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CONTRACT: 50000.1.STR1T1B ID: P-5208G AND P-5208H

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

ROADWAY SUBSURFACE INVESTIGATION

PROJ. REFERENCE NO. 50000.1.STR09T1B (P-5208G AND P-5208H) F.A. PROJ. N/A

COUNTY MECKLENBERG

PROJECT DESCRIPTION MILLBROOK (MP 365.5) TO JUNKER (MP 372.2) THE NCRR/NS MAINLINE: ROADBED CURVE WIDENING

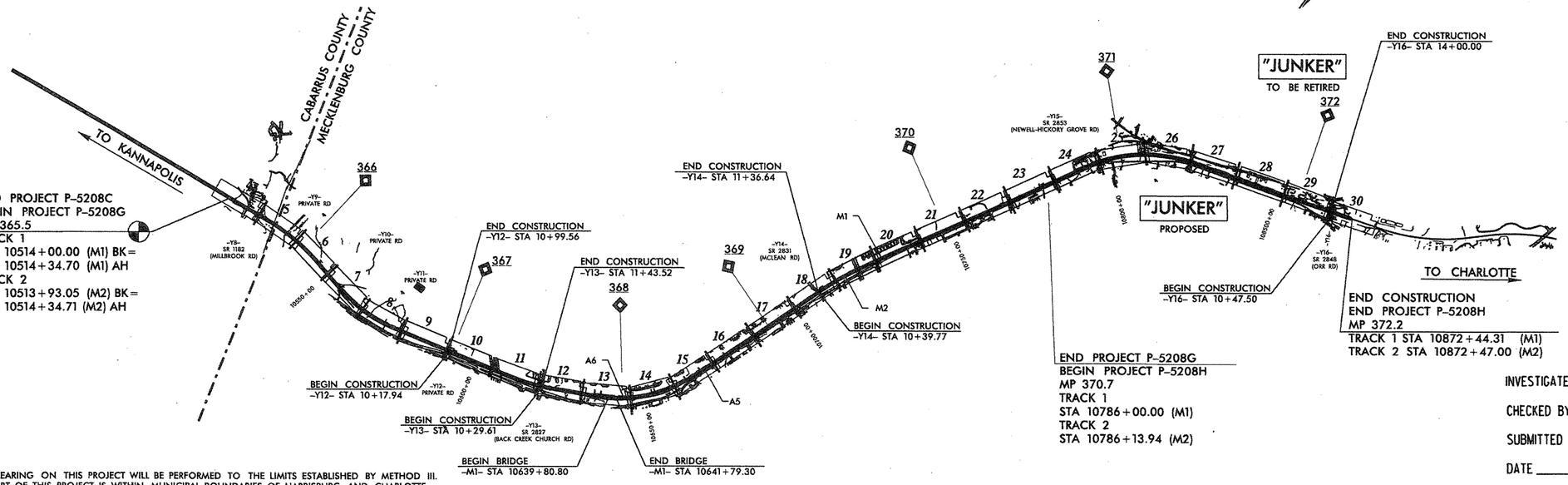
INVENTORY

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	5200.1.STR09T1B (P-5208G AND P-5208H)	1	

STATE PROJ. NO.	F. A. PROJ. NO.	DESCRIPTION
50000.1.STR11T1B	N/A	P.E.
		R/W & UTIL.

CONTENTS

LINE	STATION	PLAN	PROFILE	XSECT
MIG	10514+34.70 TO 10524+00	4	4	N/A
MIG	10524+00 TO 10537+00	5	5	N/A
MIG	10537+00 TO 10550+00	6	6	N/A
MIG	10550+00 TO 10564+00	7	7	N/A
MIG	10564+00 TO 10577+00	8	8	N/A
MIG	10577+00 TO 10591+00	9	9	N/A
MIG	10591+00 TO 10605+00	10	10	N/A
MIG	10605+00 TO 10619+00	11	11	N/A
MIG	10619+00 TO 10632+00	12	12	N/A
MIG	10632+00 TO 10646+00	13	13	N/A
MIG	10646+00 TO 10659+00	14	14	N/A
MIG	10659+00 TO 10672+00	15	15	N/A
MIG	10672+00 TO 10686+00	16	16	N/A
MIG	10686+00 TO 10700+00	17	17	N/A
MIG	10700+00 TO 10714+00	18	18	N/A
MIG	10714+00 TO 10727+00	19	19	N/A
MIG	10727+00 TO 10741+00	20	20	N/A
MIG	10741+00 TO 10755+00	21	21	N/A
MIG	10755+00 TO 10769+00	22	22	N/A
MIG	10769+00 TO 10783+00	23	23	N/A
MIG	10783+00 TO 10797+00	24	24	33
MIG	10797+00 TO 10810+00	25	25	33-35
MIG	10810+00 TO 10823+00	26	26	36
MIG	10823+00 TO 10837+00	27	27	N/A
MIG	10619+00 TO 10632+00	28	28	N/A
MIG	10619+00 TO 10632+00	29	29	N/A
MIG	10619+00 TO 10632+00	30	30	N/A
A6	10635+64.86 TO 10659+00	13	31	37-38
A6	10659+00 TO 10667+74.54	14	32	N/A



CLEARING ON THIS PROJECT WILL BE PERFORMED TO THE LIMITS ESTABLISHED BY METHOD III.
PART OF THIS PROJECT IS WITHIN MUNICIPAL BOUNDARIES OF HARRISBURG AND CHARLOTTE.

CAUTION NOTICE

THE SUBSURFACE INFORMATION AND THE SUBSURFACE INVESTIGATION ON WHICH IT IS BASED WERE MADE FOR THE PURPOSE OF STUDY, PLANNING, AND DESIGN, AND NOT FOR CONSTRUCTION OR PAY PURPOSES. THE VARIOUS FIELD BORING LOGS, ROCK CORES, AND SOIL TEST DATA AVAILABLE MAY BE REVIEWED OR INSPECTED IN RALEIGH BY CONTACTING THE N. C. DEPARTMENT OF TRANSPORTATION, GEOTECHNICAL ENGINEERING UNIT AT (919) 707-6850. NEITHER THE SUBSURFACE PLANS AND REPORTS, NOR THE FIELD BORING LOGS, ROCK CORES, OR SOIL TEST DATA ARE PART OF THE CONTRACT.

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

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

NAD 83/ NSRS 2007

PERSONNEL
R. TOOTHMAN
G. LOWDERMILK
J. FREGOSI
W. FELDER
S. GOWERS

INVESTIGATED BY T. WELLS
CHECKED BY T. WELLS
SUBMITTED BY KLEINFELDER
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NORTH CAROLINA PROFESSIONAL SEAL 15741 ENGINEER XAVIER C. BARRETT 5/13/13

DRAWN BY: W. FELDER

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.

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PROJECT REFERENCE NO.	SHEET NO.
50000.1.STRIITIB (P-5208G)	2

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL ENGINEERING UNIT

SUBSURFACE INVESTIGATION

SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

SOIL DESCRIPTION

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

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

SOIL LEGEND AND AASHTO CLASSIFICATION

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

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

CONSISTENCY OR DENSENESS

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

TEXTURE OR GRAIN SIZE

U.S. STD. SIEVE SIZE	4	10	40	60	200	270
OPENING (MM)	4.76	2.00	0.42	0.25	0.075	0.053

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

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

SOIL MOISTURE - CORRELATION OF TERMS

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

PLASTICITY

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

COLOR

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

GRADATION

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

ANGULARITY OF GRAINS

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

MINERALOGICAL COMPOSITION

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

COMPRESSIBILITY

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

PERCENTAGE OF MATERIAL

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

GROUND WATER

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

MISCELLANEOUS SYMBOLS

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

ABBREVIATIONS

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

SAMPLE ABBREVIATIONS

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

EQUIPMENT USED ON SUBJECT PROJECT

DRILL UNITS:
- [X] MOBILE B- 57
- [ ] BK-51
- [ ] CME-45C
- [ ] CME-550
- [ ] PORTABLE HOIST
- [X] CME-55
- [ ] _____

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

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

CORE SIZE:
- [ ] -B_____
- [ ] -N_____
- [ ] -H_____

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

ROCK DESCRIPTION

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

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

WEATHERING

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

ROCK HARDNESS

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

FRACTURE SPACING

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

BEDDING

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

INDURATION

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

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

TERMS AND DEFINITIONS

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

AQUIFER - A WATER BEARING FORMATION OR STRATA.

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

ARGILLACEOUS - APPLIED TO ALL ROCKS OR SUBSTANCES COMPOSED OF CLAY MINERALS, OR HAVING A NOTABLE PROPORTION OF CLAY IN THEIR COMPOSITION, AS SHALE, SLATE, ETC.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT) - NUMBER OF BLOWS (N OR BPF) OF A 140 LB. HAMMER FALLING 30 INCHES REQUIRED TO PRODUCE A PENETRATION OF 1 FOOT INTO SOIL WITH A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER. SPT REFUSAL IS PENETRATION EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS.

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

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

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

BENCH MARK: BM-107 (571705 FT N, 1487615 FT E)

ELEVATION: 729.21

NOTES: GEOPAK WAS USED TO OBTAIN SOME BORING ELEVATIONS

REVISED 09/23/09

0041DEL_p10a1

KLEINFELDER
Bright People. Right Solutions.

March 21, 2013
File No. 12785 | GSO13R0180

STATE PROJECT:	50000.1STR11T1B (P-5208G)
FEDERAL PROJECT:	N/A
COUNTY:	Mecklenburg
DESCRIPTION:	Millbrook Road (MP 365.5) to Junker (MP 372.2) on the NCRR/NS Mainline

SUBJECT: **Geotechnical Report - Inventory**

PROJECT DESCRIPTION

The project is located in Charlotte in central Mecklenburg County, North Carolina. This project consists of a proposed 3,680 feet, roadbed curve widening along –M1G- between Newell-Hickory Grove Road (-Y15-) and King George Drive as well as the 1,000 feet, Mallard Creek Church Road Detour (-A6-).

The geotechnical investigation was conducted during December of 2012 and February of 2013. Two drill machines, a CME 55 and a Mobile B-57 with automatic hammers, were used during the investigation. Standard Penetration Tests were performed at selected locations. Representative soil samples were collected for visual classification in the field and selected samples were submitted for laboratory analysis by Kleinfelder Southeast, Inc.

The following alignments, totaling 0.9 mile, were investigated. Profiles and cross sections of these alignments are included in this report.

LINE	STATIONS
-MIG-	10790+00 to 10826+80
-A6-	10640+00 to 10650+00

AREAS OF SPECIAL GEOTECHNICAL INTEREST

1) **Highly Plastic Clays**: Highly plastic clays (PI >25) were encountered on the project at the following location:

LINE	STATION	OFFSET
-M1G-	10792+00 to 10797+00	LT to RT

2) **Artificial Fill:** Artificial fill occurs at the following location.

LINE	STATION	OFFSET
-M1G-	10790+00 to 10826+80	LT to RT

PHYSIOGRAPHY AND GEOLOGY

The project is located in the Piedmont Physiographic Province. The project corridor is located along Old Concord Road and the existing NCRR/NS Mainline which is comprised primarily of commercial properties. The general topography of the site consists of rolling hills with flat to moderate slopes along the existing railway.

Geologically, the project is located within the Charlotte Belt based on the 1985 Geologic Map on North Carolina. Soils are derived from the underlying bedrock which consists of Paleozoic/Late Proterozoic age metamorphic rock (Metamorphosed Quartz Diorite). The overlying residual soils are the product of the physical and chemical weathering of the underlying Crystalline rock.

SOIL PROPERTIES

Soils encountered during this investigation are separated into two categories based on origin. They consist of artificial fill and residual soils.

Artificial Fill soils are present throughout the project along -M1G-consisting of sandy gravel (A-1-a) which is used as ballast and subballast along the existing railway. In addition, areas of artificial fill occur along -M1G- on Plan Sheet Nos. 24 through 26. The artificial file in these areas consists of fill that was utilized to grade the existing railway. Fill primarily consists of moist to wet, very soft to stiff, red, brown and black, micaceous, sandy, silty clay (A-7-6) with some wet, soft, red and brown, micaceous, sandy silt (A-4) and some wet, very loose, gray, silty sand (A-2-4). The artificial fill clay soils exhibit medium to high plastic indices ranging from 19 to 32.

Residual soils are derived from the weathering of underlying metamorphosed quartz diorite. These soils consist of moist, stiff to very stiff, red, yellow, orange, black, and light brown, sandy, silty clays (A-7-5), tan, gray, red, and yellow, loose to medium dense, moist, silty sand (A-2-4) and moist to wet, soft to very stiff, red, yellow, gray, brown, light to dark brown, sandy silts (A-4).

GROUNDWATER

Groundwater was not encountered during the investigation.

Prepared by,

Thomas R. Wells, P.E.
Senior Professional

Xavier C. Barrett, P.E.
Principal Professional

TRW/XCB:cas

EARTHWORK BALANCE SHEET

Volumes in Cubic Yards

PROJECT: P-5208G COUNTY: MECKLENBURG/CABARRUS DATE: 5/30/2013 COMP BY: DEW CHK. BY: RWB SHEET: 1

				EXCAVATION					EMBANKMENT				BORROW	WASTE			
LINE	STATION	TO	STATION	TOTAL UNCLASSIFIED EXCAVATION	ROCK EXCAVATION	UNDERCUT EXCAVATION	UNSUITABLE UNCLASSIFIED	SUITABLE UNCLASSIFIED	TOTAL EMBANKMENT	ROCK EMBANKMENT (25%)	EARTH EMBANKMENT	EMBANKMENT +20%		ROCK	SUITABLE WASTE	UNSUITABLE WASTE	TOTAL WASTE
M1	10514+00.00	TO	10544+00.00	5842			0	5842	1370		1370	1644	0		4198	0	4198
			3000.00														
Total Summary No. 1				5842			0	5842	1370		1370	1644	0		4198	0	4198
M1	10544+00.00	TO	10574+00.00	17867			1995	15872	4328		4328	5194	0		10679	1995	12674
			3000.00														
Total Summary No. 2				17867			1995	15872	4328		4328	5194	0		10679	1995	12674
M1	10574+00.00	TO	10604+00.00	5068			0	5068	3820		3820	4584	0		484	0	484
Y12	10+17.94	TO	10+85.48	104				104	28		28	34	0		70	0	70
			3000.00														
Total Summary No. 3				5172			0	5172	3848		3848	4618	0		554	0	554
M1	10607+67.00	TO	10638+00.00	14035			3493	10542	501		501	601	0		9941	3493	13434
Y13	10+29.61	TO	11+29.27	89				89	117		117	140	51		0	0	0
			3033.00														
Total Summary No. 4				14124			3493	10631	618		618	741	51		9941	3493	13434
M1	10638+00.00	TO	10668+00.00	16007			0	16007	9438		9438	11326	0		4681	0	4681
			3000.00														
Total Summary No. 5				16007			0	16007	9438		9438	11326	0		4681	0	4681
M1	10668+00.00	TO	10698+00.00	18668			1836	16832	1642		1642	1970	0		14862	1836	16698
			3000.00														
Total Summary No. 6				18668			1836	16832	1642		1642	1970	0		14862	1836	16698
M1	10698+00.00	TO	10731+00.00	7357			944	6413	354		354	425	0		5989	944	6933
Y14	10+39.77	TO	11+21.43	89				89	62		62	74	0		15	0	15
			3300.00														
Total Summary No. 7				7446			944	6502	416		416	499	0		6004	944	6948
M1	10731+00.00	TO	10761+00.00	5185			3407	1778	6		6	7	0		1770	3407	5177
			3000.00														
Total Summary No. 8				5185			3407	1778	6		6	7	0		1770	3407	5177
M1	10761+00.00	TO	10786+00.00	4456			2979	1477	1		1	1	0		1475	2979	4454
Y16	10+47.50	TO	14+00.00	256				256	72		72	86	0		170	0	170
			2500.00														
Total Summary No. 9				4712			2979	1733	73		73	87	0		1645	2979	4624
Subtotal				95023			14654	80369	21739		21739	26086	51		54334	14654	68988
ADJUSTMENTS DUE TO																	
Earth Waste to Replace Borrow													-51		-51		-51
PROJECT TOTAL				95023			14654	80369	21739	0	21739	26086	0	0	54283	14654	68937
Est. 5% to Replace Topsoil in Borrow Pits																	
GRAND TOTAL				95023									0				
SAY				95100									0				

Est. Drainage Ditch Excav	4645	CY
Shoulder Borrow	100	CY
Estimate Undercut	200	CY
Select Granular Material	200	CY

0041 DEL-P1021
0001 ADD-P1021

PROJECT REFERENCE NO.	SHEET NO
50000.1.STR08T3 (P-5208C)	3B

EARTHWORK BALANCE SHEET

Volumes in Cubic Yards

PROJECT **TIP #** **P-5208C** COUNTY Cabarrus DATE 7/5/2013

LINE	STATION	STATION	TOTAL EXCAV. (UNCL.)	ROCK EXCAV.	UNDERCUT EXCAV.	UNSUIT. EXCAV.	SUITABLE EXCAV.	TOTAL EMB.	ROCK EMB.	EARTH EMB.	EMBANK. 20%	BORROW	SUITABLE WASTE	UNSUIT. WASTE	TOTAL WASTE
M1	10323+05.28	10343+73.70	2,323				2,323	857		857	1,028	0	1,295		1,295
		SUBTOTAL	2,323				2,323	857		857	1,028	0	1,295		1,295
M1	10344+80.65	10374+00.00	7,889				7,889	10,726		10,726	12,871	4,982	0		0
		SUBTOTAL	7,889				7,889	10,726		10,726	12,871	4,982	0		0
M1	10374+00.00	10404+00.00	8,014				8,014	4,974		4,974	5,969	0	2,045		2,045
		SUBTOTAL	8,014				8,014	4,974		4,974	5,969	0	2,045		2,045
M1	10404+00.00	10409+19.40	449				449	1		1	1	0	448	0	448
		SUBTOTAL	449				449	1		1	1	0	448	0	448
M1	10440+00.00	10470+00.00	15,005				15,005	340		340	408	0	14,597		14,597
		SUBTOTAL	15,005				15,005	340		340	408	0	14,597		14,597
M1	10470+00.00	10500+00.00	25,357				25,357	108		108	130	0	25,227		25,227
		SUBTOTAL	25,357				25,357	108		108	130	0	25,227		25,227
M1	10500+00.00	10514+00.00	16,396				16,396	49		49	59	0	16,337		16,337
		SUBTOTAL	16,396				16,396	49		49	59	0	16,337		16,337
PROJECT SUBTOTAL			75,433	0	0	0	75,433	17,055	0	16,947	20,466	4,982	59,949	0	59,949
ADDITIONAL UNDERCUT											0	0			
**EST. LOSS DUE TO CLEARING & GRUBBING			-750				-750						-750		-750
WASTE TO REPLACE BORROW												-4,982	-4,982		
PROJECT TOTAL			74,683	0	0	0	74,683	17,055	0	16,947	20,466	0	54,217	0	54,217
ESTIMATE 5% TO REPLACE TOPSOIL												0			
ON BORROW PIT															
GRAND TOTAL			74,683		0							0	54,217	0	54,217
SAY			**74,700**												

EST. DDE = 4680 CY
EST. 250 CY OF SLOPE STABILITY UNDERCUT
EST. 250 CY OF SELECT GRANULAR MATERIAL
EST. 50 CY OF SHOULDER BORROW
*** THESE EARTHWORK QUANTITIES ARE BASED IN PART ON SUBSURFACE DATA PROVIDED BY THE GEOTECHNICAL ENGINEER.**

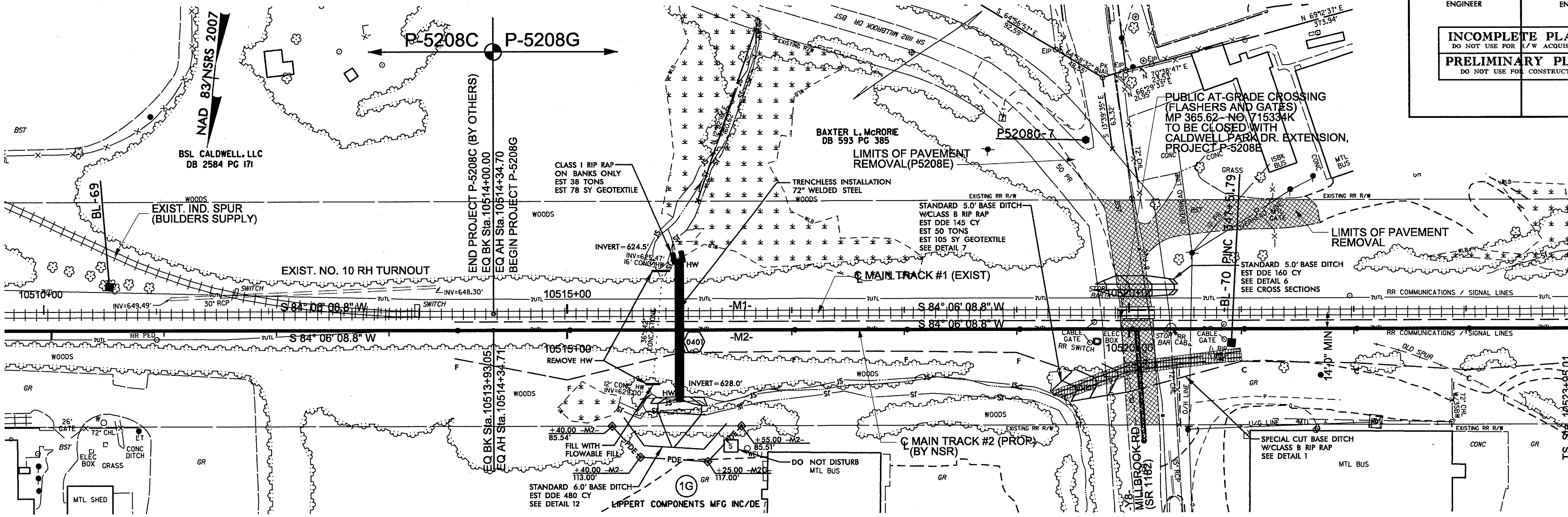
0041DEL_p10a1

PROJECT REFERENCE NO.	SHEET NO.
50000J.STRIITIB (P-5208G)	4
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

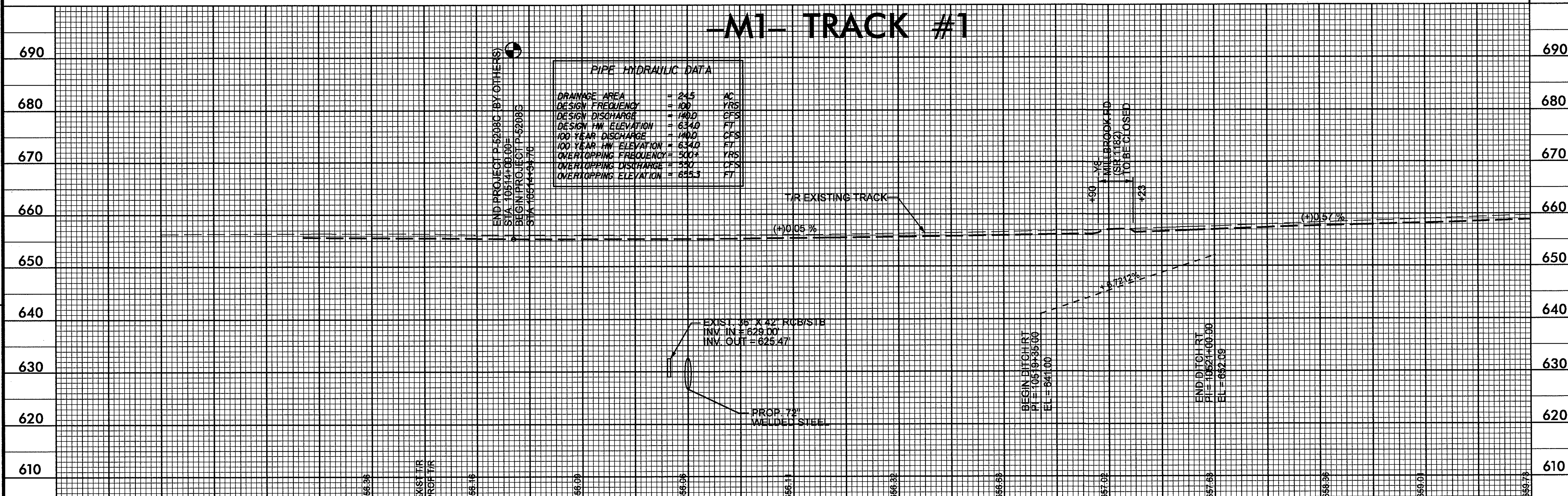
INCOMPLETE PLANS DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS DO NOT USE FOR CONSTRUCTION

REVISIONS



P-5208C
P-5208G
NAD 83/NSRS 2007
BSL CALDWELL, LLC
DB 2584 PG 171
BL-69
EXIST. IND. SPUR (BUILDERS SUPPLY)
EXIST. NO. 10 RH TURNOUT
END PROJECT P-5208C (BY OTHERS)
EQ BK Sta.10514+00.00
EQ AH Sta.10514+34.70
BEGIN PROJECT P-5208G
CLASS I RIP RAP ON BANKS ONLY EST 38 TONS EST 78 SY GEOTEXTILE
TRENCHLESS INSTALLATION 72" WELDED STEEL
BAXTER L. McRORIE DB 593 PG 385
LIMITS OF PAVEMENT REMOVAL(P5208E)
P5208G-7
PUBLIC AT-GRADE CROSSING (FLASHERS AND GATES) MP 365.62 - NO. 715334K TO BE CLOSED WITH CALDWELL PARK DR. EXTENSION, PROJECT P-5208E
STANDARD 5.0' BASE DITCH W/CLASS B RIP RAP EST DDE 145 CY EST 50 TONS EST 105 SY GEOTEXTILE SEE DETAIL 7
LIMITS OF PAVEMENT REMOVAL
STANDARD 5.0' BASE DITCH EST DDE 160 CY SEE DETAIL 6 SEE CROSS SECTIONS
C MAIN TRACK #1 (EXIST)
-M1-
S 84° 06' 08.8" W
-M2-
10515+00
10520+00
RR COMMUNICATIONS / SIGNAL LINES
EQ BK Sta.10513+93.05
EQ AH Sta.10514+34.71
REMOVE HW
INVERT = 624.5'
INVERT = 628.0'
FILL WITH FLOWABLE FILL
STANDARD 6.0' BASE DITCH EST DDE 480 CY SEE DETAIL 12
LIPPERT COMPONENTS MFG INC/DE
DO NOT DISTURB MTL BUS
C MAIN TRACK #2 (PROP) (BY NSR)
-BL-70 PINC
-Y6- MILLBROOK RD (SR 1182)
SPECIAL CUT BASE DITCH W/CLASS B RIP RAP SEE DETAIL 1
14'-0" MIN
MTL SHED
MATCHLINE -M1- 10524+00.00 SEE PLAN SHEET 5



-M1- TRACK #1
690
680
670
660
650
640
630
620
610
END PROJECT P-5208C (BY OTHERS)
STA. 10514+00.00
BEGIN PROJECT P-5208G
STA. 10514+34.70
T/R EXISTING TRACK
(+)0.05 %
(+)0.57 %
-Y6- MILLBROOK RD (SR 1182) (TO BE CLOSED)
EXIST. 36" X 42" RCB/STB
INV. IN = 629.00
INV. OUT = 625.47
PROP. 72" WELDED STEEL
BEGIN DITCH RT PI = 10519+35.00 EL = 641.00
END DITCH RT PI = 10521+00.00 EL = 652.09
EXIST T/R
PROF T/R
10511+00
10512+00
10513+00
10514+00
10515+00
10516+00
10517+00
10518+00
10519+00
10520+00
10521+00
10522+00
10523+00
10524+00

PIPE HYDRAULIC DATA

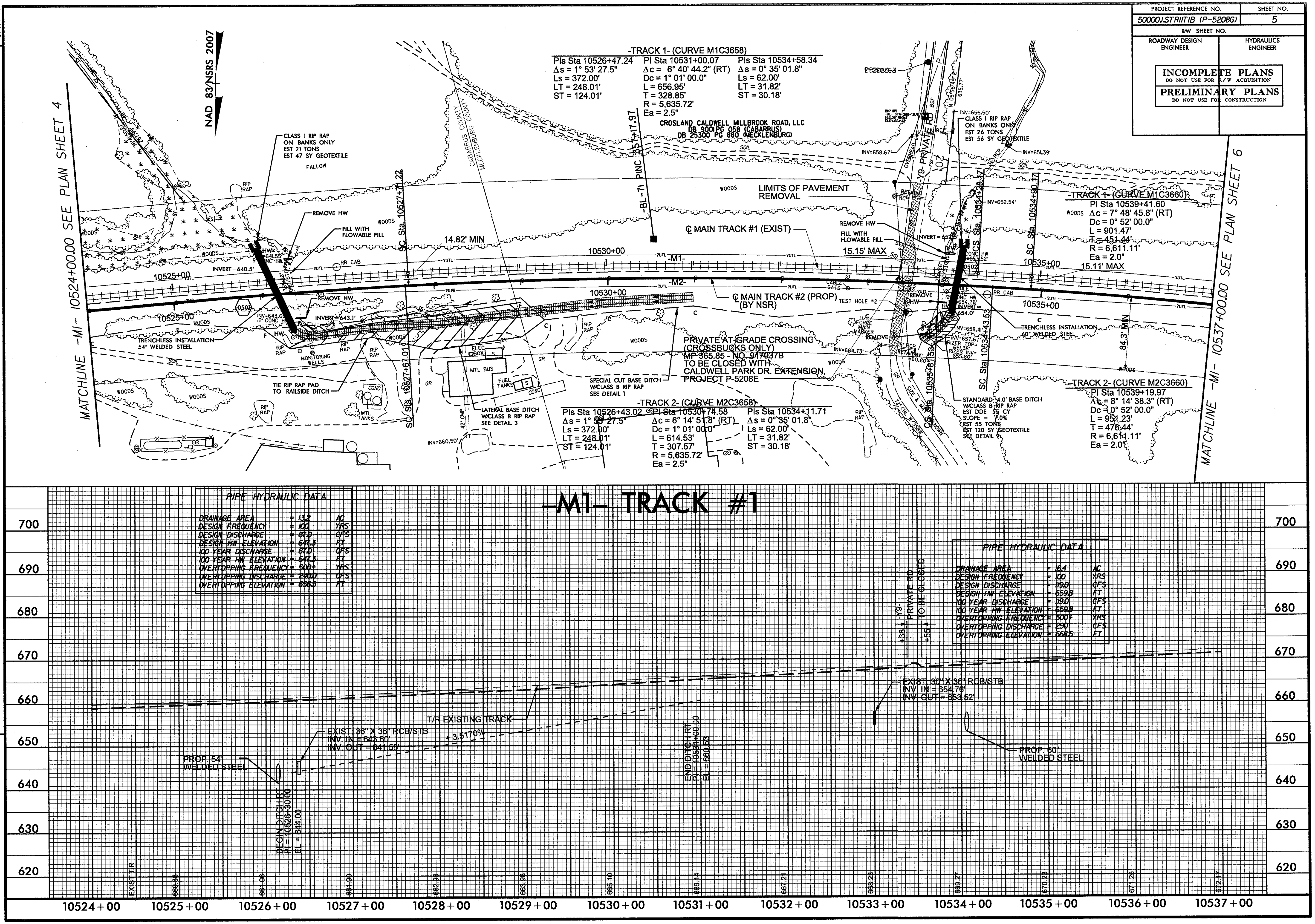
DRAINAGE AREA	=	24.5	AC
DESIGN FREQUENCY	=	100	YRS
DESIGN DISCHARGE	=	140.0	CFS
DESIGN HW ELEVATION	=	634.0	FT
100 YEAR DISCHARGE	=	140.0	CFS
100 YEAR HW ELEVATION	=	634.0	FT
OVERTOPPING FREQUENCY	=	500+	YRS
OVERTOPPING DISCHARGE	=	550	CFS
OVERTOPPING ELEVATION	=	655.3	FT

0041DEL_p10a1

PROJECT REFERENCE NO.	SHEET NO.
50000JSTRIITIB (P-5208G)	5
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS DO NOT USE FOR CONSTRUCTION



PIPE HYDRAULIC DATA

DRAINAGE AREA	= 13.2	AC
DESIGN FREQUENCY	= 100	YRS
DESIGN DISCHARGE	= 87.0	CFS
DESIGN HW ELEVATION	= 647.3	FT
100 YEAR DISCHARGE	= 87.0	CFS
100 YEAR HW ELEVATION	= 647.3	FT
OVERTOPPING FREQUENCY	= 500+	YRS
OVERTOPPING DISCHARGE	= 240.0	CFS
OVERTOPPING ELEVATION	= 656.5	FT

PIPE HYDRAULIC DATA

DRAINAGE AREA	= 16.4	AC
DESIGN FREQUENCY	= 100	YRS
DESIGN DISCHARGE	= 119.0	CFS
DESIGN HW ELEVATION	= 659.8	FT
100 YEAR DISCHARGE	= 119.0	CFS
100 YEAR HW ELEVATION	= 659.8	FT
OVERTOPPING FREQUENCY	= 500+	YRS
OVERTOPPING DISCHARGE	= 290	CFS
OVERTOPPING ELEVATION	= 668.5	FT

0041DEL_p10a1

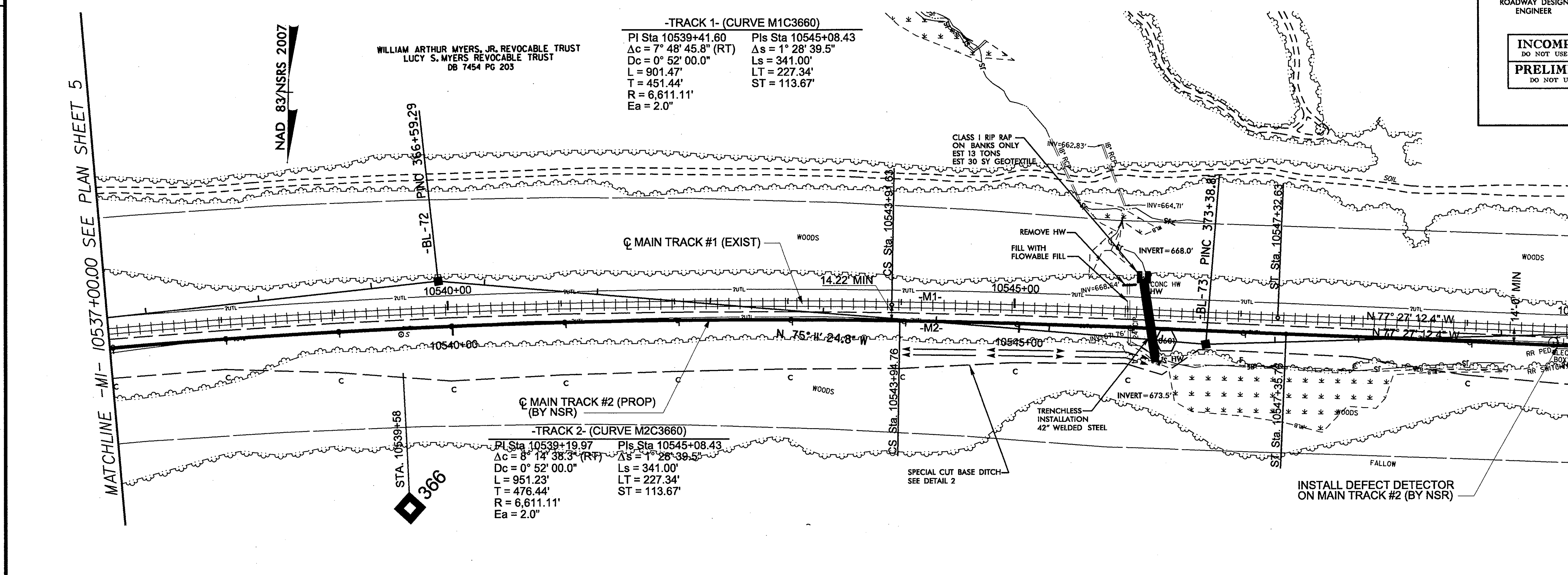
8/17/99

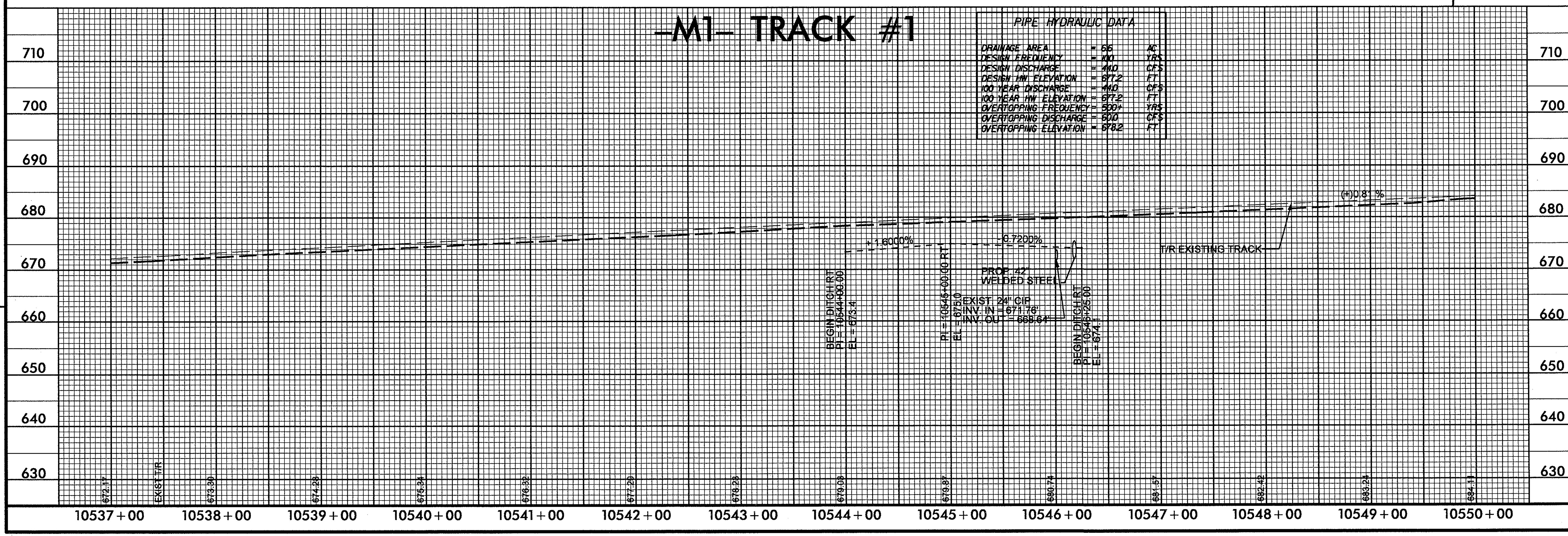
PROJECT REFERENCE NO.	SHEET NO.
50000J.STRIITIB (P-5208G)	6
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

REVISIONS





PIPE HYDRAULIC DATA

DRAINAGE AREA	=	66	AC
DESIGN FREQUENCY	=	100	YRS
DESIGN DISCHARGE	=	440	CFS
DESIGN HW ELEVATION	=	677.2	FT
100 YEAR DISCHARGE	=	440	CFS
100 YEAR HW ELEVATION	=	677.2	FT
OVERTOPPING FREQUENCY	=	500+	YRS
OVERTOPPING DISCHARGE	=	600	CFS
OVERTOPPING ELEVATION	=	678.2	FT

0041DEL_p10a1

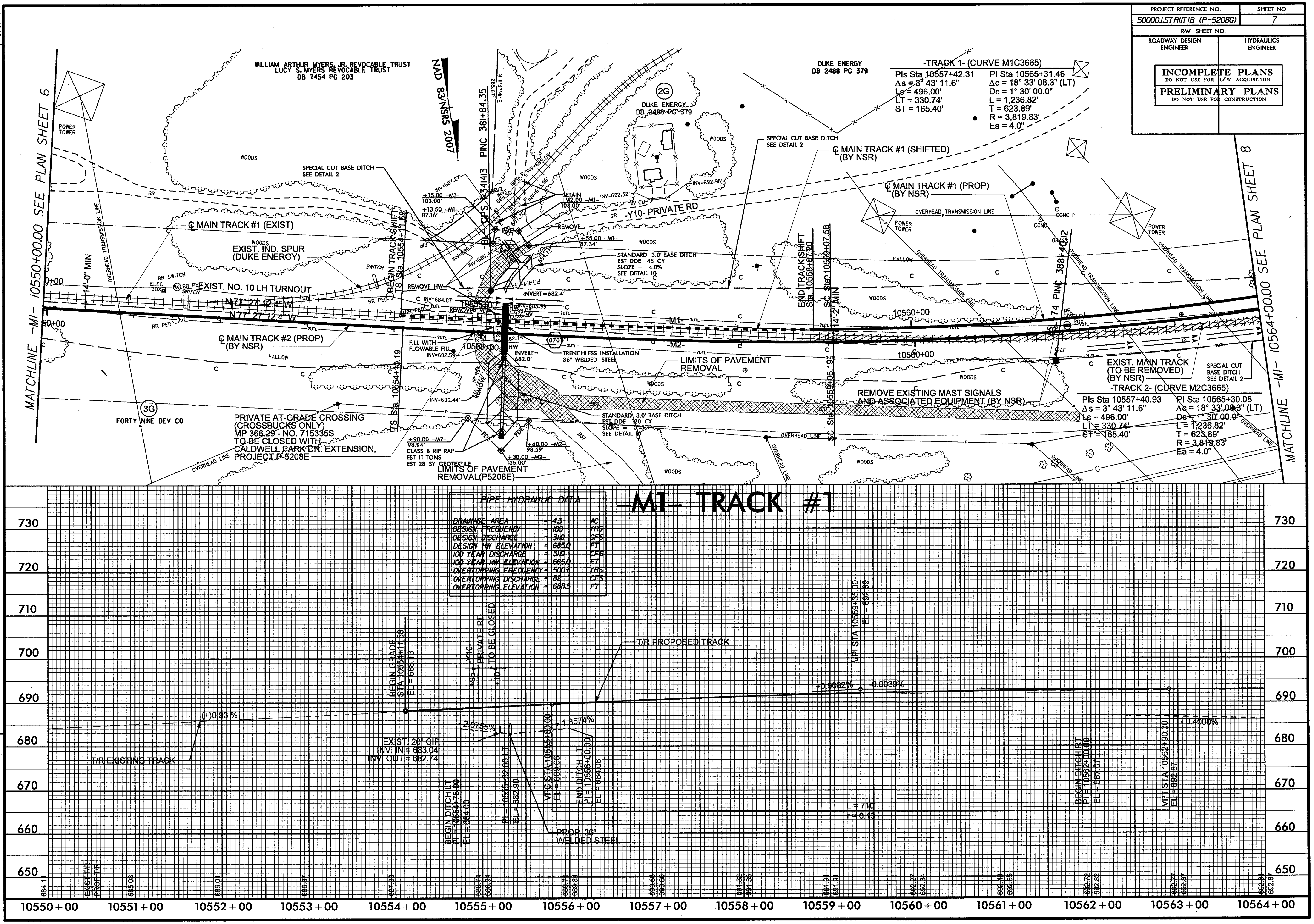
8/17/99

REVISIONS

PROJECT REFERENCE NO.	SHEET NO.
50000J.STRIITIB (P-5208G)	7
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION



PIPE HYDRAULIC DATA

DRAINAGE AREA	=	4.3	AC
DESIGN FREQUENCY	=	100	YRS
DESIGN DISCHARGE	=	31.0	CFS
DESIGN HW ELEVATION	=	685.0	FT
100 YEAR DISCHARGE	=	31.0	CFS
100 YEAR HW ELEVATION	=	685.0	FT
OVERTOPPING FREQUENCY	=	500+	YRS
OVERTOPPING DISCHARGE	=	82	CFS
OVERTOPPING ELEVATION	=	688.5	FT

0041DEL_p10a1

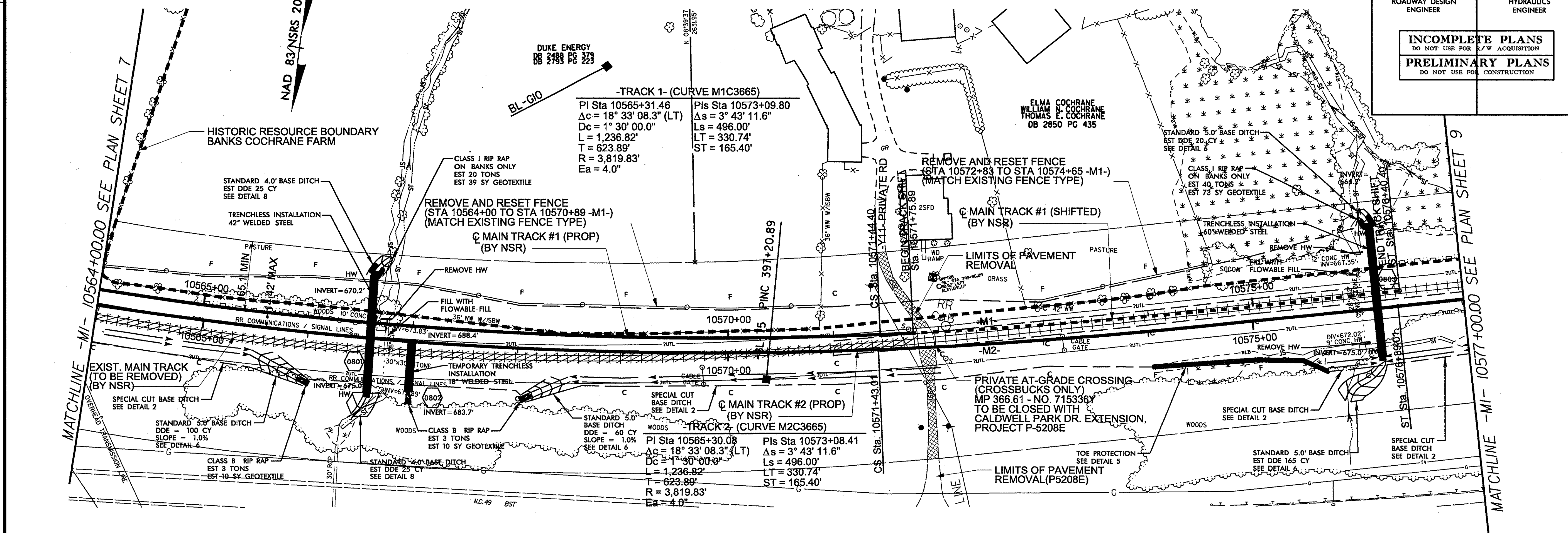
8/17/99

PROJECT REFERENCE NO.	SHEET NO.
50000J.STRIITIB (P-5208G)	8
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

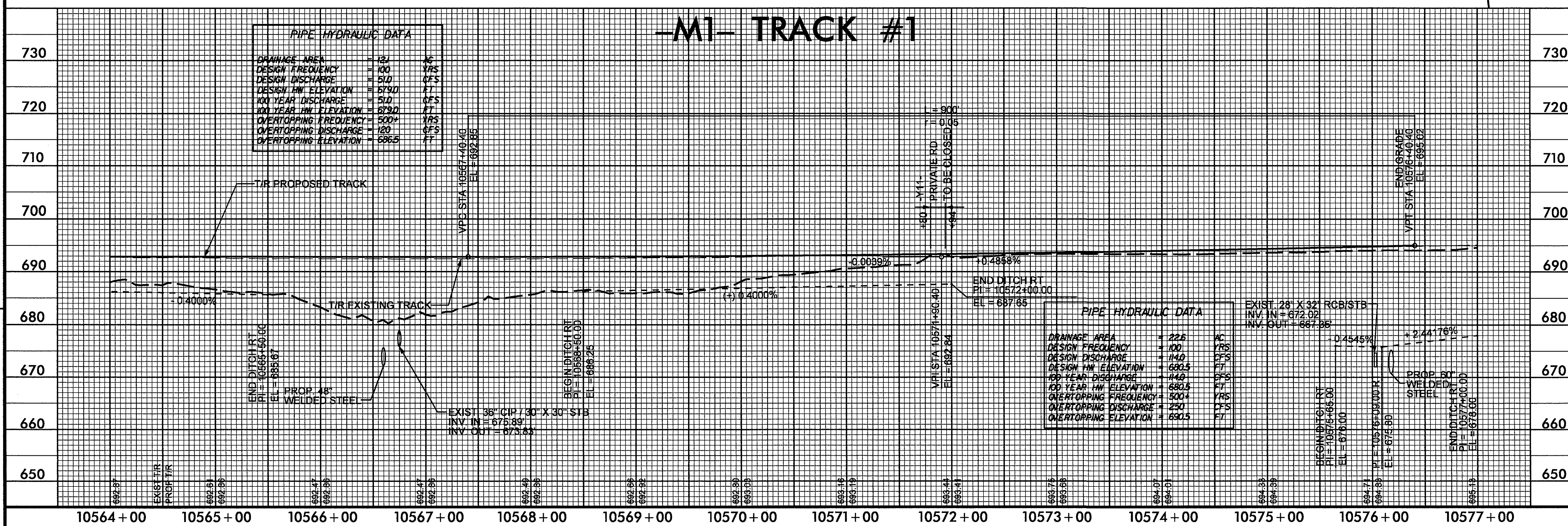
INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

