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

CONTENTS

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

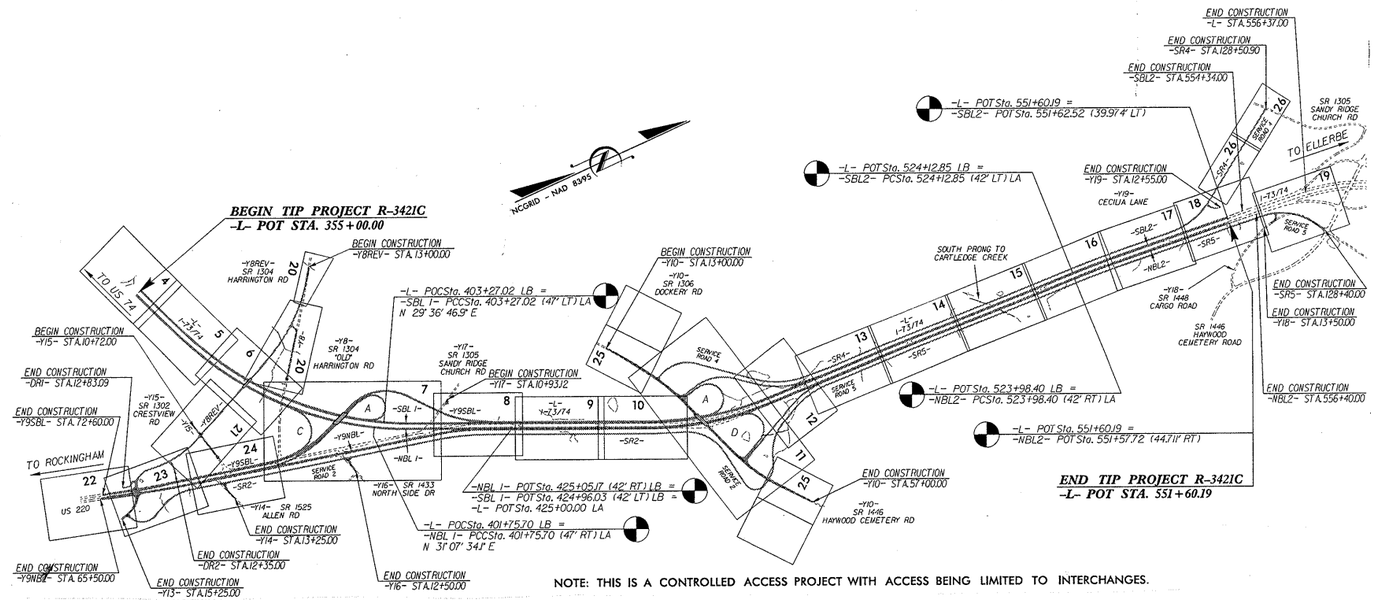
ROADWAY SUBSURFACE INVESTIGATION

PROJ. REFERENCE NO. 34542.1.2 (R-3421C) F.A. PROJ. NHF-220(4)

COUNTY RICHMOND

PROJECT DESCRIPTION US 220 BYPASS FROM 0.2 MILES SOUTHWEST OF SR 1304 (HARRINGTON RD.) TO US 220 BUSINESS/BYPASS INTERCHANGE SOUTH OF ELLERBE

INVENTORY



NOTE: THIS IS A CONTROLLED ACCESS PROJECT WITH ACCESS BEING LIMITED TO INTERCHANGES.

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	R-3421C	1	73

STATE PROJ. NO.	F. A. PROJ. NO.	DESCRIPTION
34542.1.2	NHF-0220(4)	PE
34542.2.5	HPPNHF-0220(56)	R/W & UTILITIES
34542.3.5	HPPNHS-0220(65)	CONSTRUCTION

CAUTION NOTICE

THE SUBSURFACE INFORMATION AND THE SUBSURFACE INVESTIGATION ON WHICH IT IS BASED WERE MADE FOR THE PURPOSE OF STUDY, PLANNING, AND DESIGN, AND NOT FOR CONSTRUCTION OR PAY PURPOSES. THE VARIOUS FIELD BORING LOGS, ROCK CORES, AND SOIL TEST DATA AVAILABLE MAY BE REVIEWED OR INSPECTED IN RALEIGH BY CONTACTING THE N. C. DEPARTMENT OF TRANSPORTATION, GEOTECHNICAL ENGINEERING UNIT AT (919) 250-4088. NEITHER THE SUBSURFACE PLANS AND REPORTS, NOR THE FIELD BORING LOGS, ROCK CORES, OR SOIL TEST DATA ARE PART OF THE CONTRACT.

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

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

PERSONNEL

C.C. MURRAY

J.E. ESTEP

L.N. HARPER

INVESTIGATED BY C.B. LITTLE

CHECKED BY C.B. LITTLE

SUBMITTED BY C.B. LITTLE

DATE

NORTH CAROLINA REGISTERED SEAL 10425 GEOLOGIST CLINTON B. LITTLE 6-25-09

CONTRACT: C202962 ID: R-3421C

DRAWN BY: J.K. McCLURE

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.

TIP PROJECT: R-3421C

CONTRACT:

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	R-3421C	1A	
STATE PROJ. NO.	F.A. PROJ. NO.	DESCRIPTION	
34542.1.2	NHF-220(4)	PE	

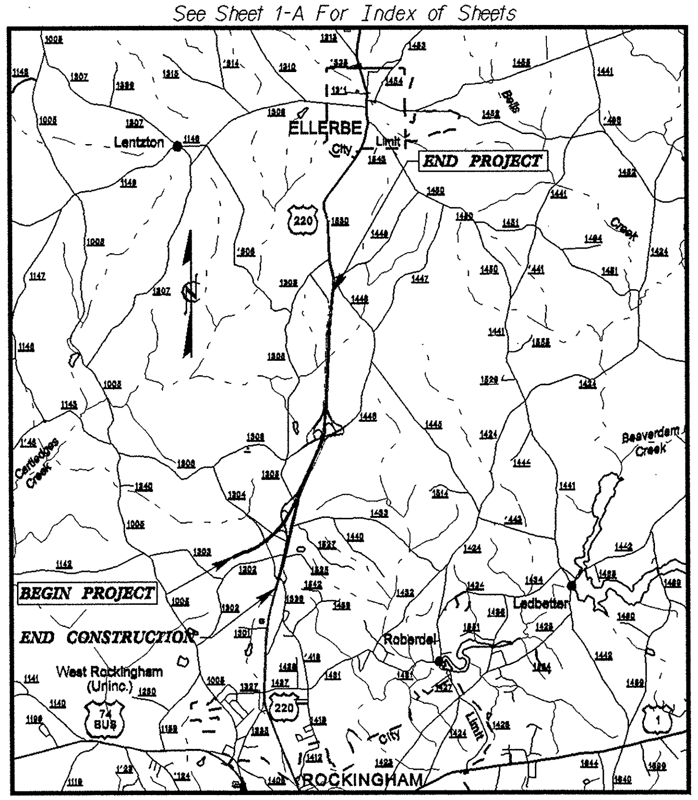
STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

RICHMOND COUNTY

LOCATION: US 220 BYPASS FROM 0.2 MILES SOUTHWEST OF SR 1304 (HARRINGTON RD) TO US 220 BUSINESS/BYPASS INTERCHANGE SOUTH OF ELLERBE

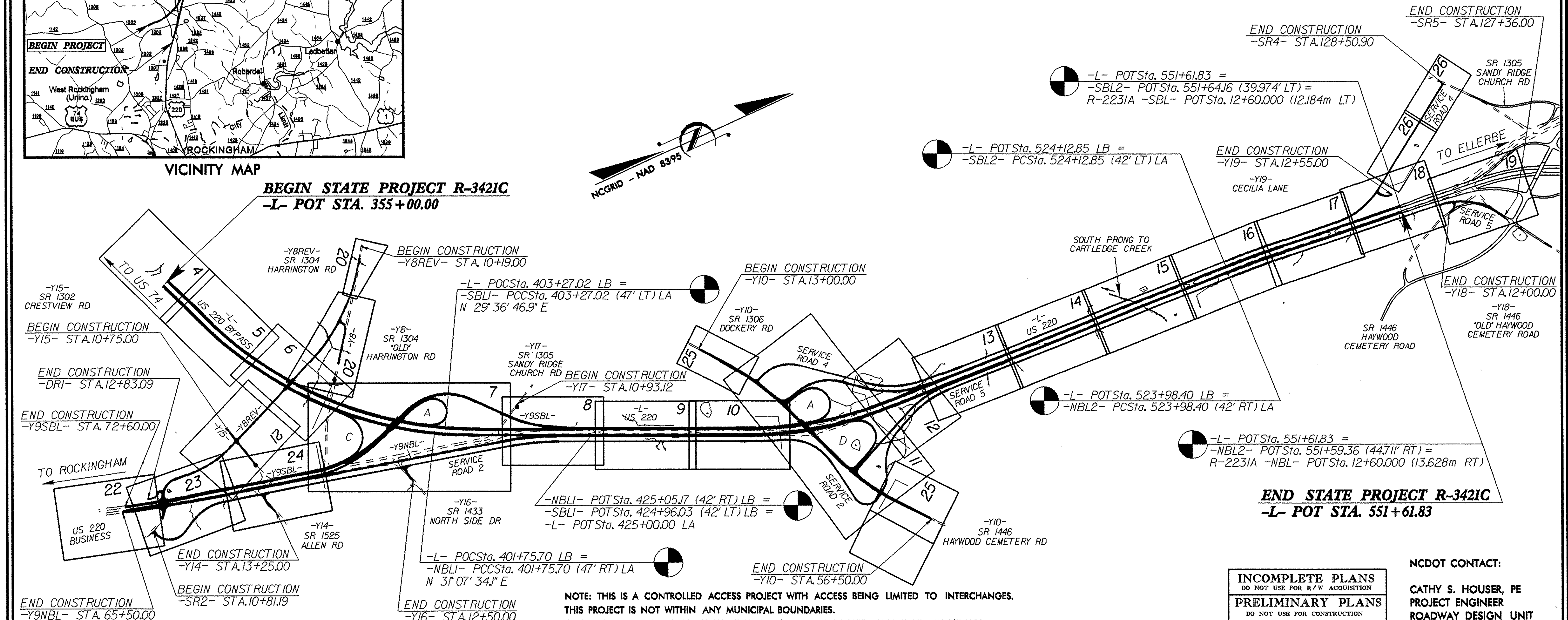
TYPE OF WORK: GRADING, PAVING, DRAINAGE, SIGNING, STRUCTURES, AND CULVERT

See Sheet 1-A For Index of Sheets



VICINITY MAP

NOTE: NCDOT PROJECT R-2231A CURRENTLY UNDER CONSTRUCTION, SHOWN IN GRAY.



NOTE: THIS IS A CONTROLLED ACCESS PROJECT WITH ACCESS BEING LIMITED TO INTERCHANGES.
THIS PROJECT IS NOT WITHIN ANY MUNICIPAL BOUNDARIES.
CLEARING ON THIS PROJECT SHALL BE PERFORMED TO THE LIMITS ESTABLISHED BY METHOD ___.

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

NCDOT CONTACT:
CATHY S. HOUSER, PE
PROJECT ENGINEER
ROADWAY DESIGN UNIT

GRAPHIC SCALES

50 25 0 50 100 — PLANS

50 25 0 50 100 — PROFILE (HORIZONTAL)

10 5 0 10 20 — PROFILE (VERTICAL)

DESIGN DATA

ADT 2005 = 21,610
ADT 2025 = 32,520
DHV = 10 %
D = 60 %
T = 28 % *
V = 70 MPH
* TTST 18 % DUAL 10 %

PROJECT LENGTH

LENGTH ROADWAY F.A. PROJECT NHF-220(4)	= 3.724 mi
TOTAL LENGTH STATE PROJECT NO. 34542.1.2	= 3.724 mi

-L- LINE USED FOR PROJECT LENGTH

Prepared for:
DIVISION OF HIGHWAYS
1000 Birch Ridge Dr., NC, 27610
Prepared by:
MA ENGINEERING CONSULTANTS, INC.
598 E. CHATHAM STREET, SUITE 137
CARY, NORTH CAROLINA 27511
(919) 297-0220

2002 STANDARD SPECIFICATIONS

RIGHT OF WAY DATE:
APRIL , 2006
LETTING DATE:

R.W. PORTER JR., PE
PROJECT ENGINEER

K.S. HUTCHENS
PROJECT DESIGN ENGINEER

HYDRAULICS ENGINEER
SIGNATURE: P.E.

ROADWAY DESIGN ENGINEER
SIGNATURE: P.E.

DIVISION OF HIGHWAYS
STATE OF NORTH CAROLINA

STATE HIGHWAY DESIGN ENGINEER P.E.

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callaway AT GEH21459

PROJECT REFERENCE NO.	SHEET NO.
R-3421C	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	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 MX	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/FT²)
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
- SOUNDING ROD
- SPT CPT DPT DMT VST PMT — TEST BORING
- AUGER BORING
- CORE BORING
- MW — MONITORING WELL
- PIEZOMETER INSTALLATION
- SLOPE INDICATOR INSTALLATION
- SPT N-VALUE
- REF — SPT REFUSAL

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

ABBREVIATIONS

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

EQUIPMENT USED ON SUBJECT PROJECT

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

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

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

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

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

ROCK DESCRIPTION

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

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

WEATHERING

FRESH	ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING. ROCK RINGS UNDER HAMMER IF CRYSTALLINE.
VERY 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:

ELEVATION: FT.

NOTES:

REVISED 02/23/06

Project: R-3421C 34542.3.FS5 County: Richmond Date: November 14, 2013 Computed by: RWP Sheet : 2 of 4

STATION to STATION	EXCAVATION					EMBANKMENT				BORROW	WASTE			
	TOTAL UNCLASS.	ROCK	UNDERCUT	UNSUITABLE UNCLASS.	SUITABLE UNCLASS.	TOTAL	ROCK	EARTH	EMBANK. +20%		ROCK	SUITABLE	UNSUITABLE	TOTAL
-TA3- 32+96.54 TO 45+03.94 (DETOUR)	496				496	262		262	314			182		182
-TA4- 60+41.92 TO 81+80.08 (DETOUR)	772				772	10,606		10,606	12,727	11,955				
-TA8- 12+50.00 TO 14+82.99 (DETOUR)	220				220							220		220
-TA8- 15+07.05 TO 15+65.62 (DETOUR)						138		138	166	166				
-TA6- 98+00.00 TO 112+52.29 (DETOUR)	907				907	435		435	522			385		385
AREA 2 SUBTOTAL	172,032				172,032	159,356		159,356	191,227	88,619		69,424		69,424
WASTE TO REPLACE BORROW										-69,424		-69,424		-69,424
AREA 2 TOTAL	**172,032**				**172,032**	**159,356**		**159,356**	**191,227**	**19,195**		**0**		**0**
AREA 3 (-L- & -Y10- QUADRANT D AREA, -SR2- LEFT OF -Y9NBL- AND -SR2- & -SR5- RIGHT OF -L-)														
-SR2- 10+81.24 TO 40+00.00	31,551				31,551	60,058		60,058	72,070	40,519				
-Y14- 10+12.00.19 TO 13+25.00	39				39	1,687		1,687	2,024	1,985				
-SR2- 40+00.00 TO 70+00.00	39,687				39,687	10,345		10,345	12,414			27,273		27,273
-Y16- 10+12.00 TO 12+50.00	283				283	271		271	325	42				
-SR2- 70+00.00 TO 100+00.00	124,159				124,159	30,631		30,631	36,757			87,402		87,402
-SR2- 100+00.00 TO 127+06.94	13,783				13,783	77,914		77,914	93,497	79,714				
-TA1- 10+45.83 TO 26+44.50 (DETOUR)	438				438	2,662		2,662	3,194	2,756				
-TA9- 32+27.13 TO 43+19.69 (DETOUR)	30				30	602		602	722	692				
-L- RT. (NB LANES) 439+00.00 TO 468+00 INCL. -Y10LPD- 0+00.00 TO 4+50.00 (-L- RT. 461+00.00 TO 465+50.00)	11,910				11,910	11,458		11,458	13,750	1,840				
-Y10LPD- 4+50.00 TO 14+29.01	560				560	11,005		11,005	13,206	12,646				
-Y10- 34+38.60 (END BRIDGE) TO 57+00.00	4,524				4,524	45,688		45,688	54,826	50,302				
-Y10RPD- 4+00.00 TO 19+95.51	10,558				10,558	10,899		10,899	13,079	2,521				
-SR5- 19+16.16 TO 40+00.00	38,779				38,779	13,109		13,109	15,731			23,048		23,048
-SR5- 40+00 TO 70+00.00	45,948				45,948	21,141		21,141	25,369			20,579		20,579
-SR5- 70+00.00 TO 100+00.00	2,141				2,141	58,660		58,660	70,392	68,251				
-SR5- 100+00.00 TO 128+64.00	8,800				8,800	23,821		23,821	28,585	19,785				
-Y18- 10+12.37 TO 12+00.00	219				219	586		586	703	484				
-TA5- 65+38.46 TO 81+00.00 (DETOUR)	1,214				1,214	1,277		1,277	1,532	318				
-TA8- 16+73.25 TO 17+32.57 (DETOUR)						117		117	140	140				
-TA8- 17+56.57 TO 20+50.00 (DETOUR)	371				371	145		145	174			197		197
-TA7- 98+00.00 TO 112+51.85 (DETOUR)	413				413	82		82	98			315		315
AREA 3 SUBTOTAL	335,407				335,407	382,158		382,158	458,588	281,995		158,814		158,814
WASTE TO REPLACE BORROW										-158,814		-158,814		-158,814
AREA 3 TOTAL	**335,407**				**335,407**	**382,158**		**382,158**	**458,588**	**123,181**		**0**		**0**
-TA2- 40+43.83 TO 52+90.89 (DETOUR - AREA 5)	467				467	904		904	1,085	618				
-TA8- 15+90.41 TO 16+49.51 (DETOUR - AREA 4)						138		138	166	166				
PHASE I SUBTOTAL (AREA 1+ AREA 2 + AREA 3 + DETOURS)	1,395,855				1,395,855	1,104,073		1,104,073	1,324,886	143,160		214,129		214,129
WASTE TO REPLACE BORROW										-143,160		-143,160		-143,160
PHASE I TOTAL	**1,395,855**				**1,395,855**	**1,104,073**		**1,104,073**	**1,324,886**	**0**		**70,969**		**70,969**

Project: R-3421C 34542.3.FS5 County: Richmond Date: November 14, 2013 Computed by: RWP Sheet : 3 of 4

STATION to STATION	EXCAVATION					EMBANKMENT				BORROW	WASTE			
	TOTAL UNCLASS.	ROCK	UNDERCUT	UNSUITABLE UNCLASS.	SUITABLE UNCLASS.	TOTAL	ROCK	EARTH	EMBANK. +20%		ROCK	SUITABLE	UNSUITABLE	TOTAL
PHASE II														
AREA 1 (-L-, -Y8REV-, & -Y9- INTERCHANGE NEW LOCATION AREA)														
-L- LT. (SB LANES) 409+00.00 TO 414+00.00	26,406				26,406							26,406		26,406
-L- LT. (SB LANES) 414+00.00 TO 439+00.00 INCL. -Y9SBL- 0+00.00 TO 5+52.24 (-L- LT. 422+96.03 TO 417+50.00)	60,356				60,356	37,816		37,816	45,379			14,977		14,977
-Y9SBL- 5+52.24 TO 11+35.00	57,209				57,209							57,209		57,209
-Y9SBL- 36+87.00 TO 66+59.33 INCL. -Y9RPC- 10+60.23 TO 12+76.51 (-Y9SBL- 36+87.00 TO 39+03.58) INCL. -Y9LPA- 22+31.78 TO 27+26.17 (-Y9SBL- 36+87.00 TO 41+69.08)	26,986				26,986	812		812	974			26,012		26,012
-Y9SBL- 66+59.33 TO 72+60.00	564				564	215		215	258			306		306
-Y17- 10+93.12 TO 12+00.00	229				229	75		75	90			139		139
AREA I SUBTOTAL	171,750				171,750	38,918		38,918	46,701			125,049		125,049
AREA I TOTAL	**171,750**				**171,750**	**38,918**		**38,918**	**46,701**			**125,049**		**125,049**
AREA 4 (-L- NB & SB LANES BETWEEN -SR4- & -SR5- SERVICE ROAD DETOURS)														
-L- LT. (SB LANES) 464+00.00 TO 494+00.00 INCL. -Y10RPA- 0+00.00 TO 5+00.00 (-L- LT. 478+00.00 TO 473+00.00)	830				830	13,616		13,616	16,339	15,509				
-L- LT. (SB LANES) 494+00.00 TO 509+50.00	970				970	5,008		5,008	6,010	5,040				
-L- LT. (SB LANES) 509+50 TO 524+00.00	195				195	5,374		5,374	6,449	6,254				
-L- LT. (SB LANES) 524+00 TO 554+00.00	8,616				8,616	5,916		5,916	7,099			1,517		1,517
-L- RT. (NB LANES) 468+00.00 TO 494+00.00 INCL. -Y10RPD- 0+00.00 TO 4+00.00 (-L- RT. 479+55.00 TO 475+50.00)	3,308				3,308	4,252		4,252	5,102	1,794				
-L- RT. (NB LANES) 494+00.00 TO 510+00.00	10,650				10,650	1,549		1,549	1,859			8,791		8,791
-L- RT. (NB LANES) 510+00.00 TO 524+00.00	642				642	6,955		6,955	8,346	7,704				
-L- RT. (NB LANES) 524+00.00 TO 556+00.00	4,901				4,901	12,256		12,256	14,707	9,806				
-TA8- 15+90.41 TO 16+49.51 (DETOUR REMOVAL)	138				138							138		138
AREA 4 SUBTOTAL	30,250				30,250	54,926		54,926	65,911	46,107		10,446		10,446
WASTE TO REPLACE BORROW										-10,446		-10,446		-10,446
AREA 4 TOTAL	**30,250**				**30,250**	**54,926**		**54,926**	**65,911**	**35,661**		**0**		**0**
-TA8- 12+50.00 TO 14+82.99 (DETOUR REMOVAL - AREA 2)	13				13	13		13	16	3				
-TA8- 15+07.05 TO 15+65.62 (DETOUR REMOVAL - AREA 2)	138				138							138		138
-TA6- 98+00.00 TO 112+52.29 (DETOUR REMOVAL - AREA 2)	568				568	180		180	216			352		352
PHASE II SUBTOTAL (AREA 1 + AREA 4 + DETOUR REMOVALS)	202,719				202,719	94,037		94,037	112,844	35,664		125,539		125,539
WASTE TO REPLACE BORROW										-35,664		-35,664		-35,664
PHASE II TOTAL	**202,719**				**202,719**	**94,037**		**94,037**	**112,844**	**0**		**89,875**		**89,875**

Project: R-3421C 34542.3.FS5 County: Richmond Date: November 14, 2013 Computed by: RWP Sheet : 4 of 4

STATION to STATION	EXCAVATION					EMBANKMENT				BORROW	WASTE			
	TOTAL UNCLASS.	ROCK	UNDERCUT	UNSUITABLE UNCLASS.	SUITABLE UNCLASS.	TOTAL	ROCK	EARTH	EMBANK. +20%		ROCK	SUITABLE	UNSUITABLE	TOTAL
PHASE III														
AREA 5 (-L- NB LANES BETWEEN -Y9SBL- AND -SR2- SERVICE ROAD DETOURS)														
-L- RT. (NB LANES) 409+00.00 TO 414+00.00	6,167				6,167	4		4	5			6,162		6,162
-L- RT. (NB LANES) 414+00.00 TO 439+00.00 INCL. -Y9NBL- 0+00.00 TO 5+84.38 (-L- RT. 419+82.28 TO 414+00.00)	34,669				34,669	14,101		14,101	16,921			17,748		17,748
-Y9NBL- 5+84.38 TO 34+00.00	22,199				22,199	4,865		4,865	5,838			16,361		16,361
-Y9NBL- 34+00.00 TO 59+00.00 INCL. -Y9LPA- 27+26.17 TO 31+17.16 (-Y9NBL- 34+00.00 TO 37+89.86)	1,404				1,404	2,404		2,404	2,885	1,481				
-Y9NBL- 59+00.00 TO 66+00.00	3,856				3,856	254		254	305			3,551		3,551
-Y13- 10+12.28 TO 15+25.00	146				146	25		25	30			116		116
-TA2- 40+43.83 TO 52+90.89 (DETOUR REMOVAL)	612				612							612		612
AREA 5 SUBTOTAL	69,053				69,053	21,653		21,653	25,984	1,481		44,550		44,550
WASTE TO REPLACE BORROW										-1,481		-1,481		-1,481
AREA 5 TOTAL	69,053				69,053	21,653		21,653	25,984	0		43,069		43,069
-TA1- 10+45.83 TO 26+44.50 (DETOUR REMOVAL - AREA 3)	3,189				3,189	89		89	107			3,082		3,082
-TA3- 32+96.54 TO 45+03.94 (DETOUR REMOVAL - AREA 1)	261				261							261		261
-TA4- 60+41.92 TO 81+80.08 (DETOUR REMOVAL - AREA 2)	11,142				11,142	15		15	18			11,124		11,124
-TA9- 32+27.13 TO 43+19.69 (DETOUR REMOVAL - AREA 3)	698				698							698		698
-TA5- 65+38.46 TO 81+00.00 (DETOUR REMOVAL -AREA 3)	1,628				1,628	311		311	373			1,255		1,255
-TA8- 16+73.25 TO 17+32.57 (DETOUR REMOVAL - AREA 3)	117				117							117		117
-TA8- 17+56.57 TO 20+50.00 (DETOUR REMOVAL - AREA 3)	112				112							112		112
-TA7- 98+00.00 TO 112+51.85 (DETOUR REMOVAL - AREA 3)	326				326							326		326
PHASE III SUBTOTAL (AREA 5 + DETOUR REMOVALS)	86,526				86,526	22,068		22,068	26,482			60,044		60,044
PHASE III TOTAL	**86,526**				**86,526**	**22,068**		**22,068**	**26,482**	**0**		**60,044**		**60,044**
PROJECT SUBTOTAL (PHASE I+II+III)	**1,685,100**				**1,685,100**	**1,220,178**		**1,220,178**	**1,464,212**	**0**		**220,888**		**220,888**
ESTIMATED LOSS DUE TO CLEARING & GRUBBING	-20,000				-20,000							-20,000		-20,000
GRAND TOTAL (CUBIC YARDS)	**1,665,100**				**1,665,100**	**1,220,178**		**1,220,178**	**1,464,212**	**0**		**200,888**		**200,888**
SAY (CUBIC YARDS)	**1,665,100**		**0**							**0**				

ESTIMATED SHOULDER BORROW = SAY 66,690 CY

PAVEMENT STRUCTURE VOLUME: -L- = 24,050 CY -SR2- = 9,879 CY -SR4- = 9,889 CY -SR5- = 5,675 CY -Y9NBL- (INCL. -Y9LPA-) = 4,584 CY -Y9SBL- (INCL. -Y9LPA-) = 10,447 CY

PAVEMENT STRUCTURE VOLUME: -Y10RPA- = 1,139 CY -Y10LPA- = 204 CY -Y10RPD- = 1,443 CY -Y10LPD- = 25 CY -Y8REV- = 283 CY

ESTIMATED DRAINAGE DITCH EXCAVATION = 4,570 CY

THE FOLLOWING QUANTITIES ARE PER THE "GEOTECHNICAL REPORT - DESIGN AND CONSTRUCTION RECOMMENDATIONS" LETTER DATED JULY 10, 2012)

ESTIMATED SHALLOW UNDERCUT= 15,200 CY	**(CONTINGENCY, AS DIRECTED BY THE ENGINEER.)**
ESTIMATED CLASS IV SUBGRADE STABILIZATION = 28,800 TONS	**(CONTINGENCY, FOR SHALLOW UNDERCUT AREAS, AS DIRECTED BY THE ENGINEER.**
ESTIMATED UNDERCUT = 2,000 CY	**(CONTINGENCY, 1,000 CY, FOR UNDERCUT BENEATH EMBANKMENTS; 1,000 CY, UNDERCUT IN PAVEMENT SUBGRADES. ALL, AS DIRECTED BY THE ENGINEER.)**
ESTIMATED SELECT GRANULAR MATERIAL = 29,700 CY	**(27,700 CY, FOR EMBANKMENT CONSTRUCTION IN SOFT, WET AREAS; 1,000 CY, CONTINGENCY, TO REPLACE UNDERCUT BENEATH EMBANKMENTS; 1,000 CY, CONTINGENCY, TO REPLACE UNDERCUT IN PAVEMENT SUBGRADES. ALL, AS DIRECTED BY THE ENGINEER.)**

3D

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION

MICHAEL F. EASLEY
GOVERNOR

P.O.BOX 25201, RALEIGH, N.C. 27611-5201

LYNDO TIPPETT
SECRETARY

June 25, 2009

STATE PROJECT: 34542.1.2 (R-3421C)
FEDERAL PROJECT: NHF-220(4)
COUNTY: Richmond
DESCRIPTION: US 220 BYPASS FROM 0.2 MILES SOUTHWEST OF SR 1304 (HARRINGTON ROAD), TO US 220 BUSINESS/BYPASS INTERCHANGE SOUTH OF ELLERBE

SUBJECT: Geotechnical Report – Inventory

PROJECT DESCRIPTION

The R-3421C project is a combination of new alignment, and widening that will connect the new U.S.220 Ellerbe bypass with the new Rockingham Bypass, (R-3421A). When the R-3421 projects are complete they will be part of the new Interstate Highway, I-73, between Wilmington and Greensboro, utilizing and improving parts of U.S. 220, and U.S. 74, and incorporating new alignment as well.

