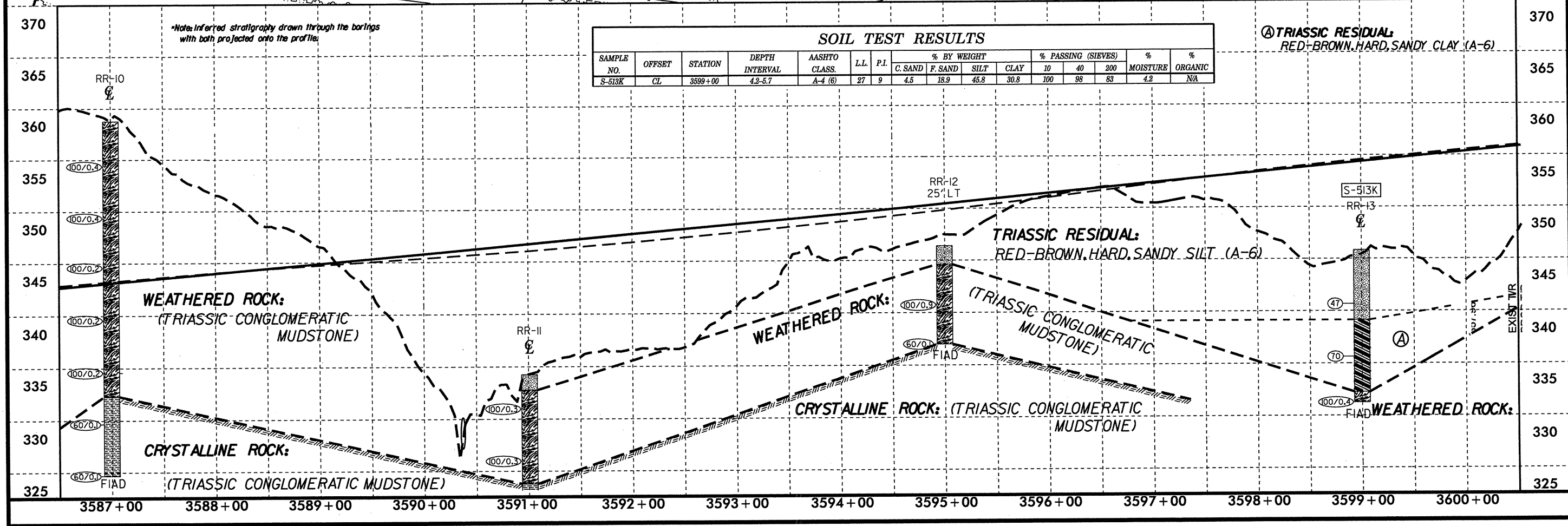
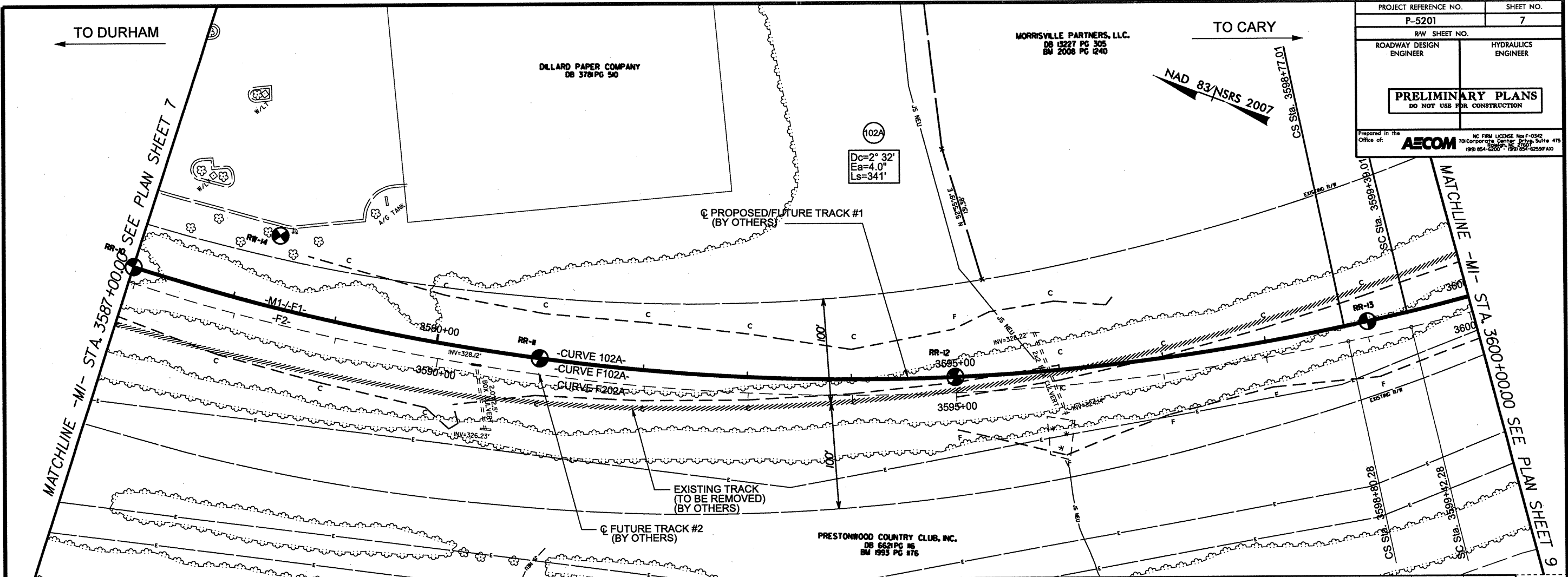
SOIL TEST RESULTS

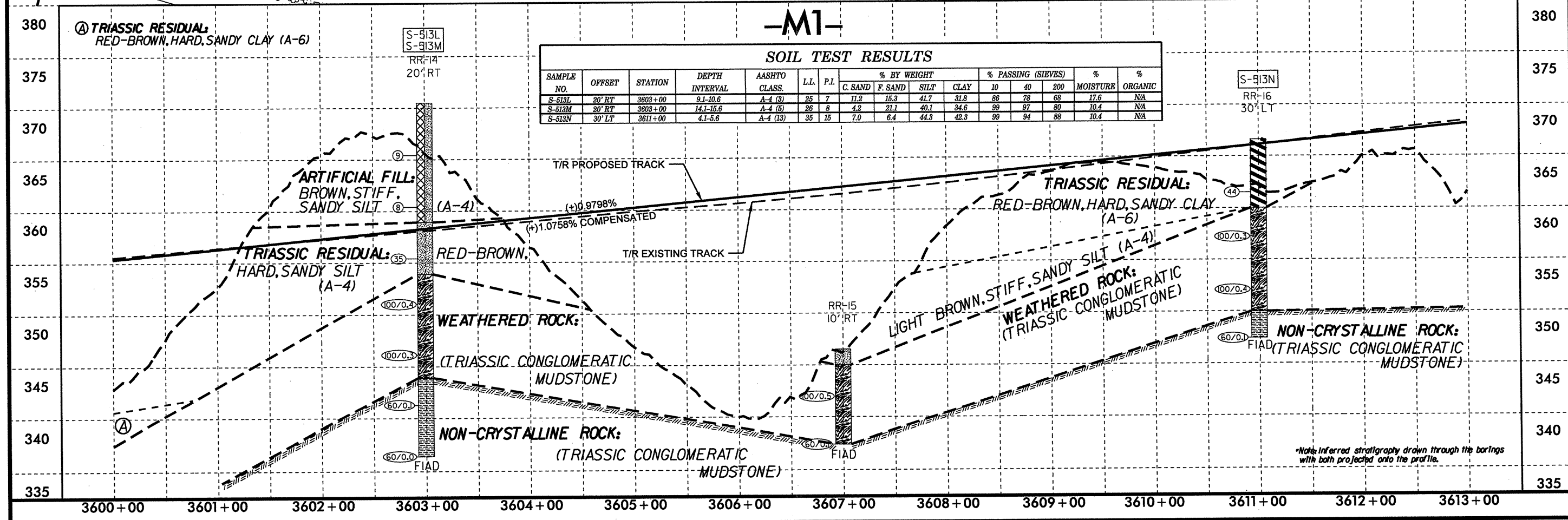
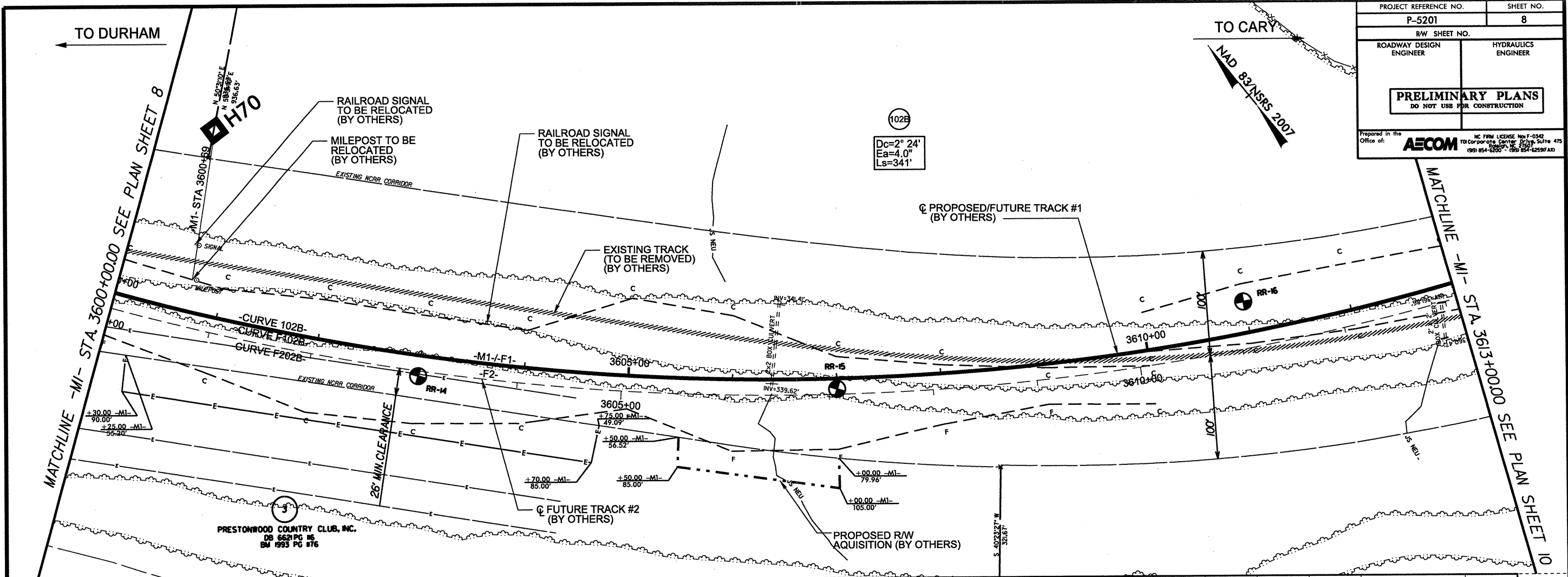
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			MOISTURE	ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
S-513J	10' LT	3579+00	4.4-5.9	A-2-4 (0)	28	9	38.1	17.5	20.2	24.1	74	54	35	13.4	N/A

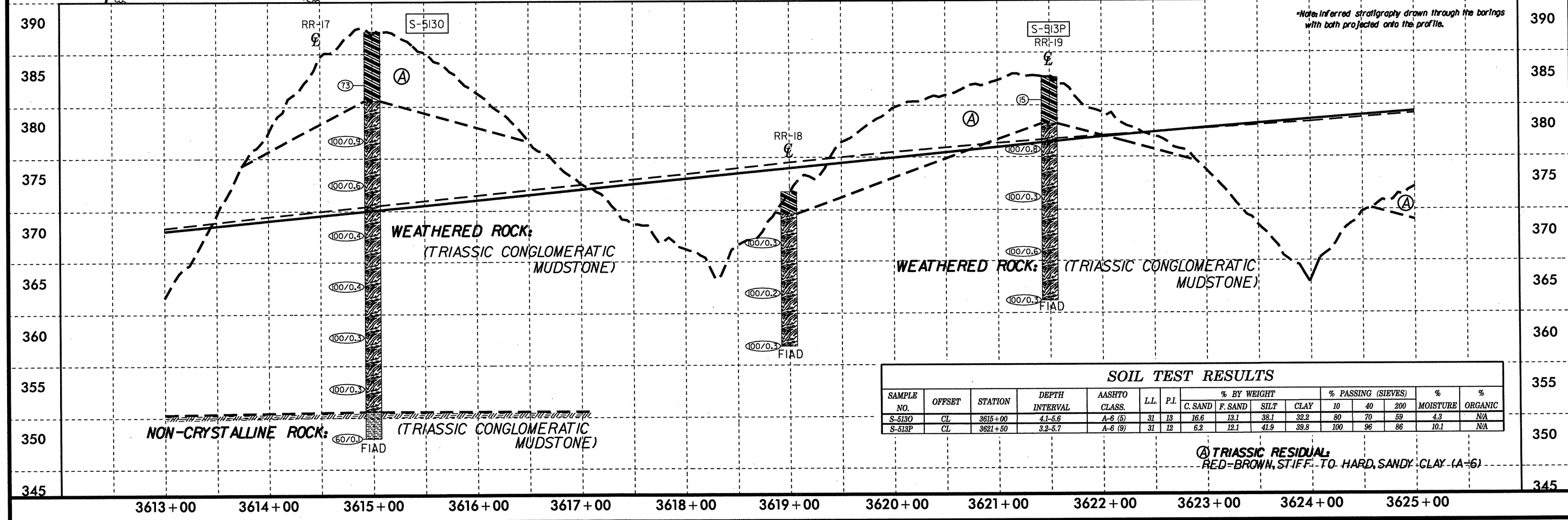
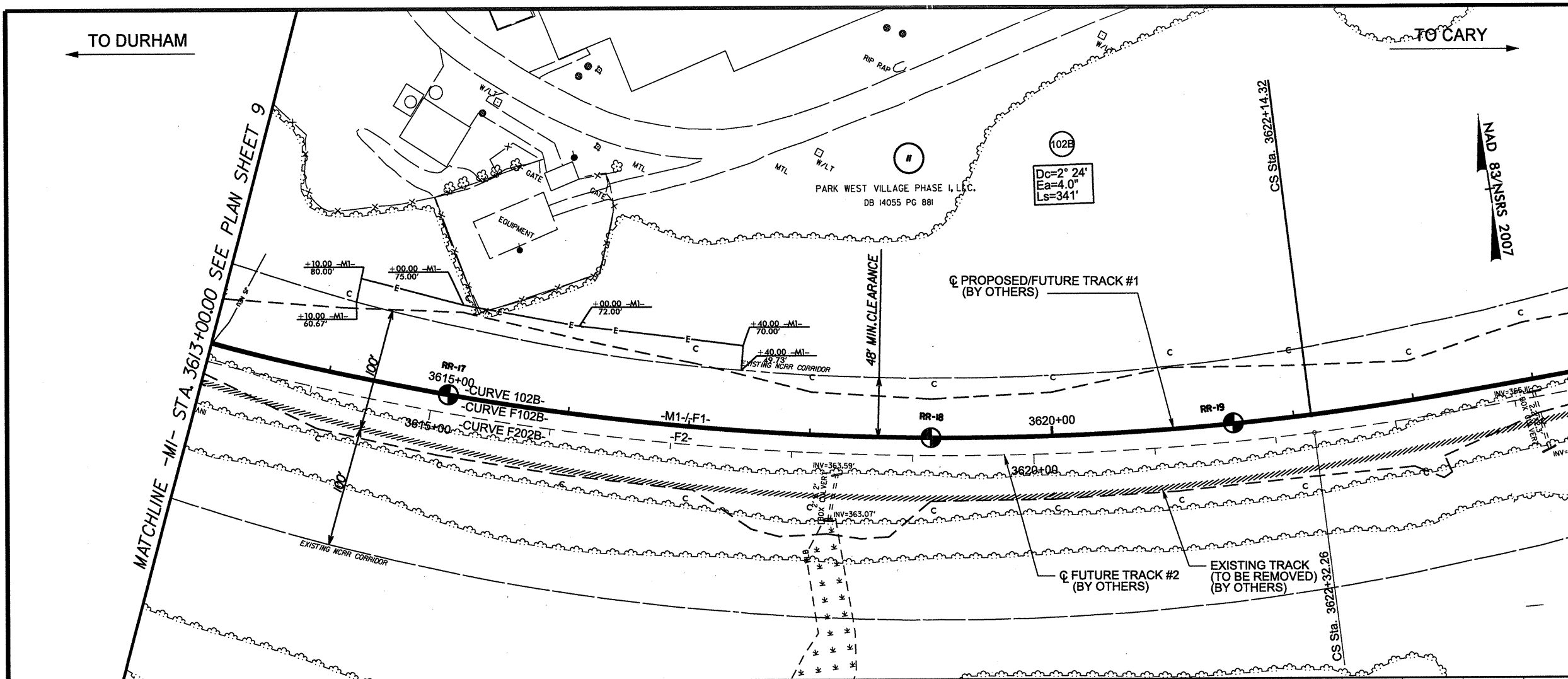


- ⊙ TRIASSIC RESIDUAL: ORANGE-BROWN, V. STIFF, SANDY CLAY (A-6)
- ⊙ TRIASSIC RESIDUAL: RED-BROWN, MED. DENSE, SILTY SAND (A-2-4)
- ⊙ TRIASSIC RESIDUAL: RED-BROWN, HARD, SANDY CLAY (A-5)
- ⊙ ARTIFICIAL FILL: DARK BROWN TO BLACK, SANDY CLAY (A-6) WITH RIP-RAP

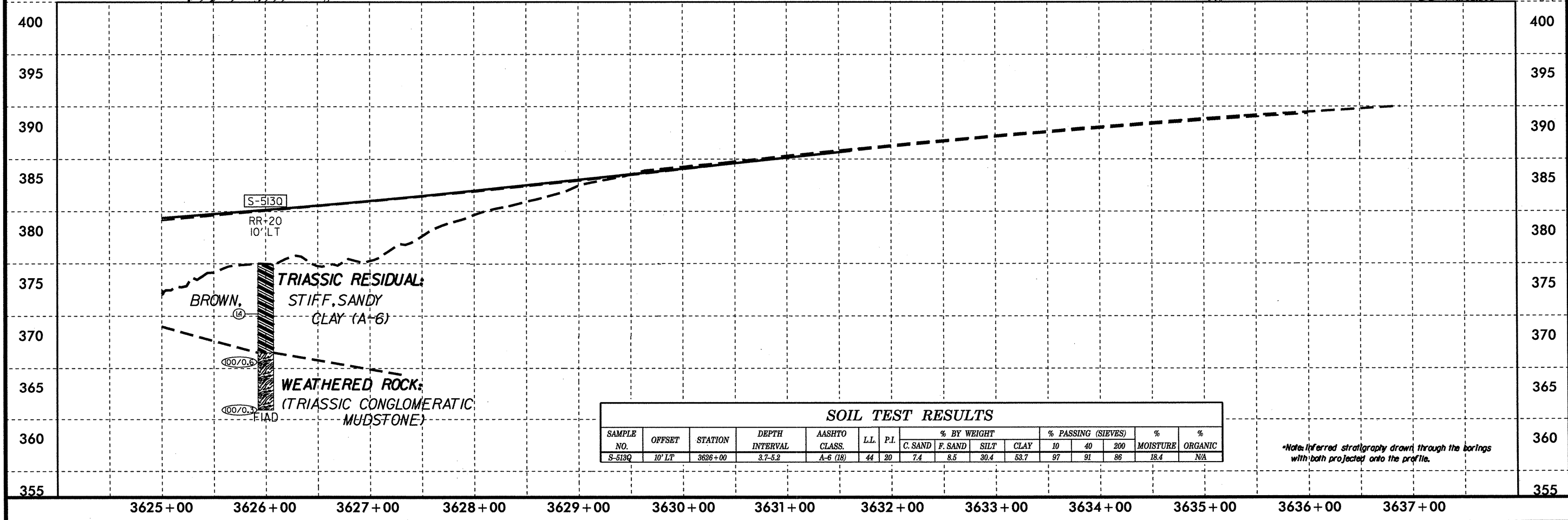
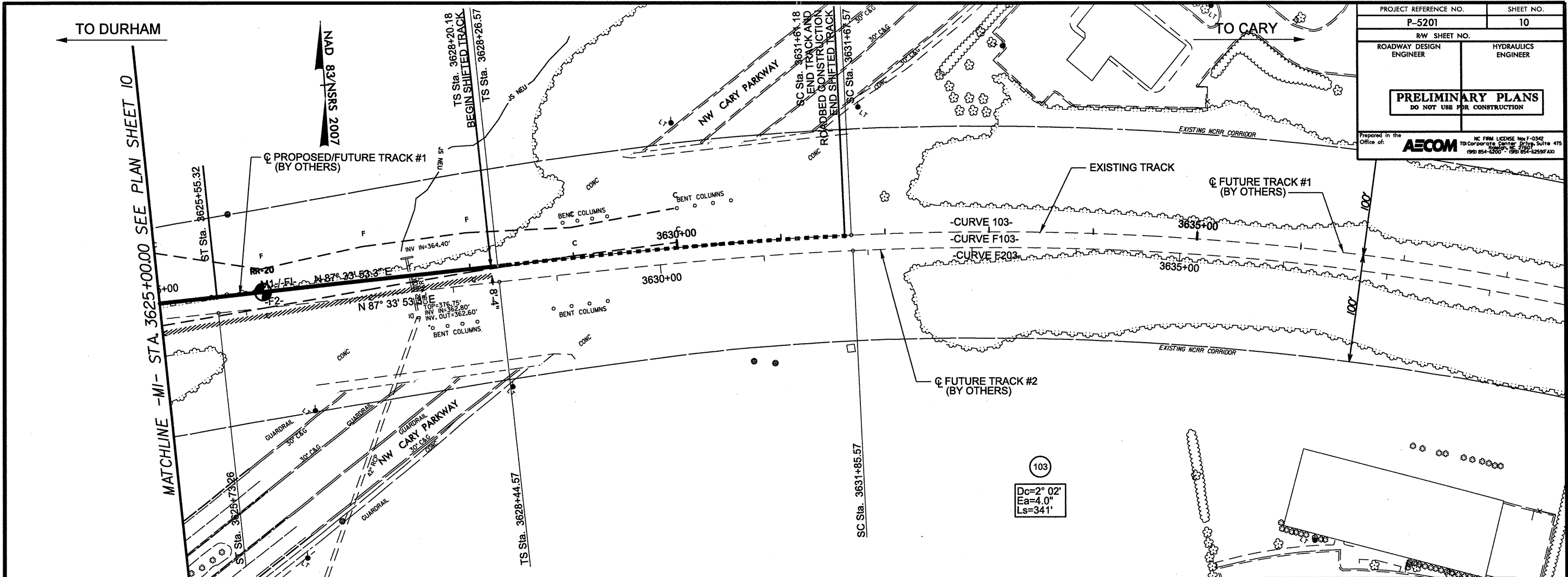
PROJECT REFERENCE NO. P-5201	SHEET NO. 7
RW SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
PRELIMINARY PLANS DO NOT USE FOR CONSTRUCTION	
Prepared in the Office of: AECOM <small>NC PERM LICENSE No F-0542 101 Corporate Center Drive, Suite 475 Raleigh, NC 27601 (919) 854-6200 • (919) 854-6259 FAX</small>	





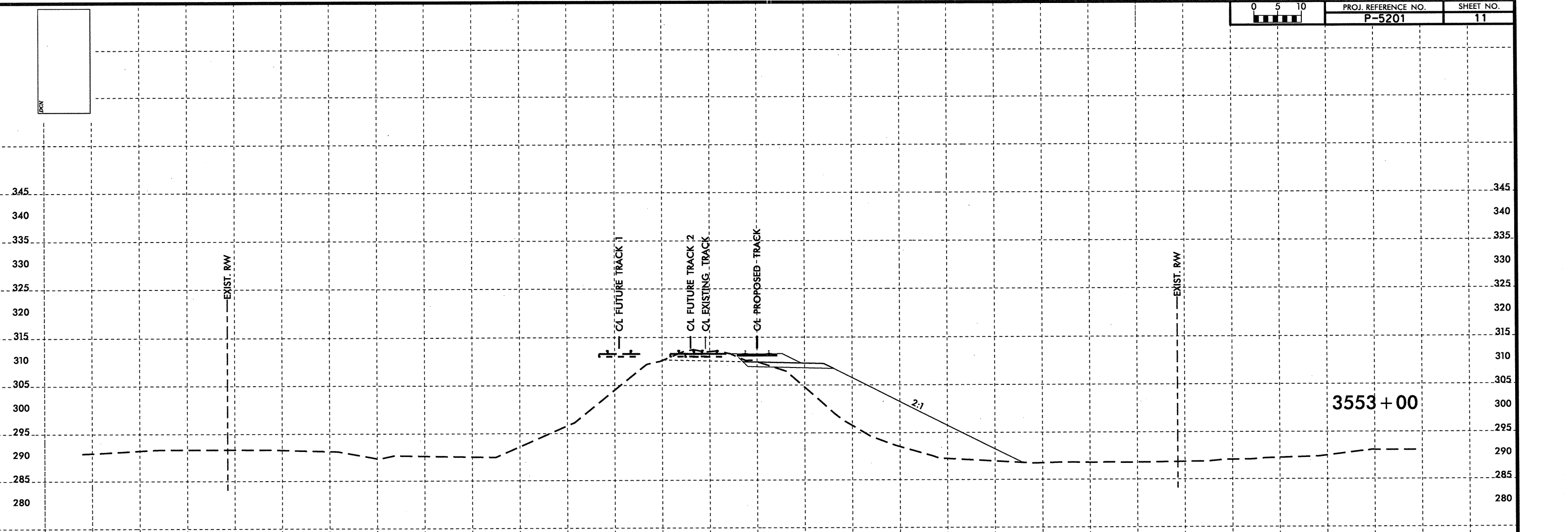


PROJECT REFERENCE NO. P-5201	SHEET NO. 10
RW SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
PRELIMINARY PLANS DO NOT USE FOR CONSTRUCTION	
<small>Prepared in the Office of:</small> AECOM	



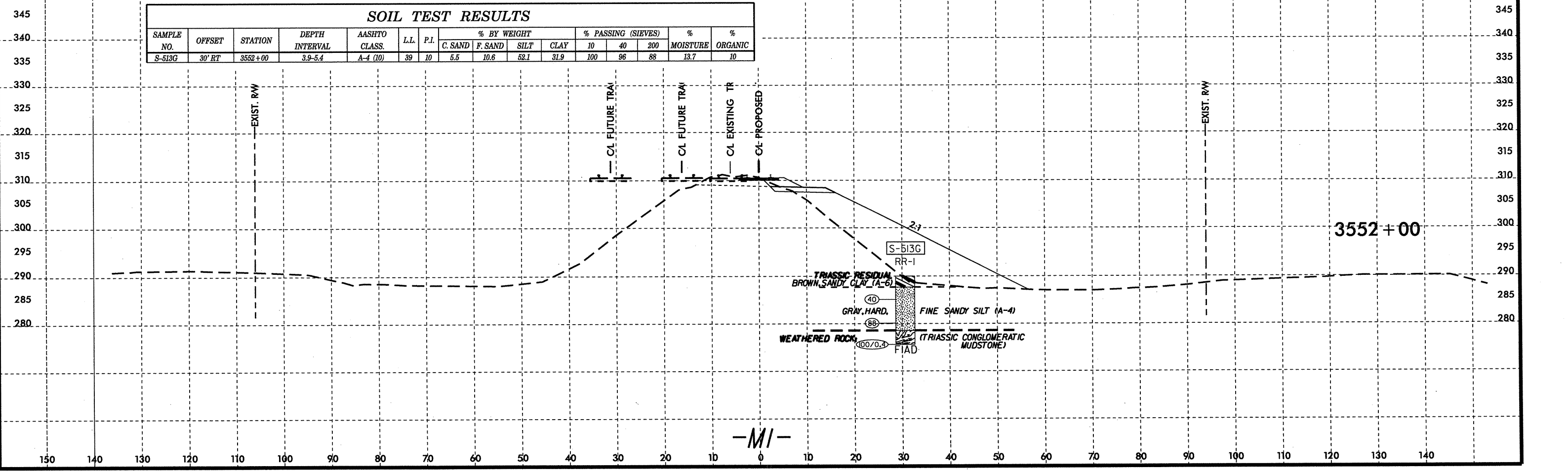
SOIL TEST RESULTS															
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	LL	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							G. SAND	F. SAND	SILT	CLAY	10	40	200		
S-513Q	10' LT	3626+00	3.7-5.2	A-6 (18)	44	20	7.4	8.5	30.4	53.7	97	91	86	18.4	N/A

**Note: Inferred stratigraphy drawn through the borings with both projected onto the profile.*



SOIL TEST RESULTS

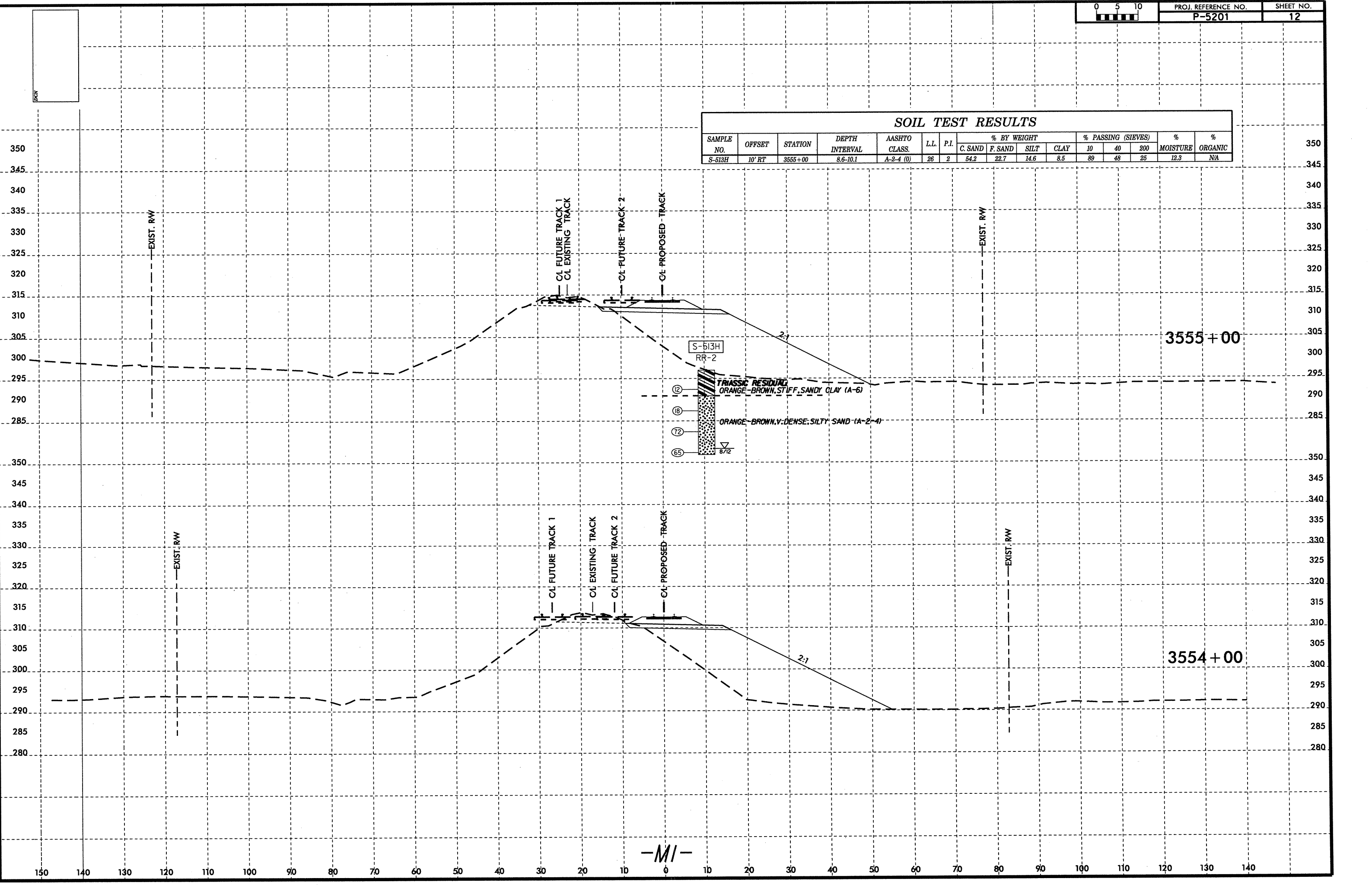
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	LL.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE ORGANIC	
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
S-513G	30' RT	3552+00	3.9-5.4	A-4 (10)	39	10	5.5	10.6	52.1	31.9	100	96	88	13.7	10