REVISIONS



-M1- TRACK #1



PIPE HYDRAULIC DATA

DRAINAGE AREA	=	12.1	AC
DESIGN FREQUENCY	=	100	YRS
DESIGN DISCHARGE	=	51.0	CFS
DESIGN HW ELEVATION	=	679.0	FT
100 YEAR DISCHARGE	=	51.0	CFS
100 YEAR HW ELEVATION	=	679.0	FT
OVERTOPPING FREQUENCY	=	500+	YRS
OVERTOPPING DISCHARGE	=	120	CFS
OVERTOPPING ELEVATION	=	686.5	FT

PIPE HYDRAULIC DATA

DRAINAGE AREA	=	22.6	AC
DESIGN FREQUENCY	=	100	YRS
DESIGN DISCHARGE	=	114.0	CFS
DESIGN HW ELEVATION	=	680.5	FT
100 YEAR DISCHARGE	=	114.0	CFS
100 YEAR HW ELEVATION	=	680.5	FT
OVERTOPPING FREQUENCY	=	500+	YRS
OVERTOPPING DISCHARGE	=	250	CFS
OVERTOPPING ELEVATION	=	690.5	FT

0041DEL_p10a1

8/17/99

REVISIONS

PROJECT REFERENCE NO.	SHEET NO.
50000J.STR/TIB (P-5208G)	9
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

MATCHLINE -MI- 10577+00.00 SEE PLAN SHEET 8

MATCHLINE -MI- 10591+00.00 SEE PLAN SHEET 10

ELMA COCHRANE
WILLIAM N. COCHRANE
THOMAS E. COCHRANE
DB 2850 PG 435

JOHN B. STROUP
HAZEL H. STROUP

HISTORIC RESOURCE BOUNDARY
BANKS COCHRANE FARM

NAD 83/NSRS 2007

-BL-76 PINC 406+30.36

-BL-77 PINC 413+36.34

℄ MAIN TRACK #1 (EXIST)

℄ MAIN TRACK #2 (PROP)
(BY NSR)

14'-0" MIN

FALLOW

WOODS

5SELEC

2UTL

10580+00

10585+00

10590+00

S 76° 33' 16.1" W

-M1-

-M2-

RR PED

CABLE
DATE
INV=699.70

CONC

8" CHL

15" RCP

N.C.49

BST

CB
CONC

OVERHEAD LINE

49

TOE PROTECTION
SEE DETAIL 5

-M1- TRACK #1

(+)0.59 %

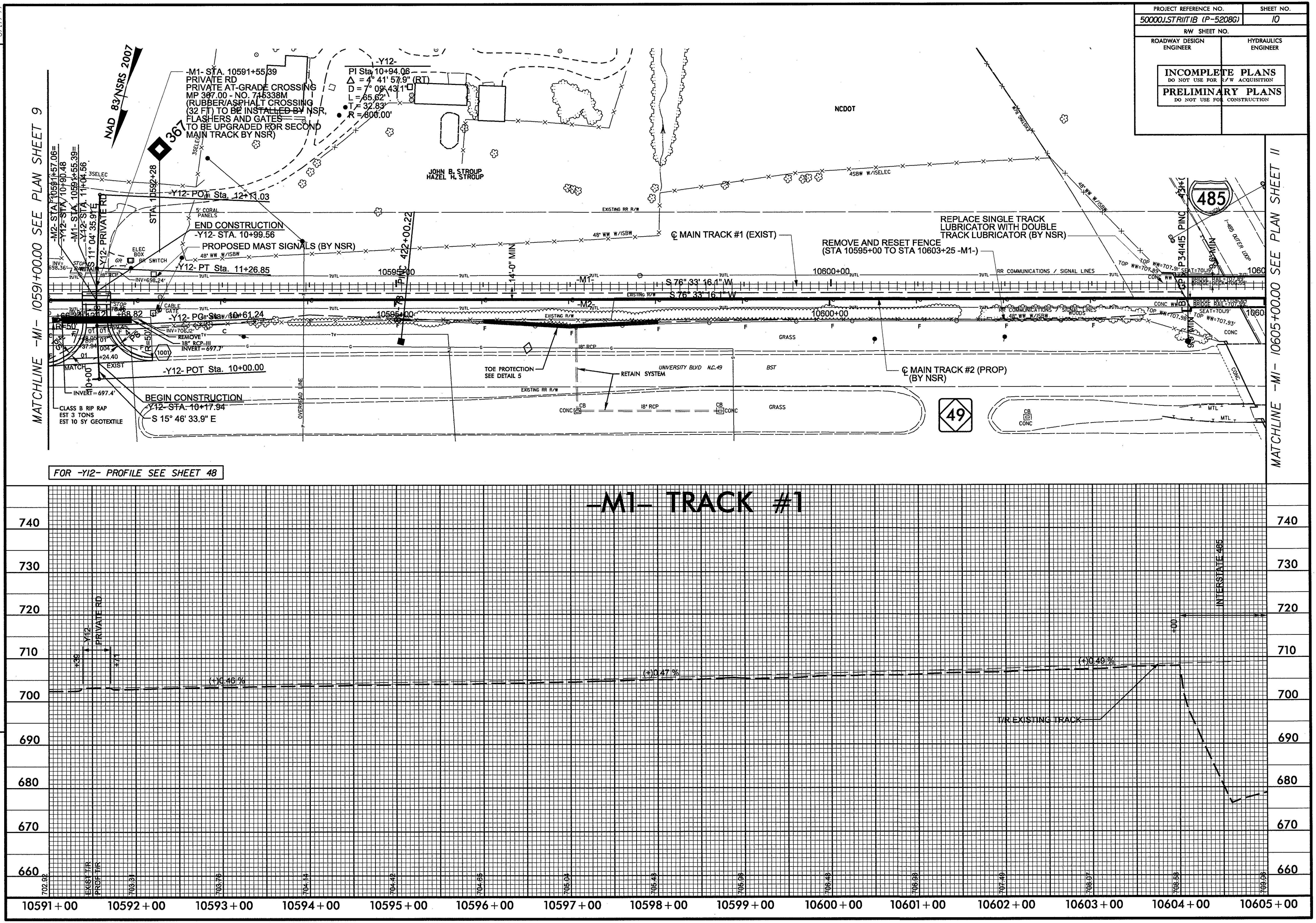
(+)0.46 %

(+)0.66 %

T/R EXISTING TRACK

730														730
720														720
710														710
700														700
690														690
680														680
670														670
660														660
650														650
	695.18 EXIST T/R PROP T/R	695.61	696.16	696.69	697.20	697.71	698.28	698.81	699.39	699.96	700.55	701.14	701.76	702.37	702.92	
	10577+00	10578+00	10579+00	10580+00	10581+00	10582+00	10583+00	10584+00	10585+00	10586+00	10587+00	10588+00	10589+00	10590+00	10591+00	

0041DEL_p10a1



0041DEL_p10a1

8/17/99

REVISIONS

PROJECT REFERENCE NO.	SHEET NO.
50000.1.STR1T1B (P-5208G)	11

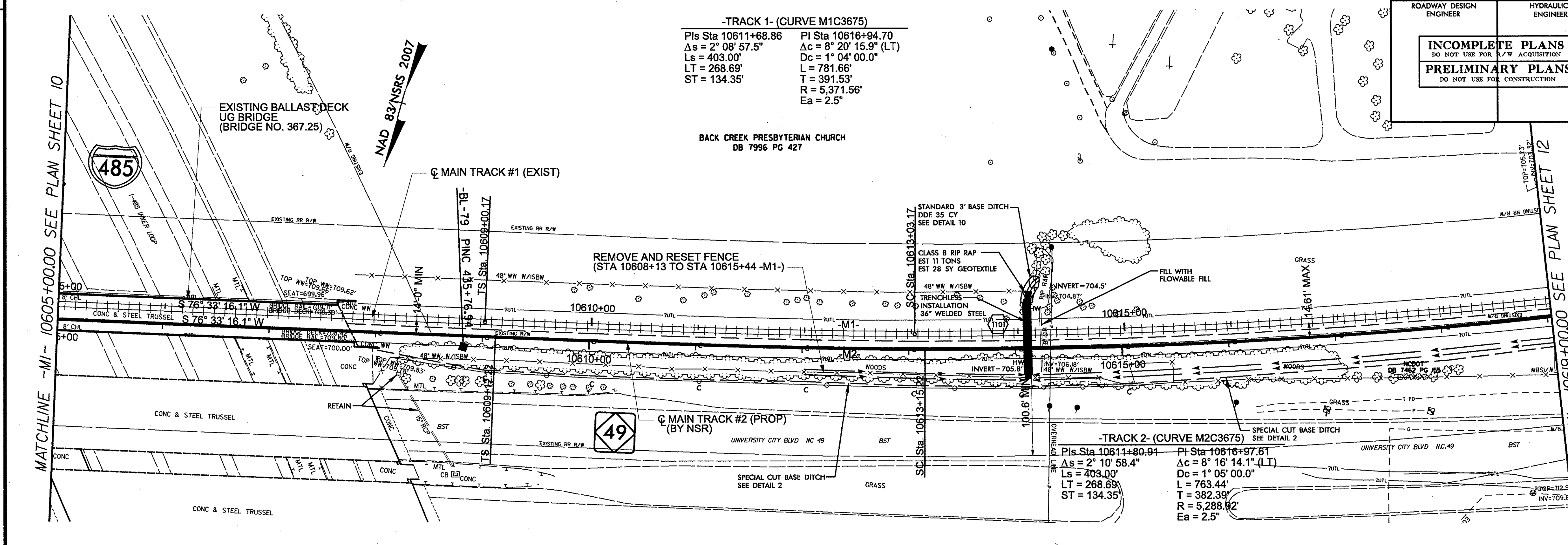
R/W SHEET NO.

ROADWAY DESIGN ENGINEER

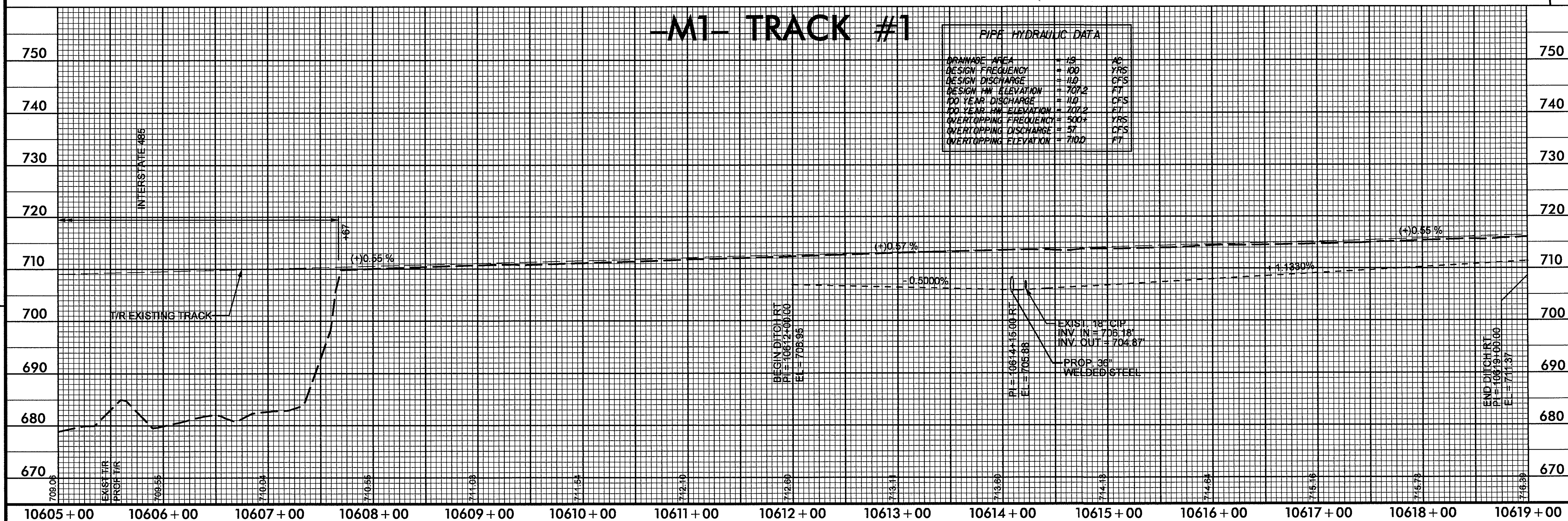
HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION



-TRACK 1- (CURVE M1C3675)
PIs Sta 10611+68.86
Δs = 2° 08' 57.5"
Ls = 403.00'
LT = 268.69'
ST = 134.35'
PI Sta 10616+94.70
Δc = 8° 20' 15.9" (LT)
Dc = 1° 04' 00.0"
L = 781.66'
T = 391.53'
R = 5,371.56'
Ea = 2.5"
-TRACK 2- (CURVE M2C3675)
PIs Sta 10611+80.91
Δs = 2° 10' 58.4"
Ls = 403.00'
LT = 268.69'
ST = 134.35'
PI Sta 10616+97.61
Δc = 8° 16' 14.1" (LT)
Dc = 1° 05' 00.0"
L = 763.44'
T = 382.39'
R = 5,288.92'
Ea = 2.5"
NAD 83/NSRS 2007
485
EXISTING BALLAST DECK UG BRIDGE (BRIDGE NO. 367.25)
BACK CREEK PRESBYTERIAN CHURCH
DB 7996 PG 427
℄ MAIN TRACK #1 (EXIST)
-BL-79 PINC 435+76.94
TS Sta. 10609+00.17
TS Sta. 10609+12.22
REMOVE AND RESET FENCE (STA 10608+13 TO STA 10615+44 -M1-)
SC Sta. 10613+03.17
SC Sta. 10613+15.22
STANDARD 3' BASE DITCH
DDE 35 CY
SEE DETAIL 10
CLASS B RIP RAP
EST 11 TONS
EST 28 SY GEOTEXTILE
TRENCHLESS INSTALLATION
36" WELDED STEEL
FILL WITH FLOWABLE FILL
INVERT = 704.5'
INVERT = 705.8'
S 76° 33' 16.1" W
CONC & STEEL TRUSSEL
10610+00
10615+00
-M1-
-M2-
14.0' MIN
14.61' MAX
100.6' MIN
℄ MAIN TRACK #2 (PROP) (BY NSR)
49
UNIVERSITY CITY BLVD NC 49
SPECIAL CUT BASE DITCH
SEE DETAIL 2
RETAIN
WOODS
GRASS
EXISTING RR R/W
OVERHEAD LINE
MATCHLINE -M1- 10605+00.00 SEE PLAN SHEET 10
MATCHLINE -M1- 10619+00.00 SEE PLAN SHEET 12



-M1- TRACK #1
750
740
730
720
710
700
690
680
670
INTERSTATE 485
T/R EXISTING TRACK
EXIST T/R
PROP T/R
(+)0.55 %
(+)0.57 %
(+)0.55 %
-0.5000%
+1.1330%
BEGIN DITCH RT
PI = 10612+00.00
EL = 708.95
PI = 10614+15.00 RT
EL = 705.88
EXIST. 18" CIP
INV. IN = 706.18'
INV. OUT = 704.87'
PROP. 36" WELDED STEEL
END DITCH RT
PI = 10619+00.00
EL = 711.37
10605+00
10606+00
10607+00
10608+00
10609+00
10610+00
10611+00
10612+00
10613+00
10614+00
10615+00
10616+00
10617+00
10618+00
10619+00

PIPE HYDRAULIC DATA

DRAINAGE AREA	= 19	AC
DESIGN FREQUENCY	= 100	YRS
DESIGN DISCHARGE	= 11.0	CFS
DESIGN HW ELEVATION	= 707.2	FT
100 YEAR DISCHARGE	= 11.0	CFS
100 YEAR HW ELEVATION	= 707.2	FT
OVERTOPPING FREQUENCY	= 500+	YRS
OVERTOPPING DISCHARGE	= 57	CFS
OVERTOPPING ELEVATION	= 710.0	FT

0041DEL_p10a1

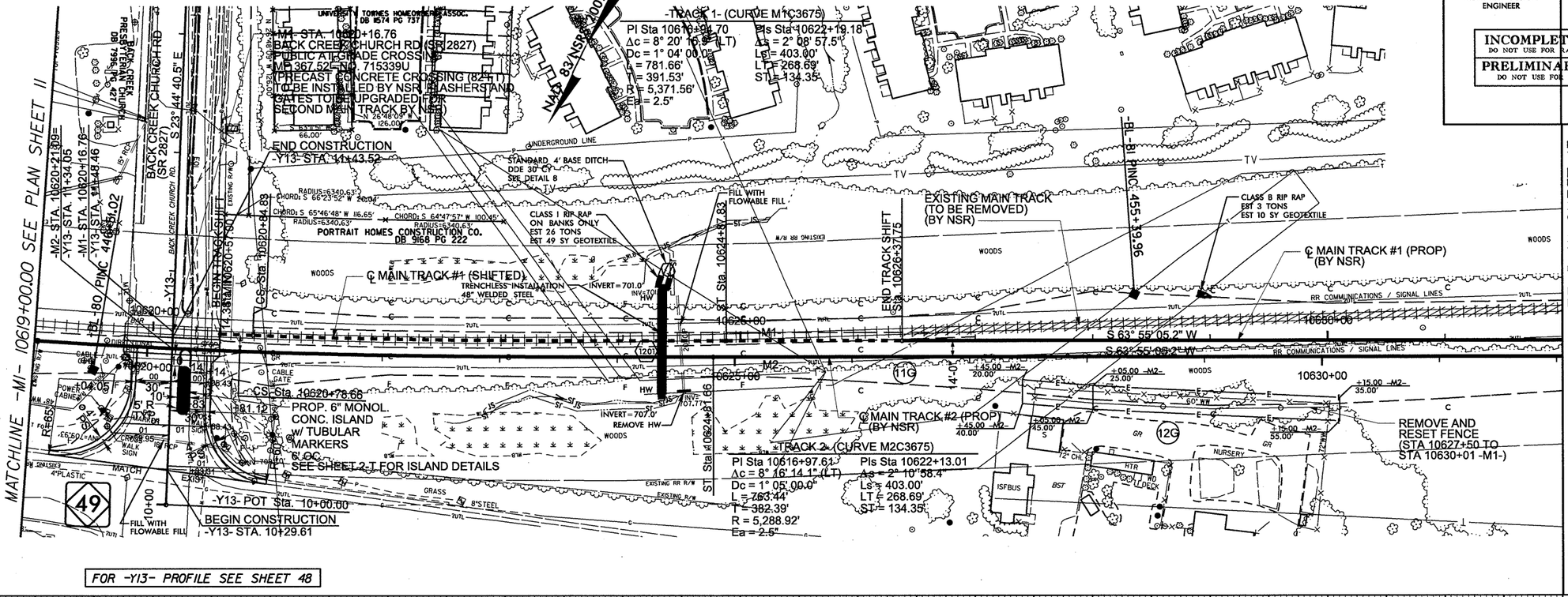
8/17/99

REVISIONS

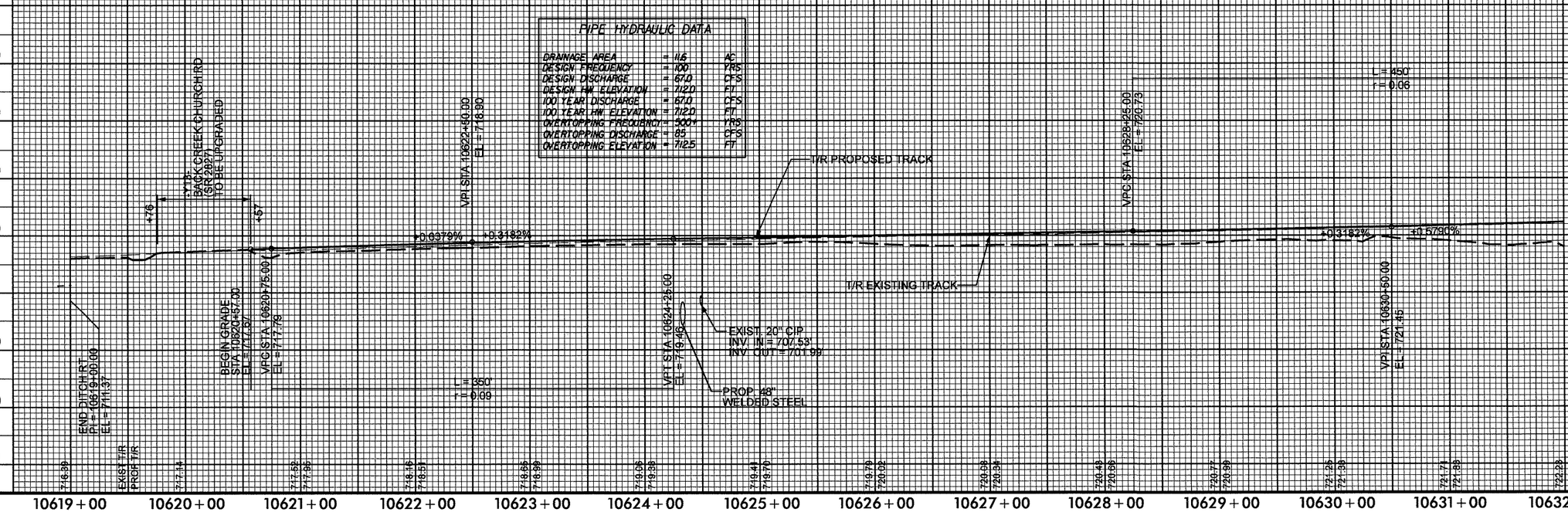
PROJECT REFERENCE NO.	SHEET NO.
50000JSTRMTIB (P-5208G)	12
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION



-M1- TRACK #1



0041DEL_p10a1

REVISIONS

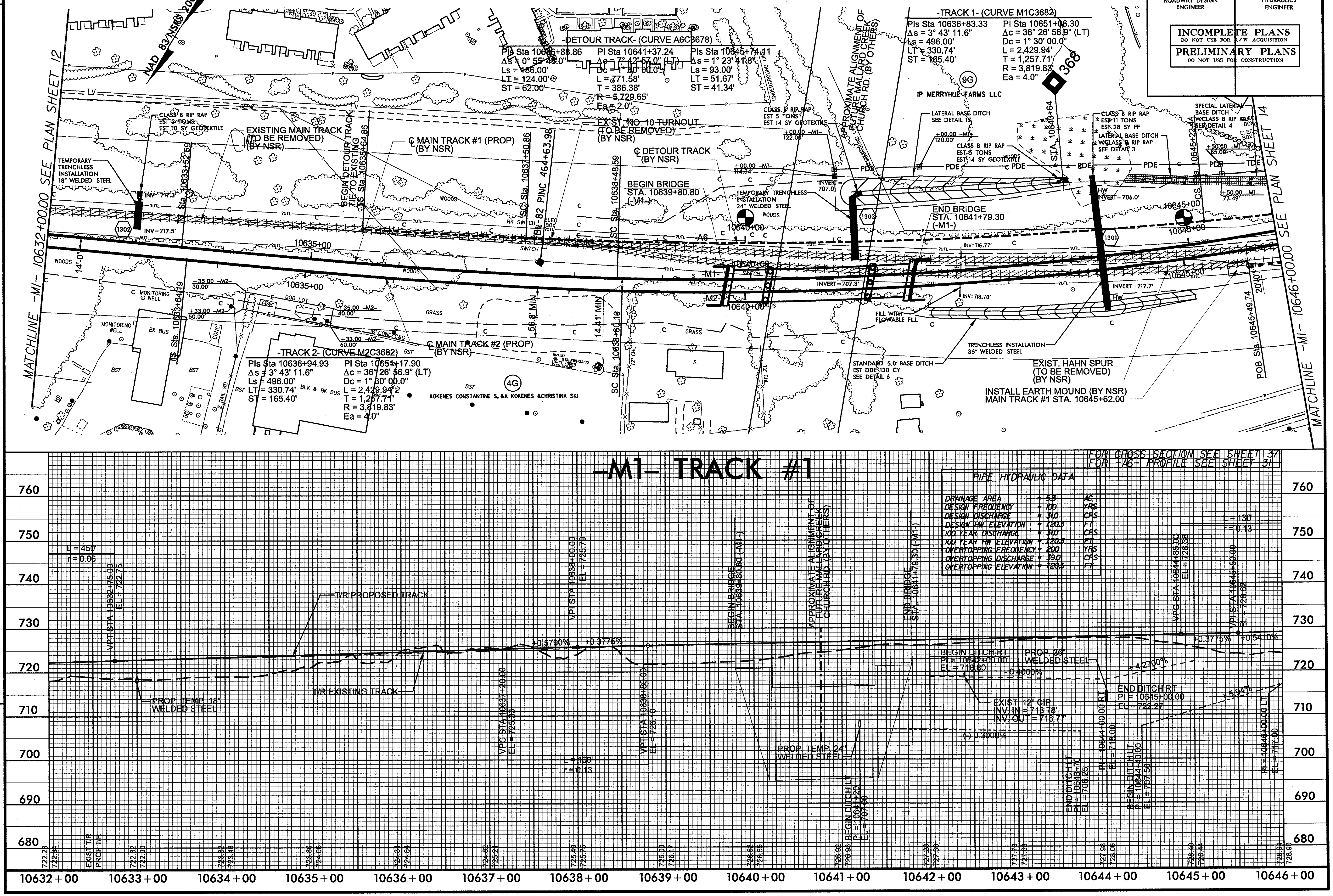
2. ROW REV - 1/3/2003
ADDED PARCEL 9G AND PDE AND TDE ON PARCEL 9G.
ADDED PARCEL 10G AND CONSTRUCTION EASEMENT ON 10G.

8/17/99

PROJECT REFERENCE NO.	SHEET NO.
50000J.STR!T!B (P-5208G)	13
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION



0041DEL_p10a1

8/17/99

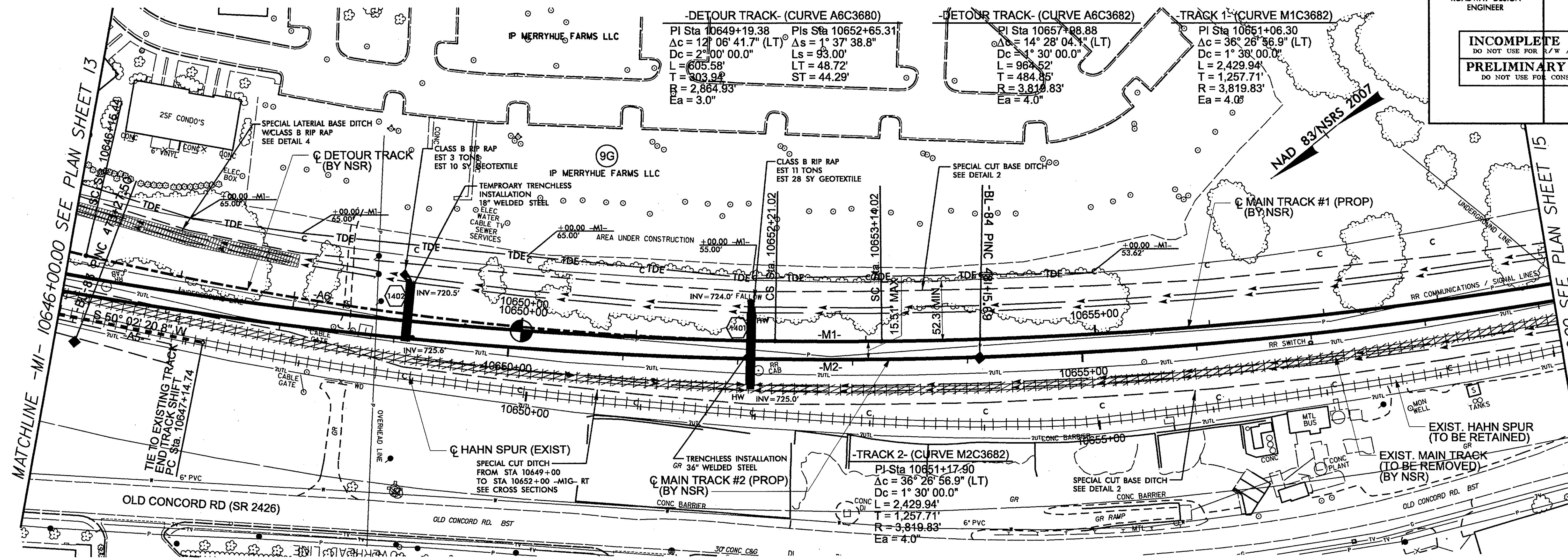
REVISIONS

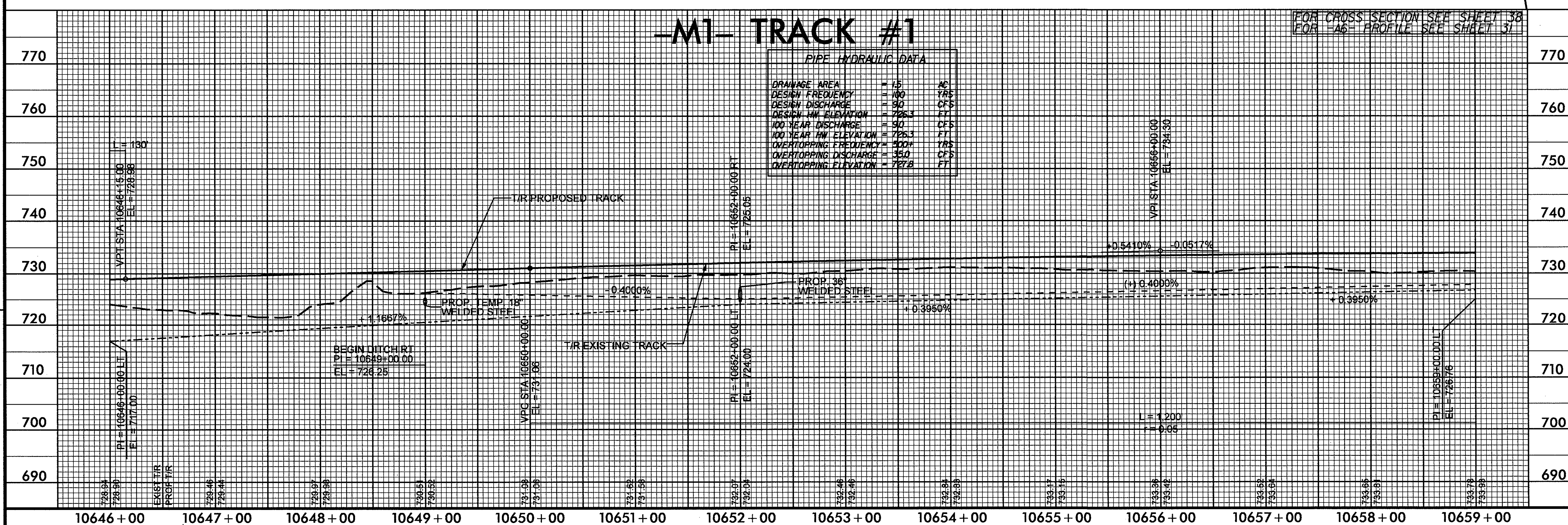
2. ROW REV - 1/3/2013
ADDED PARCEL 9G AND PDE AND TDE ON PARCEL 9G.
ADDED PARCEL 10G AND CONSTRUCTION EASEMENT ON 10G.

PROJECT REFERENCE NO.	SHEET NO.
50000JSTRIITIB (P-5208G)	14
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION





0041DEL_p10a1

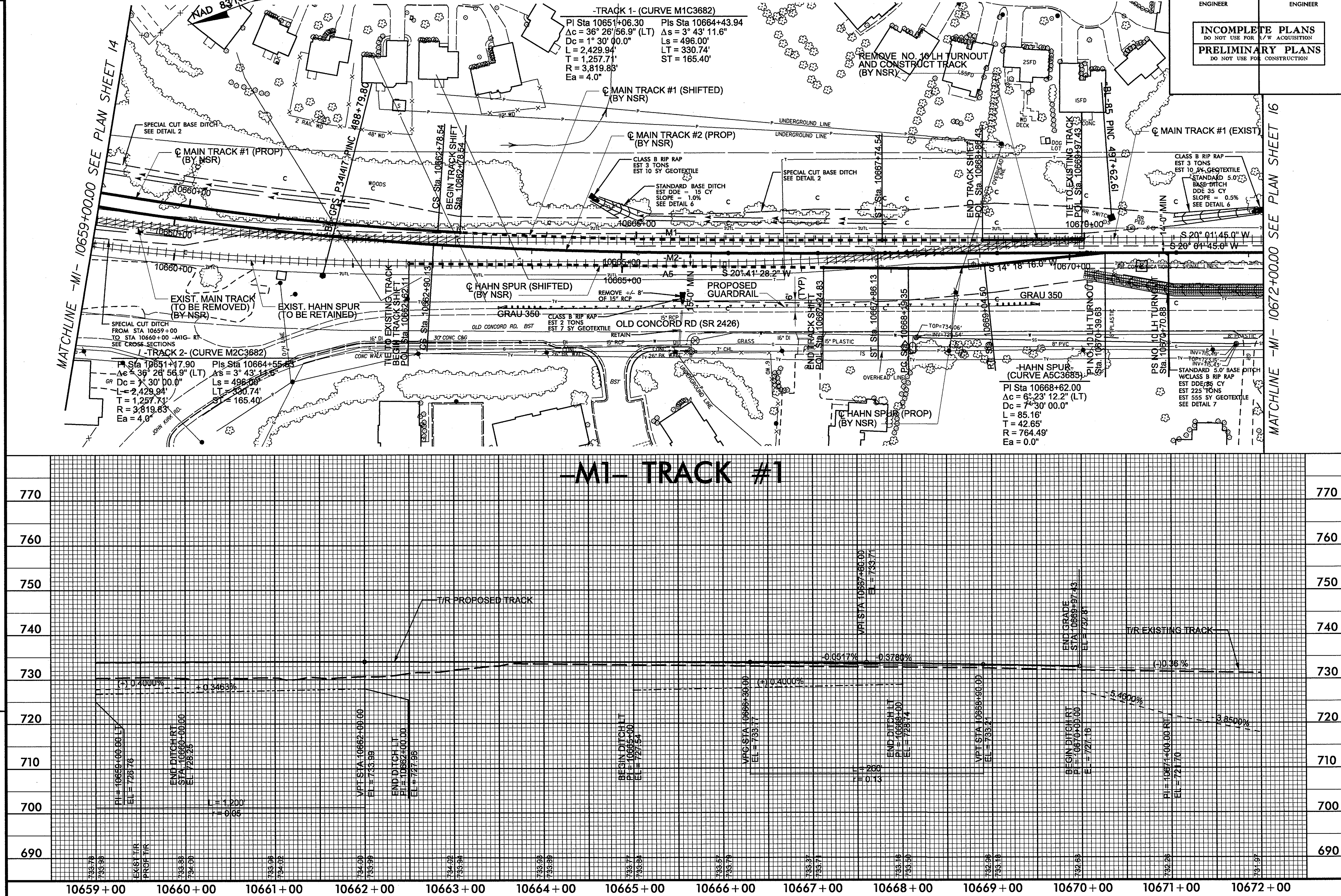
PROJECT REFERENCE NO.	SHEET NO.
50000J.STRIITIB (P-5208G)	15
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

8/17/99

REVISIONS



0041DEL_p10a1

PROJECT REFERENCE NO.	SHEET NO.
50000J.STRIITIB (P-5208G)	16
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

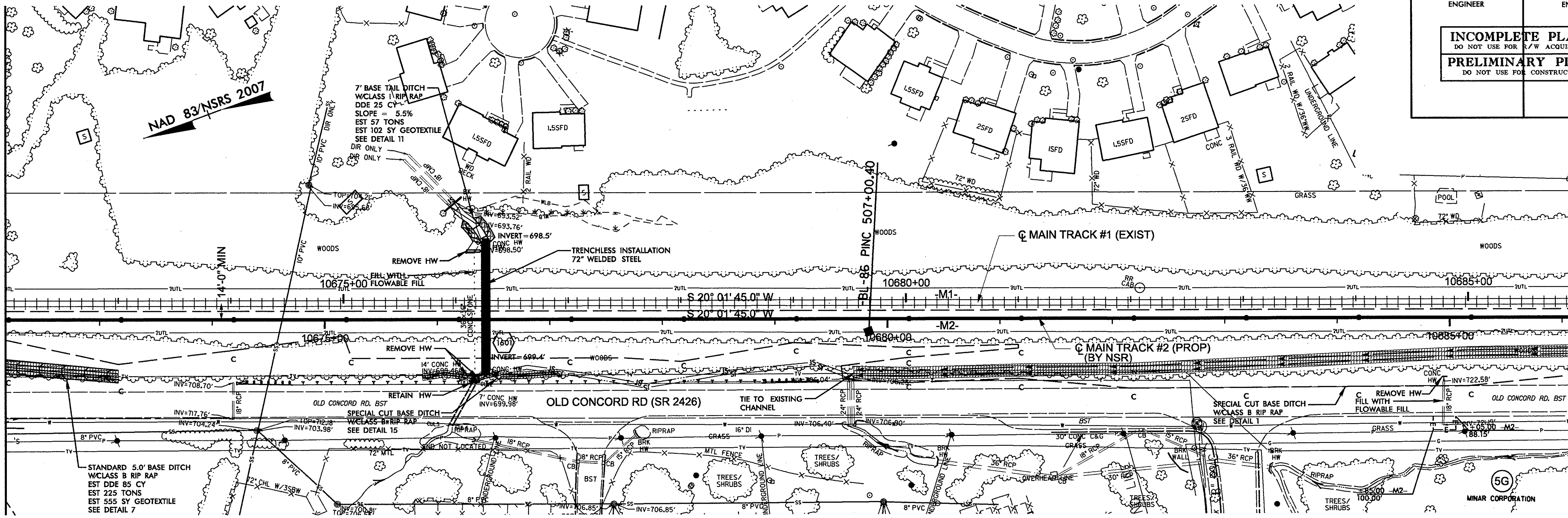
INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

8/17/99

REVISIONS

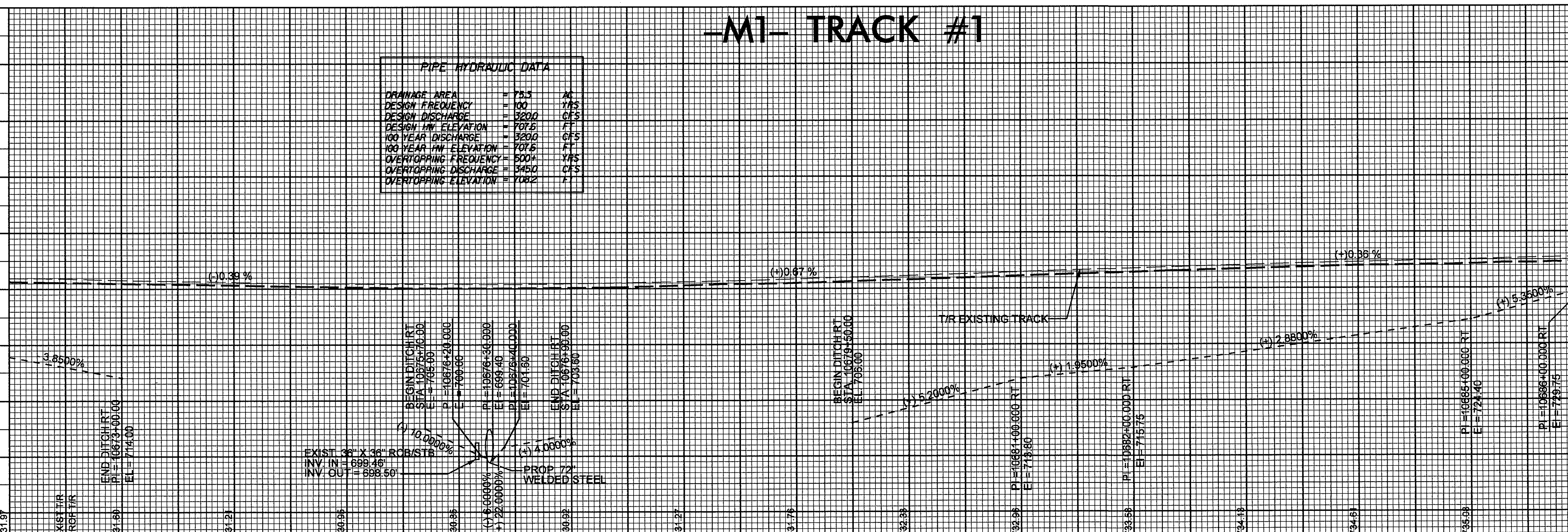
MATCHLINE -M1- 10672+00.00 SEE PLAN SHEET 15



NAD 83/NSRS 2007
7' BASE TAIL DITCH W/CLASS I RIP RAP DDE 25 CY SLOPE = 5.5% EST 57 TONS EST 102 SY GEOTEXTILE SEE DETAIL 11
TRENCHLESS INSTALLATION 72" WELDED STEEL
REMOVE HW
FILL WITH FLOWABLE FILL
℄ MAIN TRACK #1 (EXIST)
℄ MAIN TRACK #2 (PROP) (BY NSR)
S 20° 01' 45.0" W
10675+00
10680+00
10685+00
-M1-
-M2-
-BL-86 PINC 507+00.40
OLD CONCORD RD (SR 2426)
OLD CONCORD RD. BST
TIE TO EXISTING CHANNEL
SPECIAL CUT BASE DITCH W/CLASS B RIP RAP SEE DETAIL 15
SPECIAL CUT BASE DITCH W/CLASS B RIP RAP SEE DETAIL 1
STANDARD 5.0' BASE DITCH W/CLASS B RIP RAP EST DDE 85 CY EST 225 TONS EST 555 SY GEOTEXTILE SEE DETAIL 7
WOODS
TREES/ SHRUBS
MINAR CORPORATION

MATCHLINE -M1- 10686+00.00 SEE PLAN SHEET 17

-M1- TRACK #1



770
760
750
740
730
720
710
700
690
(-)0.39 %
(+)0.67 %
(+)0.36 %
T/R EXISTING TRACK
EXIST. 36" X 36" RCB/STB INV. IN = 699.46' INV. OUT = 698.50'
PROP. 72" WELDED STEEL
10672+00
10673+00
10674+00
10675+00
10676+00
10677+00
10678+00
10679+00
10680+00
10681+00
10682+00
10683+00
10684+00
10685+00
10686+00

PIPE HYDRAULIC DATA			
DRAINAGE AREA	=	73.5	AC
DESIGN FREQUENCY	=	100	YRS
DESIGN DISCHARGE	=	3200.0	CFS
DESIGN HW ELEVATION	=	707.6	FT
100 YEAR DISCHARGE	=	3200.0	CFS
100 YEAR HW ELEVATION	=	707.6	FT
OVERTOPPING FREQUENCY	=	500+	YRS
OVERTOPPING DISCHARGE	=	3450.0	CFS
OVERTOPPING ELEVATION	=	708.2	FT

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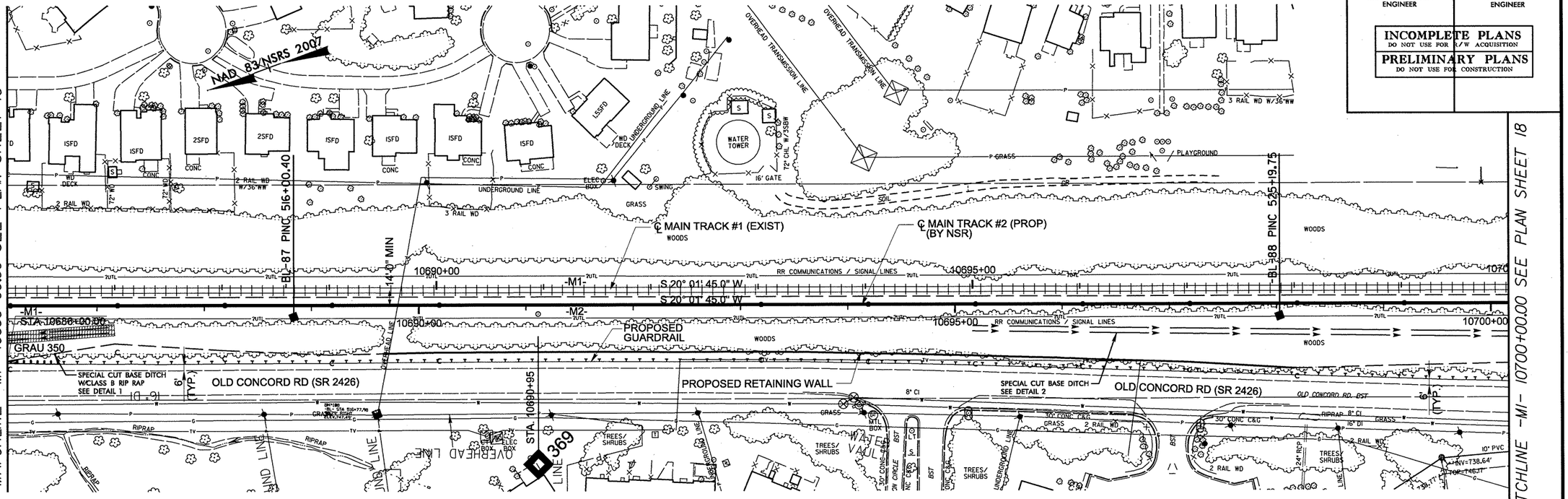
8/17/99