This R-3421C report describes a project that will include 3.7 miles of new divided interstate highway, most with 1 or two parallel service roads. Two interchanges, each with 1 new bridge, provide access to existing roads. The bridge over the South Prong to Cartledge Creek will be widened. Up to 50' of cut is required at -Y8- and –L- in the new alignment connecting to R-3421B. The widening sections are generally limited to around 20 feet of cut.

The field investigation was conducted from August 2005 to October 2005, using a CME-550 drill machine with an automatic hammer. Standard Penetration Tests, (SPT), were performed at selected locations, through hollow stem augers and additional borings were advanced using solid continuous flight augers. Representative soil samples were collected and forwarded to the Materials and Tests Unit laboratory for soil quality analysis, moisture content and ASTM classification.

The reader is expected to make his or her own judgement of the sufficiency of the data underpinning any particular geologic interpretation within this report, and the validity of the interpretation. All available drillholes are plotted on the plan view and also appear projected into the profiles.

The following alignments, totaling 8.27 miles, were investigated.

	Line	Station			Length
	-L-	355+00.00	to	551+61.83	19,663.83
	-SBL1-	403+27.02		424+96.03	2,169.01
	-NBL1 –	401+75.7		425+05.17	2,329.47
	-SBL2-	524+12.85		551+63.16	2,751.31
	-NBL2	523+98.40		551+59.36	2,760.96
	-Y8REV-	11+50.00		60+67.89	4,917.89
	Y9NBL	0+00.00		65+50.00	6,550.00
	Y9SBL	0+00.00		72+60.00	7,260.00
	Y9LPA	0+00.00		31+17.16	3,117.16
	Y9RPC	0+00.00		12+76.51	1,276.51
	Y10	13+00.00		56+50.00	4,350.00
	Y10RPA	0+00.00		24+56.27	2,456.27
	Y10RPD	00+00.00		19+95.51	1,995.51
	Y10LPA	00+00.00		13+95.15	1,395.15
	Y10LPD	0+00.00		14+29.02	1,429.02
	SR2	10+81.82		127+06.94	11,625.12
	SR4	9+81.25		128+50.90	11,869.65
	SR5	19+16.16		126+28.91	10,712.75
	Y8	10+12.00		17+00.00	688.00
	Y14	10+12.00		13+25.00	313.00
	Y15	12+21.03		17+30.00	589.97
	Y16	10+12.00		12+50.00	238.00
	Y18	10+12.00		12+00.00	188.00
	Y19	10+12.00		12+55.00	243.00
	DRI	10+16.78		12+83.09	266.31
					Total 101,155.9
					(19.2 miles)

AREAS OF SPECIAL GEOTECHNICAL INTEREST

Highly plastic clays: Soil with plasticity indices equal to or greater than 28, were found in the following areas. The highest PI soil is near the basal contact of the coastal plain unit, usually on the coastal plain side of the contact.

The following intervals were found to have PI values commonly above PI=28

	Line	Station			
	-L-	381+00.00	to	453+00	PI 20-35, Non continuous.
	-L-	453+00		470+00	PI 35-50
	-L-	470+00		485+00	PI 28-35
	-Y8REV-	20+00		38+00	PI 28-35
	-Y8REV-	45+00		57+00	PI 28-35
	Y9RPC	0+00.00		10+00	PI 28-35
	Y10	21+00		56+50.00	PI 28-45
	Y10RPA	0+00.00		24+56.27	PI 28-45
	Y10RPD	08+00.00		19+95.51	PI 28-45
	Y10LPA	00+00.00		13+95.15	PI 28-35
	Y10LPD	0+00.00		14+29.02	PI 28-45
	SR2	10+81.82		127+06.94	PI 20-35, Non continuous
	SR4	9+81.25		45+00	PI 28 to 45
	SR4	530+00		545+00	PI 28 to 45
	SR5	19+16.16		40+00	PI 18 to 35
	SR5	104+00		116+00	PI 28 to 35

Groundwater: The following sections were found to exhibit a water table above grade, seasonal high groundwater, or the potential for groundwater related construction problems.

3E

Line	Station			comment
-L-	358+00	to	372+00	Water above grade in cut
-L-	377+00		386+00	Water at surface, below planned fill.

All-weather spring fed seeps or streams: The following locations had water at the time of the investigation.

Line	Station			comment
-L-	510+00	to		South Prong Cartledge Creek

Triassic Stratigraphy: The Triassic sediments of the Newark Group, have not performed well in embankments, in the past. The following interval of –L- and contiguous alignments are underlain by Triassic rock or soil.

Line	Station			comment
-L-	470+00	to	542+00	Triassic Rock

Wetlands

Wetlands, identified by others, are shown on the plans.

Wetlands were plotted in the following areas.

	Line	Station			
	-L-	End of 3421B	to	355+00	
	-L-	372+00		377+00	
	-L-	382+00		384+00	
	-L-	432+00		438+00	
	-L-	448+00		454+00	
	Y-8REV	10+00		13+00	
	Y8	13+00		16+00	
	SR2	16+00		20+00	
	SR2	25+00		27+00	
	SR2	29+00		32+00	
	SR2	87+00		92+00	
	SR2	102+00		108+00	

PHYSIOGRAPHY AND GEOLOGY

Physiography

This R-3421C project is located where the Coastal Plain physiographic province meets the Piedmont physiographic provinces. The Coastal Plain province has sand or very sandy soil and extends from this area to the Atlantic coastal area. Relief decreases from the 200' from creek to ridge here, to 5 or 10' at the coast. The Piedmont province is almost all residual soil that is dissected by streams, with increasing relief from this area northwest to the mountainous Blue Ridge province. In the project area streams such as the South Prong to Cartledge Creek, have cut through the Coastal Plain sand to the residual soil typical of the Piedmont below.

Geology

Throughout North Carolina the geologic provinces run northeast – southwest. In this area, we will encounter part of the Triassic basins, the Slate Belt, and the Coastal Plain. The Wadesboro Basin is an area of Triassic age silt stone that has filled in a fault-bounded northeast trending basin, that is bordered to the northwest and southeast by Paleozoic age rock. Beyond the Paleozoic rock to the southeast, Cretaceous age sand covers the older rock, and in turn, the Cretaceous age sand is covered in places by Tertiary age sand.

This project runs generally north so it traversing the geology at an oblique angle. More specifically, the road begins in the Cretaceous and Tertiary age sand and then as the road descends into the South Prong Valley, it crosses an area of Triassic rock interpreted to be a small basin, parallel to the larger Wadesboro basin, the Ellerbe Basin. When the road climbs out of the low place, the sandy stratigraphy is again encountered.

This terminology, Paleozoic, Triassic, Cretaceous, and Tertiary refers to rock age. The bedrock types can also be distinguished by rock type, for instance, slate, granite, siltstone, etcetera. The important thing is that soils are formed from these rocks, and the soil characteristics are strongly influenced by the original rock type.

Soil Properties

The units that appear on the Geologic Map of North Carolina, (1985), that occur within the project are described below.

Soil mapped as Tp: There is a soil type, the Pinehurst Formation that is mapped north of Ellerbe, and as described, matches soil found in the project area. It is sandy soil, A-2-4 or A-1 loose, without much clay or silt, and is considered to be a windblown deposit. It occurrs on the ridge tops and drapes down the hill slopes. Usually it is less than 5' thick.

Soil mapped as Tt: The soil mapped as Tt, Tertiary terrace deposits occurs on the "A" and "B" sections of the project. It is mostly a red clayey or sandy unit with quartz cobble beds. It was not encountered on the "C" section of roadway. An equivalent age unit may be directly under the Tp in places.

Soil mapped as Km: The mapped extent of the "Km" soil, the Middendorf formation, probably includes areas that are actually Cape Fear formation, and possibly other Cretaceous and Tertiary age deposits. The lowermost sandy unit in this area is white, slightly micaceous, usually with weathered feldspar showing up as kaolin clay. This fits the Cape Fear description fairly well. Above this unit, there is the indication of a persistent less clayey sandy unit, usually gray or red.

3F

Residual soil mapped as CSph$_1$: An occurrence of residual soil derived from rock type CSph$_1$ near the beginning of the project, was found only in drill holes. The rock is mapped as metamorphosed slate belt rock has PI values of PI=40 and greater.

Residual soil mapped as TRC: The soil mapped as TRC on the project corridor lies in the area adjacent to the stream known as South Prong to Cartledge Creek. This rock is poorly indurated sediment and may break down where it is exposed to weathering. Drill samples from this material found the silt constituent above 30%.

Residual soil mapped as Czmd: The soil mapped as Czmd is the "normal" slatebelt rock that is found under most of Union County. The physical properties of the soil are similar to the slate belt soil on the other side of the Triassic rock. That is: high PI, high percentage of clay, low percentage of silt.

Rock Properties

No in-place rock was identified within the limits of this project. Intervals of N=100 or greater were encountered, but were not above grade.

Groundwater Properties

There are four recognized aquifer systems in North Carolina's Coastal Plain region[1], and two of them will be encountered in this project. The Surficial Aquifer is nothing more than the permeable soil between land surface and the first impermeable layer. Standing water far above the residual contact at around 310' elevation is evidence of this aquifer, which is probably local in scope. The Cretaceous Aquifer is the contact zone of the lowermost Cretaceous strata and the underlying bedrock aquifer. On this project it is seen in the borings that show a static water table in the lower Coastal Plain soil, above the Residual soil.

GEOTECHNICAL DESCRIPTIVE ANALYSIS

The project covers about 3.7 miles of interstate highway partly on a new location and partly as road widening, with two interchanges. For descriptive purposes, the project has been divided into 3 segments.

Segment 1: South of South Prong Drainage: covers the –L- alignment, the Y9 alignment, the interchanges and all related roads from the beginning up to –L- 460+00, the edge of the "South Prong to Cartledge Creek" drainage.

Segment 2: South Prong Drainage: covers the drainage feature from –L-460+00 to –L- 540+00

Segment 3: North of South Prong Drainage: covers the –L- and all other roads and structures north and east of the Cartledge Creek drainage, from –L-540+00 to the end at –L-551+61, including parts of SR-2 and SR-5.

[1] Ground Water in the Coastal Plain of North Carolina: http://www.bae.ncsu.edu/programs/extension/publicat/wqwm/ag450

3-G

Segment 1: South of South Prong Drainage
Coastal Plain Sand

Physical Description
The limits of this segment were established to reflect the geologic conditions. It covers all of the interchange between U.S. 220 and the new U.S. 220 Rockingham Bypass. It also covers the –L- alignment where it travels through the interchange that will provide local access to Haywood Cemetery Road, Dockery Road and the future service roads from Ellerbe.

This segment is mapped in plan on sheets 4 through 12, 20 through 25. and profile sheets 27 through 33, and sheet 40, through 58, and sheets 67 through 69. The –L- alignment begins at station 355, elevation 400, descends to elevation 365 at station 384, then climbs to the interchange with the future improved U.S. 220, at elevation 400' at station 404. Beyond station 404, the project is a widening project and the alignment is referenced to north bound and southbound lanes. It climbs through the interchange to elevation 420 at station 414. From station 414 the lanes descend to elevation 360 at station 436, then climb to elevation 400 at station 458, then descend to the end of the segment at station 460 and elevation 395.

Geology
This segment is all covered by Coastal Plain sandy soil, above the residual soil contact at about 360' elevation. Most of the sand at the surface is tan loose sand, most likely Pinehurst formation. This sand is generally less than 10' thick and covers the more clayey Coastal Plain sand. Within this segment sandy formations are found from 440' elevation to 330' elevation, a 110' thick package of clay, sand and sandy clay. In the drill data, there is the suggestion of persistent layering but the data is open to multiple interpretations.

Cuts and Fills
The best portrayal of the cuts and fills in this segment of the project appear on sheets 27 through 33, and sheet 40, through 58, and sheets 67 through 69, the profile sheets. The most significant cuts are in the vicinity of the –L- / -Y9- interchange, which is almost all on new alignment.

Soil
The soil encountered in this project is either residual soil, (created by weathering rock), or sedimentary soil, (deposited by wind or water), or artificial fill, (soil moved, usually by mechanical means and not compacted to a known specification). The residual soil, a weathering product of granite, gabbro, or metamorphic rock, is usually clayey or silty soil. All sedimentary soil is lumped together as alluvial Coastal Plain soil.

Coastal Plain Soil
The Coastal Plain Soil is mostly sandy clay or clayey sand with a lower elevation limit of around 350' elevation above sea level, and a maximum of about 440' elevation above sea level for a total of 100' thick more or less.

There are areas of the segment that consistently have high PI values, and others that consistently have low clay content. It was not possible to resolve these occurrences into an overall pattern that would predict, for instance, the PI of the soil based on elevation.

Rock
No rock or weathered rock was found on this project.[2]

Groundwater
Our drilling in the Coastal Plain sediment section found water above grade from –L-360+00 to 372+00, possibly as a perched aquifer.

Wetlands
This segment contains all of the identified wetlands. They occur related to topographic lows on sheets 4,5,6,7,9,10,20,21,23,and 24. Among the criteria for determining the boundaries of a wetland is the persistent presence of water near ground surface. This water can be "perched", resting on impermeable, soil, or it can be the exposed top of the bedrock aquifer. In this case, because the wetlands are all within the coastal plain sand section, the wetlands indicate the existence of areas of high PI, impermeable soil, and a perched aquifer.

Segment 2.South Prong of Cartledge Creek valley, from –L-460+00 to –L-540+00

Physical Description
This segment of the job is a road-widening project. This segment appears on plan sheets 11 through 17, and profile sheets 33 through 39, 51, 52, 59, 60, 61, 62, 63, 64, 65, and 66. The finished grade will drop from 460' elevation at the beginning, to prong Creek at at –L-510',elevation305', then climb to elevation 410' at –L-540+00, the end of the segment. The segment lies entirely within the South Prong valley, and follows the path of the existing road.

Geology
The limits of this segment were set at the limits of residual soil. The valley of the South Prong of Cartledge Creek has residual soil exposed in the slopes or barely covered by a thin veneer of wind-blown sand. Except at the beginning or end of this segment, the underlying rock is Triassic age Sedimentary rock of the Newark Supergroup. This material often loses strength and weathers rapidly when used in a roadway embankment. The upper elevation of the residual soil is at about 360' elevation.

Cuts and Fills
This entire segment is a road-widening project. The surface for the profile sheets was "cut" at the center of the existing roadway, so planned cuts or fills are indicated where the borings appear to be underground or floating in the air.

Soil
This segment is mostly residual soil, though at each end, alluvial Coastal Plain sediment is exposed. The residual soil samples have a silt content of 30 to 40% relative to the coastal plain with less than 10% silt. In this case, the silt content is a good guide to the presence of residual soil.
Residual Soil from Phyllite: From –L-460+00 to –L-475+00, and –L-536+00 to –L-546+00, borings at the brow of the slope found phyllite weathered to very stiff residual soil, covered by a veneer of coastal plain sand. At the contact between the water-lain sand and the residual soil, PI values of 40 to 51 are found in the proposed subgrade. At elevations below this contact the PI values in residual soil are 15 to 20.
Residual Soil from Triassic rock: From –L-475+00, and –L-579+00, The soil is derived from Triassic age material. The silt content ranges from 35 to 45%. PI values of 20 to 30 are common.

[2] Values of N> 100 were returned from hard sedimentary clay beds, and from gravel layers.

3 H

Groundwater
No groundwater was identified in this segment.

Wetlands
There are small wetland areas along the persistent streams listed below.

Wet weather and persistent streams
The following locations are topographic lows that channel water all or part of the year.

Drainage Locations	-L-510+00 (South Prong to Cartledge Creek.

Segment 3.
This segment covers –L from 274 +00 to the end at –L-355+00 including the interchange and auxiliary or access roads. Besides being "everything else" on a construction basis, this segment is characterized by light colored coastal plain sediments that have a marine origin. The project appears in plan on sheets 15 through19, 22, and 23 and in profile on sheets 34 through 40, and 48 through 56.

Alignment	Type of work	
-L-	Widening	540+00 to 551+00
SR-4	New Alignment	100+00 to 128+00
-SR-5-	New Alignment	100+00 to 127+00

Physical Description
The finished grade of this segment of 'L' begins at about elevation 410 and gradually climbs to elevation 425 at the end at –L-551+00. (Plan sheets 18, 19, 26 and profile sheets 38, 39, 62, and 63.

Soil
The segment is underlain by Coastal plain soil.
Residual Soil: The finished grade comes close to residual soil, but no residual soil was found above planned grade.
Coastal Plain Soil: Most of the Coastal Plain soil is A-7-6 or A-6 clayey sand that is probably of marine origin.

Groundwater
Groundwater was not measured in any of the borings.

Wetlands
No wet lands were identified.

Respectfully Submitted

Roger Q Callaway, P.G.

PROJECT REFERENCE NO.	SHEET NO.
R-3421C	4
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
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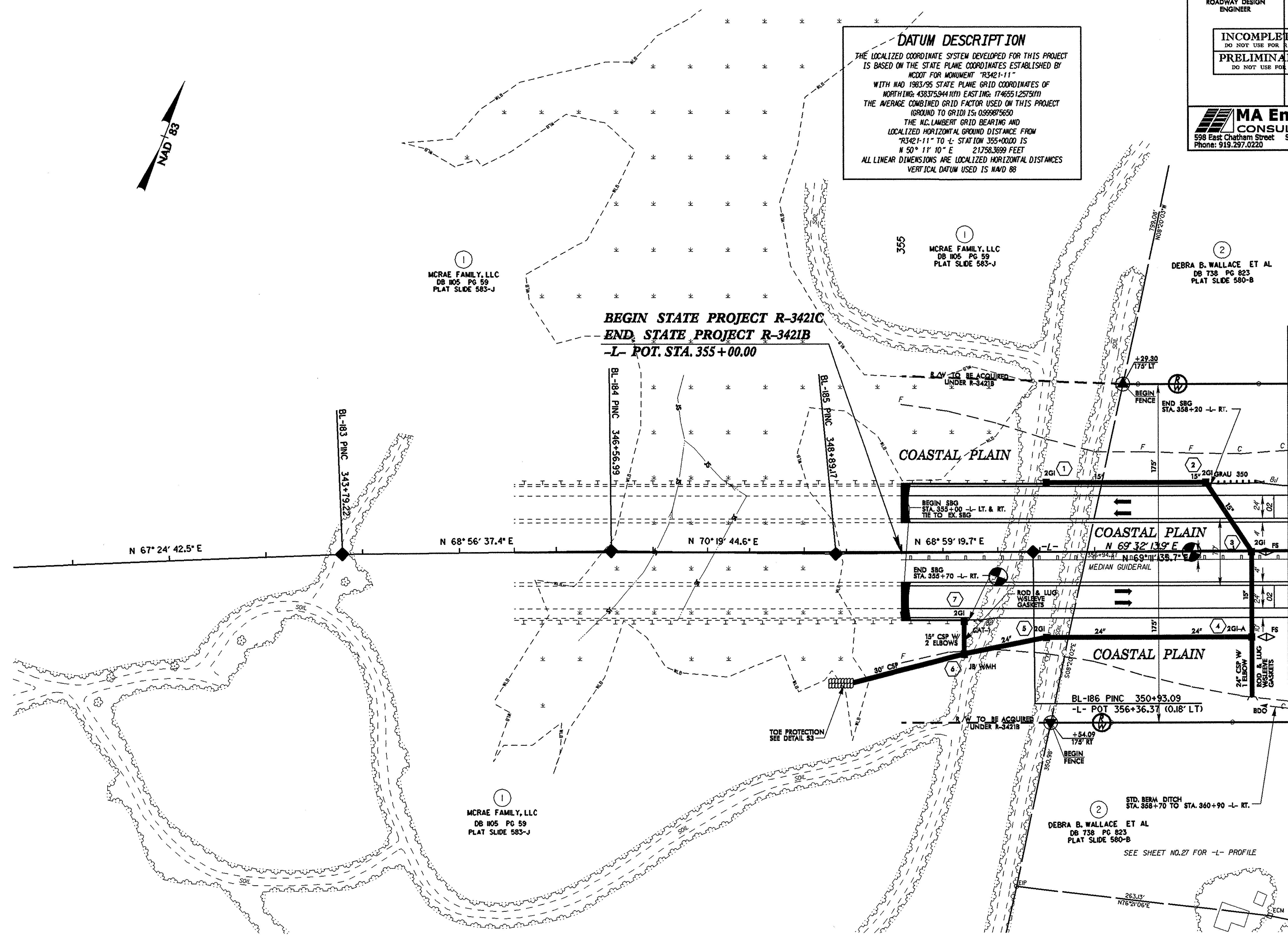
598 East Chatham Street Suite 137 Cary, NC 27511
Phone: 919.297.0220 Fax: 919.297.0221

DATUM DESCRIPTION

THE LOCALIZED COORDINATE SYSTEM DEVELOPED FOR THIS PROJECT IS BASED ON THE STATE PLANE COORDINATES ESTABLISHED BY NCDOT FOR MONUMENT "R3421-11"
WITH NAD 1983/95 STATE PLANE GRID COORDINATES OF NORTHING: 438375.9441(ft) EASTING: 1746551.2575(ft)
THE AVERAGE COMBINED GRID FACTOR USED ON THIS PROJECT (GROUND TO GRID) IS: 0.999875650
THE N.C. LAMBERT GRID BEARING AND LOCALIZED HORIZONTAL GROUND DISTANCE FROM "R3421-11" TO -L- STATION 355+00.00 IS
N 50° 11' 10" E 21758.3699 FEET
ALL LINEAR DIMENSIONS ARE LOCALIZED HORIZONTAL DISTANCES
VERTICAL DATUM USED IS NAVD 88



SEE SHEET NO.27 FOR -L- PROFILE

REVISIONS

8/17/99

16-SEP-2008 13:29
r3421c_geo_inv_004_psh04.dgn

PROJECT REFERENCE NO.	SHEET NO.
R-3421C	5
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