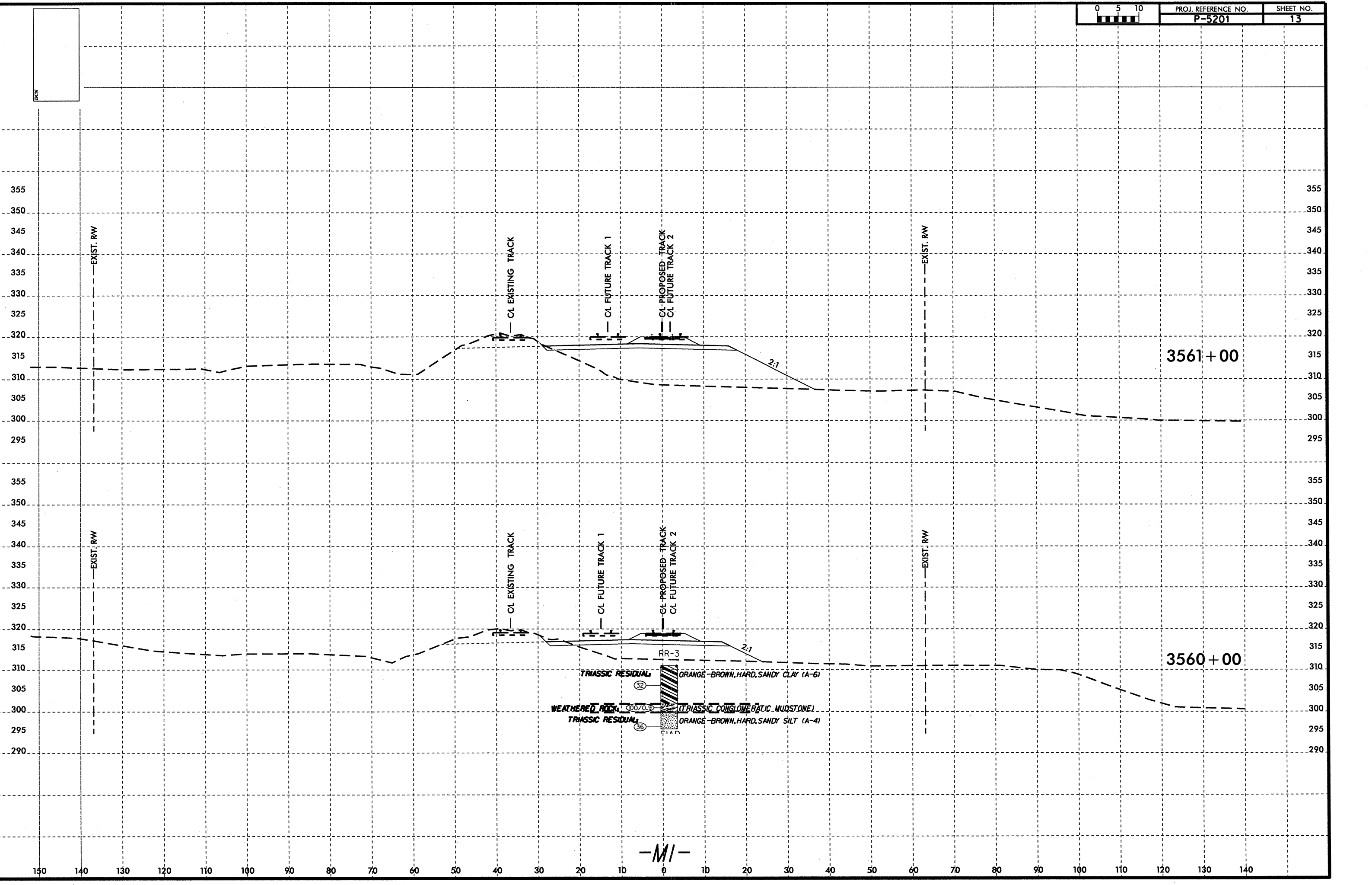
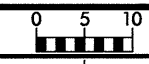
-M-



SOIL TEST RESULTS															
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	LL	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
S-513H	10' RT	3555+00	8.6-10.1	A-2-4 (0)	26	2	54.2	22.7	14.6	8.5	89	48	25	12.3	NA



-M-

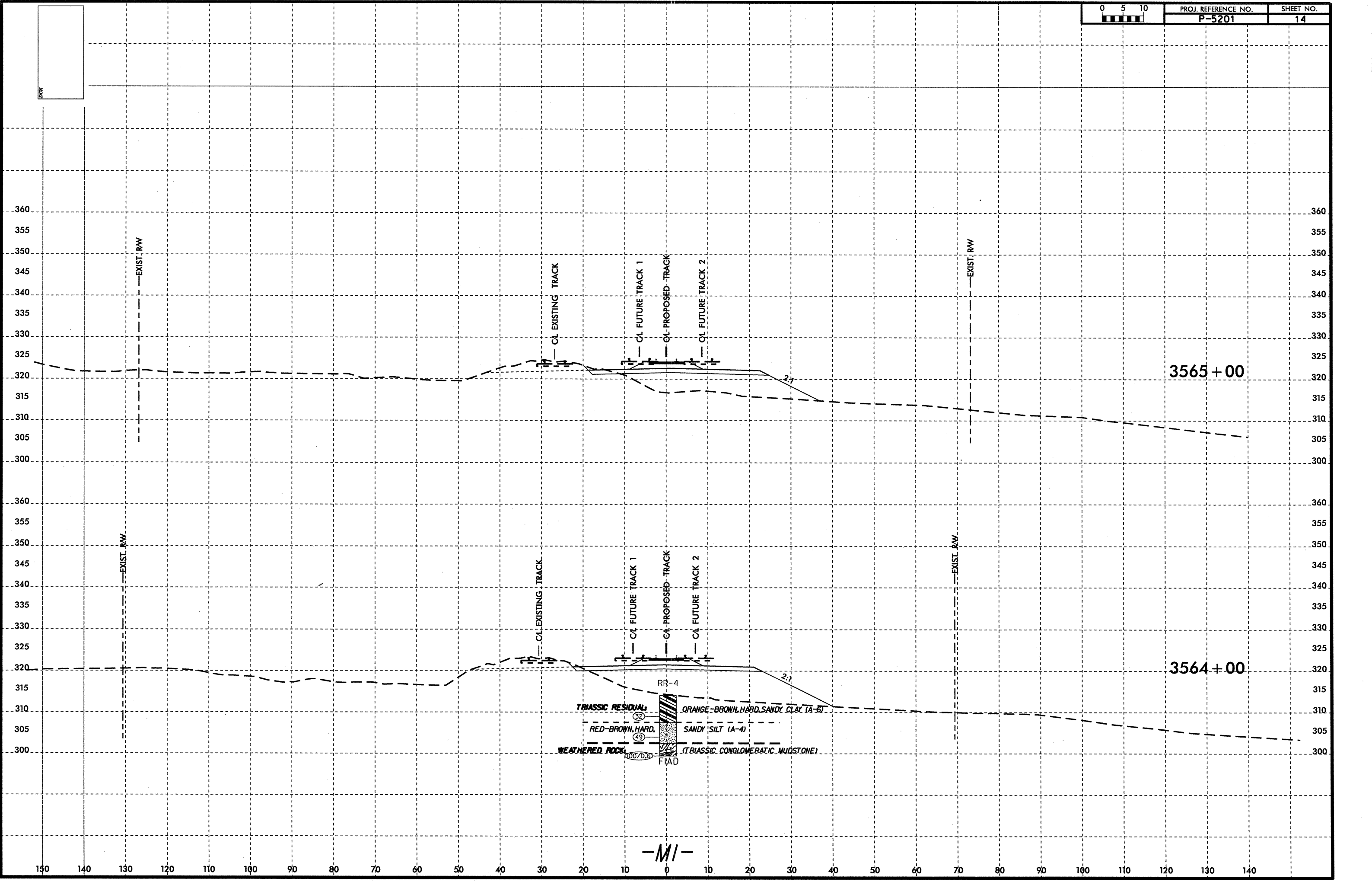
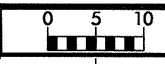


3561+00

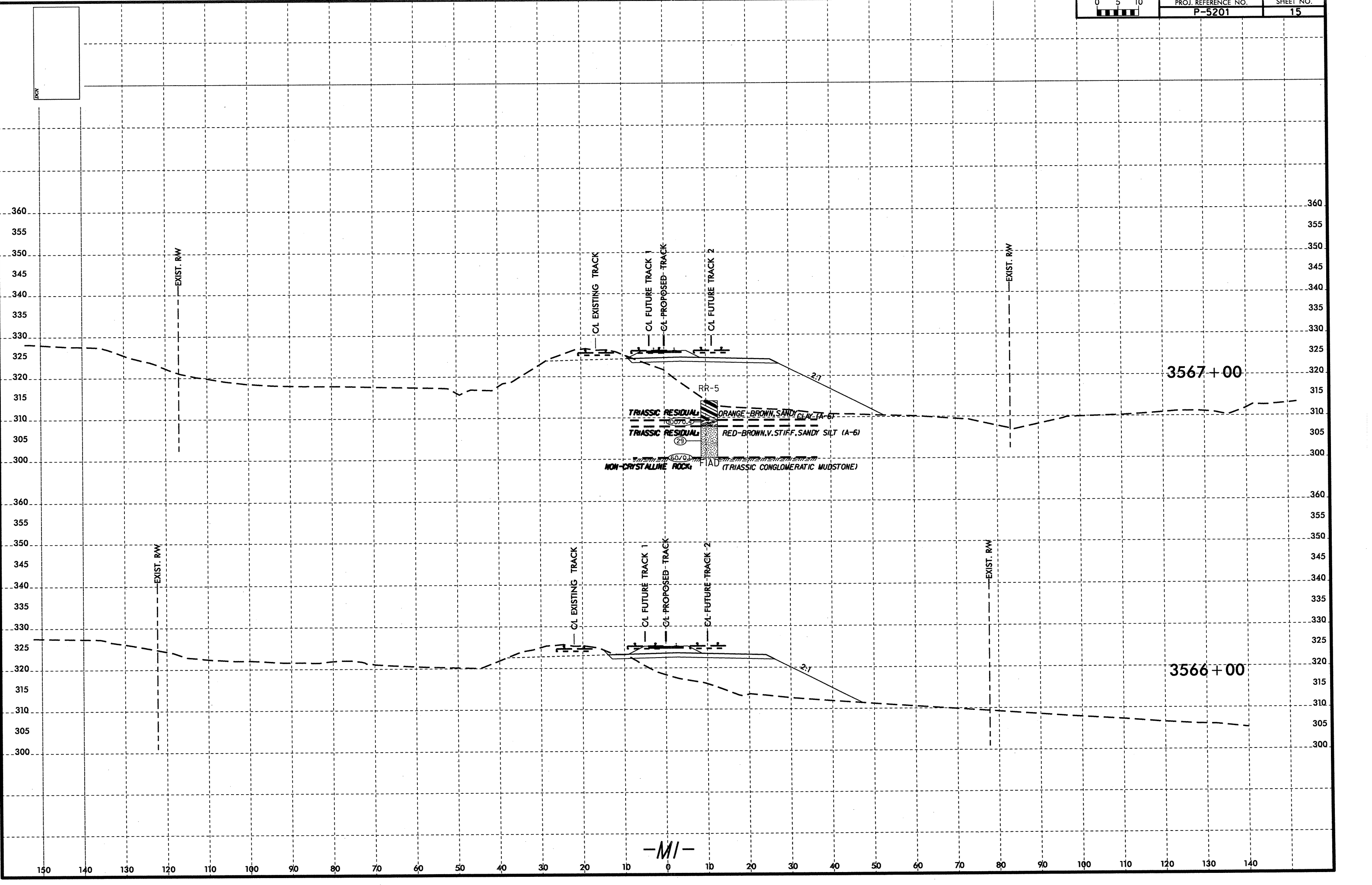
3560+00

-MI-

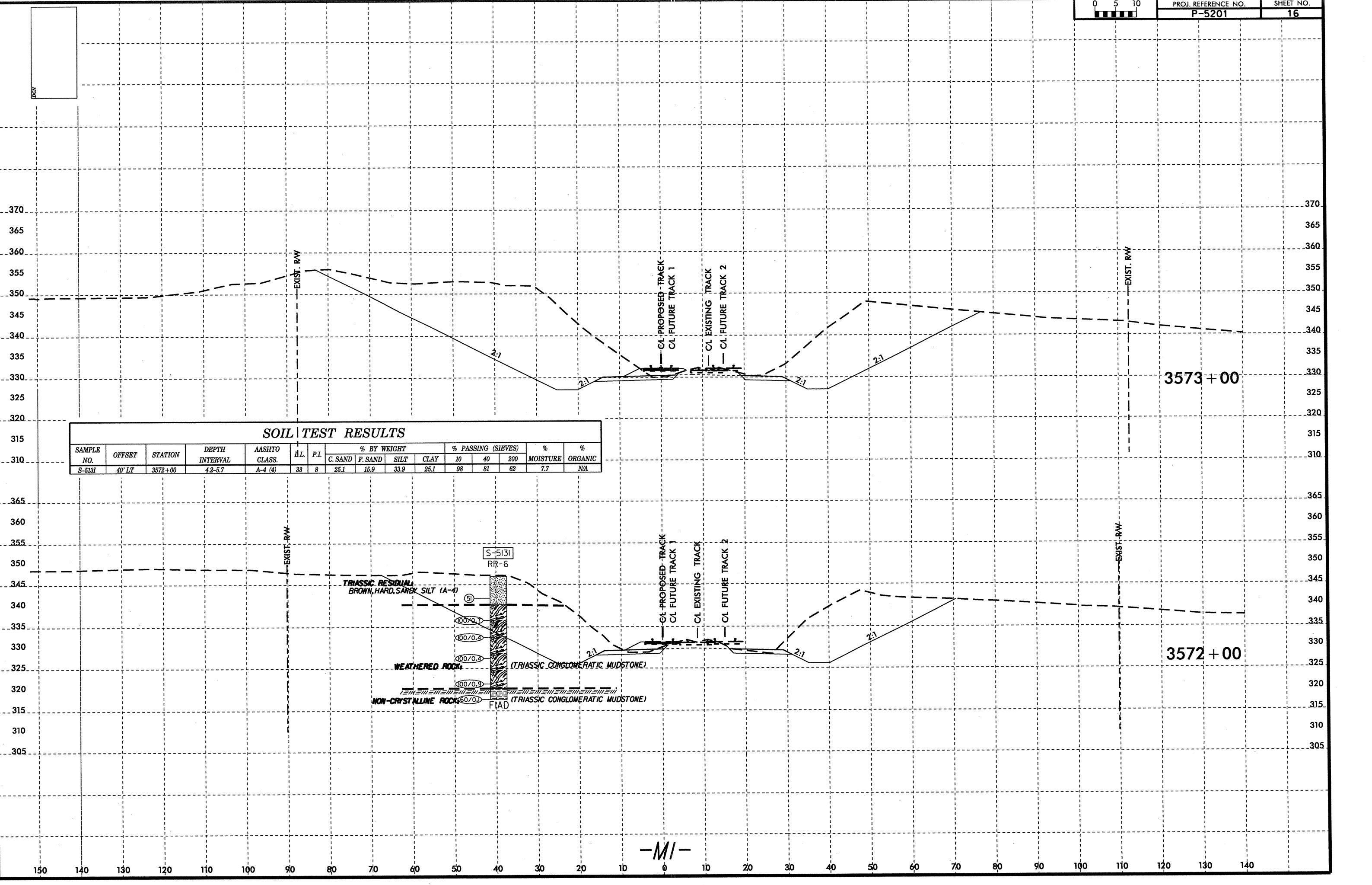
TRASSIC RESIDUAL (32) ORANGE-BROWN, HARD, SANDY CLAY (A-6)
WEATHERED ROCK (32) (TRIASSIC CONGLOMERATIC MUDSTONE)
TRASSIC RESIDUAL (36) ORANGE-BROWN, HARD, SANDY SILT (A-4)



-M1-



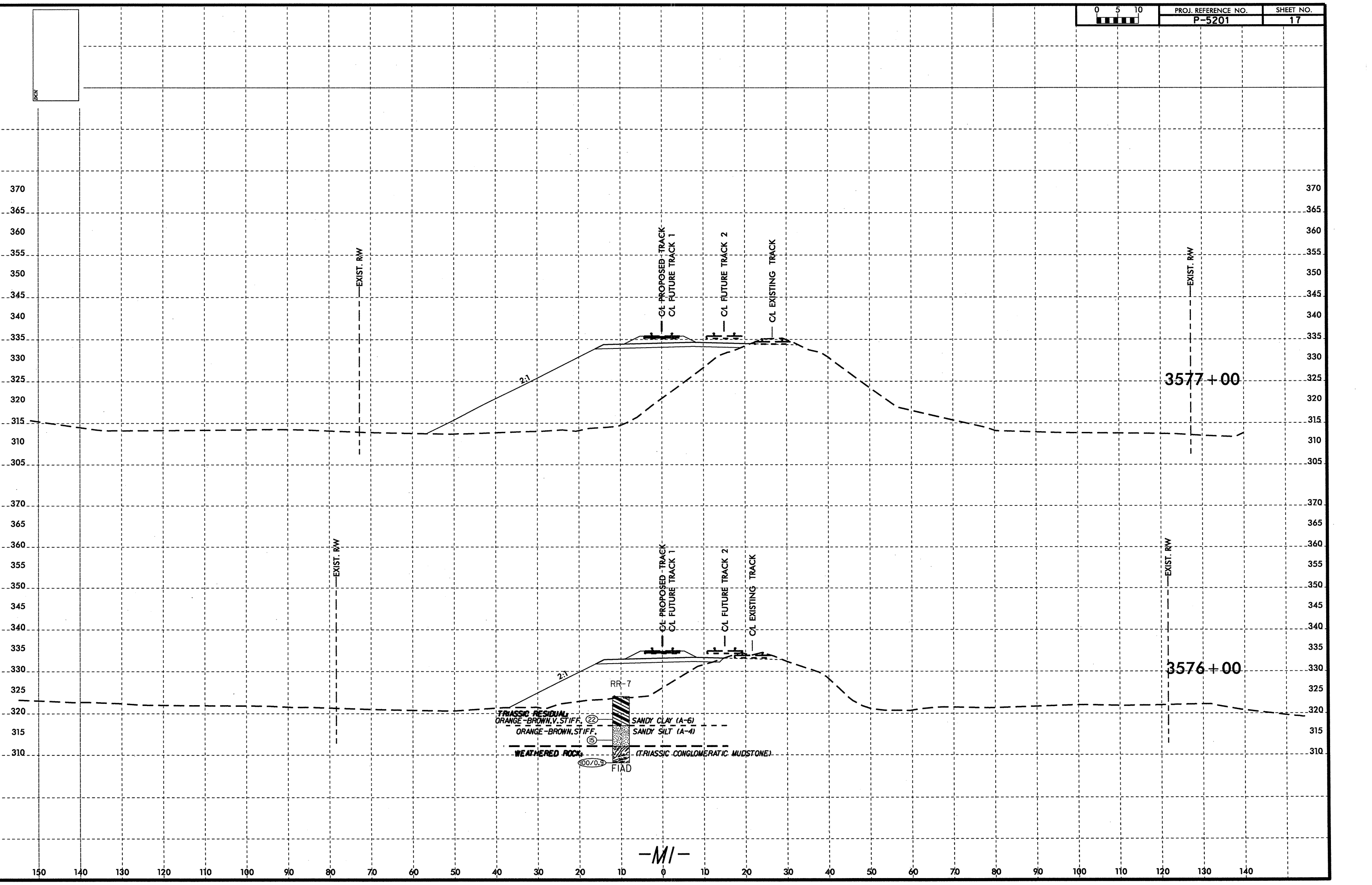
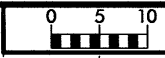
-M1-



SOIL TEST RESULTS

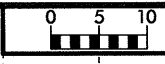
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	LL	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
S-5131	40' LT	3572+00	4.2-5.7	A-4 (4)	33	8	25.1	15.9	33.9	25.1	98	81	62	7.7	NA

-MI-

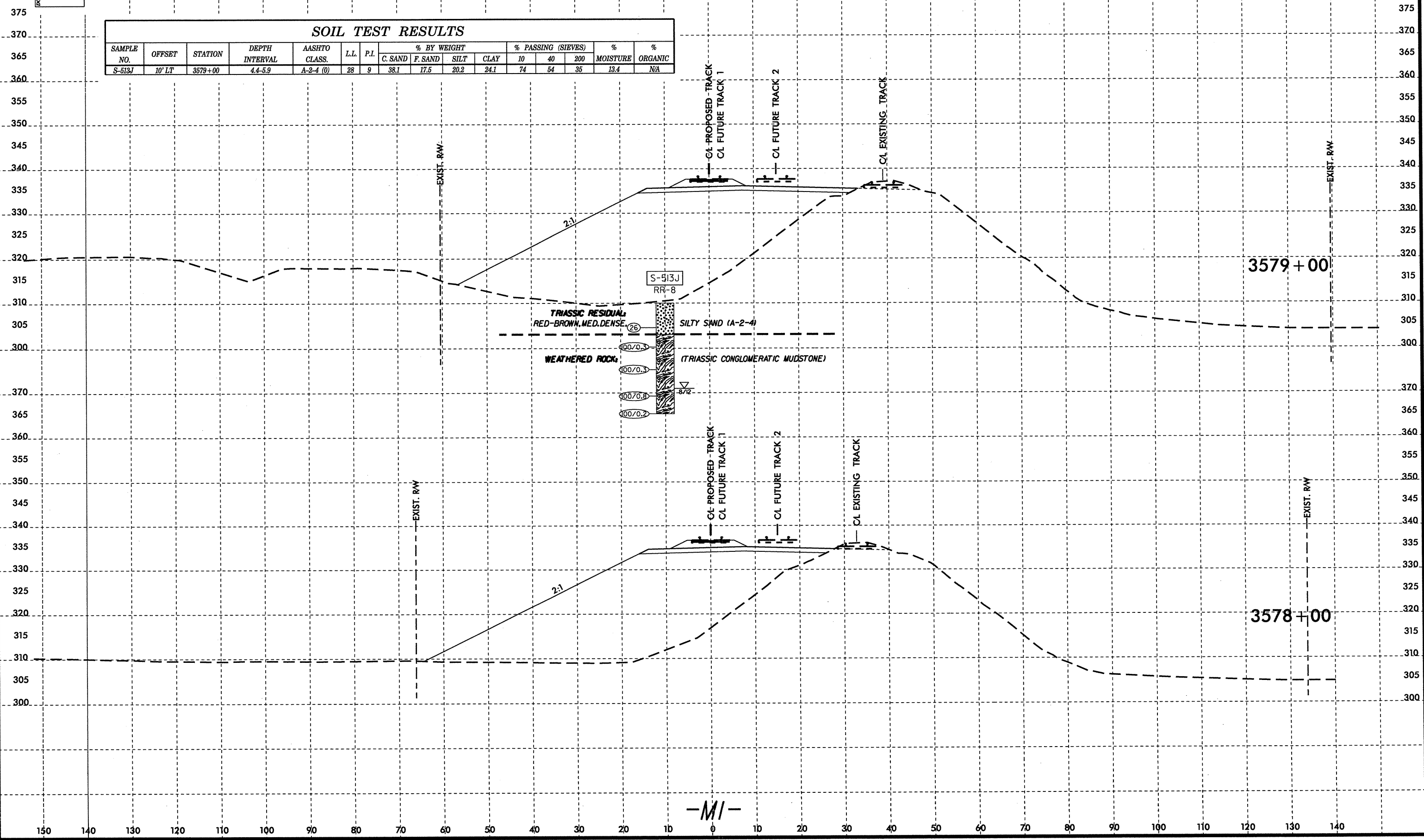


TRIASSIC RESIDUAL
 ORANGE-BROWN, V. STIFF, (2)
 ORANGE-BROWN, STIFF, (B)
 WEATHERED ROCK (00/0.3)
 RR-7
 SANDY CLAY (A-6)
 SANDY SILT (A-4)
 FIAD
 (TRIASSIC CONGLOMERATIC MUDSTONE)

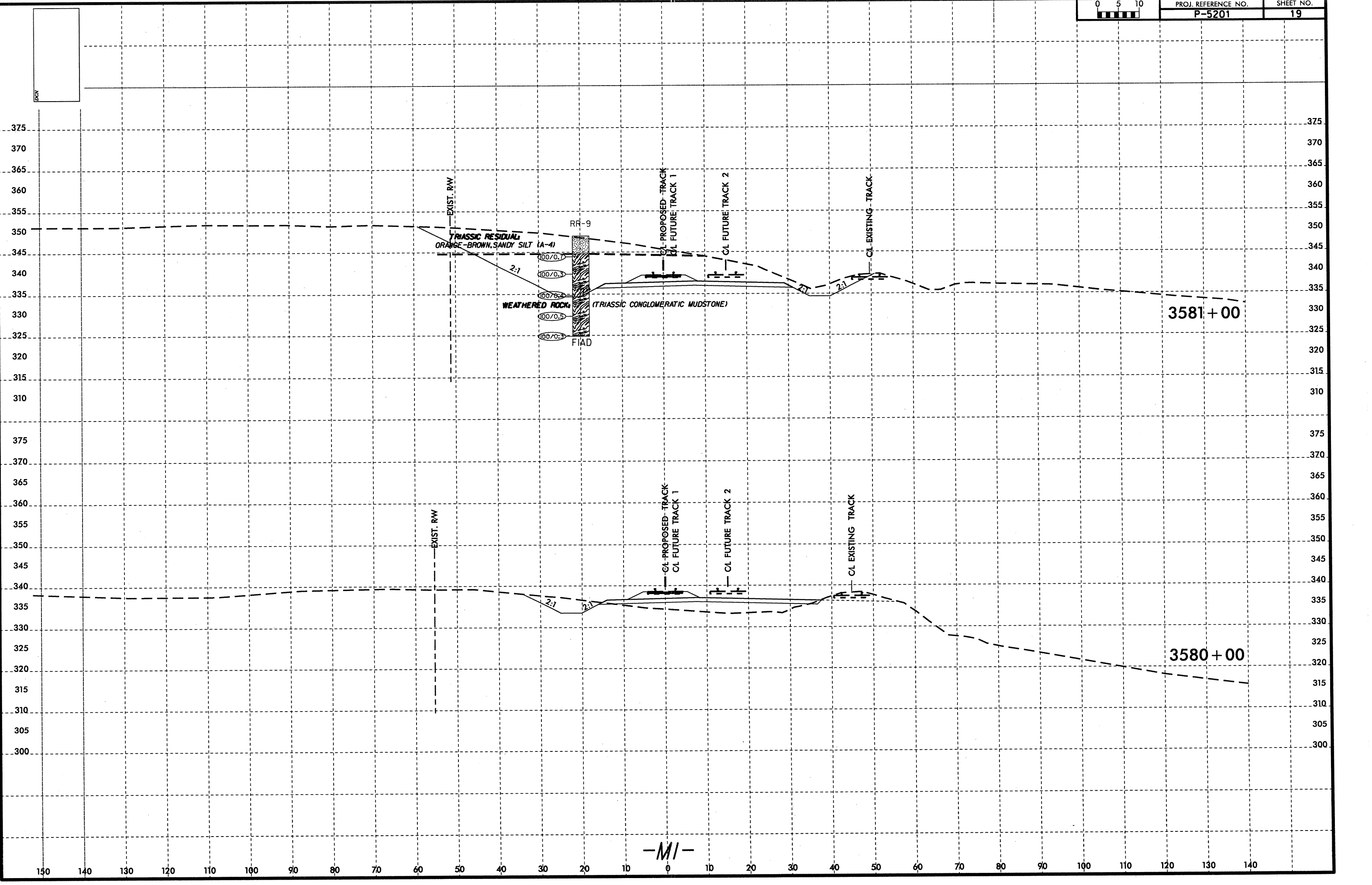
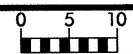
-MI-



SOIL TEST RESULTS															
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	LL	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
S-513J	10' LT	3579+00	4.4-5.9	A-2-4 (0)	28	9	38.1	17.5	20.2	24.1	74	54	35	13.4	N/A



-M-



EXIST. RW

RR-9

TRIASSIC RESIDUAL
ORANGE-BROWN SANDY SILT (A-4)

(00/0.1)

(00/0.3)

(00/0.4)

(00/0.5)

(00/0.3)

WEATHERED ROCK

(TRIASSIC CONGLOMERATIC MUDSTONE)