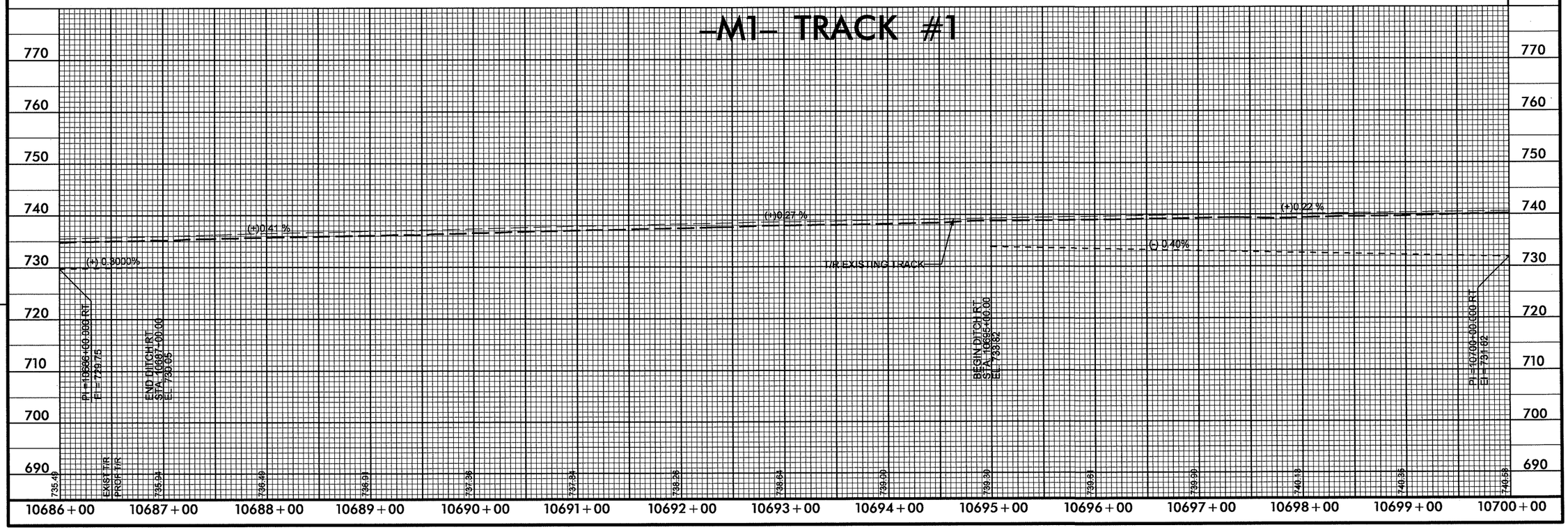
REVISIONS

PROJECT REFERENCE NO.	SHEET NO.
50000JSTRITIB (P-52086)	17
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION





0041DEL_p10a1

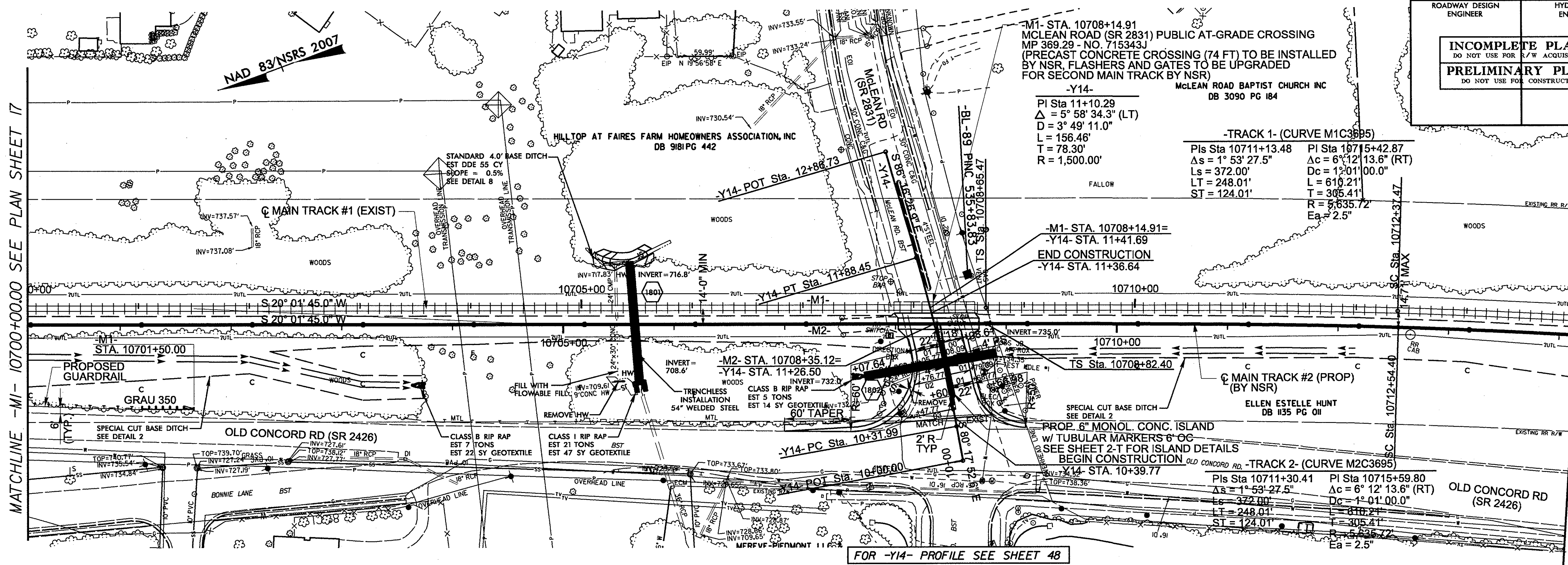
8/17/99

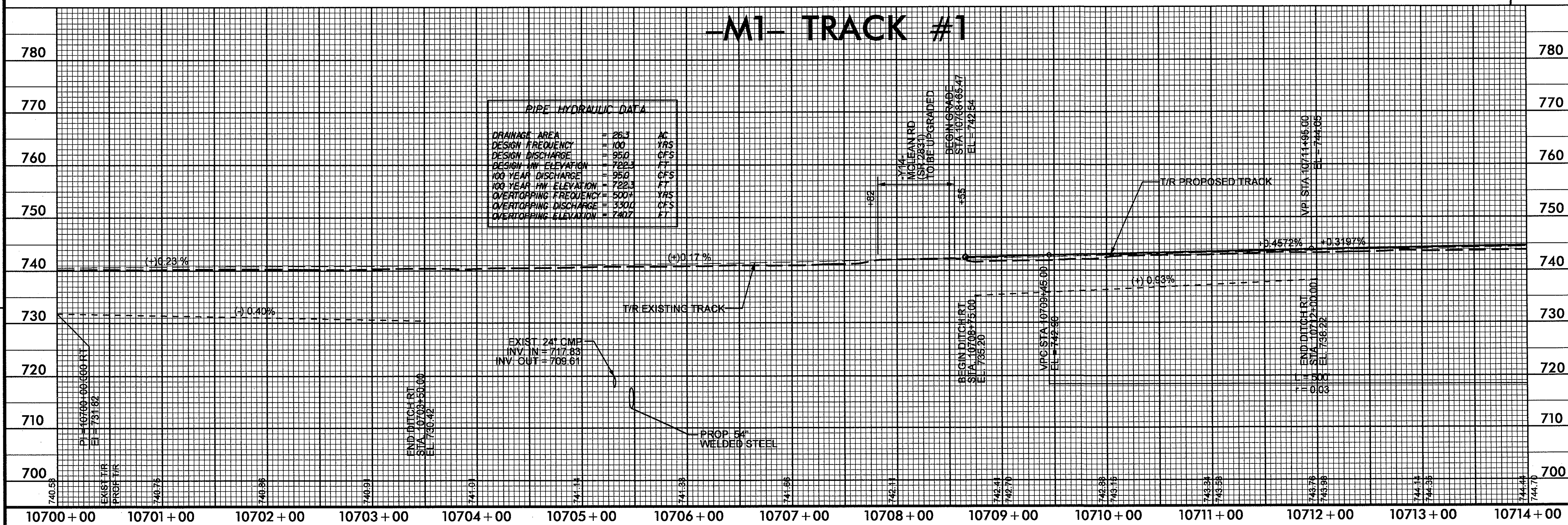
REVISIONS

PROJECT REFERENCE NO.	SHEET NO.
50000J.STRIITIB (P-5208G)	18
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION





PIPE HYDRAULIC DATA

DRAINAGE AREA	=	26.3	AC
DESIGN FREQUENCY	=	100	YRS
DESIGN DISCHARGE	=	95.0	CFS
DESIGN HW ELEVATION	=	722.3	FT
100 YEAR DISCHARGE	=	95.0	CFS
100 YEAR HW ELEVATION	=	722.3	FT
OVERTOPPING FREQUENCY	=	500+	YRS
OVERTOPPING DISCHARGE	=	330.0	CFS
OVERTOPPING ELEVATION	=	740.7	FT

PROJECT REFERENCE NO.	SHEET NO.
50000J.STRIITIB (P-5208G)	19

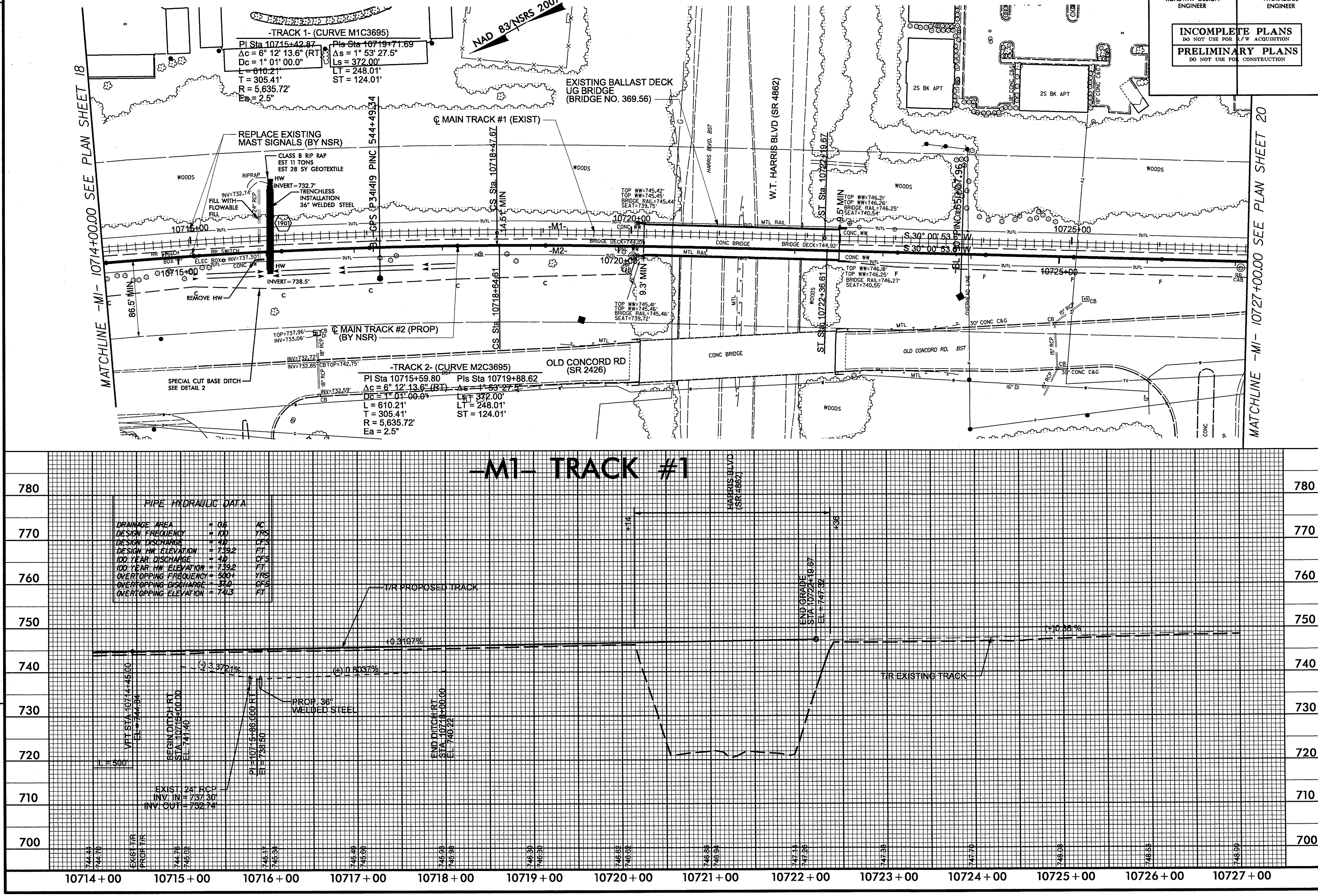
R/W SHEET NO.

ROADWAY DESIGN ENGINEER

HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION



PIPE HYDRAULIC DATA

DRAINAGE AREA	= 0.6	AC
DESIGN FREQUENCY	= 100	YRS
DESIGN DISCHARGE	= 4.0	CFS
DESIGN HW ELEVATION	= 739.2	FT
100 YEAR DISCHARGE	= 4.0	CFS
100 YEAR HW ELEVATION	= 739.2	FT
OVERTOPPING FREQUENCY	= 500+	YRS
OVERTOPPING DISCHARGE	= 37.0	CFS
OVERTOPPING ELEVATION	= 741.3	FT

REVISIONS

0041DEL_p10a1

0041DEL_p10a1

8/17/99

REVISIONS

PROJECT REFERENCE NO.	SHEET NO.
50000JSTRIITIB (P-5208G)	20
RW SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

NAD 83/NSRS 2007

MATCHLINE -M1- 10727+00.00 SEE PLAN SHEET 19

MATCHLINE -M1- 10741+00.00 SEE PLAN SHEET 21

℄ MAIN TRACK #1 (EXIST)

℄ MAIN TRACK #2 (PROP) (BY NSR)

BL 91 PINC 559+57.86

-M1-

-M2-

S 30° 00' 53.6" W

S 30° 00' 53.6" W

15.00' MIN

10730+00

10735+00

10740+00

RR COMMUNICATIONS / SIGNAL LINES

OLD CONCORD RD (SR 2426)

OLD CONCORD RD. BST

WOODS

BK BUS

GUARD POST

CONC

CB

15" RCP

18" CONC C&G

BST

GRASS

BK WALL

MTL GATES

TREES

SOIL

GR

LIGHT POLE

GENERATOR

ELEC BOX

AIR

RR CAB

16" DI

OVERHEAD LINE

GAS PUMPS

TANK FILLS

IS MAS BUS

-M1- TRACK #1

(+)0.57 %

(+)0.29 %

(+)0.43 %

T/R EXISTING TRACK

EXIST T/R 748.99

PROP T/R 749.57

750.19

750.61

751.05

751.49

751.96

752.41

752.82

753.28

753.85

754.39

754.88

755.28

755.67

790 780 770 760 750 740 730 720 710

10727+00 10728+00 10729+00 10730+00 10731+00 10732+00 10733+00 10734+00 10735+00 10736+00 10737+00 10738+00 10739+00 10740+00 10741+00

0041DEL_p10a1

PROJECT REFERENCE NO.	SHEET NO.
50000J.STRIITIB (P-5208G)	21
R/W SHEET NO.	

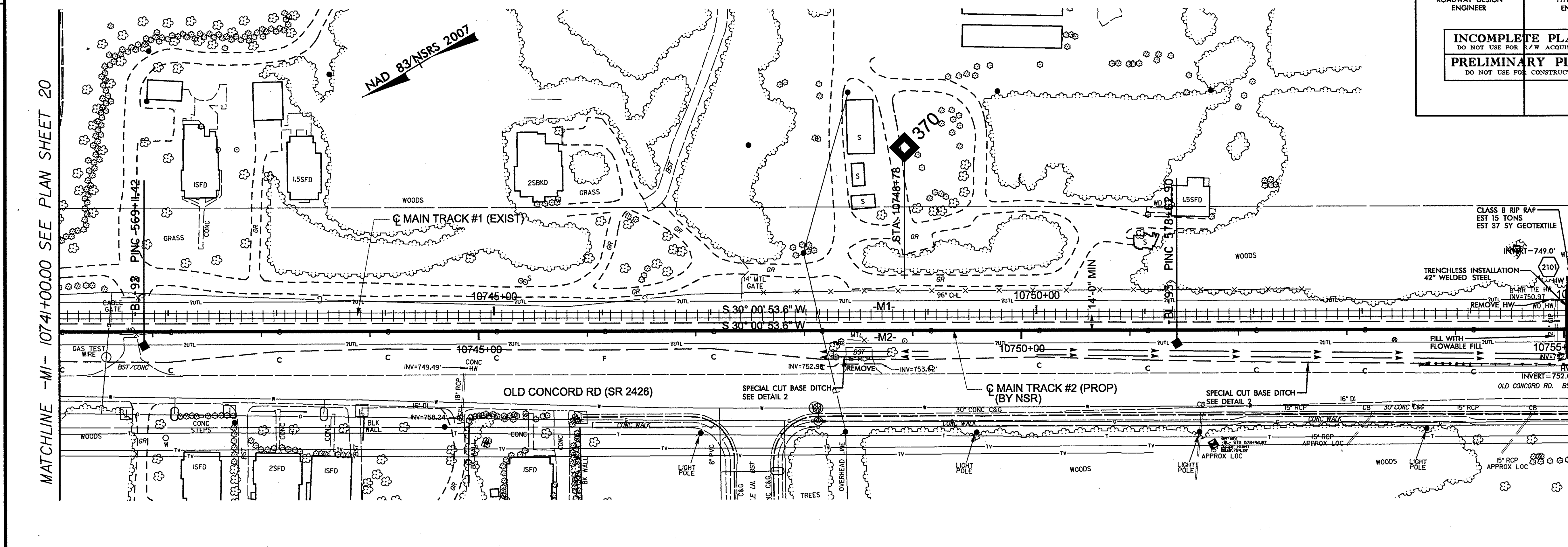
ROADWAY DESIGN ENGINEER

HYDRAULICS ENGINEER

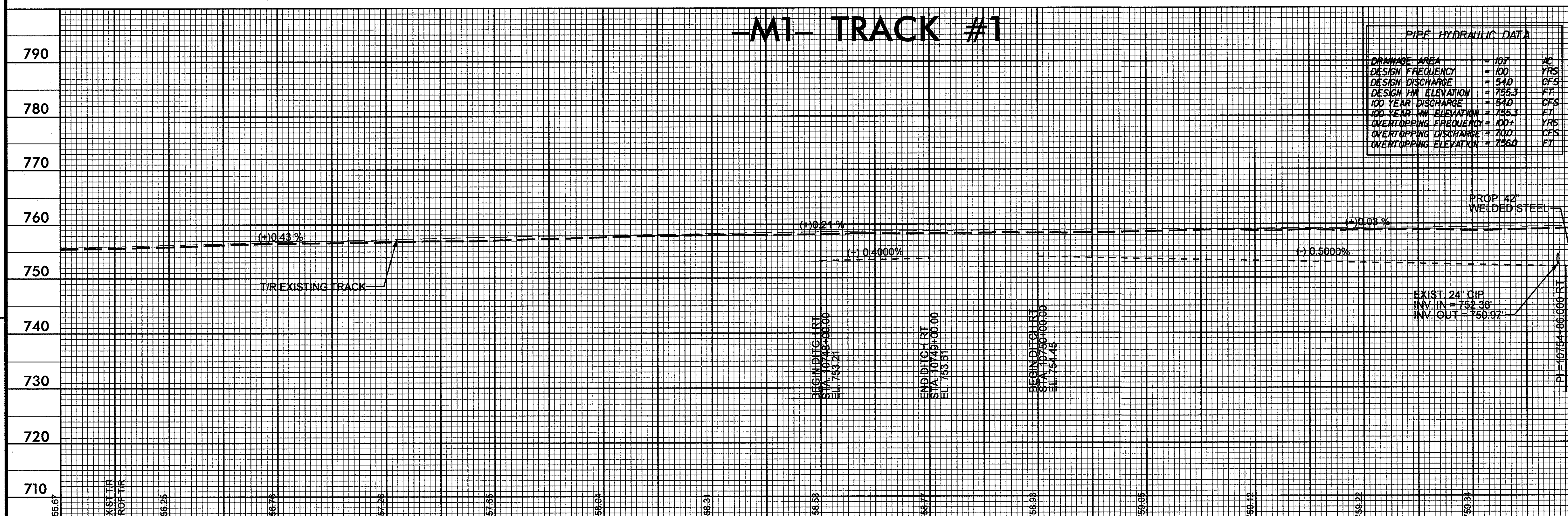
INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

REVISIONS



-M1- TRACK #1



PIPE HYDRAULIC DATA

DRAINAGE AREA	= 107	AC
DESIGN FREQUENCY	= 100	YRS
DESIGN DISCHARGE	= 54.0	CFS
DESIGN HW ELEVATION	= 755.3	FT
100 YEAR DISCHARGE	= 54.0	CFS
100 YEAR HW ELEVATION	= 755.3	FT
OVERTOPPING FREQUENCY	= 100+	YRS
OVERTOPPING DISCHARGE	= 70.0	CFS
OVERTOPPING ELEVATION	= 756.0	FT

0041DEL_p10a1

8/17/99

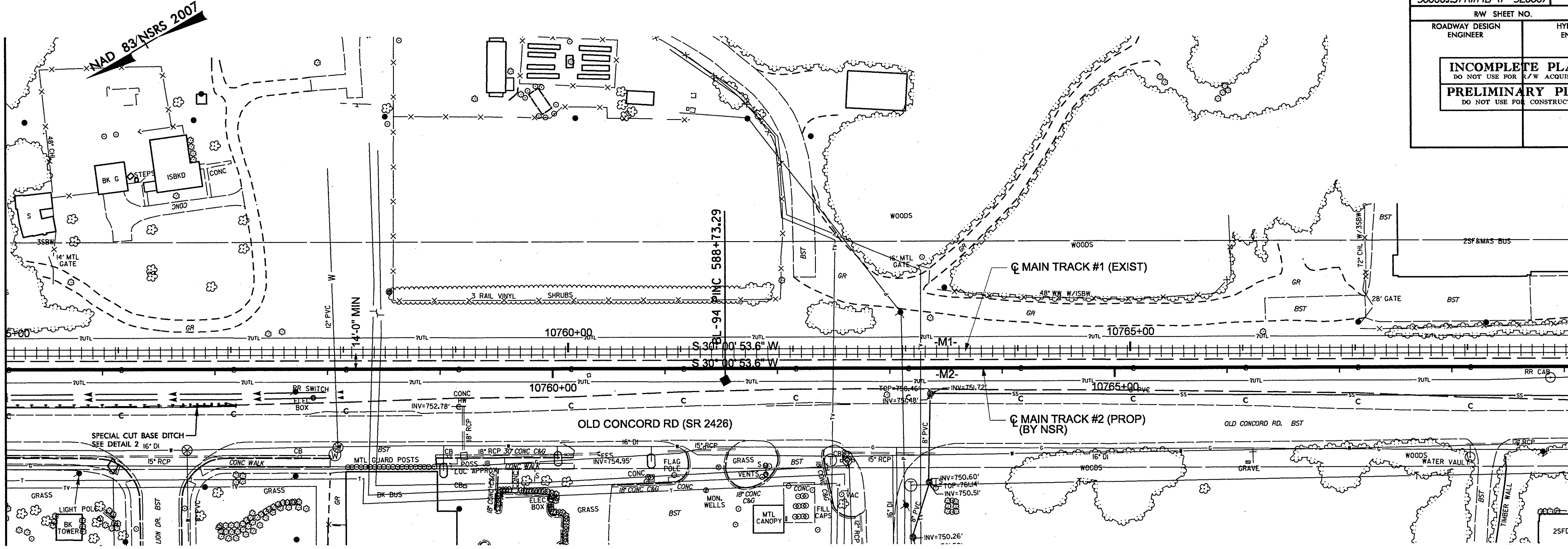
PROJECT REFERENCE NO.	SHEET NO.
50000J.STRIITIB (P-5208G)	22
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

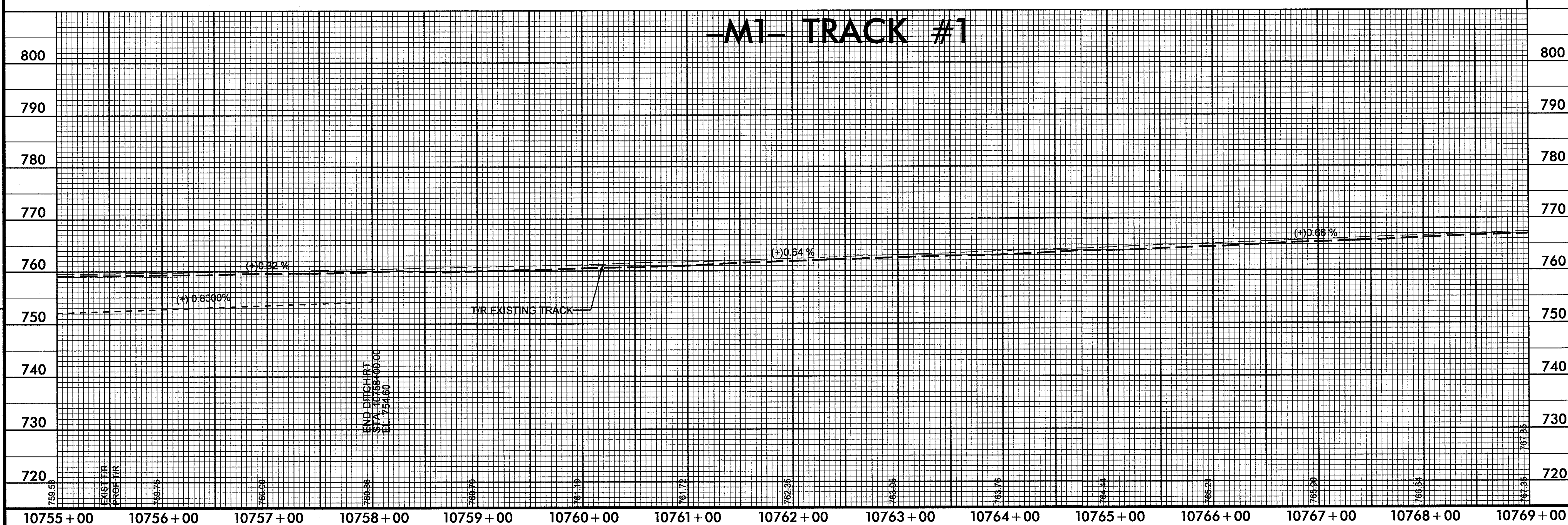
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

REVISIONS

MATCHLINE -MI- 10755+00.00 SEE PLAN SHEET 21



MATCHLINE -MI- 10769+00.00 SEE PLAN SHEET 23



0041DEL_p10a1

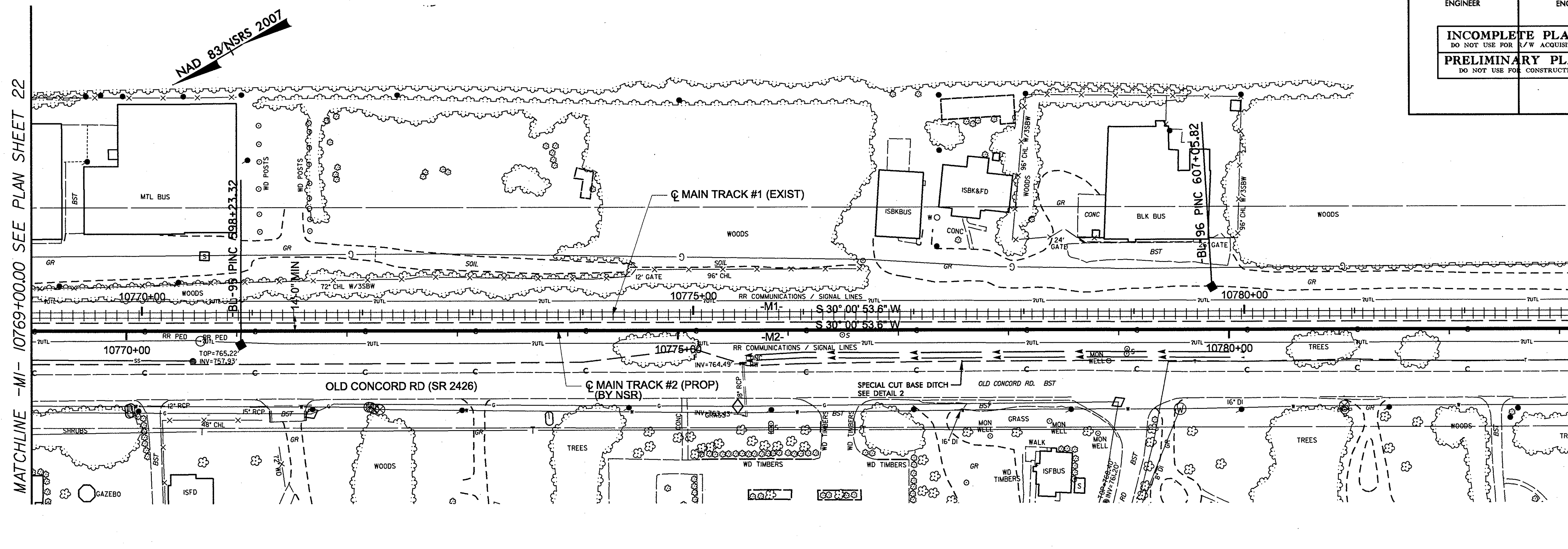
8/17/99

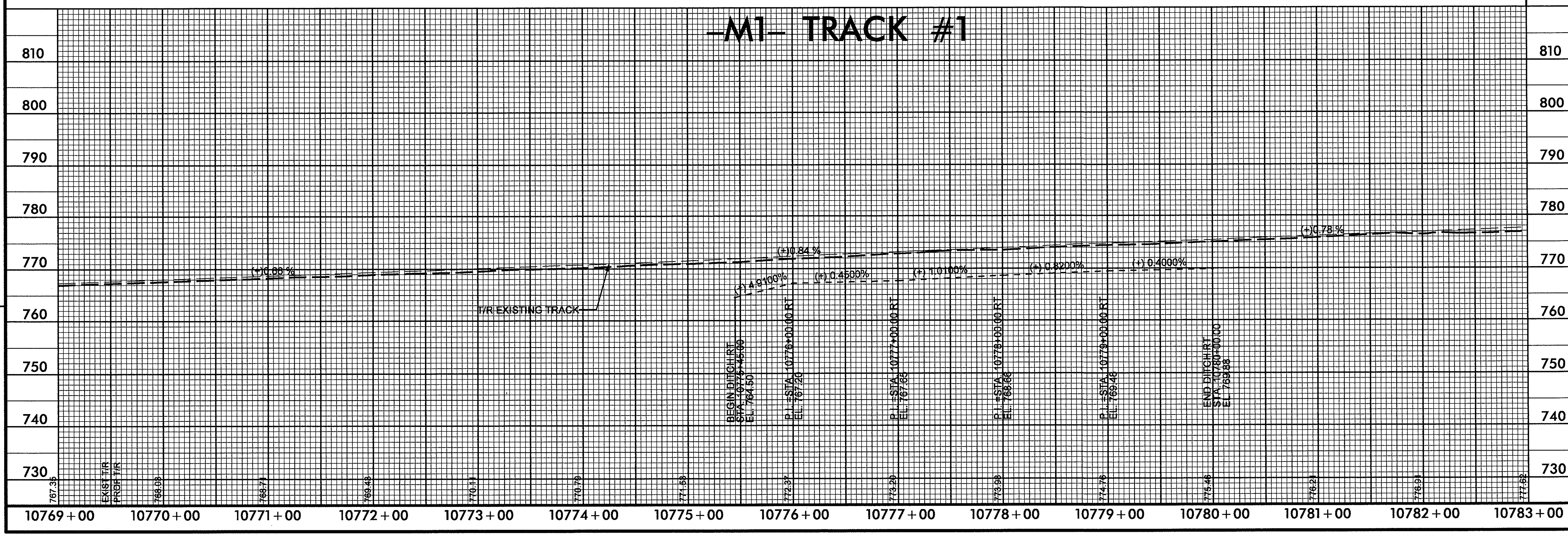
REVISIONS

PROJECT REFERENCE NO.	SHEET NO.
50000J.STR1IT1B (P-5208G)	23
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

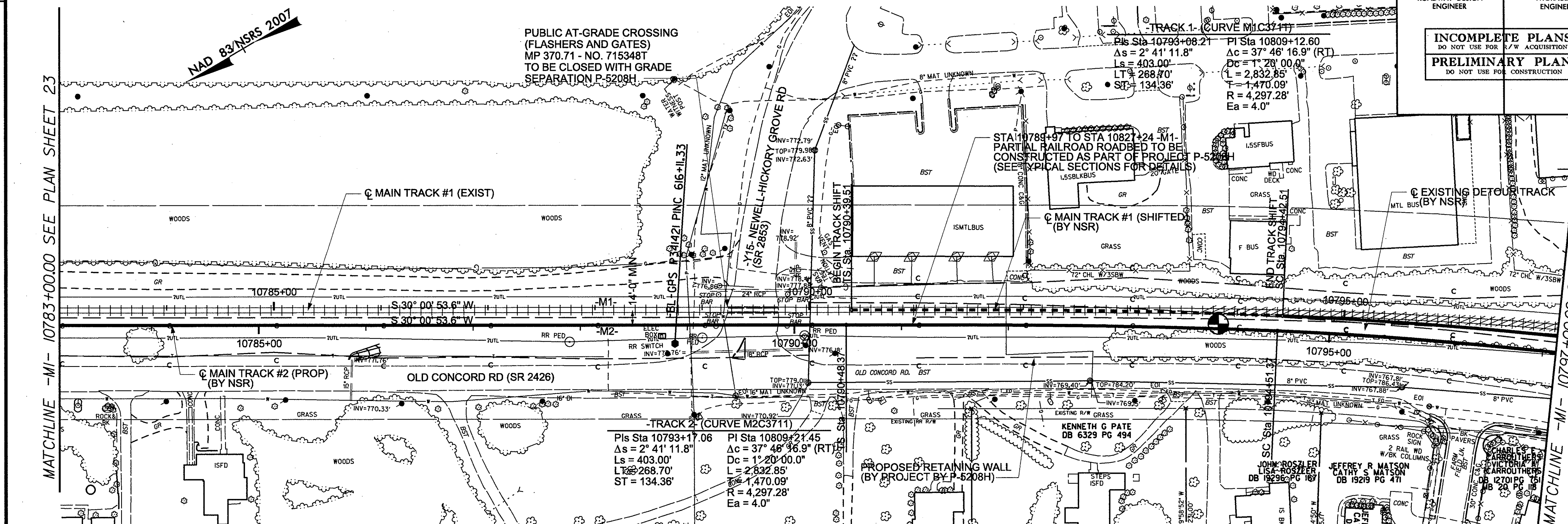




PROJECT REFERENCE NO.	SHEET NO.
50000J.STRIIT1B (P-5208G)	24
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

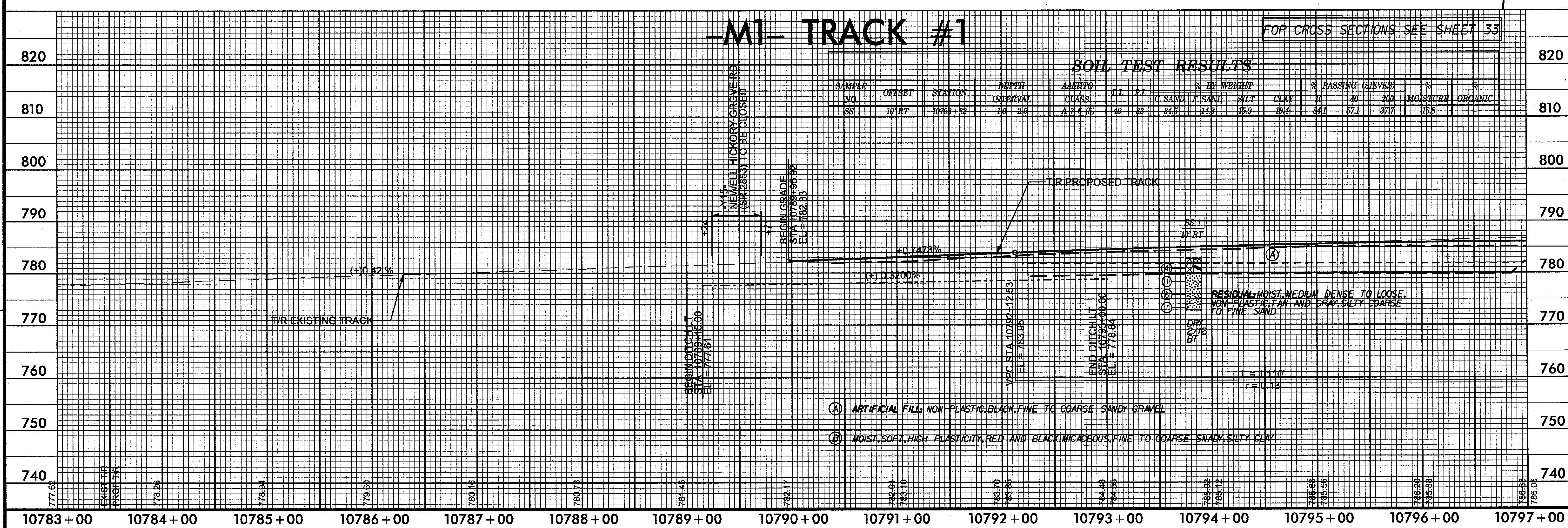


-M1- TRACK #1

FOR CROSS SECTIONS SEE SHEET 33

SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS	L.L.	P.I.	% BY WEIGHT C. SAND	F. SAND	SILT	CLAY	% PASSING (SIEVES) 10	40	200	% MOISTURE	% ORGANIC
SS-1	10' RT	10793+82	1.0 - 2.5	A-7-6 (5)	49	32	34.5	14.3	15.9	19.4	84.1	57.1	37.7	16.8	



REVISIONS

8/17/99

0041DEL_p10a1

0041DEL_p10a1

PROJECT REFERENCE NO.	SHEET NO.
50000J.STRIITIB (P-5208G)	25

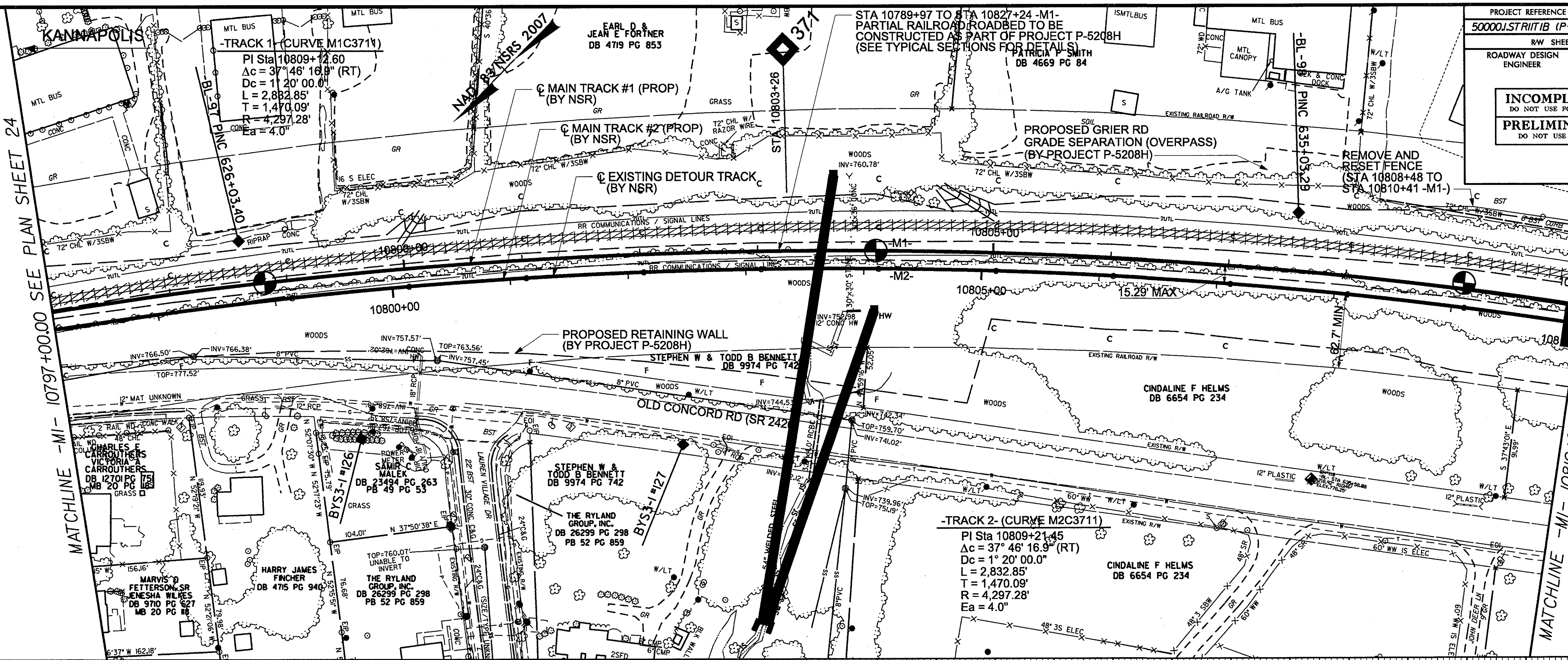
R/W SHEET NO.

ROADWAY DESIGN ENGINEER — HYDRAULICS ENGINEER

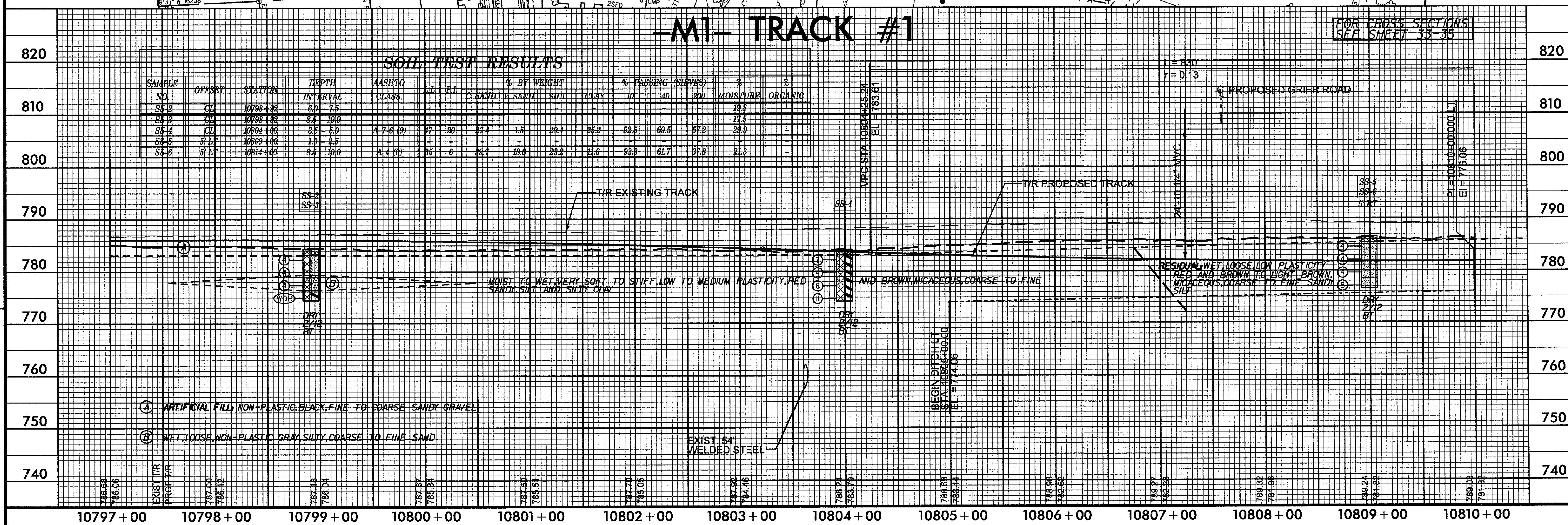
INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

REVISIONS



KANNAPOLIS
-TRACK 1- (CURVE M1C3711)
PI Sta 10809+12.60
Δc = 37° 46' 16.9" (RT)
Dc = 1° 20' 00.0"
L = 2,832.85'
T = 1,470.09'
R = 4,297.28'
Ea = 4.0"
NAD 83/NSRS 2007
EARL D & JEAN E FORTNER
DB 4719 PG 853
STA 10789+97 TO STA 10827+24 -M1-
PARTIAL RAILROAD ROADBED TO BE
CONSTRUCTED AS PART OF PROJECT P-5208H
(SEE TYPICAL SECTIONS FOR DETAILS)
PATRICIA P SMITH
DB 4669 PG 84
℄ MAIN TRACK #1 (PROP)
(BY NSR)
℄ MAIN TRACK #2 (PROP)
(BY NSR)
℄ EXISTING DETOUR TRACK
(BY NSR)
PROPOSED GRIER RD
GRADE SEPARATION (OVERPASS)
(BY PROJECT P-5208H)
REMOVE AND
RESET FENCE
(STA 10808+48 TO
STA 10810+41 -M1-)
-BL-97 PINC 626+03.40
-BL-96 PINC 635+05.29
MATCHLINE -M1- 10797+00.00 SEE PLAN SHEET 24
MATCHLINE -M1- 10810+00.00 SEE PLAN SHEET 26
10800+00
10805+00
15.29' MAX
62.7' MIN
PROPOSED RETAINING WALL
(BY PROJECT P-5208H)
STEPHEN W & TODD B BENNETT
DB 9974 PG 742
OLD CONCORD RD (SR 2420)
CINDALINE F HELMS
DB 6654 PG 234
CHARLES E CARROUTHERS
VICTORIA A CARROUTHERS
DB 12701 PG 75
MB 20 PG 115
SAMIR C MALEK
DB 23494 PG 263
PB 49 PG 53
HARRY JAMES FINCHER
DB 4715 PG 940
MARVIS D FETTERSON, SR
JENESHA WILKES
DB 9710 PG 627
MB 20 PG 18
THE RYLAND GROUP, INC.
DB 26299 PG 298
PB 52 PG 859
-TRACK 2- (CURVE M2C3711)
PI Sta 10809+21.45
Δc = 37° 46' 16.9" (RT)
Dc = 1° 20' 00.0"
L = 2,832.85'
T = 1,470.09'
R = 4,297.28'
Ea = 4.0"



-M1- TRACK #1
FOR CROSS SECTIONS SEE SHEET 33-35
T/R EXISTING TRACK
T/R PROPOSED TRACK
VPC STA 10804+25.24
EL = 783.61
℄ PROPOSED GRIER ROAD
PI = 10810+00.000 LT
EL = 776.06
MOIST TO WET, VERY SOFT TO STIFF, LOW TO MEDIUM PLASTICITY, RED AND BROWN, MICACEOUS, COARSE TO FINE SANDY SILT AND SILTY CLAY
RESIDUAL: WET, LOOSE, LOW PLASTICITY RED AND BROWN TO LIGHT BROWN, MICACEOUS, COARSE TO FINE SANDY SILT
BEGIN DITCH LT
EXIST 54" WELDED STEEL
Ⓐ ARTIFICIAL FILL: NON-PLASTIC, BLACK, FINE TO COARSE SANDY GRAVEL
Ⓑ WET, LOOSE, NON-PLASTIC, GRAY, SILTY, COARSE TO FINE SAND
820
810
800
790
780
770
760
750
740
10797+00
10798+00
10799+00
10800+00
10801+00
10802+00
10803+00
10804+00
10805+00
10806+00
10807+00
10808+00
10809+00
10810+00

SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT C. SAND	F. SAND	SILT	CLAY	% PASSING (SIEVES) 10	40	200	% MOISTURE	% ORGANIC
SS-2	CL	10798+92	6.0 - 7.5		-	-	-	-	-	-	-	-	-	19.8	-
SS-3	CL	10798+92	8.5 - 10.0											17.5	
SS-4	CL	10804+00	3.5 - 5.0	A-7-6 (9)	47	20	27.4	1.5	29.4	25.2	92.5	69.5	57.2	29.9	-
SS-5	5' LT	10809+00	1.0 - 2.5	-	-	-	-	-	-	-	-	-	-	-	-
SS-6	5' LT	10814+00	8.5 - 10.0	A-4 (0)	35	6	39.7	18.8	23.2	11.6	93.3	61.7	37.8	21.3	-

0041DEL_p10a1

8/17/99

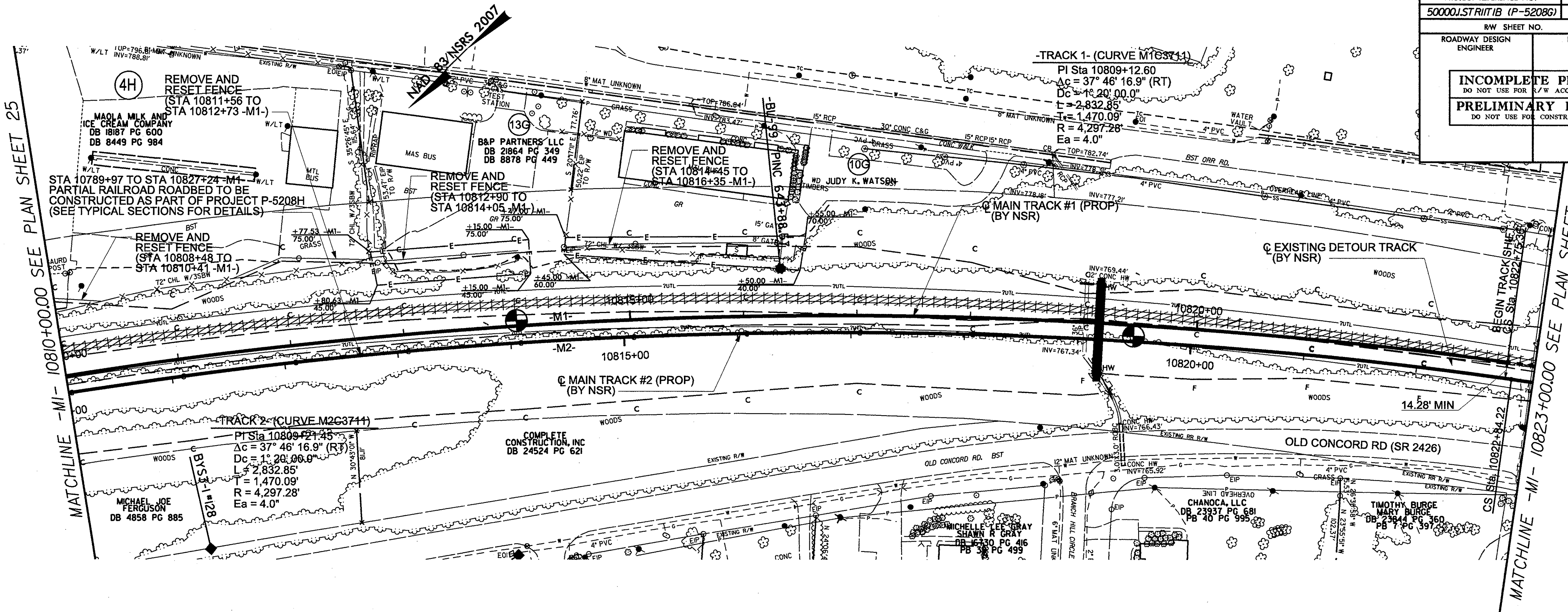
PROJECT REFERENCE NO.	SHEET NO.
50000J.STRIITIB (P-5208G)	26
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

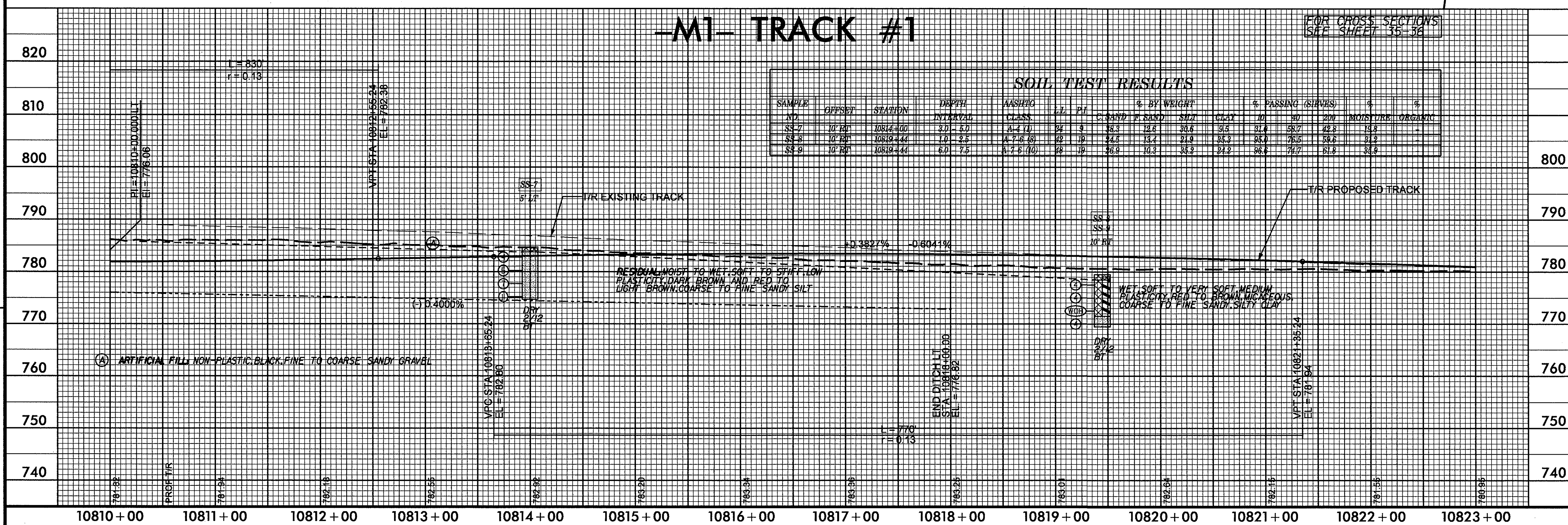
INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

REVISIONS

2. ROW REV - 1/3/203 ADDED PARCEL 9G AND PDE AND TDE ON PARCEL 9G. ADDED PARCEL 10G AND CONSTRUCTION EASEMENT ON 10G.





SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT C. SAND	F. SAND	SILT	CLAY	% PASSING (SIEVES) 10	40	200	% MOISTURE	% ORGANIC
SS-7	10' RT	10814+00	3.0 - 5.0	A-4 (1)	34	9	38.3	12.6	30.6	9.5	31.0	58.7	42.8	19.8	-
SS-8	10' RT	10819+44	1.0 - 2.5	A-7-6 (8)	42	19	24.5	13.4	21.9	35.3	95.0	76.5	59.6	31.2	-
SS-9	10' RT	10819+44	6.0 - 7.5	A-7-6 (10)	48	19	26.9	10.3	35.2	24.2	96.6	74.7	61.8	34.9	-

0041DEL_p10a1

8/17/99

PROJECT REFERENCE NO.	SHEET NO.
50000J.STRIITIB (P-5208G)	27

RW SHEET NO.