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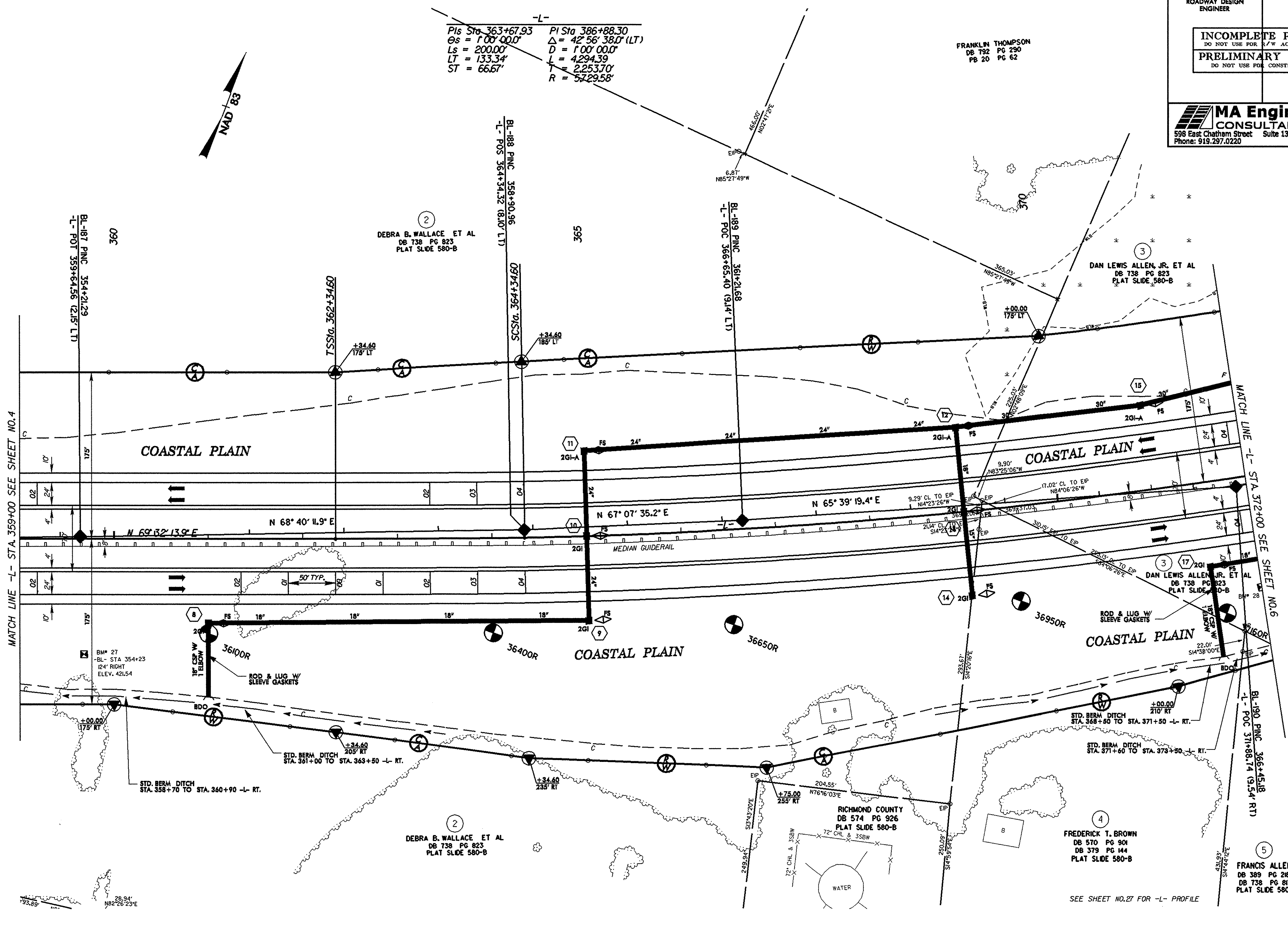
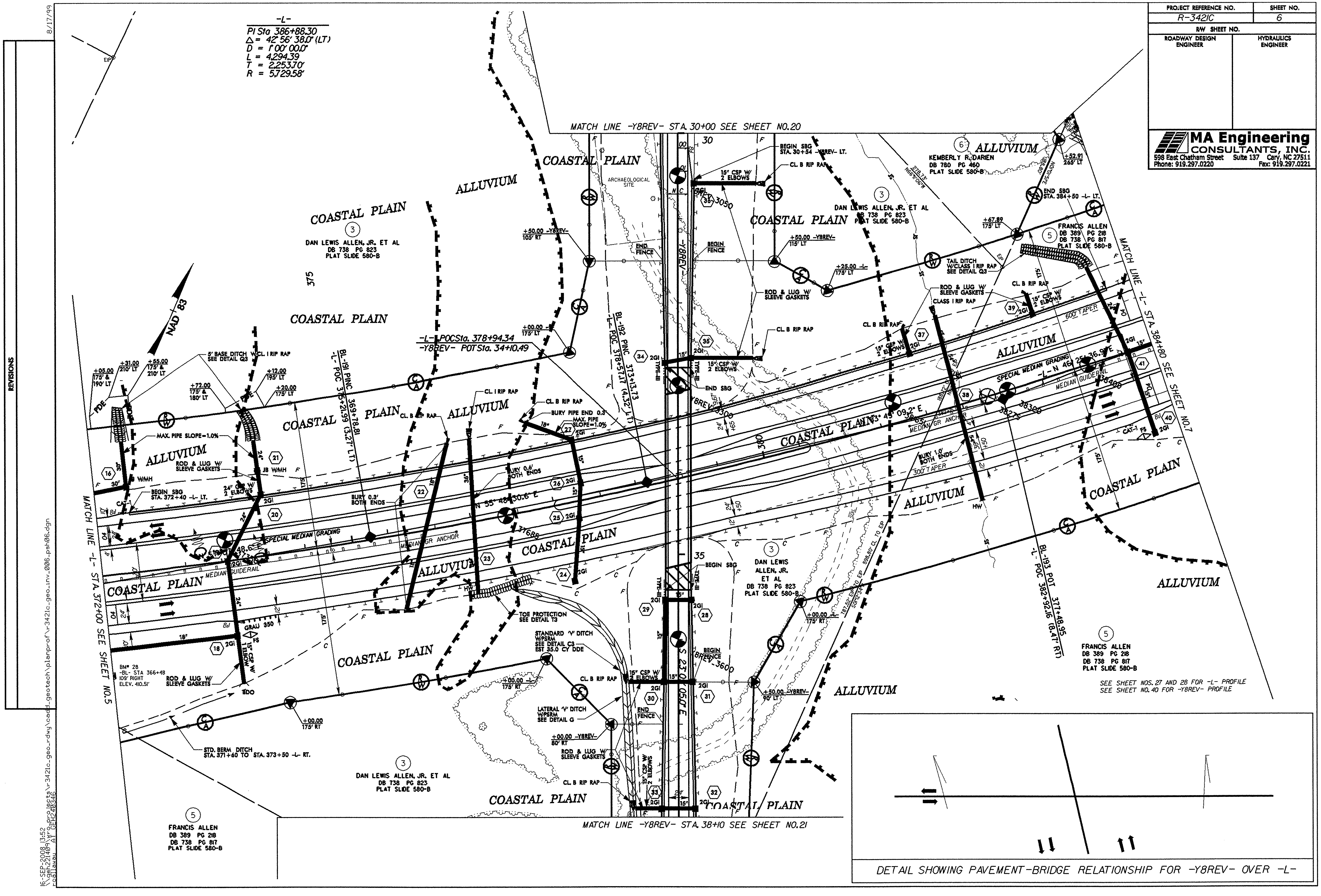
REVISIONS



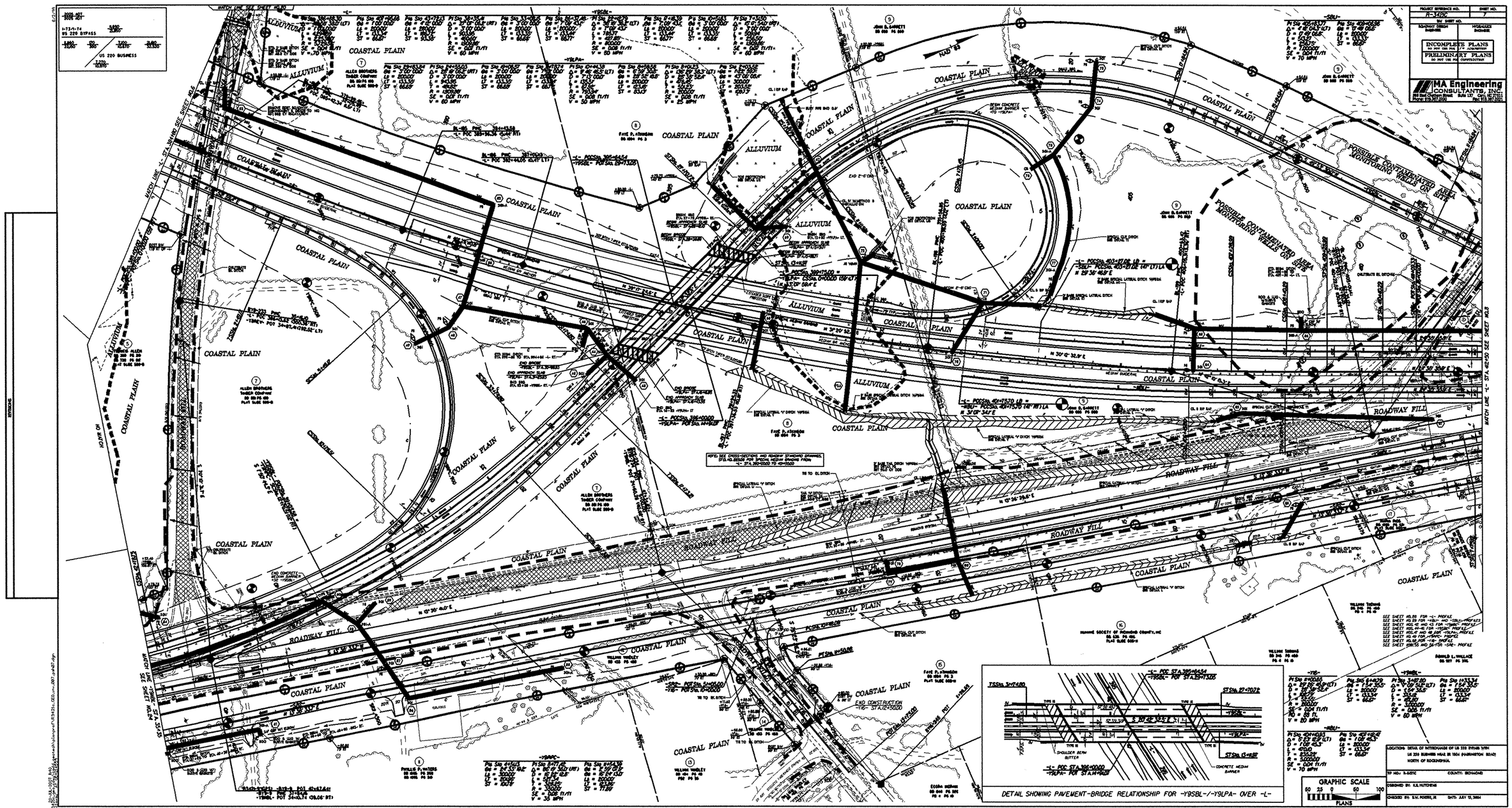
-L-
PIs Sta 363+67.93
θs = 1°00' 00.0"
Ls = 200.00'
LT = 133.34'
ST = 66.67'
PI Sta 386+88.30
Δ = 42° 56' 38.0" (LT)
D = 1° 00' 00.0"
L = 4,294.39
T = 2,253.70'
R = 5,729.58'
NAD 83
FRANKLIN THOMPSON
DB 792 PG 290
PB 20 PG 62
DEBRA B. WALLACE ET AL
DB 738 PG 823
PLAT SLIDE 580-B
DAN LEWIS ALLEN, JR. ET AL
DB 738 PG 823
PLAT SLIDE 580-B
BL-187 PINC 354+21.29
-L- POT 359+64.56 (2.15' LT)
BL-188 PINC 358+90.96
-L- POS 364+34.32 (8.10' LT)
BL-189 PINC 361+21.68
-L- POC 366+65.40 (9.14' LT)
TSSta. 362+34.60
SCSta. 364+34.60
360
365
370
COASTAL PLAIN
MATCH LINE -L- STA. 359+00 SEE SHEET NO.4
MATCH LINE -L- STA. 372+00 SEE SHEET NO.6
N 69° 32' 13.9" E
N 68° 40' 11.9" E
N 67° 07' 35.2" E
N 65° 39' 19.4" E
MEDIAN GUIDERAIL
50' TYP.
36100R
36400R
36650R
36950R
37160R
ROD & LUG W/ SLEEVE GASKETS
BM# 27
-BL- STA 354+23
124' RIGHT
ELEV. 421.54
STD. BERM DITCH STA. 358+70 TO STA. 360+90 -L- RT.
STD. BERM DITCH STA. 361+00 TO STA. 363+50 -L- RT.
STD. BERM DITCH STA. 368+50 TO STA. 371+50 -L- RT.
STD. BERM DITCH STA. 371+60 TO STA. 373+50 -L- RT.
RICHMOND COUNTY
DB 574 PG 926
PLAT SLIDE 580-B
FREDERICK T. BROWN
DB 570 PG 901
DB 379 PG 144
PLAT SLIDE 580-B
FRANCIS ALLEN
DB 389 PG 218
DB 738 PG 817
PLAT SLIDE 580-B
BL-190 PINC 366+45.18
-L- POC 371+88.74 (9.54' RT)
72' CHL & 3SBW
WATER
SEE SHEET NO.27 FOR -L- PROFILE

8/17/99

16-SEP-2008 13:34
r3421c_GEO_inv_005_psh05.dgn



PROJECT REFERENCE NO. R-3421C
SHEET NO. 6
R/W SHEET NO.
ROADWAY DESIGN ENGINEER
HYDRAULICS ENGINEER
MA Engineering CONSULTANTS, INC.
598 East Chatham Street Suite 137 Cary, NC 27511
Phone: 919.297.0220 Fax: 919.297.0221
-L-
PI Sta 386+88.30
△ = 42° 56' 38.0" (LT)
D = 1° 00' 00.0"
L = 4,294.39
T = 2,253.70'
R = 5,729.58'
REVISIONS
MATCH LINE -Y8REV- STA. 30+00 SEE SHEET NO.20
MATCH LINE -Y8REV- STA. 38+10 SEE SHEET NO.21
MATCH LINE -L- STA. 372+00 SEE SHEET NO.5
MATCH LINE -L- STA. 384+80 SEE SHEET NO.7
NAD 83
COASTAL PLAIN
ALLUVIUM
DAN LEWIS ALLEN, JR. ET AL
DB 738 PG 823
PLAT SLIDE 580-B
FRANCIS ALLEN
DB 389 PG 218
DB 738 PG 817
PLAT SLIDE 580-B
KEMBERLY R. DARIEN
DB 780 PG 460
PLAT SLIDE 580-B
-L- POC Sta. 378+94.34
-Y8REV- POT Sta. 34+10.49
BL-191 PINC 369+78.81
-L- POC 375+21.99 (3.27' LT)
BL-192 PINC 373+13.73
-L- POC 378+57.17 (4.32' LT)
BL-193 POT 377+48.95
-L- POC 382+92.16 (8.47' RT)
SPECIAL MEDIAN GRADING
MEDIAN GUIDERAIL
MEDIAN GR ANCHOR
TOE PROTECTION SEE DETAIL T3
STANDARD 'V' DITCH W/PSRM SEE DETAIL C3 EST 35.0 CY DDE
LATERAL 'V' DITCH W/PSRM SEE DETAIL G
STD. BERM DITCH STA. 371+60 TO STA. 373+50 -L- RT.
5' BASE DITCH W/CL. I RIP RAP SEE DETAIL Q3
TAIL DITCH W/CLASS I RIP RAP SEE DETAIL Q3
ROD & LUG W/ SLEEVE GASKETS
CL. B RIP RAP
CL. I RIP RAP
BURY PIPE END 0.3'
MAX. PIPE SLOPE=1.0%
BEGIN SBG STA. 372+40 -L- LT.
BEGIN SBG STA. 30+54 -Y8REV- LT.
END SBG STA. 384+50 -L- LT.
BEGIN FENCE
END FENCE
ARCHAEOLOGICAL SITE
500' TAPER
300' TAPER
BM# 28 -BL- STA 366+48 109' RIGHT ELEV. 410.51'
SEE SHEET NOS. 27 AND 28 FOR -L- PROFILE
SEE SHEET NO. 40 FOR -Y8REV- PROFILE
DETAIL SHOWING PAVEMENT-BRIDGE RELATIONSHIP FOR -Y8REV- OVER -L-
8/17/99
16-SEP-2008 13:52



DETAIL SHOWING PAVEMENT-BRIDGE RELATIONSHIP FOR -Y9SBL-/-Y9LPA- OVER -L-

PROJECT REFERENCE NO.	SHEET NO.
R-3421C	7
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
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CONSULTANTS, INC.
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GRAPHIC SCALE
50 25 0 50 100
PLANS

LOCATION: DETAIL OF INTERCHANGE OF US 220 BYPASS WITH US 220 BUSINESS NEAR SR 1304 (HARRINGTON ROAD) NORTH OF ROCKINGHAM.

TIP NO.: R-3421C COUNTY: RICHMOND

DESIGNED BY: K.E. HUTCHENS

CHECKED BY: S.W. PORTER, JR DATE: JULY 12, 2004

PROJECT REFERENCE NO.	SHEET NO.
R-3421C	8
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

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8/17/99

REVISIONS

20-JUL-2007 11:42
\\geh221409\wro_projects\r3421c-geo_rdwy\cadd_geotech\planprof\R3421c_GEO_inv_008_psh08.dgn
rcalloway AT GEH214559

-Y9SBL-

PIs Sta 10+51.63	PI Sta 7+31.50	PIs Sta 4+08.35
θs = 3° 00′ 00.0″	Δ = 15° 17′ 54.0″ (RT)	θs = 3° 00′ 00.0″
Ls = 200.00′	D = 3° 00′ 00.0″	Ls = 200.00′
LT = 133.35′	L = 509.94	LT = 133.35′
ST = 66.68′	T = 256.50′	ST = 66.68′
	R = 1,909.86′	
	SE = 0.07 ft/ft	
	V = 60 MPH	

SEE SHEET NOS. 29 AND 30 FOR -NBLI- AND -SBLI- PROFILES
SEE SHEET NO. 42 FOR -Y9NBL- PROFILE
SEE SHEET NO. 44 FOR -Y9SBL- PROFILE

-Y9NBL-

PIs Sta 6+41.79	PI Sta 3+87.80	PIs Sta 1+33.34
θs = 1° 54′ 35.5″	Δ = 7° 09′ 51.2″ (LT)	θs = 1° 54′ 35.5″
Ls = 200.00′	D = 1° 54′ 35.5″	Ls = 200.00′
LT = 133.34′	L = 375.12	LT = 133.34′
ST = 66.67′	T = 187.80′	ST = 66.67′
	R = 3,000.00′	
	SE = 0.05 ft/ft	
	V = 60 MPH	

-SR2-

PI Sta 70+57.02
Δ = 10° 59′ 02.2″ (RT)
D = 1° 29′ 59.6″
L = 732.32′
T = 367.28′
R = 3,820.00′
SE = 0.03 ft/ft
RO = 75 ft
V = 50 MPH

PROJECT REFERENCE NO.	SHEET NO.
R-3421C	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

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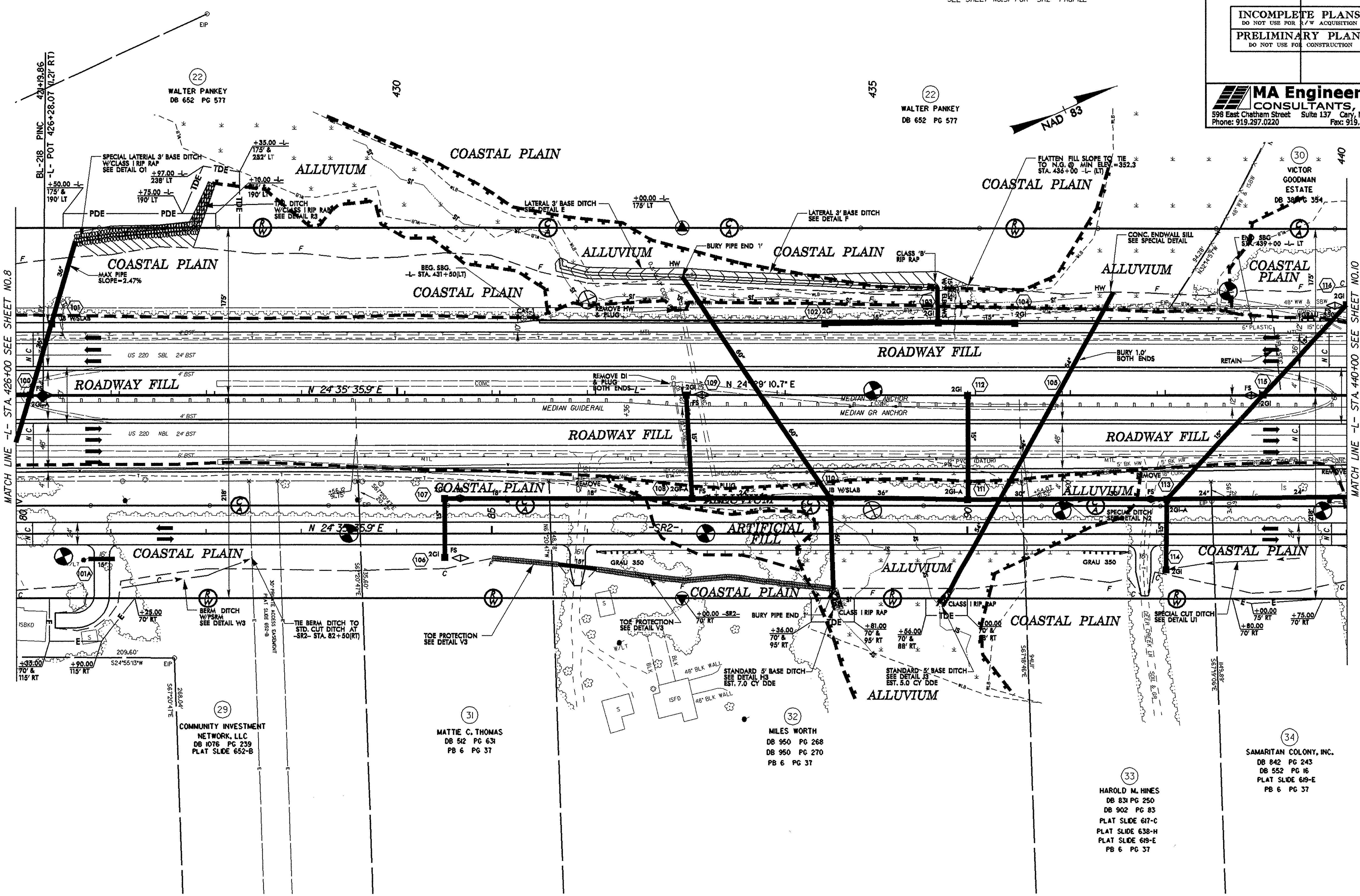
598 East Chatham Street Suite 137 Cary, NC 27511
Phone: 919.297.0220 Fax: 919.297.0221

SEE SHEET NOS. 30 AND 31 FOR -NBL- AND -SBL- PROFILES
SEE SHEET NO. 57 FOR -SR2- PROFILE


MATCH LINE -L- STA 426+00 SEE SHEET NO. 8
MATCH LINE -L- STA 440+00 SEE SHEET NO. 10
BL-218 PINC 421+19.86
-L- POT 426+28.07 (1.21' RT)
NAD 83
WALTER PANKEY
DB 652 PG 577
VICTOR GOODMAN ESTATE
COASTAL PLAIN
ALLUVIUM
ROADWAY FILL
ARTIFICIAL FILL
US 220 SBL 24' BST
US 220 NBL 24' BST
N 24°35'35.9" E
N 24°39'10.7" E
MEDIAN GUIDERAIL
MEDIAN GR ANCHOR
COMMUNITY INVESTMENT NETWORK, LLC
DB 1076 PG 239
PLAT SLIDE 652-B
MATTIE C. THOMAS
DB 512 PG 631
PB 6 PG 37
MILES WORTH
DB 950 PG 268
DB 950 PG 270
PB 6 PG 37
HAROLD M. HINES
DB 831 PG 250
DB 902 PG 83
PLAT SLIDE 617-C
PLAT SLIDE 638-H
PLAT SLIDE 619-E
PB 6 PG 37
SAMARITAN COLONY, INC.
DB 842 PG 243
DB 552 PG 16
PLAT SLIDE 619-E
PB 6 PG 37
SPECIAL LATERAL 3' BASE DITCH W/CLASS I RIP RAP SEE DETAIL O1
LATERAL 3' BASE DITCH SEE DETAIL E
LATERAL 3' BASE DITCH SEE DETAIL F
FLATTEN FILL SLOPE TO TIE TO N.G. @ MIN ELEV.=352.3 STA. 436+00 -L- (LT)
CONC. ENDWALL SILL SEE SPECIAL DETAIL
BERM DITCH W/PSRM SEE DETAIL W3
TIE BERM DITCH TO STD. CUT DITCH AT -SR2- STA. 82+50(RT)
TOE PROTECTION SEE DETAIL V3
STANDARD 5' BASE DITCH SEE DETAIL H3 EST. 7.0 CY DDE
STANDARD 5' BASE DITCH SEE DETAIL I3 EST. 5.0 CY DDE
SPECIAL CUT DITCH SEE DETAIL U1
BURY PIPE END
MAX PIPE SLOPE=2.47%
REMOVE DI & PLUG BOTH ENDS
BURY 1.0' BOTH ENDS

REVISIONS
8/17/99

PROJECT REFERENCE NO.	SHEET NO.
R-3421C	10

R/W SHEET NO.

ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER

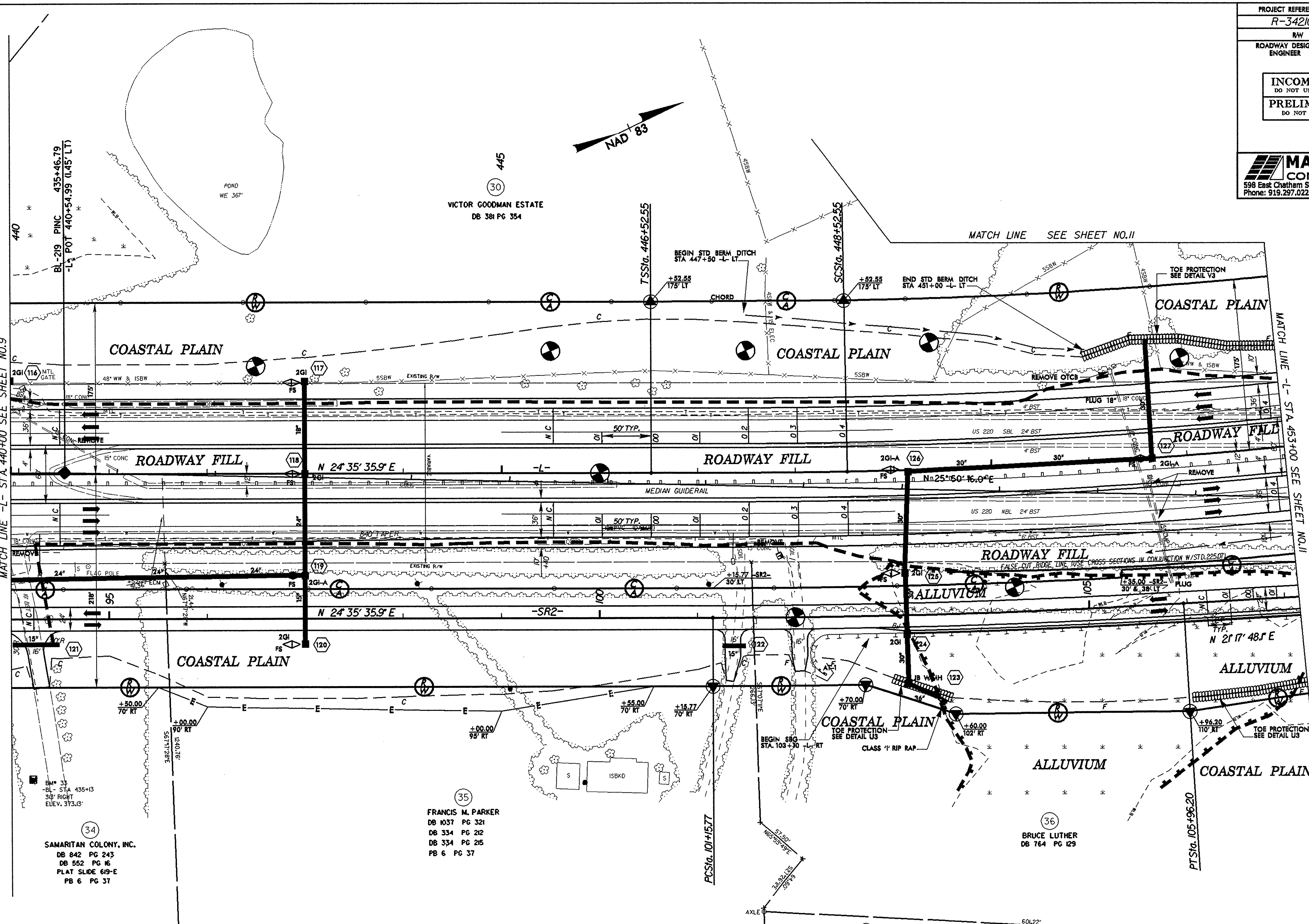
INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

MA Engineering CONSULTANTS, INC.
598 East Chatham Street Suite 137 Cary, NC 27511
Phone: 919.297.0220 Fax: 919.297.0221

REVISIONS

8/17/99



NAD 83
MATCH LINE SEE SHEET NO.11
MATCH LINE -L- STA 440+00 SEE SHEET NO.9
MATCH LINE -L- STA 453+00 SEE SHEET NO.11
VICTOR GOODMAN ESTATE
DB 381 PG 354
POND
BL-219 PINC 435+46.79
-L- POT 440+54.99 (1.45' LT)
TSSta. 446+52.55
SCSta. 448+52.55
BEGIN STD BERM DITCH STA 447+50 -L- LT
END STD BERM DITCH STA 451+00 -L- LT
TOE PROTECTION SEE DETAIL V3
COASTAL PLAIN
ROADWAY FILL
ALLUVIUM
N 24° 35' 35.9" E
N 25° 50' 16.0" E
N 21° 17' 48.1" E
MEDIAN GUIDERAIL
US 220 SBL 24' BST
US 220 NBL 24' BST
50' TYP.
640' TAPER
FALSE CUT RIDGE LINE USE CROSS SECTIONS IN CONJUNCTION W/STD.225.07
REMOVE
PLUG
BM* 33
-BL- STA 435+13
313' RIGHT
ELEV. 373.13'
SAMARITAN COLONY, INC.
DB 842 PG 243
DB 552 PG 16
PLAT SLIDE 619-E
PB 6 PG 37
FRANCIS M. PARKER
DB 1037 PG 321
DB 334 PG 212
DB 334 PG 215
PB 6 PG 37
BRUCE LUTHER
DB 764 PG 129
STEVE R. WILLIAMS
DB 680 PG 178
DB 602 PG 267
BEGIN SBG STA. 103+10 -L- RT
TOE PROTECTION SEE DETAIL U3
CLASS 'I' RIP RAP
PCSta. 101+15.77
PTSta. 105+96.20