FIAD

CL PROPOSED TRACK
CL FUTURE TRACK 1

CL FUTURE TRACK 2

CL EXISTING TRACK

3581+00

EXIST. RW

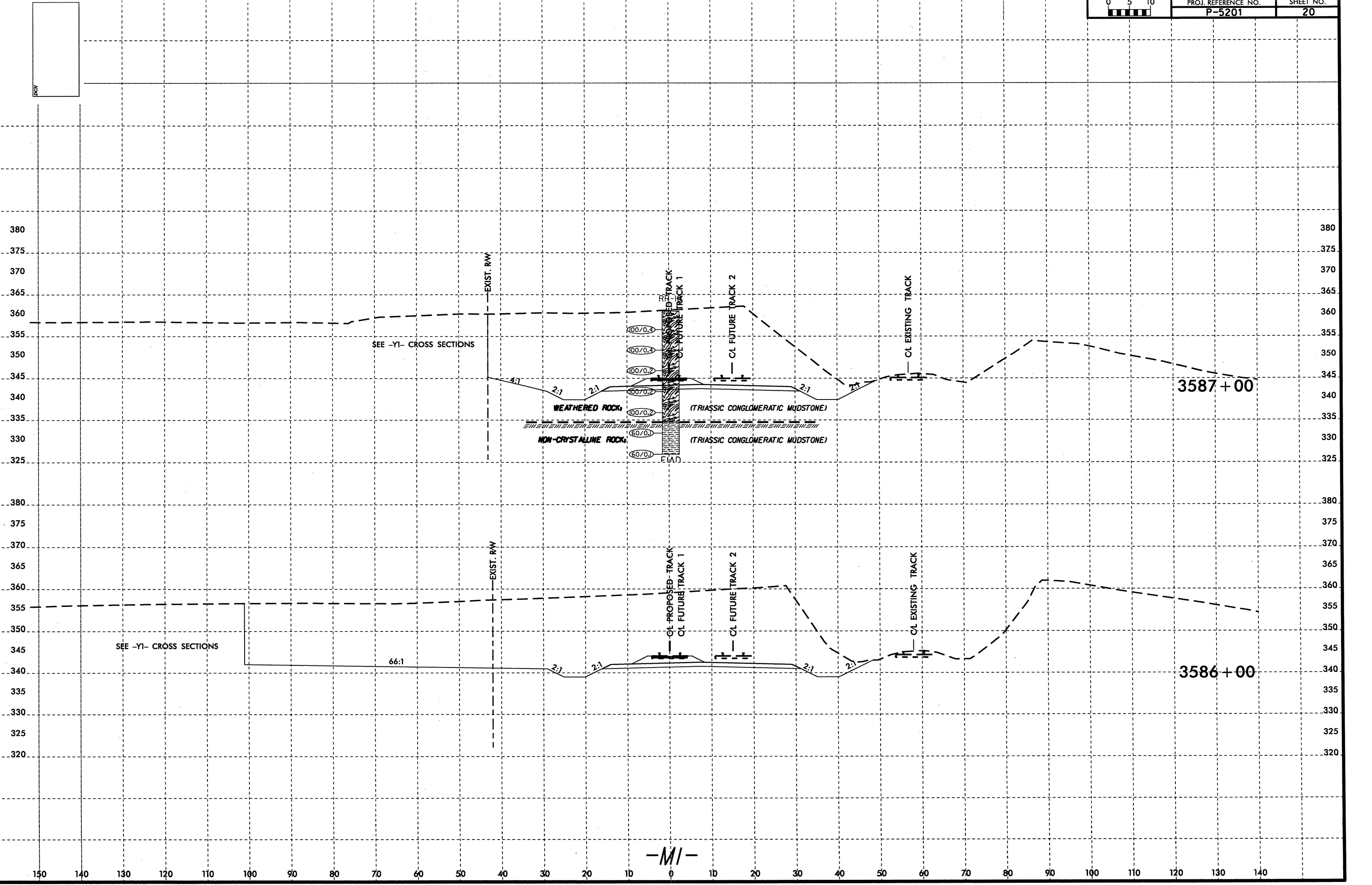
CL PROPOSED TRACK
CL FUTURE TRACK 1

CL FUTURE TRACK 2

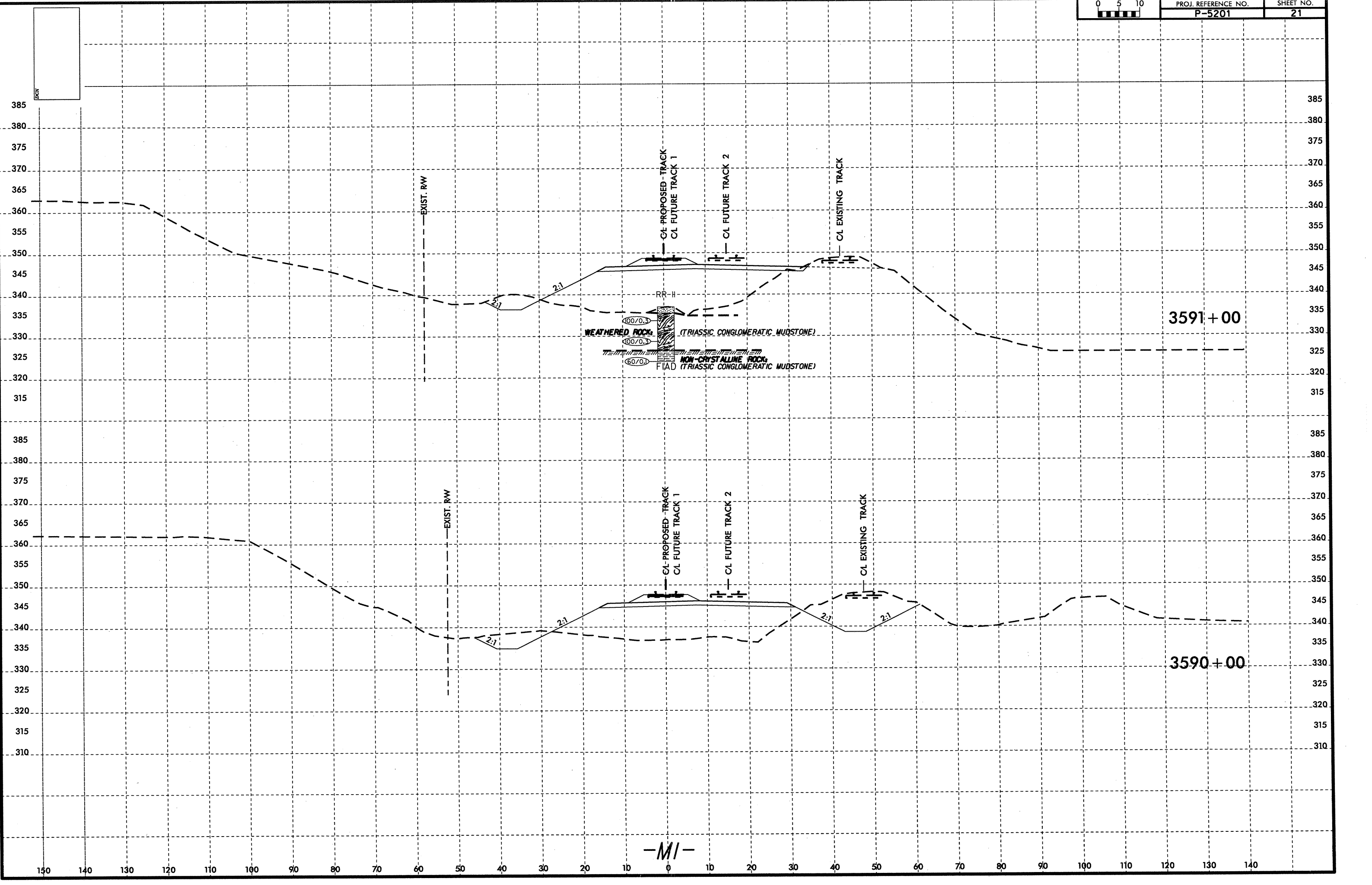
CL EXISTING TRACK

3580+00

-M-



-M1-



-M1-

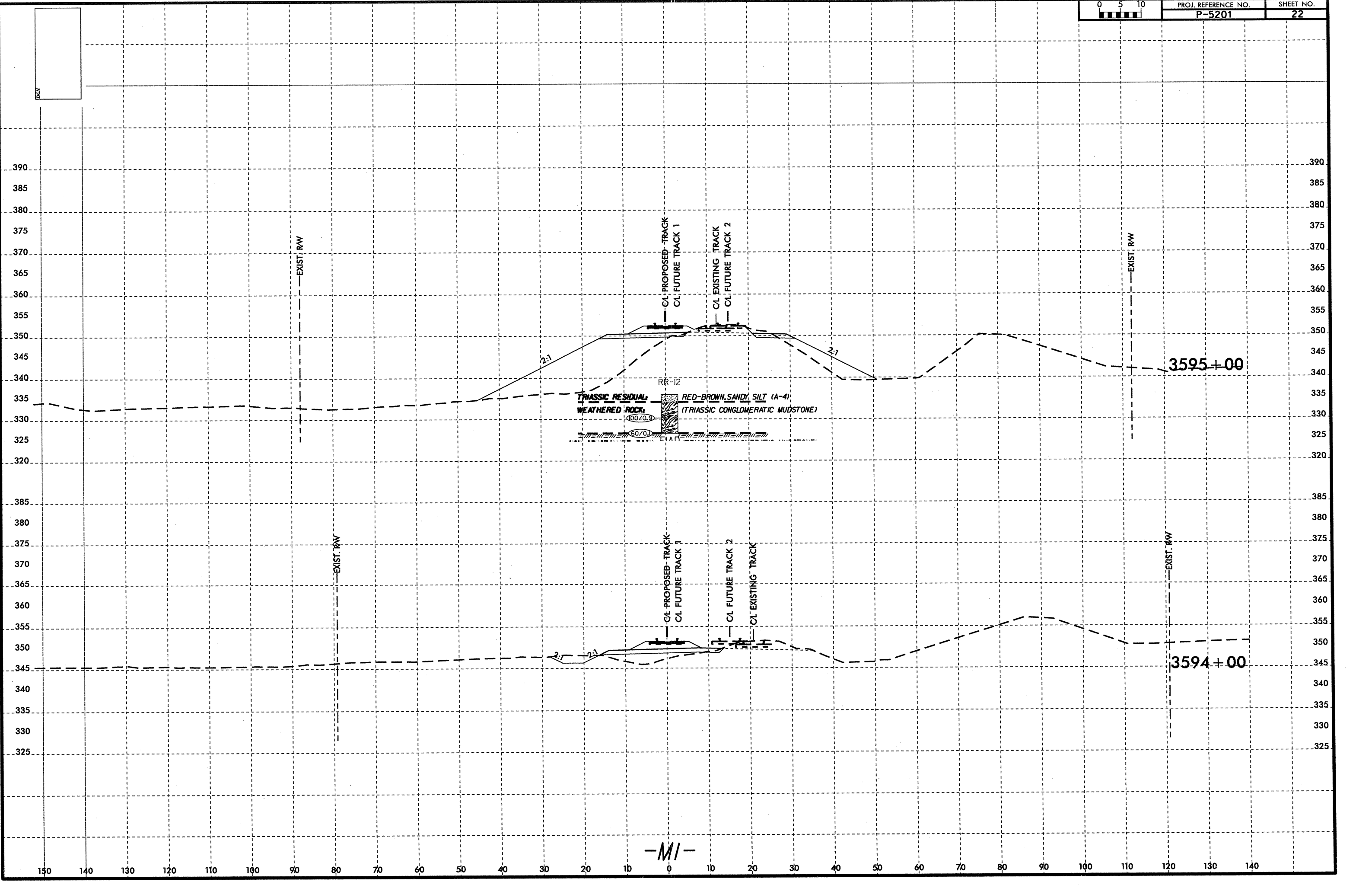
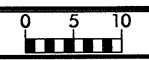
3591+00

3590+00

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

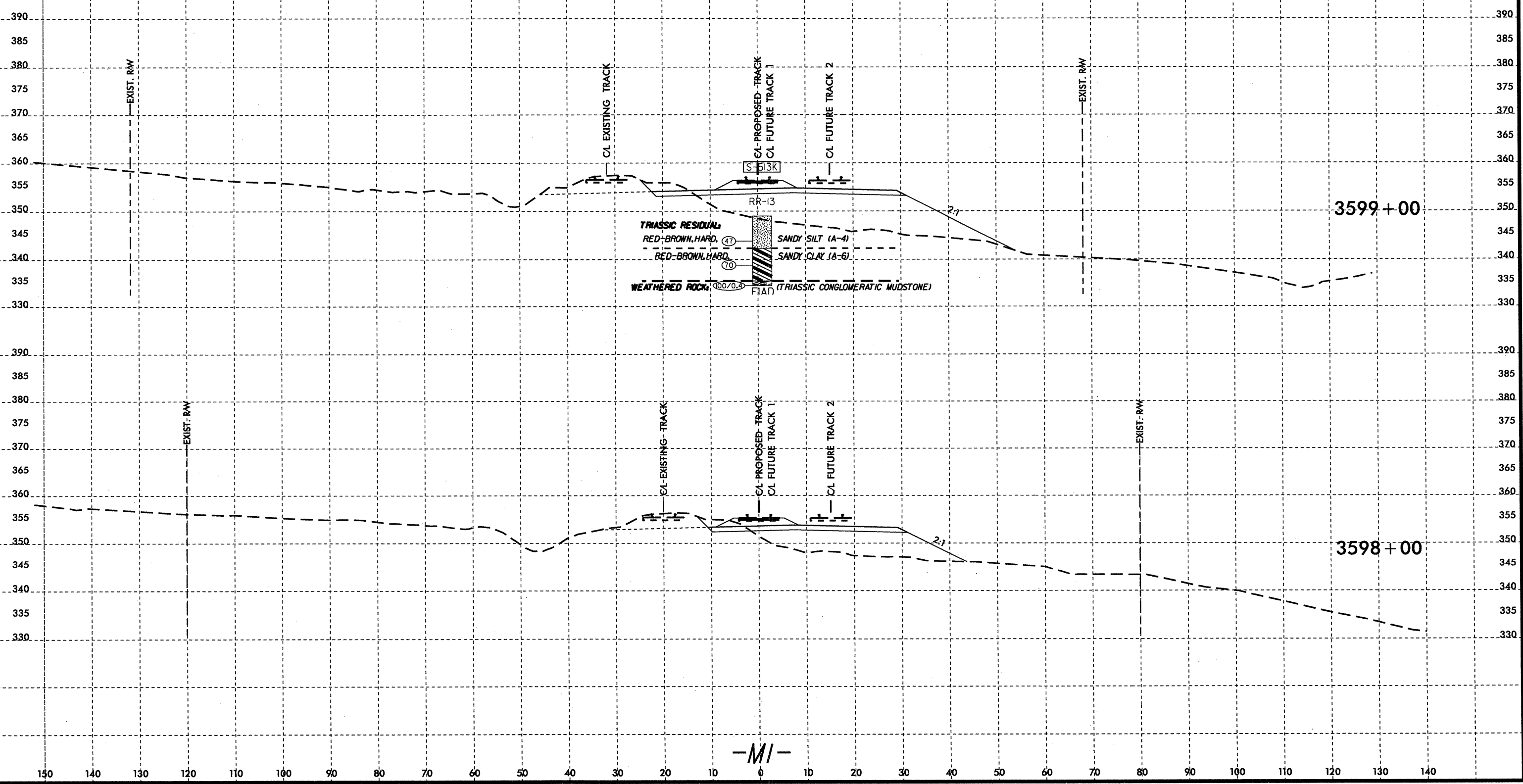
385
380
375
370
365
360
355
350
345
340
335
330
325
320
315
385
380
375
370
365
360
355
350
345
340
335
330
325
320
315
310

385
380
375
370
365
360
355
350
345
340
335
330
325
320
315
385
380
375
370
365
360
355
350
345
340
335
330
325
320
315
310



-M1-

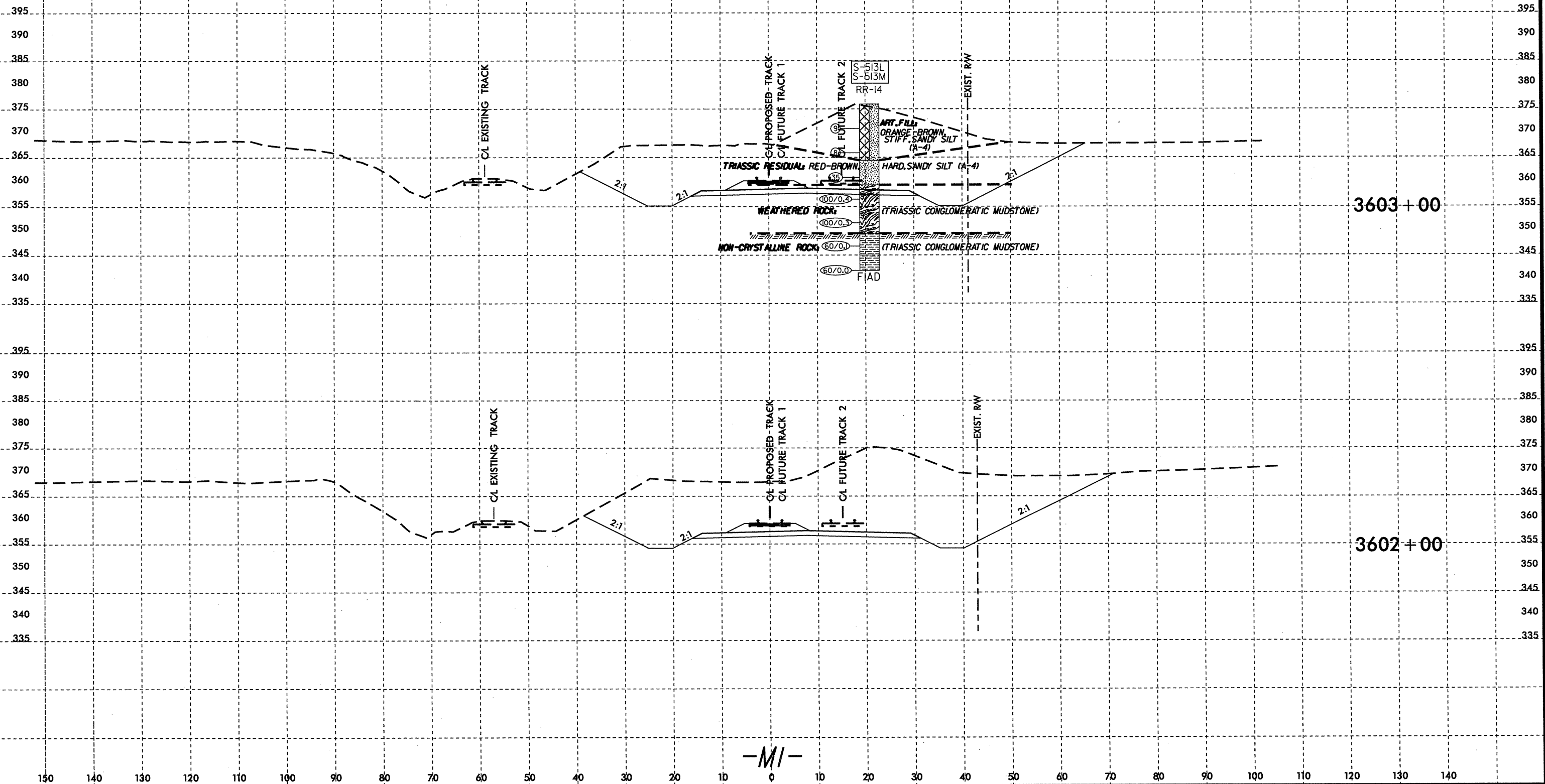
SOIL TEST RESULTS															
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	LL	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
S-513K	CL	3599+00	4.2-5.7	A-4 (6)	27	9	4.5	18.9	45.8	30.8	100	98	83	4.2	N/A



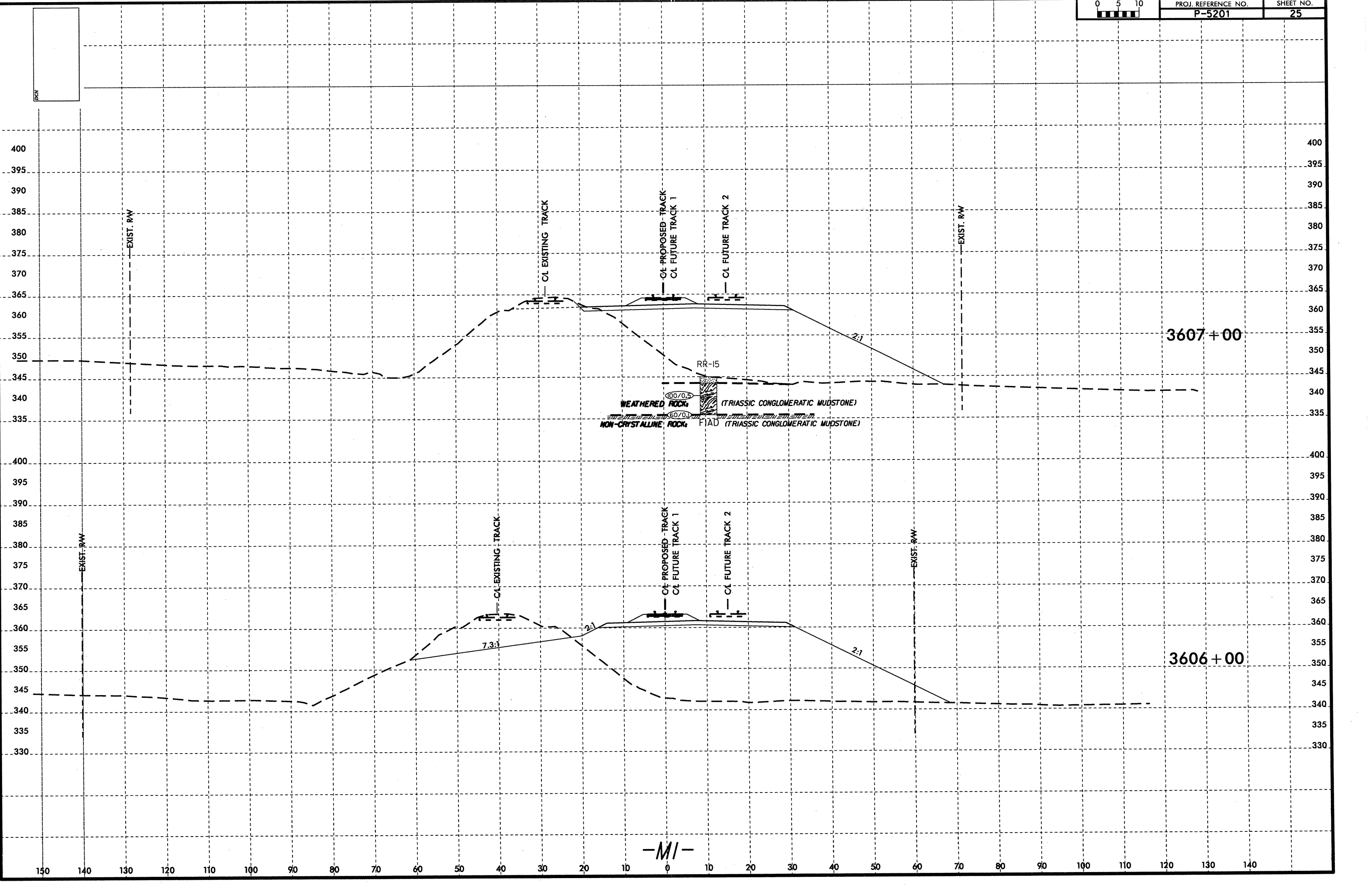
-MI-



SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	LL	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
S-513L	20' RT	3603+00	9.1-10.6	A-4 (3)	25	7	11.2	15.3	41.7	31.8	86	78	10	17.6	N/A
S-513M	20' RT	3603+00	14.1-15.6	A-4 (5)	86	8	4.2	21.1	40.1	34.6	99	97	80	10.4	N/A

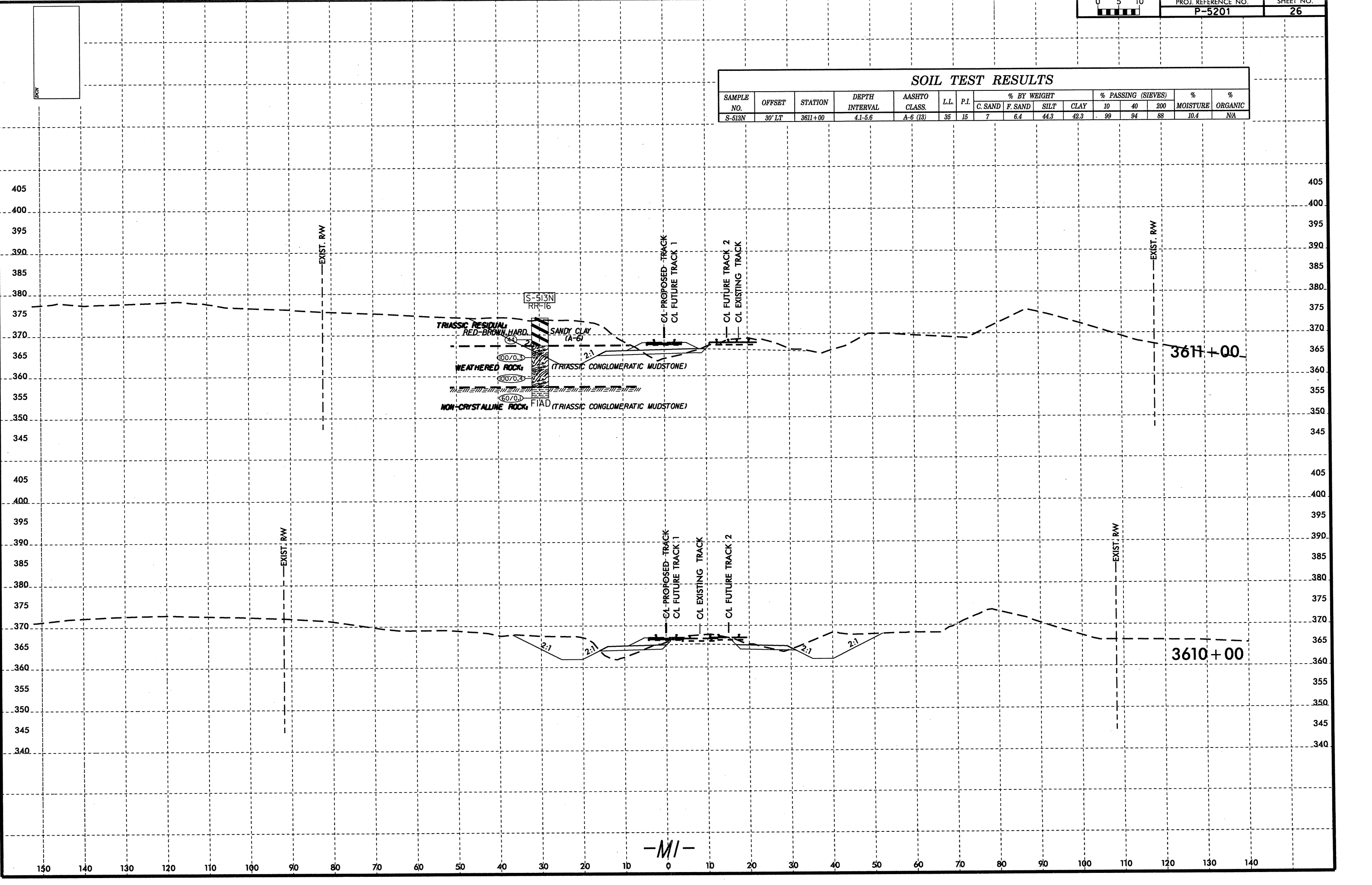


-M1-

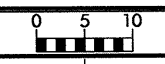


-M-

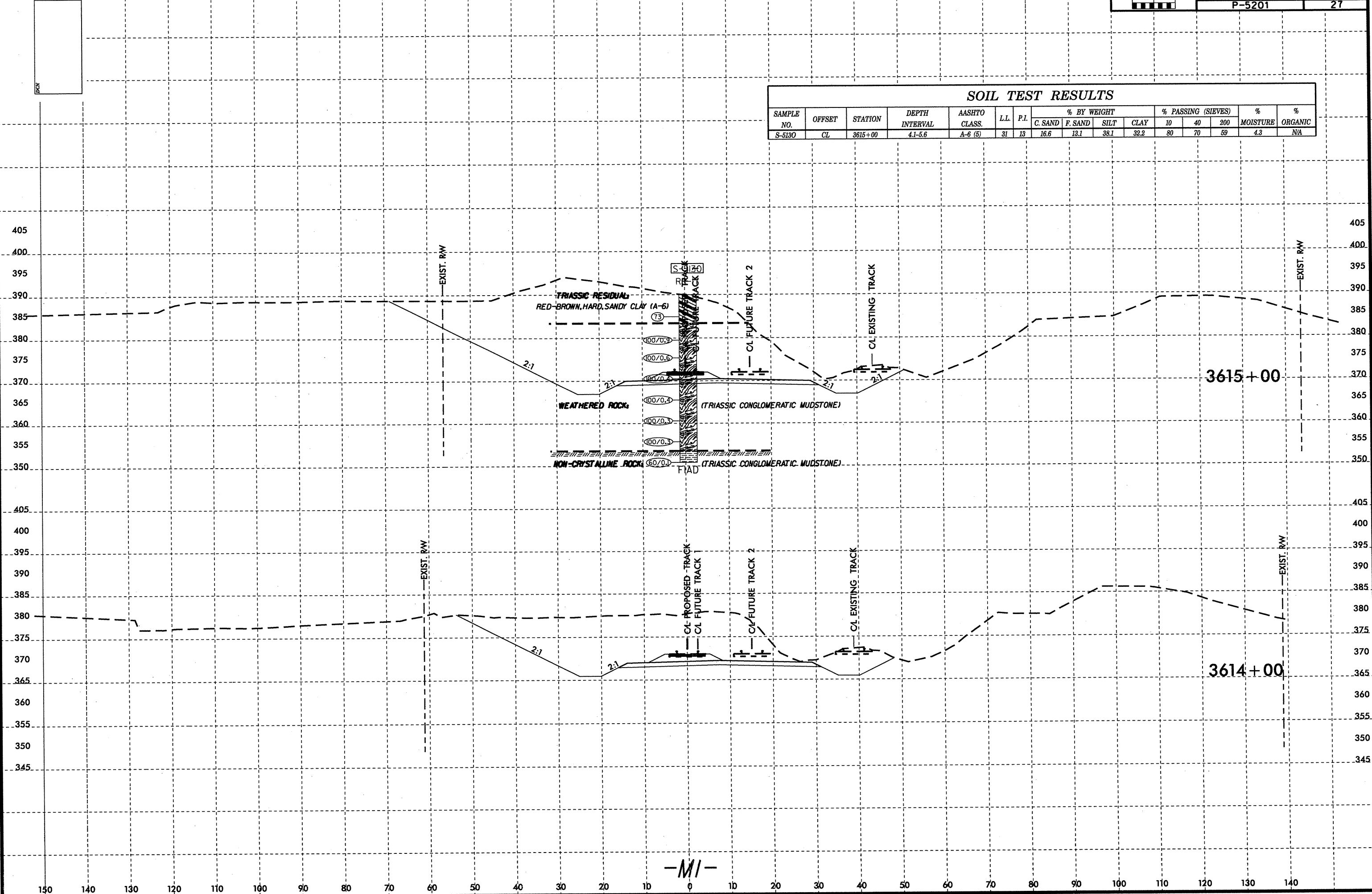
SOIL TEST RESULTS															
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	LL.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
S-513N	30' LT	3611+00	4.1-5.6	A-6 (13)	35	15	7	6.4	44.3	42.3	99	94	88	10.4	NA