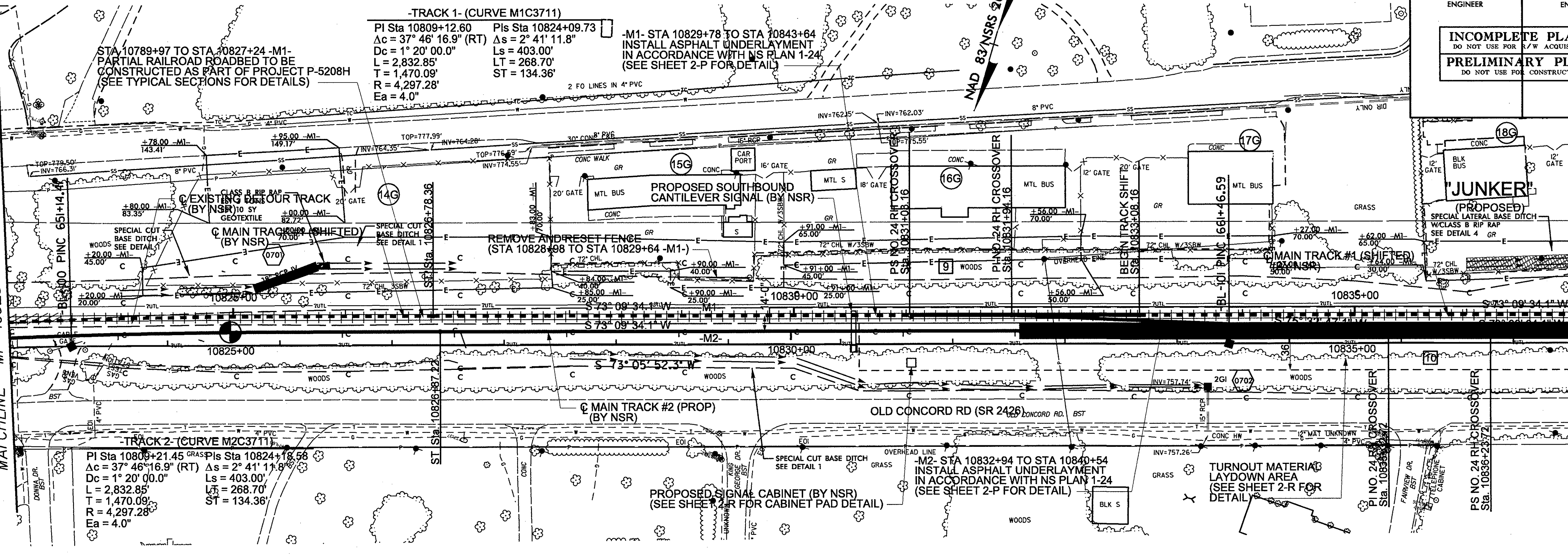
ROADWAY DESIGN ENGINEER

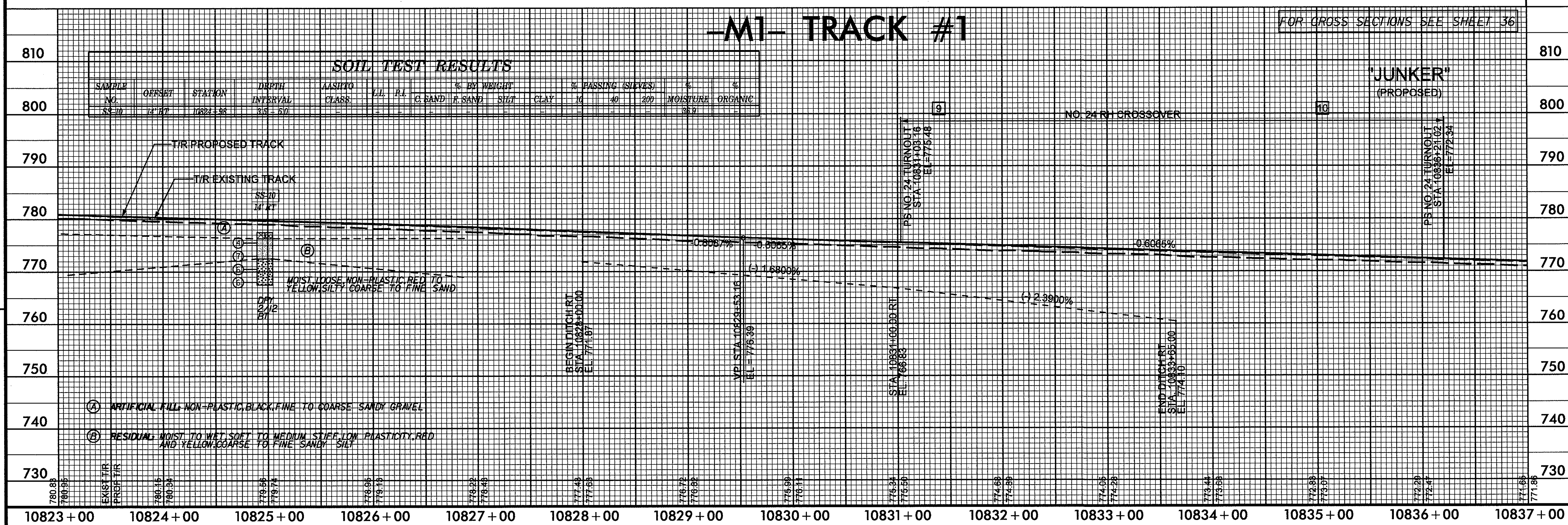
HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

REVISIONS





SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT C. SAND	F. SAND	SILT	CLAY	% PASSING (SIEVES) 10	40	200	% MOISTURE	% ORGANIC
SS-10	14' RT	10824+98	3.5 - 5.0	-	-	-	-	-	-	-	-	-	-	36.9	-

(A) ARTIFICIAL FILL: NON-PLASTIC, BLACK, FINE TO COARSE SANDY GRAVEL

(B) RESIDUAL: MOIST TO WET, SOFT TO MEDIUM STIFF, LOW PLASTICITY, RED AND YELLOW, COARSE TO FINE SANDY SILT

0041DEL_p10a1

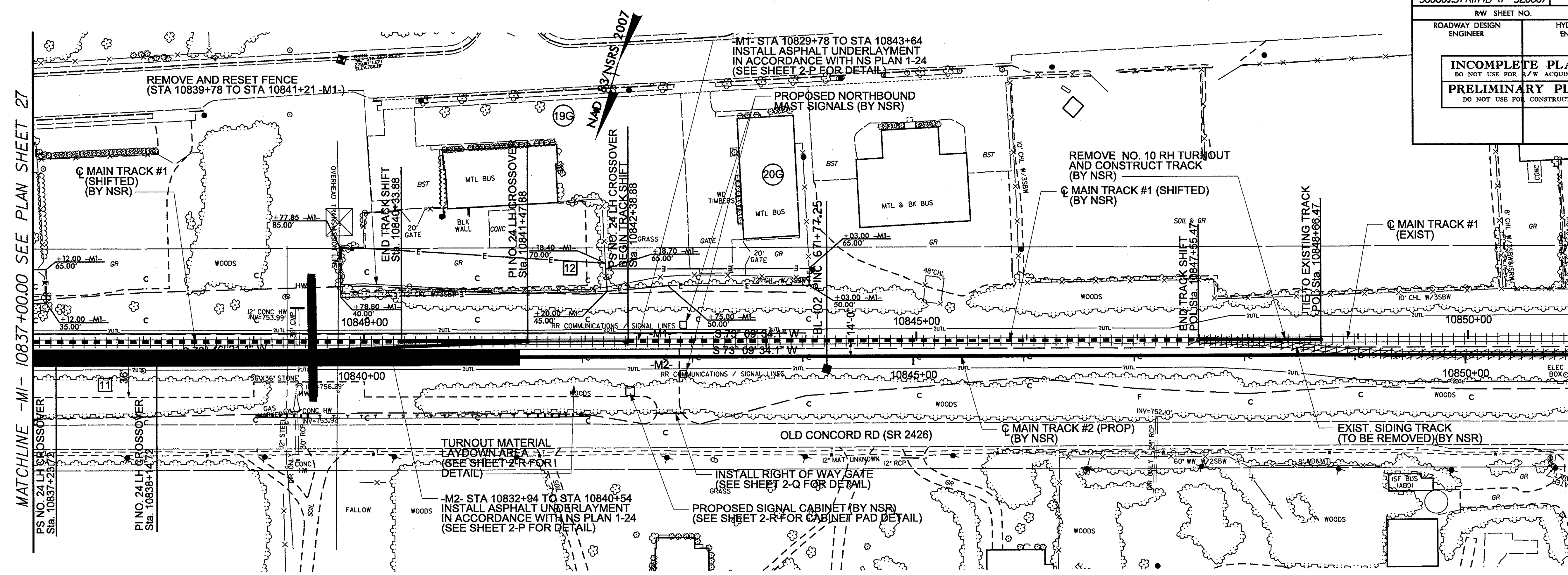
8/17/99

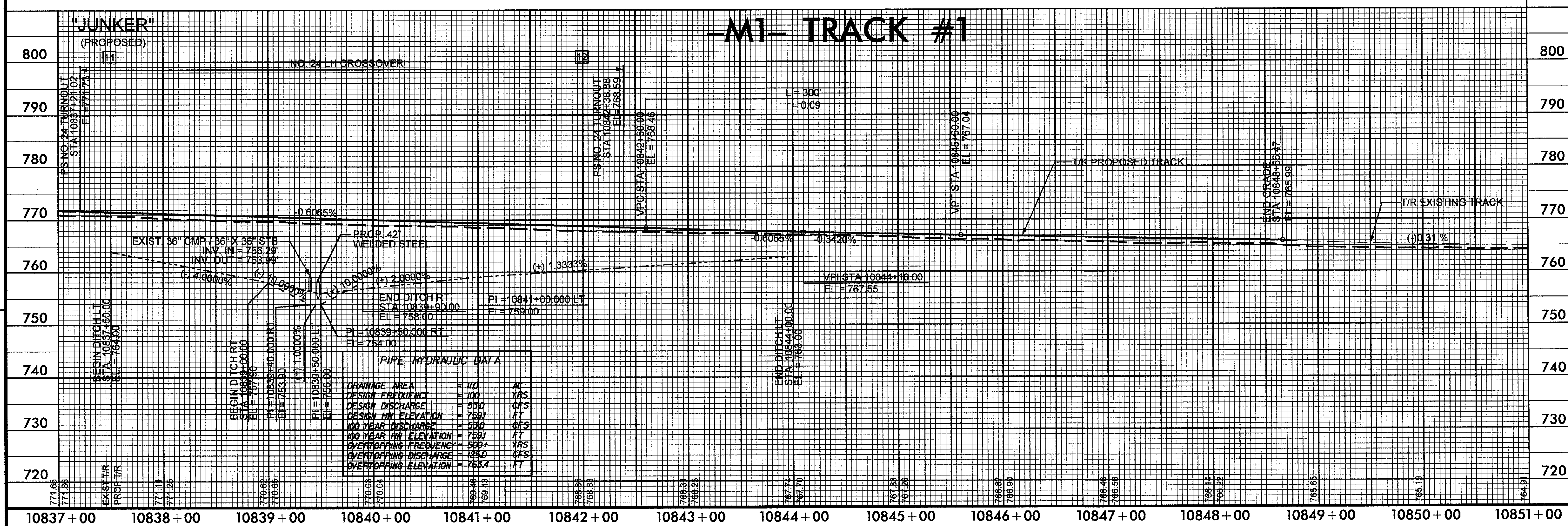
REVISIONS

PROJECT REFERENCE NO.	SHEET NO.
50000JSTRIITIB (P-5208G)	28
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION





PIPE HYDRAULIC DATA

DRAINAGE AREA	=	110	AC
DESIGN FREQUENCY	=	100	YRS
DESIGN DISCHARGE	=	530	CFS
DESIGN HW ELEVATION	=	759.1	FT
100 YEAR DISCHARGE	=	530	CFS
100 YEAR HW ELEVATION	=	759.1	FT
OVERTOPPING FREQUENCY	=	500+	YRS
OVERTOPPING DISCHARGE	=	1250	CFS
OVERTOPPING ELEVATION	=	765.4	FT

0041DEL_p10a1

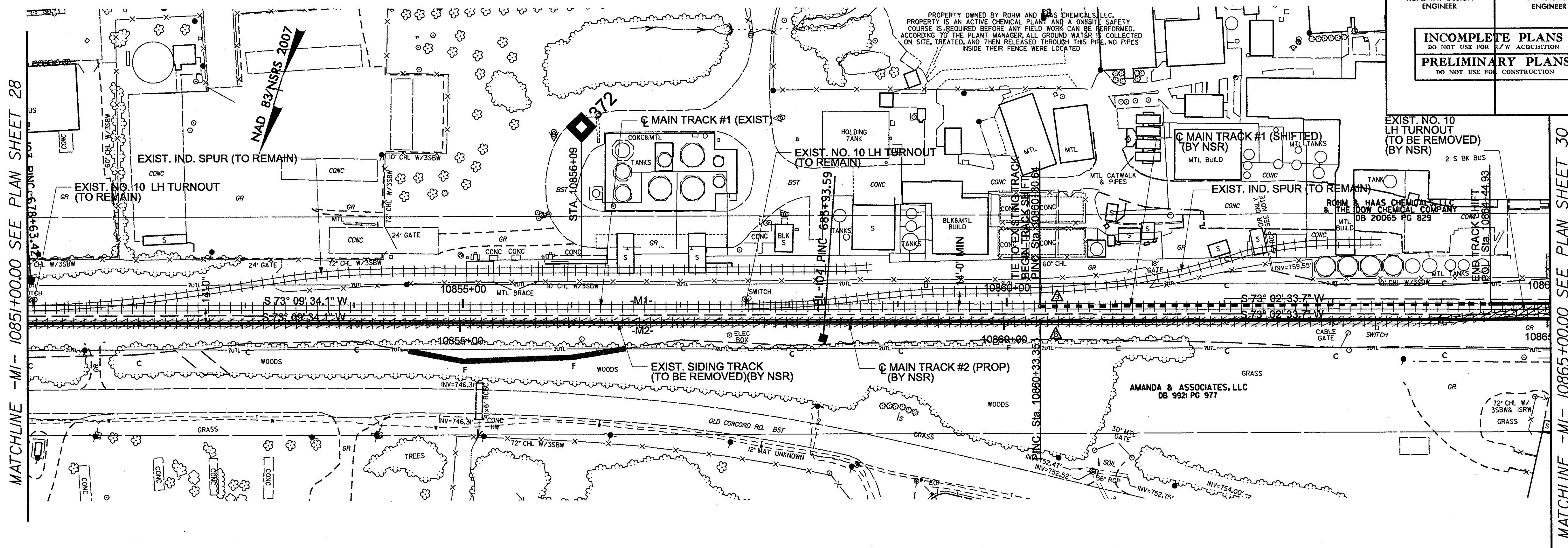
8/17/99

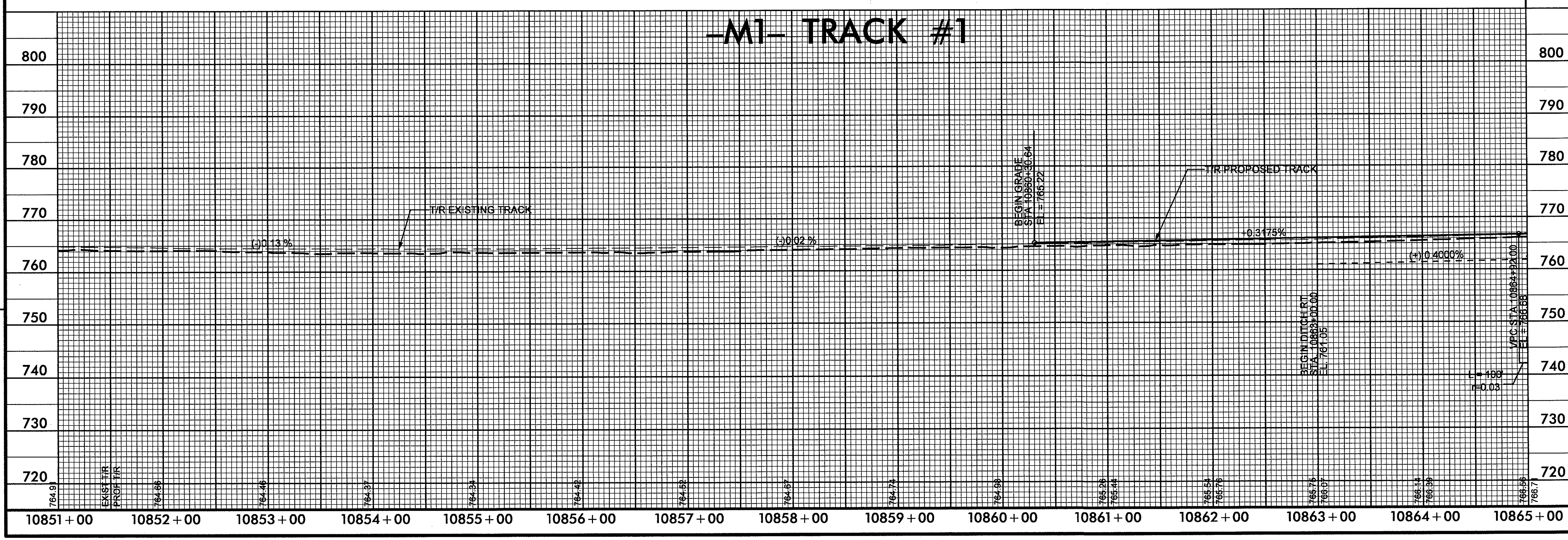
REVISIONS

PROJECT REFERENCE NO.	SHEET NO.
50000J.STRIITIB (P-5208G)	29
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION





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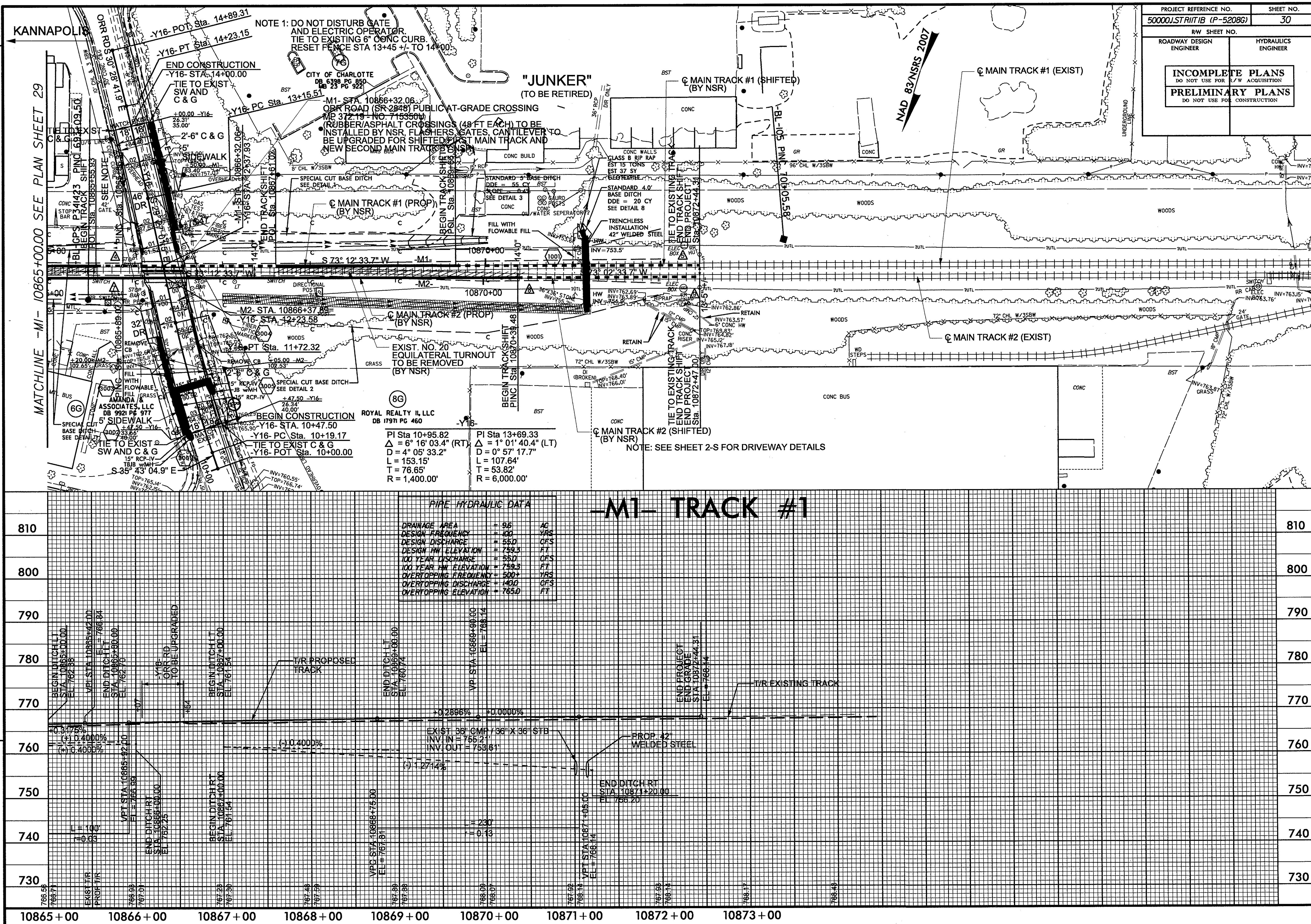


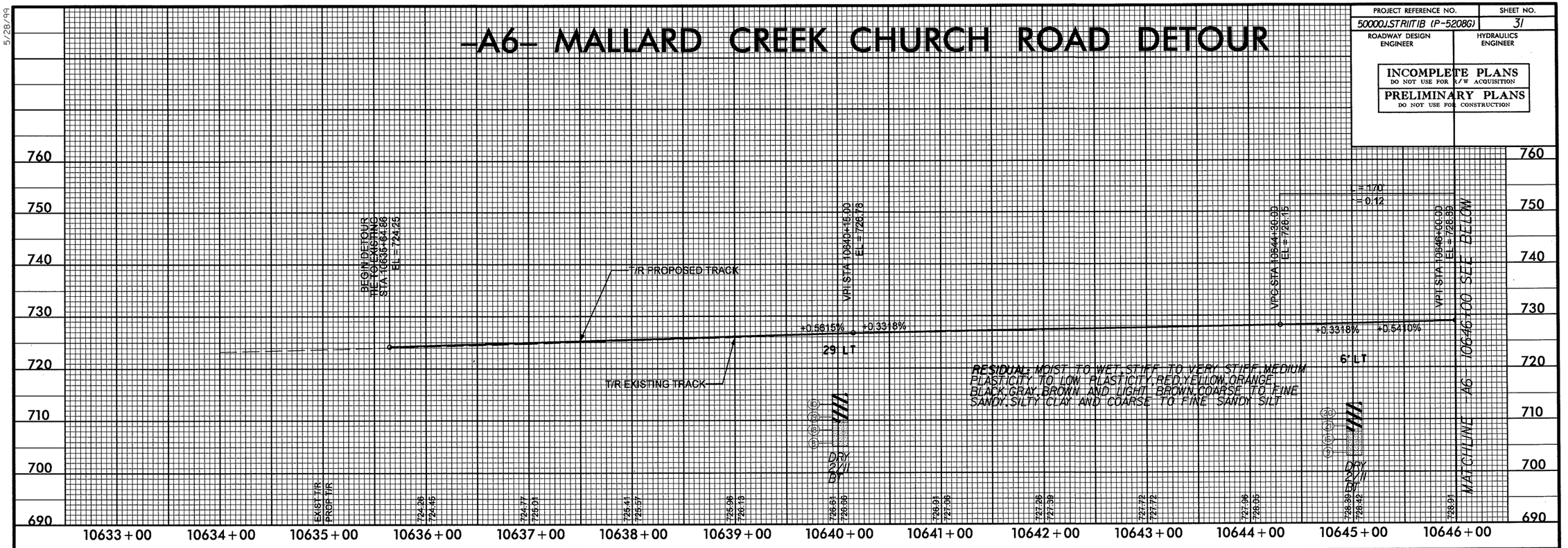
0041DEL_p10a1

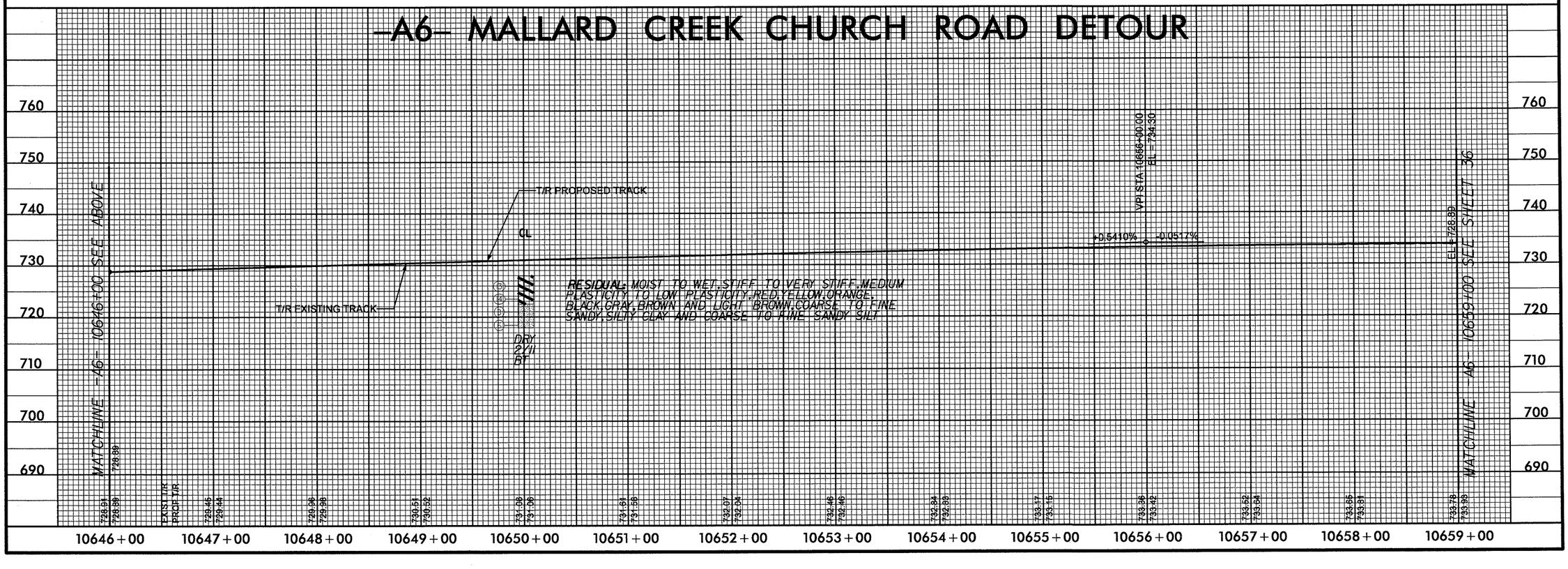
5/28/99

-A6- MALLARD CREEK CHURCH ROAD DETOUR

PROJECT REFERENCE NO.	SHEET NO.
50000JSTRITIB (P-5208G)	31
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

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





0041DEL_p10a1

5/28/99

-A6- MALLARD CREEK CHURCH ROAD DETOUR

PROJECT REFERENCE NO.	SHEET NO.
50000.1.STR.1.B (P-5208G)	32
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

MATCHLINE -A6- 0659+00 SEE SHEET 35

T/R PROPOSED TRACK

T/R EXISTING TRACK

EXIST T/R
DROP T/R

VPI STA 10665+60.00

0.6517%

-0.1983%

END DETOUR
TIE TO EXISTING
STA 10667+74.54
EL = 739.37

733.88 734.00 733.96 734.02 734.00 733.99 734.02 733.94 733.98 733.99 733.77 733.84 733.67 733.71 733.97 733.52 732.16 732.96 732.83 732.26 731.97

750 740 730 720 710 700 690

10659+00 10660+00 10661+00 10662+00 10663+00 10664+00 10665+00 10666+00 10667+00 10668+00 10669+00 10670+00 10671+00 10672+00

SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT C. SAND	% BY WEIGHT F. SAND	% BY WEIGHT SILT	% BY WEIGHT CLAY	% PASSING (SIEVES) 10	% PASSING (SIEVES) 40	% PASSING (SIEVES) 200	% MOISTURE	% ORGANIC
SS-1	10' RT	10793+82	1.0 – 2.5	A-7-6 (5)	49	32	34.5	14.3	15.9	19.4	84.1	57.1	37.7	16.8	–
SS-2	CL	10798+92	6.0 – 7.5	–	–	–	–	–	–	–	–	–	–	19.8	–
SS-3	CL	10798+92	8.5 – 10.0	–	–	–	–	–	–	–	–	–	–	17.5	–

SS-2
SS-3

STA 10798+92

℄ EXISTING TRACK 1 (TO BE REMOVED)
℄ PROPOSED TRACK 1
℄ PROPOSED TRACK 2
DETOUR TRACK

2:1 2:1 2:1 2:1 2:1

(A) (4) (C) (4) (4) (WOH)

WET, LOOSE, NON-PLASTIC GRAY, SILTY, COARSE TO FINE SAND

MOIST, VERY SOFT, MEDIUM MICACEOUS COARSE TO PLASTICITY, RED AND BROWN, FINE SANDY, SILTY CLAY

DRY
2/12
BT

(A) **ARTIFICIAL FILL:** NON-PLASTIC, BLACK, FINE TO COARSE SANDY GRAVEL

(B) MOIST, SOFT, HIGH PLASTICITY, RED AND BLACK, MICACEOUS, FINE TO COARSE SNADY, SILTY CLAY

(C) WET, SOFT, LOW PLASTICITY, RED AND BROWN, MICACEOUS, COARSE TO FINE SANDY SILT

10799+00.00

SS-1

STA 10793+82

℄ EXISTING TRACK 1 (TO BE REMOVED)
℄ PROPOSED TRACK 1
℄ DETOUR TRACK
℄ PROPOSED TRACK 2

1.75:1 2:1 2:1 2:1

(A) (B) (4) (11) (6) (7)

RESIDUAL: MOIST, MEDIUM DENSE TO LOOSE, NON-PLASTIC, TAN AND GRAY, SILTY COARSE TO FINE SAND

DRY
2/12
BT

10794+00.00

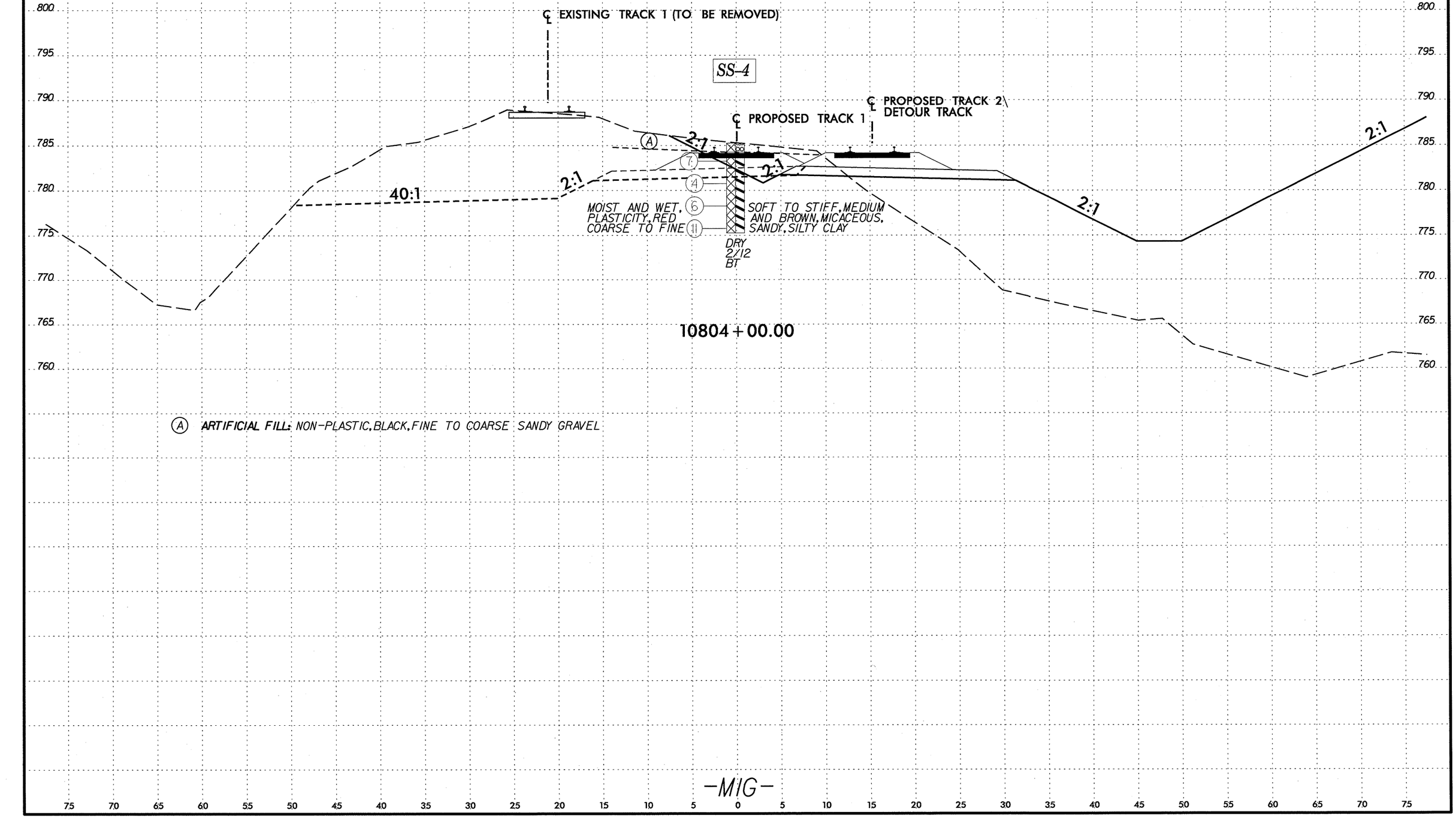
-MIG-

0041DEL_p10a1 8/23/96

0 2.5 5	PROJ. REFERENCE NO.	SHEET NO.
	50000.1.STR11T1B (P5208-G)	34

SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
SS-4	CL	10804+00	3.5 - 5.0	A-7-6 (9)	47	20	27.4	1.5	29.4	25.2	92.5	69.5	57.2	29.9	-



(A) **ARTIFICIAL FILL:** NON-PLASTIC, BLACK, FINE TO COARSE SANDY GRAVEL

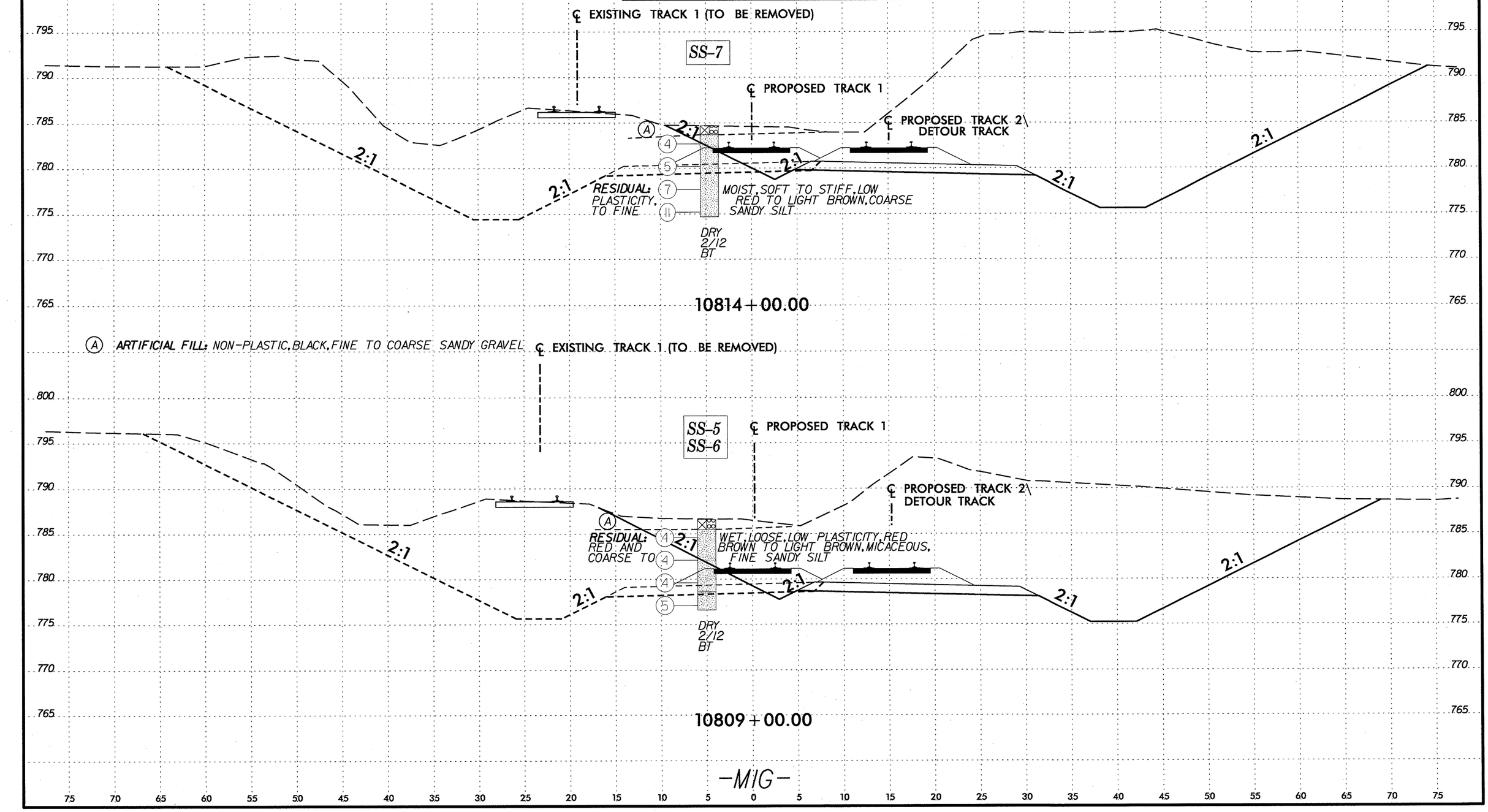
-MIG-

0041DEL_p10a1 8/23/99

0 2.5 5	PROJ. REFERENCE NO.	SHEET NO.
	50000.1.STR11T1B (P-5208G)	35

SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT C. SAND	% BY WEIGHT F. SAND	% BY WEIGHT SILT	% BY WEIGHT CLAY	% PASSING (SIEVES) 10	% PASSING (SIEVES) 40	% PASSING (SIEVES) 200	% MOISTURE	% ORGANIC
SS-5	5' LT	10809+00	1.0 – 2.5	–	–	–	–	–	–	–	–	–	–	–	–
SS-6	5' LT	10814+00	8.5 – 10.0	A-4 (0)	35	6	39.7	18.8	23.2	11.6	93.3	61.7	37.8	21.3	–
SS-7	10' RT	10814+00	3.0 – 5.0	A-4 (1)	34	9	38.3	12.6	30.6	9.5	31.0	58.7	42.8	19.8	–



(A) ARTIFICIAL FILL: NON-PLASTIC, BLACK, FINE TO COARSE SANDY GRAVEL

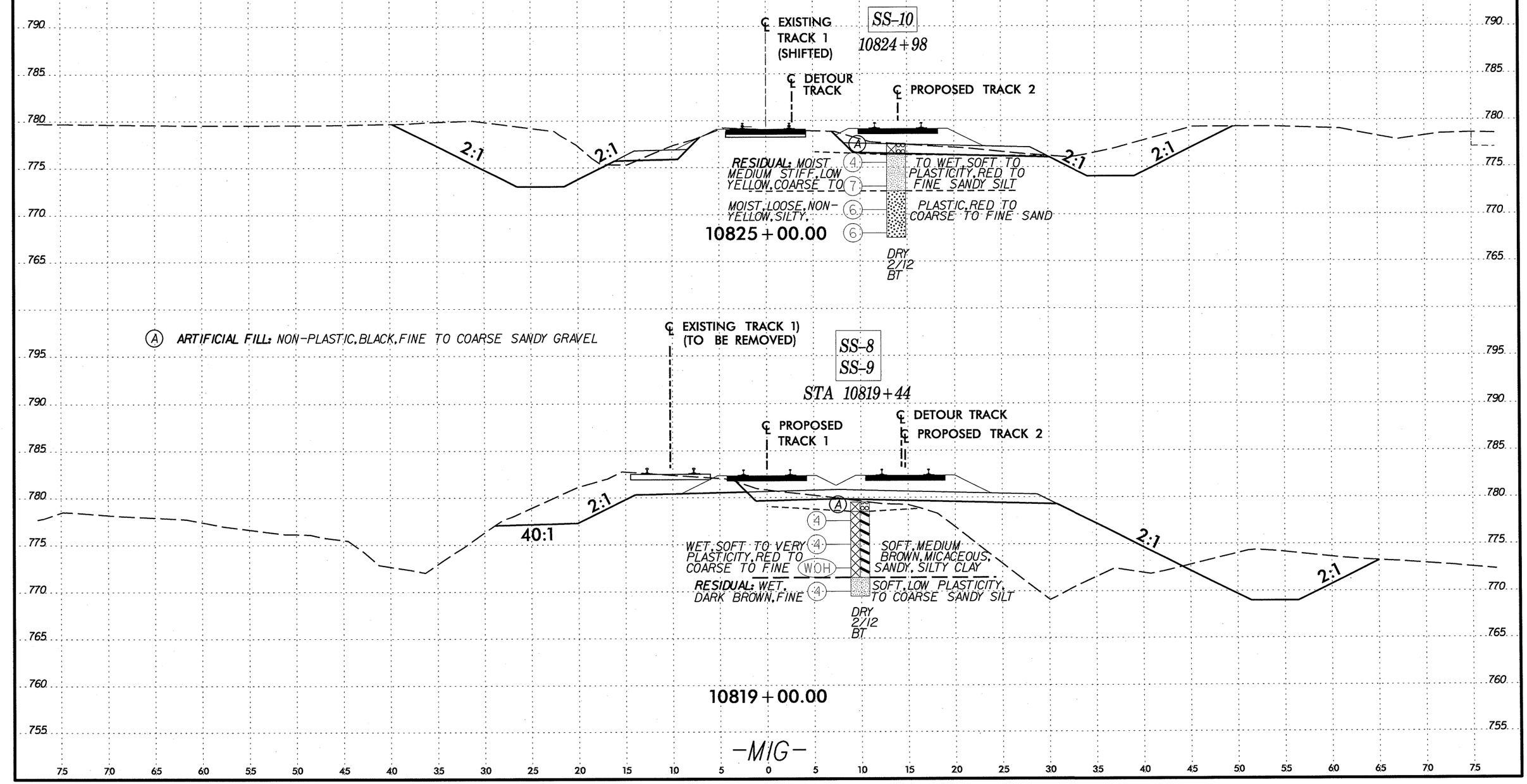
-MIG-

0041DEL_p10a1 9/23/99

0 2,5 5	PROJ. REFERENCE NO.	SHEET NO.
	50000.1.STR11T1B (P-5208G)	36

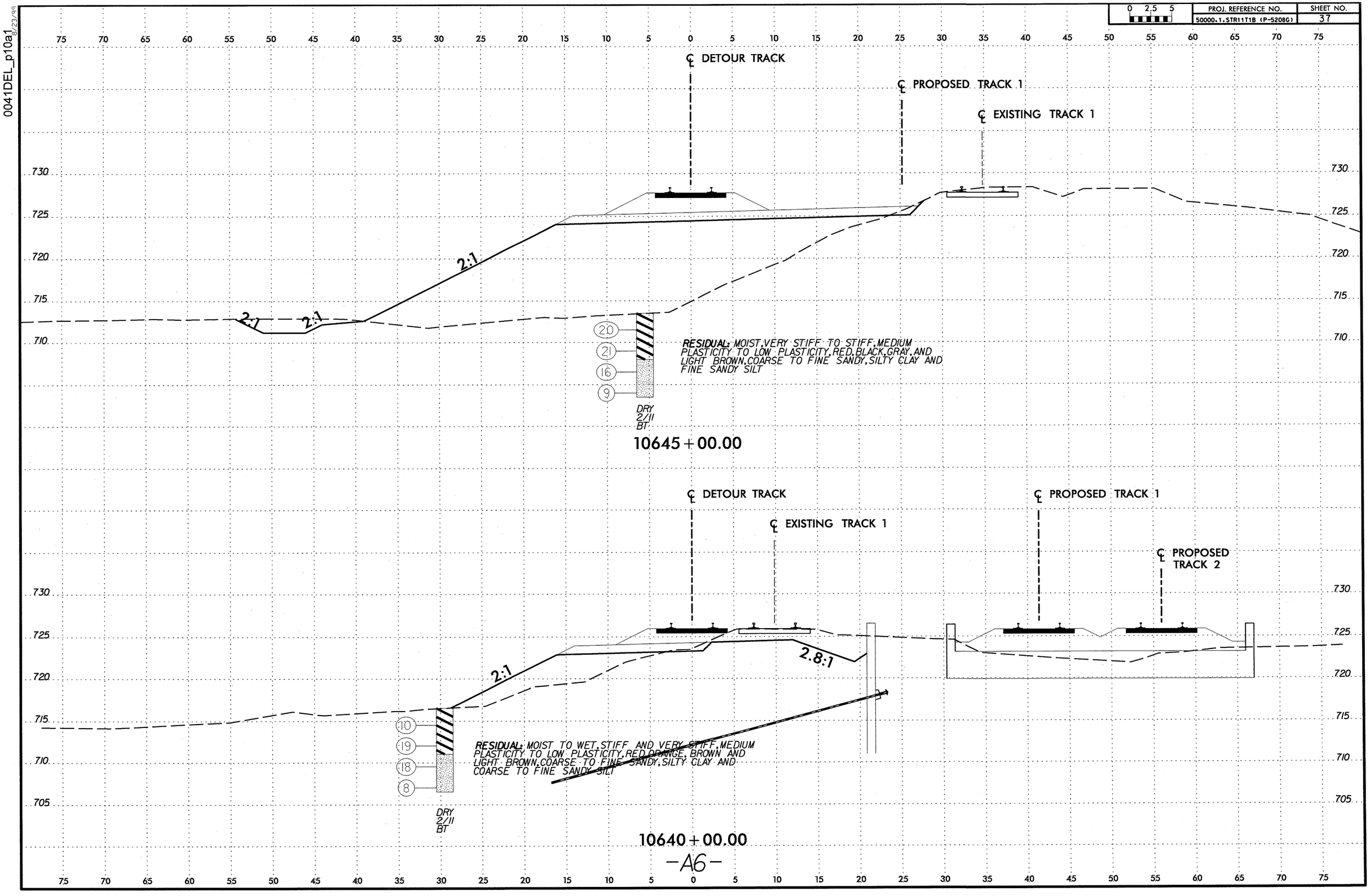
SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
SS-8	10' RT	10819+44	1.0 - 2.5	A-7-6 (8)	42	19	24.5	13.4	21.9	35.3	95.0	76.5	59.6	31.2	-
SS-9	10' RT	10819+44	6.0 - 7.5	A-7-6 (10)	48	19	26.9	10.3	35.2	24.2	96.6	74.7	61.8	35.9	-
SS-10	14' RT	10824+98	3.5 - 5.0	-	-	-	-	-	-	-	-	-	-	36.9	-