-L-		-SR2-
PIs Sta 447+85.89	PI Sta 458+60.22	PI Sta 103+56.05
θs = 1° 00' 00.0"	Δ = 19° 56' 57.5" (LT)	Δ = 3° 17' 47.8" (LT)
Ls = 200.00'	D = 1° 00' 00.0"	D = 0° 41' 10.2"
LT = 133.34'	L = 1,994.93	L = 480.43'
ST = 66.67'	T = 1,007.67'	T = 240.28'
	R = 5,729.58'	R = 8,350.00'
		SE = N.C.
		V = 50 MPH

SEE SHEET NOS. 31 AND 32 FOR -NBL- AND -SBL- PROFILES
SEE SHEET NO.58 FOR -SR2- PROFILE

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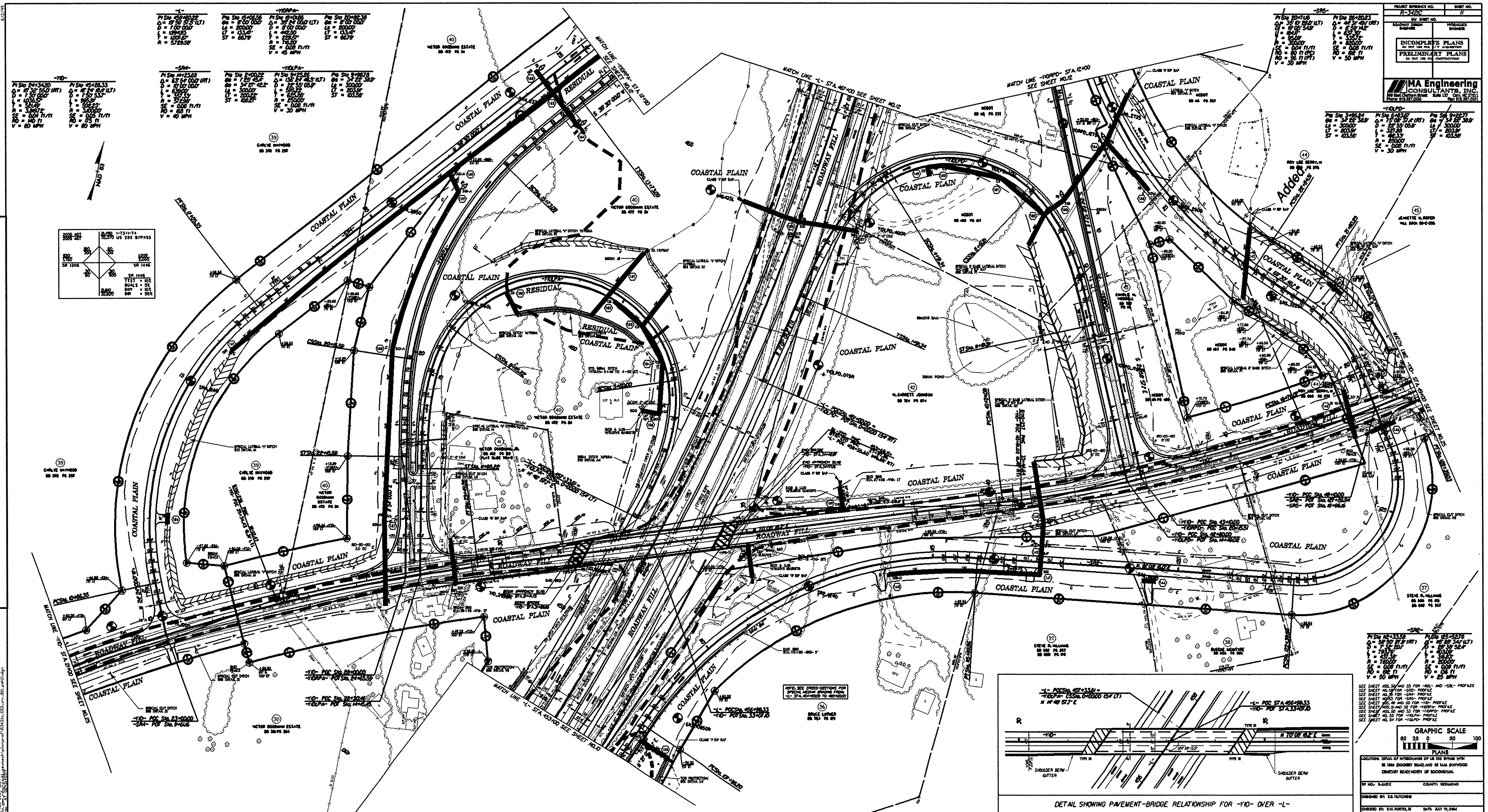

PROJECT REFERENCE NO.
SHEET NO.
R-3421C
11
R/W SHEET NO.
ROADWAY DESIGN ENGINEER
HYDRAULICS ENGINEER
INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION
MA Engineering CONSULTANTS, INC.
COASTAL PLAIN
RESIDUAL
ROADWAY FILL
SEE SHEET NOS. 32 AND 33 FOR -NBL- AND -SBL- PROFILES
SEE SHEET NO. 58 FOR -SR2- PROFILE
SEE SHEET NO. 59 FOR -SR4- PROFILE
SEE SHEET NO. 63 FOR -SR5- PROFILE
SEE SHEET NOS. 49 AND 50 FOR -Y10- PROFILE
SEE SHEET NOS. 51 AND 52 FOR -Y10RPA- PROFILE
SEE SHEET NOS. 52 AND 53 FOR -Y10RPD- PROFILE
SEE SHEET NO. 53 FOR -Y10LPA- PROFILE
SEE SHEET NO. 54 FOR -Y10LPD- PROFILE
GRAPHIC SCALE
PLANS
DETAIL SHOWING PAVEMENT-BRIDGE RELATIONSHIP FOR -Y10- OVER -L-
COUNTY: RICHMOND
DESIGNED BY: K.S. HUTCHENS
CHECKED BY: R.W. PORTER, JR
DATE: JULY 19, 2004

-SR4-

PI Sta 31+68.57
Δ = 34° 33' 21.6" (LT)
D = 4° 05' 33.2"
L = 844.36'
T = 435.46'
R = 1,400.00'
SE = 0.065 ft/ft
RO = 156 ft
V = 50 MPH

-Y1ORPA-

PIs Sta 2+73.44	PI Sta 6+78.09	PIs Sta 10+70.67
θs = 4° 00' 00.0"	Δ = 26° 33' 21.6" (RT)	θs = 4° 00' 00.0"
Ls = 200.00'	D = 4° 00' 00.0"	Ls = 200.00'
LT = 133.37'	L = 663.90	LT = 133.37'
ST = 66.70'	T = 338.02'	ST = 66.70'
	R = 1,432.39'	
	SE = 0.08 ft/ft	
	V = 60 MPH	

-L-

PI Sta 458+60.22	PIs Sta 469+14.15
Δ = 19° 56' 57.5" (LT)	θs = 1° 00' 00.0"
D = 1° 00' 00.0"	Ls = 200.00'
L = 1,994.93	LT = 133.54'
T = 1,007.67'	ST = 66.67'
R = 5,729.58'	

-Y1ORPD-

PIs Sta 1+33.37	PI Sta 4+47.76	PIs Sta 7+57.36
θs = 4° 00' 00.0"	Δ = 19° 37' 35.5" (LT)	θs = 4° 00' 00.0"
Ls = 200.00'	D = 4° 00' 00.0"	Ls = 200.00'
LT = 133.37'	L = 490.66	LT = 133.37'
ST = 66.70'	T = 247.76'	ST = 66.70'
	R = 1,432.39'	
	SE = 0.08 ft/ft	
	V = 60 MPH	

-SR5-

PI Sta 26+20.23	PI Sta 35+53.09
Δ = 44° 31' 49.1" (RT)	Δ = 27° 37' 35.5" (RT)
D = 6° 59' 14.2"	D = 4° 00' 24.1"
L = 637.30'	L = 689.51'
T = 335.72'	T = 351.59'
R = 820.00'	R = 1,430.00'
SE = 0.08 ft/ft	SE = 0.065 ft/ft
RO = 192 ft	RO = 156 ft
V = 50 MPH	V = 50 MPH

PROJECT REFERENCE NO.	SHEET NO.
R-3421C	12
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

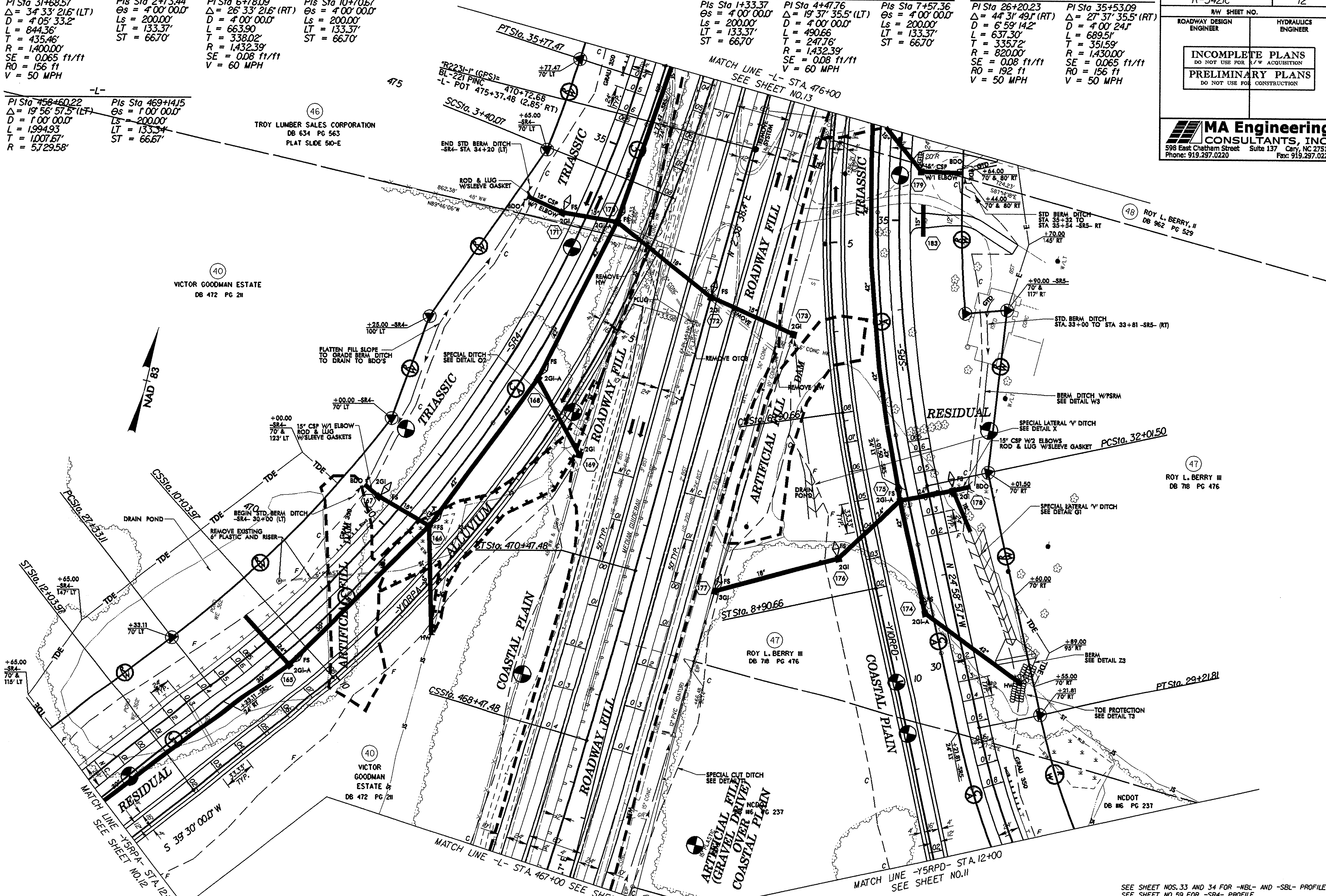
INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

MA Engineering CONSULTANTS, INC.
598 East Chatham Street Suite 137 Cary, NC 27511
Phone: 919.297.0220 Fax: 919.297.0221

8/17/99

REVISIONS


MATCH LINE -L- STA. 476+00
SEE SHEET NO.13
PT Sta. 35+77.47
SCSta. 3+40.07
TROY LUMBER SALES CORPORATION
DB 634 PG 563
PLAT SLIDE 510-E
VICTOR GOODMAN ESTATE
DB 472 PG 211
ROY L. BERRY, II
DB 962 PG 529
ROY L. BERRY III
DB 718 PG 476
NCDOT
DB 1116 PG 237
NAD 83
TRIASSIC
ALLUVIUM
ROADWAY FILL
ARTIFICIAL FILL
COASTAL PLAIN
RESIDUAL
ARTIFICIAL FILL (GRAVEL DRIVE) OVER COASTAL PLAIN
DRAIN POND
REMOVE EXISTING 6" PLASTIC AND RISER
FLATTEN FILL SLOPE TO GRADE BERM DITCH TO DRAIN TO BDO'S
SPECIAL DITCH SEE DETAIL O2
STD. BERM DITCH STA. 33+00 TO STA 33+81 -SR5- (RT)
BERM DITCH W/PSRM SEE DETAIL W3
SPECIAL LATERAL 'V' DITCH SEE DETAIL X
SPECIAL LATERAL 'V' DITCH SEE DETAIL G1
BERM SEE DETAIL Z3
TOE PROTECTION SEE DETAIL T3
SPECIAL CUT DITCH SEE DETAIL F1
PCSta. 32+01.50
PT Sta. 29+21.81
ST Sta. 8+90.66
CSSta. 468+47.48
ST Sta. 470+47.48
CSSta. 10+03.97
PCSta. 27+53.11
STSta. 12+03.97
S 39° 30' 00.0" W
N 24° 58' 57.1" W
MATCH LINE -Y5RPA- STA. 12+90
SEE SHEET NO.12
MATCH LINE -L- STA. 467+00 SEE SHEET NO.11
MATCH LINE -Y5RPD- STA. 12+00
SEE SHEET NO.11

SEE SHEET NOS. 33 AND 34 FOR -NBL- AND -SBL- PROFILES
SEE SHEET NO. 59 FOR -SR4- PROFILE
SEE SHEET NOS. 63 AND 64 FOR -SR5- PROFILE
SEE SHEET NO. 51 FOR -Y1ORPA- PROFILE
SEE SHEET NO. 52 FOR -Y1ORPD- PROFILE

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PROJECT REFERENCE NO.	SHEET NO.
R-3421C	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

MA Engineering CONSULTANTS, INC.
598 East Chatham Street Suite 137 Cary, NC 27511
Phone: 919.297.0220 Fax: 919.297.0221

REVISIONS

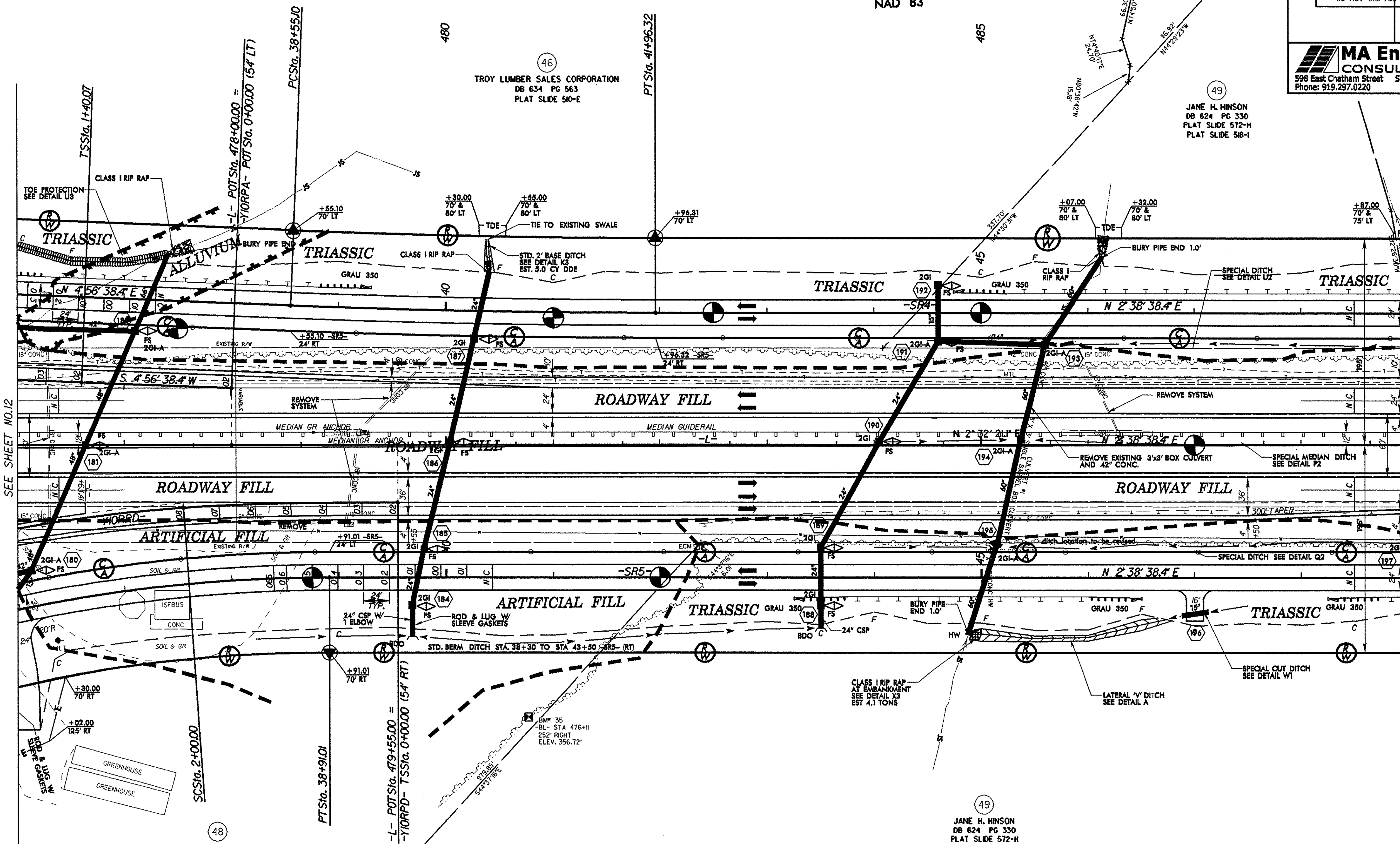
8/17/99

-SR4-

PI Sta 40+25.73
Δ = 2° 18' 00.0" (LT)
D = 0° 40' 26.6"
L = 341.21'
T = 170.63'
R = 8,500.00'
SE = N.C.
V = 50 MPH

-Y10RPA-

PIs Sta 2+73.44	PI Sta 6+78.09	PIs Sta 10+70.67
θs = 4° 00' 00.0"	Δ = 26° 33' 21.6" (RT)	θs = 4° 00' 00.0"
Ls = 200.00'	D = 4° 00' 00.0"	Ls = 200.00'
LT = 133.37'	L = 663.90	LT = 133.37'
ST = 66.70'	T = 338.02'	ST = 66.70'
	R = 1,432.39'	
	SE = 0.08 ft/ft	
	V = 60 MPH	



-SR5-

PI Sta 35+53.09
Δ = 27° 37' 35.5" (RT)
D = 4° 00' 24.1"
L = 689.51'
T = 351.59'
R = 1,430.00'
SE = 0.065 ft/ft
RO = 156 ft
V = 50 MPH

-Y10RPD-

PIs Sta 1+33.37	PI Sta 4+47.76	PIs Sta 7+57.36
θs = 4° 00' 00.0"	Δ = 19° 37' 35.5" (LT)	θs = 4° 00' 00.0"
Ls = 200.00'	D = 4° 00' 00.0"	Ls = 200.00'
LT = 133.37'	L = 490.66	LT = 133.37'
ST = 66.70'	T = 247.76'	ST = 66.70'
	R = 1,432.39'	
	SE = 0.08 ft/ft	
	V = 60 MPH	

SEE SHEET NOS. 34 AND 35 FOR -NBL- AND -SBL- PROFILES
SEE SHEET NOS. 59 AND 60 FOR -SR4- PROFILE
SEE SHEET NO. 64 FOR -SR5- PROFILE
SEE SHEET NO. 51 FOR -Y10RPA- PROFILE
SEE SHEET NO. 52 FOR -Y10RPD- PROFILE

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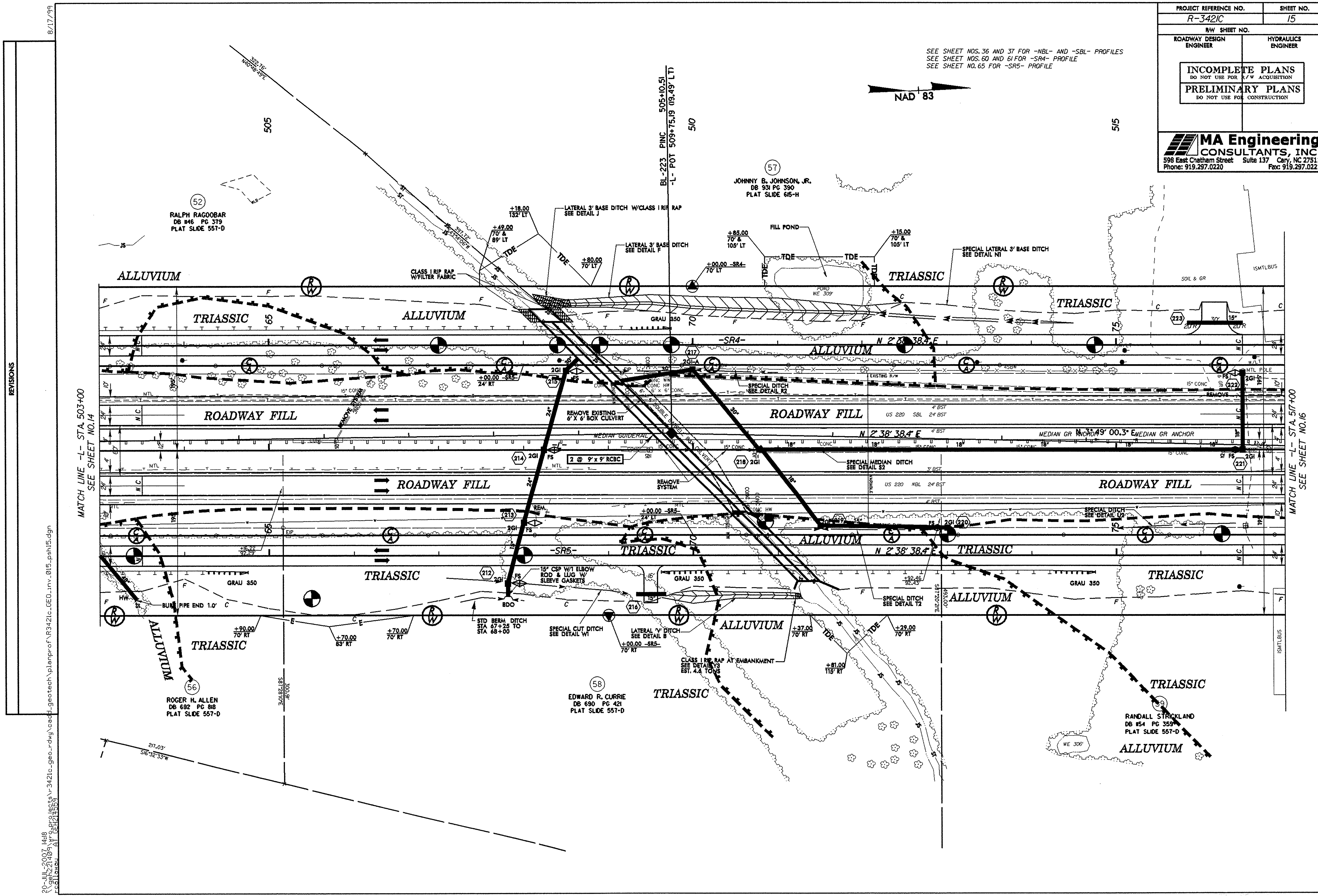
PROJECT REFERENCE NO.	SHEET NO.
R-3421C	14
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

MA Engineering CONSULTANTS, INC.
598 East Chatham Street Suite 137 Cary, NC 27511
Phone: 919.297.0220 Fax: 919.297.0221

SEE SHEET NOS. 35 AND 36 FOR -NBL- AND -SBL- PROFILES
SEE SHEET NO. 60 FOR -SR4- PROFILE
SEE SHEET NOS. 64 AND 65 FOR -SR5- PROFILE


PROJECT REFERENCE NO.
R-3421C
SHEET NO.
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
MA Engineering CONSULTANTS, INC.
598 East Chatham Street Suite 137 Cary, NC 27511
Phone: 919.297.0220 Fax: 919.297.0221
SEE SHEET NOS. 36 AND 37 FOR -NBL- AND -SBL- PROFILES
SEE SHEET NOS. 60 AND 61 FOR -SR4- PROFILE
SEE SHEET NO. 65 FOR -SR5- PROFILE
NAD 83
REVISIONS
8/17/99
BL-223 PINC 505+10.51
-L- POT 509+75.19 (19.49' LT)
505
510
515
RALPH RAGOOBAR
DB 1146 PG 379
PLAT SLIDE 557-D
JOHNNY B. JOHNSON, JR.
DB 931 PG 390
PLAT SLIDE 615-H
ROGER H. ALLEN
DB 692 PG 818
PLAT SLIDE 557-D
EDWARD R. CURRIE
DB 690 PG 421
PLAT SLIDE 557-D
RANDALL STRICKLAND
DB 1154 PG 359
PLAT SLIDE 557-D
ALLUVIUM
TRIASSIC
ROADWAY FILL
MATCH LINE -L- STA. 503+00 SEE SHEET NO. 14
MATCH LINE -L- STA. 511+00 SEE SHEET NO. 16
LATERAL 3' BASE DITCH W/CLASS I RIP RAP SEE DETAIL J
LATERAL 3' BASE DITCH SEE DETAIL F
SPECIAL LATERAL 3' BASE DITCH SEE DETAIL N1
CLASS I RIP RAP W/FILTER FABRIC
FILL POND
REMOVE EXISTING 6' X 6' BOX CULVERT
2 @ 9' x 9' RCBC
REMOVE SYSTEM
SPECIAL DITCH SEE DETAIL R2
SPECIAL MEDIAN DITCH SEE DETAIL S2
SPECIAL DITCH SEE DETAIL U2
SPECIAL DITCH SEE DETAIL T2
15" CSP W/1 ELBOW ROD & LUG W/ SLEEVE GASKETS
STD BERM DITCH STA 67+25 TO STA 68+00
SPECIAL CUT DITCH SEE DETAIL W1
LATERAL 'V' DITCH SEE DETAIL B
CLASS I RIP RAP AT EMBANKMENT SEE DETAIL Y3 EST. 4.4 TONS
BURY PIPE END 1.0'
N 2°38' 38.4" E
N 3°49' 00.3" E
MEDIAN GR ANCHOR
US 220 SBL
US 220 NBL
-SR4-
-SR5-
GRAU 350