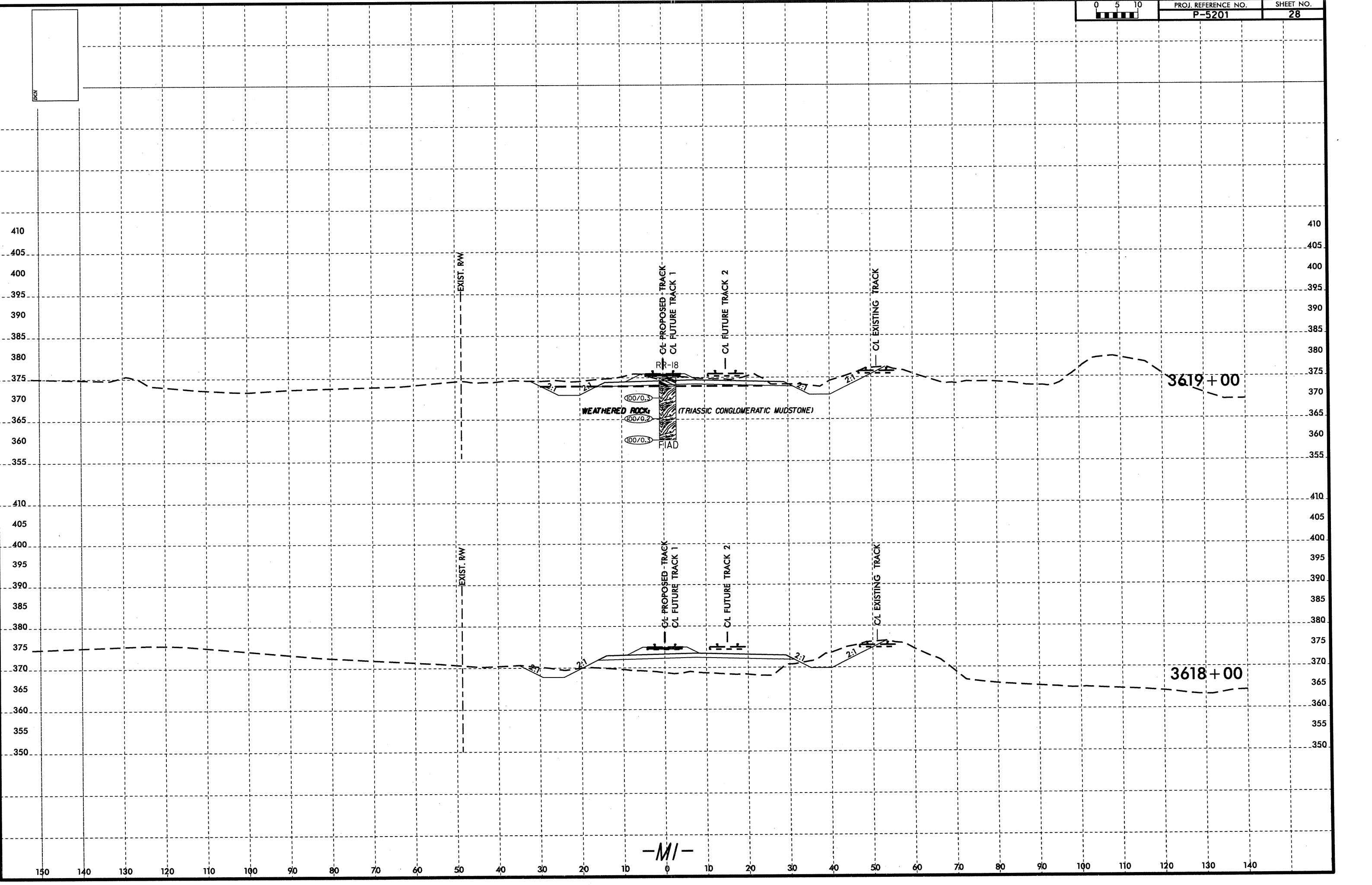
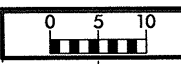
-MI-



SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	LL	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
S-5130	CL	3615+00	4.1-5.6	A-6 (5)	31	13	16.6	13.1	38.1	32.2	80	70	59	4.3	NA



-M1-

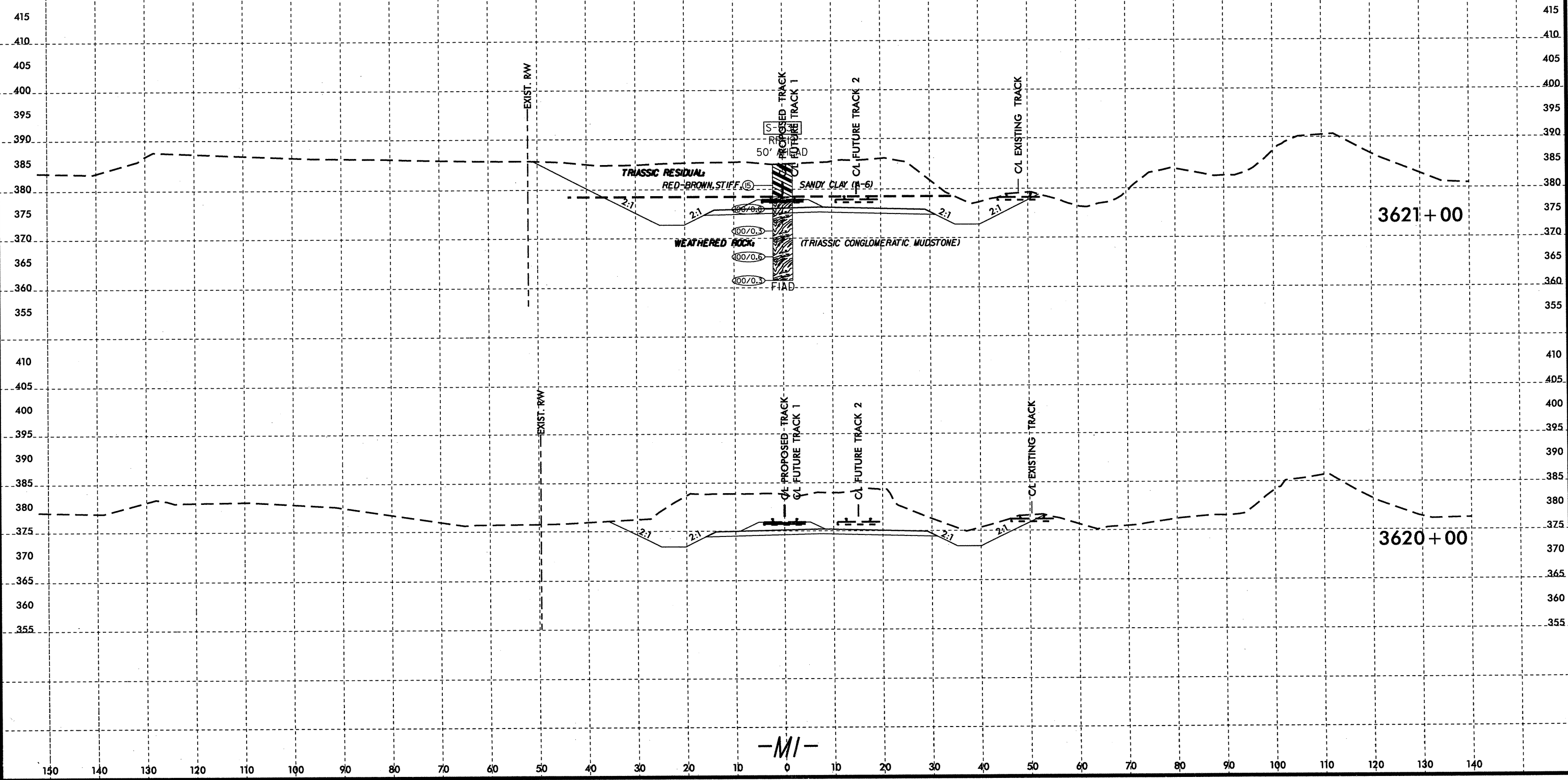


-M1-

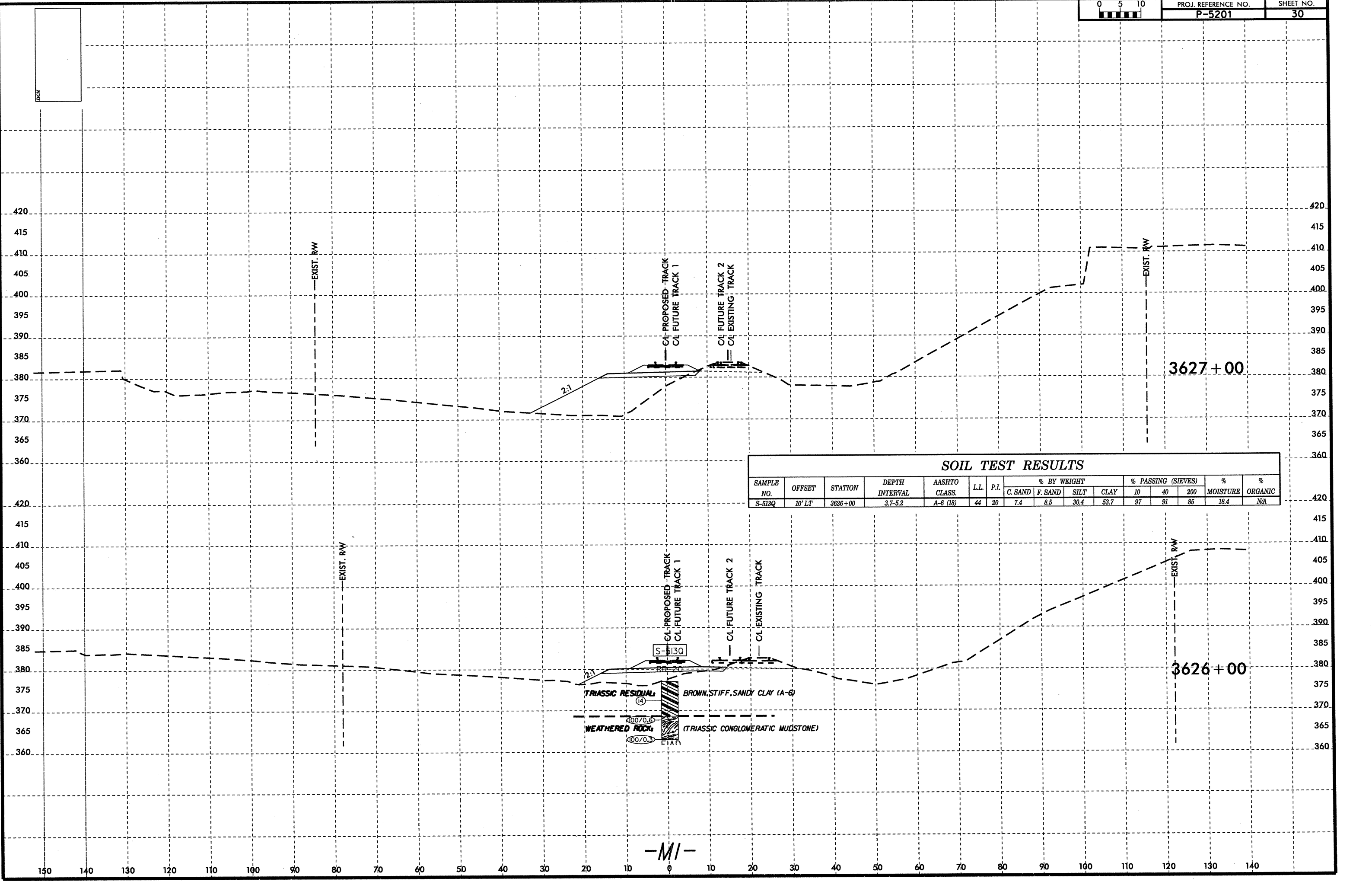
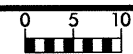


SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	LL	PI	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
S-513P	CL	3621+50	3.2-5.7	A-6 (9)	44	20	6.2	12.1	41.9	39.8	100	96	86	10.1	N/A

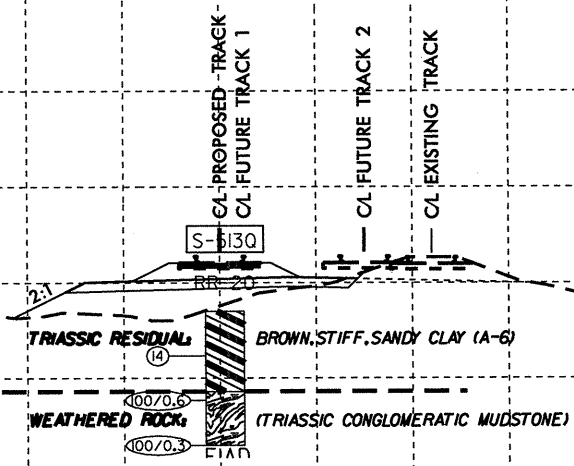


-M-



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		
S-513Q	10' LT	3626+00	3.7-5.2	A-6 (18)	44	20	7.4	8.5	30.4	53.7	97	91	85	18.4	NA



-M-



NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

WBS 52100.1.STR03TIB		TIP P-5201		COUNTY WAKE		GEOLOGIST Brett Smith	
SITE DESCRIPTION NS/NCRR (-M1-) - Morrisville Parkway Grade Separation							GROUND WTR (ft)
BORING NO. RR-1		STATION 3552+00		OFFSET 30 ft RT		ALIGNMENT -M1-	
COLLAR ELEV. 290.0 ft		TOTAL DEPTH 14.3 ft		NORTHING 753,051		EASTING 2,052,398	
DRILL RIG/HAMMER EFF./DATE SUM0093 DIETRICH D-50 87% 07/27/2012		DRILL METHOD H.S. Augers		HAMMER TYPE Automatic			
DRILLER Jacob Bare		START DATE 08/08/12		COMP. DATE 08/08/12		SURFACE WATER DEPTH N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION	ELEV. (ft)	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100							
290															290.0	0.0	GROUND SURFACE
																	TRIASSIC RESIDUAL brown, SANDY CLAY (A-6) gray, FINE SANDY SILT (A-4)
285	286.1	3.9	13	19	21							S-513G	14%				
280	281.1	8.9	32	33	55									D			
	276.1	13.9	100/0.4												275.7	14.3	WEATHERED ROCK (Triassic Siltstone)
																	Boring Terminated at Elevation 275.7 ft in Weathered Rock (Triassic Siltstone)

WBS 52100.1.STR03TIB		TIP P-5201		COUNTY WAKE		GEOLOGIST Brett Smith	
SITE DESCRIPTION NS/NCRR (-M1-) - Morrisville Parkway Grade Separation							GROUND WTR (ft)
BORING NO. RR-2		STATION 3555+00		OFFSET 10 ft RT		ALIGNMENT -M1-	
COLLAR ELEV. 297.0 ft		TOTAL DEPTH 20.1 ft		NORTHING 752,771		EASTING 2,052,503	
DRILL RIG/HAMMER EFF./DATE SUM0093 DIETRICH D-50 87% 07/27/2012		DRILL METHOD H.S. Augers		HAMMER TYPE Automatic			
DRILLER Jacob Bare		START DATE 08/08/12		COMP. DATE 08/08/12		SURFACE WATER DEPTH N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION	ELEV. (ft)	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100							
300															297.0	0.0	GROUND SURFACE
																	TRIASSIC RESIDUAL orange-brown to dark brown, SANDY CLAY (A-6)
295	293.4	3.6	8	8	4									M			
290	288.4	8.6	5	10	8							S-513H	12%				
285	283.4	13.6	3	6	66									W			
280	278.4	18.6	53	30	35									Sat.			
															276.9	20.1	Boring Terminated at Elevation 276.9 ft in Triassic Residual (SILTY SAND)

NCDOT BORE DOUBLE P-5201 MORRISVILLE PARKWAY-RAILBORINGS.GPJ NC_DOT_GDT_2/20/13

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

WBS 52100.1.STR03TIB		TIP P-5201		COUNTY WAKE			GEOLOGIST Brett Smith				
SITE DESCRIPTION NS/NCRR (-M1-) - Morrisville Parkway Grade Separation								GROUND WTR (ft)			
BORING NO. RR-3		STATION 3559+50		OFFSET CL		ALIGNMENT -M1-		0 HR. Dry		24 HR. FIAD	
COLLAR ELEV. 311.0 ft		TOTAL DEPTH 15.2 ft		NORTHING 752,327		EASTING 2,052,568					
DRILL RIG/HAMMER EFF./DATE SUM0093 DIETRICH D-50 87% 07/27/2012				DRILL METHOD H.S. Augers			HAMMER TYPE Automatic				
DRILLER Jacob Bare		START DATE 08/08/12		COMP. DATE 08/08/12		SURFACE WATER DEPTH N/A					

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION		
			0.5ft	0.5ft	0.5ft	0	25	50	75	100				ELEV. (ft)	DEPTH (ft)	
315																
															311.0	GROUND SURFACE
																0.0
310																
	307.3	3.7														
						12	14	18								
305																
	302.3	8.7				16	37	63/0.4								
300																
	297.3	13.7				22	25	11								

WBS 52100.1.STR03TIB		TIP P-5201		COUNTY WAKE			GEOLOGIST Brett Smith				
SITE DESCRIPTION NS/NCRR (-M1-) - Morrisville Parkway Grade Separation								GROUND WTR (ft)			
BORING NO. RR-4		STATION 3564+00		OFFSET CL		ALIGNMENT -M1-		0 HR. Dry		24 HR. FIAD	
COLLAR ELEV. 314.0 ft		TOTAL DEPTH 14.6 ft		NORTHING 751,879		EASTING 2,052,536					
DRILL RIG/HAMMER EFF./DATE SUM0093 DIETRICH D-50 87% 07/27/2012				DRILL METHOD H.S. Augers			HAMMER TYPE Automatic				
DRILLER Jacob Bare		START DATE 08/08/12		COMP. DATE 08/08/12		SURFACE WATER DEPTH N/A					

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION		
			0.5ft	0.5ft	0.5ft	0	25	50	75	100				ELEV. (ft)	DEPTH (ft)	
315																
															314.0	GROUND SURFACE
																0.0
310	310.0	4.0														
						9	15	17								
305	305.0	9.0														
						12	16	33								
300	300.0	14.0														
						67	33/0.1									
															299.4	Boring Terminated at Elevation 299.4 ft in Weathered Rock (Triassic Conglomeratic Mudstone)

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

WBS 52100.1.STR03TIB	TIP P-5201	COUNTY WAKE	GEOLOGIST Brett Smith
SITE DESCRIPTION NS/NCRR (-M1-) - Morrisville Parkway Grade Separation			GROUND WTR (ft)
BORING NO. RR-5	STATION 3567+00	OFFSET 10 ft RT	ALIGNMENT -M1-
COLLAR ELEV. 314.0 ft	TOTAL DEPTH 13.7 ft	NORTHING 751,591	EASTING 2,052,455
DRILL RIG/HAMMER EFF./DATE SUM0093 DIEDRICH D-50 87% 07/27/2012		DRILL METHOD H.S. Augers	HAMMER TYPE Automatic
DRILLER Jacob Bare	START DATE 08/08/12	COMP. DATE 08/08/12	SURFACE WATER DEPTH N/A

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100					
315														GROUND SURFACE	0.0
														TRIASSIC RESIDUAL orange-brown to yellow-brown, SANDY CLAY (A-6)	
310	310.4	3.6	12	13	100/0.4									WEATHERED ROCK (Triassic Conglomeratic Mudstone)	4.6
														TRIASSIC RESIDUAL red-brown, SANDY SILT with some clay (A-4)	6.1
305	305.4	8.6	11	15	14										
	300.4	13.6												NON-CRYSTALLINE ROCK (Triassic Conglomeratic Mudstone) Boring Terminated with Standard Penetration Test Refusal at Elevation 300.3 ft on Non-Crystalline Rock (Triassic Conglomeratic Mudstone)	13.7

WBS 52100.1.STR03TIB	TIP P-5201	COUNTY WAKE	GEOLOGIST Brett Smith
SITE DESCRIPTION NS/NCRR (-M1-) - Morrisville Parkway Grade Separation			GROUND WTR (ft)
BORING NO. RR-6	STATION 3572+00	OFFSET 40 ft LT	ALIGNMENT -M1-
COLLAR ELEV. 347.0 ft	TOTAL DEPTH 29.3 ft	NORTHING 751,110	EASTING 2,052,309
DRILL RIG/HAMMER EFF./DATE SUM0093 DIEDRICH D-50 87% 07/27/2012		DRILL METHOD H.S. Augers	HAMMER TYPE Automatic
DRILLER Jacob Bare	START DATE 08/09/12	COMP. DATE 08/09/12	SURFACE WATER DEPTH N/A

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100					
350														GROUND SURFACE	0.0
														TRIASSIC RESIDUAL brown, SANDY SILT with some clay (A-4)	
345															
														WEATHERED ROCK (Triassic Conglomeratic Mudstone)	6.7
340	342.8	4.2	13	24	27										
335	337.8	9.2	15	33	67/0.2										
330	332.8	14.2			100/0.4										
325	327.8	19.2			100/0.4										
320	322.8	24.2	55	14	86/0.4										
	317.8	29.2			60/0.1									NON-CRYSTALLINE ROCK (Triassic Conglomeratic Mudstone) Boring Terminated with Standard Penetration Test Refusal at Elevation 317.7 ft in Non-Crystalline Rock (Triassic Conglomeratic Mudstone) Able to slowly advance auger through NCR.	29.3

NCDOT BORE DOUBLE P-5201 MORRISVILLE PARKWAY-RAILBORINGS.GPJ NC_DOT_GDT_2/2013

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

WBS 52100.1.STR03TIB	TIP P-5201	COUNTY WAKE	GEOLOGIST Brett Smith
SITE DESCRIPTION NS/NCRR (-M1-) - Morrisville Parkway Grade Separation			GROUND WTR (ft)
BORING NO. RR-7	STATION 3576+00	OFFSET 10 ft LT	ALIGNMENT -M1-
COLLAR ELEV. 324.0 ft	TOTAL DEPTH 15.8 ft	NORTHING 750,760	EASTING 2,052,113
DRILL RIG/HAMMER EFF./DATE SUM0093 DIEDRICH D-50 87% 07/27/2012		DRILL METHOD H.S. Augers	HAMMER TYPE Automatic
DRILLER Jacob Bare	START DATE 08/09/12	COMP. DATE 08/09/12	SURFACE WATER DEPTH N/A

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)
			0.5ft	0.5ft	0.5ft	0	25	50	75	100				
325													GROUND SURFACE	0.0
320	319.6	4.4	9	10	12							M	TRIASSIC RESIDUAL orange-brown to yellow-brown, SANDY CLAY with trace gravel (A-6)	
315	314.6	9.4	4	6	9							M	orange-brown to red-brown, SANDY SILT with some clay (A-4)	6.9
310	309.6	14.4	23	38	62/0.4								WEATHERED ROCK (Triassic Conglomeratic Mudstone)	11.9
													Boring Terminated at Elevation 308.2 ft in Weathered Rock (Triassic Conglomeratic Mudstone)	15.8

WBS 52100.1.STR03TIB	TIP P-5201	COUNTY WAKE	GEOLOGIST Brett Smith
SITE DESCRIPTION NS/NCRR (-M1-) - Morrisville Parkway Grade Separation			GROUND WTR (ft)
BORING NO. RR-8	STATION 3579+00	OFFSET 10 ft LT	ALIGNMENT -M1-
COLLAR ELEV. 310.0 ft	TOTAL DEPTH 24.6 ft	NORTHING 750,482	EASTING 2,052,004
DRILL RIG/HAMMER EFF./DATE SUM0093 DIEDRICH D-50 87% 07/27/2012		DRILL METHOD H.S. Augers	HAMMER TYPE Automatic
DRILLER Jacob Bare	START DATE 08/09/12	COMP. DATE 08/09/12	SURFACE WATER DEPTH N/A

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)
			0.5ft	0.5ft	0.5ft	0	25	50	75	100				
310													GROUND SURFACE	0.0
305	305.6	4.4	3	16	10						S-513J	13%	TRIASSIC RESIDUAL red-brown, SILTY SAND with some clay and little gravel (A-2-4)	
300	300.6	9.4											WEATHERED ROCK (Triassic Conglomeratic Mudstone)	6.9
295	295.6	14.4												
290	290.6	19.4												
	285.6	24.4											Boring Terminated at Elevation 285.4 ft in Weathered Rock (Triassic Conglomeratic Mudstone)	24.6

NCDOT BORE DOUBLE P-5201 MORRISVILLE PARKWAY-RAILBORINGS.GPJ NC_DOT.GDT 2/20/13

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

WBS 52100.1.STR03TIB	TIP P-5201	COUNTY WAKE	GEOLOGIST Brett Smith
SITE DESCRIPTION NS/NCRR (-M1-) - Morrisville Parkway Grade Separation			GROUND WTR (ft)
BORING NO. RR-9	STATION 3581+00	OFFSET 20 ft LT	ALIGNMENT -M1-
COLLAR ELEV. 349.0 ft	TOTAL DEPTH 24.2 ft	NORTHING 750,288	EASTING 2,051,961
DRILL RIG/HAMMER EFF./DATE SUM0093 DIEDRICH D-50 87% 07/27/2012		DRILL METHOD H.S. Augers	HAMMER TYPE Automatic
DRILLER Jacob Bare	START DATE 08/09/12	COMP. DATE 08/09/12	SURFACE WATER DEPTH N/A

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG MOI	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)
			0.5ft	0.5ft	0.5ft	0	25	50	75	100					
350														GROUND SURFACE	0.0
345	345.1	3.9	14	37	63/0.2									TRIASSIC RESIDUAL orange-brown to red-brown, SANDY SILT with some clay (A-4)	4.4
340	340.1	8.9	100/0.3											WEATHERED ROCK (Triassic Conglomeratic Mudstone)	
335	335.1	13.9	100/0.4												
330	330.1	18.9	80	20/0.0											
325	325.1	23.9	100/0.3												

Boring Terminated at Elevation 324.8 ft in Weathered Rock (Triassic Conglomeratic Mudstone)

WBS 52100.1.STR03TIB	TIP P-5201	COUNTY WAKE	GEOLOGIST Brett Smith
SITE DESCRIPTION NS/NCRR (-M1-) - Morrisville Parkway Grade Separation			GROUND WTR (ft)
BORING NO. B2-B	STATION 3583+28	OFFSET 13 ft RT	ALIGNMENT -M1-
COLLAR ELEV. 321.1 ft	TOTAL DEPTH 25.6 ft	NORTHING 750,070	EASTING 2,051,890
DRILL RIG/HAMMER EFF./DATE SUM3359 CME-450 84% 07/27/2012		DRILL METHOD Core Boring	HAMMER TYPE Automatic
DRILLER Craig Husketh	START DATE 10/17/12	COMP. DATE 10/17/12	SURFACE WATER DEPTH N/A

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG MOI	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)
			0.5ft	0.5ft	0.5ft	0	25	50	75	100					
325														GROUND SURFACE	0.0
320														ARTIFICIAL FILL Red-brown to black, SANDY CLAY (A-6) w/ Rip-Rap	3.4
315	317.7	3.4	100/0.5											WEATHERED ROCK (Triassic Conglomeratic Mudstone)	5.9
310	312.7	8.4	21	40	24									TRIASSIC RESIDUAL Red-brown, hard, SANDY CLAY (A-6)	
305	307.7	13.4	60/0.1											NON-CRYSTALLINE ROCK (Triassic Conglomeratic Mudstone)	13.5
300															

Boring Terminated at Elevation 295.5 ft in Non-Crystalline Rock (Triassic Conglomeratic Mudstone)

Perched water encountered at 2-3 ft.

NCDOT BORE DOUBLE P-5201 MORRISVILLE PARKWAY-RAILBORINGS.GPJ NC_DOT.GDT 2/20/13

WBS 52100.1.STR03TIB		TIP P-5201		COUNTY WAKE		GEOLOGIST Brett Smith												
SITE DESCRIPTION NS/NCRR (-M1-) - Morrisville Parkway Grade Separation							GROUND WTR (ft)											
BORING NO. RR-10		STATION 3587+00		OFFSET CL		ALIGNMENT -M1-												
COLLAR ELEV. 361.0 ft		TOTAL DEPTH 34.1 ft		NORTHING 749,697		EASTING 2,051,887												
DRILL RIG/HAMMER EFF./DATE SUM3359 CME-450 84% 07/27/2012		DRILL METHOD H.S. Augers			HAMMER TYPE Automatic													
DRILLER Craig Husketh		START DATE 08/21/12		COMP. DATE 08/21/12		SURFACE WATER DEPTH N/A												
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG MOI	LOG	SOIL AND ROCK DESCRIPTION	ELEV. (ft)	DEPTH (ft)		
			0.5ft	0.5ft	0.5ft	0	25	50	75	100								
365																		
360	357.0	4.0	100	0.4											361.0	0.0	GROUND SURFACE	
																		WEATHERED ROCK (Triassic Conglomeratic Mudstone)
355	352.0	9.0	100	0.4														
350	347.0	14.0	100	0.2														
345	342.0	19.0	100	0.2														
340	337.0	24.0	100	0.2														
335	332.0	29.0	60	0.1											334.5	28.5		NON-CRYSTALLINE ROCK (Triassic Conglomeratic Mudstone)
330	327.0	34.0	60	0.1											326.9	34.1		Boring Terminated with Standard Penetration Test Refusal at Elevation 326.9 ft in Non-Crystalline Rock (Triassic Conglomeratic Mudstone)
																		Able to slowly advance auger through the NCR.

NCDOT BORE DOUBLE P-5201 MORRISVILLE PARKWAY-RAILBORINGS.GPJ NC_DOT_GDT 2/20/13

WBS 52100.1.STR03TIB		TIP P-5201		COUNTY WAKE		GEOLOGIST Brett Smith												
SITE DESCRIPTION NS/NCRR (-M1-) - Morrisville Parkway Grade Separation							GROUND WTR (ft)											
BORING NO. RR-11		STATION 3591+00		OFFSET CL		ALIGNMENT -M1-												
COLLAR ELEV. 337.0 ft		TOTAL DEPTH 13.1 ft		NORTHING 749,300		EASTING 2,051,939												
DRILL RIG/HAMMER EFF./DATE SUM3359 CME-450 84% 07/27/2012		DRILL METHOD H.S. Augers			HAMMER TYPE Automatic													
DRILLER Craig Husketh		START DATE 08/20/12		COMP. DATE 08/20/12		SURFACE WATER DEPTH N/A												
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG MOI	LOG	SOIL AND ROCK DESCRIPTION	ELEV. (ft)	DEPTH (ft)		
			0.5ft	0.5ft	0.5ft	0	25	50	75	100								
340																		
335	334.0	3.0	100	0.3											337.0	0.0		GROUND SURFACE
															335.5	1.5		TRIASSIC RESIDUAL
																		red-brown, SANDY SILT with some clay and gravel (A-4)
330	329.0	8.0	100	0.3														WEATHERED ROCK (Triassic Conglomeratic Mudstone)
325	324.0	13.0	60	0.1											326.5	10.5		NON-CRYSTALLINE ROCK (Triassic Conglomeratic Mudstone)
															323.9	13.1		Boring Terminated with Standard Penetration Test Refusal at Elevation 323.9 ft in Non-Crystalline Rock (Triassic Conglomeratic Mudstone)
																		Able to slowly advance auger through NCR.