0041DEL_p10a1 8/23/99

0 2.5 5	PROJ. REFERENCE NO.	SHEET NO.
	50000.1.STR11T1B (P-5208G)	37



0041DEL_p10a1 8/23/95

0 2.5 5

PROJ. REFERENCE NO.	SHEET NO.
50000.1.STR11T1B (P-5208G)	38

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

℄ DETOUR TRACK

℄ PROPOSED TRACK 1

℄ PROPOSED TRACK 2

℄ EXISTING TRACK 1

735

730

725

720

715

735

X-14

730

725

720

715

2:1

2:1

2:1

2:1

13

14

8

6

DRY
2/11
BT

RESIDUAL: *MOIST, STIFF TO MEDIUM STIFF, MEDIUM PLASTICITY TO LOW PLASTICITY, RED AND YELLOW, COARSE TO FINE SANDY, SILTY CLAY AND COARSE TO FINE SANDY SILT*

10650+00.00

-A6-

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

SUMMARY OF LABORATORY TEST DATA

PROJECT NO. 50000.1.STR11T1B (P-5208G)
FA NO. N/A
COUNTY: MECKLENBURG
BRIDGE ON NCRR/NS MAINLINE OVER MALLARD CREEK CHURCH ROAD

						Atterberg Limits			Gradation Results							
Boring Number	Sample Depth (ft.)	Sample No.*	Natural Moisture Content (%)	AASHTO Class (Group Index)	N-Value (blows/ ft.)	L.L.	P.L.	P.I.	Pass #10 Sieve	Pass #40 Sieve	Pass #200 Sieve	Retained #270 Sieve	Coarse Sand (%)	Fine Sand (%)	Silt (%)	Clay (%)
B-1	1.0 – 2.5	SS-1	16.8	A-7-6 (5)	4	49	17	32	84.1	57.1	37.7	64.7	34.5	14.3	15.9	19.4
B-2	6.0 – 7.5	SS-2	19.8	--	4	--	--	--	--	--	--	--	--	--	--	--
B-2	8.5 – 10.0	SS-3	17.5	--	WOH	--	--	--	--	--	--	--	--	--	--	--
B-3	3.5 – 5.0	SS-4	29.9	A-7-6 (9)	4	47	27	20	92.5	69.5	57.2	45.4	27.4	10.5	29.4	25.2
B-4	1.0 – 2.5	SS-5	26.9	--	4	--	--	--	--	--	--	--	--	--	--	--
B-4	8.5 – 10.0	SS-6	21.3	A-4 (0)	5	35	29	6	93.3	61.7	37.8	65.1	39.7	18.8	23.2	11.6
B-5	3.5 – 5.0	SS-7	19.8	A-4 (1)	5	34	25	9	91.0	58.7	42.8	59.9	38.3	12.6	30.6	9.5
B-6	1.0 – 2.5	SS-8	31.2	A-7-6 (8)	4	42	23	19	95.0	76.5	59.6	42.8	24.5	13.4	21.9	35.3
B-6	6.0 – 7.5	SS-9	35.9	A-7-6 (10)	WOH	48	29	19	96.6	74.7	61.8	40.6	26.9	10.3	35.2	24.2
B-7	3.5 – 5.0	SS-10	36.9	--	7	--	--	--	--	--	--	--	--	--	--	--

SS = Split-Barrel Sample (ASTM-D-1586) ST = Shelby Tube (Undisturbed) Sample
S = Grab Sample
NP -- Non Plastic NA-- Non Applicable

Lab Technician: Joshua D. Fregosi

NCDOT Certification No.: 111-05-1203

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	50000.1.STR08T3 (P-5208C)	1	39

STATE PROJ. NO.	F. A. PROJ. NO.	DESCRIPTION
		P.E.
		R/W & UTIL.

ID: P-5208C

CONTRACT: _____

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

CONTENTS

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RAIL DIVISION

ROADWAY SUBSURFACE INVESTIGATION

PROJ. REFERENCE NO. *50000.1.STR08T3* F.A. PROJ. _____

COUNTY *CABARRUS*

PROJECT DESCRIPTION *NCRR/NS MAINLINE HAYDOCK TO JUNKER RAILROAD ROADBED (MP 361.9 TO MP 365.5)*

INVENTORY

CAUTION NOTICE

THE SUBSURFACE INFORMATION AND THE SUBSURFACE INVESTIGATION ON WHICH IT IS BASED WERE MADE FOR THE PURPOSE OF STUDY, PLANNING, AND DESIGN, AND NOT FOR CONSTRUCTION OR PAY PURPOSES. THE VARIOUS FIELD BORING LOGS, ROCK CORES, AND SOIL TEST DATA AVAILABLE MAY BE REVIEWED OR INSPECTED IN RALEIGH BY CONTACTING THE N.C. DEPARTMENT OF TRANSPORTATION, GEOTECHNICAL ENGINEERING UNIT AT (919) 707-6850. NEITHER THE SUBSURFACE PLANS AND REPORTS, NOR THE FIELD BORING LOGS, ROCK CORES, OR SOIL TEST DATA ARE PART OF THE CONTRACT.

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

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

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INVESTIGATED BY *TERRACON CONSULTANTS*

CHECKED BY *CORLEY, D.J.*

SUBMITTED BY *TERRACON CONSULTANTS*

DATE *JUNE 2013*

NORTH CAROLINA PROFESSIONAL SEAL 21914 ENGINEER DAVID J. CORLEY 6/1/13

DRAWN BY: *ALEXANDER, M.J.*

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

PROJECT REFERENCE NO.	SHEET NO
50000.1.STR08T3 (P-5208C)	2

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

RAIL DIVISION

SUBSURFACE INVESTIGATION

SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

SOIL DESCRIPTION

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

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

SOIL LEGEND AND AASHTO CLASSIFICATION

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

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

CONSISTENCY OR DENSENESS

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

TEXTURE OR GRAIN SIZE

U.S. STD. SIEVE SIZE	4	10	40	60	200	270
OPENING (MM)	4.76	2.00	0.42	0.25	0.075	0.053

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

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

SOIL MOISTURE - CORRELATION OF TERMS

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

PLASTICITY

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

COLOR

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

GRADATION

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

ANGULARITY OF GRAINS

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

MINERALOGICAL COMPOSITION

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

COMPRESSIBILITY

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

PERCENTAGE OF MATERIAL

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

GROUND WATER

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

MISCELLANEOUS SYMBOLS

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

ABBREVIATIONS

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

SAMPLE ABBREVIATIONS

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

EQUIPMENT USED ON SUBJECT PROJECT

DRILL UNITS:
- [ ] MOBILE B-___
- [ ] BK-51
- [ ] CME-45C
- [ ] CME-550
- [ ] PORTABLE HOIST
- [X] CME 75 (TER6847)
- [ ] _____

ADVANCING TOOLS:
- [ ] CLAY BITS
- [ ] 6" CONTINUOUS FLIGHT AUGER
- [X] 8" HOLLOW AUGERS
- [ ] HARD FACED FINGER BITS
- [ ] TUNG.-CARBIDE INSERTS
- [X] CASING [ ] W/ ADVANCER
- [ ] TRICONE _____" STEEL TEETH
- [X] TRICONE 2 15/16" TUNG.-CARB.
- [ ] CORE BIT
- [ ] _____

HAMMER TYPE:
- [X] AUTOMATIC [ ] MANUAL

CORE SIZE:
- [ ] -B_____
- [ ] -N_____
- [ ] -H_____

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

ROCK DESCRIPTION

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

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

WEATHERING

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

ROCK HARDNESS

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

FRACTURE SPACING

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

BEDDING

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

INDURATION

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

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

TERMS AND DEFINITIONS

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

AQUIFER - A WATER BEARING FORMATION OR STRATA.

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

ARGILLACEOUS - APPLIED TO ALL ROCKS OR SUBSTANCES COMPOSED OF CLAY MINERALS, OR HAVING A NOTABLE PROPORTION OF CLAY IN THEIR COMPOSITION, AS SHALE, SLATE, ETC.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT) - NUMBER OF BLOWS (N OR BPF) OF A 140 LB. HAMMER FALLING 30 INCHES REQUIRED TO PRODUCE A PENETRATION OF 1 FOOT INTO SOIL WI A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER. SPT REFUSAL IS PENETRATION EQUAL TO OR LES THAN 0.1 FOOT PER 60 BLOWS.

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

STRATA ROCK QUALITY DESIGNATION (SRQD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS WITHIN A STRATUM EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE.

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

BENCH MARK: ELEVATIONS TAKEN FROM PROVIDED TIN FILE

ELEVATION: F

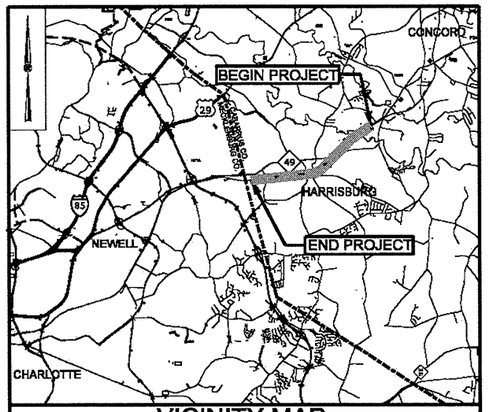
NOTES:
FIAD: FILLED IN AFTER DRILLING

REVISED 09/23/09

TIP PROJECT: P-5208C

CONTRACT:

SEE SHEET 1A FOR INDEX OF SHEETS



VICINITY MAP

NAD 83/ NSRS 2007

NCDOT
RAIL DIVISION

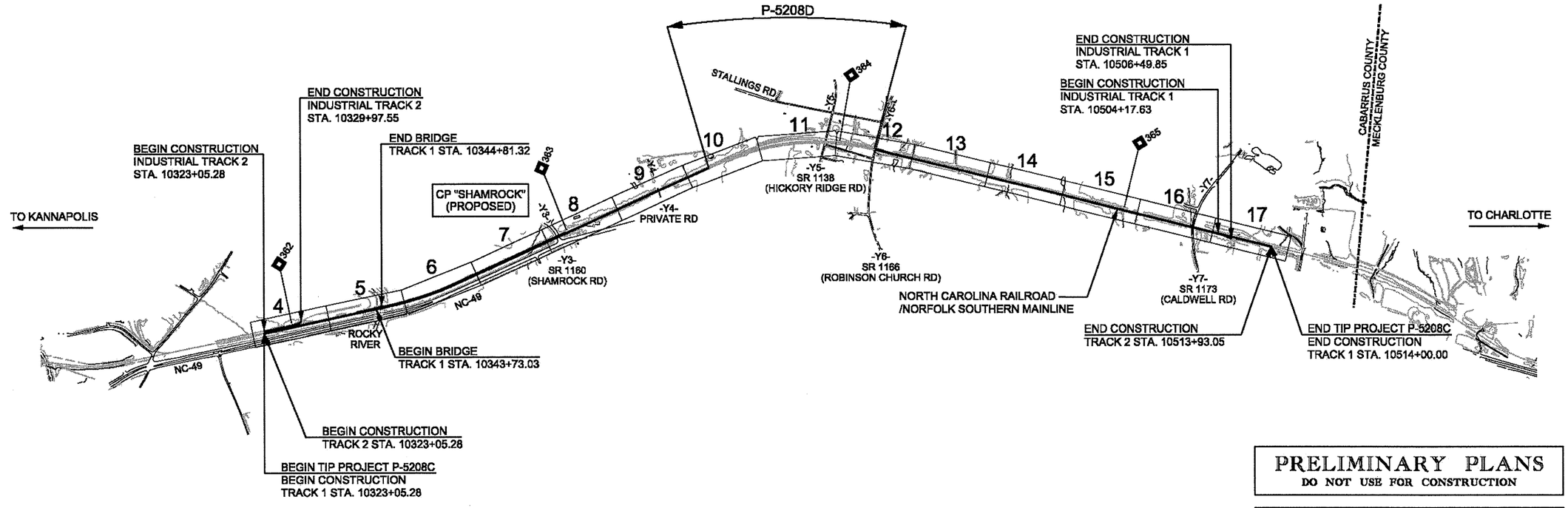
CABARRUS COUNTY

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	P-5208C	2A	39

STATE PROJ. NO.	F.A. PROJ. NO.	DESCRIPTION
50000.1.STR07T1B		P.E./UTIL P.E.
50000.1.STR0BT3		P.E./UTIL P.E.
43219.2.STR09P5208		R.O.W.
50000.3.STR03T4A		CONST./UTIL CONST.

PROJECT TITLE: NCRR/NS MAINLINE HAYDOCK TO JUNKER RAILROAD ROADBED (MP 361.9 TO MP 365.5)

TYPE OF WORK: GRADING, DRAINAGE, PAVING, STRUCTURES, RETAINING WALLS

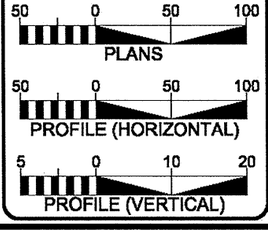


CLEARING ON THIS PROJECT SHALL BE PERFORMED TO THE LIMITS ESTABLISHED BY METHOD III
PART OF THIS PROJECT IS WITHIN HARRISBURG MUNICIPAL BOUNDARIES

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

SUBMITTAL: RIGHT-OF-WAY
DATE: SEPTEMBER 28, 2012

GRAPHIC SCALES



PROJECT LENGTH

LENGTH OF RAIL TIP PROJECT	3.595 MILES
LENGTH OF STRUCTURES TIP PROJECT	0.021 MILES
TOTAL LENGTH OF TIP PROJECT	3.616 MILES

Prepared in the Office of:
HNTB
HNTB NORTH CAROLINA, P.C.
343 E. Six Forks Road, Suite 200
Raleigh, North Carolina 27609
NC License No: C-1554

2012 STANDARD SPECIFICATIONS

RIGHT OF WAY DATE: SEPTEMBER 2012

LETTING DATE: JULY 16, 2013

COREY VERNIER, P.E.
RAIL PROJECT ENGINEER
ENRICO ROQUE, P.E.
RAIL PROJECT DESIGN ENGINEER
DAVID HAWKINS, P.E.
STRUCTURE PROJECT ENGINEER
JAMES BYRD, P.E.
HYDRAULICS PROJECT ENGINEER
BRAD SYMTHE, P.E.
NCDOT PROJECT MANAGER

RAIL ENGINEER
P.E.
SIGNATURE:

HYDRAULICS ENGINEER
P.E.
SIGNATURE:

NC DEPARTMENT OF TRANSPORTATION
RAIL DIVISION
ENGINEERING AND SAFETY BRANCH
CAPITAL YARD
1556 MAIL SERVICE CENTER
RALEIGH, NC 27699-1556

Terracon

June 7, 2013

State of N.C. Department of Transportation
Rail Division
Geotechnical Engineering Unit
1556 Mail Service Center
Raleigh, North Carolina 27699-1556

Attn: Mr. Brad Symthe, PE

Re: Geotechnical Report - Inventory
NCRR/NS Mainline Haydock to Junker Railroad Roadbed
MP 361.9 to MP 365.5
Cabarrus County, North Carolina
Project No. 50000.1.STR08T3
TIP No. P-5208C
Terracon Project No. 71125063

Dear Mr. Symthe:

Terracon Consultants, Inc. (Terracon) has completed the geotechnical subsurface exploration for the above referenced project. This report details the areas investigated, methods used to perform our investigation, subsurface materials encountered, and summarizes our lab testing.

We appreciate the opportunity to be of service to you on this project. If you have any questions concerning this report, please contact us.

Sincerely,
Terracon Consultants, Inc.

Christopher R. Briggs, P.E.
Geotechnical Project Engineer

David J. Corley, P.E.
Geotechnical Department Manager

NORTH CAROLINA PROFESSIONAL SEAL 21914 4/7/13 ENGINEER DAVID J. CORLEY

Terracon Consultants, Inc. 2020 Starita Road, Suite E Charlotte, North Carolina 28273
NC License No. F-0869 P [704] 509 1777 F [704] 509 1888 terracon.com

Project Description

The proposed NCRR/NS Mainline Haydock to Junker Railroad Roadbed project includes the construction of approximately 3.6 miles of a second mainline track between MP 361.9 and MP 365.5 (-TRK1- Station 10323+05 to 10514+00). This project will consist primarily of the construction of a new second mainline track parallel to the existing NCRR/NS mainline track. Between approximately MP 363.53 and MP 694.15 the curve for both the existing mainline track and the proposed second mainline track will be realigned to the north of the existing alignment. The rail project will be constructed through areas that are currently occupied by residences, businesses and warehouses. Several at-grade road crossings will be either reconstructed or closed permanently along the project alignment to accommodate the new second mainline track. Additionally, the project includes a 108 foot single span bridge over Rocky River between -TRK1- Station 10373+73 and 10344+81.

Terracon's field investigation was performed from November to December of 2012. The soil borings were advanced with a truck- or track-mounted rotary drill rig. The subsurface materials encountered in our borings were classified in the field and representative samples were collected and transported to our laboratory in Charlotte for further testing and evaluation.

The following alignment was investigated by performing borings at locations that were selected and approved by HNTB. Subsurface profiles of this alignment are included in this report.

Line	Station
-TRK1-	10323+05 to 10514+00

Areas of Special Geotechnical Interest

1) Highly plastic clays (PI>25) were encountered within or near 3' of proposed subgrade at the following locations.

Line	Station
-TRK1-	10417+00 to 10419+00

2) Artificial fill was encountered at the following locations.

Line	Station
-TRK1-	10342+00 to 10415+00
-TRK1-	10426+00 to 10508+00

3) Soft/loose soils were encountered within or near 3' of proposed subgrade at the following locaiton.

Line	Station
-TRK1-	10431+50 to 10440+00

4) Very dense / hard residual soils were encountered within areas of proposed cut at the following locations.

Line	Station
-TRK1-	10420+00 to 10422+70

Physiography and Geology

The project corridor is located within the Piedmont Physiographic Province. Topography along the project varies from nearly flat to moderately sloping and exhibits good surface drainage. Elevations along the project range from 568 to 656 feet.

The project corridor is underlain by the Charlotte Belt. The soils of this belt are typically characterized by dark and coarse-grained gabbro and metagabbro rock. Epidote is common, and biotite and spinel may be present as well.

Groundwater

Ground water data was collected during November and December 2012, during a time of normal precipitation. Ground water elevations, where encountered, ranged from 530 to 556.5 feet along the project corridor.

Soil and Rock Properties

Soils within the project area include roadway embankment fill, artificial fill, alluvial, and Piedmont residual soils of the Charlotte Belt.

Roadway embankment fill was encountered in the soil borings advanced at -TRK1- Stations 10342+38, 10345+67, 10378+58, 10427+66, 10430+62, 10432+23, 10435+09, and 10439+36. The roadway embankment fill consists of sand with varying amounts of silt (A-2-4 and A-3), silt with varying amounts of sand (A-4) and clay with varying amounts of sand (A-6). Artificial fill was encountered in the soil borings advanced at -TRK1- Stations 10343+50, 10344+97, 10363+70, 10372+82, 10374+80, 10376+79, 10413+49, 10455+25, 10498+75, and 10507+57. The artificial fill consists of sand with varying amounts of silt (A-1-b, A-2-4 and A-3), sand with varying amounts of clay (A-2-7), silt with varying amounts of sand (A-4) and clay with varying amounts of sand (A-6).

Alluvial soils were encountered at the existing NCRR/NS Rocky River Bridge. The alluvial material consists of sand with little silt (A-2-4). The alluvial soils were encountered underlying the artificial fill in the boring advanced at -TRK1- Station 10343+50.

The Piedmont soils in the area belong to the Charlotte Belt. Piedmont residual soils were encountered underlying the roadway embankment and the artificial fill in each of the above mentioned soil borings with the exception of the soil boring advanced at -TRK1- Station 10343+50. Residual soils were also encountered in the soil borings advanced at -TRK1- Stations 10416+33, 10418+80, 10421+18 and 10424+18. The residual soils encountered in the borings consist predominantly of sands with varying amounts of silt (A-2-4 and A-3), sands with varying amounts of clay (A-2-7), silts with varying amounts of sand (A-4), and clay with varying amounts of sand (A-7-5).

Atterberg testing was performed on soil samples classified as A-2-4, A-2-7, A-4 and A-7-5. Plasticity Index (PI) values range from non-plastic (NP) to 9 for A-2-4 soils, 13 to 21 for A-2-7 soils, NP for A-4 soils and 14 for A-7-5 soils. Atterberg testing was not performed on encountered soils classified as A-1-b, A-3 or A-6; however typical PI values for these soils are NP for A-1-b and A-3 soils, and at least 11 or higher for A-6 soils.

Weathered rock was encountered underlying the roadway embankment in the soil test boring advanced at -TRK1- Station 10345+67, and underlying the residual soils in the soil test borings advanced at -TRK1- Stations 10342+38, 10372+82, 10376+79 and 10498+75. The weathered rock encountered in the borings consists predominantly of weathered metagabbro rock. In addition to the weathered rock encountered along the alignment, very dense or hard residual soils were encountered that we expect will be similar to weathered rock when excavated. These very dense/hard residual soils were encountered in the soil test borings advanced at -TRK1- Stations 10378+58, 10416+33, 10421+18, 10427+66 and 10430+62.

Standard penetration test refusal and auger refusal was encountered underlying the residual soils and weathered rock in the soil test borings advanced at -TRK1- Stations 10342+38, 10344+97, 10345+67, 10374+80 and 10376+79, and underlying alluvial soils in the soil test boring advanced at -TRK1- Station 10343+50. SPT refusal typically indicates the elevation of crystalline rock, which is expected to be gabbro and metagabbro in the area of the alignment. Elevations of crystalline rock encountered range from approximately 509.8 feet to 559.5 feet.

PROJECT REFERENCE NO.	SHEET NO
50000.I.STR08T3 (P-5208C)	3B

EARTHWORK BALANCE SHEET

PROJECT REFERENCE NO.	SHEET NO.
50000.1.STR08T3 (P-5208C)	4
RW SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

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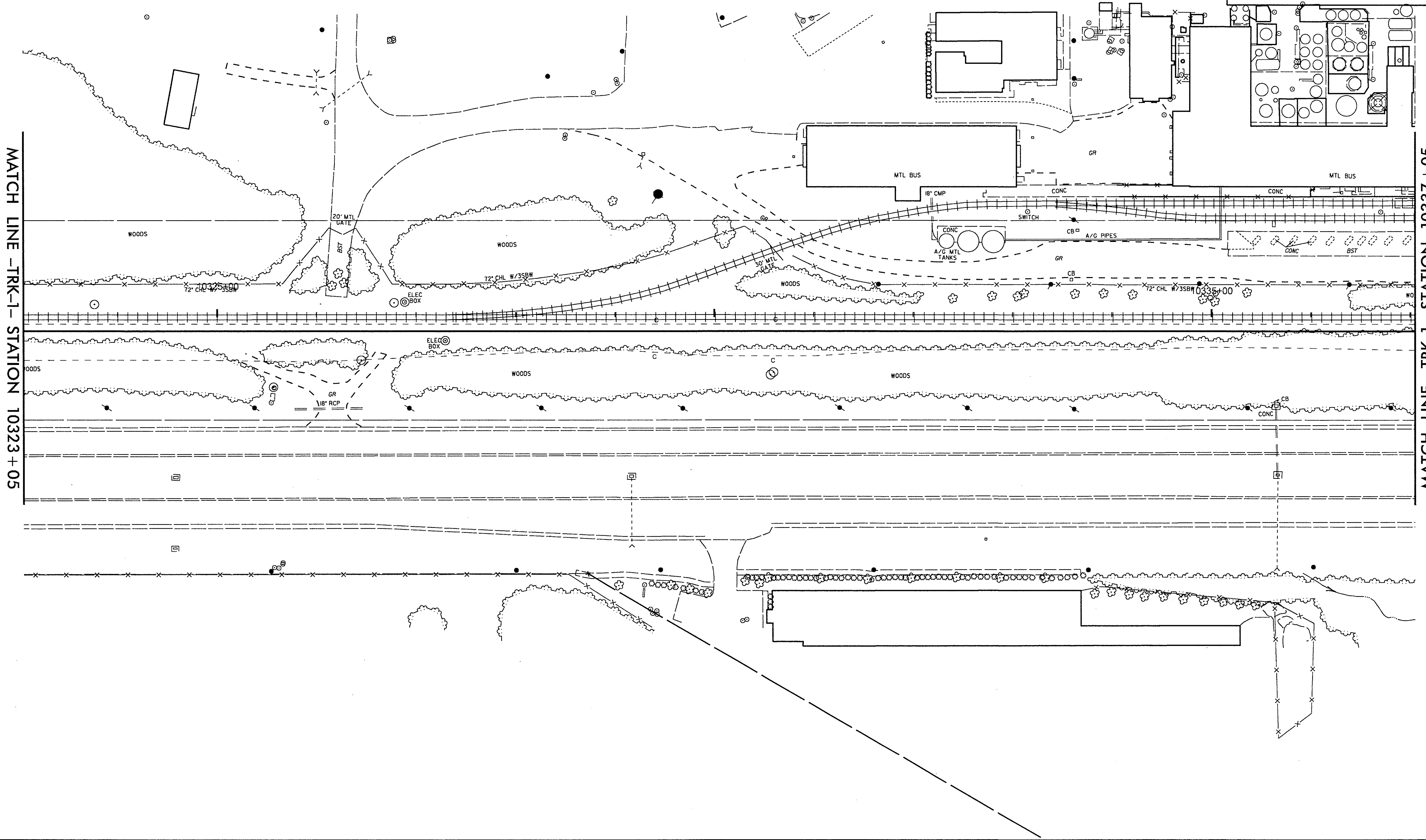
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION



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PROJECT REFERENCE NO.	SHEET NO.
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R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

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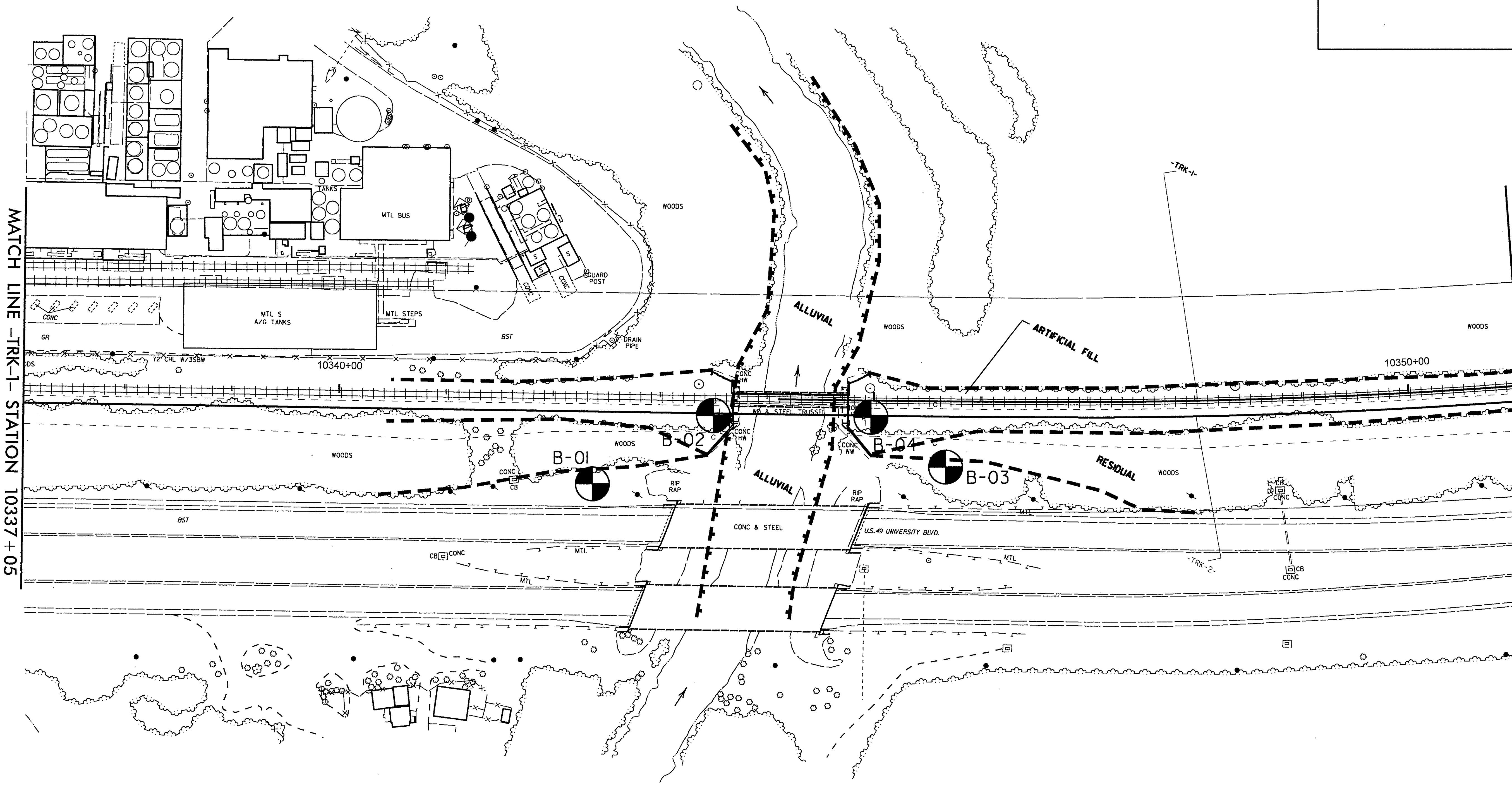
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION



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PROJECT REFERENCE NO.	SHEET NO.
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R/W SHEET NO.	
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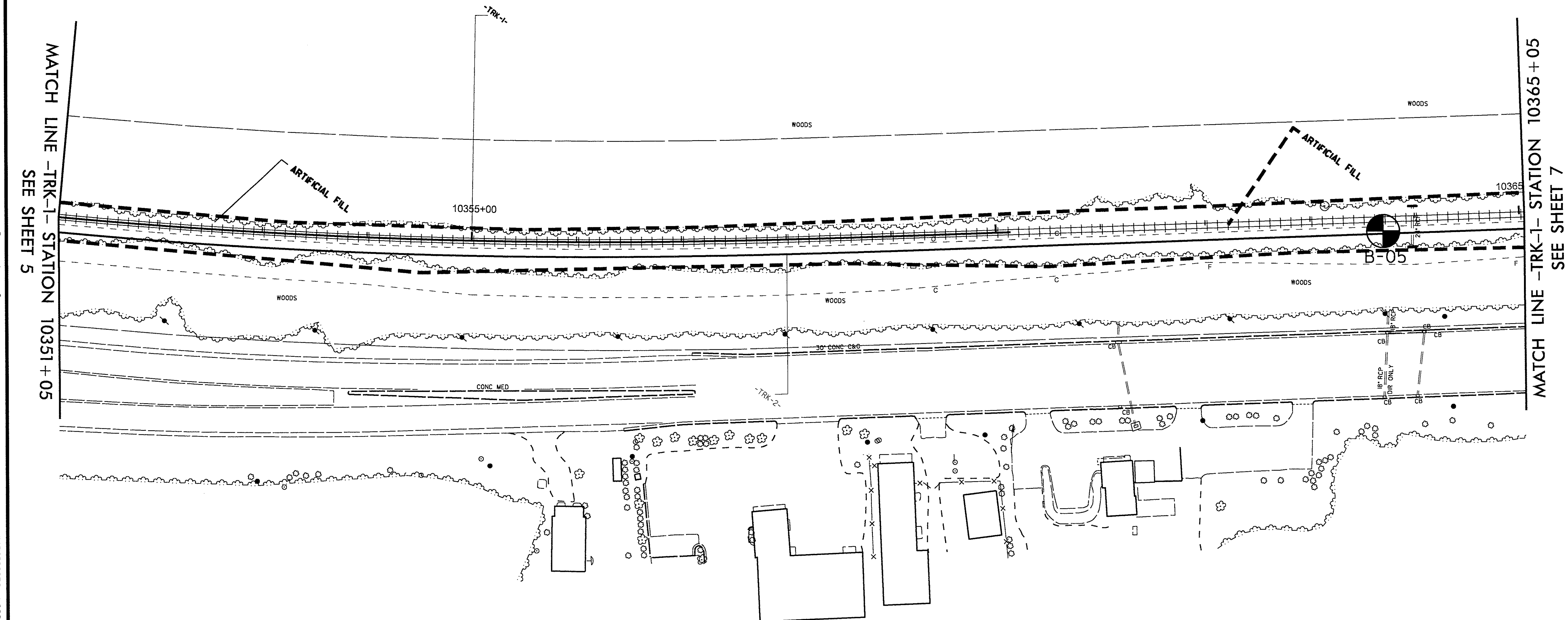
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION



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PROJECT REFERENCE NO.	SHEET NO.
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RW SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

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PRELIMINARY PLANS
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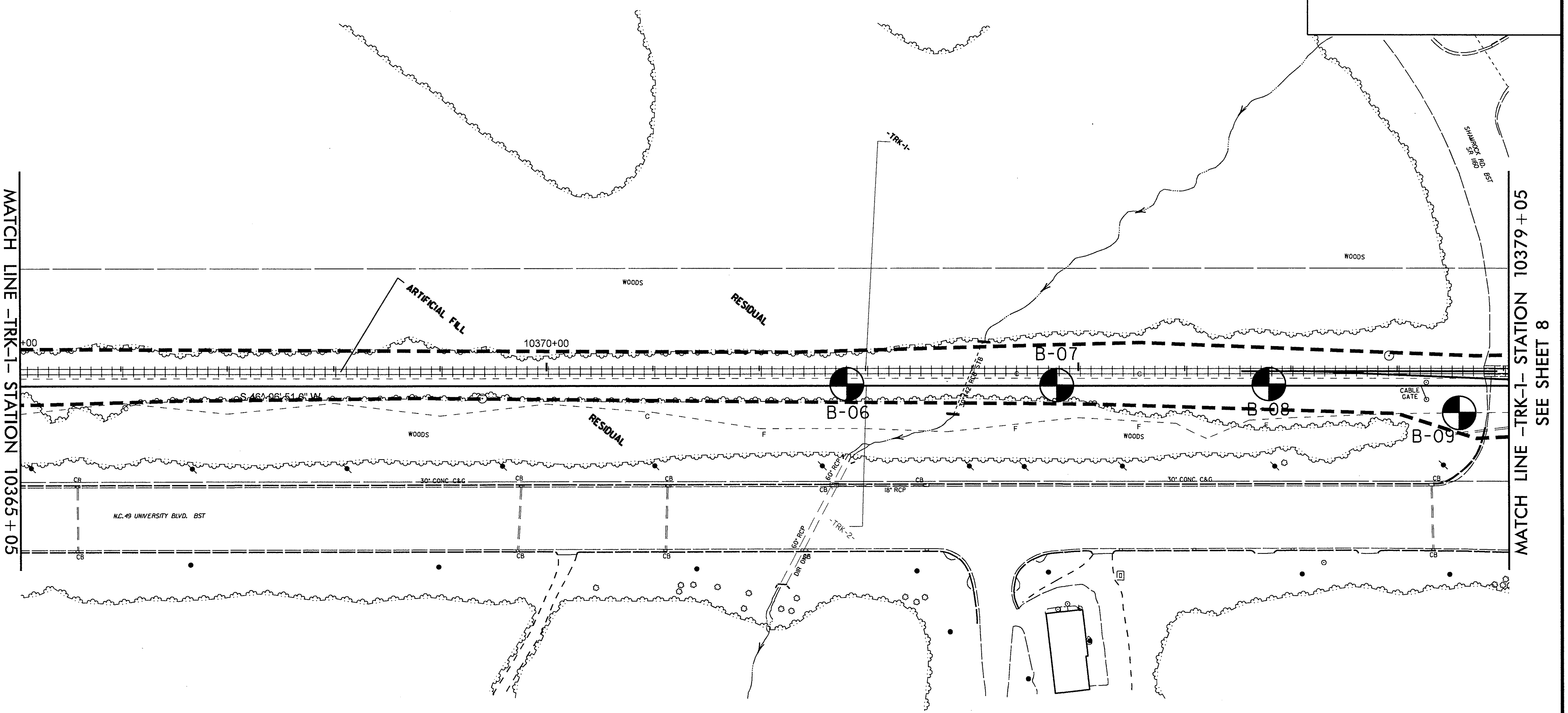

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PROJECT REFERENCE NO.	SHEET NO.
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R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

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PROJECT REFERENCE NO.	SHEET NO.
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RW SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

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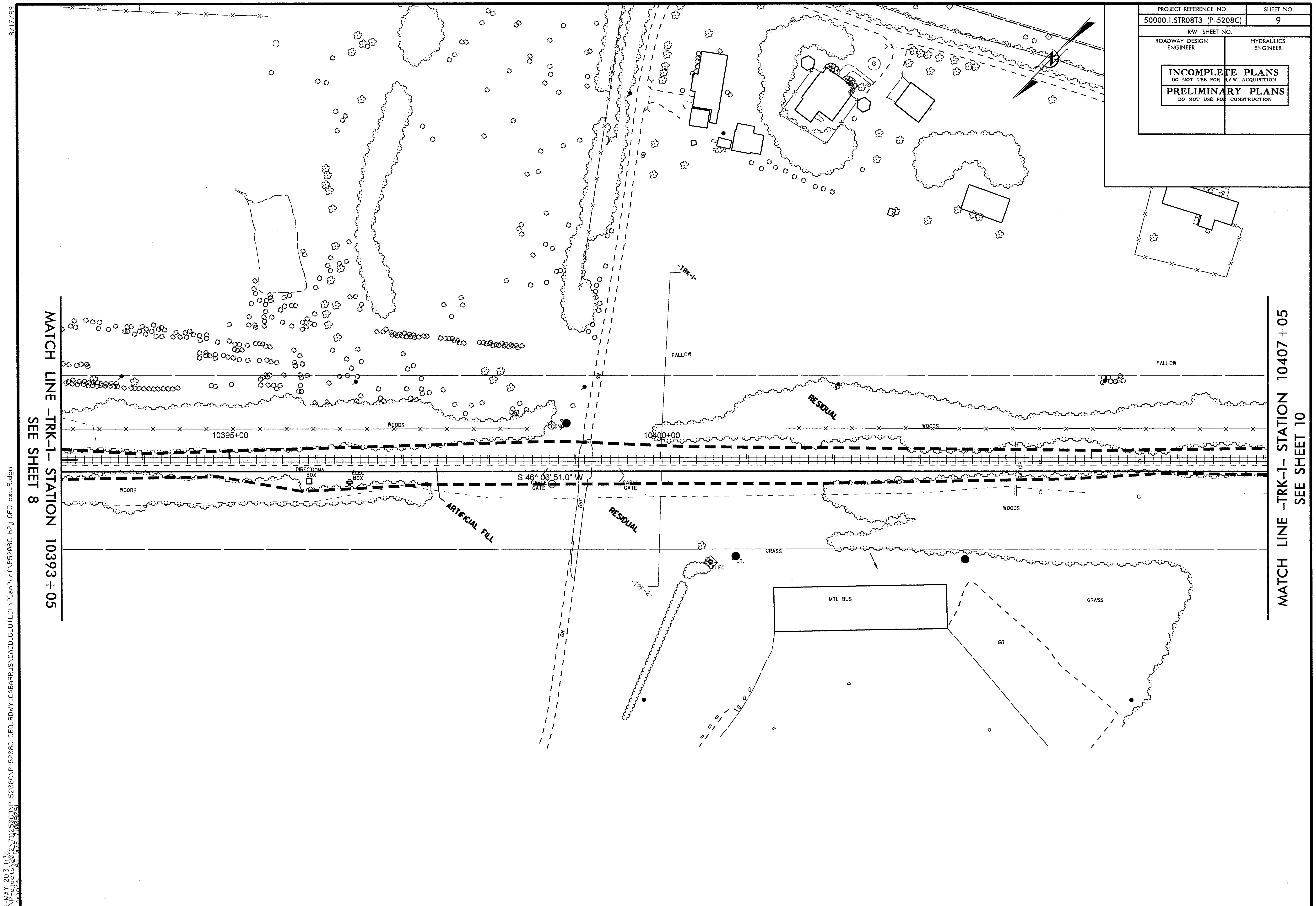
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION



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PROJECT REFERENCE NO.	SHEET NO.
50000.1.STR08T3 (P-5208C)	10
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

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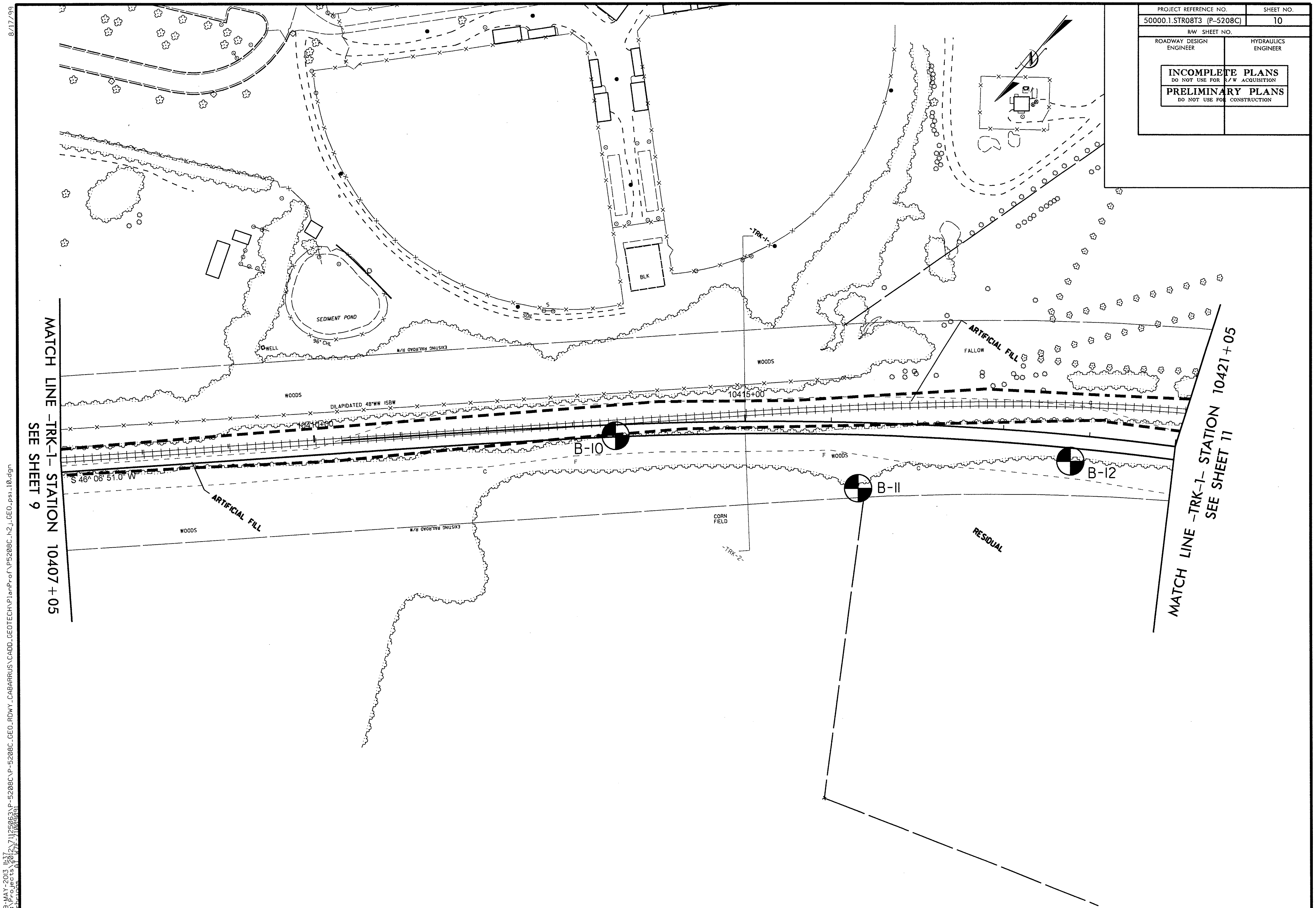
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION



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PROJECT REFERENCE NO.	SHEET NO.
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ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