PROJECT REFERENCE NO.	SHEET NO.
R-3421C	16
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

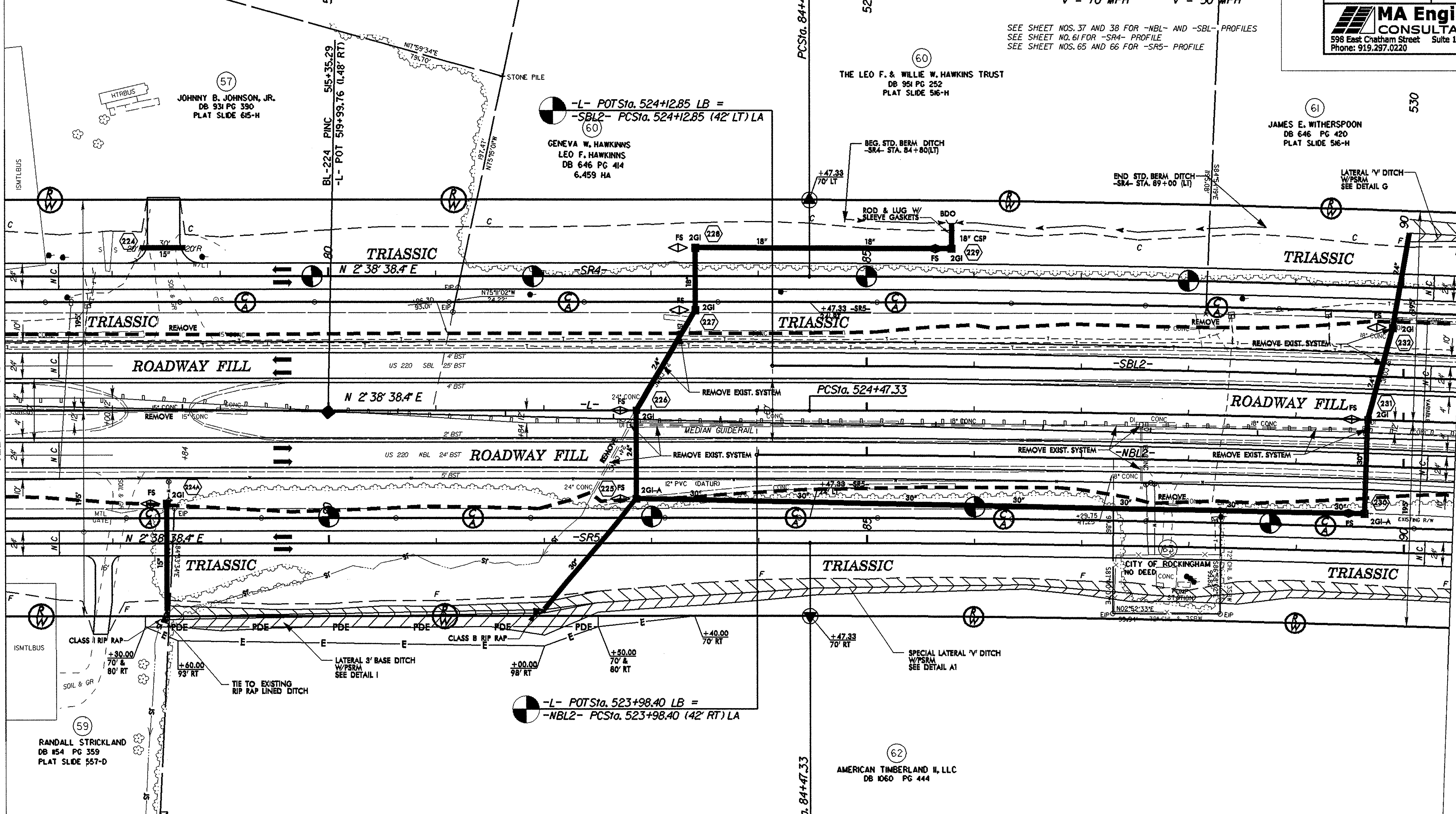
INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

MA Engineering CONSULTANTS, INC.
598 East Chatham Street Suite 137 Cary, NC 27511
Phone: 919.297.0220 Fax: 919.297.0221

-L-	-SBL2-	-SR4-
PI Sta 529+02.07	PI Sta 528+67.60	PI Sta 89+05.63
Δ = 3° 15' 21.6" (RT)	Δ = 3° 15' 21.6" (RT)	Δ = 3° 15' 21.6" (RT)
D = 0° 21' 29.2"	D = 0° 21' 29.2"	D = 0° 21' 19.2"
L = 909.25'	L = 909.25'	L = 916.35'
T = 454.75'	T = 454.75'	T = 458.30'
R = 16,000.00'	R = 16,000.00'	R = 16,125.00'
	SE = N.C.	SE = N.C.
	V = 70 MPH	V = 50 MPH

SEE SHEET NOS. 37 AND 38 FOR -NBL- AND -SBL- PROFILES
SEE SHEET NO. 61 FOR -SR4- PROFILE
SEE SHEET NOS. 65 AND 66 FOR -SR5- PROFILE



NAD 83
JAMES K. CROKE DB 963 PG 118 PLAT SLIDE 580-H
57 JOHNNY B. JOHNSON, JR. DB 931 PG 390 PLAT SLIDE 615-H
60 GENEVA W. HAWKINS LEO F. HAWKINS DB 646 PG 414 6.459 HA
60 THE LEO F. & WILLIE W. HAWKINS TRUST DB 951 PG 252 PLAT SLIDE 516-H
61 JAMES E. WITHERSPOON DB 646 PG 420 PLAT SLIDE 516-H
59 RANDALL STRICKLAND DB 1154 PG 359 PLAT SLIDE 557-D
62 AMERICAN TIMBERLAND II, LLC DB 1060 PG 444
CITY OF ROCKINGHAM NO DEED
BL-224 PINC 515+35.29 -L- POT 519+99.76 (1.48' RT)
-L- POT Sta. 524+12.85 LB = -SBL2- PCSta. 524+12.85 (42' LT) LA
-L- POT Sta. 523+98.40 LB = -NBL2- PCSta. 523+98.40 (42' RT) LA
PCSta. 84+47.33
PCSta. 524+47.33
N 2° 38' 38.4" E
TRIASSIC
ROADWAY FILL
US 220 SBL
US 220 NBL
-SR4-
-SR5-
-SBL2-
-NBL2-
-L-
REMOVE EXIST. SYSTEM
BEG. STD. BERM DITCH -SR4- STA. 84+80(LT)
END STD. BERM DITCH -SR4- STA. 89+00 (LT)
ROD & LUG W/ SLEEVE GASKETS
LATERAL 'V' DITCH W/PSRM SEE DETAIL G
SPECIAL LATERAL 'V' DITCH W/PSRM SEE DETAIL A1
LATERAL 3' BASE DITCH W/PSRM SEE DETAIL I
TIE TO EXISTING RIP RAP LINED DITCH
CLASS B RIP RAP
CLASS II RIP RAP
MEDIAN GUIDERAIL
BM# 37 -BL- STA 513+89 378' RIGHT ELEV. 320.60'
MATCH LINE -L- STA. 517+00 SEE SHEET NO.15
MATCH LINE -L- STA. 530+50 SEE SHEET NO.17

-NBL2-	-SR5-
PI Sta 528+53.15	PI Sta 88+98.52
Δ = 3° 15' 21.6" (RT)	Δ = 3° 15' 21.6" (RT)
D = 0° 21' 29.2"	D = 0° 21' 39.3"
L = 909.25'	L = 902.14'
T = 454.75'	T = 451.19'
R = 16,000.00'	R = 15,875.00'
SE = N.C.	SE = N.C.
V = 70 MPH	V = 50 MPH

REVISIONS

8/17/99

PROJECT REFERENCE NO.	SHEET NO.
R-3421C	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

MA Engineering CONSULTANTS, INC.
598 East Chatham Street Suite 137 Cary, NC 27511
Phone: 919.297.0220 Fax: 919.297.0221

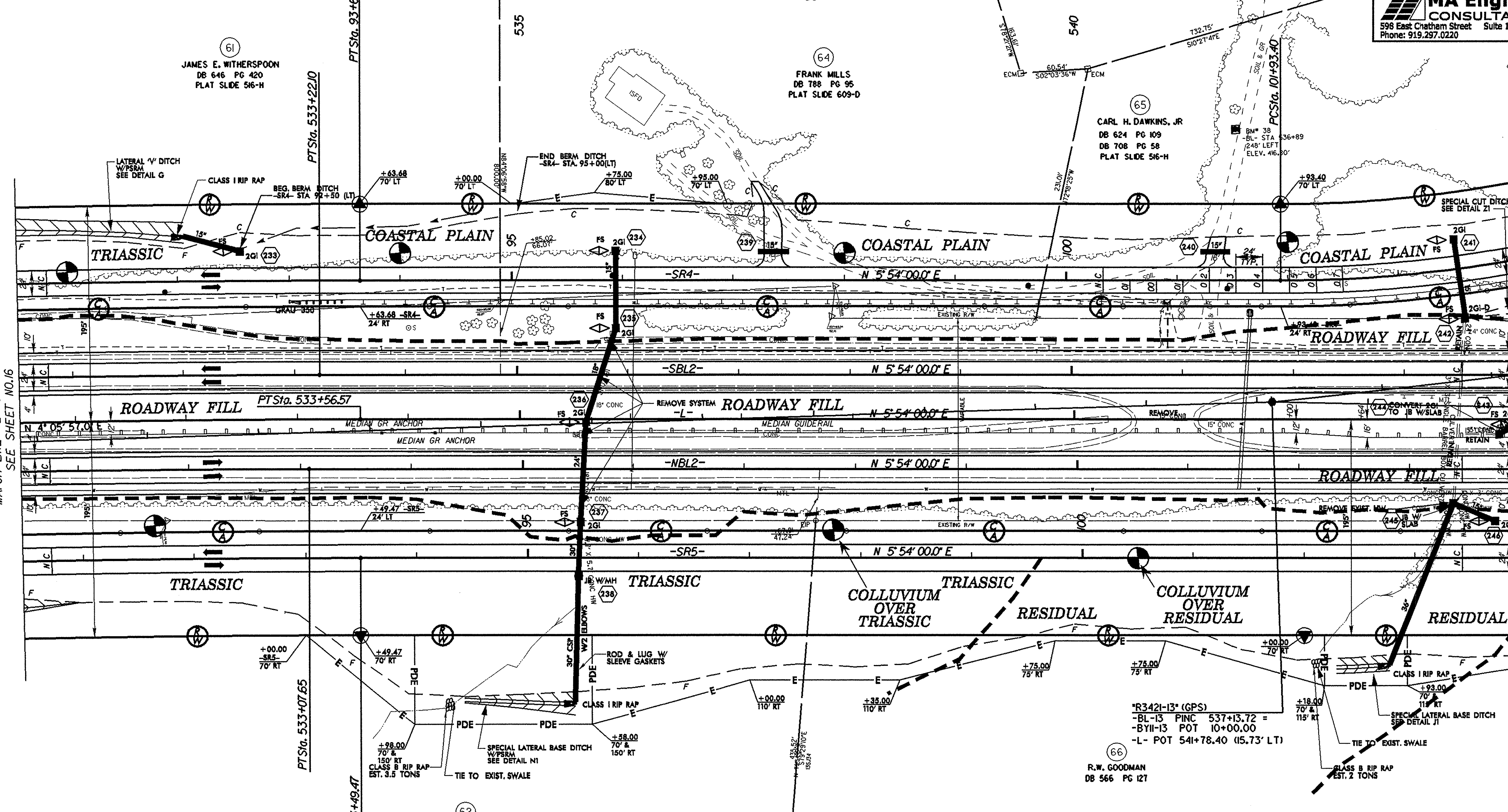
SEE SHEET NOS. 38 AND 39 FOR -NBL- AND -SBL- PROFILES
SEE SHEET NOS. 61 AND 62 FOR -SR4- PROFILE
SEE SHEET NO. 66 FOR -SR5- PROFILE

-L-
PI Sta 529+02.07
Δ = 3° 15' 21.6" (RT)
D = 0° 21' 29.2"
L = 909.25'
T = 454.75'
R = 16,000.00'

-SBL2-
PI Sta 528+67.60
Δ = 3° 15' 21.6" (RT)
D = 0° 21' 29.2"
L = 909.25'
T = 454.75'
R = 16,000.00'
SE = N.C.
V = 70 MPH

-SR4-
PI Sta 89+05.63
Δ = 3° 15' 21.6" (RT)
D = 0° 21' 19.2"
L = 916.35'
T = 458.30'
R = 16,125.00'
SE = N.C.
V = 50 MPH

PI Sta 106+23.86
Δ = 39° 28' 01.6" (LT)
D = 4° 46' 28.7"
L = 826.60'
T = 430.46'
R = 1,200.00'
SE = 0.07 ft/ft
RO = 168 ft
V = 50 MPH



NAD 83
JAMES E. WITHERSPOON
DB 646 PG 420
PLAT SLIDE 516-H
FRANK MILLS
DB 788 PG 95
PLAT SLIDE 609-D
CARL H. DAWKINS, JR
DB 624 PG 109
DB 708 PG 58
PLAT SLIDE 516-H
AMERICAN TIMBERLAND II, LLC
DB 1060 PG 444
R.W. GOODMAN
DB 566 PG 127
PT Sta. 93+63.68
PT Sta. 533+22.10
PT Sta. 533+56.57
PT Sta. 533+07.65
PT Sta. 93+49.47
PC Sta. 101+93.40
MATCH LINE -L- STA. 530+50 SEE SHEET NO.16
MATCH LINE -L- STA. 544+00 SEE SHEET NO.18
TRIASSIC
COASTAL PLAIN
ROADWAY FILL
COLLUVIUM OVER TRIASSIC
COLLUVIUM OVER RESIDUAL
RESIDUAL
-SR4-
-SBL2-
-L-
-NBL2-
-SR5-
N 5° 54' 00.0" E
N 4° 05' 57.0" E
LATERAL 'V' DITCH W/PSRM SEE DETAIL G
CLASS I RIP RAP
BEG. BERM DITCH -SR4- STA 92+50 (LT)
END BERM DITCH -SR4- STA. 95+00(LT)
REMOVE SYSTEM
MEDIAN GR ANCHOR
MEDIAN GUIDERAIL
SPECIAL CUT DITCH SEE DETAIL Z1
ROD & LUG W/ SLEEVE GASKETS
SPECIAL LATERAL BASE DITCH W/PSRM SEE DETAIL N1
TIE TO EXIST. SWALE
CLASS B RIP RAP EST. 3.5 TONS
CLASS B RIP RAP EST. 2 TONS
SPECIAL LATERAL BASE DITCH SEE DETAIL J1
"R3421-13" (GPS)
-BL-13 PINC 537+13.72 =
-BYII-13 POT 10+00.00
-L- POT 541+78.40 (15.73' LT)
BM# 38 -BL- STA 536+89 248' LEFT ELEV. 416.30'

-NBL2-
PI Sta 528+53.15
Δ = 3° 15' 21.6" (RT)
D = 0° 21' 29.2"
L = 909.25'
T = 454.75'
R = 16,000.00'
SE = N.C.
V = 70 MPH

-SR5-
PI Sta 88+98.52
Δ = 3° 15' 21.6" (RT)
D = 0° 21' 39.3"
L = 902.14'
T = 451.19'
R = 15,875.00'
SE = N.C.
V = 50 MPH

INFORMATION ON THIS SHEET SHOWN IN GRAY DEPICTS NCDOT PROJECT R-2231A, WHICH IS CURRENTLY UNDER CONSTRUCTION.

REVISIONS

8/17/99

20-JUL-2007 14:20
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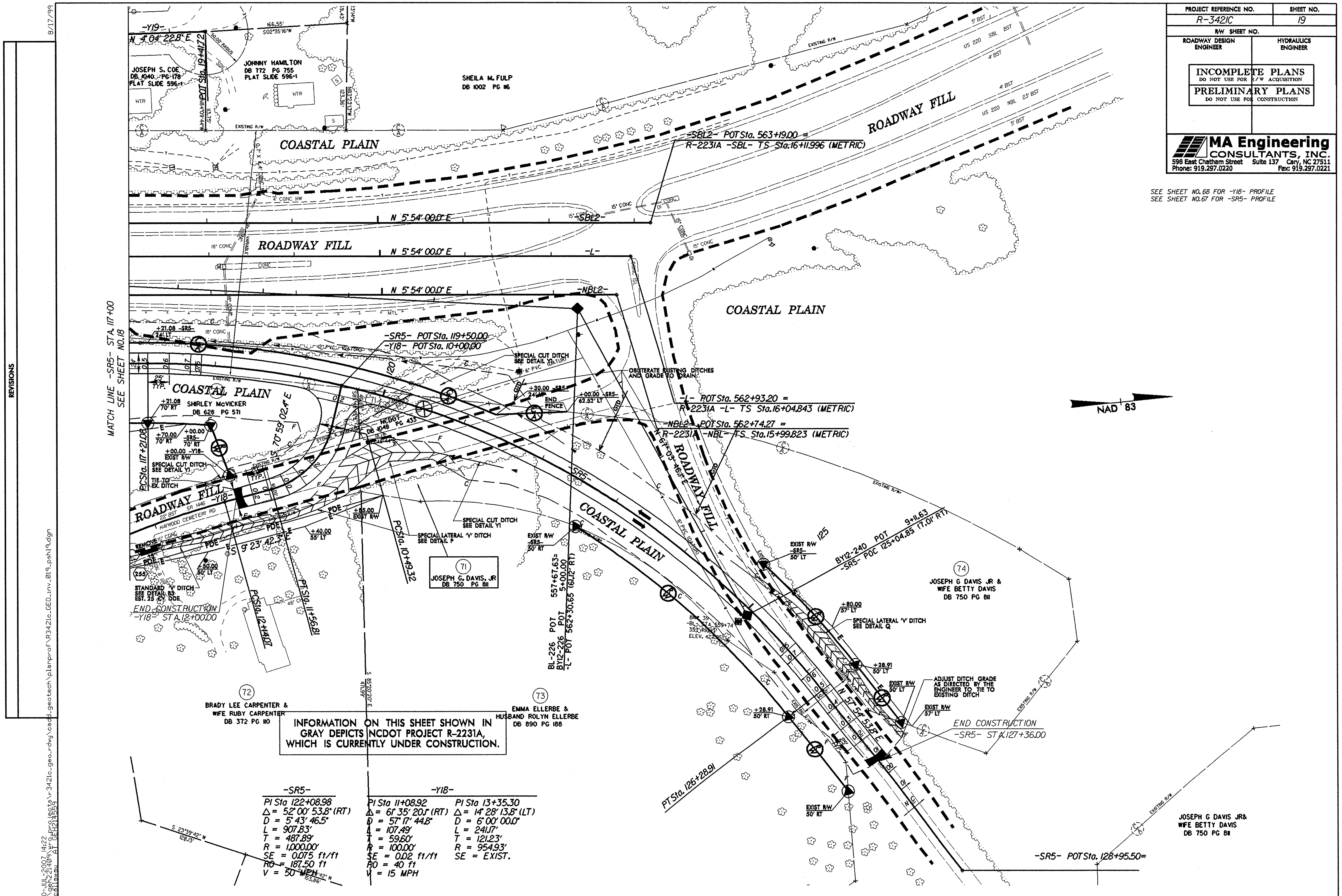

PROJECT REFERENCE NO. R-3421C
SHEET NO. 19
R/W SHEET NO.
ROADWAY DESIGN ENGINEER
HYDRAULICS ENGINEER
INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION
MA Engineering CONSULTANTS, INC.
598 East Chatham Street Suite 137 Cary, NC 27511
Phone: 919.297.0220 Fax: 919.297.0221
SEE SHEET NO. 68 FOR -Y18- PROFILE
SEE SHEET NO. 67 FOR -SR5- PROFILE
REVISIONS
8/17/99
JOSEPH S. COE
DB 1040 PG 178
PLAT SLIDE 596-1
JOHNNY HAMILTON
DB 772 PG 755
PLAT SLIDE 596-1
SHEILA M. FULP
DB 1002 PG 116
COASTAL PLAIN
ROADWAY FILL
N 5°54' 00.0" E
-SBL2- POT Sta. 563+19.00 =
R-2231A -SBL- TS Sta.16+11.996 (METRIC)
-SR5- POT Sta. 119+50.00
-Y18- POT Sta. 10+00.00
-L- POT Sta. 562+93.20 =
R-2231A -L- TS Sta.16+04.843 (METRIC)
-NBL2- POT Sta. 562+74.27 =
R-2231A -NBL- TS Sta.15+99.823 (METRIC)
NAD 83
MATCH LINE -SR5- STA. 117+00
SEE SHEET NO.18
SHIRLEY McVICKER
DB 628 PG 571
JOSEPH G. DAVIS, JR
DB 750 PG 811
JOSEPH G DAVIS JR &
WIFE BETTY DAVIS
DB 750 PG 811
BRADY LEE CARPENTER &
WIFE RUBY CARPENTER
DB 372 PG 110
EMMA ELLERBE &
HUSBAND ROLYN ELLERBE
DB 890 PG 188
SPECIAL CUT DITCH SEE DETAIL Y1
SPECIAL LATERAL 'V' DITCH SEE DETAIL P
SPECIAL LATERAL 'V' DITCH SEE DETAIL Q
STANDARD 'V' DITCH SEE DETAIL 83 EST. 25 CY DDE
OBLITERATE EXISTING DITCHES AND GRADE TO DRAIN
ADJUST DITCH GRADE AS DIRECTED BY THE ENGINEER TO TIE TO EXISTING DITCH
END CONSTRUCTION -Y18- STA.12+00.00
END CONSTRUCTION -SR5- STA.127+36.00
BY12-240 POT 9+11.63
-SR5- POC 125+04.85 (7.01' RT)
BL-226 POT 557+67.63=
BY12-226 POT 5+00.00
-L- POT 562+30.65 (61.12' RT)
PT Sta. 126+28.91
PC Sta. 10+49.32
PT Sta. 11+56.81
PC Sta. 12+14.07
PC Sta. 117+21.08
-SR5- POT Sta. 128+95.50=
INFORMATION ON THIS SHEET SHOWN IN GRAY DEPICTS NCDOT PROJECT R-2231A, WHICH IS CURRENTLY UNDER CONSTRUCTION.
-SR5-
PI Sta 122+08.98
Δ = 52° 00' 53.8" (RT)
D = 5° 43' 46.5"
L = 907.83'
T = 487.89'
R = 1,000.00'
SE = 0.075 ft/ft
RO = 187.50 ft
V = 50 MPH
-Y18-
PI Sta 11+08.92
Δ = 61° 35' 20.1" (RT)
D = 57° 17' 44.8"
L = 107.49'
T = 59.60'
R = 100.00'
SE = 0.02 ft/ft
RO = 40 ft
V = 15 MPH
PI Sta 13+35.30
Δ = 14° 28' 13.8" (LT)
D = 6° 00' 00.0"
L = 241.17'
T = 121.23'
R = 954.93'
SE = EXIST.

PROJECT REFERENCE NO.	SHEET NO.
R-3421C	20
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

MA Engineering CONSULTANTS, INC.
598 East Chatham Street Suite 137 Cary, NC 27511
Phone: 919.297.0220 Fax: 919.297.0221

REVISIONS

PROJECT REFERENCE NO.	SHEET NO.
R-3421C	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

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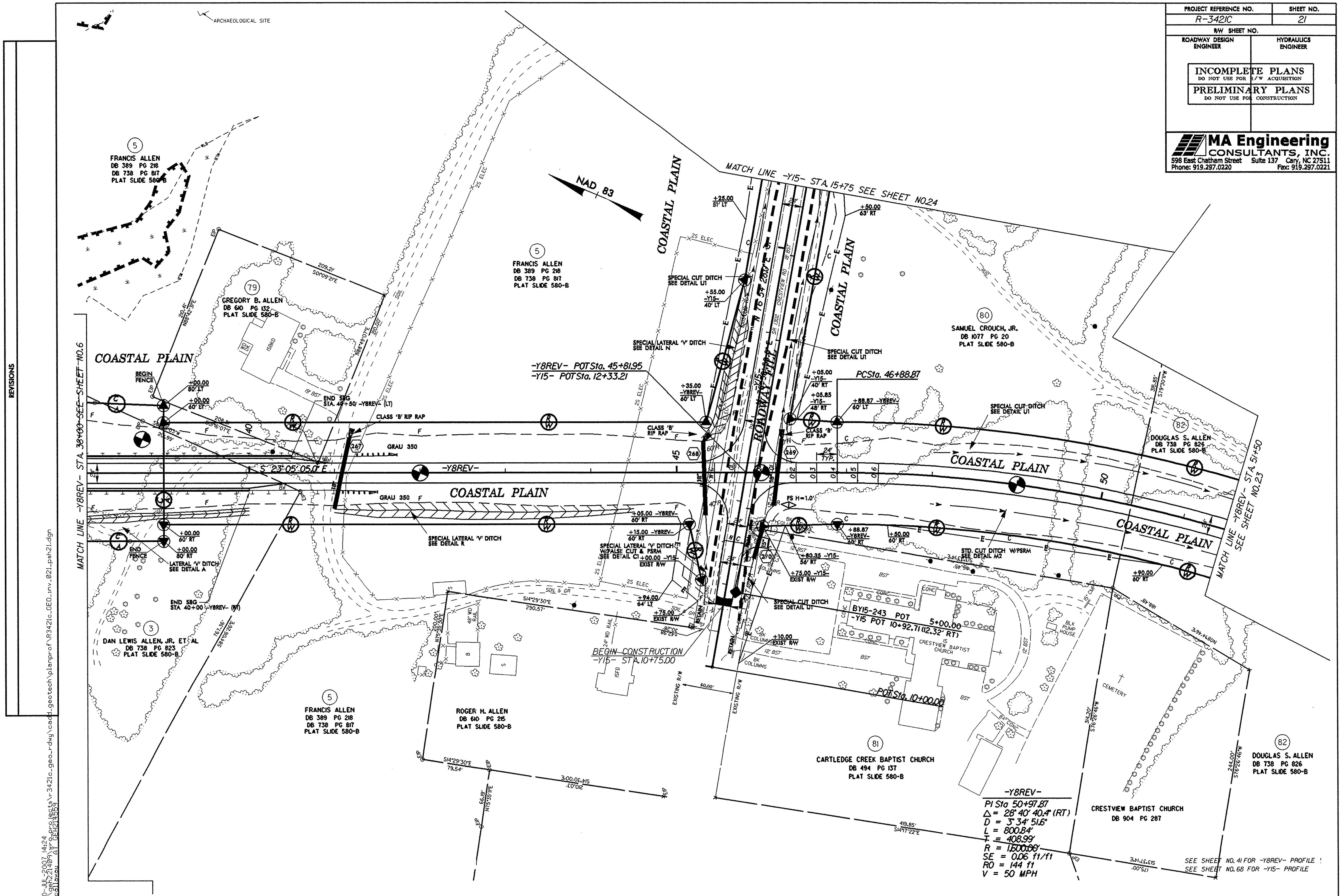
598 East Chatham Street Suite 137 Cary, NC 27511
Phone: 919.297.0220 Fax: 919.297.0221