WBS 52100.1.STR03TIB	TIP P-5201	COUNTY WAKE	GEOLOGIST Brett Smith
SITE DESCRIPTION NS/NCRR (-M1-) - Morrisville Parkway Grade Separation			GROUND WTR (ft) 0 HR. Dry
BORING NO. RR-12	STATION 3595+00	OFFSET 25 ft LT	ALIGNMENT -M1-
COLLAR ELEV. 336.0 ft	TOTAL DEPTH 9.4 ft	NORTHING 748,920	EASTING 2,052,059
DRILL RIG/HAMMER EFF./DATE SUM3359 CME-450 84% 07/27/2012		DRILL METHOD H.S. Augers	HAMMER TYPE Automatic
DRILLER Craig Husketh	START DATE 08/20/12	COMP. DATE 08/20/12	SURFACE WATER DEPTH N/A

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG MOI	LOG	SOIL AND ROCK DESCRIPTION	ELEV. (ft)	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100							
340																	
															336.0	0.0	GROUND SURFACE
335															334.2	1.8	TRIASSIC RESIDUAL red-brown, SANDY SILT with some clay and gravel (A-4)
																	WEATHERED ROCK (Triassic Conglomeratic Mudstone)
330	331.7	4.3	28	65	35/0.4												
	326.7	9.3	60/0.1												326.6	9.4	NON-CRYSTALLINE ROCK (Triassic Conglomeratic Mudstone) Boring Terminated with Standard Penetration Test Refusal at Elevation 326.6 ft on Non-Crystalline Rock (Triassic Conglomeratic Mudstone)

WBS 52100.1.STR03TIB	TIP P-5201	COUNTY WAKE	GEOLOGIST Brett Smith
SITE DESCRIPTION NS/NCRR (-M1-) - Morrisville Parkway Grade Separation			GROUND WTR (ft) 0 HR. Dry
BORING NO. RR-13	STATION 3599+00	OFFSET CL	ALIGNMENT -M1-
COLLAR ELEV. 349.0 ft	TOTAL DEPTH 14.6 ft	NORTHING 748,566	EASTING 2,052,245
DRILL RIG/HAMMER EFF./DATE SUM3359 CME-450 84% 07/27/2012		DRILL METHOD H.S. Augers	HAMMER TYPE Automatic
DRILLER Craig Husketh	START DATE 08/23/12	COMP. DATE 08/23/12	SURFACE WATER DEPTH N/A

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG MOI	LOG	SOIL AND ROCK DESCRIPTION	ELEV. (ft)	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100							
															349.0	0.0	GROUND SURFACE
																	TRIASSIC RESIDUAL red-brown, FINE SANDY SILT with some clay (A-4)
345	344.8	4.2	16	19	28												
																	red-brown, SANDY CLAY with trace gravel (A-6)
340	339.8	9.2	14	22	48												
335	334.8	14.2	100/0.4												335.4	13.6	WEATHERED ROCK (Triassic Conglomeratic Mudstone) Boring Terminated at Elevation 334.4 ft in Weathered Rock (Triassic Conglomeratic Mudstone) Harder drilling at 13.6 feet was interpreted as the top of Weathered Rock.
															334.4	14.6	



NCDOT GEOTECHNICAL ENGINEERING UNIT

BORELOG REPORT

WBS 52100.1.STR03TIB	TIP P-5201	COUNTY WAKE	GEOLOGIST Brett Smith	
SITE DESCRIPTION NS/NCRR (-M1-) - Morrisville Parkway Grade Separation				GROUND WTR (ft)
BORING NO. RR-14	STATION 3603+00	OFFSET 20 ft RT	ALIGNMENT -M1-	0 HR. Dry
COLLAR ELEV. 376.0 ft	TOTAL DEPTH 34.1 ft	NORTHING 748,236	EASTING 2,052,474	24 HR. FIAD
DRILL RIG/HAMMER EFF./DATE SUM3359 CME-450 84% 07/27/2012		DRILL METHOD H.S. Augers	HAMMER TYPE Automatic	
DRILLER Craig Husketh	START DATE 08/23/12	COMP. DATE 08/23/12	SURFACE WATER DEPTH N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)
			0.5ft	0.5ft	0.5ft	0	25	50	75	100					
380															
375														GROUND SURFACE	0.0
370	371.9	4.1	4	4	5								M	ARTIFICIAL FILL orange-brown, SANDY SILT with some clay and trace gravel (A-4)	
365	366.9	9.1	5	4	4								S-513L 18%	TRIASSIC RESIDUAL red-brown, SANDY SILT with some clay (A-4)	11.6
360	361.9	14.1	9	15	20								S-513M 10%	WEATHERED ROCK (Triassic Conglomeratic Mudstone)	16.6
355	356.9	19.1	100/0.4												100/0.4
350	351.9	24.1	100/0.3												100/0.3
345	346.9	29.1	60/0.1												60/0.1
	341.9	34.1	60/0.0												60/0.0
														NON-CRYSTALLINE ROCK (Triassic Conglomeratic Mudstone)	26.6
														NON-CRYSTALLINE ROCK (Triassic Conglomeratic Mudstone)	34.1
														Boring Terminated with Standard Penetration Test Refusal at Elevation 341.9 ft in Non-Crystalline Rock (Triassic Conglomeratic Mudstone)	
														Able to slowly advance auger through NCR.	

WBS 52100.1.STR03TIB	TIP P-5201	COUNTY WAKE	GEOLOGIST Brett Smith	
SITE DESCRIPTION NS/NCRR (-M1-) - Morrisville Parkway Grade Separation				GROUND WTR (ft)
BORING NO. RR-15	STATION 3607+00	OFFSET 10 ft RT	ALIGNMENT -M1-	0 HR. Dry
COLLAR ELEV. 345.0 ft	TOTAL DEPTH 9.1 ft	NORTHING 747,970	EASTING 2,052,776	24 HR. FIAD
DRILL RIG/HAMMER EFF./DATE SUM3359 CME-450 84% 07/27/2012		DRILL METHOD H.S. Augers	HAMMER TYPE Automatic	
DRILLER Craig Husketh	START DATE 08/22/12	COMP. DATE 08/22/12	SURFACE WATER DEPTH N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)
			0.5ft	0.5ft	0.5ft	0	25	50	75	100					
345														GROUND SURFACE	0.0
340	341.0	4.0												TRIASSIC RESIDUAL light brown, SANDY SILT with some gravel (A-4)	1.5
	336.0	9.0												WEATHERED ROCK (Triassic Conglomeratic Mudstone)	
														NON-CRYSTALLINE ROCK (Triassic Conglomeratic Mudstone)	9.1
														Boring Terminated with Standard Penetration Test Refusal at Elevation 335.9 ft on Non-Crystalline Rock (Triassic Conglomeratic Mudstone)	

NCDOT BORE DOUBLE P-5201 MORRISVILLE PARKWAY-RAILBORINGS.GPJ NC_DOT_GDT_2/20/13



NCDOT GEOTECHNICAL ENGINEERING UNIT

BORELOG REPORT

WBS 52100.1.STR03TIB	TIP P-5201	COUNTY WAKE	GEOLOGIST Brett Smith
SITE DESCRIPTION NS/NCRR (-M1-) - Morrisville Parkway Grade Separation			GROUND WTR (ft)
BORING NO. RR-16	STATION 3611+00	OFFSET 30 ft LT	ALIGNMENT -M1-
COLLAR ELEV. 374.0 ft	TOTAL DEPTH 19.2 ft	NORTHING 747,786	EASTING 2,053,131
DRILL RIG/HAMMER EFF./DATE SUM3359 CME-450 84% 07/27/2012		DRILL METHOD H.S. Augers	HAMMER TYPE Automatic
DRILLER Craig Husketh	START DATE 08/17/12	COMP. DATE 08/17/12	SURFACE WATER DEPTH N/A

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)			
			0.5ft	0.5ft	0.5ft	0	25	50	75	100								
375															374.0	GROUND SURFACE	0.0	
370	369.9	4.1	7	16	28										367.4	TRIASSIC RESIDUAL red-brown, SANDY CLAY (A-6)	6.6	
365	364.9	9.1	100/0.3												357.4	WEATHERED ROCK (Triassic Conglomeratic Mudstone)	16.6	
360	359.9	14.1	100/0.4												354.8	NON-CRYSTALLINE ROCK (Triassic Conglomeratic Mudstone)	19.2	
355	354.9	19.1	60/0.1												354.8	Boring Terminated with Standard Penetration Test Refusal at Elevation 354.8 ft in Non-Crystalline Rock (Triassic Conglomeratic Mudstone)		
																	Able to slowly advance auger through NCR.	

WBS 52100.1.STR03TIB	TIP P-5201	COUNTY WAKE	GEOLOGIST Brett Smith
SITE DESCRIPTION NS/NCRR (-M1-) - Morrisville Parkway Grade Separation			GROUND WTR (ft)
BORING NO. RR-17	STATION 3615+00	OFFSET CL	ALIGNMENT -M1-
COLLAR ELEV. 390.0 ft	TOTAL DEPTH 39.2 ft	NORTHING 747,599	EASTING 2,053,483
DRILL RIG/HAMMER EFF./DATE SUM3359 CME-450 84% 07/27/2012		DRILL METHOD H.S. Augers	HAMMER TYPE Automatic
DRILLER Craig Husketh	START DATE 08/17/12	COMP. DATE 08/17/12	SURFACE WATER DEPTH N/A

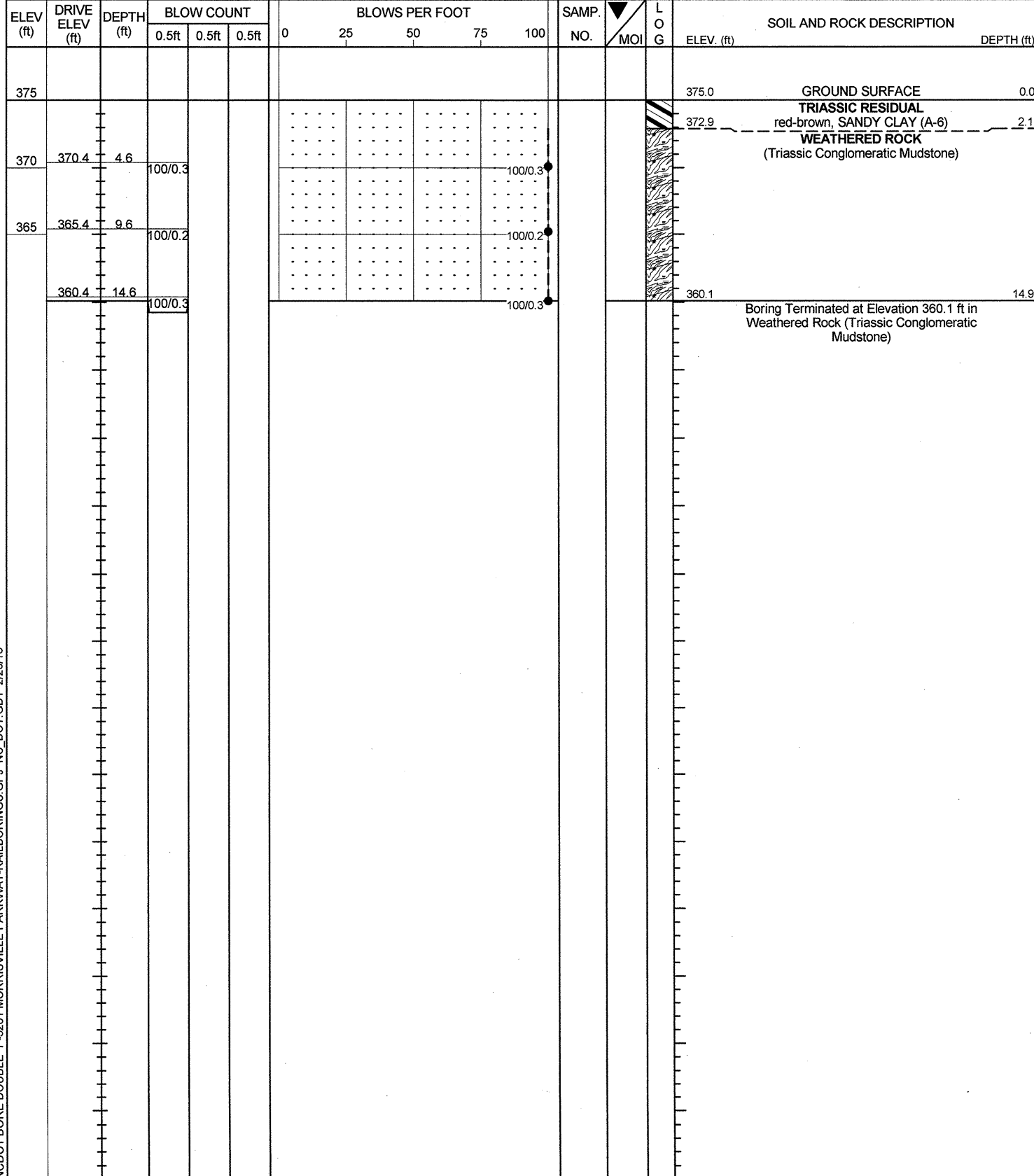
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)			
			0.5ft	0.5ft	0.5ft	0	25	50	75	100								
390															390.0	GROUND SURFACE	0.0	
385	385.9	4.1	24	31	42										383.4	TRIASSIC RESIDUAL yellow-brown to red-brown, SANDY CLAY with little gravel (A-6)	6.6	
380	380.9	9.1	17	34	66/0.4										357.4	WEATHERED ROCK (Triassic Conglomeratic Mudstone)	16.6	
375	375.9	14.1	85	15/0.1											354.8	NON-CRYSTALLINE ROCK (Triassic Conglomeratic Mudstone)	19.2	
370	370.9	19.1	100/0.4												354.8	Boring Terminated with Standard Penetration Test Refusal at Elevation 354.8 ft in Non-Crystalline Rock (Triassic Conglomeratic Mudstone)		
365	365.9	24.1	100/0.4												354.8			
360	360.9	29.1	100/0.3												354.8			
355	355.9	34.1	100/0.3												354.8			
	350.9	39.1	60/0.1												350.8	Boring Terminated with Standard Penetration Test Refusal at Elevation 350.8 ft in Non-Crystalline Rock (Triassic Conglomeratic Mudstone)		
																	Able to slowly advance auger through NCR.	

NCDOT BORE DOUBLE P-5201 MORRISVILLE PARKWAY-RAILBORINGS.GPJ NC_DOT.GDT 2/20/13

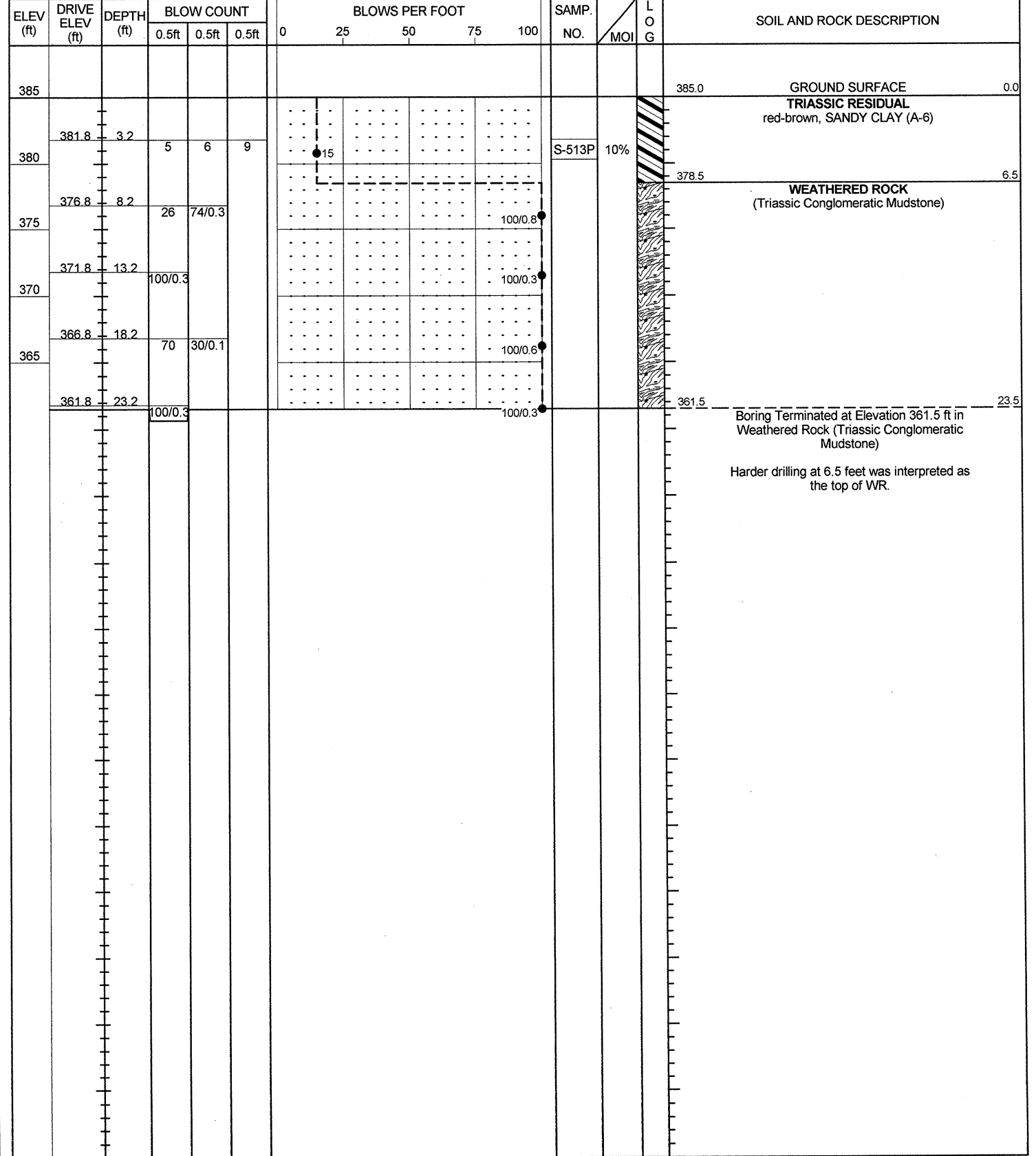
NCDOT GEOTECHNICAL ENGINEERING UNIT

BORELOG REPORT

WBS 52100.1.STR03TIB		TIP P-5201		COUNTY WAKE		GEOLOGIST Brett Smith	
SITE DESCRIPTION NS/NCRR (-M1-) - Morrisville Parkway Grade Separation						GROUND WTR (ft)	
BORING NO. RR-18		STATION 3619+00		OFFSET CL		ALIGNMENT -M1-	
COLLAR ELEV. 375.0 ft		TOTAL DEPTH 14.9 ft		NORTHING 747,502		EASTING 2,053,870	
DRILL RIG/HAMMER EFF./DATE SUM3359 CME-450 84% 07/27/2012		DRILL METHOD H.S. Augers		HAMMER TYPE Automatic			
DRILLER Craig Husketh		START DATE 08/17/12		COMP. DATE 08/17/12		SURFACE WATER DEPTH N/A	



WBS 52100.1.STR03TIB		TIP P-5201		COUNTY WAKE		GEOLOGIST Brett Smith	
SITE DESCRIPTION NS/NCRR (-M1-) - Morrisville Parkway Grade Separation						GROUND WTR (ft)	
BORING NO. RR-19		STATION 3621+50		OFFSET CL		ALIGNMENT -M1-	
COLLAR ELEV. 385.0 ft		TOTAL DEPTH 23.5 ft		NORTHING 747,476		EASTING 2,054,119	
DRILL RIG/HAMMER EFF./DATE SUM3359 CME-450 84% 07/27/2012		DRILL METHOD H.S. Augers		HAMMER TYPE Automatic			
DRILLER Luis Gonzalez		START DATE 08/16/12		COMP. DATE 08/16/12		SURFACE WATER DEPTH N/A	



NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

WBS 52100.1.STR03TIB	TIP P-5201	COUNTY WAKE	GEOLOGIST Brett Smith
SITE DESCRIPTION NS/NCRR (-M1-) - Morrisville Parkway Grade Separation			GROUND WTR (ft)
BORING NO. RR-20	STATION 3626+00	OFFSET 10 ft LT	ALIGNMENT -M1-
COLLAR ELEV. 377.0 ft	TOTAL DEPTH 14.0 ft	NORTHING 747,481	EASTING 2,054,569
DRILL RIG/HAMMER EFF./DATE SUM3359 CME-450 84% 07/27/2012		DRILL METHOD H.S. Augers	HAMMER TYPE Automatic
DRILLER Luis Gonzalez	START DATE 08/16/12	COMP. DATE 08/16/12	SURFACE WATER DEPTH N/A

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)
			0.5ft	0.5ft	0.5ft	0	25	50	75	100					
380															
														GROUND SURFACE	0.0
375	373.3	3.7	4	6	8						S-513Q	18%	TRIASSIC RESIDUAL brown, SANDY CLAY (A-6)		
370	368.3	8.7	70	30/0.1									WEATHERED ROCK (Triassic Conglomeratic Mudstone)	8.4	
365	363.3	13.7	100/0.3										Boring Terminated at Elevation 363.0 ft in Weathered Rock (Triassic Conglomeratic Mudstone)	14.0	
													Harder drilling at 8.4 feet was interpreted as the top of WR.		

NCDOT BORE DOUBLE P-5201 MORRISVILLE PARKWAY-RAILBORINGS.GPJ NC_DOT_GDT 2/2013

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

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

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	P-5201	1	24

CONTENTS

LINE	STATION	PLAN	PROFILE	XSECT
-L-	18+00 TO 29+50	4-5	6	7-14
-Y1-	10+00 TO 13+50	4-5	6	15-16
-Y2-	10+00 TO 12+66	4-5	6	10-13

	SHEET
TITLE SHEET	1
LEGEND	2
RDWY TITLE SHEET	2A
INVENTORY TEXT	3A-3B
EARTHWORK BALANCE SHEET	3C
BORING LOGS	17-24

ROADWAY
SUBSURFACE INVESTIGATION

PROJ. REFERENCE NO. P-5201 F.A. PROJ. N/A
COUNTY WAKE
PROJECT DESCRIPTION MORRISVILLE PARKWAY (SR 3060) GRADE SEPARATION UNDER NS/NCRR RAILROAD FROM WEST OF CRABTREE CROSSINGS PARKWAY TO EAST OF BRISTOL CREEK DRIVE

INVENTORY

CAUTION NOTICE

THE SUBSURFACE INFORMATION AND THE SUBSURFACE INVESTIGATION ON WHICH IT IS BASED WERE MADE FOR THE PURPOSE OF PREPARING THE SCOPE OF WORK TO BE INCLUDED IN THE REQUEST FOR PROPOSAL. 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) 707-6850. THE SUBSURFACE PLANS, FIELD BORING LOGS, ROCK CORES, AND SOIL TEST DATA ARE NOT PART OF THE CONTRACT.

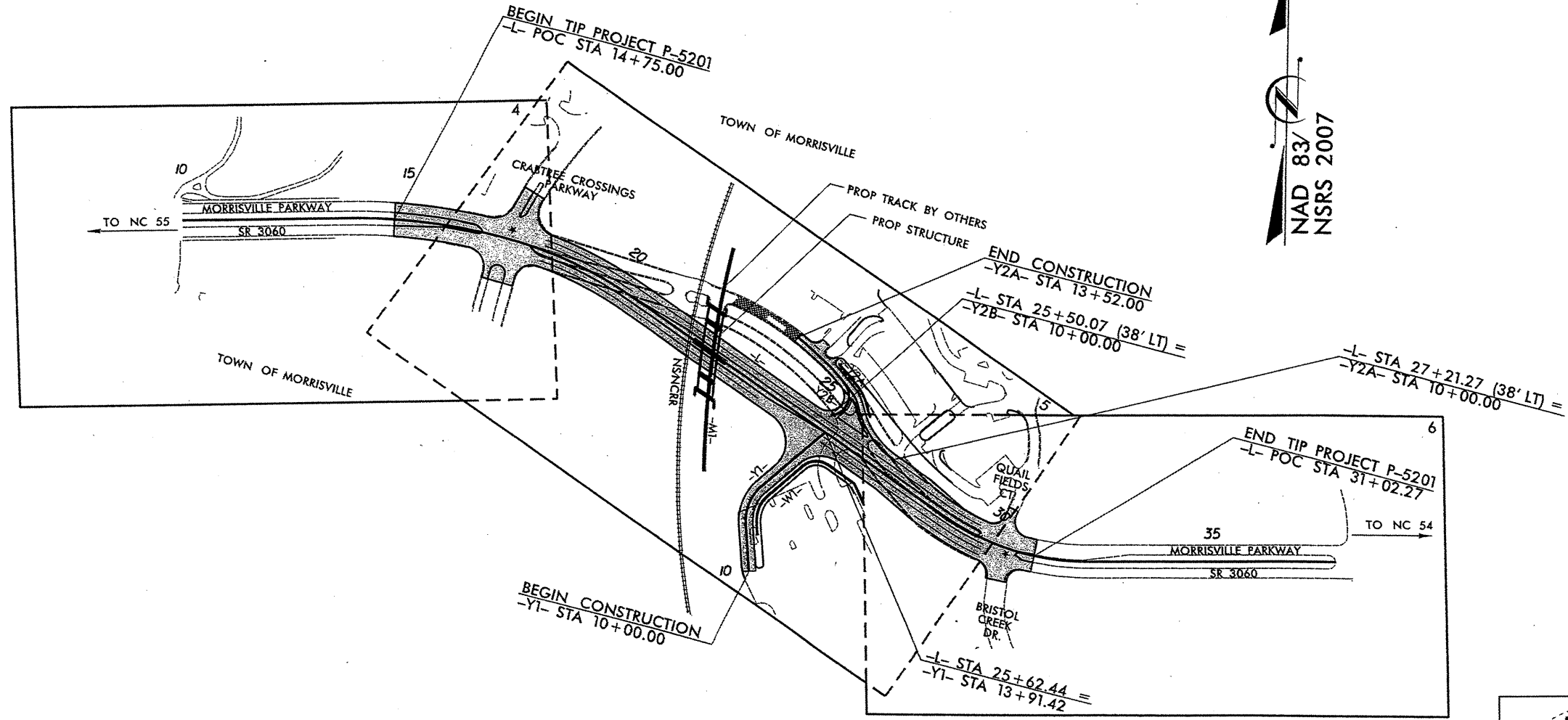
SOIL AND ROCK BOUNDARIES WITHIN A BOREHOLE ARE BASED ON GEOTECHNICAL INTERPRETATION UNLESS ENCOUNTERED IN A SAMPLE. INTERPRETED BOUNDARIES MAY NOT NECESSARILY REFLECT ACTUAL SUBSURFACE CONDITIONS BETWEEN SAMPLED STRATA, AND BOREHOLE INFORMATION MAY NOT NECESSARILY REFLECT ACTUAL SUBSURFACE CONDITIONS BETWEEN BORINGS. 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 DEPARTMENT DOES NOT WARRANT OR GUARANTEE THE SUFFICIENCY OR ACCURACY OF THE INVESTIGATION MADE, OR THE 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 THE 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.

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

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

CONTRACT: ID: P-5201



- PERSONNEL
- B. SMITH, GIT
 - L. GONZALEZ
 - C. HUSKETH
 - R. FLICK
 - B. WORLEY, PG

- DRAWN BY B. WORLEY, PG
- DRAWN BY M. BRANDON
- INVESTIGATED BY B. WORLEY, PG
- CHECKED BY D. DEWEY, PE
- SUBMITTED BY Summit Design and Engineering
- DATE FEBRUARY, 2013



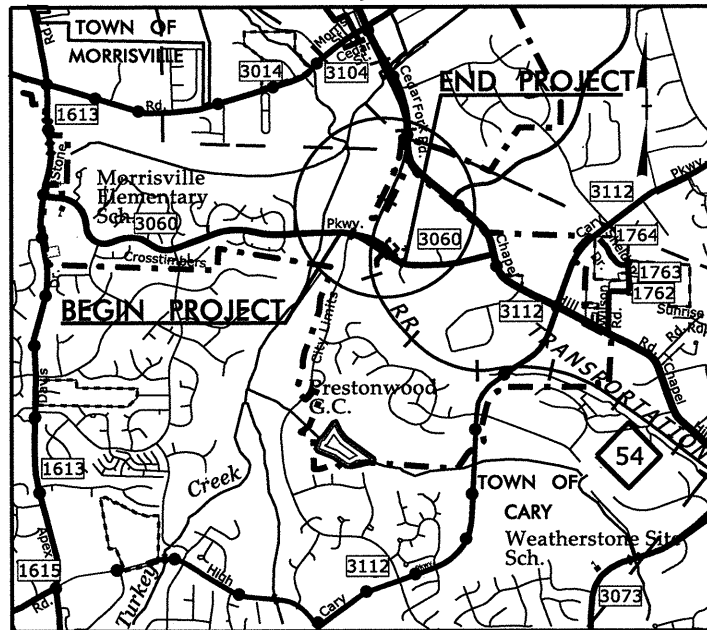
Prepared in the Office of: **SUMMIT** DESIGN AND ENGINEERING SERVICES
NC FIRM LICENSE No: P-0339 and C-487
504 Meadowlands Drive
Hillsborough, NC 27278
(919) 732-3883
(919) 732-6676 (FAX)

B. Worley

TIP PROJECT: P-5201

CONTRACT:

See Sheet 1-A For Index of Sheets
See Sheet 1-B For Conventional Symbols



VICINITY MAP

PROP. DETOUR

STATE OF NORTH CAROLINA
RAIL DIVISION

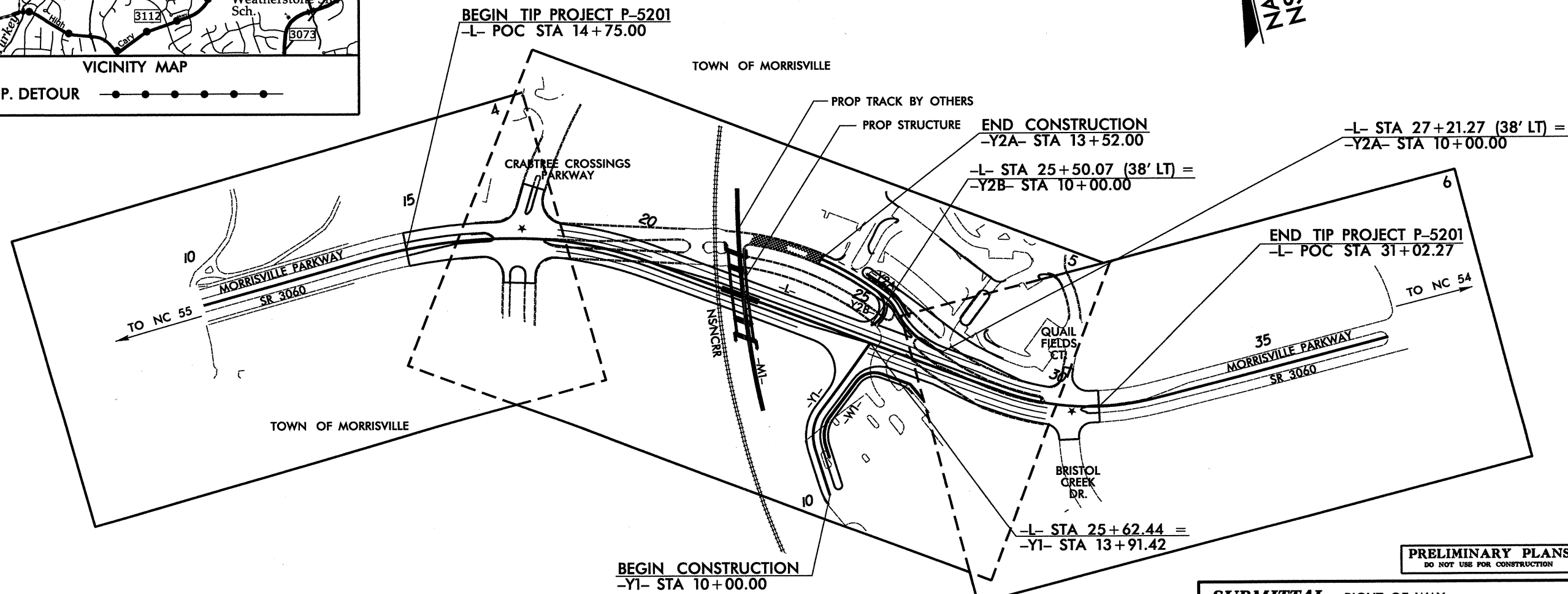
WAKE COUNTY

**LOCATION: MORRISVILLE PARKWAY (SR 3060)
GRADE SEPARATION UNDER NS/NCRR RAILROAD
FROM WEST OF CRABTREE CROSSINGS PARKWAY
TO EAST OF BRISTOL CREEK DR**

**TYPE OF WORK: GRADING, DRAINAGE, PAVING,
STRUCTURE, SIGNING, SIGNALS,
AND TRACKBED**



STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	P-5201	2A	24
STATE PROJ. NO.	F.A. PROJ. NO.	DESCRIPTION	
52100.1.STR03TIB		UTIL PE, PE	
43219.2.STR05P5201		RW	
52100.3.STR01T4		UTIL CONST	

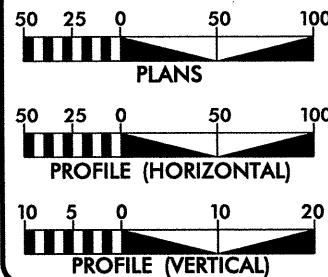


PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

CLEARING ON THIS PROJECT SHALL BE PERFORMED TO THE LIMITS ESTABLISHED BY METHOD III
THIS PROJECT IS WITHIN MUNICIPAL BOUNDARIES OF TOWN OF MORRISVILLE

SUBMITTAL: RIGHT OF WAY
DATE: SEPTEMBER 28, 2012

GRAPHIC SCALES



DESIGN DATA

ADT 2012 = 11,200
ADT 2035 = 25,600
DHV = 12%
D = 65%
T = 4
V = 40 MPH
* TTST = 1% DUAL 3%
FUNC CLASS = COLL
SUBREGIONAL TIER

PROJECT LENGTH

LENGTH ROADWAY STATE PROJECT P-5201 = 0.308 MILES
TOTAL LENGTH STATE PROJECT P-5201 = 0.308 MILES

NC DOT CONTACT: SANDRA STEPNEY, PE
PROJECT ENGINEER

Prepared in the Office of:
AECOM
NC FIRM LICENSE No. F-0342
701 Corporate Center Drive, Suite 475
Raleigh, NC 27607
(919) 854-6200 - (919) 854-6259(FAX)

FOR THE NORTH CAROLINA DEPT. OF TRANSPORTATION
2012 STANDARD SPECIFICATIONS

RIGHT OF WAY DATE:
SEPTEMBER 28, 2012

LETTING DATE:
OCTOBER 15, 2013

BILL JENKINS, PE
PROJECT ENGINEER

TOM HILDEBRAND, PE
PROJECT DESIGN ENGINEER

HYDRAULICS ENGINEER

SIGNATURE: _____ P.E.
ROADWAY DESIGN ENGINEER

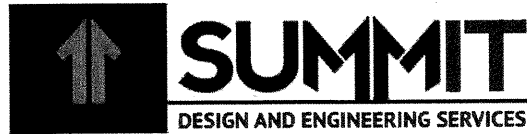
SIGNATURE: _____ P.E.