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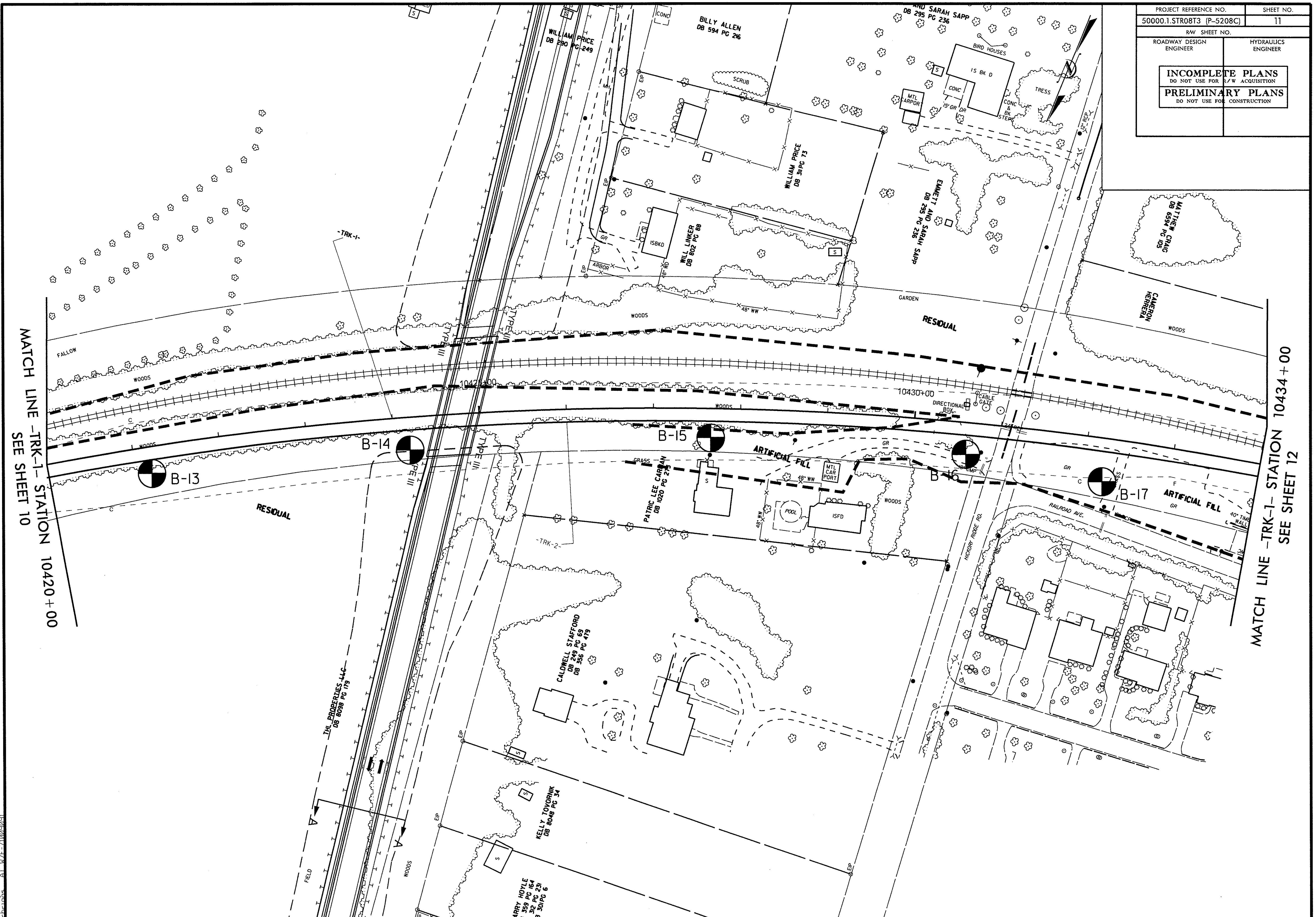
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION



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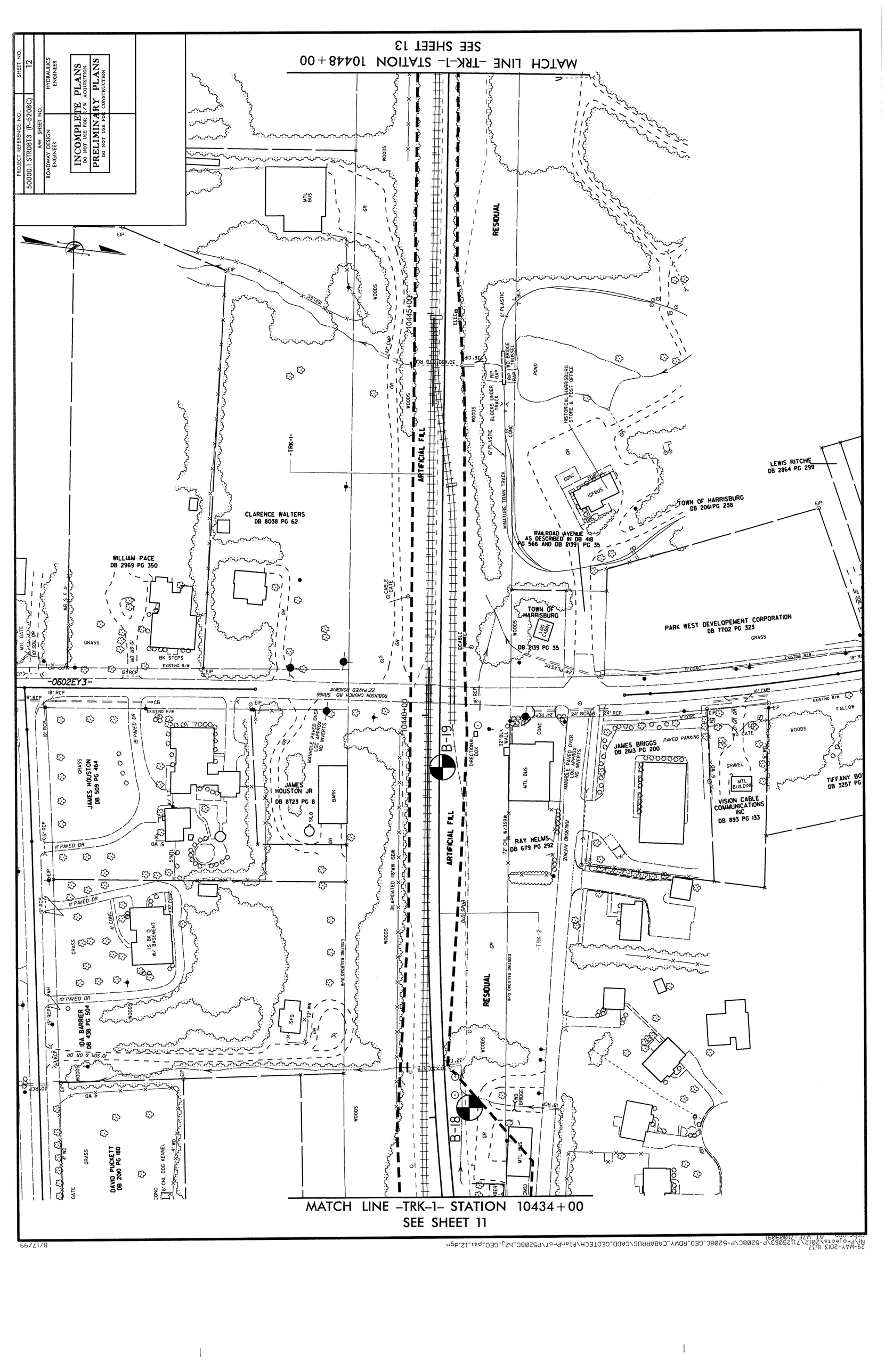
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SHEET NO.
12
RW SHEET NO.
ROADWAY DESIGN ENGINEER
HYDRAULICS ENGINEER
INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION
MATCH LINE -TRK-1- STATION 10448+00
SEE SHEET 13
RESIDUAL
ARTIFICIAL FILL
-TRK-1-
-TRK-2-
B-19
B-18
CLARENCE WALTERS
DB 8038 PG 62
WILLIAM PACE
DB 2969 PG 350
JAMES HOUSTON
DB 509 PG 464
JAMES HOUSTON JR
DB 8723 PG 8
IDA BARRIER
DB 438 PG 504
DAVID PUCKETT
DB 200 PG 80
RAY HELMS
DB 679 PG 292
JAMES BRIGGS
DB 2613 PG 200
VISION CABLE COMMUNICATIONS INC
DB 893 PG 133
TOWN OF HARRISBURG
DB 2139 PG 35
TOWN OF HARRISBURG
DB 2061 PG 238
LEWIS RITCHIE
DB 2864 PG 299
PARK WEST DEVELOPEMENT CORPORATION
DB 7702 PG 323
RAILROAD AVENUE
AS DESCRIBED IN DB 468 PG 566 AND DB 2139 PG 35
HISTORICAL HARRISBURG STORE & POST OFFICE
MINIATURE TRAIN TRACK
POND
BLOCKS UNDER TRACK
ROBINSON CHURCH RD
22' PAVED ROADWAY
10440+00
10445+00
MATCH LINE -TRK-1- STATION 10434+00
SEE SHEET 11

8/17/99

PROJECT REFERENCE NO.	SHEET NO.
50000.1.STR08T3 (P-5208C)	13
RW SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

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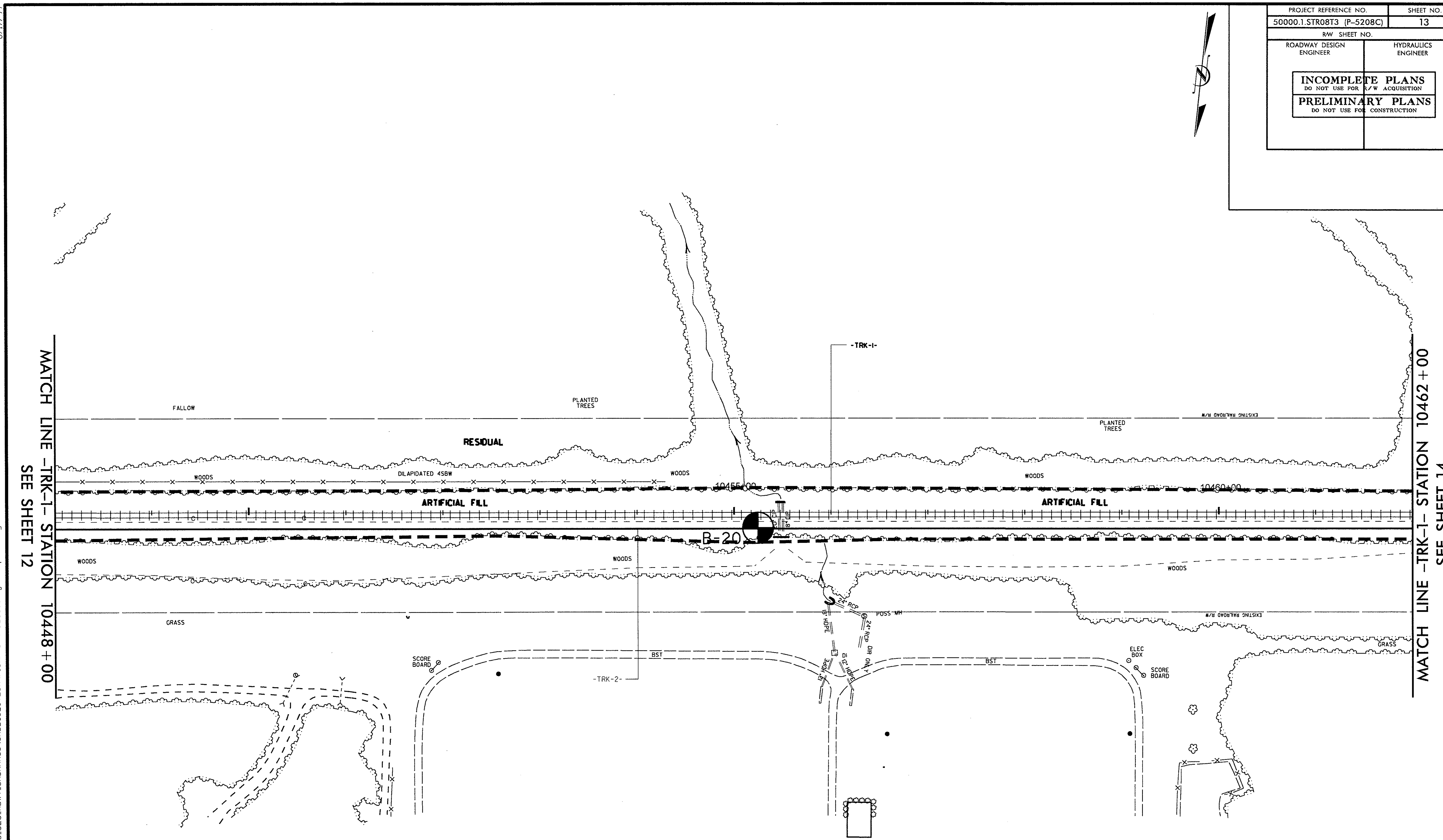
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION



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PROJECT REFERENCE NO.	SHEET NO.
50000.1.STR08T3 (P-5208C)	14

R/W SHEET NO.

ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER

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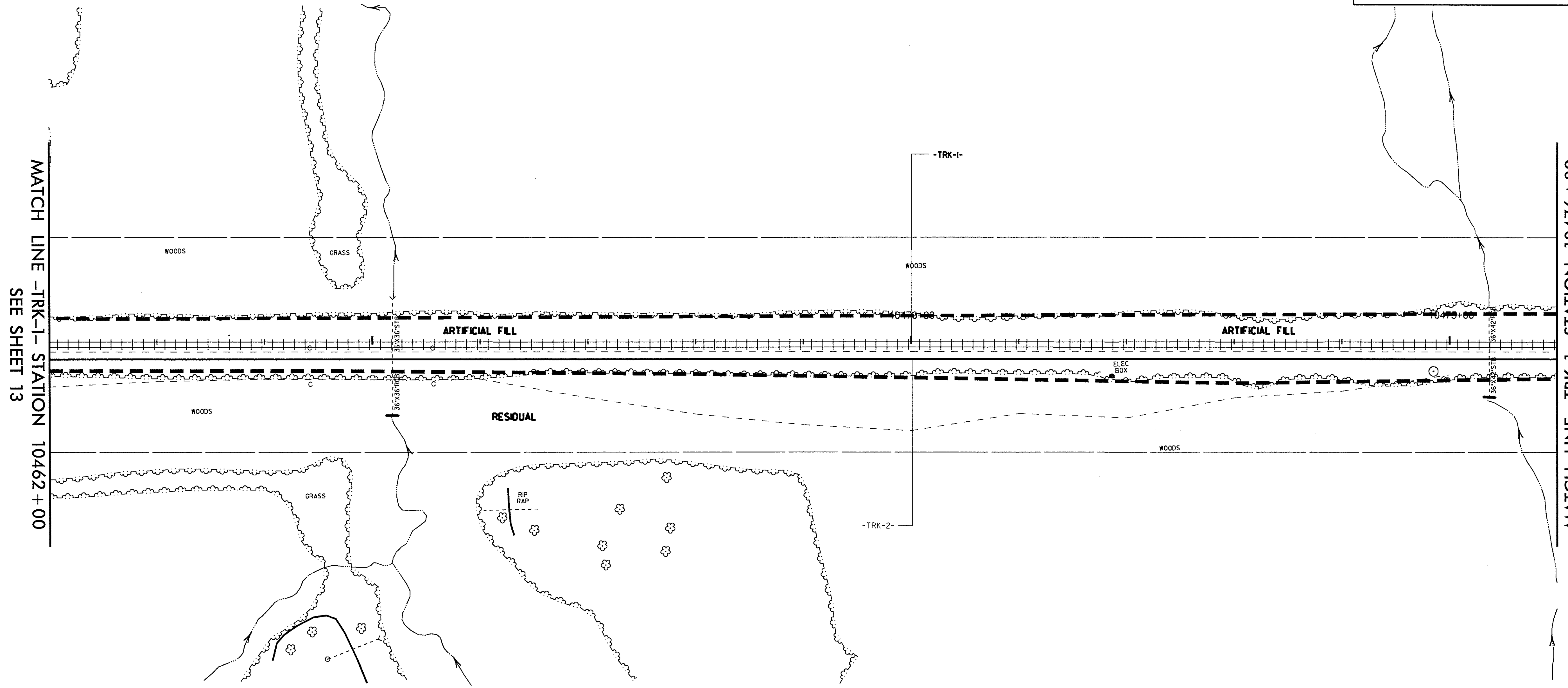
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION



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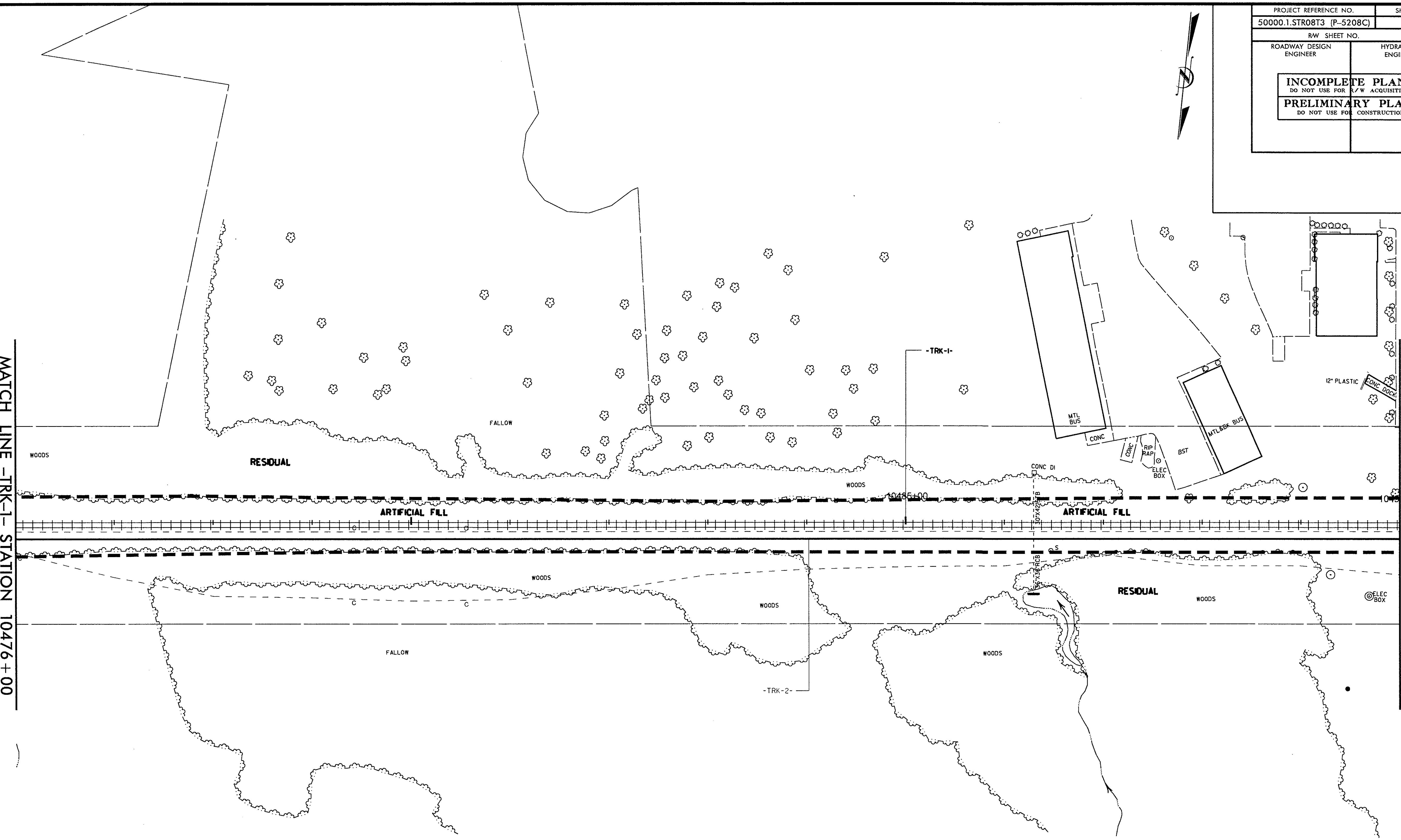
PROJECT REFERENCE NO.	SHEET NO.
50000.1.STR08T3 (P-5208C)	15

R/W SHEET NO.

ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION



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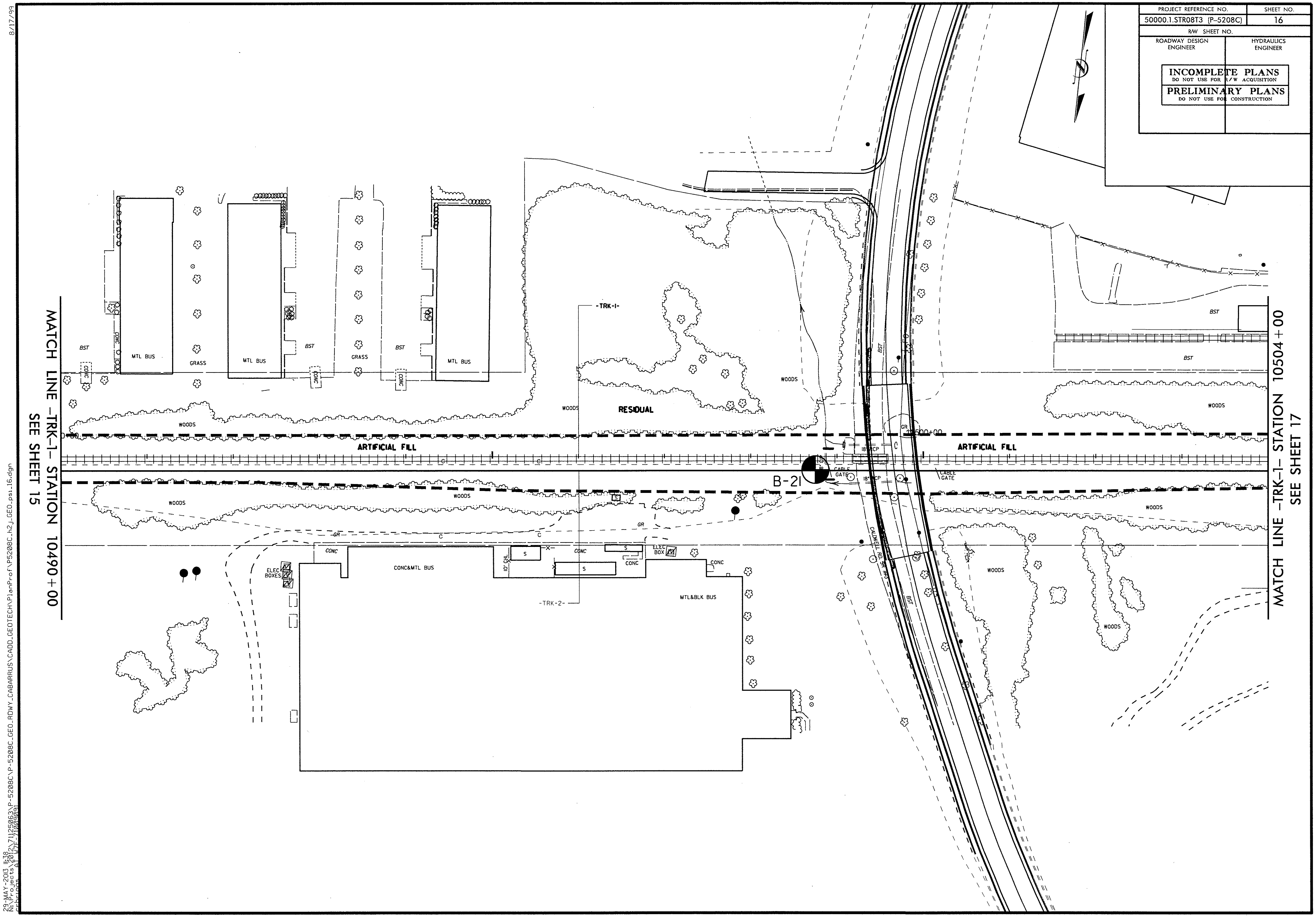

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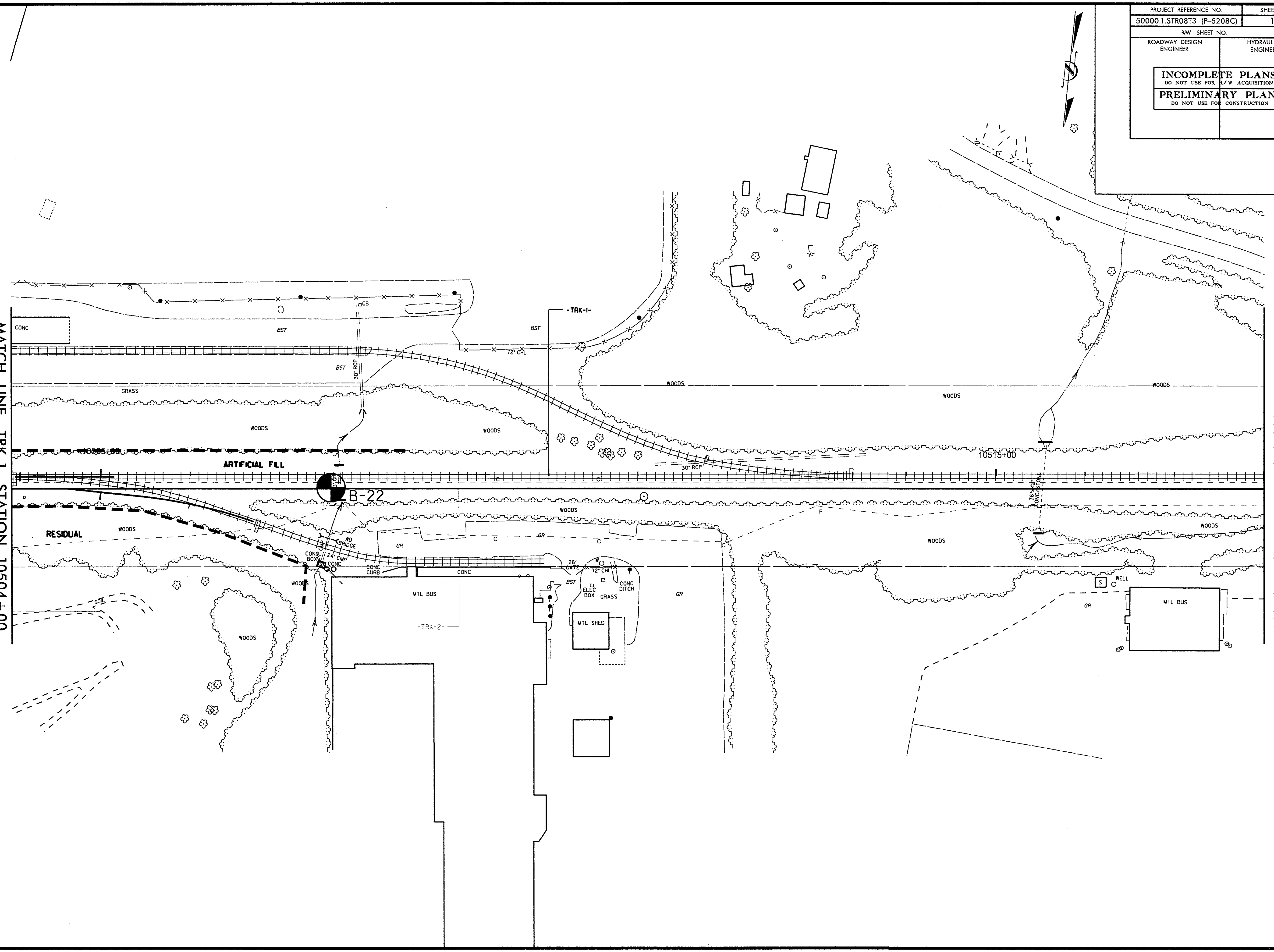
PROJECT REFERENCE NO.	SHEET NO.
50000.1.STR08T3 (P-5208C)	17
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION



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PROJECT REFERENCE NO.	SHEET NO.
50000.1.STR08T3 (P-5208C)	18

ROADWAY DESIGN ENGINEER

HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

5/14/99

610
600
590
580
570
560
550
540
530
520

EXISTING GRADE

PROPOSED GRADE

600
590
580
570
560
550
540
530
520

10324+00 10325+00 10326+00 10327+00 10328+00 10329+00 10330+00 10331+00 10332+00 10333+00 10334+00 10335+00 10336+00 10337+00

-TRK-1-

29-MAY-2013 18:08
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PROJECT REFERENCE NO.	SHEET NO.
50000.1.STR08T3 (P-5208C)	19
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

5/14/99

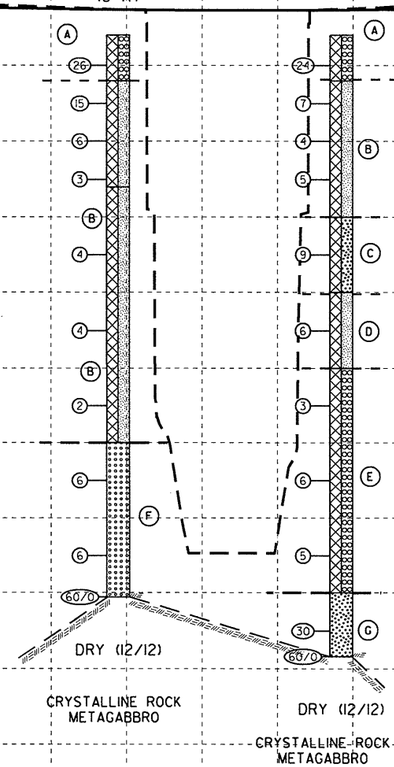
590
580
570
560
550
540
530
520
510
500

SS-1
SS-2

EXISTING GRADE
PROPOSED GRADE

B-02
-TRK-1- 10343+50
16' RT

B-04
-TRK-1- 10344+97
15' RT



(A) ARTIFICIAL FILL, BLACK, MOIST, MEDIUM DENSE, SAND WITH SOME GRAVEL

(B) ARTIFICIAL FILL (RAILROAD EMBANKMENT), BROWN, MOIST, SOFT TO STIFF, SILT AND SANDY SILT

(C) ARTIFICIAL FILL (RAILROAD EMBANKMENT), BLACK AND BROWN, MOIST, LOOSE, SILTY SAND

(D) ARTIFICIAL FILL (RAILROAD EMBANKMENT), BROWN, MOIST, MEDIUM STIFF, SILT LITTLE SAND

(E) ARTIFICIAL FILL (RAILROAD EMBANKMENT), BROWN AND GRAY, MOIST, VERY LOOSE TO LOOSE, SAND LITTLE SILT

(F) ALLUVIAL, BROWN AND GRAY, MOIST, LOOSE, SAND LITTLE SILT

(G) RESIDUAL, DARK GRAY AND TAN, MOIST, HARD, SANDY SILT

-TRK-1-

10338+00 10339+00 10340+00 10341+00 10342+00 10343+00 10344+00 10345+00 10346+00 10347+00 10348+00 10349+00 10350+00 10351+00

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ardrigos at WTE-7100420

PROJECT REFERENCE NO.	SHEET NO.
50000.1.STR08T3 (P-5208C)	20
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
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PRELIMINARY PLANS
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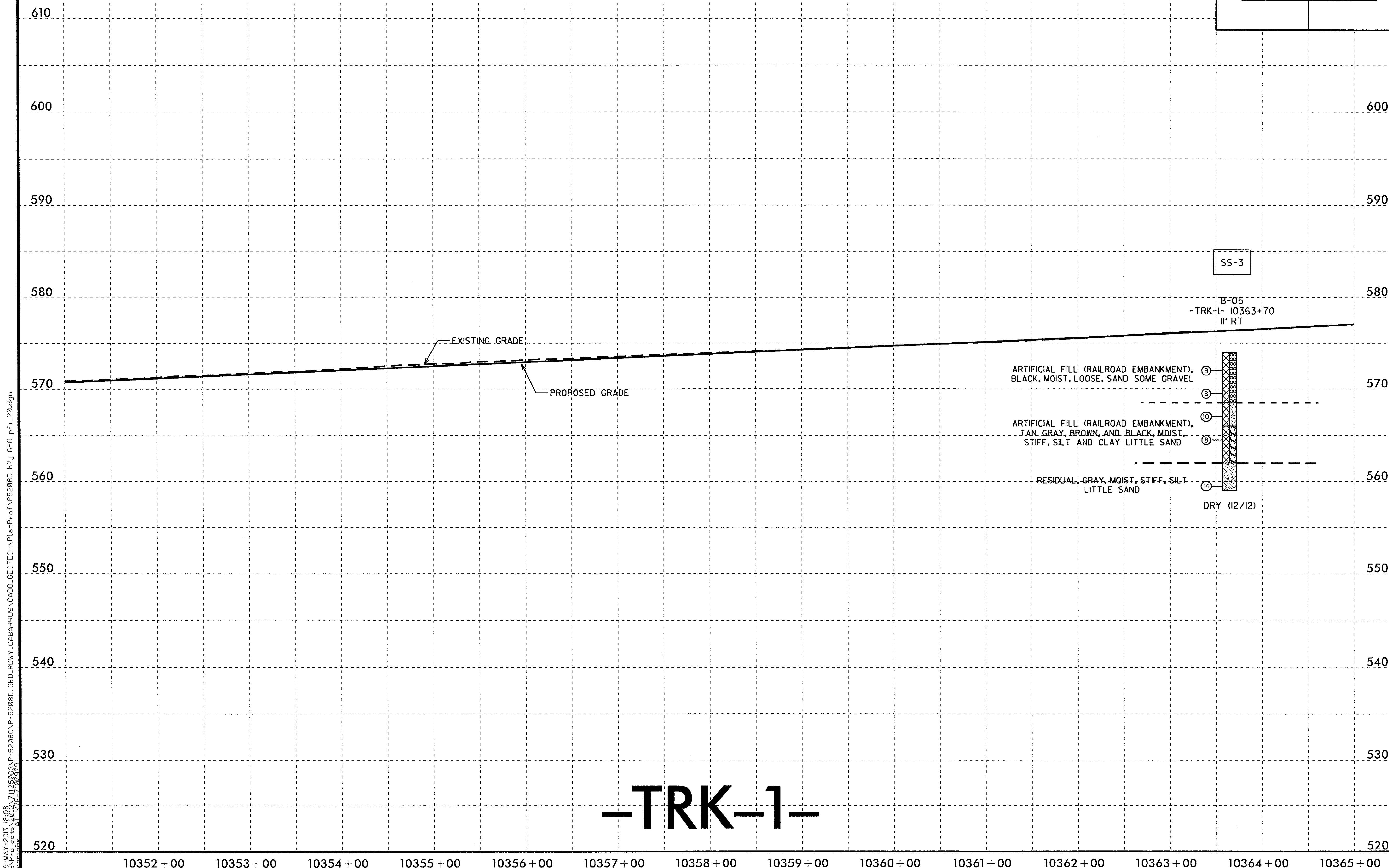


PROJECT REFERENCE NO.	SHEET NO.
50000.1.STR08T3 (P-5208C)	21
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

610
600
590
580
570
560
550
540
530
520

10366+00 10367+00 10368+00 10369+00 10370+00 10371+00 10372+00 10373+00 10374+00 10375+00 10376+00 10377+00 10378+00 10379+00

EXISTING GRADE
PROPOSED GRADE

B-06
-TRK-1- 10372+82
12' RT

B-07
-TRK-1- 10374+80
13' RT

B-08
-TRK-1- 10376+79
12' RT

B-09
-TRK-1- 10378+58
40' RT

SS-4

SS-5

ARTIFICIAL FILL (RAILROAD EMBANKMENT), MOIST, MEDIUM STIFF TO VERY STIFF, AND GRAVEL, AND CLAY TRACE SAND

ARTIFICIAL FILL (RAILROAD EMBANKMENT), BROWN AND TAN, SILT TO SILT SOME SAND

ARTIFICIAL FILL (RAILROAD EMBANKMENT), BLACK AND GRAY, MOIST, LOOSE TO MEDIUM DENSE, SAND SOME GRAVEL

RESIDUAL, DARK GRAY, AND TAN MOIST, MEDIUM DENSE SAND, LITTLE CLAY

RESIDUAL, TAN AND DARK GRAY, MOIST, VERY DENSE, SAND LITTLE SILT

RESIDUAL, TAN AND DARK GRAY, SATURATED, VERY DENSE, SAND

RESIDUAL, GRAY, MOIST, DENSE TO VERY DENSE, SAND LITTLE TO SOME SILT

WEATHERED ROCK (TAN AND GRAY METAGABBRO)

ROCK (TAN AND GRAY METAGABBRO)

CRYSTALLINE ROCK, METAGABBRO

DRY (12/12)

DRY (12/12)

(H) ROADWAY EMBANKMENT, DARK BROWN, MOIST, MEDIUM STIFF, SILT SOME SAND

(I) ROADWAY EMBANKMENT, BROWN AND TAN, MOIST, LOOSE, SAND LITTLE SILT

(J) ROADWAY EMBANKMENT, BROWN AND BLACK, MOIST, STIFF, CLAY SOME SAND

(K) RESIDUAL, GRAY, MOIST, VERY DENSE, SAND LITTLE SILT

-TRK-1-

5/14/99

29-MAY-2013 18:08
N:\Projects\2013_71125063\P-5208C\P-5208C_GEO_RDWY_CABARRUS\CADD_GEOTECH\PlanProf\P5208C_h2_GEO_pf1_21.dgn
cebridges AT WZE-71000091

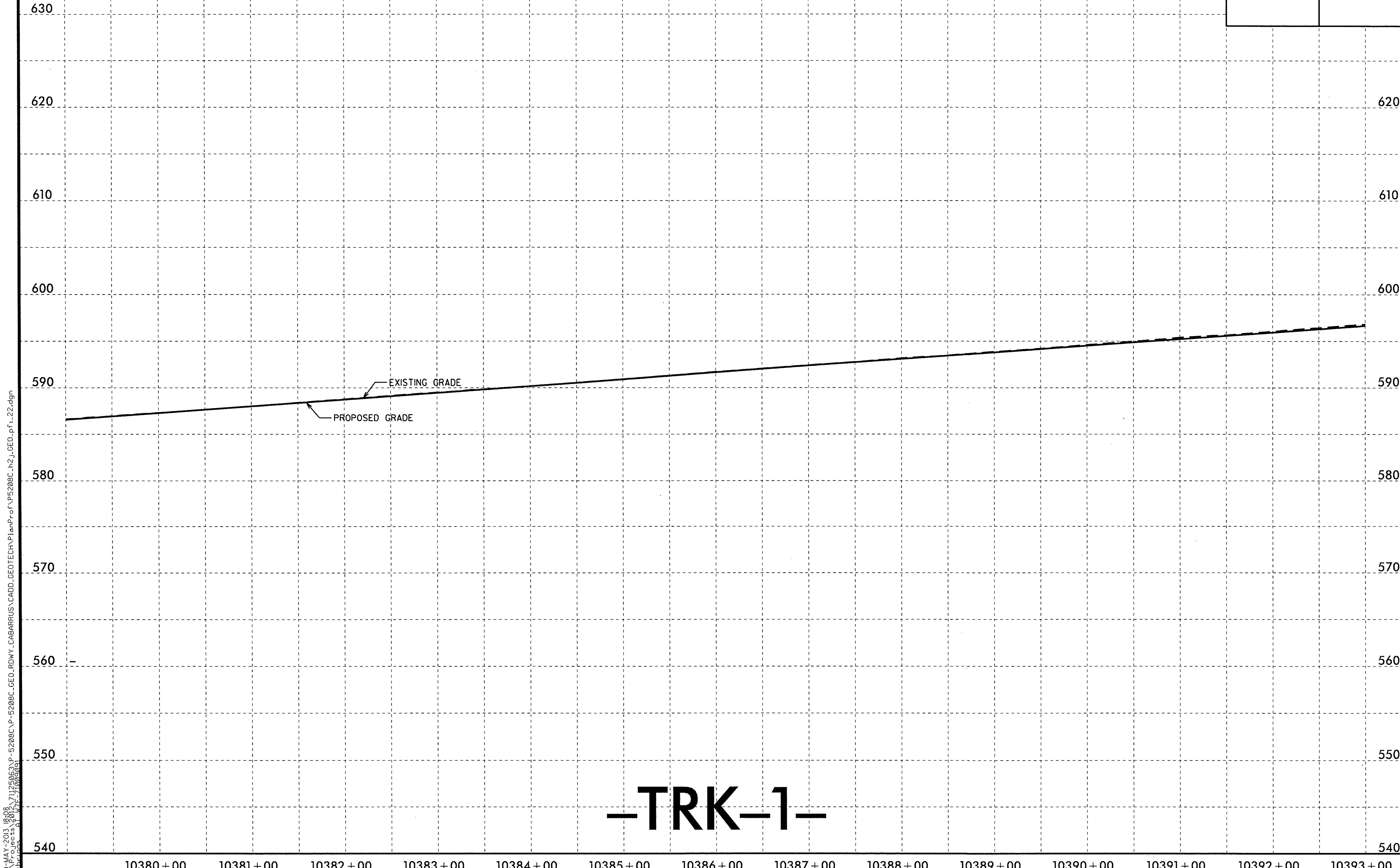
PROJECT REFERENCE NO.	SHEET NO.
50000.1.STR08T3 (P-5208C)	22

ROADWAY DESIGN ENGINEER

HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION



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5/14/99

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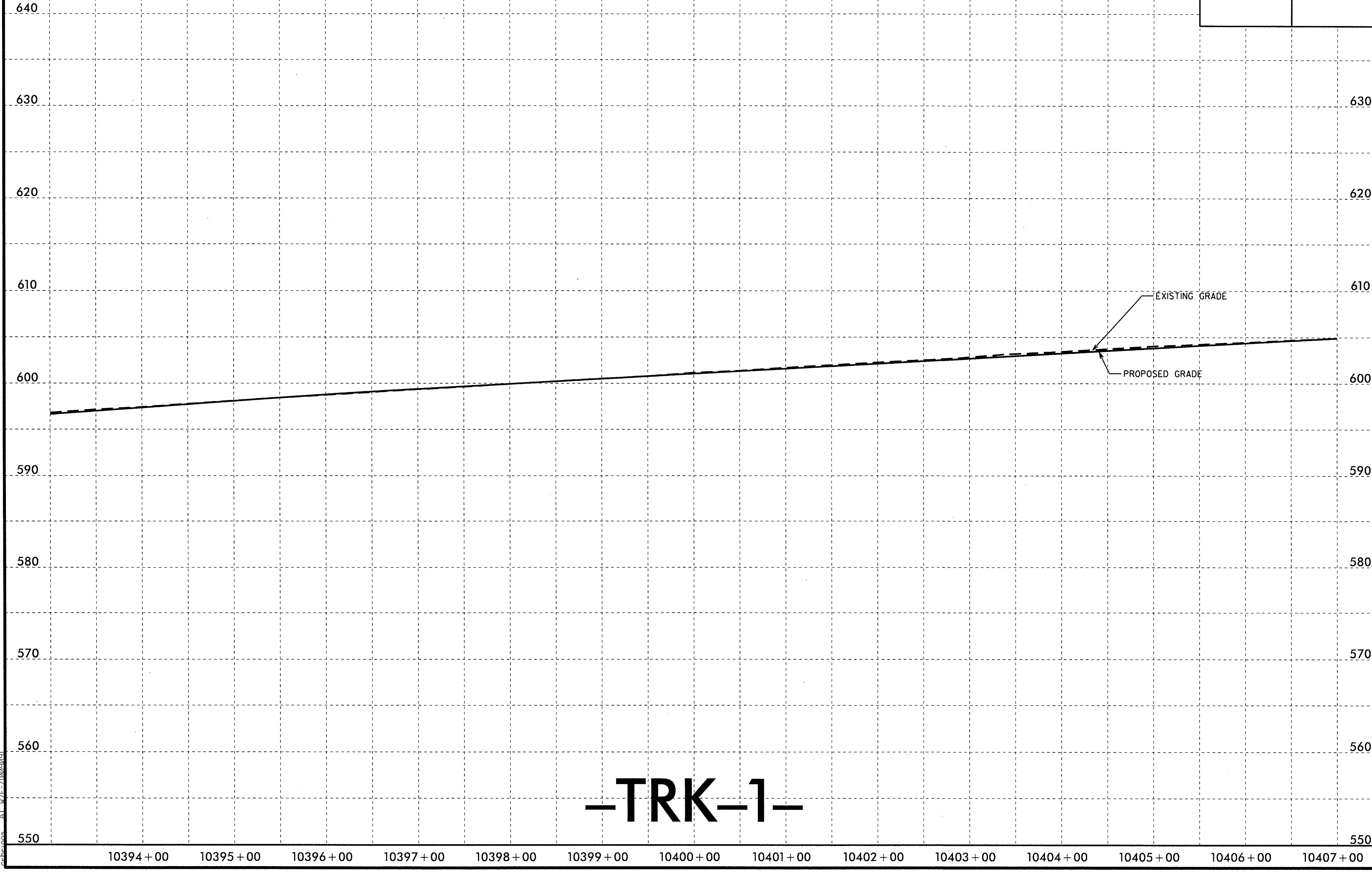
crbriggs AT W7E-71009091

PROJECT REFERENCE NO.	SHEET NO.
50000.1.STR08T3 (P-5208C)	23
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION



5/14/99

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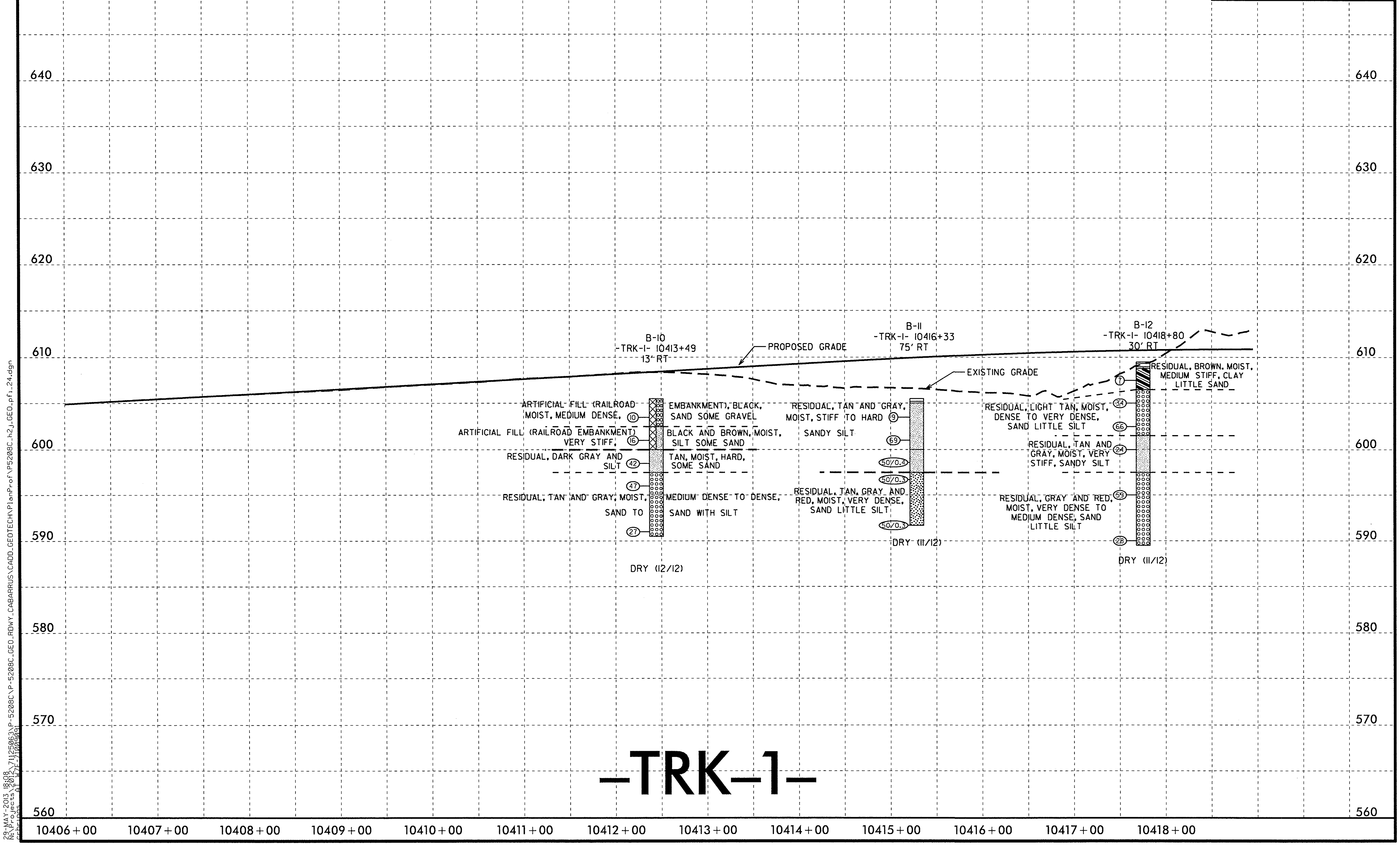
PROJECT REFERENCE NO.	SHEET NO.
50000.1.STR08T3 (P-5208C)	24
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION



5/14/99

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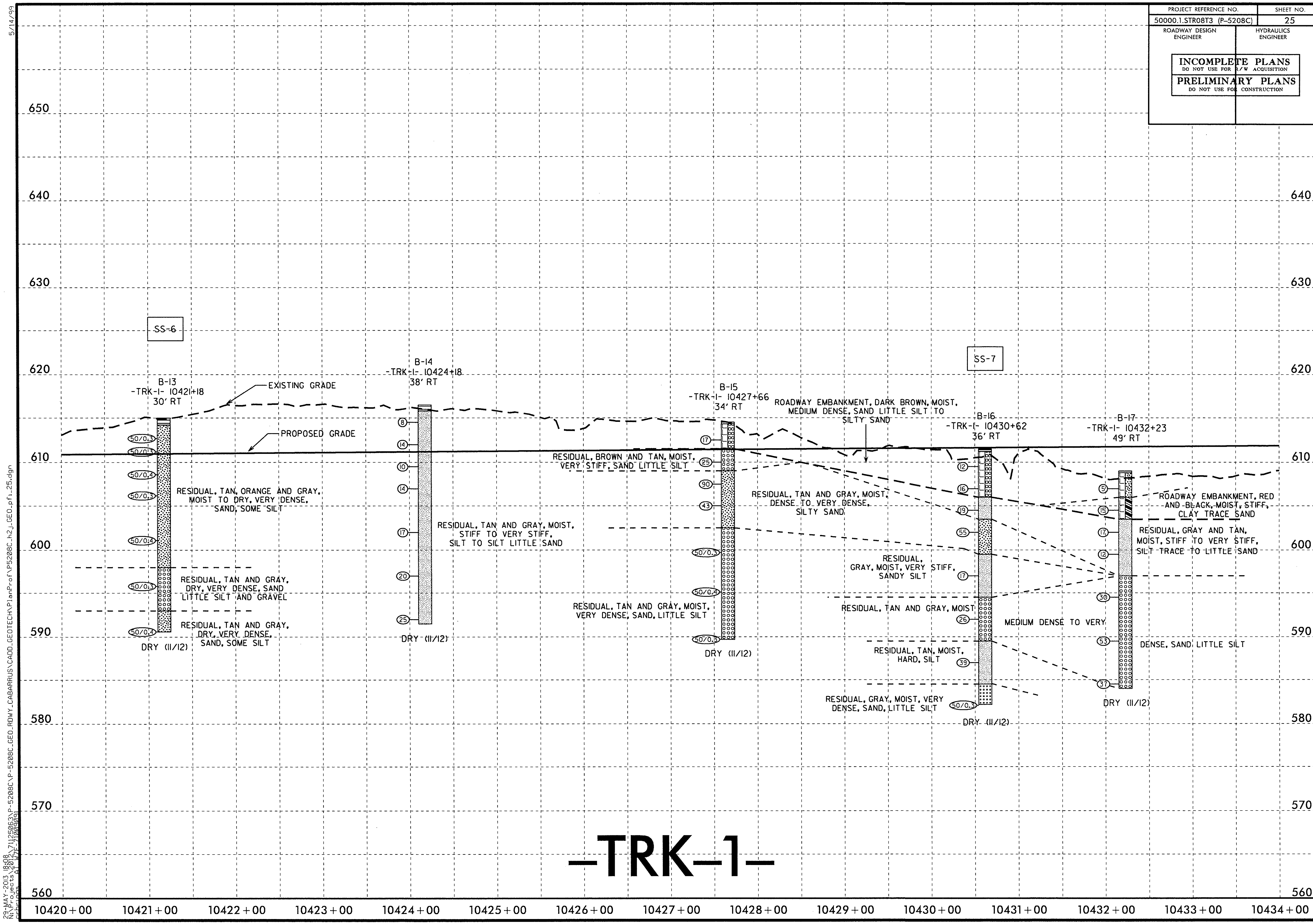
PROJECT REFERENCE NO.	SHEET NO.
50000.1.STR08T3 (P-5208C)	25
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

5/14/99



650
640
630
620
610
600
590
580
570
560
SS-6
SS-7
B-13
-TRK-1- 10421+18
30' RT
B-14
-TRK-1- 10424+18
38' RT
B-15
-TRK-1- 10427+66
34' RT
B-16
-TRK-1- 10430+62
36' RT
B-17
-TRK-1- 10432+23
49' RT
EXISTING GRADE
PROPOSED GRADE
RESIDUAL, TAN, ORANGE AND GRAY, MOIST TO DRY, VERY DENSE, SAND, SOME SILT
RESIDUAL, TAN AND GRAY, DRY, VERY DENSE, SAND LITTLE SILT AND GRAVEL
RESIDUAL, TAN AND GRAY, DRY, VERY DENSE, SAND, SOME SILT
RESIDUAL, TAN AND GRAY, MOIST, STIFF TO VERY STIFF, SILT TO SILT LITTLE SAND
ROADWAY EMBANKMENT, DARK BROWN, MOIST, MEDIUM DENSE, SAND LITTLE SILT TO SILTY SAND
RESIDUAL, BROWN AND TAN, MOIST, VERY STIFF, SAND LITTLE SILT
RESIDUAL, TAN AND GRAY, MOIST, DENSE TO VERY DENSE, SILTY SAND
RESIDUAL, GRAY, MOIST, VERY STIFF, SANDY SILT
RESIDUAL, TAN AND GRAY, MOIST, VERY DENSE, SAND, LITTLE SILT
RESIDUAL, TAN AND GRAY, MOIST
MEDIUM DENSE TO VERY
DENSE, SAND, LITTLE SILT
RESIDUAL, TAN, MOIST, HARD, SILT
RESIDUAL, GRAY, MOIST, VERY DENSE, SAND, LITTLE SILT
ROADWAY EMBANKMENT, RED AND BLACK, MOIST, STIFF, CLAY TRACE SAND
RESIDUAL, GRAY AND TAN, MOIST, STIFF TO VERY STIFF, SILT TRACE TO LITTLE SAND
50/0.3
50/0.1
50/0.4
50/0.3
50/0.4
50/0.3
50/0.4
8
14
10
14
17
20
25
17
25
90
43
50/0.3
50/0.4
50/0.3
12
16
19
55
17
26
39
50/0.3
5
15
17
12
30
53
37
DRY (11/12)
DRY (11/12)
DRY (11/12)
DRY (11/12)
DRY (11/12)
10420+00
10421+00
10422+00
10423+00
10424+00
10425+00
10426+00
10427+00
10428+00
10429+00
10430+00
10431+00
10432+00
10433+00
10434+00

-TRK-1-

23-MAY-2013 18:08
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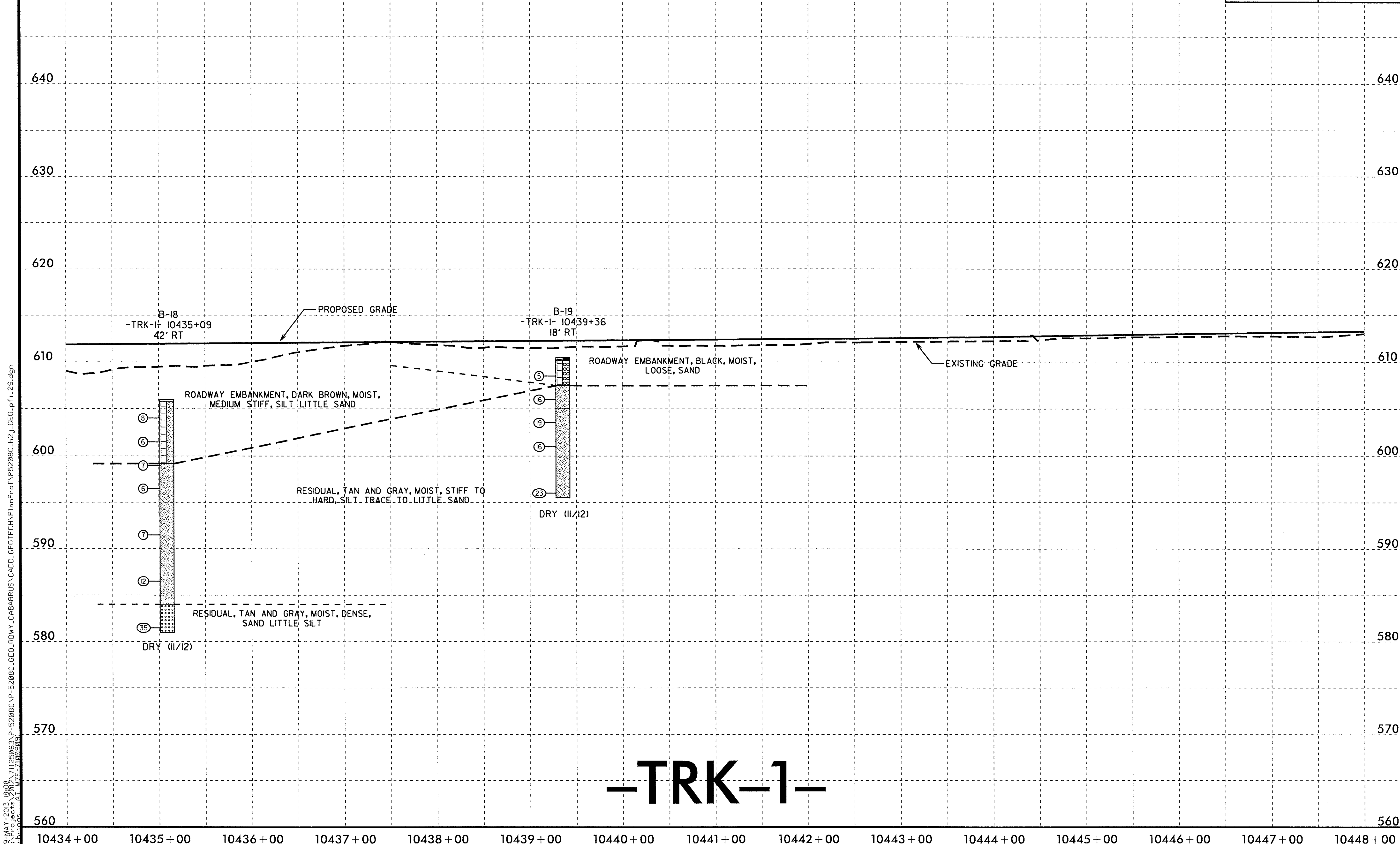
PROJECT REFERENCE NO.	SHEET NO.
50000.1.STR08T3 (P-5208C)	26
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION



5/14/99

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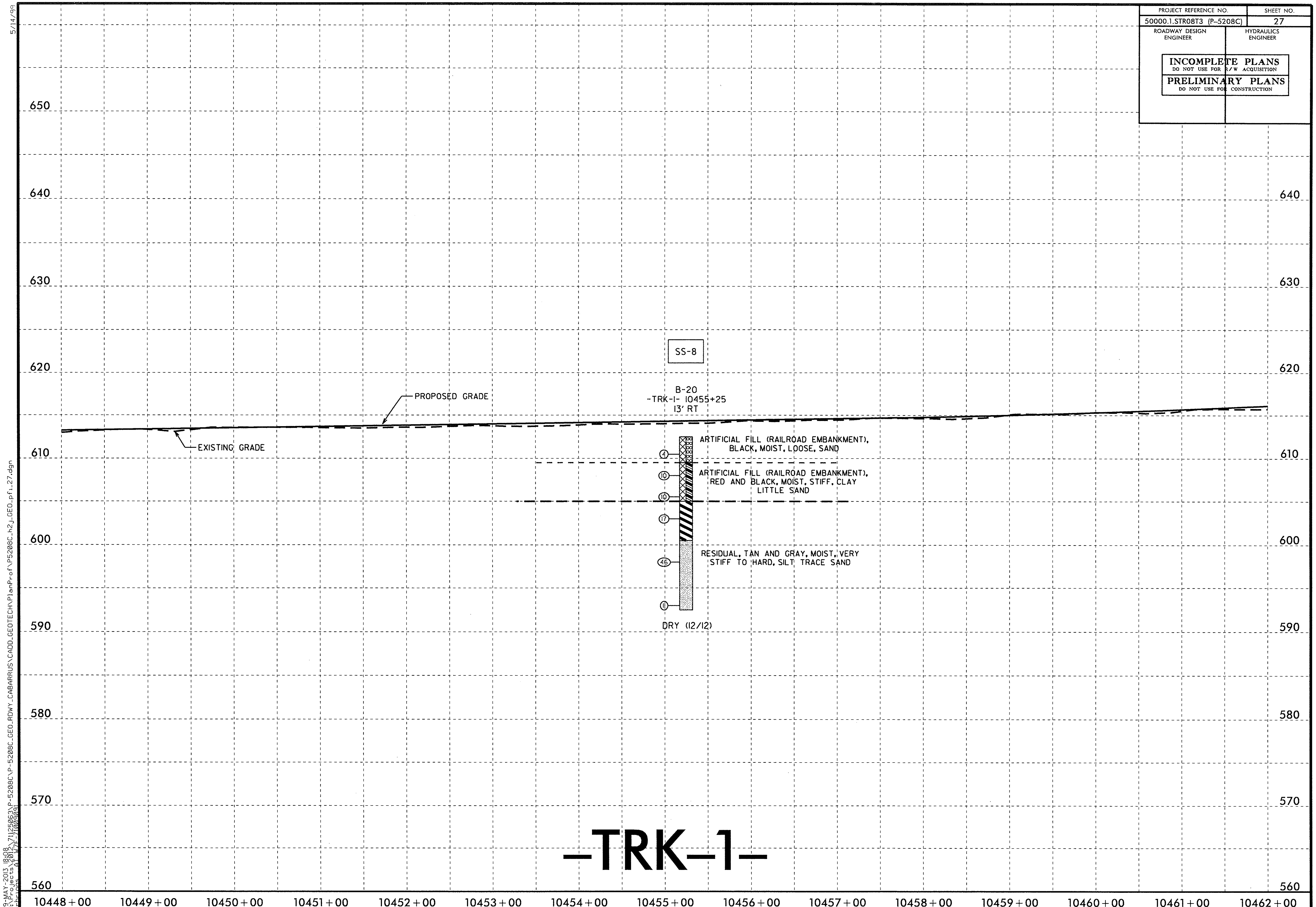

5/14/99

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PROJECT REFERENCE NO.	SHEET NO.
50000.1.STR08T3 (P-5208C)	28

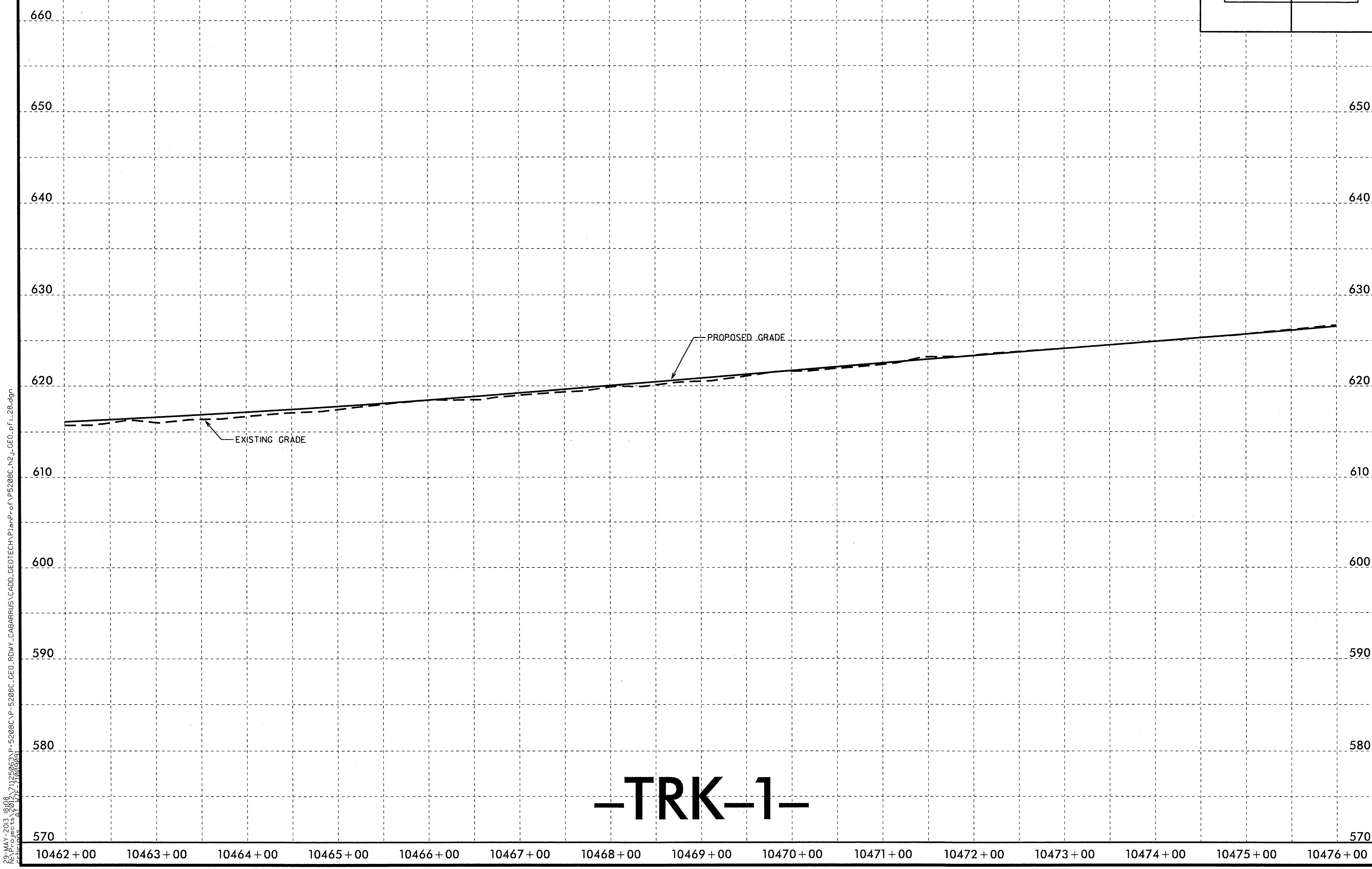
ROADWAY DESIGN ENGINEER

HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

5/14/99



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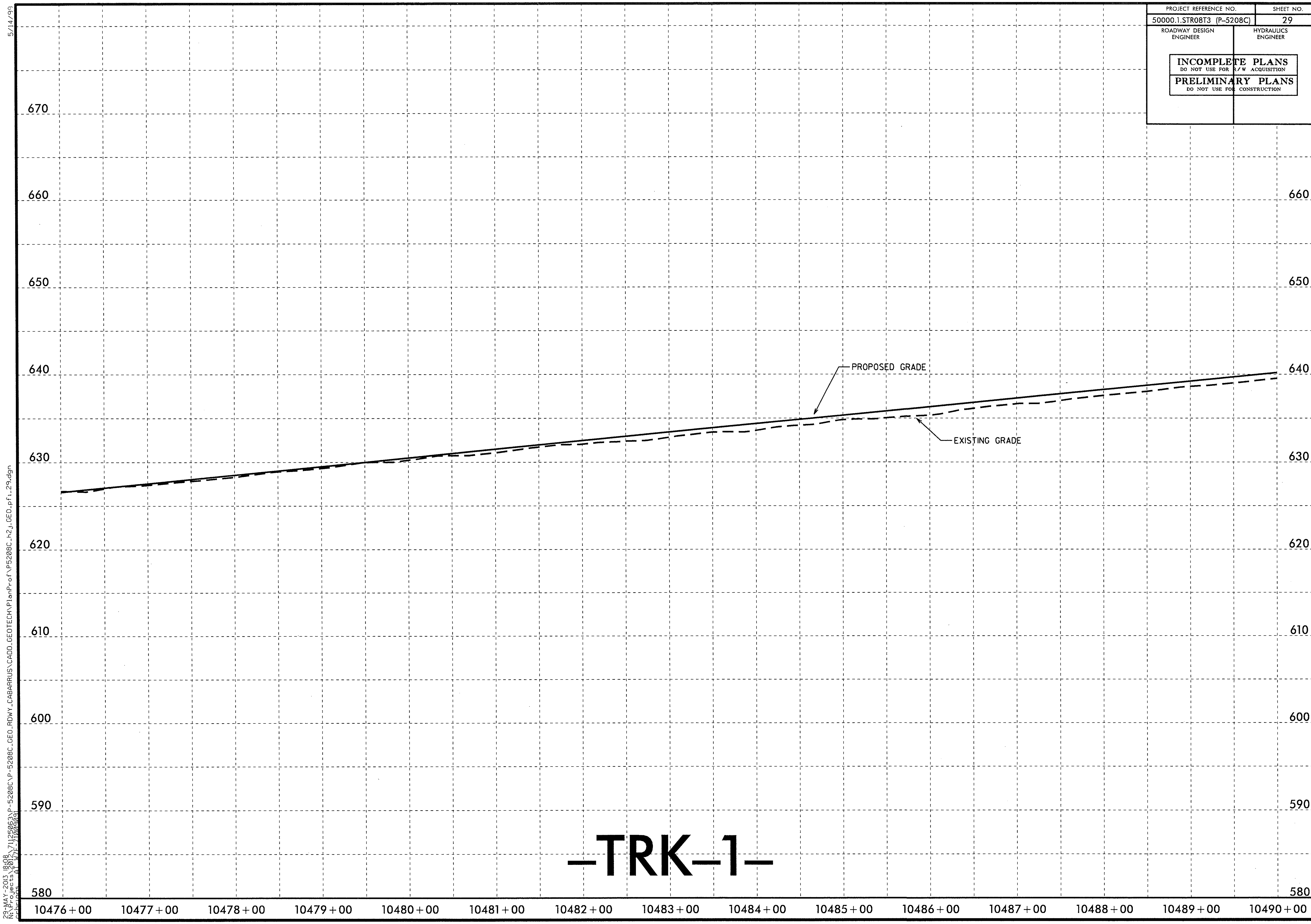
PROJECT REFERENCE NO.	SHEET NO.
50000.1.STR08T3 (P-5208C)	29

ROADWAY DESIGN ENGINEER

HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION



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5/14/99

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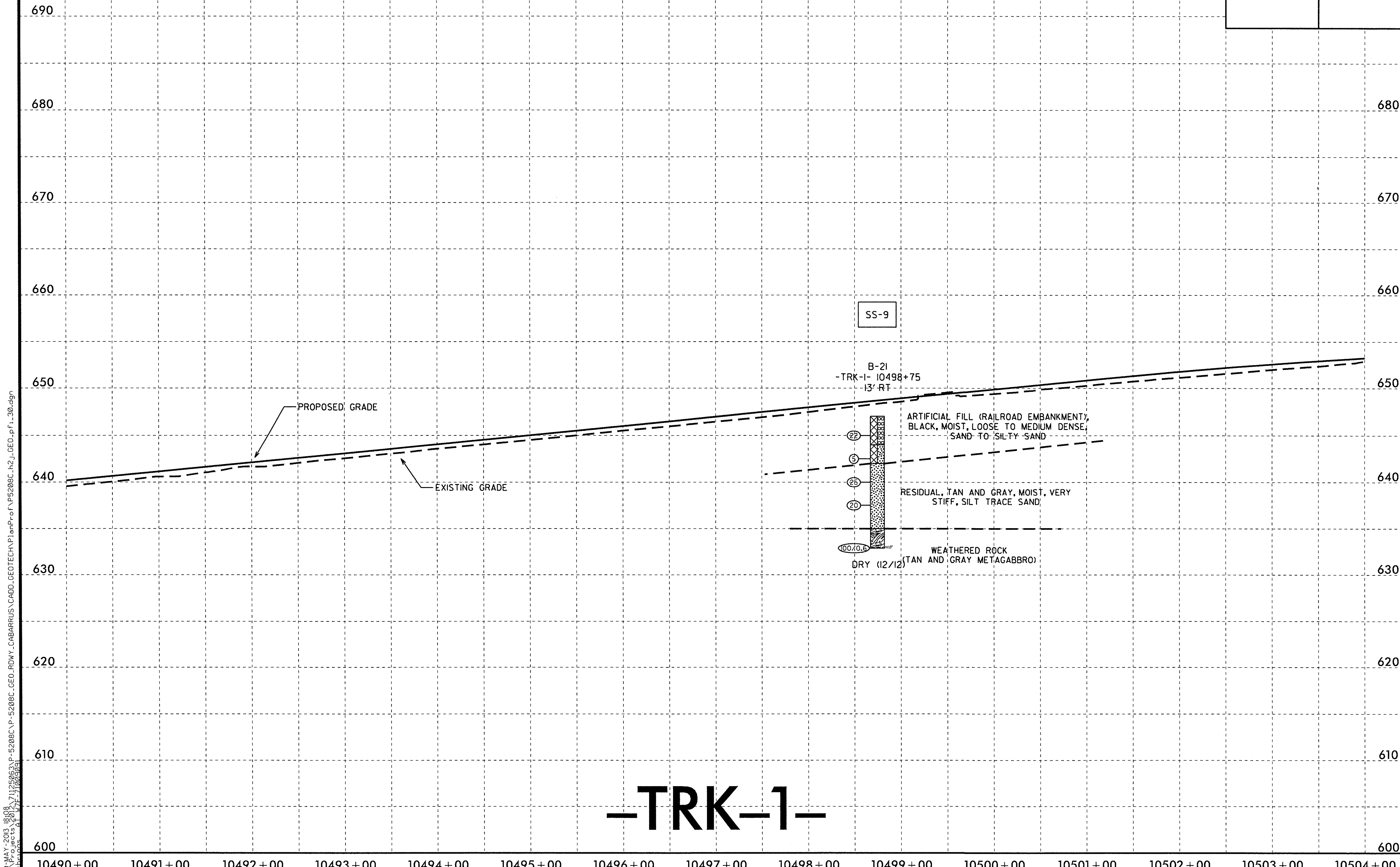
PROJECT REFERENCE NO.	SHEET NO.
50000.1.STR08T3 (P-5208C)	30

ROADWAY DESIGN ENGINEER

HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION



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5/14/99

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5/14/99

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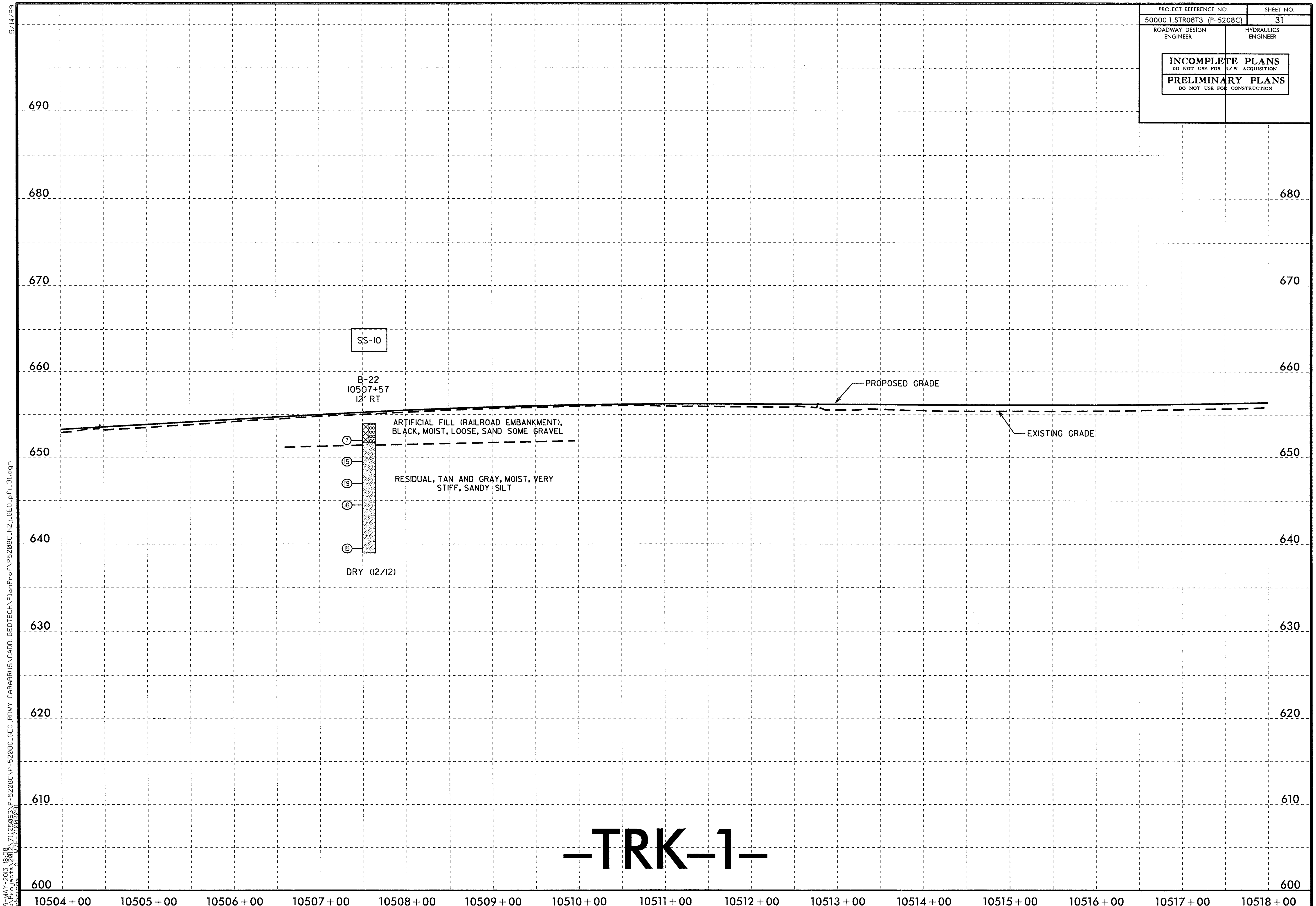

8/23/99

0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	5000.1.STR08T3 (P-5208C)	32

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

580 570 560 550 540 530 520 510 500 490 480 470 460 450

℄ TRK 1 ℄ TRK 2

(A) ARTIFICIAL FILL (ROADWAY EMBANKMENT), RED, MOIST, STIFF, SILT, TRACE SAND

(B) RESIDUAL, BROWN, MOIST, MEDIUM-DENSE, SAND, LITTLE SILT

(C) RESIDUAL, TAN, GRAY, MOIST, VERY DENSE, SAND, LITTLE SILT

B-01
-TRK-1- 10342+37
81' RT

WEATHERED ROCK
(TAN AND GRAY METAGABBRO)

WEATHERED ROCK
(TAN AND GRAY METAGABBRO)

WEATHERED ROCK
(TAN AND GRAY METAGABBRO)

WEATHERED ROCK
(TAN AND GRAY METAGABBRO)

CRYSTALLINE ROCK
(METAGABBRO)

10
100/0.8
100/0.8
100/0.8
100/0.9
57
1/13
100/0.8
100/0.5
100/0.4
100/0.5
60/0

10342+00.00

-TRK-1-

07-JUN-2013 15:16
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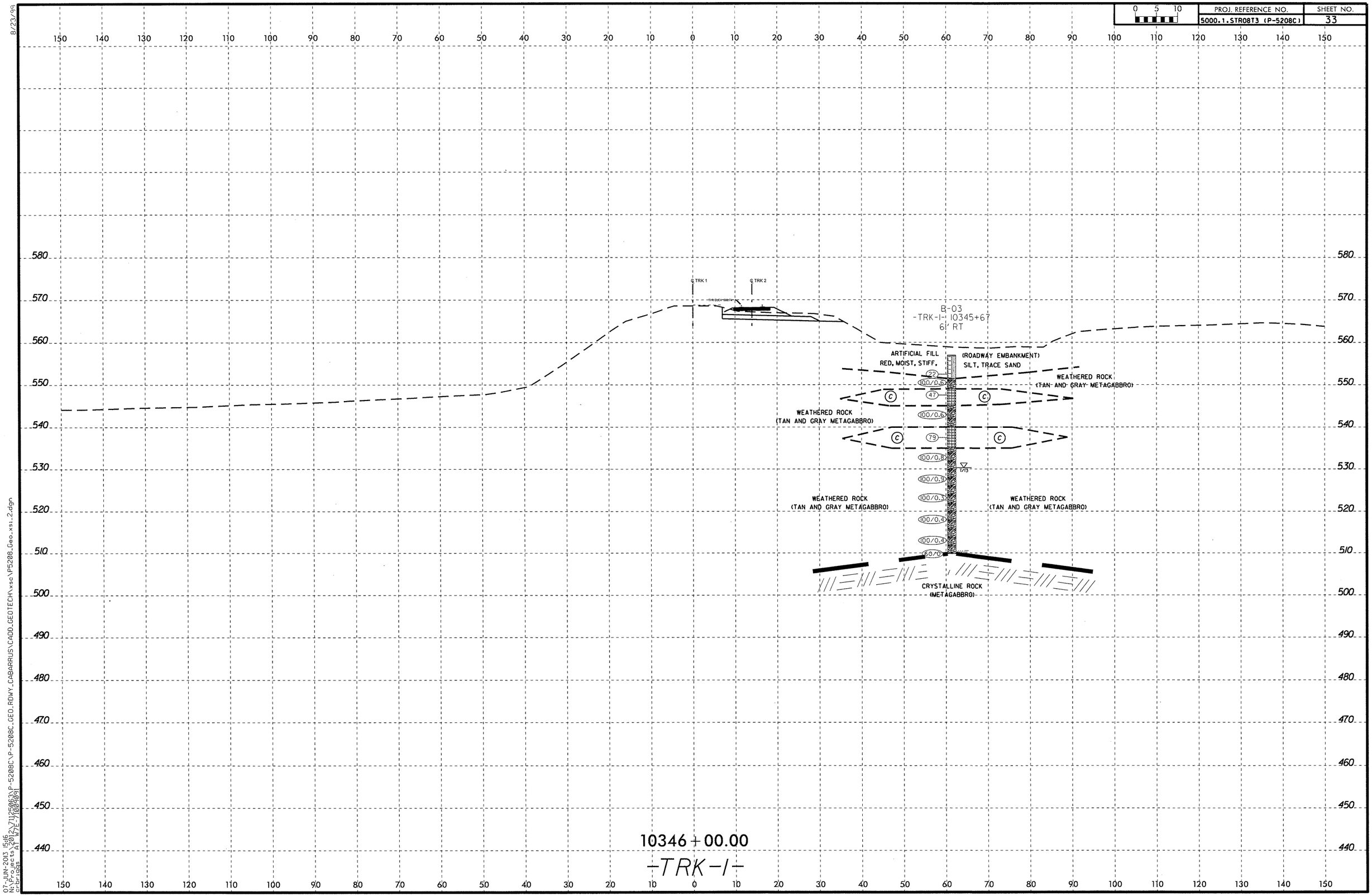
crbriggs
ATTE-71000309

8/23/99

0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	5000.1.STR08T3 (P-5208C)	33



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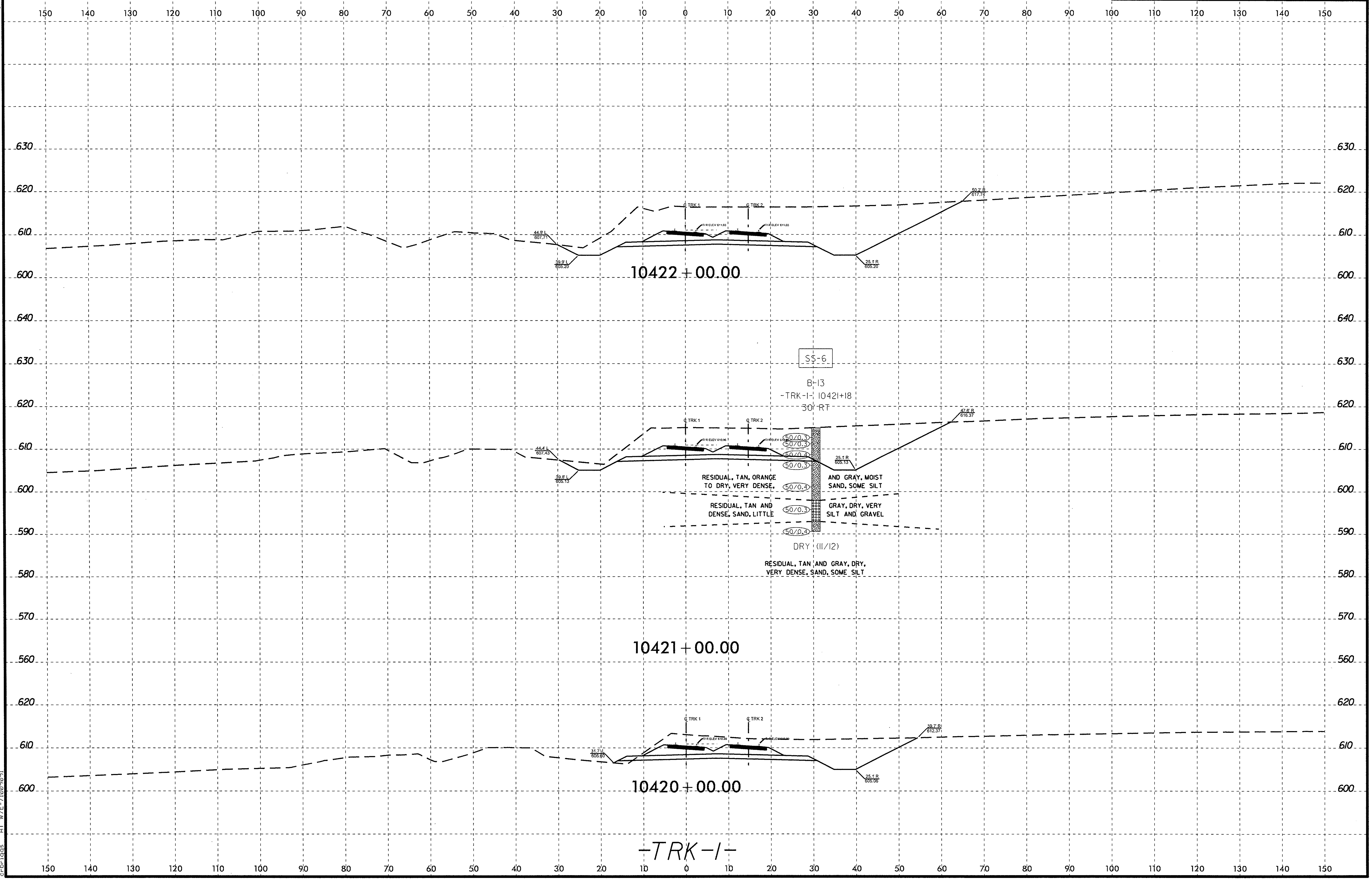
A1 W7E-7100901

PROJ. REFERENCE NO.	SHEET NO.
5000.1.STR08T3 (P-5208C)	34



8/23/99

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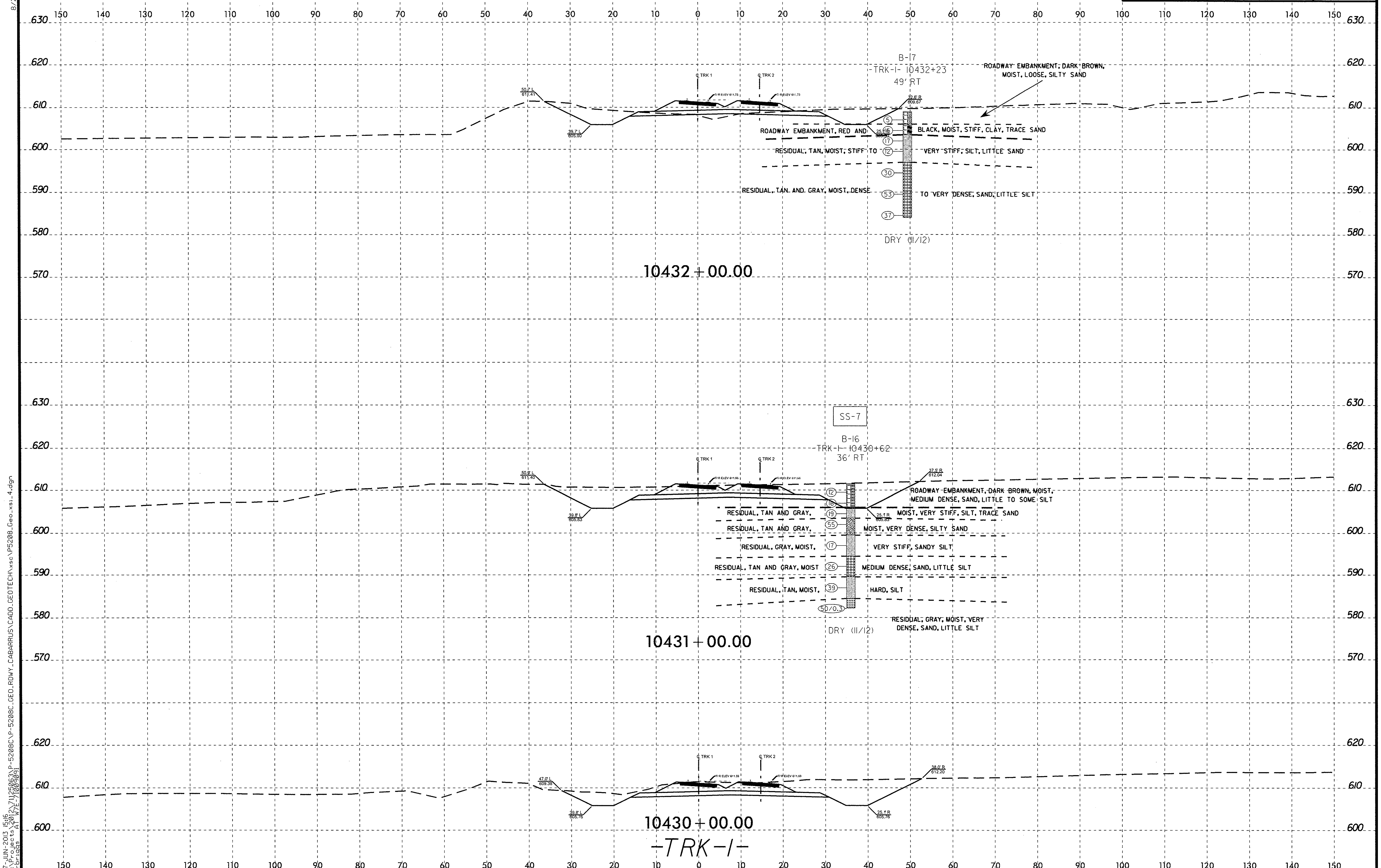
crbriggs AT W7E-71009091

PROJ. REFERENCE NO.	SHEET NO.
5000.1.STR08T3 (P-5208C)	35



8/23/99

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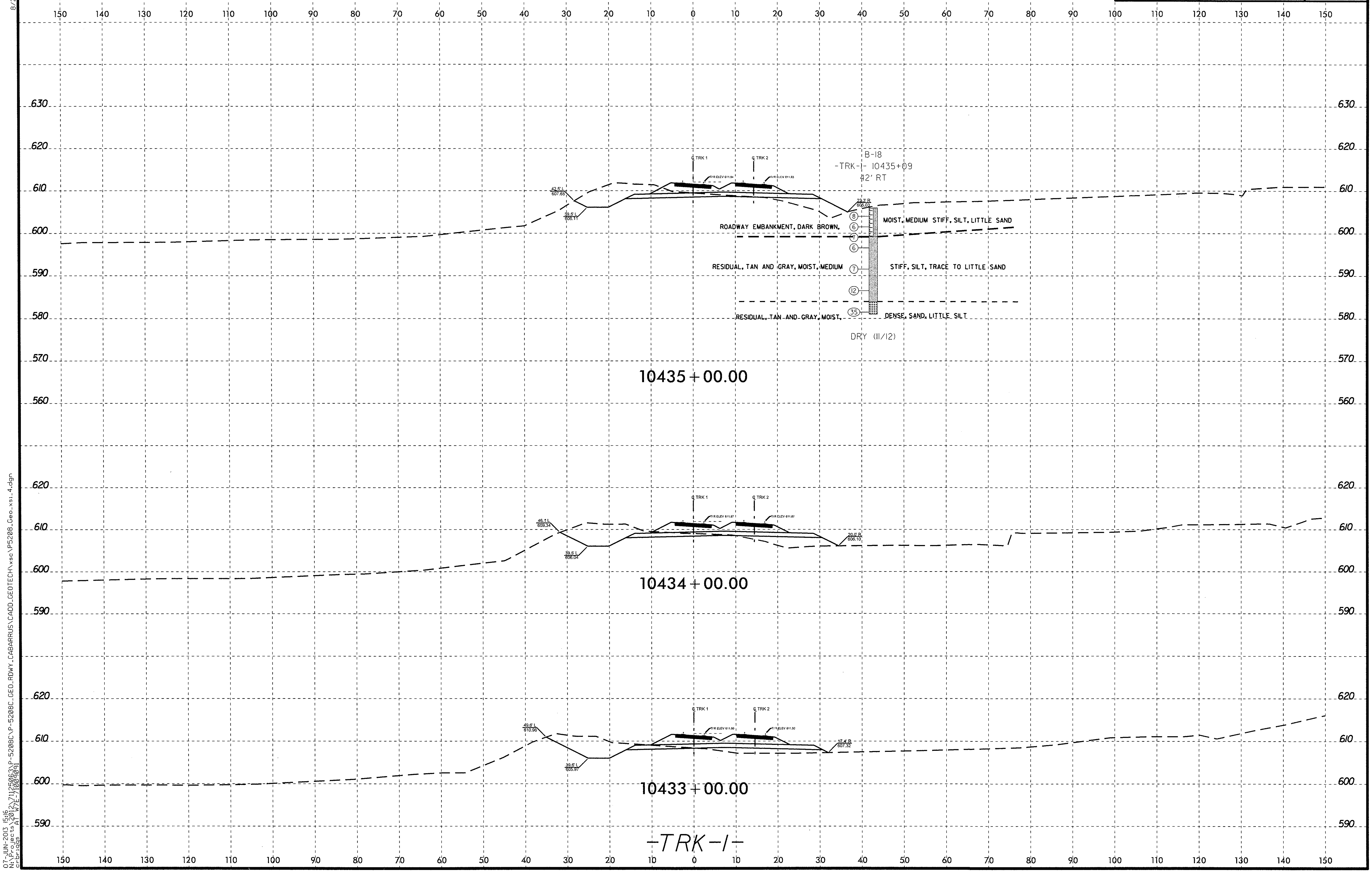
PROJ. REFERENCE NO.	SHEET NO.
5000.1.STR08T3 (P-5208C)	36



8/23/99

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crbriggs AT W7E-7100-4041

8/23/99

0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	5000.1.STR08T3 (P-5208C)	37

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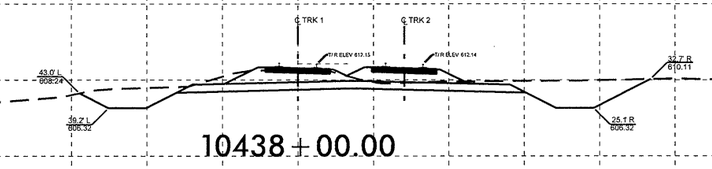
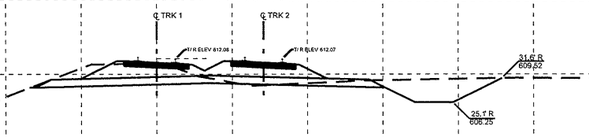
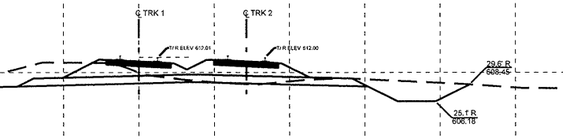
620 610 600



10438+00.00



10437+00.00



10436+00.00

-TRK-1-

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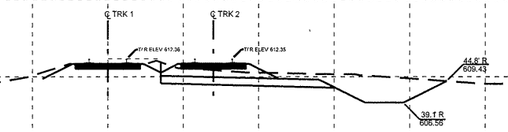
crbriggs
A1 WZE-7100901

8/23/99

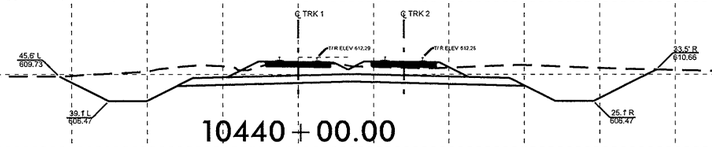
150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150

620
610
600



10441+00.00

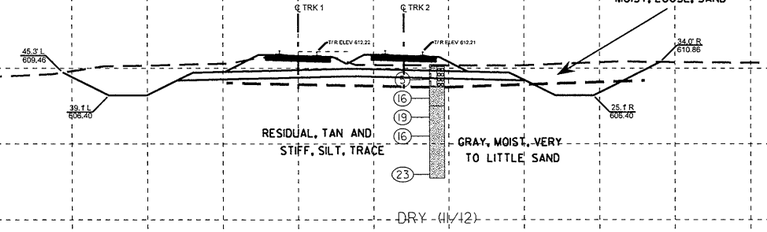
630
620
610
600



10440+00.00

630
620
610
600
590
580
570

B-19
-TRK-1- 10439+36
18' RT



DRY (11/12)

10439+00.00

-TRK-1-

630
620
610
600
590
580
570

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

07-JUN-2013 15:16
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crbriggs
A1 WZE-7100501

Project Reference No.	Sheet No.
50000.1.STR08T3 (P-5208C)	39

SUMMARY OF LABORATORY TEST RESULTS

Sample No.	Station	Offset * (feet)	Depth Interval (feet)	AASHTO Class.	L.L.	P.I.	% by Weight				% Passing (sieves)			% Moisture	% Organic
							Coarse Sand	Fine Sand	Silt	Clay	#10	#40	#200		
SS-1	10343+50	16 RT	33.5 – 35	A-2-4	NP	NP	8.0	57	-	-	100	99	35	26.5	-
SS-2	10344+97	15 RT	38.5 – 40	A-2-4	NP	NP	24.1	47.1	-	-	100	90	29	14.1	-
SS-3	10363+70	11 RT	8.5 – 10	A-2-7	41	21	28.2	44.5	-	-	98	83	25	19.5	-
SS-4	10374+80	13 RT	13.5 – 15	A-2-7	41	13	21.3	46.8	-	-	99	88	31	30.7	-
SS-5	10378+58	40 RT	8.5 – 10	A-2-4	NP	NP	36.7	37.3	-	-	95	73	21	14.6	-
SS-6	10421+18	30 RT	8.5 – 10	A-2-4	NP	NP	24.7	45.6	-	-	99	87	29	3.9	-
SS-7	10430+62	36 RT	3.5 – 5	A-2-4	30	9	32.9	41.2	-	-	98	80	24	9.5	-
SS-8	10455+25	13 RT	8.5 – 10	A-7-5	41	14	10.6	48.5	-	-	99	94	40	18.6	-
SS-9	10498+75	13 RT	8.5 – 10	A-2-4	NP	NP	31.4	35.3	-	-	89	70	22	15.2	-
SS-10	10507+57	12 RT	8.5 – 10	A-4	NP	NP	14.0	50.4	-	-	100	96	36	17.0	-

* OFFSET REFERENCED FROM -TRK1- ALIGNMENT

Douglas DeEsch, Jr.
Laboratory Manager
NCDOT CERT. No. 126-01-0910

Terracon Consultants, Inc.
Charlotte, North Carolina
NCDOT CERT No. 126-0910

June 7, 2013

Terracon

State of N.C. Department of Transportation
Rail Division
Geotechnical Engineering Unit
1556 Mail Service Center
Raleigh, North Carolina 27699-1556

Attn: Mr. Brad Symthe, PE

Re: Geotechnical Report - Recommendations
NCRR/NS Mainline Haydock to Junker Railroad Roadbed
MP 361.9 to MP 365.5
Cabarrus County, North Carolina
Project No. 50000.1.STR08T3
TIP No. P-5208C
Terracon Project No. 71125063

Dear Mr. Symthe:

Terracon Consultants, Inc. (Terracon) has completed the geotechnical subsurface exploration for the above referenced project. This report presents our geotechnical recommendations for construction of the NCRR/NS second mainline track.