REVISIONS
ARCHAEOLOGICAL SITE
NAD 83
MATCH LINE -Y15- STA 15+75 SEE SHEET NO.24
MATCH LINE -Y8REV- STA 38+00 SEE SHEET NO.6
MATCH LINE -Y8REV- STA 51+50 SEE SHEET NO.23
COASTAL PLAIN
FRANCIS ALLEN
DB 389 PG 218
DB 738 PG 817
PLAT SLIDE 580-B
GREGORY B. ALLEN
DB 610 PG 132
PLAT SLIDE 580-B
SAMUEL CROUCH, JR.
DB 1077 PG 20
PLAT SLIDE 580-B
DOUGLAS S. ALLEN
DB 738 PG 826
PLAT SLIDE 580-B
DAN LEWIS ALLEN, JR. ET AL
DB 738 PG 823
PLAT SLIDE 580-B
ROGER H. ALLEN
DB 610 PG 215
PLAT SLIDE 580-B
CARTLEDGE CREEK BAPTIST CHURCH
DB 494 PG 137
PLAT SLIDE 580-B
CRESTVIEW BAPTIST CHURCH
DB 904 PG 287
-Y8REV- POT Sta. 45+81.95
-Y15- POT Sta. 12+33.21
PC Sta. 46+88.87
BY15-243 POT 5+00.00
-Y15 POT 10+92.71 (12.32' RT)
BEGIN CONSTRUCTION -Y15- STA.10+75.00
POT Sta. 10+00.00
S 23°05'05.0" E
-Y8REV-
ROADWAY FILL
CLASS 'B' RIP RAP
GRAU 350
SPECIAL CUT DITCH SEE DETAIL U1
SPECIAL LATERAL 'V' DITCH SEE DETAIL N
SPECIAL LATERAL 'V' DITCH SEE DETAIL R
LATERAL 'V' DITCH SEE DETAIL A
STD. CUT DITCH W/PSRM SEE DETAIL M2
END SBG STA. 40+00 -Y8REV- (RT)
END SBG STA. 40+50 -Y8REV- (LT)
BEGIN FENCE
END FENCE
CEMETERY
BLK PUMP HOUSE
-Y8REV-
PI Sta 50+97.87
Δ = 28° 40' 40.4" (RT)
D = 3° 34' 51.6"
L = 800.84'
T = 408.99'
R = 1,600.00'
SE = 0.06 ft/ft
RO = 144 ft
V = 50 MPH
SEE SHEET NO. 41 FOR -Y8REV- PROFILE
SEE SHEET NO. 68 FOR -Y15- PROFILE

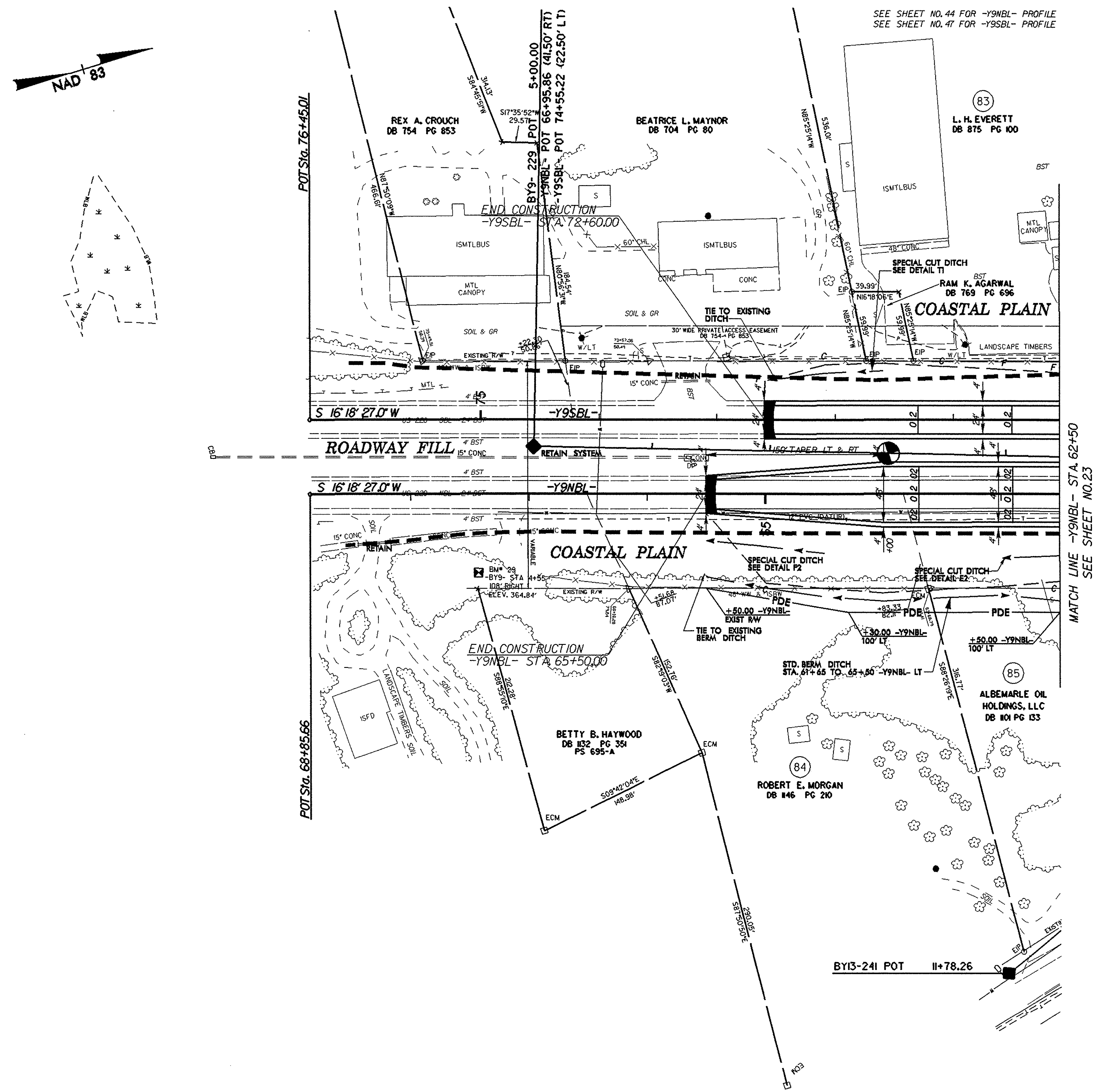
PROJECT REFERENCE NO.	SHEET NO.
R-3421C	22
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

MA Engineering CONSULTANTS, INC.
598 East Chatham Street Suite 137 Cary, NC 27511
Phone: 919.297.0220 Fax: 919.297.0221

SEE SHEET NO. 44 FOR -Y9NBL- PROFILE
SEE SHEET NO. 47 FOR -Y9SBL- PROFILE



REVISIONS

8/17/99

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PROJECT REFERENCE NO.	SHEET NO.
R-3421C	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

MA Engineering CONSULTANTS, INC.
598 East Chatham Street Suite 137 Cary, NC 27511
Phone: 919.297.0220 Fax: 919.297.0221

REVISIONS 8/17/99

-Y8REV-
PI Sta 58+80.71
Δ = 75° 16' 27.4" (LT)
D = 20° 50' 05.4"
L = 361.29'
T = 212.06'
R = 275.00'
SE = 0.08 ft/ft
RO = 192 ft
V = 30 MPH

PI Sta 50+97.87
Δ = 28° 40' 40.4" (RT)
D = 3° 34' 51.6"
L = 800.84'
T = 408.99'
R = 1,600.00'
SE = 0.06 ft/ft
RO = 144 ft
V = 50 MPH

-DRI-
PI Sta 12+67.53
Δ = 3° 33' 58.9" (RT)
D = 11° 27' 33.0"
L = 31.12'
T = 15.57'
R = 500.00'

PI Sta 11+65.10
Δ = 45° 32' 19.6" (RT)
D = 114° 35' 29.6"
L = 40.61'
T = 21.50'
R = 50.00'

PI Sta 10+67.69
Δ = 70° 52' 21.4" (LT)
D = 190° 59' 09.4"
L = 37.11'
T = 21.35'
R = 30.00'

-Y9SBL-
PI Sta 66+19.44
Δ = 2° 41' 53.3" (RT)
D = 0° 28' 38.9"
L = 565.10'
T = 282.60'
R = 12,000.00'
SE = N.C.
V = 60 MPH

-SR2-
PI Sta 14+59.46
Δ = 98° 12' 03.7" (LT)
D = 19° 05' 54.9"
L = 514.18'
T = 346.34'
R = 300.00'
SE = 0.08 ft/ft
RO = 168 ft
V = 30 MPH

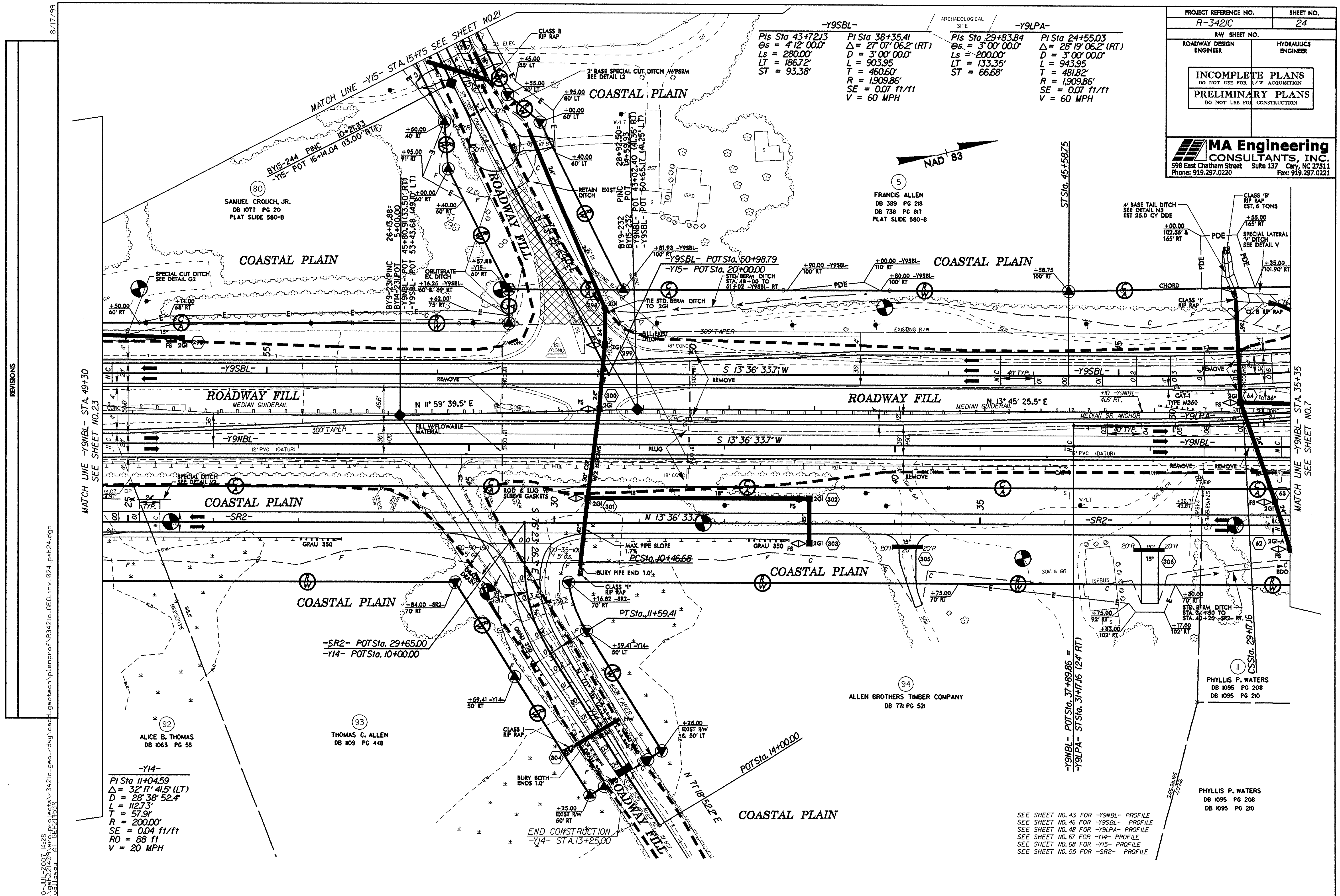
PI Sta 21+05.70
Δ = 40° 15' 48.7" (RT)
D = 7° 32' 20.1"
L = 534.08'
T = 278.60'
R = 760.00'
SE = 0.08 ft/ft
RO = 192 ft
V = 50 MPH

-Y9NBL-
PI Sta 54+63.49
Δ = 2° 41' 53.3" (RT)
D = 0° 21' 29.2"
L = 753.46'
T = 376.80'
R = 16,000.00'
SE = N.C.
V = 60 MPH

SEE SHEET NO. 41 FOR -Y8REV- PROFILE
SEE SHEET NOS. 43 AND 44 FOR -Y9NBL- PROFILE
SEE SHEET NOS. 46 AND 47 FOR -Y9SBL- PROFILE
SEE SHEET NO. 54 FOR -SR2- PROFILE

NAD 83

MATCH LINE -Y9NBL- STA 62+50 SEE SHEET NO.22
MATCH LINE -Y8REV- STA 51+50 SEE SHEET NO.21
MATCH LINE -Y9NBL- STA 49+30 SEE SHEET NO.24



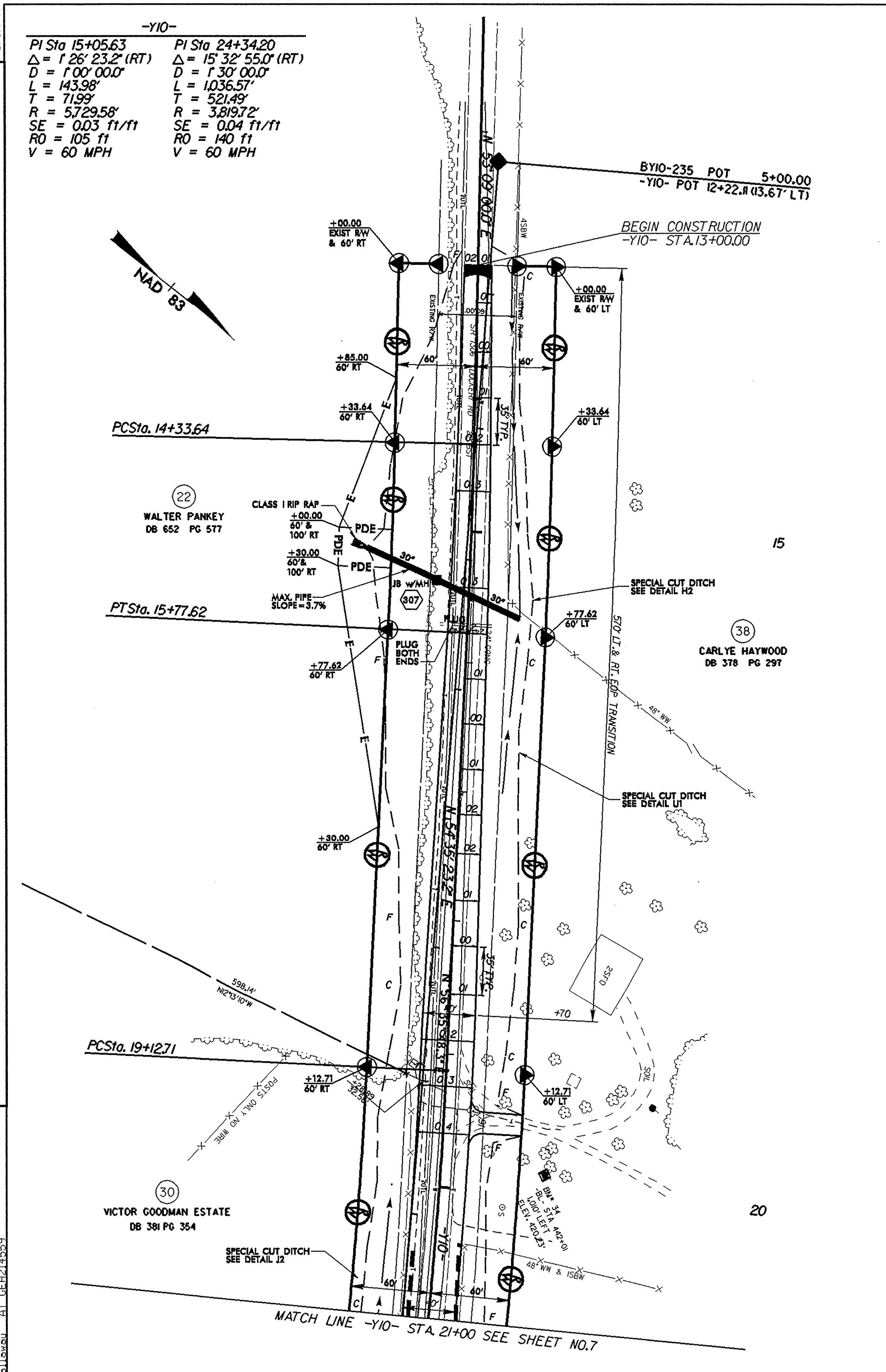
PROJECT REFERENCE NO.
R-3421C
SHEET NO.
24
R/W SHEET NO.
ROADWAY DESIGN ENGINEER
HYDRAULICS ENGINEER
INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION
MA Engineering
CONSULTANTS, INC.
598 East Chatham Street Suite 137 Cary, NC 27511
Phone: 919.297.0220 Fax: 919.297.0221
-Y9SBL-
PIs Sta 43+72.13
Θs = 4°12' 00.0"
Ls = 280.00'
LT = 186.72'
ST = 93.38'
PI Sta 38+35.41
Δ = 27° 07' 06.2" (RT)
D = 3° 00' 00.0"
L = 903.95
T = 460.60'
R = 1,909.86'
SE = 0.07 ft/ft
V = 60 MPH
ARCHAEOLOGICAL SITE
-Y9LPA-
PIs Sta 29+83.84
Θs = 3° 00' 00.0"
Ls = 200.00'
LT = 133.35'
ST = 66.68'
PI Sta 24+55.03
Δ = 28° 19' 06.2" (RT)
D = 3° 00' 00.0"
L = 943.95
T = 481.82'
R = 1,909.86'
SE = 0.07 ft/ft
V = 60 MPH
MATCH LINE -Y15- STA. 15+75 SEE SHEET NO.21
NAD 83
COASTAL PLAIN
ROADWAY FILL
SAMUEL CROUCH, JR.
DB 1077 PG 20
PLAT SLIDE 580-B
FRANCIS ALLEN
DB 389 PG 218
DB 738 PG 817
PLAT SLIDE 580-B
-Y9SBL- POT Sta. 50+98.79
-Y15- POT Sta. 20+00.00
ST Sta. 45+58.75
MATCH LINE -Y9NBL- STA. 49+30 SEE SHEET NO. 23
MATCH LINE -Y9NBL- STA. 35+35 SEE SHEET NO. 7
-Y9SBL-
S 13° 36' 33.7" W
-Y9NBL-
S 13° 36' 33.7" W
N 11° 59' 39.5" E
N 13° 45' 25.5" E
-SR2-
N 13° 36' 33.7" E
MEDIAN GUIDERAIL
PCS Sta. 10+46.68
-SR2- POT Sta. 29+65.00
-Y14- POT Sta. 10+00.00
PT Sta. 11+59.41
POT Sta. 14+00.00
N 71° 18' 52.2" E
CS Sta. 29+17.16
-Y9NBL- POT Sta. 37+89.86 =
-Y9LPA- ST Sta. 31+17.16 (24' RT)
ALLEN BROTHERS TIMBER COMPANY
DB 771 PG 521
PHYLLIS P. WATERS
DB 1095 PG 208
DB 1095 PG 210
ALICE B. THOMAS
DB 1063 PG 55
THOMAS C. ALLEN
DB 1109 PG 448
-Y14-
PI Sta 11+04.59
Δ = 32° 17' 41.5" (LT)
D = 28° 38' 52.4"
L = 112.73'
T = 57.91'
R = 200.00'
SE = 0.04 ft/ft
RO = 88 ft
V = 20 MPH
END CONSTRUCTION
-Y14- STA. 13+25.00
SEE SHEET NO. 43 FOR -Y9NBL- PROFILE
SEE SHEET NO. 46 FOR -Y9SBL- PROFILE
SEE SHEET NO. 48 FOR -Y9LPA- PROFILE
SEE SHEET NO. 67 FOR -Y14- PROFILE
SEE SHEET NO. 68 FOR -Y15- PROFILE
SEE SHEET NO. 55 FOR -SR2- PROFILE
REVISIONS
8/17/99

PROJECT REFERENCE NO.	SHEET NO.
R-3421C	25
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

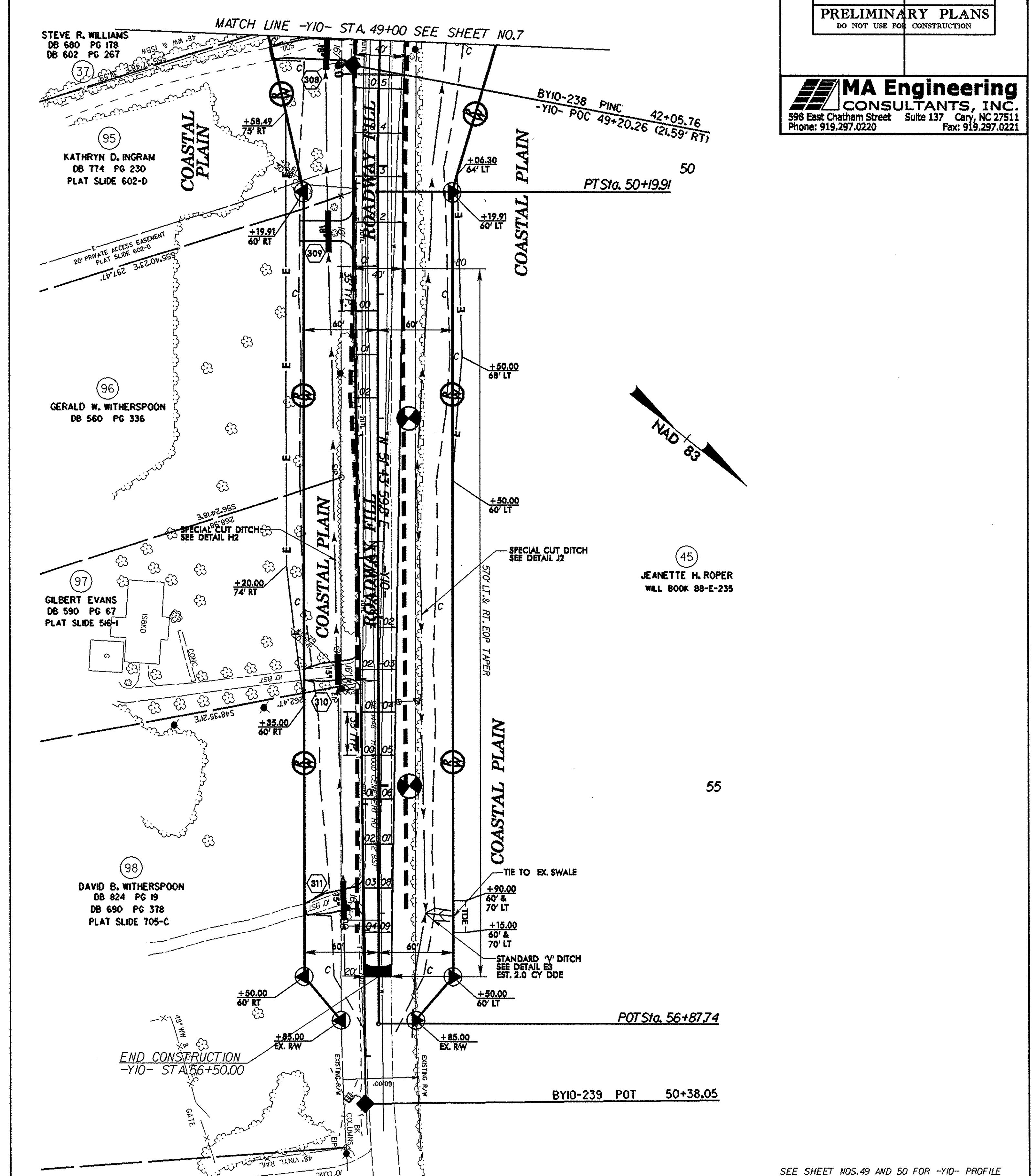
INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

MA Engineering CONSULTANTS, INC.
598 East Chatham Street Suite 137 Cary, NC 27511
Phone: 919.297.0220 Fax: 919.297.0221



-Y10-
PI Sta 15+05.63
Δ = 1° 26' 23.2" (RT)
D = 1° 00' 00.0"
L = 143.98'
T = 71.99'
R = 5,729.58'
SE = 0.03 ft/ft
RO = 105 ft
V = 60 MPH
PI Sta 24+34.20
Δ = 15° 32' 55.0" (RT)
D = 1° 30' 00.0"
L = 1,036.57'
T = 521.49'
R = 3,819.72'
SE = 0.04 ft/ft
RO = 140 ft
V = 60 MPH
NAD 83
BY10-235 POT 5+00.00
-Y10- POT 12+22.11 (13.67' LT)
BEGIN CONSTRUCTION
-Y10- STA.13+00.00
+00.00 EXIST R/W & 60' RT
+00.00 EXIST R/W & 60' LT
+85.00 60' RT
+33.64 60' RT
+33.64 60' LT
PCSta. 14+33.64
22
WALTER PANKEY
DB 652 PG 577
CLASS I RIP RAP
+00.00 60' & 100' RT
+30.00 60'& 100' RT
PDE
MAX. PIPE SLOPE=3.7%
JB w/MH
307
SPECIAL CUT DITCH SEE DETAIL H2
PTSta. 15+77.62
+77.62 60' LT
+77.62 60' RT
PLUG BOTH ENDS
38
CARLYE HAYWOOD
DB 378 PG 297
570' LT. & RT. EOP TRANSITION
SPECIAL CUT DITCH SEE DETAIL U1
15
+30.00 60' RT
PCSta. 19+12.71
+12.71 60' RT
+12.71 60' LT
30
VICTOR GOODMAN ESTATE
DB 381 PG 354
SPECIAL CUT DITCH SEE DETAIL J2
20
MATCH LINE -Y10- STA. 21+00 SEE SHEET NO.7



MATCH LINE -Y10- STA. 49+00 SEE SHEET NO.7
STEVE R. WILLIAMS
DB 680 PG 178
DB 602 PG 267
37
308
BY10-238 PINC 42+05.76
-Y10- POC 49+20.26 (21.59' RT)
+58.49 75' RT
95
KATHRYN D. INGRAM
DB 774 PG 230
PLAT SLIDE 602-D
COASTAL PLAIN
ROADWAY FILL
+06.30 64' LT
PTSta. 50+19.91
50
+19.91 60' LT
+19.91 60' RT
309
20' PRIVATE ACCESS EASEMENT PLAT SLIDE 602-D
+50.00 68' LT
96
GERALD W. WITHERSPOON
DB 560 PG 336
NAD 83
+50.00 60' LT
SPECIAL CUT DITCH SEE DETAIL H2
SPECIAL CUT DITCH SEE DETAIL J2
45
JEANETTE H. ROPER
WILL BOOK 88-E-235
97
GILBERT EVANS
DB 590 PG 67
PLAT SLIDE 516-I
+20.00 74' RT
570' LT. & RT. EOP TAPER
310
+35.00 60' RT
55
98
DAVID B. WITHERSPOON
DB 824 PG 19
DB 690 PG 378
PLAT SLIDE 705-C
311
TIE TO EX. SWALE
+90.00 60' & 70' LT
+15.00 60' & 70' LT
STANDARD 'V' DITCH SEE DETAIL E3 EST. 2.0 CY DDE
+50.00 60' RT
+50.00 60' LT
POTSta. 56+87.74
+85.00 EX. R/W
END CONSTRUCTION
-Y10- STA.56+50.00
BY10-239 POT 50+38.05