NC DEPARTMENT OF
TRANSPORTATION
RAIL DIVISION

ENGINEERING AND SAFETY BRANCH
CAPITAL TAHS
100 MAIL SERVICE CENTER
RALEIGH, NC 27601-1000





919.732.3883 SUMMIT-ENGINEER.COM

504 Meadowland Drive, Hillsborough, NC 27278

February 23, 2012

STATE PROJECT: P-5201
 F.A. PROJECT: N/A
 COUNTY: Wake
 DESCRIPTION: Morrisville Parkway (SR 3060) Grade Separation under NS/NCRR Railroad from west of Crabtree Crossings Parkway to east of Bristol Creek Drive
 SUBJECT: Geotechnical Report - Inventory

Project Description

The project consists of constructing 0.3 miles of roadbed improvement and realignment of Morrisville Parkway (SR 3060) to accommodate the grade separation for the proposed NS/NCRR –M1- alignment. The overall project also includes the construction of a grade separation railroad bridge over Morrisville Parkway. The structure subsurface inventory was turned in under separate cover in December of 2012.

The geotechnical investigation was originally conducted in 2012 utilizing Summit personnel and equipment. Borings were advanced using CME-450 drill machine equipped with automatic hammers. Standard Penetration Tests were performed at specific locations to provide subsurface information for roadbed design and construction. Representative soil samples were collected and submitted to the Summit’s soils laboratory for analysis. All investigation and reporting was performed in accordance with the NCDOT Geotechnical Engineering Unit’s 1994 “Geotechnical Investigation Requirements, Procedures and Guidelines.”

The following alignments were investigated for this project:

<u>Line</u>	<u>Station(±)</u>
-L-	18+00 to 29+50
-Y1-	10+00 to 13+50
-Y2-	10+00 to 12+66

Areas of Special Geotechnical Interest

1) Plastic Soils- Medium plastic clays occur near surface, in both residual and artificial fill, throughout the length of the project.

2) Artificial Fill- Artificial fill was encountered at the following locations

<u>Line</u>	<u>Station (±)</u>
-L-	21+00 to 23+50
-Y1-	10+00 to 11+50

3) Non-Crystalline Rock – Triassic non-crystalline rock was encountered within 6 feet of proposed grade during the roadway investigation at the following locations

-L-	23+00 to 27+50
-Y1-	12+00 to 13+50
-Y2-	10+50 to 11+80

4) Weathered Rock- Triassic weathered rock outcrops were observed along proposed grade at the following location. The weathered rock outcrops have the appearance of non-crystalline rock, but when SPT drilling was done in this material the N-values show that the material is weathered rock by NCDOT Geotechnical Legend criteria.

<u>Line</u>	<u>Station (±)</u>
-L-	21+50 to 22+50

Physiography, Geology and Surface Water

The project corridor is located in the central eastern portion of the Piedmont Physiographic Province near the towns of Cary and Morrisville, NC. Topography in the area is generally gently rolling. The project area is comprised of small pine forest and residential/commercial development.

Geologically the project area lies within the Durham Triassic Basin and consists of Triassic age sediments, weather rock, and non-crystalline rock.

Surface water is drained from the corridor by several smaller unnamed creeks and tributaries that generally trend east-southeast across the project.

Soils Properties

Residual soils encountered along the project corridor are primarily derived from the weathering of Triassic age non-crystalline rock. Typically, these Triassic are laterally discontinuous and vary in thickness. Residual soils

consist of gray to red-brown and orange brown, stiff to hard, fine sandy clay (A-6); orange brown, very dense, silty sand (A-2-4); red-brown, hard, sandy silt (A-4), and orange-brown, hard, sandy clay (A-6);

Artificial Fill soil encountered during the investigation is underlain by residual soils. Artificial fill soils consist of dark brown to black, sandy clay (A-6), with rip-rap. The artificial fill soils are associated with the industrial development on both the north and south side of the proposed roadway alignments and with the existing rail roadbed embankment near existing Morrisville Parkway.

Rock Properties

Weathered rock and non-crystalline rock occur in several areas of the project. The weathered rock is derived from the underlying sedimentary rock of the Durham Triassic Basin, and consists of conglomeratic mudstone containing rounded to partially-rounded boulder-, cobble-, gravel- and sand-size crystalline rock clasts. Weathered and non-crystalline Triassic rock in this area is known to be highly degradable when exposed to air and water. Areas containing Weathered and Non-Crystalline Rock are listed above in the section "Areas of Special Geotechnical Interest."

Ground Water

During the geotechnical field investigation of the roadway alignments, several borings encountered ground water. These borings fell in the area of an existing man-made drainage between -L- 21+00 and 24+00. All other borings were dry at the time of investigation. Ground water data was collected during below average to average rainfall conditions. Ground water may fluctuate with seasonal precipitation.

BULK SAMPLES

There were no bulk samples collected during the geotechnical investigation.

Respectfully Submitted,



Bradley D. Worley, PG
Senior Transportation Geologist
Summit Design and Engineering, PLLC

EARTHWORK BALANCE SHEET

Volumes in Cubic Yards

Rock Swell:

PROJECT: Morrisville Parkway

COUNTY: WAKE

DATE

7/12/2013

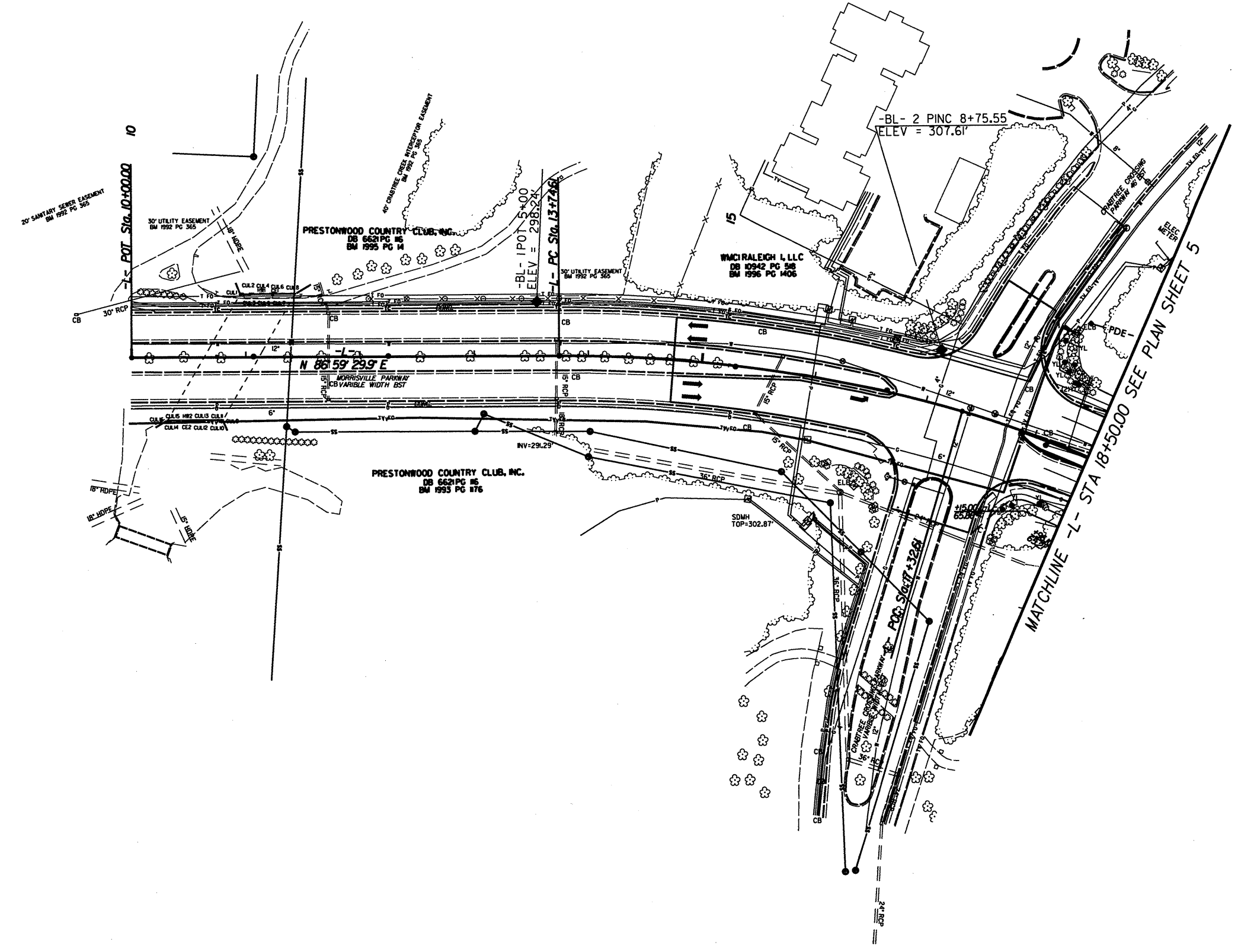
SHEET 1 OF 1

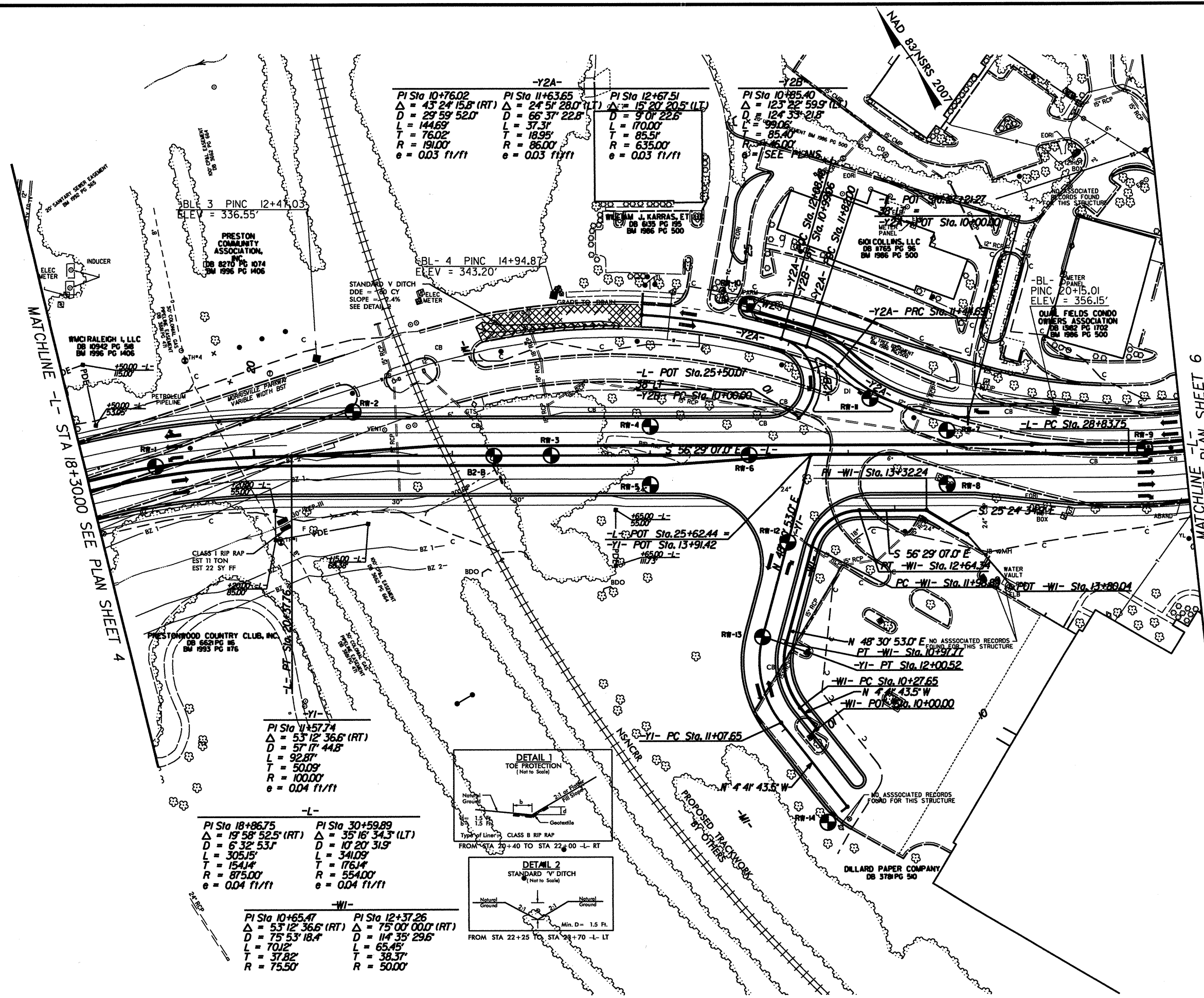
LINE	STATION	STATION	TOTAL EXCAV. (UNCL.)	ROCK EXCAV.	UNDERCUT EXCAV.	UNSUIT. EXCAV. (ROCK)	SUITABLE EXCAV.	TOTAL EMB.	ROCK EMB.	UNDERCUT EMB.	EARTH EMB.	EMBANK. +20%	BORROW	ROCK WASTE	SUITABLE WASTE	UNSUIT. WASTE (ROCK)	TOTAL WASTE
L2	10+41.89	16+00.00	540				540	107			107	128			411		411
Subtotal No. 1			540				540	107			107	128			411		411
L	17+85.00	30+00.00	73,663			6,750	66,913	488			488	586			66,327	6,750	73,077
L XOVER	21+50.00	24+50.00	429				429	6			6	7			422		422
Y1	10+00.00	13+52.08	7,111				7,111	26			26	31			7,080		7,080
Y2	10+38.00	12+37.25	996				996	8			8	10			986		986
DR1	10+00.00	11+60.00	570				570	0			0	0			570		570
Subtotal No. 2			82,769			6,750	76,019	528			528	633			75,386	6,750	82,136
M1	3549+00.00	3582+39.61	23,618				23,618	36,935			36,935	44,322	20,704				
Subtotal No. 3			23,618				23,618	36,935			36,935	44,322	20,704				
M1	End Bridge	3584+31.11	3614+00.00	41,541			41,541	24,256			24,256	29,107			12,434		12,434
Subtotal No. 4			41,541				41,541	24,256			24,256	29,107			12,434		12,434
M1		3614+00.00	3630+00.00	21,046			21,046	3,826			3,826	4,592			16,454		16,454
Subtotal No. 5			21,046				21,046	3,826			3,826	4,592			16,454		16,454
PROJECT TOTAL			169,515			6,750	162,765	65,652			65,652	78,782	20,704		104,686	6,750	111,436
LOSS DUE TO CLEARING AND GRUBBING - Grade Separation			-9550				-9550								-9550		-9550
WASTE TO REPLACE BORROW													-20,704		-20,704		-20,704
GRAND TOTAL			159,965			6,750	153,215	65,652			65,652	78,782	0		74,432	6,750	81,182
SAY			160,000														

ESTIMATED DDE 1890 CY
 SHALLOW UNDERCUT 300 CY
 ADDITIONAL UNDERCUT 2050 CY
 SELECT GRANULAR MATERIAL CLASS III 800 CY
 SUBGRADE STABILIZATION CLASS IV 600 TONS
 SHOULDER BORROW 100 CY
 PAVEMENT STRUCTURE VOLUME 5110 CY

PROJECT REFERENCE NO.	SHEET NO.
P-5201	4
RW SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
PRELIMINARY PLANS	
DO NOT USE FOR CONSTRUCTION	
<small>Prepared in the Office of:</small> AECOM	
<small>NC FIRM LICENSE No F-0542 TO Corporate Center, Suite 415 1901 854-2000 • 1901 854-2297 FAX</small>	

NAD 83/NSRS 2007





-Y2B-	
PI Sta 10+85.40	PI Sta 10+85.40
$\Delta = 123^{\circ} 22' 59.9''$ (L)	$\Delta = 123^{\circ} 22' 59.9''$ (L)
D = 124' 33" 21.8"	D = 124' 33" 21.8"
L = 99.06'	L = 99.06'
T = 85.40'	T = 85.40'
R = 46.00'	R = 46.00'

BL-3 PINC 12+41.03
ELEV = 336.55'

PRESTON COMMUNITY ASSOCIATION, INC.
DB 8270 PG 1074
BM 1996 PG 1406

BL-4 PINC 14+94.87
ELEV = 343.20'

STANDARD V DITCH
DDE = 120 CY
SLOPE = 2.4%
SEE DETAIL 1

BL-PINC 20+15.01
ELEV = 356.15'

QUAL FIELDS CONDO OWNERS ASSOCIATION
DB 1382 PG 1102
BM 1986 PG 500

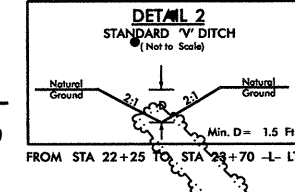
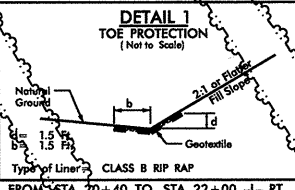
MATCHLINE -L- STA 18+30.00 SEE PLAN SHEET 4

MATCHLINE -L- PLAN SHEET 6 STA 29+40.00 SEE PLAN SHEET 6

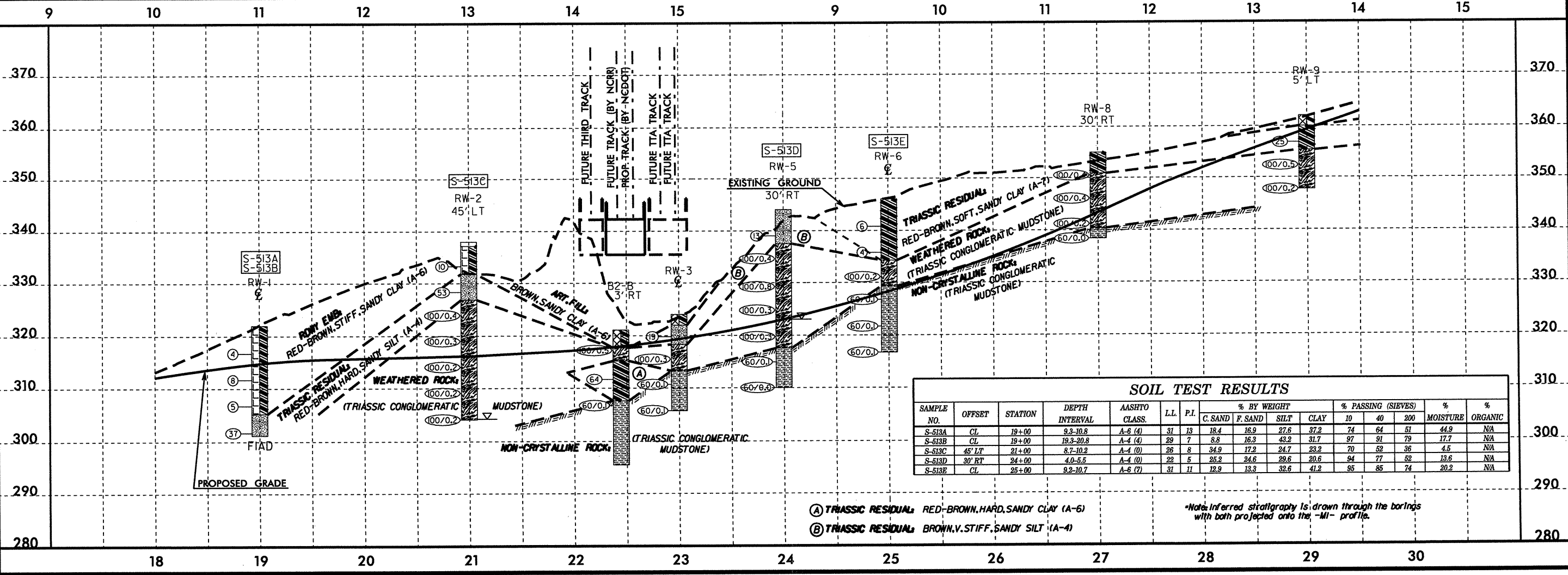
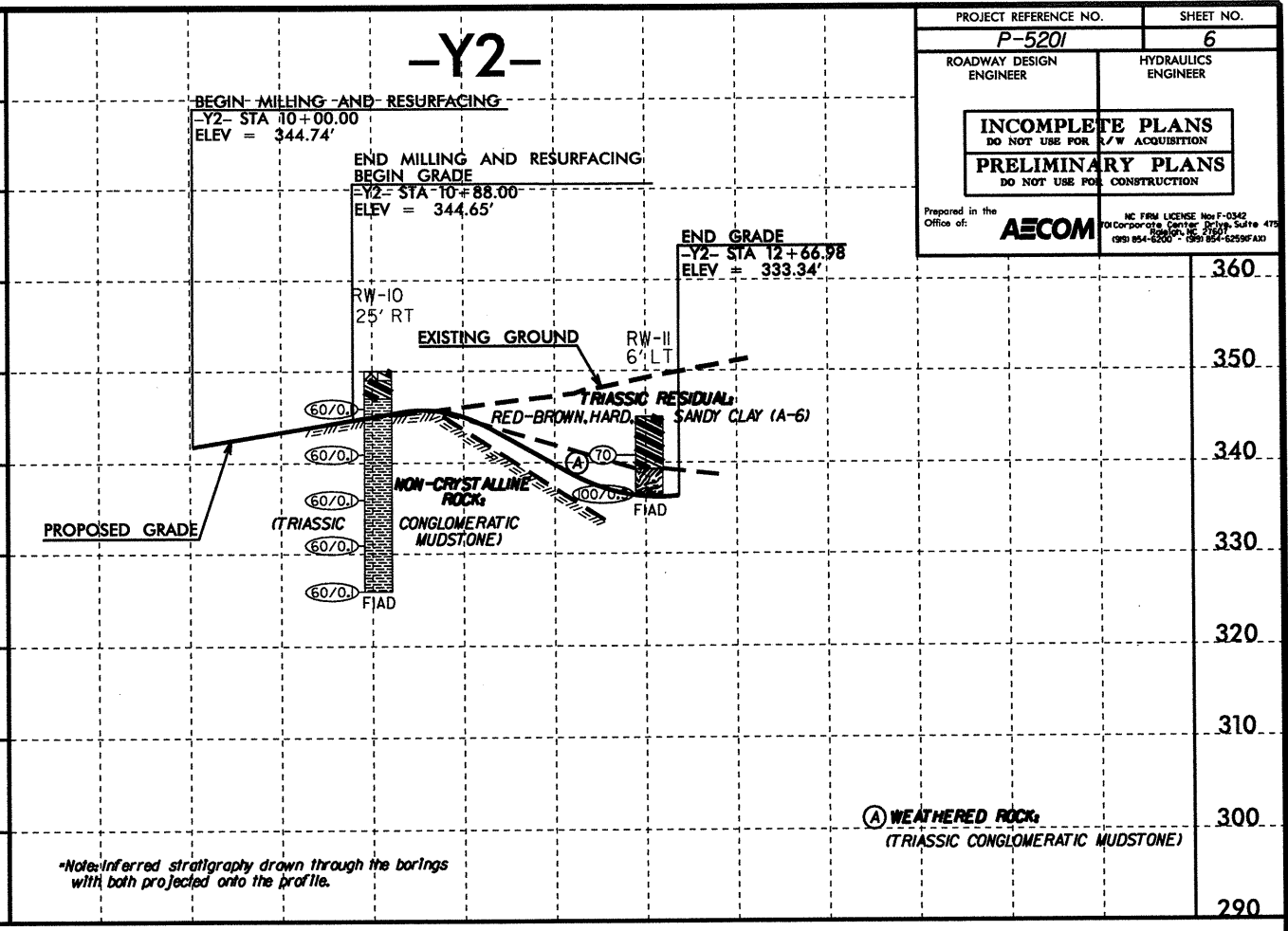
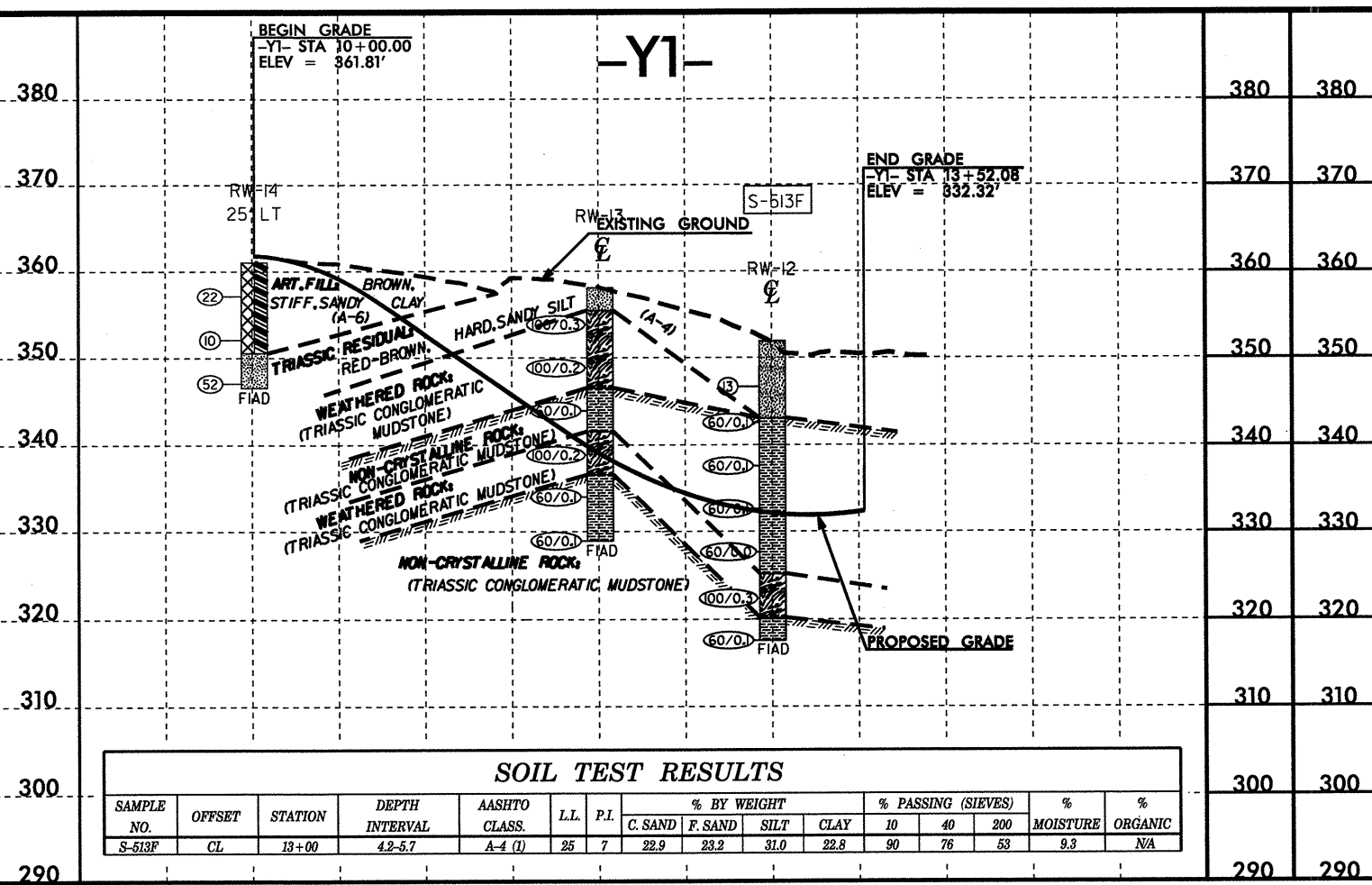
-Y1-	
PI Sta 11+57.74	PI Sta 11+57.74
$\Delta = 53^{\circ} 12' 36.6''$ (RT)	$\Delta = 53^{\circ} 12' 36.6''$ (RT)
D = 57' 17" 44.8"	D = 57' 17" 44.8"
L = 92.87'	L = 92.87'
T = 50.09'	T = 50.09'
R = 100.00'	R = 100.00'
e = 0.04 ft/ft	e = 0.04 ft/ft

-L-	
PI Sta 18+86.75	PI Sta 30+59.89
$\Delta = 19^{\circ} 58' 52.5''$ (RT)	$\Delta = 35^{\circ} 16' 34.3''$ (LT)
D = 6' 32" 53.1"	D = 10' 20" 31.9"
L = 305.15'	L = 341.09'
T = 154.14'	T = 176.14'
R = 875.00'	R = 554.00'
e = 0.04 ft/ft	e = 0.04 ft/ft

-WI-	
PI Sta 10+65.47	PI Sta 12+37.26
$\Delta = 53^{\circ} 12' 36.6''$ (RT)	$\Delta = 75^{\circ} 00' 00.0''$ (RT)
D = 75' 53" 18.4"	D = 114' 35" 29.6"
L = 70.12'	L = 65.45'
T = 37.82'	T = 38.37'
R = 75.50'	R = 50.00'