We appreciate the opportunity to be of service to you on this project. If you have any questions concerning this report, please contact us.

Sincerely,
Terracon Consultants, Inc.

Christopher R. Briggs, P.E.
Staff Engineer

David J. Corley, P.E.
Geotechnical Department Manager

NORTH CAROLINA PROFESSIONAL SEAL 21914 ENGINEER DAVID J. CORLEY

Terracon Consultants, Inc. 2020 Starita Road, Suite E Charlotte, North Carolina 28273
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I. Slope/Embankment Stability

a. Slope Design

We recommend that all sloped be constructed at a ratio of 2:1 (H : V) or flatter.

b. Undercut for Slope Stability

The soils encountered in the vicinity of the proposed embankment slope between approximately -TRK1- Station 10373+00 and Station 10379+00 appear to be adequate for the support of the slope; however, we recommend a quantity of 250 cubic yards of slope stability undercut be included in the project contract as a contingency item to be used at the discretion of the Engineer. At the discretion of the Engineer, undercut material may be used outside the trackbed footprint or otherwise wasted.

c. Geotextile for Slope Stabilization

We recommend a quantity of 200 square yards of geotextile for soil stabilization be included in the project contract as a contingency item to be used at the discretion of the Engineer for slope stabilization.

II. Subgrade Stability

a. Undercut for Subgrade Stability

Due to relatively soft/loose soils encountered in the near-surface in borings B-18 and B-19, we recommend undercutting the area between approximately -TRK1- Station 10431+40 and Station 10439+85 to a depth of approximately 3 feet below existing or proposed grades (whichever is lower) and backfilling with approved borrow material as described in Section III-a of this report. A quantity of approximately 2,250 cubic yards of undercut should be included in the project contract to account for the unsuitable soils in this area.

In addition, we recommend a quantity of 750 cubic yards of subgrade stability undercut be included in the project contract as a contingency item to be used at the discretion of the Engineer. At the discretion of the Engineer, undercut material may be used outside the trackbed footprint or otherwise wasted.

b. Geotextile for Subgrade Stabilization

Geotextile for soil stabilization is recommended for placement in the base of undercut sections. We recommend a quantity of 2,850 square yards of geotextile for soil stabilization be included in the project contract as a contingency item to be used at the discretion of the Engineer in conjunction with the undercut in Section II.a.

III. Borrow Specifications

a. Borrow Criteria

Common borrow for embankment and trackbed construction to subgrade shall meet Statewide criteria outlined in the 2012 Standard Specifications, Article 1018-2, Section A.

b. Disposal of Waste Materials

The undercut soils as described in Section II-a of this report appear suitable for use as backfill material outside of the proposed trackbed footprint, provided they meet the specifications described in Section III-a of this report. These soils should be evaluated in the field and used for embankment construction at the Engineer's discretion.

c. Shrinkage Factor

A shrinkage factor of 20 percent in recommended for calculation of earthwork on this project.

d. Select Granular Material

We recommend 3,250 cubic yards of Class II, Type 2 Select Material for backfill be included as a contingency item in the project contract. This material should be used as backfill in undercut areas with geotextile. Select Material for backfill shall meet the criteria outlined in the Standard Specifications, Article 1016-3, Class II, Type 2.

e. Unclassified Excavation

Based on the current trackbed plans, the unclassified excavation along the alignment will be primarily derived from cut sections due to proposed trackbed subgrades and embankment cuts. The near surface soils encountered in our borings along the alignment appear suitable for use as trackbed and embankment fill. These soils should be evaluated in the field and used for construction at the Engineer's discretion.

IV. Miscellaneous

a. Reduction of Unclassified Excavation

A loss of 750 cubic yards of unclassified excavation is estimated on this project due to clearing and grubbing of cut sections.

b. Rock

Shallow very dense/hard residual soils were encountered in boring B-13. Based on the current plans, this very dense/hard residual soil will require excavation between approximately -TRK1- Station 10420+00 and Station 10422+70. A larger trackhoe or bulldozer equipped with a single-tooth ripper may be required to excavate these materials. While we do not expect rock to be encountered at the proposed depths, the ripping or blasting of rock excavations should be placed in the project contract as a contingency item to be used at the discretion of the Engineer.

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

GEOTECHNICAL ENGINEERING UNIT

Summary of Quantities

WBS No.: 50000.1.STR08T3 County: Cabarrus Project Engineer: D. Corley

TIP No.: P-5208C Field Office: Terracon Charlotte Offi Project Geologist:

Description: NCRR/NS Mainline Haydock to Junker Railroad Railbed (MP 361.9 to MP 365.5)

Pay Item No.	Pay Item/ Quantity Adjustment	Spec Book Section No. or Special Provision (SP) Reference	Report Section	Alignment	Begin Station	End Station	Quantity	Units
0036000000-E	Undercut Excavation	225 - Roadway Excavation	I. B	Contingency	N/A	N/A	250	CY
0036000000-E	Undercut Excavation	225 - Roadway Excavation	II. A	-TRK-1-	10431+40.00	10439+85.00	2,250	CY
0036000000-E	Undercut Excavation	225 - Roadway Excavation	II. A	Contingency	N/A	N/A	750	CY
						Total Quantity of Undercut Excavation =	**3,250**	**CY**
0195000000-E	Select Granular Material	265 - Select Granular Material	III. D	Contingency	N/A	N/A	250	CY
0195000000-E	Select Granular Material	265 - Select Granular Material	III. D	Contingency	N/A	N/A	3,000	CY
						Total Quantity of Select Granular Material =	**3,250**	**CY**
0196000000-E	Geotextile for Soil Stabilization	270 - Geotextile for Soil Stabilization	I. C	Contingency	N/A	N/A	200	SY
0196000000-E	Geotextile for Soil Stabilization	270 - Geotextile for Soil Stabilization	II. B	Contingency	N/A	N/A	2,850	SY
						Total Quantity of Geotextile for Soil Stabilization =	**3,050**	**SY**

These Items Only Impact Earthwork Totals								
N/A	Loss Due to Clearing & Grubbing	200 - Clearing and Grubbing	IV. A	N/A	N/A	N/A	750	CY
N/A	Shrinkage Factor	235 - Embankments	III. C	N/A	N/A	N/A	20	%

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	50000.1.STR08T3 (P-5208C)	1	11

STATE PROJ. NO.	F.A. PROJ. NO.	DESCRIPTION
		P.E.
		RW & UTIL.

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

CONTENTS

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RAIL DIVISION

ROADWAY SUBSURFACE INVESTIGATION

PROJ. REFERENCE NO. *50000.1.STR08T3* F.A. PROJ. _____

COUNTY *CABARRUS*

PROJECT DESCRIPTION *NCRR/NS MAINLINE HAYDOCK TO JUNKER RAILROAD ROADBED (MP 361.9 TO MP 365.5)*

RECOMMENDATIONS

CAUTION NOTICE

THE SUBSURFACE INFORMATION AND THE SUBSURFACE INVESTIGATION ON WHICH IT IS BASED WERE MADE FOR THE PURPOSE OF STUDY, PLANNING, AND DESIGN, AND NOT FOR CONSTRUCTION OR PAY PURPOSES. THE VARIOUS FIELD BORING LOGS, ROCK CORES, AND SOIL TEST DATA AVAILABLE MAY BE REVIEWED OR INSPECTED IN RALEIGH BY CONTACTING THE N. C. DEPARTMENT OF TRANSPORTATION, GEOTECHNICAL ENGINEERING UNIT AT (919) 707-6850. NEITHER THE SUBSURFACE PLANS AND REPORTS, NOR THE FIELD BORING LOGS, ROCK CORES, OR SOIL TEST DATA ARE PART OF THE CONTRACT.

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

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

PERSONNEL

McCLOUD, P.D.

BRIGGS, C.R.

TURNAGE, J.R.

REARDON, C.R.

INVESTIGATED BY *TERRACON CONSULTANTS*

CHECKED BY *CORLEY, D.J.*

SUBMITTED BY *TERRACON CONSULTANTS*

DATE *JUNE 2013*

NORTH CAROLINA PROFESSIONAL SEAL 21914 ENGINEER DAVID J. CORLEY 6/7/13

ID: P-5208C

CONTRACT: _____

DRAWN BY: *ALEXANDER, M.J.*

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.

PROJECT REFERENCE NO.	SHEET NO
50000.1.STR08T3 (P-5208C)	2

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

RAIL DIVISION

SUBSURFACE INVESTIGATION

SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

SOIL DESCRIPTION

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

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

SOIL LEGEND AND AASHTO CLASSIFICATION

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

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

CONSISTENCY OR DENSENESS

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

TEXTURE OR GRAIN SIZE

U.S. STD. SIEVE SIZE	4	10	40	60	200	270
OPENING (MM)	4.76	2.00	0.42	0.25	0.075	0.053

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

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

SOIL MOISTURE - CORRELATION OF TERMS

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

PLASTICITY

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

COLOR

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

GRADATION

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

ANGULARITY OF GRAINS

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

MINERALOGICAL COMPOSITION

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

COMPRESSIBILITY

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

PERCENTAGE OF MATERIAL

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

GROUND WATER

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

MISCELLANEOUS SYMBOLS

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

ABBREVIATIONS

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

SAMPLE ABBREVIATIONS

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

EQUIPMENT USED ON SUBJECT PROJECT

DRILL UNITS:
- [ ] MOBILE B-___
- [ ] BK-51
- [ ] CME-45C
- [ ] CME-550
- [ ] PORTABLE HOIST
- [X] CME 75 (TER6847)
- [ ] _____

ADVANCING TOOLS:
- [ ] CLAY BITS
- [ ] 6" CONTINUOUS FLIGHT AUGER
- [X] 8" HOLLOW AUGERS
- [ ] HARD FACED FINGER BITS
- [ ] TUNG.-CARBIDE INSERTS
- [X] CASING [ ] W/ ADVANCER
- [ ] TRICONE _____" STEEL TEETH
- [X] TRICONE 2 15/16" TUNG.-CARB.
- [ ] CORE BIT
- [ ] _____

HAMMER TYPE:
- [X] AUTOMATIC [ ] MANUAL

CORE SIZE:
- [ ] -B_____
- [ ] -N_____
- [ ] -H_____

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

ROCK DESCRIPTION

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

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

WEATHERING

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

ROCK HARDNESS

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

FRACTURE SPACING

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

BEDDING

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

INDURATION

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

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

TERMS AND DEFINITIONS

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

AQUIFER - A WATER BEARING FORMATION OR STRATA.

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

ARGILLACEOUS - APPLIED TO ALL ROCKS OR SUBSTANCES COMPOSED OF CLAY MINERALS, OR HAVING A NOTABLE PROPORTION OF CLAY IN THEIR COMPOSITION, AS SHALE, SLATE, ETC.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT) - NUMBER OF BLOWS (N OR BPF) OF A 140 LB. HAMMER FALLING 30 INCHES REQUIRED TO PRODUCE A PENETRATION OF 1 FOOT INTO SOIL WI A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER. SPT REFUSAL IS PENETRATION EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS.

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

STRATA ROCK QUALITY DESIGNATION (SRQD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS WITHIN A STRATUM EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE.

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

BENCH MARK: ELEVATIONS TAKEN FROM PROVIDED TIN FILE

ELEVATION: F

NOTES:

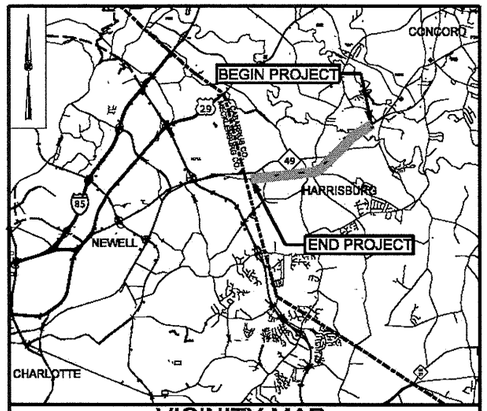
☒ UNDERCUT EXCAVATION

REVISED 09/23/09

TIP PROJECT: P-5208C

CONTRACT:

SEE SHEET 1A FOR INDEX OF SHEETS



VICINITY MAP

NAD 83/ NSRS 2007

NCDOT
RAIL DIVISION

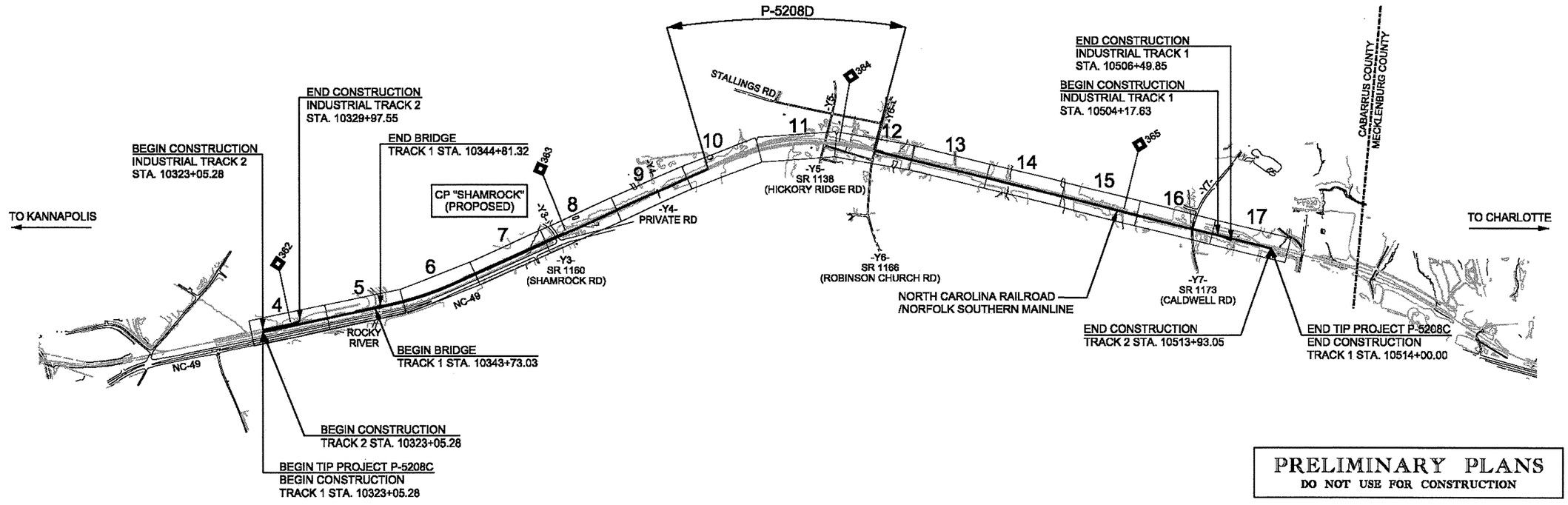
CABARRUS COUNTY

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	P-5208C	2A	11

STATE PROJ. NO.	F.A. PROJ. NO.	DESCRIPTION
50000.1.STR07T1B		P.E./UTIL P.E.
50000.1.STR08T3		P.E./UTIL P.E.
43219.2.STR09P5208		R.O.W.
50000.3.STR03T4A		CONST./UTIL CONST.

PROJECT TITLE: NCRR/NS MAINLINE HAYDOCK TO JUNKER RAILROAD ROADBED (MP 361.9 TO MP 365.5)

TYPE OF WORK: GRADING, DRAINAGE, PAVING, STRUCTURES, RETAINING WALLS

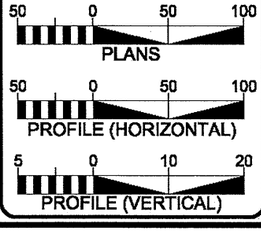


PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

SUBMITTAL: RIGHT-OF-WAY
DATE: SEPTEMBER 28, 2012

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

GRAPHIC SCALES



PROJECT LENGTH

LENGTH OF RAIL TIP PROJECT	3.595 MILES
LENGTH OF STRUCTURES TIP PROJECT	0.021 MILES
TOTAL LENGTH OF TIP PROJECT	3.616 MILES

Prepared in the Office of:
HNTB
HNTB NORTH CAROLINA, P.C.
343 E. Six Forks Road, Suite 200
Raleigh, North Carolina 27609
NC License No: C-1554

2012 STANDARD SPECIFICATIONS

RIGHT OF WAY DATE: SEPTEMBER 2012

LETTING DATE: JULY 16, 2013

COREY VERNIER, P.E. — *RAIL PROJECT ENGINEER*
ENRICO ROQUE, P.E. — *RAIL PROJECT DESIGN ENGINEER*
DAVID HAWKINS, P.E. — *STRUCTURE PROJECT ENGINEER*
JAMES BYRD, P.E. — *HYDRAULICS PROJECT ENGINEER*
BRAD SYMTHE, P.E. — *NCDOT PROJECT MANAGER*

RAIL ENGINEER
P.E.
SIGNATURE:

HYDRAULICS ENGINEER
P.E.
SIGNATURE:

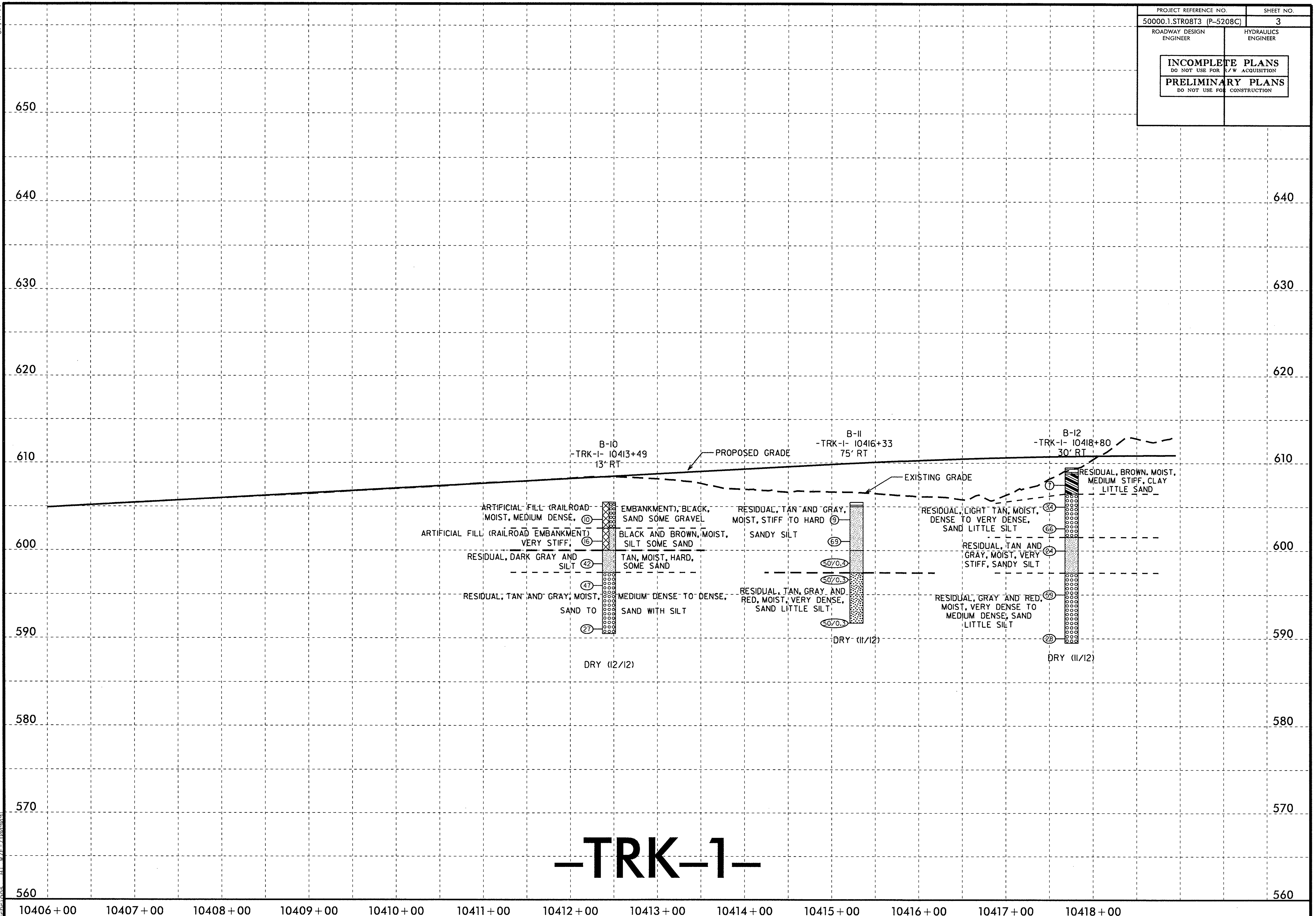
NC DEPARTMENT OF TRANSPORTATION
RAIL DIVISION
ENGINEERING AND SAFETY BRANCH
CAPITAL YARD
1556 MAIL SERVICE CENTER
RALEIGH, NC 27699-1556

PROJECT REFERENCE NO.	SHEET NO.
50000.1.STR08T3 (P-5208C)	3

ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION



5/14/99

PROJECT REFERENCE NO.	SHEET NO.
50000.1.STR08T3 (P-5208C)	4
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

650
640
630
620
610
600
590
580
570
560

SS-6

B-13
-TRK-I- 10421+18
30' RT

EXISTING GRADE

PROPOSED GRADE

50/0.3
50/0.3
50/0.4
50/0.3
50/0.4
50/0.3
50/0.4

RESIDUAL, TAN, ORANGE AND GRAY, MOIST TO DRY, VERY DENSE, SAND, SOME SILT

RESIDUAL, TAN AND GRAY, DRY, VERY DENSE, SAND LITTLE SILT AND GRAVEL

RESIDUAL, TAN AND GRAY, DRY, VERY DENSE, SAND, SOME SILT

DRY (11/12)

B-14
-TRK-I- 10424+18
38' RT

8
14
10
14
17
20
25

RESIDUAL, TAN AND GRAY, MOIST, STIFF TO VERY STIFF, SILT TO SILT LITTLE SAND

DRY (11/12)

B-15
-TRK-I- 10427+66
34' RT

17
25
90
43
50/0.3
50/0.3

RESIDUAL, BROWN AND TAN, MOIST, VERY STIFF, SAND LITTLE SILT

RESIDUAL, TAN AND GRAY, MOIST, VERY DENSE, SAND, LITTLE SILT

DRY (11/12)

ROADWAY EMBANKMENT, DARK BROWN, MOIST, MEDIUM DENSE, SAND LITTLE SILT TO SILTY SAND

RESIDUAL, TAN AND GRAY, MOIST, DENSE TO VERY DENSE, SILTY SAND

SS-7

B-16
-TRK-I- 10430+62
36' RT

12
16
19
55
17
26
39
50/0.3

RESIDUAL, GRAY, MOIST, VERY STIFF, SANDY SILT

RESIDUAL, TAN AND GRAY, MOIST

RESIDUAL, TAN, MOIST, HARD, SILT

RESIDUAL, GRAY, MOIST, VERY DENSE, SAND, LITTLE SILT

DRY (11/12)

B-17
-TRK-I- 10432+23
49' RT

8
15
17
12
30
53
37

ROADWAY EMBANKMENT, RED AND BLACK, MOIST, STIFF, CLAY TRACE SAND

RESIDUAL, GRAY AND TAN, MOIST, STIFF TO VERY STIFF, SILT TRACE TO LITTLE SAND

MEDIUM DENSE TO VERY DENSE, SAND LITTLE SILT

DRY (11/12)

10420+00 | 10421+00 | 10422+00 | 10423+00 | 10424+00 | 10425+00 | 10426+00 | 10427+00 | 10428+00 | 10429+00 | 10430+00 | 10431+00 | 10432+00 | 10433+00 | 10434+00

-TRK-1-

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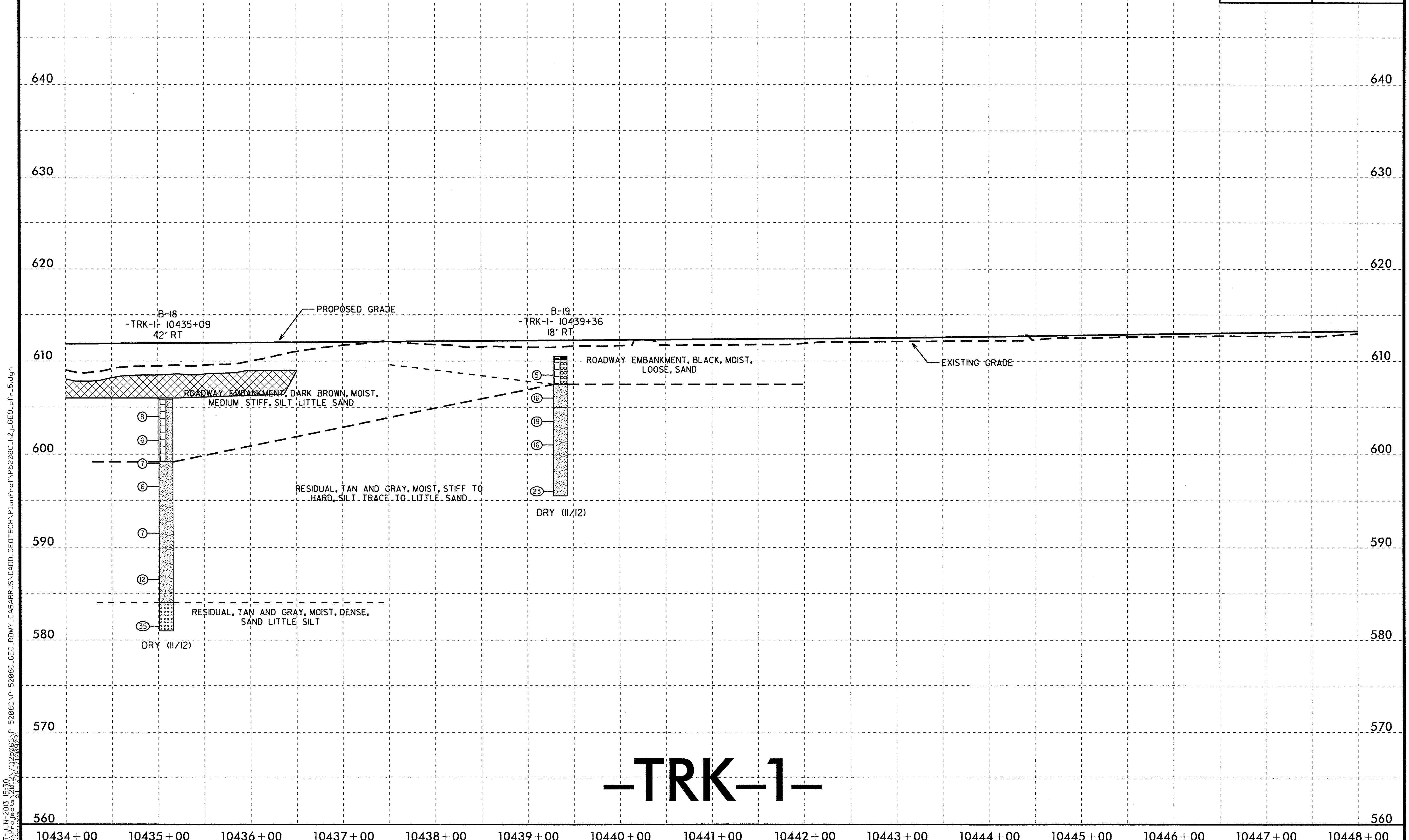
PROJECT REFERENCE NO.	SHEET NO.
50000.1.STR08T3 (P-5208C)	5
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION



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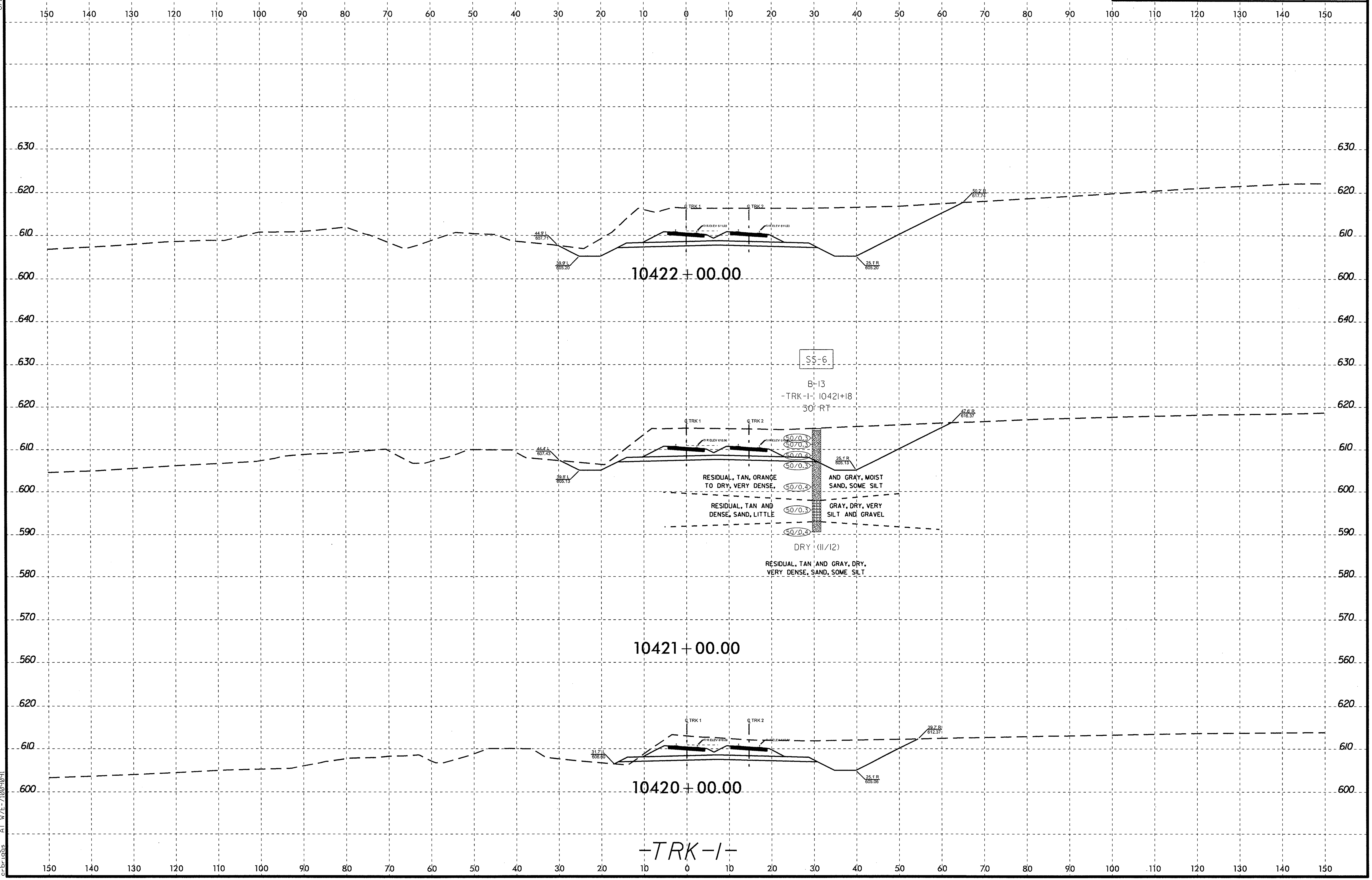

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0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	5000.1.STR08T3 (P-5208C)	7

BEGIN UNDERCUT FOR SUBGRADE STABILITY
-TRK-1- 10431+40

B-17
-TRK-1- 10432+23
49' RT

ROADWAY EMBANKMENT, DARK BROWN, MOIST, LOOSE, SILTY SAND

ROADWAY EMBANKMENT, RED AND BLACK, MOIST, STIFF, CLAY, TRACE SAND

RESIDUAL, TAN, MOIST, STIFF TO VERY STIFF, SILT, LITTLE SAND

RESIDUAL, TAN AND GRAY, MOIST, DENSE TO VERY DENSE, SAND, LITTLE SILT

DRY (11/12)

10432+00.00

SS-7

B-16
-TRK-1- 10430+62
36' RT

ROADWAY EMBANKMENT, DARK BROWN, MOIST, MEDIUM DENSE, SAND, LITTLE TO SOME SILT

RESIDUAL, TAN AND GRAY, MOIST, VERY STIFF, SILT, TRACE SAND

RESIDUAL, TAN AND GRAY, MOIST, VERY DENSE, SILTY SAND

RESIDUAL, GRAY, MOIST, VERY STIFF, SANDY SILT

RESIDUAL, TAN AND GRAY, MOIST MEDIUM DENSE, SAND, LITTLE SILT

RESIDUAL, TAN, MOIST, HARD, SILT

RESIDUAL, GRAY, MOIST, VERY DENSE, SAND, LITTLE SILT

DRY (11/12)

10431+00.00

10430+00.00
-TRK-1-

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crbridge
AT W7E-1100901

8/23/99

0 5 10	PROJ. REFERENCE NO.	SHEET NO.
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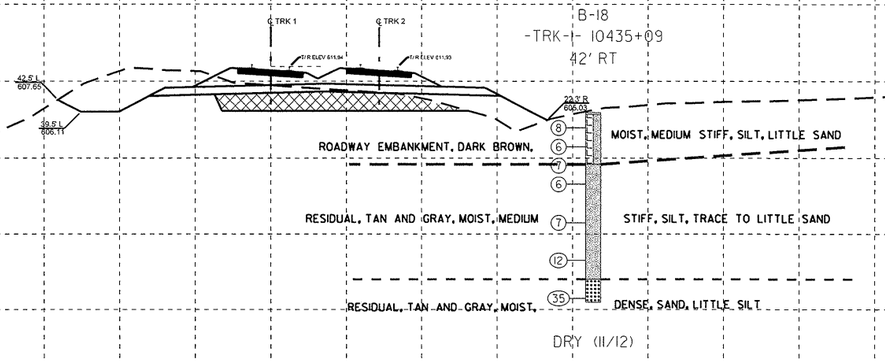

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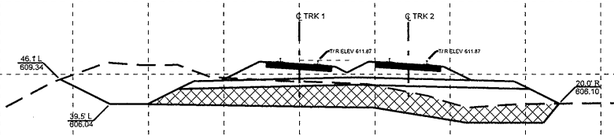

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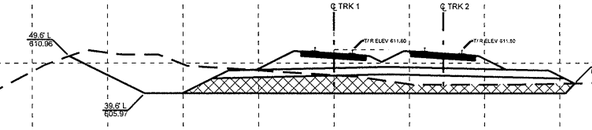

10433+00.00

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AT WPE 7100909

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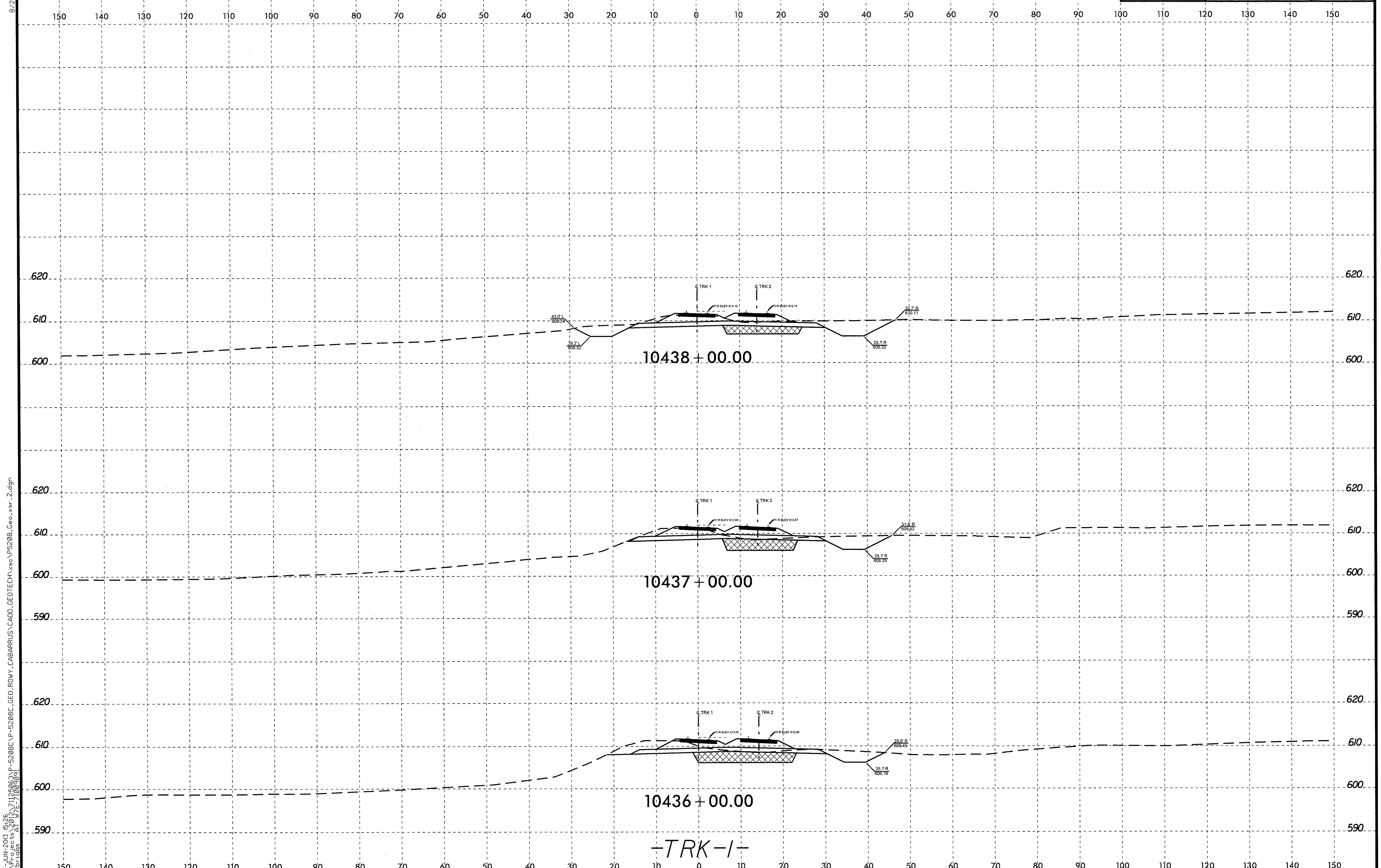

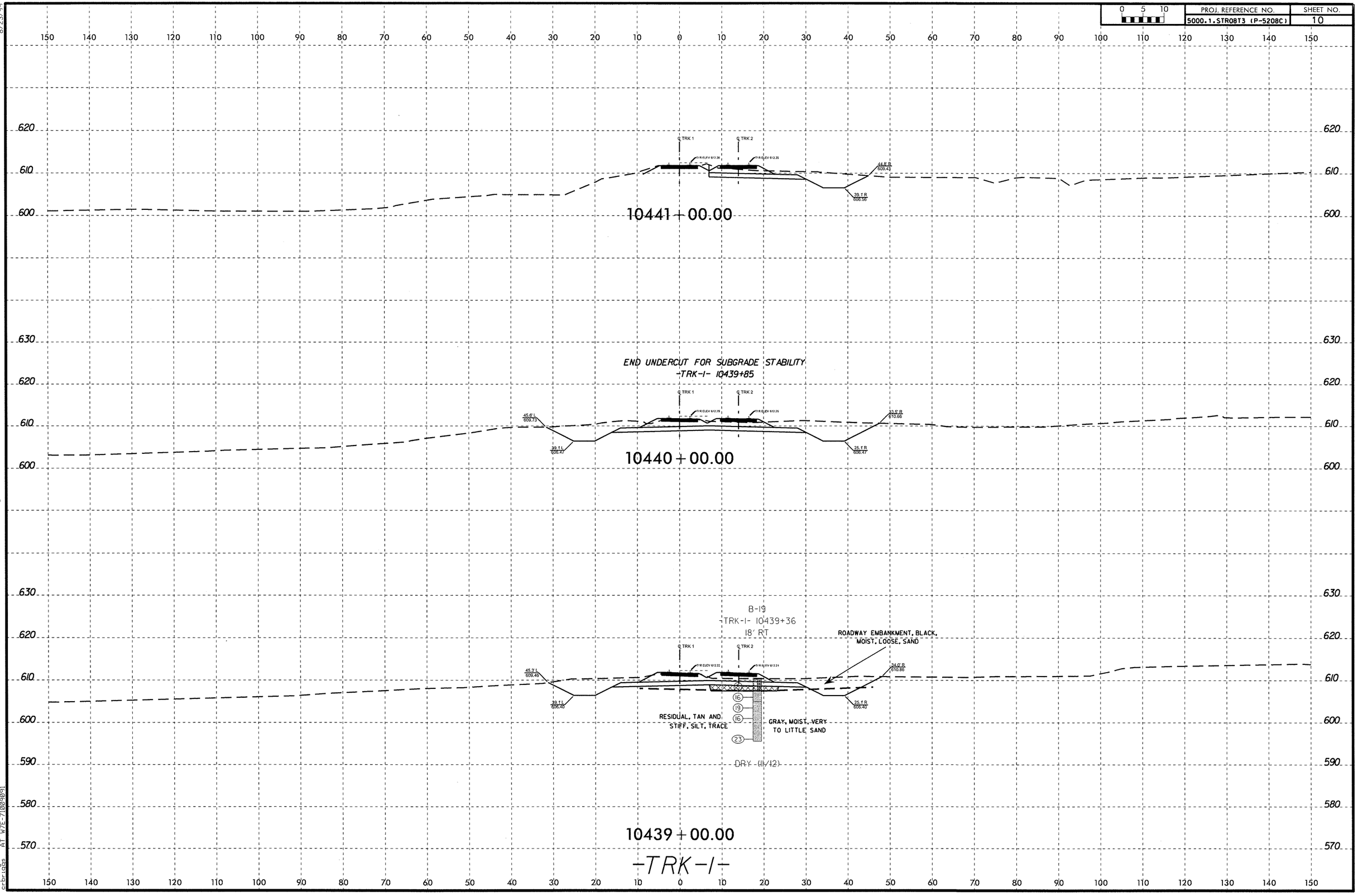

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crbriggs
ATT W7E-7100901

Project Reference No.	Sheet No.
50000.1.STR08T3 (P-5208C)	11

SUMMARY OF LABORATORY TEST RESULTS

Sample No.	Station	Offset * (feet)	Depth Interval (feet)	AASHTO Class.	L.L.	P.I.	% by Weight				% Passing (sieves)			% Moisture	% Organic
							Coarse Sand	Fine Sand	Silt	Clay	#10	#40	#200		
SS-1	10343+50	16 RT	33.5 – 35	A-2-4	NP	NP	8.0	57	-	-	100	99	35	26.5	-
SS-2	10344+97	15 RT	38.5 – 40	A-2-4	NP	NP	24.1	47.1	-	-	100	90	29	14.1	-
SS-3	10363+70	11 RT	8.5 – 10	A-2-7	41	21	28.2	44.5	-	-	98	83	25	19.5	-
SS-4	10374+80	13 RT	13.5 – 15	A-2-7	41	13	21.3	46.8	-	-	99	88	31	30.7	-
SS-5	10378+58	40 RT	8.5 – 10	A-2-4	NP	NP	36.7	37.3	-	-	95	73	21	14.6	-
SS-6	10421+18	30 RT	8.5 – 10	A-2-4	NP	NP	24.7	45.6	-	-	99	87	29	3.9	-
SS-7	10430+62	36 RT	3.5 – 5	A-2-4	30	9	32.9	41.2	-	-	98	80	24	9.5	-
SS-8	10455+25	13 RT	8.5 – 10	A-7-5	41	14	10.6	48.5	-	-	99	94	40	18.6	-
SS-9	10498+75	13 RT	8.5 – 10	A-2-4	NP	NP	31.4	35.3	-	-	89	70	22	15.2	-
SS-10	10507+57	12 RT	8.5 – 10	A-4	NP	NP	14.0	50.4	-	-	100	96	36	17.0	-

* OFFSET REFERENCED FROM -TRK1- ALIGNMENT

Douglas DeEsch, Jr.
Laboratory Manager
NCDOT CERT. No. 126-01-0910

Terracon Consultants, Inc.
Charlotte, North Carolina
NCDOT CERT No. 126-0910