SEE SHEET NOS. 49 AND 50 FOR -Y10- PROFILE

REVISIONS

8/17/99

PROJECT REFERENCE NO.	SHEET NO.
R-3421C	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

MA Engineering CONSULTANTS, INC.
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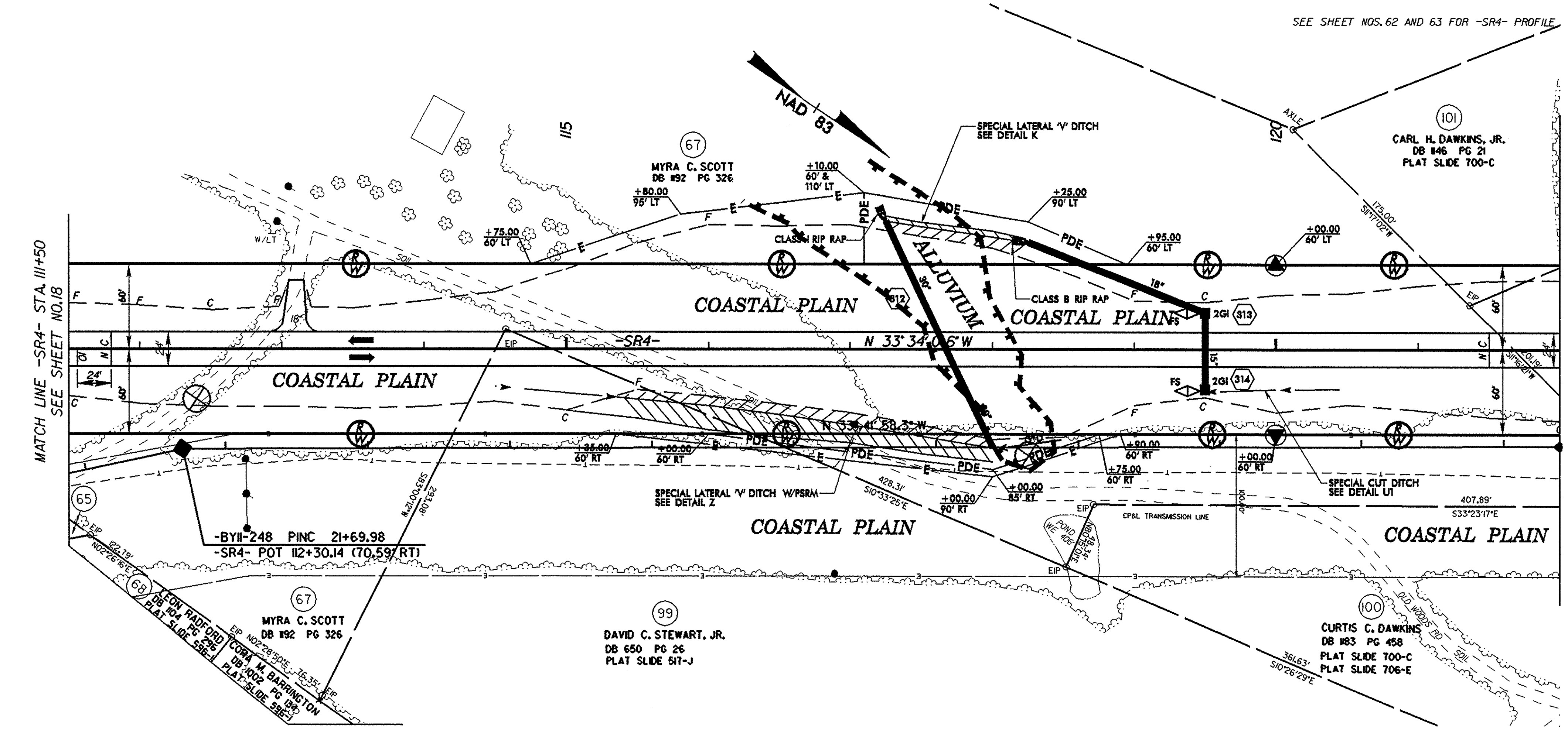
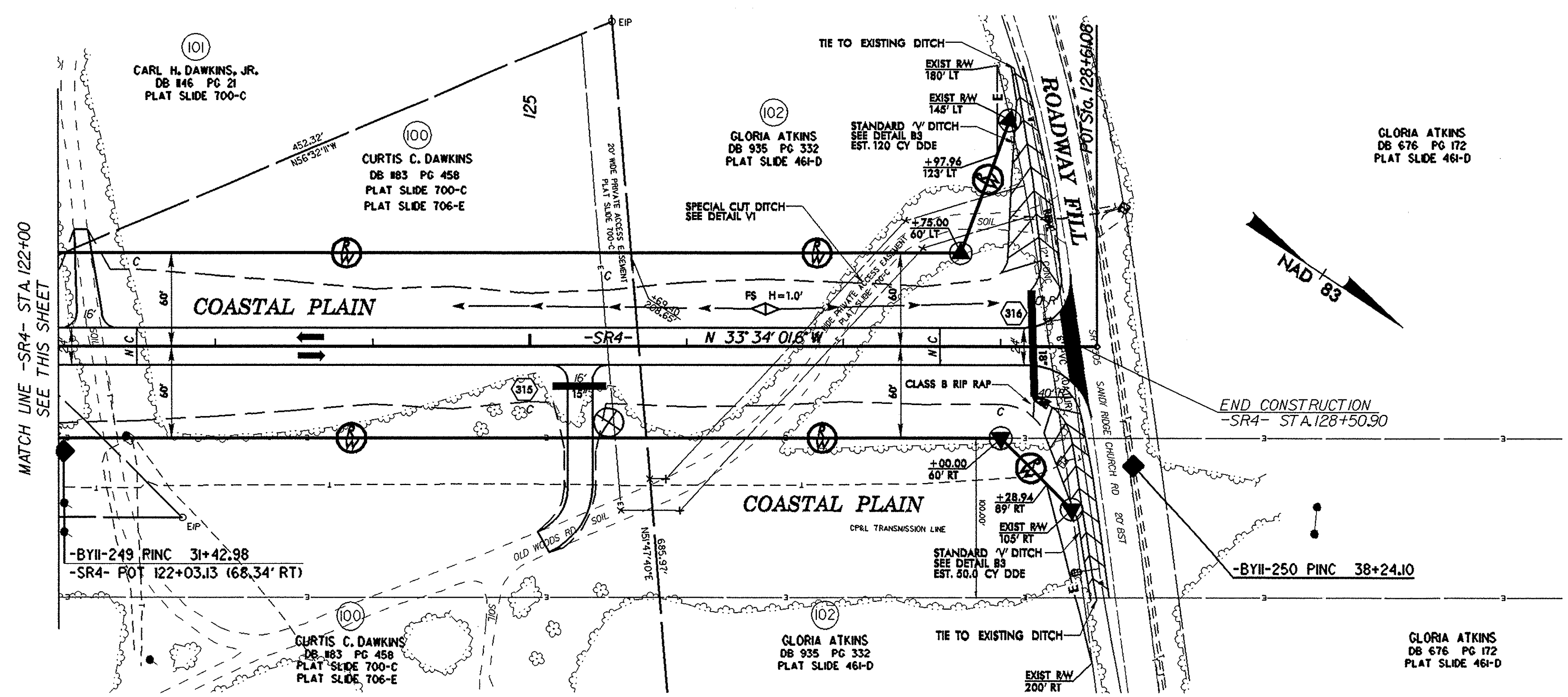
SEE SHEET NOS. 62 AND 63 FOR -SR4- PROFILE


NAD 83
SPECIAL LATERAL 'V' DITCH SEE DETAIL K
ALLUVIUM
COASTAL PLAIN
COASTAL PLAIN
COASTAL PLAIN
COASTAL PLAIN
COASTAL PLAIN
-SR4-
N 33° 34' 01.6" W
CLASS B RIP RAP
CLASS B RIP RAP
MYRA C. SCOTT DB 192 PG 326
CARL H. DAWKINS, JR. DB 146 PG 21 PLAT SLIDE 700-C
-BY11-248 PINC 21+69.98
-SR4- POT 112+30.14 (70.59' RT)
SPECIAL LATERAL 'V' DITCH W/PSRM SEE DETAIL Z
SPECIAL CUT DITCH SEE DETAIL U1
MYRA C. SCOTT DB 192 PG 326
DAVID C. STEWART, JR. DB 650 PG 26 PLAT SLIDE 517-J
CURTIS C. DAWKINS DB 183 PG 458 PLAT SLIDE 700-C PLAT SLIDE 706-E
CP&L TRANSMISSION LINE
MATCH LINE -SR4- STA. 111+50 SEE SHEET NO. 18
MATCH LINE -SR4- STA. 122+00 SEE THIS SHEET


CARL H. DAWKINS, JR. DB 146 PG 21 PLAT SLIDE 700-C
CURTIS C. DAWKINS DB 183 PG 458 PLAT SLIDE 700-C PLAT SLIDE 706-E
GLORIA ATKINS DB 935 PG 332 PLAT SLIDE 461-D
GLORIA ATKINS DB 676 PG 172 PLAT SLIDE 461-D
TIE TO EXISTING DITCH
STANDARD 'V' DITCH SEE DETAIL B3 EST. 120 CY DDE
SPECIAL CUT DITCH SEE DETAIL V1
ROADWAY FILL
NAD 83
COASTAL PLAIN
COASTAL PLAIN
-SR4-
N 33° 34' 01.6" W
CLASS B RIP RAP
END CONSTRUCTION -SR4- STA. 128+50.90
SANDY RIDGE CHURCH RD
-BY11-249 PINC 31+42.98
-SR4- POT 122+03.13 (68.34' RT)
-BY11-250 PINC 38+24.10
STANDARD 'V' DITCH SEE DETAIL B3 EST. 50.0 CY DDE
CP&L TRANSMISSION LINE
MATCH LINE -SR4- STA. 122+00 SEE THIS SHEET

REVISIONS

20-JUL-2007 14:31

MA Engineering
CONSULTANTS, INC.
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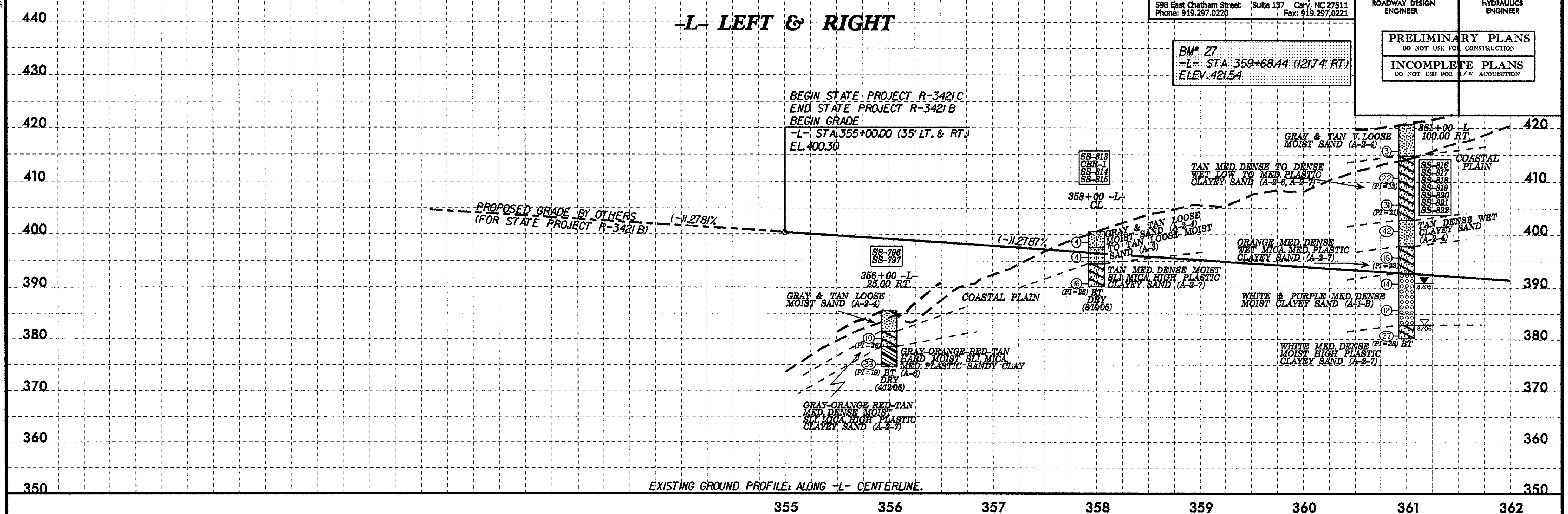
PROJECT REFERENCE NO.	SHEET NO.
R-3421C	27
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

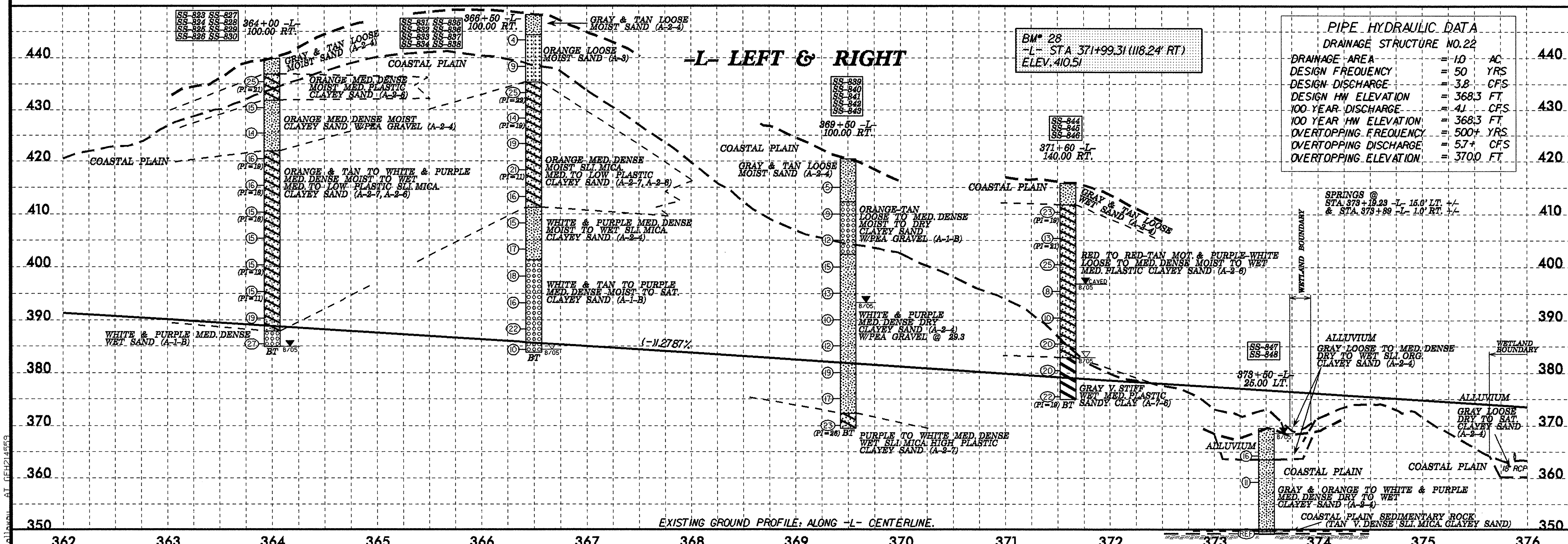
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

-L- LEFT & RIGHT


BM* 27
-L- STA 359+68.44 (121.74' RT)
ELEV. 421.54
BEGIN STATE PROJECT R-3421C
END STATE PROJECT R-3421B
BEGIN GRADE
-L- STA 355+00.00 (35' LT. & RT.)
EL 400.30
PROPOSED GRADE BY OTHERS
(FOR STATE PROJECT R-3421B)
(-)1.2781%
(-)1.2787%
356+00 -L- 25.00' RT.
358+00 -L- CL
361+00 -L- 100.00' RT.
GRAY & TAN LOOSE MOIST SAND (A-2-4)
GRAY-ORANGE-RED-TAN HARD MOIST SLI. MICA. MED. PLASTIC SANDY CLAY (A-6)
GRAY-ORANGE-RED-TAN MED. DENSE MOIST SLI. MICA. HIGH PLASTIC CLAYEY SAND (A-2-7)
COASTAL PLAIN
GRAY & TAN LOOSE MOIST SAND (A-2-4) TO TAN LOOSE MOIST SAND (A-3)
TAN MED. DENSE MOIST SLI. MICA. HIGH PLASTIC CLAYEY SAND (A-2-7)
GRAY & TAN V. LOOSE MOIST SAND (A-2-4)
TAN MED. DENSE TO DENSE WET LOW TO MED. PLASTIC CLAYEY SAND (A-2-6, A-2-7)
ORANGE MED. DENSE WET MICA. MED. PLASTIC CLAYEY SAND (A-2-7)
TAN DENSE WET CLAYEY SAND (A-2-4)
WHITE & PURPLE MED. DENSE MOIST CLAYEY SAND (A-1-B)
WHITE MED. DENSE MOIST HIGH PLASTIC CLAYEY SAND (A-2-7)
EXISTING GROUND PROFILE: ALONG -L- CENTERLINE.
355 356 357 358 359 360 361 362

-L- LEFT & RIGHT


BM* 28
-L- STA 371+99.31 (118.24' RT)
ELEV. 410.51
364+00 -L- 100.00' RT.
366+50 -L- 100.00' RT.
369+50 -L- 100.00' RT.
371+60 -L- 140.00' RT.
373+50 -L- 25.00' LT.
COASTAL PLAIN
GRAY & TAN LOOSE MOIST SAND (A-2-4)
ORANGE MED. DENSE MOIST MED. PLASTIC CLAYEY SAND (A-2-6)
ORANGE MED. DENSE MOIST CLAYEY SAND W/PEA GRAVEL (A-2-4)
ORANGE & TAN TO WHITE & PURPLE MED. DENSE MOIST TO WET MED. TO LOW PLASTIC SLI. MICA. CLAYEY SAND (A-2-7, A-2-6)
WHITE & PURPLE MED. DENSE WET SAND (A-1-B)
ORANGE LOOSE MOIST SAND (A-3)
ORANGE MED. DENSE MOIST SLI. MICA. MED. TO LOW PLASTIC CLAYEY SAND (A-2-7, A-2-6)
WHITE & PURPLE MED. DENSE MOIST TO WET SLI. MICA. CLAYEY SAND (A-2-4)
WHITE & TAN TO PURPLE MED. DENSE MOIST TO SAT. CLAYEY SAND (A-1-B)
(-)1.2787%
ORANGE-TAN LOOSE TO MED. DENSE MOIST TO DRY CLAYEY SAND W/PEA GRAVEL (A-1-B)
WHITE & PURPLE MED. DENSE DRY CLAYEY SAND (A-2-4) W/PEA GRAVEL @ 29.3
PURPLE TO WHITE MED. DENSE WET SLI. MICA. HIGH PLASTIC CLAYEY SAND (A-2-7)
RED TO RED-TAN MOT. & PURPLE-WHITE LOOSE TO MED. DENSE MOIST TO WET MED. PLASTIC CLAYEY SAND (A-2-6)
GRAY V. STIFF WET MED. PLASTIC SANDY CLAY (A-7-6)
SPRINGS @ STA. 373+18.23 -L- 15.0' LT. +/- & STA. 373+89 -L- 1.0' RT. +/-
WETLAND BOUNDARY
ALLUVIUM
GRAY LOOSE TO MED. DENSE DRY TO WET SLI. ORG. CLAYEY SAND (A-2-4)
GRAY LOOSE DRY TO SAT. CLAYEY SAND (A-2-4)
GRAY & ORANGE TO WHITE & PURPLE MED. DENSE DRY TO WET CLAYEY SAND (A-2-4)
COASTAL PLAIN SEDIMENTARY ROCK (TAN V. DENSE SLI. MICA. CLAYEY SAND)
18" RCP
EXISTING GROUND PROFILE: ALONG -L- CENTERLINE.
362 363 364 365 366 367 368 369 370 371 372 373 374 375 376

PIPE HYDRAULIC DATA
DRAINAGE STRUCTURE NO. 22

DRAINAGE AREA	= 1.0	AC
DESIGN FREQUENCY	= 50	YRS
DESIGN DISCHARGE	= 3.8	CFS
DESIGN HW ELEVATION	= 368.3	FT
100 YEAR DISCHARGE	= 4.1	CFS
100 YEAR HW ELEVATION	= 368.3	FT
OVERTOPPING FREQUENCY	= 500+	YRS
OVERTOPPING DISCHARGE	= 5.7+	CFS
OVERTOPPING ELEVATION	= 370.0	FT

18-JUL-2007 10:47

MA Engineering CONSULTANTS, INC.	PROJECT REFERENCE NO.	SHEET NO.
598 East Chatham Street Suite 137 Cary, NC 27511	R-3421C	28
Phone: 919.297.0220 Fax: 919.297.0221	ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

-L- LEFT & RIGHT

PIPE HYDRAULIC DATA
DRAINAGE STRUCTURE NO.23

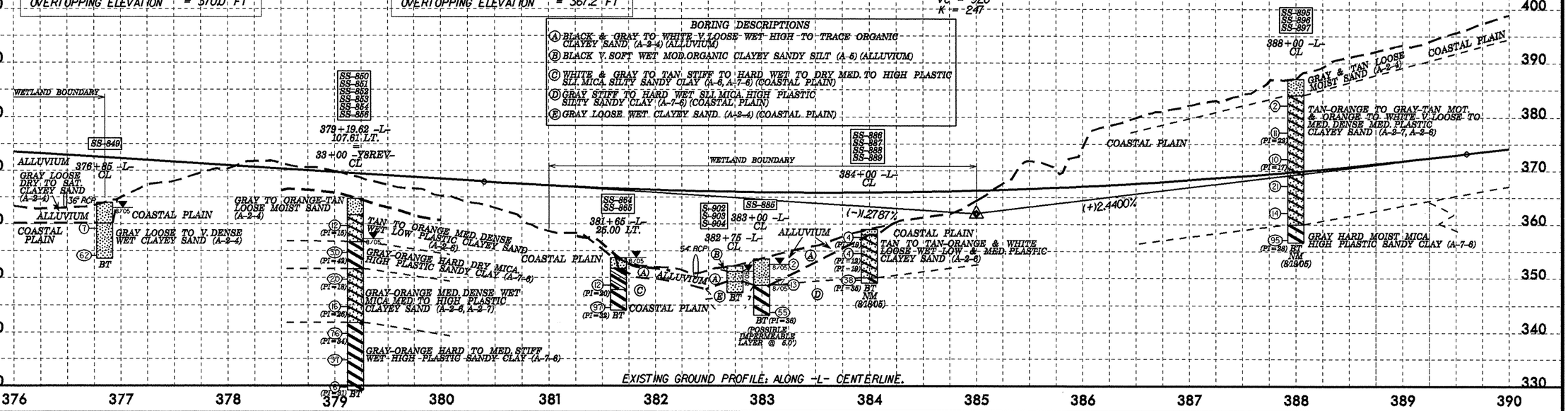
DRAINAGE AREA	= 15.7	AC
DESIGN FREQUENCY	= 50	YRS
DESIGN DISCHARGE	= 300	CFS
DESIGN HW ELEVATION	= 370.2	FT
100 YEAR DISCHARGE	= 340	CFS
100 YEAR HW ELEVATION	= 370.6	FT
OVERTOPPING FREQUENCY	= 25+	YRS
OVERTOPPING DISCHARGE	= 280	CFS
OVERTOPPING ELEVATION	= 370.0	FT

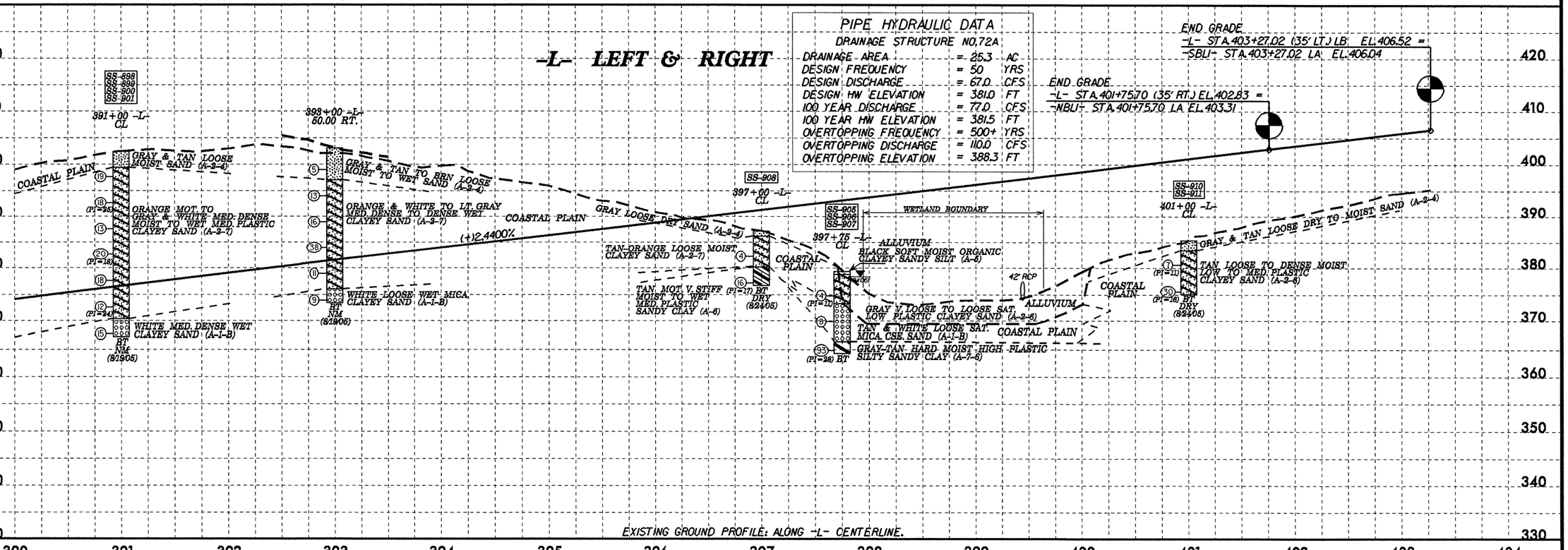
PIPE HYDRAULIC DATA
DRAINAGE STRUCTURE NO.38

DRAINAGE AREA	= 55.0	AC
DESIGN FREQUENCY	= 50	YRS
DESIGN DISCHARGE	= 93.0	CFS
DESIGN HW ELEVATION	= 356.9	FT
100 YEAR DISCHARGE	= 110.0	CFS
100 YEAR HW ELEVATION	= 357.6	FT
OVERTOPPING FREQUENCY	= 500+	YRS
OVERTOPPING DISCHARGE	= 160.0	CFS
OVERTOPPING ELEVATION	= 367.2	FT

BORING DESCRIPTIONS
- (A) BLACK & GRAY TO WHITE V.LOOSE WET HIGH TO TRACE ORGANIC CLAYEY SAND (A-2-4) (ALLUVIUM)
- (B) BLACK V. SOFT WET MOD.ORGANIC CLAYEY SANDY SILT (A-6) (ALLUVIUM)
- (C) WHITE & GRAY TO TAN STIFF TO HARD WET TO DRY MED. TO HIGH PLASTIC SLI. MICA SILTY SANDY CLAY (A-6, A-7-6) (COASTAL PLAIN)
- (D) GRAY STIFF TO HARD WET SLI MICA HIGH PLASTIC SILTY SANDY CLAY (A-7-6) (COASTAL PLAIN)
- (E) GRAY LOOSE WET CLAYEY SAND (A-2-4) (COASTAL PLAIN)