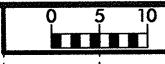


REMOVAL OF EXISTING PAVEMENT

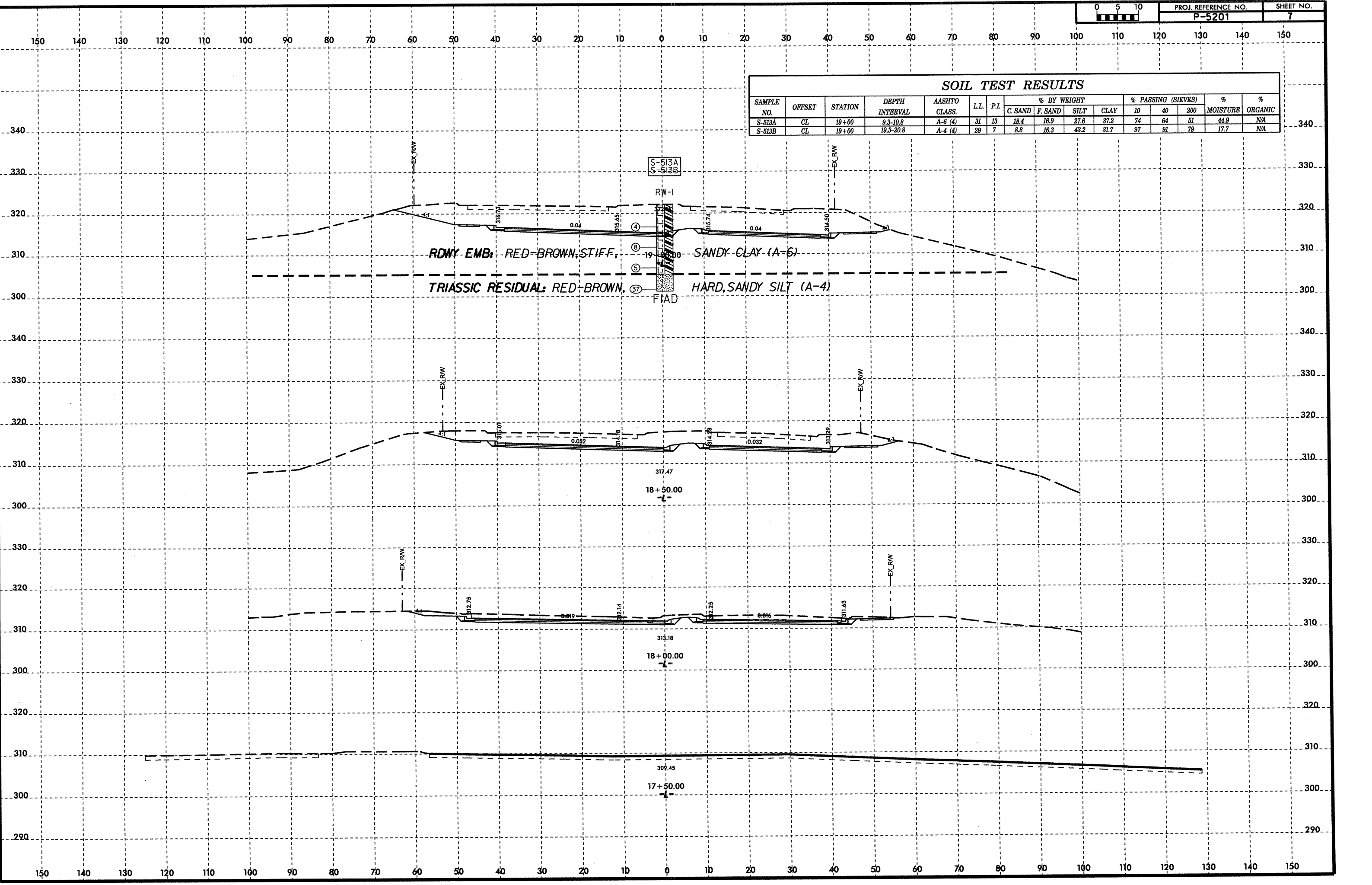


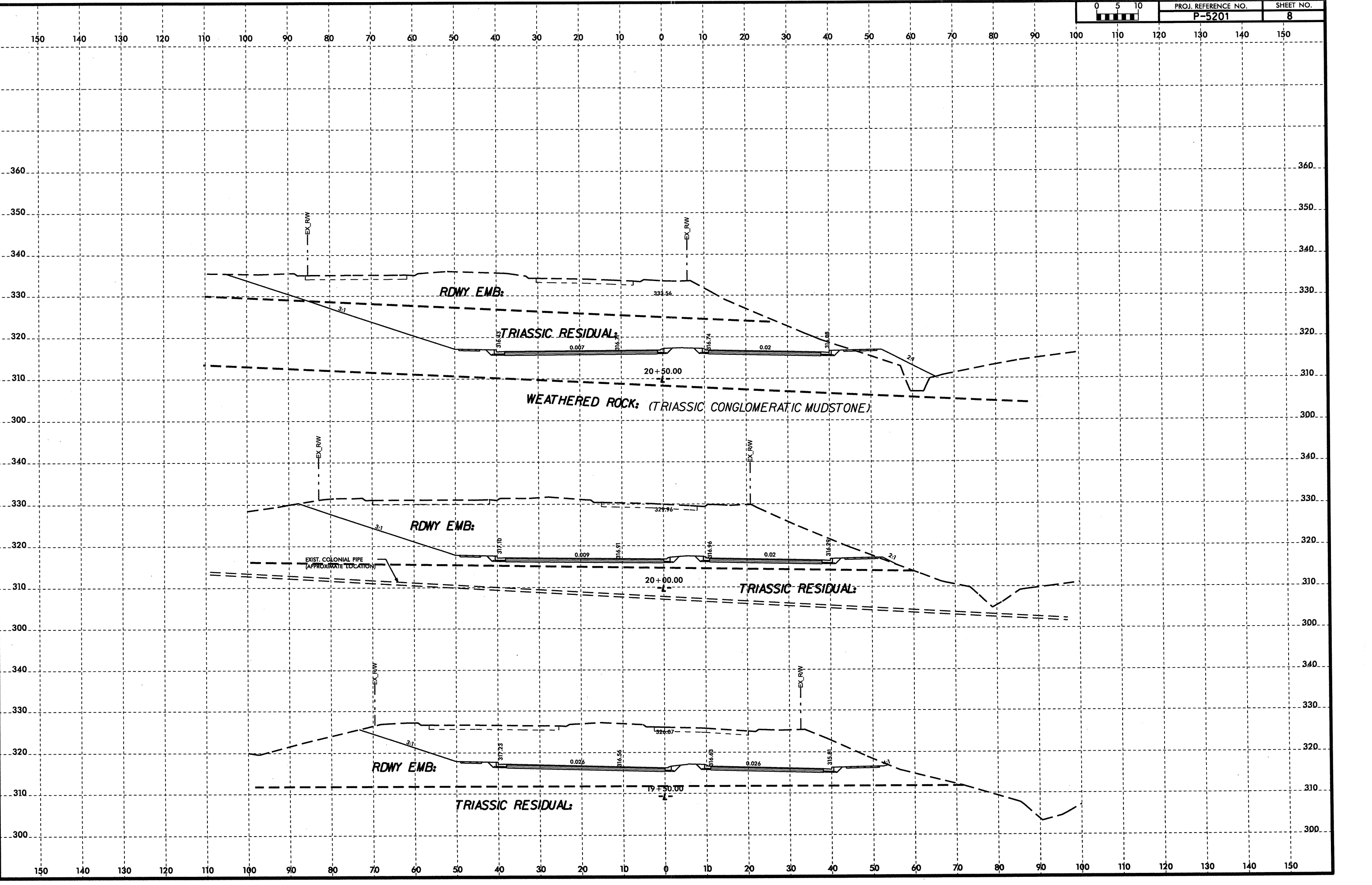
- (A) TRIASSIC RESIDUAL RED-BROWN, HARD, SANDY CLAY (A-6)
- (B) TRIASSIC RESIDUAL BROWN, V. STIFF, SANDY SILT (A-4)

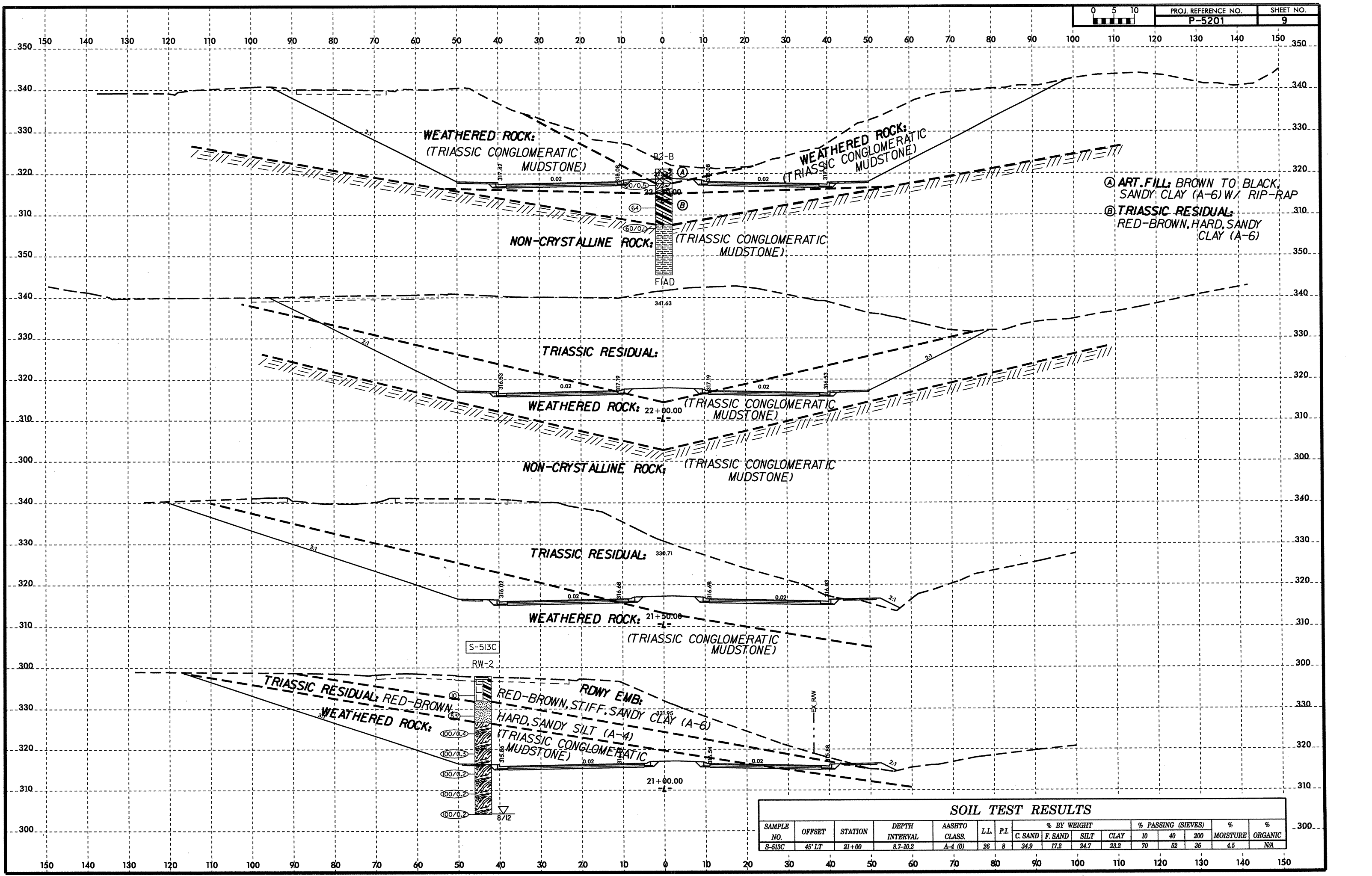
*Note: Inferred stratigraphy is drawn through the borings with both projected onto the -M1- profile.



SOIL TEST RESULTS															
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	LL	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
S-513A	CL	19+00	9.3-10.8	A-6 (4)	31	13	18.4	16.9	27.6	37.2	74	64	51	44.9	NA
S-513B	CL	19+00	19.3-20.8	A-4 (4)	29	7	8.8	16.3	43.2	31.7	97	91	79	17.7	NA



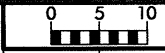




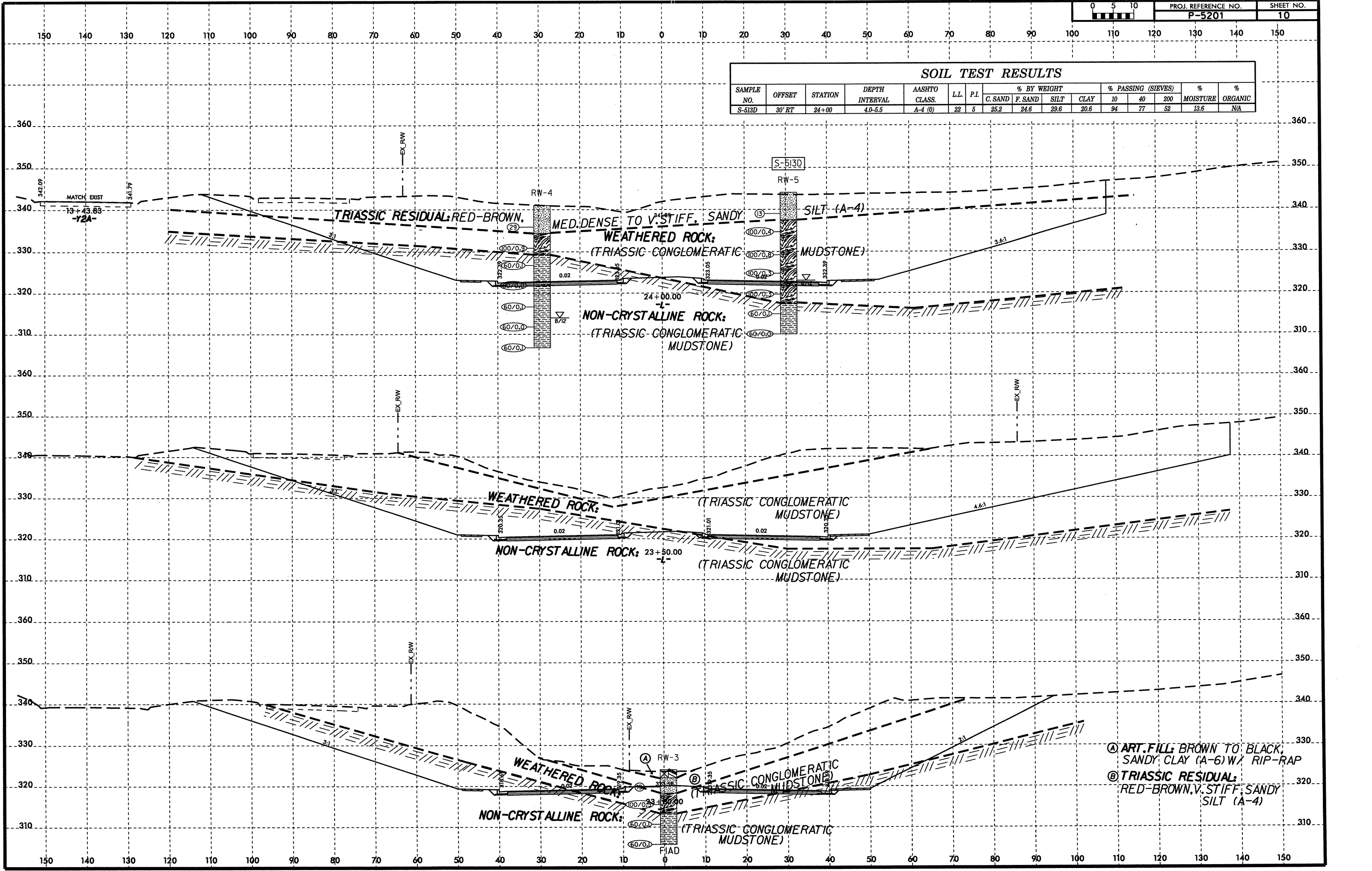
(A) ART. FILL: BROWN TO BLACK, SANDY CLAY (A-6) W/ RIP-RAP
 (B) TRIASSIC RESIDUAL: RED-BROWN, HARD, SANDY CLAY (A-6)

SOIL TEST RESULTS

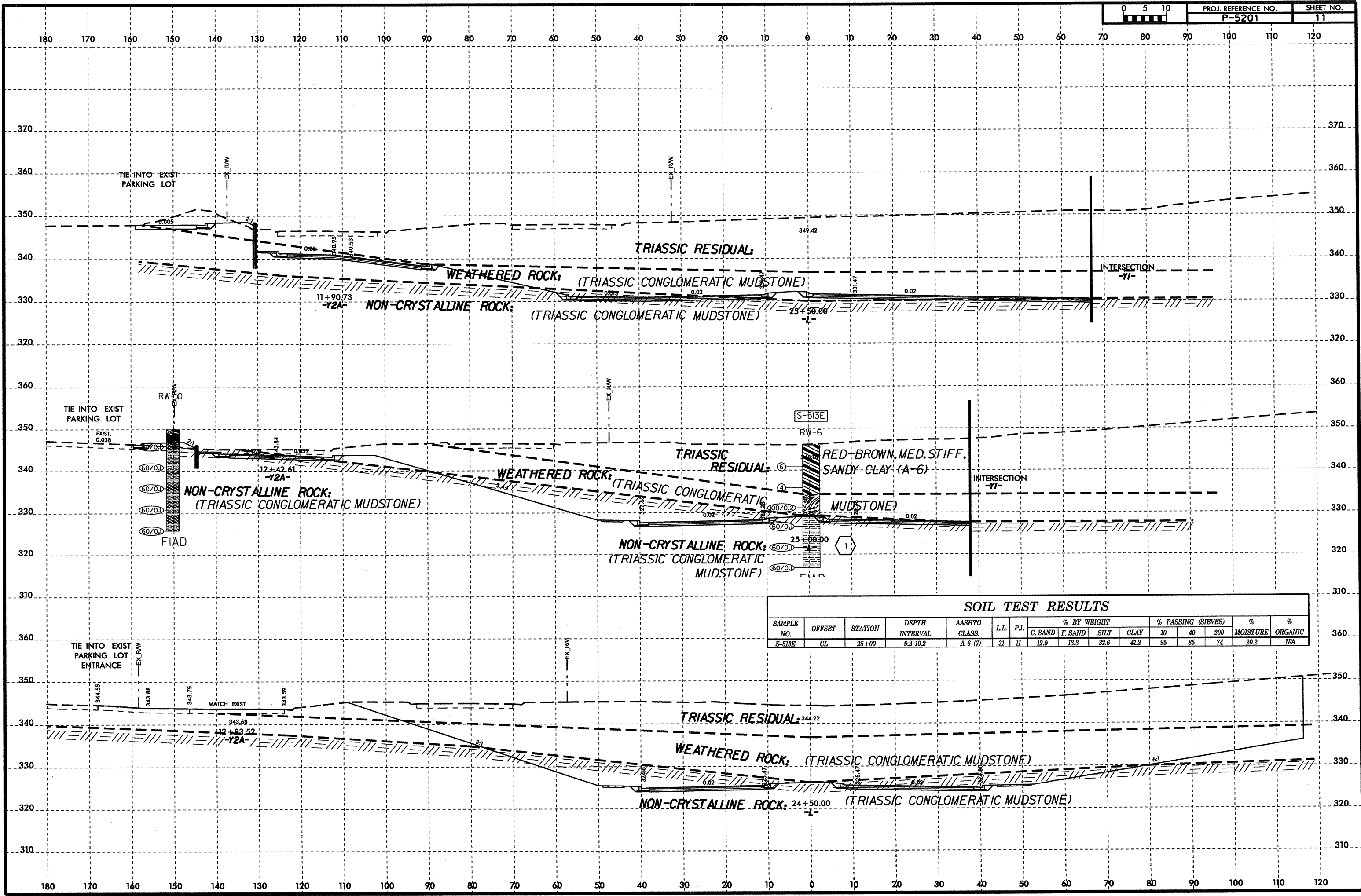
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	LL	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
S-513C	45' LT	21+00	8.7-10.2	A-4 (0)	26	8	34.9	17.2	24.7	23.2	70	62	36	4.5	NA



SOIL TEST RESULTS																
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	LL	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC	
							C. SAND	F. SAND	SILT	CLAY	10	40	200			
S-513D	30' RT	24+00	4.0-5.5	A-4 (0)	22	5	25.2	24.6	29.6	20.6	94	77	52	13.6	NA	

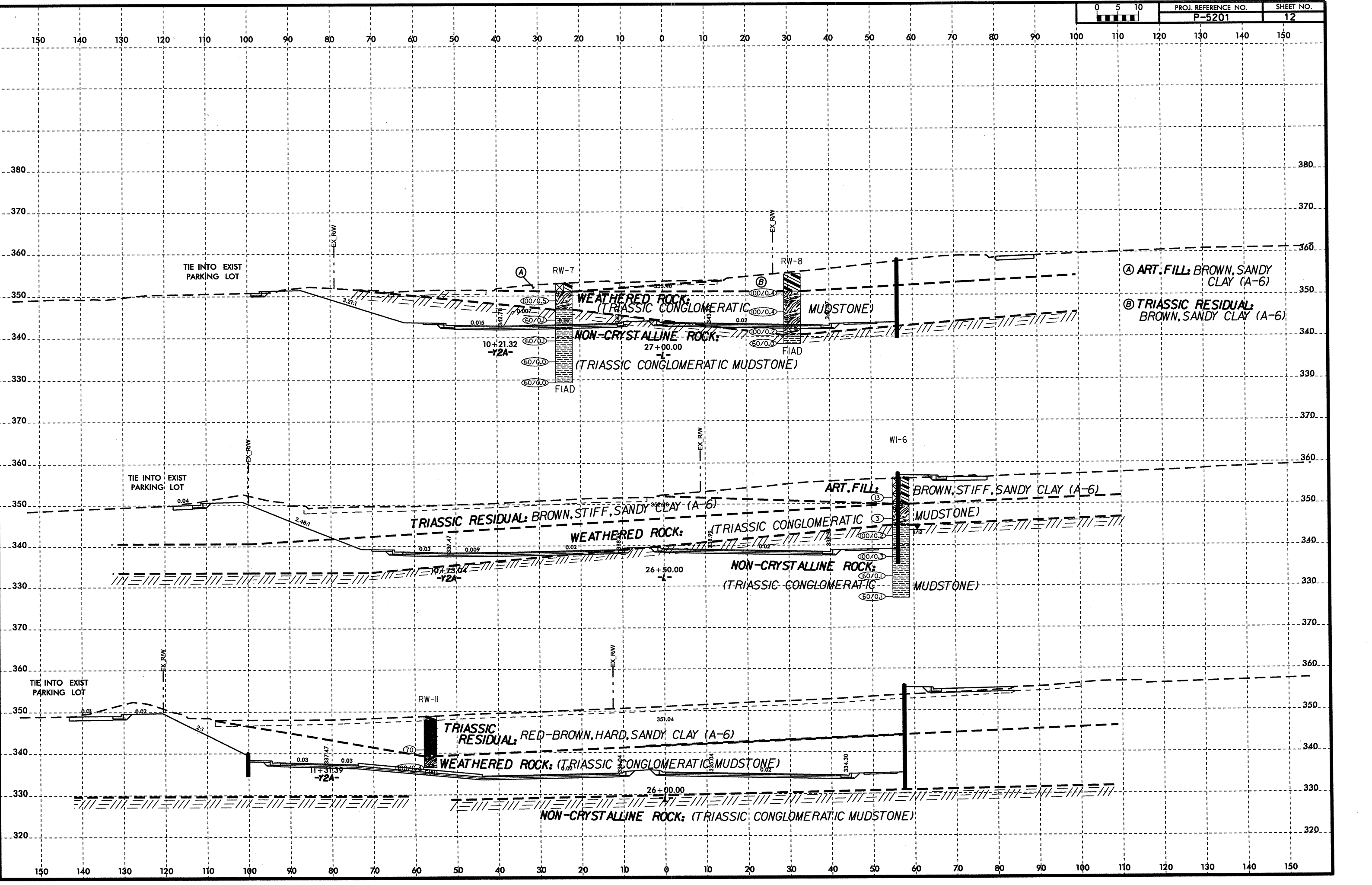
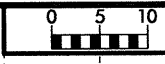


(A) ART. FILL: BROWN TO BLACK, SANDY CLAY (A-6) W/ RIP-RAP
 (B) TRIASSIC RESIDUAL: RED-BROWN, V. STIFF, SANDY SILT (A-4)



SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS	LL	P.I.	% BY WEIGHT				% PASSING (SIEVES)		% MOISTURE	% ORGANIC	
							C. SAND	F. SAND	SILT	CLAY	10	200			
S-513E	CL	25+00	9.2-10.2	A-6 (7)	31	11	12.9	13.3	32.6	41.2	95	85	74	20.2	NA



TIE INTO EXIST
PARKING LOT

TIE INTO EXIST
PARKING LOT

TIE INTO EXIST
PARKING LOT

(A)

(B)

WI-6

(A) ART. FILL: BROWN, SANDY
CLAY (A-6)

(B) TRIASSIC RESIDUAL:
BROWN, SANDY CLAY (A-6)

TRIASSIC RESIDUAL: BROWN, STIFF, SANDY CLAY (A-6)

ART. FILL: BROWN, STIFF, SANDY CLAY (A-6)

TRIASSIC RESIDUAL: RED-BROWN, HARD, SANDY CLAY (A-6)

WEATHERED ROCK: (TRIASSIC CONGLOMERATIC MUDSTONE)

NON-CRYSTALLINE ROCK: (TRIASSIC CONGLOMERATIC MUDSTONE)

WEATHERED ROCK:
(TRIASSIC CONGLOMERATIC MUDSTONE)

NON-CRYSTALLINE ROCK:
(TRIASSIC CONGLOMERATIC MUDSTONE)

MUDSTONE

WEATHERED ROCK:
(TRIASSIC CONGLOMERATIC MUDSTONE)

NON-CRYSTALLINE ROCK:
(TRIASSIC CONGLOMERATIC MUDSTONE)

MUDSTONE

MUDSTONE

RW-11

RW-7

RW-8

10+21.32
-Y2A-

27+00.00

17+75.04
-Y2A-

26+50.00

11+31.39
-Y2A-

26+00.00

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

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

380

370

360

350

340

330

370

360

350

340

330

370

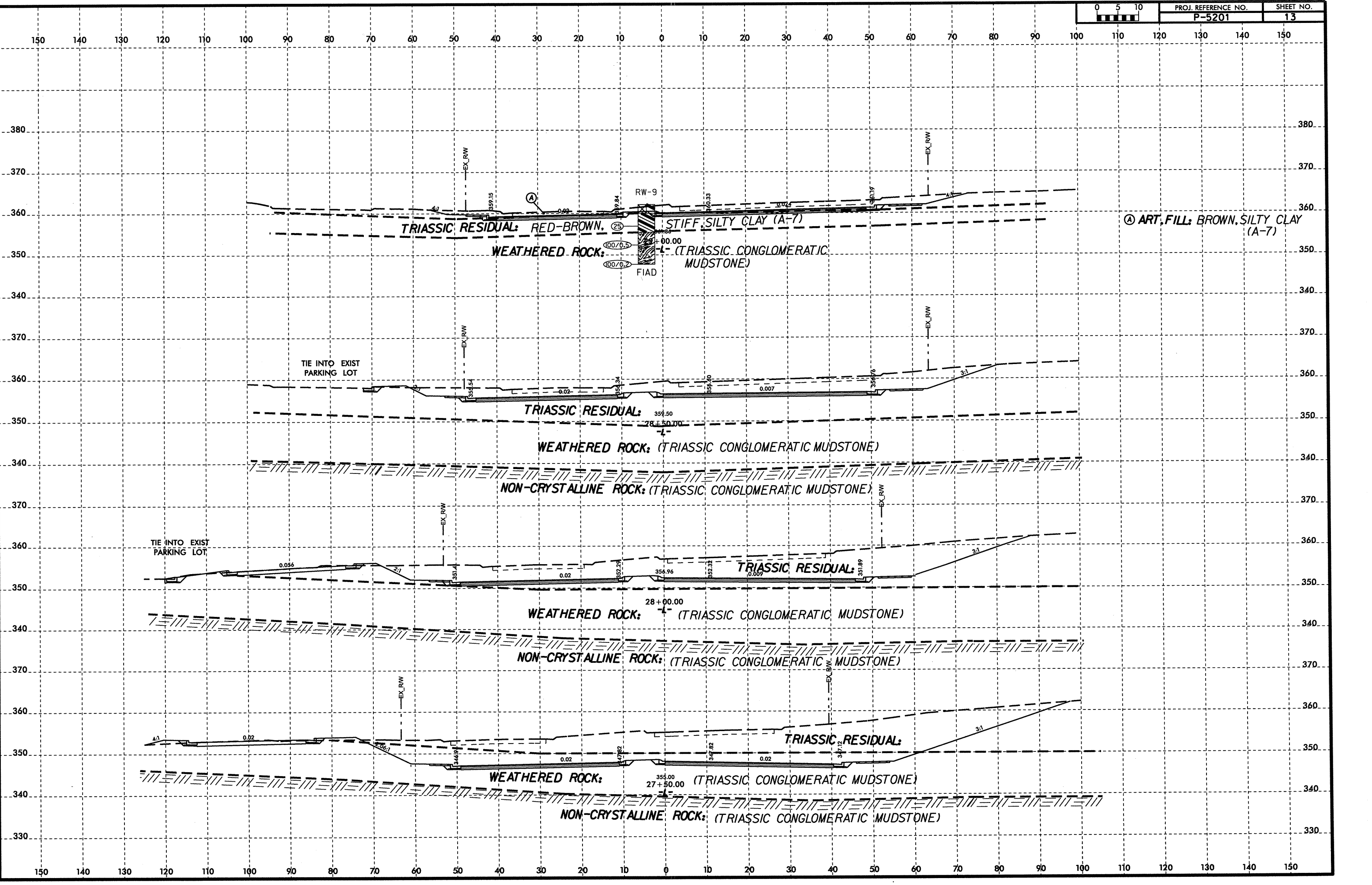
360

350

340

330

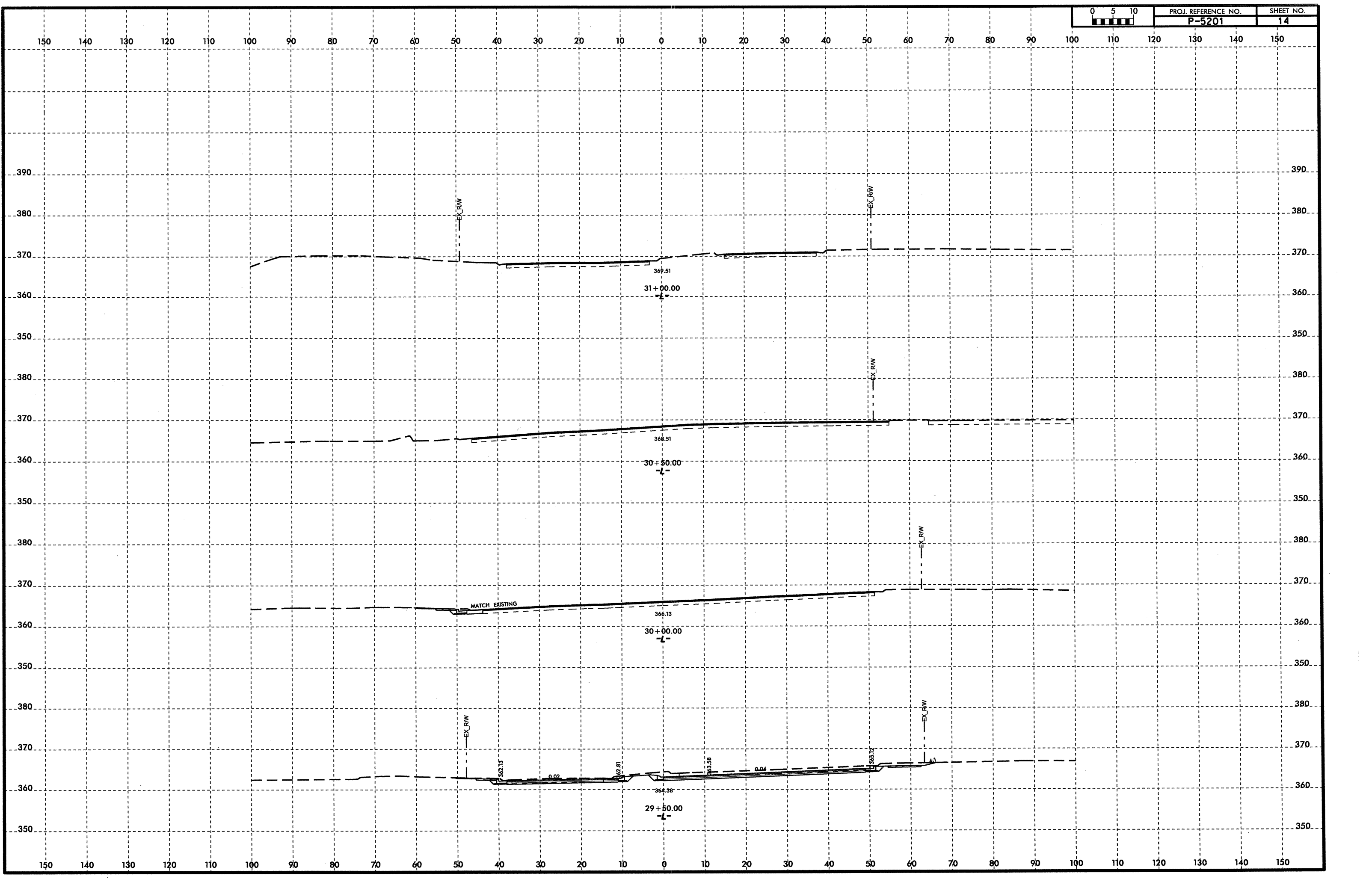
320



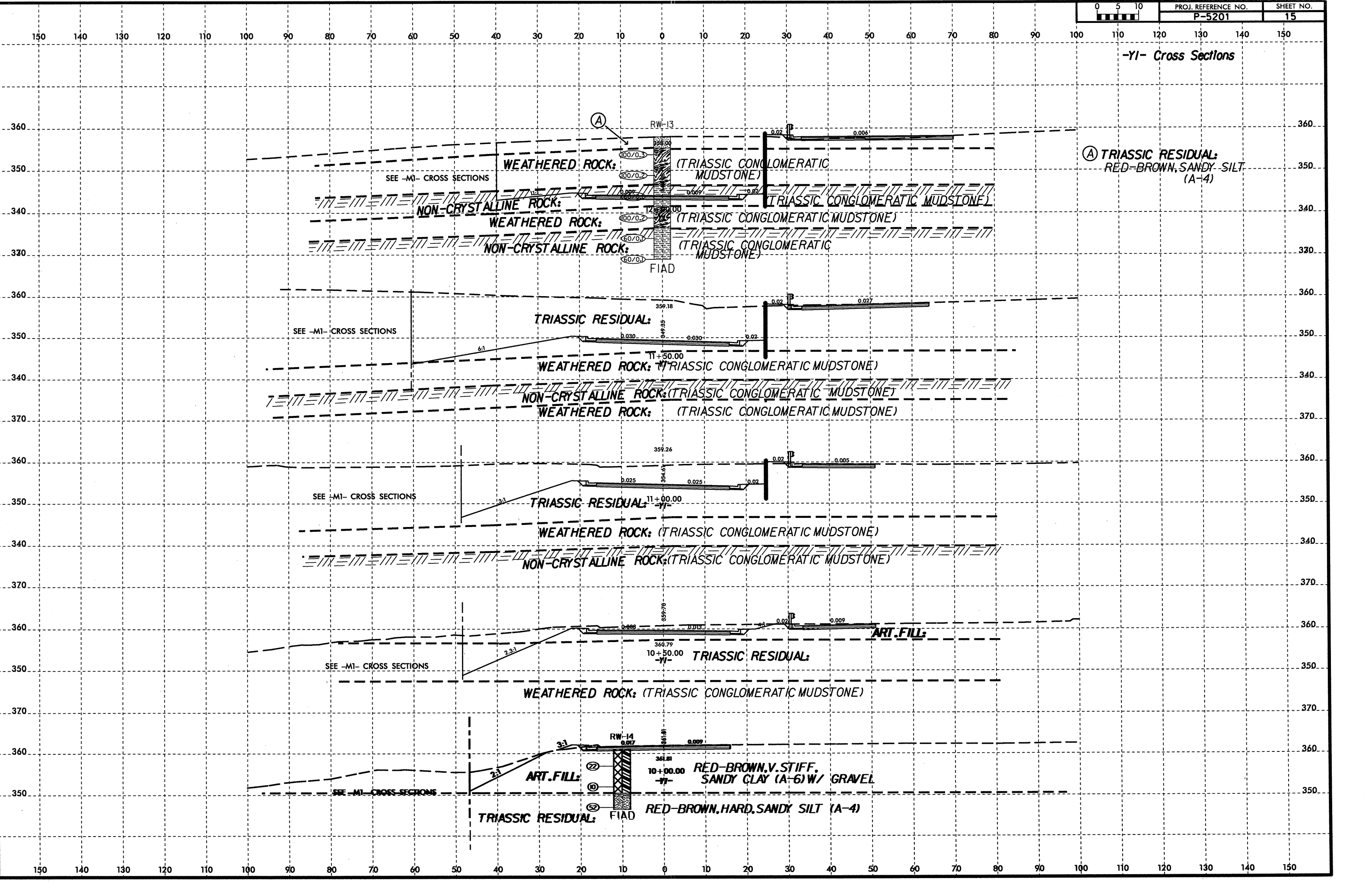


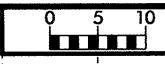
PROJ. REFERENCE NO.
P-5201

SHEET NO.
14



-YI- Cross Sections

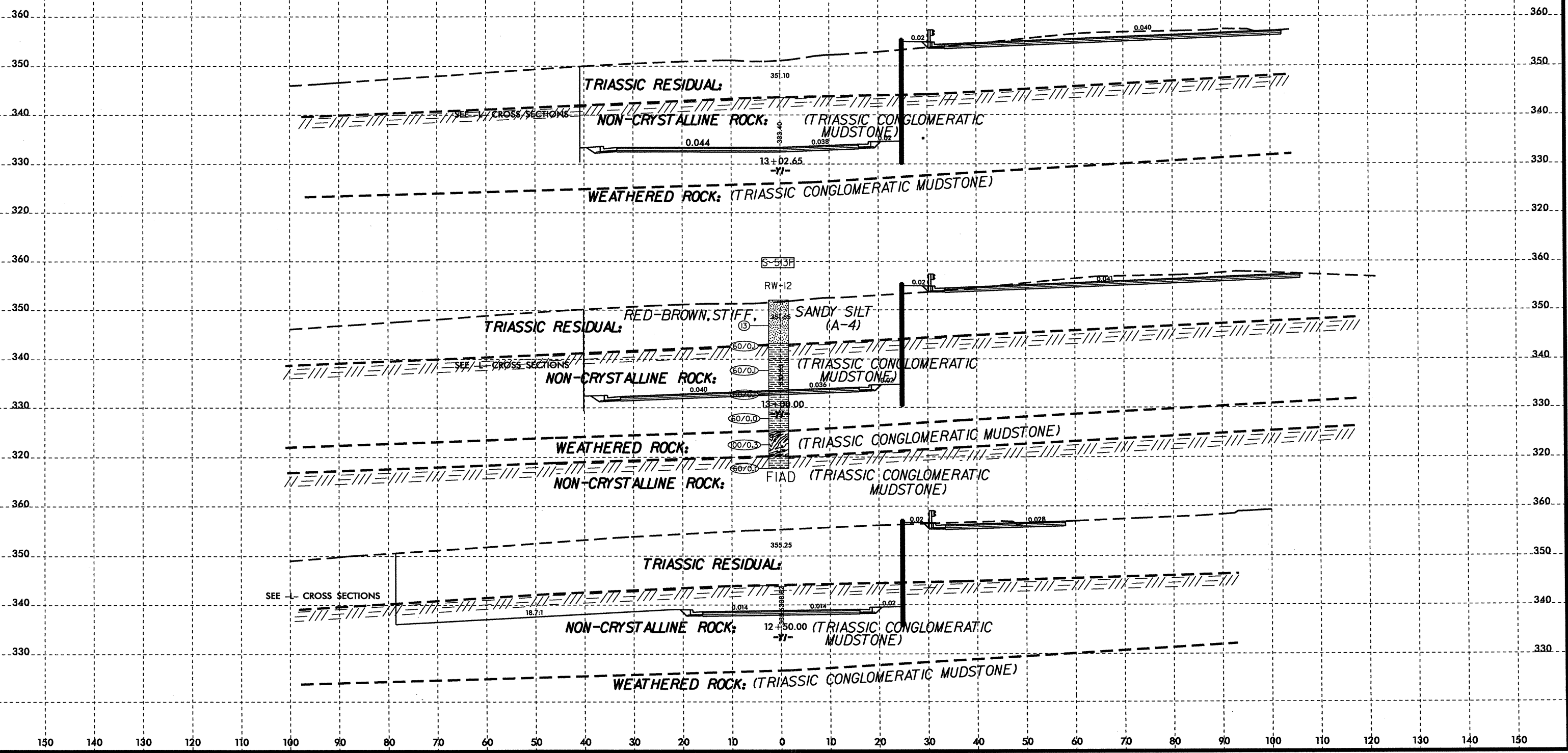




150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150

-YI- Cross Sections

SOIL TEST RESULTS															
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	LL	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
S-513F	CL	13+00	4.2-5.7	A-4 (1)	25	7	22.9	23.2	31.0	22.8	90	76	53	9.3	N/A





NCDOT GEOTECHNICAL ENGINEERING UNIT

BORELOG REPORT

WBS 52100.1.TR03TIB	TIP P-5201	COUNTY WAKE	GEOLOGIST Brett Smith
SITE DESCRIPTION Morrisville Parkway (-L-) Grade Separation			GROUND WTR (ft)
BORING NO. RW-1	STATION 19+00	OFFSET CL	ALIGNMENT -L-
COLLAR ELEV. 322.0 ft	TOTAL DEPTH 20.8 ft	NORTHING 750,250	EASTING 2,051,598
DRILL RIG/HAMMER EFF./DATE SUM3359 CME-450 84% 07/27/2012		DRILL METHOD H.S. Augers	HAMMER TYPE Automatic
DRILLER Luis Gonzalez	START DATE 08/30/12	COMP. DATE 08/30/12	SURFACE WATER DEPTH N/A

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
			0.5ft	0.5ft	0.5ft	0	25	50	75	100				
325														GROUND SURFACE ELEV. (ft) 322.0
320	317.7	4.3	3	2	2							M		ROADWAY EMBANKMENT red-brown, SANDY CLAY with some gravel (A-6)
315	312.7	9.3	3	4	4						S-513A	45%		
310	307.7	14.3	2	2	3							M		
305	302.7	19.3	8	15	22						S-513B	18%		TRIASSIC RESIDUAL orange-brown, SANDY SILT with some clay (A-4)
														Boring Terminated at Elevation 301.2 ft in Triassic Residual (SANDY SILT)

WBS 52100.1.TR03TIB	TIP P-5201	COUNTY WAKE	GEOLOGIST Brett Smith
SITE DESCRIPTION Morrisville Parkway (-L-) Grade Separation			GROUND WTR (ft)
BORING NO. RW-2	STATION 21+00	OFFSET 45 ft LT	ALIGNMENT -L-
COLLAR ELEV. 338.0 ft	TOTAL DEPTH 33.9 ft	NORTHING 750,186	EASTING 2,051,795
DRILL RIG/HAMMER EFF./DATE SUM3359 CME-450 84% 07/27/2012		DRILL METHOD H.S. Augers	HAMMER TYPE Automatic
DRILLER Luis Gonzalez	START DATE 08/30/12	COMP. DATE 08/30/12	SURFACE WATER DEPTH N/A

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
			0.5ft	0.5ft	0.5ft	0	25	50	75	100				
340														GROUND SURFACE ELEV. (ft) 338.0
335	334.3	3.7	4	5	5							M		ROADWAY EMBANKMENT pavement with gravel red-brown, SANDY CLAY (A-6)
330	329.3	8.7	21	23	30						S-513C	5%		TRIASSIC RESIDUAL red-brown, SANDY SILT with some gravel and clay (A-4)
325	324.3	13.7	100/0.4											WEATHERED ROCK (Triassic Conglomeratic Mudstone)
320	319.3	18.7	100/0.3											
315	314.3	23.7	100/0.2											
310	309.3	28.7	100/0.2											
305	304.3	33.7	100/0.2											Boring Terminated at Elevation 304.1 ft in Weathered Rock (Triassic Conglomeratic Mudstone)
														Boring offset due to access issues, drilled in roadway.

NCDOT BORE DOUBLE P-5201 MORRISVILLE PARKWAY - WALL&RDWY_MERGED.GPJ NC_DOT_GDT 2/23/13

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

WBS 52100.1.TR03TIB	TIP P-5201	COUNTY WAKE	GEOLOGIST Brett Smith
SITE DESCRIPTION Morrisville Parkway (-L-) Grade Separation			GROUND WTR (ft)
BORING NO. B2-B	STATION 21+42	OFFSET CL	ALIGNMENT -L-
COLLAR ELEV. 321.1 ft	TOTAL DEPTH 25.6 ft	NORTHING 750,070	EASTING 2,051,890
DRILL RIG/HAMMER EFF./DATE SUM3359 CME-450 84% 07/27/2012		DRILL METHOD Core Boring	HAMMER TYPE Automatic
DRILLER Craig Husketh	START DATE 10/17/12	COMP. DATE 10/17/12	SURFACE WATER DEPTH N/A

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100					
325														GROUND SURFACE	0.0
320	317.7	3.4												ARTIFICIAL FILL dark brown to black, SANDY CLAY (A-6) and rip-rap with little organics	3.4
315	312.7	8.4	21	40	24									WEATHERED ROCK (Triassic Conglomeratic Mudstone)	5.9
310	307.7	13.4												TRIASSIC RESIDUAL red-brown, SANDY CLAY (A-6)	13.5
305														NON-CRYSTALLINE ROCK (Triassic Conglomeratic Mudstone)	18.3
300														Boring Terminated at Elevation 295.5 ft in Non-Crystalline Rock (Triassic Conglomeratic Mudstone)	25.6

Perched water encountered at 2-3 ft.

WBS 52100.1.TR03TIB	TIP P-5201	COUNTY WAKE	GEOLOGIST Brett Smith
SITE DESCRIPTION Morrisville Parkway (-L-) Grade Separation			GROUND WTR (ft)
BORING NO. RW-3	STATION 23+00	OFFSET CL	ALIGNMENT -L-
COLLAR ELEV. 324.0 ft	TOTAL DEPTH 18.3 ft	NORTHING 750,038	EASTING 2,051,937
DRILL RIG/HAMMER EFF./DATE SUM3359 CME-450 84% 07/27/2012		DRILL METHOD H.S. Augers	HAMMER TYPE Automatic
DRILLER Luis Gonzalez	START DATE 08/28/12	COMP. DATE 08/28/12	SURFACE WATER DEPTH N/A

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100					
325														GROUND SURFACE	0.0
320	320.8	3.2	8	9	10									ARTIFICIAL FILL brown, SANDY CLAY with cobble and boulder sized rip-rap (A-6)	2.0
315	315.8	8.2												TRIASSIC RESIDUAL red-brown, SANDY SILT with some gravel and clay (A-4)	5.7
310	310.8	13.2												WEATHERED ROCK (Triassic Conglomeratic Mudstone)	10.7
	305.8	18.2												NON-CRYSTALLINE ROCK (Triassic Conglomeratic Mudstone)	18.3
														Boring Terminated with Standard Penetration Test Refusal at Elevation 305.7 ft in Non-Crystalline Rock (Triassic Conglomeratic Mudstone)	

Able to slowly advance auger through NCR.

NCDOT BORE DOUBLE P-5201 MORRISVILLE PARKWAY - WALL&RDWY_MERGED.GPJ NC_DOT.GDT 2/23/13



WBS 52100.1.TR03TIB	TIP P-5201	COUNTY WAKE	GEOLOGIST Brett Smith
SITE DESCRIPTION Morrisville Parkway (-L-) Grade Separation			GROUND WTR (ft)
BORING NO. RW-4	STATION 24+00	OFFSET 30 ft LT	ALIGNMENT -L-
COLLAR ELEV. 341.0 ft	TOTAL DEPTH 34.3 ft	NORTHING 750,008	EASTING 2,052,037
DRILL RIG/HAMMER EFF./DATE SUM3359 CME-450 84% 07/27/2012		DRILL METHOD H.S. Augers	HAMMER TYPE Automatic
DRILLER Luis Gonzalez	START DATE 08/28/12	COMP. DATE 08/28/12	SURFACE WATER DEPTH N/A

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION			
			0.5ft	0.5ft	0.5ft	0	25	50	75	100				ELEV. (ft)	DEPTH (ft)		
345																	
340																	341.0 GROUND SURFACE 0.0
335	336.8	4.2	13	18	11										D		341.0 TRIASSIC RESIDUAL red-brown, SANDY SILT with little clay (A-4)
330	331.8	9.2	50	50/0.4													334.3 WEATHERED ROCK (Triassic Conglomeratic Mudstone) 6.7
325	326.8	14.2	60/0.1														329.3 NON-CRYSTALLINE ROCK (Triassic Conglomeratic Mudstone) 11.7
320	321.8	19.2	60/0.0														
315	316.8	24.2	60/0.1														
310	311.8	29.2	60/0.0														
	306.8	34.2	60/0.1														306.7 Boring Terminated with Standard Penetration Test Refusal at Elevation 306.7 ft in Non-Crystalline Rock (Triassic Conglomeratic Mudstone)

WBS 52100.1.TR03TIB	TIP P-5201	COUNTY WAKE	GEOLOGIST Brett Smith
SITE DESCRIPTION Morrisville Parkway (-L-) Grade Separation			GROUND WTR (ft)
BORING NO. RW-5	STATION 24+00	OFFSET 30 ft RT	ALIGNMENT -L-
COLLAR ELEV. 344.0 ft	TOTAL DEPTH 34.0 ft	NORTHING 749,958	EASTING 2,052,004
DRILL RIG/HAMMER EFF./DATE SUM3359 CME-450 84% 07/27/2012		DRILL METHOD H.S. Augers	HAMMER TYPE Automatic
DRILLER Luis Gonzalez	START DATE 08/28/12	COMP. DATE 08/28/12	SURFACE WATER DEPTH N/A

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION			
			0.5ft	0.5ft	0.5ft	0	25	50	75	100				ELEV. (ft)	DEPTH (ft)		
345																	344.0 GROUND SURFACE 0.0
340	340.0	4.0	5	7	6												344.0 TRIASSIC RESIDUAL brown, SANDY SILT with some clay (A-4)
335	335.0	9.0	100/0.4														337.5 WEATHERED ROCK (Triassic Conglomeratic Mudstone) 6.5
330	330.0	14.0	69	31/0.3													330.0 NON-CRYSTALLINE ROCK (Triassic Conglomeratic Mudstone) 11.7
325	325.0	19.0	100/0.3														
320	320.0	24.0	100/0.3														
315	315.0	29.0	60/0.1														317.5 NON-CRYSTALLINE ROCK (Triassic Conglomeratic Mudstone) 26.5
310	310.0	34.0	60/0.0														310.0 Boring Terminated with Standard Penetration Test Refusal at Elevation 310.0 ft in Non-Crystalline Rock (Triassic Conglomeratic Mudstone)

NCDOT BORE DOUBLE P-5201 MORRISVILLE PARKWAY - WALL&RDWY_MERGED.GPJ NC_DOT.GDT 2/23/13



WBS 52100.1.TR03TIB		TIP P-5201		COUNTY WAKE		GEOLOGIST Brett Smith										
SITE DESCRIPTION -Y2- on Morrisville Parkway Grade Separation							GROUND WTR (ft)									
BORING NO. RW-11		STATION 11+00		OFFSET 25 ft LT		ALIGNMENT -Y2-										
COLLAR ELEV. 345.0 ft		TOTAL DEPTH 8.5 ft		NORTHING 749,908		EASTING 2,052,238										
DRILL RIG/HAMMER EFF./DATE SUM3359 CME-450 84% 07/27/2012		DRILL METHOD H.S. Augers		HAMMER TYPE Automatic												
DRILLER Luis Gonzalez		START DATE 08/30/12		COMP. DATE 08/30/12		SURFACE WATER DEPTH N/A										
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100						
345															345.0	0.0
															344.2	0.8
	341.8	3.2	32	15	55											
340															339.3	5.7
	336.8	8.2	100/0.3												336.5	8.5

WBS 52100.1.TR03TIB		TIP P-5201		COUNTY WAKE		GEOLOGIST Brett Smith										
SITE DESCRIPTION Retaining Wall -W1- (Morrisville Parkway Grade Separation)							GROUND WTR (ft)									
BORING NO. W1-6		STATION 13+04		OFFSET CL		ALIGNMENT -W1-										
COLLAR ELEV. 356.3 ft		TOTAL DEPTH 29.1 ft		NORTHING 749,798		EASTING 2,052,199										
DRILL RIG/HAMMER EFF./DATE SUM3359 CME-450 84% 07/27/2012		DRILL METHOD H.S. Augers		HAMMER TYPE Automatic												
DRILLER Luis Gonzalez		START DATE 11/09/12		COMP. DATE 11/09/12		SURFACE WATER DEPTH N/A										
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100						
360															356.3	0.0
355																
350																
345																
340																
335																
330																

NCDOT BORE DOUBLE P-5201 MORRISVILLE PARKWAY - WALL&RDWY_MERGED.GPJ NC_DOT_GDT_2/23/13

WBS 52100.1.TR03TIB	TIP P-5201	COUNTY WAKE	GEOLOGIST Brett Smith
SITE DESCRIPTION Morrisville Parkway (-L-) Grade Separation			GROUND WTR (ft)
BORING NO. RW-7	STATION 27+00	OFFSET 25 ft LT	ALIGNMENT -L-
COLLAR ELEV. 353.0 ft		TOTAL DEPTH 23.7 ft	NORTHING 749,838
DRILL RIG/HAMMER EFF./DATE SUM3359 CME-450 84% 07/27/2012		DRILL METHOD H.S. Augers	HAMMER TYPE Automatic
DRILLER Luis Gonzalez	START DATE 08/29/12	COMP. DATE 08/29/12	SURFACE WATER DEPTH N/A

WBS 52100.1.TR03TIB	TIP P-5201	COUNTY WAKE	GEOLOGIST Brett Smith
SITE DESCRIPTION Morrisville Parkway (-L-) Grade Separation			GROUND WTR (ft)
BORING NO. RW-8	STATION 27+00	OFFSET 30 ft RT	ALIGNMENT -L-
COLLAR ELEV. 355.0 ft		TOTAL DEPTH 16.6 ft	NORTHING 749,792
DRILL RIG/HAMMER EFF./DATE SUM3359 CME-450 84% 07/27/2012		DRILL METHOD H.S. Augers	HAMMER TYPE Automatic
DRILLER Luis Gonzalez	START DATE 08/29/12	COMP. DATE 08/29/12	SURFACE WATER DEPTH N/A

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)
			0.5ft	0.5ft	0.5ft	0	25	50	75	100				
355													GROUND SURFACE	0.0
350	349.3	3.7											ARTIFICIAL FILL (ENGINEERED) yellow-brown to brown, SANDY CLAY with some man-made debris (A-6)	2.0
345	344.3	8.7											WEATHERED ROCK (Triassic Conglomeratic Mudstone)	6.2
340	339.3	13.7											NON-CRYSTALLINE ROCK (Triassic Conglomeratic Mudstone)	6.2
335	334.3	18.7												
330	329.3	23.7												
													Boring Terminated with Standard Penetration Test Refusal at Elevation 329.3 ft in Non-Crystalline Rock (Triassic Conglomeratic Mudstone)	23.7

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)
			0.5ft	0.5ft	0.5ft	0	25	50	75	100				
355													GROUND SURFACE	0.0
350	351.4	3.6											TRIASSIC RESIDUAL brown, SANDY CLAY (A-6)	4.1
345	346.4	8.6											WEATHERED ROCK (Triassic Conglomeratic Mudstone)	4.1
340	341.4	13.6											NON-CRYSTALLINE ROCK (Triassic Conglomeratic Mudstone)	14.6
	338.4	16.6											NON-CRYSTALLINE ROCK (Triassic Conglomeratic Mudstone)	16.6
													Boring Terminated with Standard Penetration Test Refusal at Elevation 338.4 ft in Non-Crystalline Rock (Triassic Conglomeratic Mudstone)	16.6
													Able to slowly advance auger into NCR until auger refusal at 16.6 feet. Very hard drilling at 14.6 feet was interpreted as the top of NCR.	

NCDOT BORE DOUBLE P-5201 MORRISVILLE PARKWAY - WALL&RDWY. MERGED.GPJ NC_DOT.GDT 2/23/13

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

WBS 52100.1.TR03TIB	TIP P-5201	COUNTY WAKE	GEOLOGIST Brett Smith
SITE DESCRIPTION Morrisville Parkway (-L-) Grade Separation			GROUND WTR (ft)
BORING NO. RW-9	STATION 29+00	OFFSET 5 ft LT	ALIGNMENT -L-
COLLAR ELEV. 362.0 ft	TOTAL DEPTH 14.3 ft	NORTHING 749,711	EASTING 2,052,440
DRILL RIG/HAMMER EFF./DATE SUM3359 CME-450 84% 07/27/2012		DRILL METHOD H.S. Augers	HAMMER TYPE Automatic
DRILLER Luis Gonzalez	START DATE 08/29/12	COMP. DATE 08/29/12	SURFACE WATER DEPTH N/A

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG MOI	LOG G	SOIL AND ROCK DESCRIPTION	ELEV. (ft)	DEPTH (ft)
			0.5ft	0.5ft	0.5ft	0	25	50	75	100						
365														GROUND SURFACE	362.0	0.0
360														ARTIFICIAL FILL (ENGINEERED) brown, SILTY CLAY (A-7)	360.0	2.0
355	357.9	4.1	7	10	15								TRIASSIC RESIDUAL yellow-brown to light gray and red-brown, SANDY CLAY (A-6)	355.4	6.6	
350	352.9	9.1	80	20/0.0									WEATHERED ROCK (Triassic Conglomeratic Mudstone)			
	347.9	14.1	100/0.2										Boring Terminated at Elevation 347.7 ft in Weathered Rock (Triassic Conglomeratic Mudstone)	347.7	14.3	
													Boring drilled in median of Morrisville Parkway.			

WBS 52100.1.TR03TIB	TIP P-5201	COUNTY WAKE	GEOLOGIST Brett Smith
SITE DESCRIPTION -Y1- on Morrisville Parkway Grade Separation			GROUND WTR (ft)
BORING NO. RW-14	STATION 10+00	OFFSET 25 ft LT	ALIGNMENT -Y1-
COLLAR ELEV. 361.0 ft	TOTAL DEPTH 14.5 ft	NORTHING 749,574	EASTING 2,051,963
DRILL RIG/HAMMER EFF./DATE SUM3359 CME-450 84% 07/27/2012		DRILL METHOD H.S. Augers	HAMMER TYPE Automatic
DRILLER Luis Gonzalez	START DATE 08/27/12	COMP. DATE 08/27/12	SURFACE WATER DEPTH N/A

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG MOI	LOG G	SOIL AND ROCK DESCRIPTION	ELEV. (ft)	DEPTH (ft)
			0.5ft	0.5ft	0.5ft	0	25	50	75	100						
365														GROUND SURFACE	361.0	0.0
360														ARTIFICIAL FILL (ENGINEERED) red-brown, SANDY CLAY with some gravel (A-6)		
355	358.0	3.0	9	11	11											
350	353.0	8.0	5	5	5								TRIASSIC RESIDUAL red-brown, SANDY SILT with some clay (A-4)	350.5	10.5	
	348.0	13.0	24	27	25								Boring Terminated at Elevation 346.5 ft in Triassic Residual (SANDY SILT)	346.5	14.5	

NCDOT BORE DOUBLE P-5201 MORRISVILLE PARKWAY - WALL&RDWY_MERGED.GPJ NC_DOT.GDT 2/23/13



NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

WBS 52100.1.TR03TIB	TIP P-5201	COUNTY WAKE	GEOLOGIST Brett Smith	
SITE DESCRIPTION -Y1- on Morrisville Parkway Grade Separation				GROUND WTR (ft)
BORING NO. RW-13	STATION 12+00	OFFSET CL	ALIGNMENT -Y1-	0 HR. Dry
COLLAR ELEV. 358.0 ft	TOTAL DEPTH 29.1 ft	NORTHING 749,767	EASTING 2,052,013	24 HR. FIAD
DRILL RIG/HAMMER EFF./DATE SUM3359 CME-450 84% 07/27/2012		DRILL METHOD H.S. Augers	HAMMER TYPE Automatic	
DRILLER Craig Husketh	START DATE 08/24/12	COMP. DATE 08/24/12	SURFACE WATER DEPTH N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)
			0.5ft	0.5ft	0.5ft	0	25	50	75	100					
360														GROUND SURFACE	0.0
355	354.0	4.0			100/0.3									TRIASSIC RESIDUAL red-brown, SANDY SILT with some clay and gravel (A-4)	2.7
350	349.0	9.0			100/0.2									WEATHERED ROCK (Triassic Conglomeratic Mudstone)	
345	344.0	14.0			60/0.1									NON-CRYSTALLINE ROCK (Triassic Conglomeratic Mudstone)	11.5
340	339.0	19.0			100/0.2									WEATHERED ROCK (Triassic Conglomeratic Mudstone)	16.5
335	334.0	24.0			60/0.1									NON-CRYSTALLINE ROCK (Triassic Conglomeratic Mudstone)	21.5
330	329.0	29.0			60/0.1									Boring Terminated with Standard Penetration Test Refusal at Elevation 328.9 ft in Non-Crystalline Rock (Triassic Conglomeratic Mudstone)	29.1
														Harder drilling at 2.7 feet was interpreted as the top of WR. Able to slowly advance auger through NCR.	

WBS 52100.1.TR03TIB	TIP P-5201	COUNTY WAKE	GEOLOGIST Brett Smith	
SITE DESCRIPTION -Y1- on Morrisville Parkway Grade Separation				GROUND WTR (ft)
BORING NO. RW-12	STATION 13+00	OFFSET CL	ALIGNMENT -Y1-	0 HR. Dry
COLLAR ELEV. 352.0 ft	TOTAL DEPTH 34.3 ft	NORTHING 749,833	EASTING 2,052,087	24 HR. FIAD
DRILL RIG/HAMMER EFF./DATE SUM3359 CME-450 84% 07/27/2012		DRILL METHOD H.S. Augers	HAMMER TYPE Automatic	
DRILLER Luis Gonzalez	START DATE 08/27/12	COMP. DATE 08/27/12	SURFACE WATER DEPTH N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)
			0.5ft	0.5ft	0.5ft	0	25	50	75	100					
355														GROUND SURFACE	0.0
350	347.8	4.2			9 6 7									TRIASSIC RESIDUAL red-brown, SANDY SILT with some clay and trace gravel (A-4)	2.7
345	342.8	9.2			60/0.1									NON-CRYSTALLINE ROCK (Triassic Conglomeratic Mudstone)	8.8
340	337.8	14.2			60/0.1									WEATHERED ROCK (Triassic Conglomeratic Mudstone)	16.5
335	332.8	19.2			60/0.1									NON-CRYSTALLINE ROCK (Triassic Conglomeratic Mudstone)	21.5
330	327.8	24.2			60/0.0									WEATHERED ROCK (Triassic Conglomeratic Mudstone)	26.7
325	322.8	29.2			100/0.3									NON-CRYSTALLINE ROCK (Triassic Conglomeratic Mudstone)	31.7
320	317.8	34.2			60/0.1									Boring Terminated with Standard Penetration Test Refusal at Elevation 317.7 ft in Non-Crystalline Rock (Triassic Conglomeratic Mudstone)	34.3
														Harder drilling at 8.8 feet was interpreted as the top of NCR. Able to slowly advance auger through NCR.	

NCDOT BORE DOUBLE P-5201 MORRISVILLE PARKWAY - WALL&RDWY_MERGED.GPJ NC_DOT.GDT 2/23/13