PI = 385+00.00
EL = 361.94'
VC = 920'
K = 247





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rcallaway AT GEH21459

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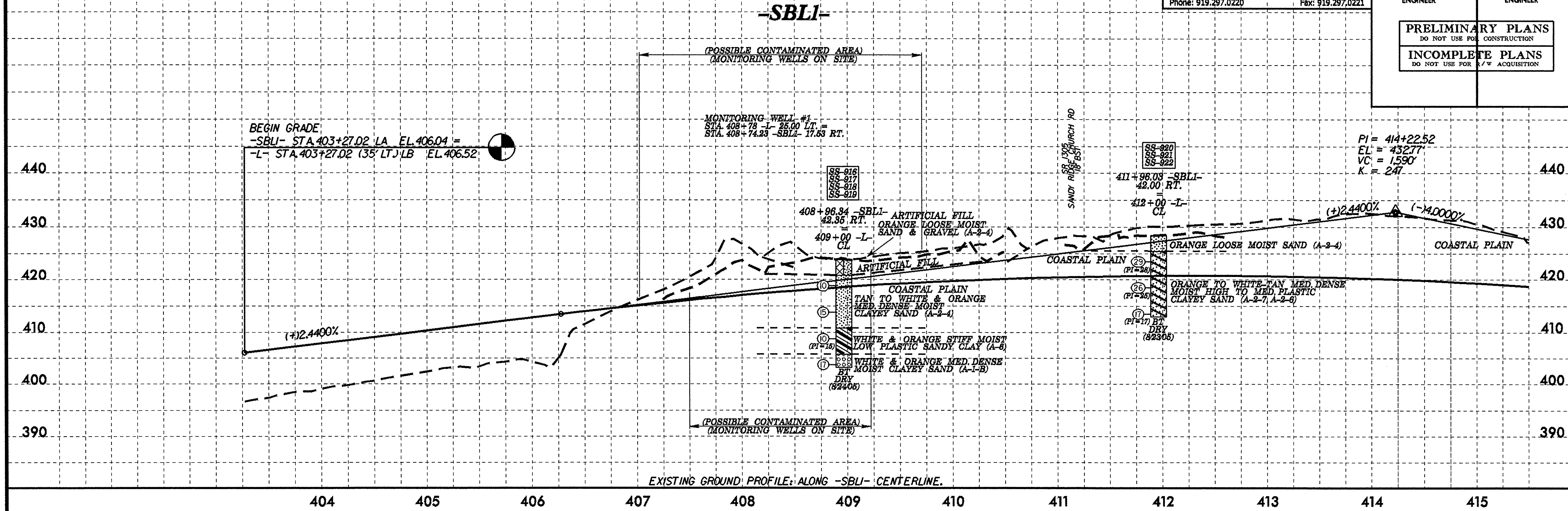
598 East Chatham Street Suite 137 Cary, NC 27511
Phone: 919.297.0220 Fax: 919.297.0221

PROJECT REFERENCE NO.	SHEET NO.
R-3421C	29
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

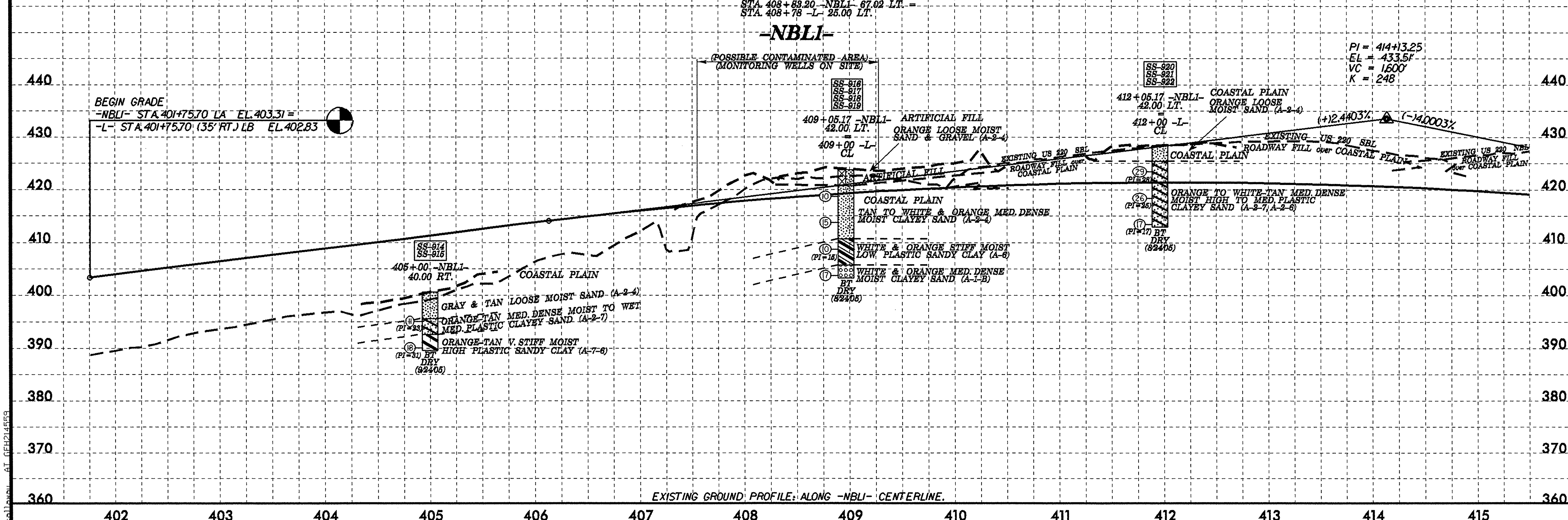
INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

-SBL1-



MONITORING WELL (MW-1)
STA. 405+83.20 -NBL1- 67.02 LT. =
STA. 408+78 -L- 25.00 LT.

-NBL1-



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598 East Chatham Street Suite 137 Cary, NC 27511
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PROJECT REFERENCE NO.	SHEET NO.
R-3421C	31

ROADWAY DESIGN ENGINEER

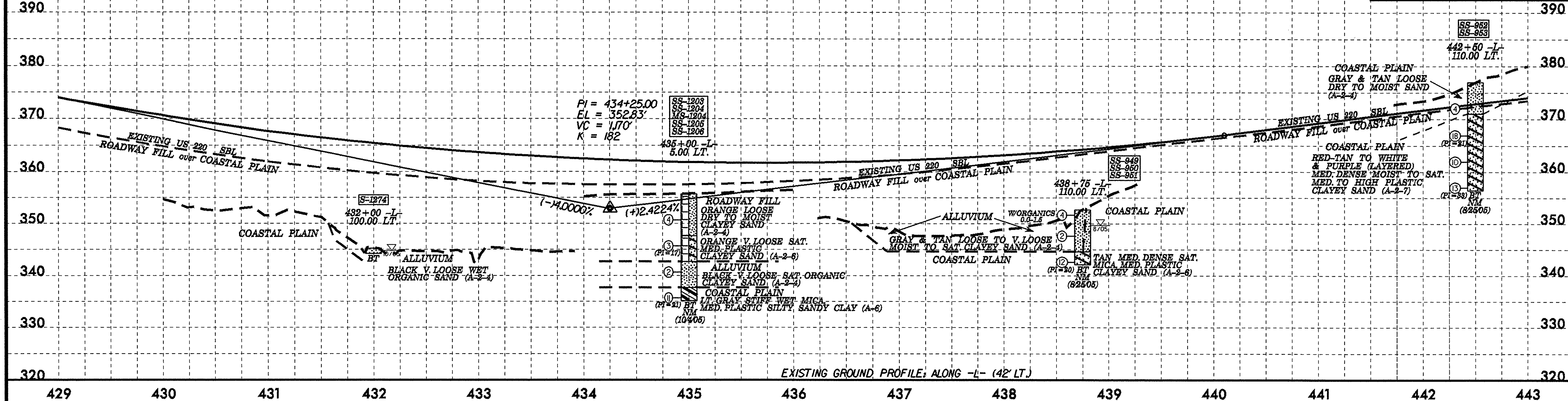
HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

BM* 33
-L- STA 440+21.86 (311.64' RT)
ELEV. 373.13

-L- LEFT (SBL)



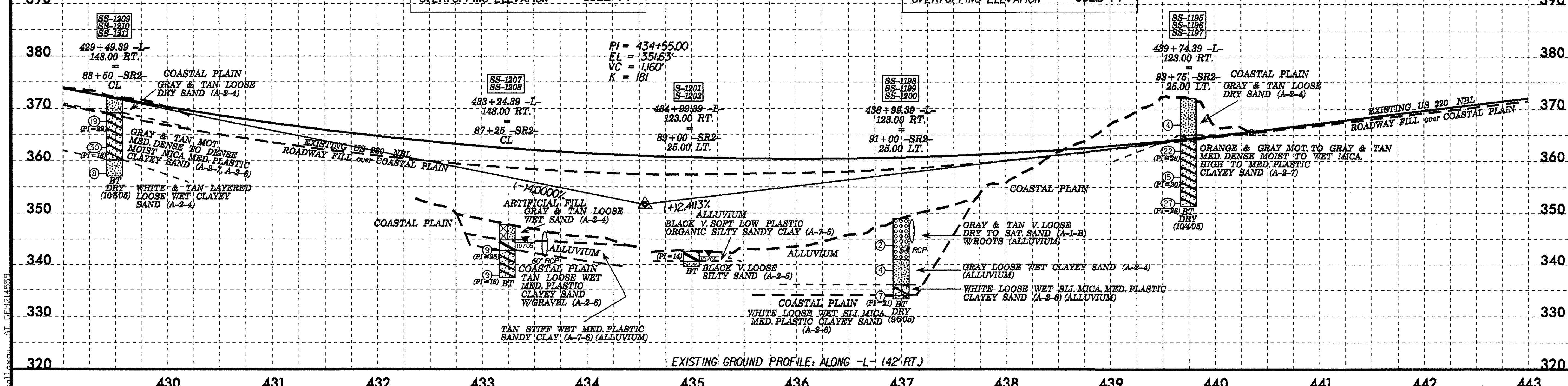
-L- RIGHT (NBL)

PIPE HYDRAULIC DATA
DRAINAGE STRUCTURE NO. 110

DRAINAGE AREA	= 75.0	AC
DESIGN FREQUENCY	= 50	YRS
DESIGN DISCHARGE	= 120.0	CFS
DESIGN HW ELEVATION	= 347.6	FT
100 YEAR DISCHARGE	= 140.0	CFS
100 YEAR HW ELEVATION	= 348.3	FT
OVERTOPPING FREQUENCY	= 500+	YRS
OVERTOPPING DISCHARGE	= 200+	CFS
OVERTOPPING ELEVATION	= 352.3*	FT

PIPE HYDRAULIC DATA
DRAINAGE STRUCTURE NO. 105

DRAINAGE AREA	= 53.0	AC
DESIGN FREQUENCY	= 50	YRS
DESIGN DISCHARGE	= 89.0	CFS
DESIGN HW ELEVATION	= 351.9	FT
100 YEAR DISCHARGE	= 100.0	CFS
100 YEAR HW ELEVATION	= 352.4	FT
OVERTOPPING FREQUENCY	= 100+/-	YRS
OVERTOPPING DISCHARGE	= 96.0	CFS
OVERTOPPING ELEVATION	= 352.3*	FT



PROJECT REFERENCE NO.	SHEET NO.
R-3421C	32
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

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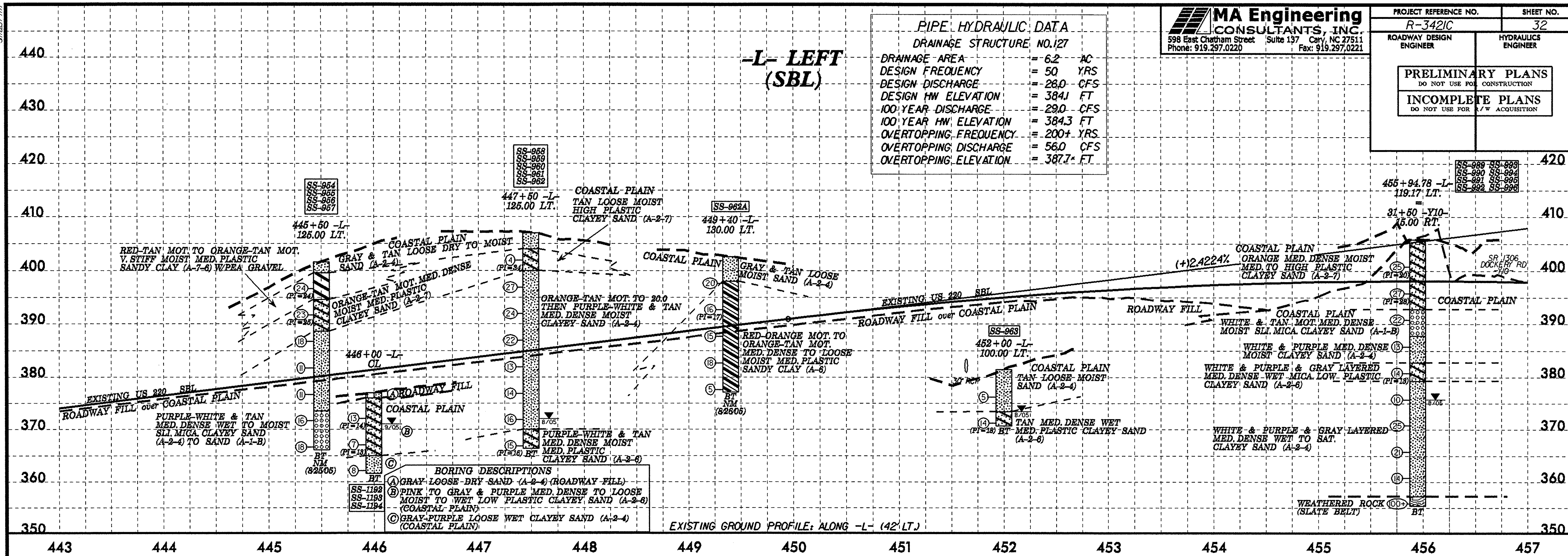
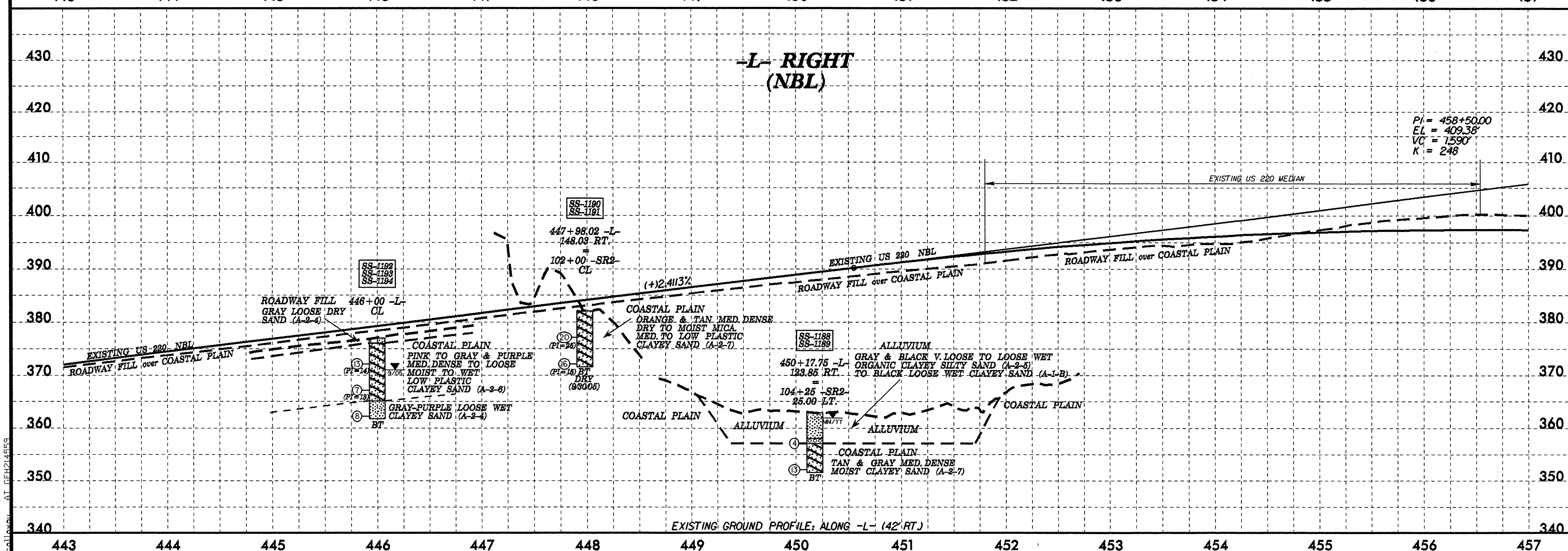
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PIPE HYDRAULIC DATA
DRAINAGE STRUCTURE NO.127

DRAINAGE AREA	= 6.2 AC
DESIGN FREQUENCY	= 50 YRS
DESIGN DISCHARGE	= 26.0 CFS
DESIGN HW ELEVATION	= 384.1 FT
100 YEAR DISCHARGE	= 29.0 CFS
100 YEAR HW ELEVATION	= 384.3 FT
OVERTOPPING FREQUENCY	= 200+ YRS
OVERTOPPING DISCHARGE	= 56.0 CFS
OVERTOPPING ELEVATION	= 387.7 FT





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PROJECT REFERENCE NO.	SHEET NO.
R-3421C	33

ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

-L- LEFT (SBL)

PI = 457+90.00
EL = 410.12'
VC = 1,590'
K = 248

(+)2.4224% (-)4.0000%

COASTAL PLAIN

EXISTING US 220 SBL
ROADWAY FILL over COASTAL PLAIN

SS-965
SS-966
SS-967
464+25 -L-
190.00 LT.

GRAY & TAN LOOSE MOIST SAND (A-2-4)

COASTAL PLAIN

(11) (PI=18) TAN MED. DENSE MOIST MED. PLASTIC CLAYEY SAND (A-2-6)

(11) (PI=28) TRIASSIC GRAY-TAN MOT. STIFF TO V. STIFF MOIST HIGH TO MED. PLASTIC SANDY SILTY CLAY (A-7-5) (EVIDENCE OF FAULT MOVEMENT)

(21) (PI=28) BT NM (8/2905)

EXISTING US 220 SBL
ROADWAY FILL over COASTAL PLAIN

SS-968
SS-969
SS-970
SS-971
469+00 -L-
90.00 LT.

COASTAL PLAIN
TAN LOOSE MOIST CLAYEY SAND (A-2-4)

PI = 472+40.00
EL = 352.12'
VC = 450'
K = 182

(17) (PI=14) RESIDUAL

(22) (PI=16) OLIVE V. STIFF TO HARD MOIST LOW TO MED. PLASTIC SILTY SANDY CLAY (A-7-5, A-7-6, A-6)

(70) (PI=15)

(45) OLIVE HARD MOIST CLAYEY SANDY SILT (A-4)

BT NM (8/2905)

EXISTING GROUND PROFILE: ALONG -L- (42' LT.)

-L- RIGHT (NBL)

PI = 458+50.00
EL = 409.38'
VC = 1,590'
K = 248

(+)2.4113% (-)4.0000%

EXISTING US 220 SBL
ROADWAY FILL over COASTAL PLAIN

SS-1179
SS-1180
461+73.16 -L-
144.48 RT.
=
0+75 -Y10LPD-
90.00 RT.

COASTAL PLAIN
TAN-BRN V. STIFF DRY MED. PLASTIC SANDY CLAY (A-7-6)

(18) (PI=23)

TAN MED. DENSE DRY HIGH PLASTIC CLAYEY SAND (A-2-7)

(19) (PI=45) BT NM (8/2905)

COASTAL PLAIN
TAN LOOSE DRY SAND (A-2-4)

SS-1163
SS-1164
464+76.40 -L-
134.56 RT.
=
4+00 -Y10LPD-
60.00 RT.

COASTAL PLAIN

(22) (PI=40) TAN MOT. MED. DENSE MOIST HIGH PLASTIC CLAYEY SAND (A-2-7) W/GRAVEL @ 9.8

RESIDUAL (8) (PI=40) BT NM (7/11/05)

WHITE STIFF MOIST HIGH PLASTIC SILTY CLAY (A-7-5) (SLATE BELT)

EXISTING US 220 MEDIAN

EXISTING US 220 NBL
ROADWAY FILL over COASTAL PLAIN

SS-1140
SS-1141
467+75 -L-
150.00 RT.

ARTIFICIAL FILL
TAN MED. STIFF DRY SANDY SILTY CLAY (A-7-5) (DRIVEWAY)

COASTAL PLAIN

RESIDUAL (10) (PI=61) TAN STIFF MOIST HIGH PLASTIC SILTY SANDY CLAY (A-7-5)

(14) (PI=28) BT NM (8/2905) OLIVE STIFF MOIST HIGH PLASTIC SANDY SILTY CLAY (A-7-5)

PI = 472+50.00
EL = 353.38'
VC = 500'
K = 183

EXISTING GROUND PROFILE: ALONG -L- (42' RT.)

420 410 400 390 380 370 360 350 340 330

457 458 459 460 461 462 463 464 465 466 467 468 469 470 471

5/1/2007

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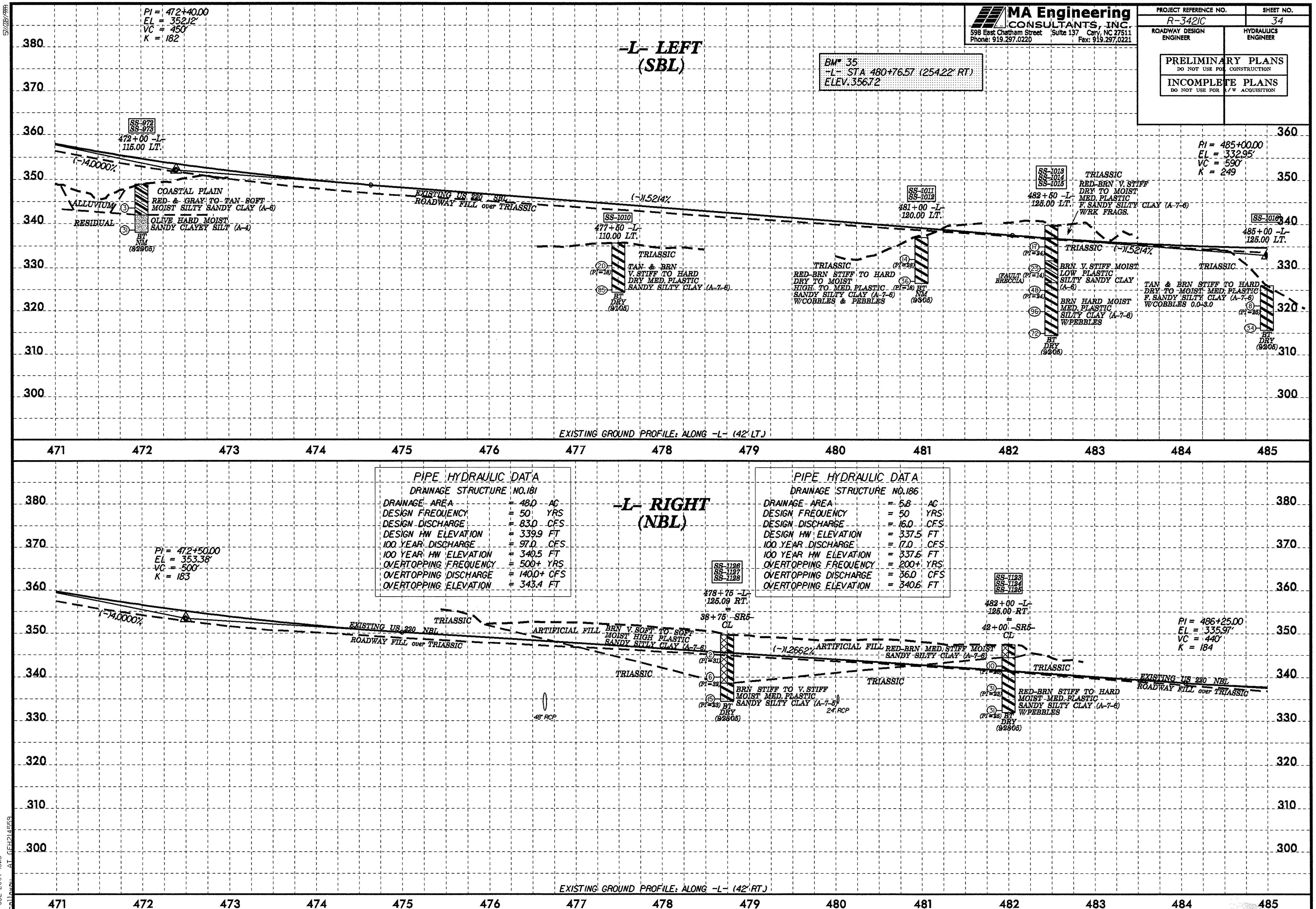

-L- LEFT (SBL)
BM# 35 -L- STA 480+76.57 (254.22' RT) ELEV. 356.72
PI = 472+40.00 EL = 352.12' VC = 450' K = 182
PI = 485+00.00 EL = 332.95' VC = 590' K = 249
(-)4.0000%
(-)1.5214%
EXISTING US 220 SBL ROADWAY FILL over TRIASSIC
SS-972 SS-973 472+00 -L- 115.00 LT.
ALLUVIUM
RESIDUAL
COASTAL PLAIN RED & GRAY TO TAN SOFT MOIST SILTY SANDY CLAY (A-6)
OLIVE HARD MOIST SANDY CLAYEY SILT (A-4)
SS-1010 477+50 -L- 110.00 LT.
TRIASSIC TAN & BRN V. STIFF TO HARD DRY MED. PLASTIC SANDY SILTY CLAY (A-7-6)
SS-1011 SS-1012 481+00 -L- 120.00 LT.
TRIASSIC RED-BRN STIFF TO HARD DRY TO MOIST HIGH TO MED. PLASTIC SANDY SILTY CLAY (A-7-6) W/COBBLES & PEBBLES
SS-1013 SS-1014 SS-1015 482+50 -L- 125.00 LT.
TRIASSIC RED-BRN V. STIFF DRY TO MOIST MED. PLASTIC F. SANDY SILTY CLAY (A-7-6) W/RK FRAGS.
BRN V. STIFF MOIST LOW PLASTIC SILTY SANDY CLAY (A-6)
BRN HARD MOIST MED. PLASTIC SILTY CLAY (A-7-6) W/PEBBLES
FAULT BRECCIA
SS-1016 485+00 -L- 125.00 LT.
TRIASSIC TAN & BRN STIFF TO HARD DRY TO MOIST MED. PLASTIC F. SANDY SILTY CLAY (A-7-6) W/COBBLES 0.0-3.0
EXISTING GROUND PROFILE: ALONG -L- (42' LT.)
-L- RIGHT (NBL)
PI = 472+50.00 EL = 353.38' VC = 500' K = 183
PI = 486+25.00 EL = 335.97' VC = 440' K = 184
(-)4.0000%
(-)1.2662%
EXISTING US 220 NBL ROADWAY FILL over TRIASSIC
SS-1126 SS-1127 SS-1128 478+75 -L- 125.09 RT. = 38+75 -SR5- CL
ARTIFICIAL FILL BRN V. SOFT TO SOFT MOIST HIGH PLASTIC SANDY SILTY CLAY (A-7-6)
BRN STIFF TO V. STIFF MOIST MED. PLASTIC SANDY SILTY CLAY (A-7-5)
SS-1123 SS-1124 SS-1125 482+00 -L- 125.00 RT. = 42+00 -SR5- CL
ARTIFICIAL FILL RED-BRN MED. STIFF MOIST SANDY SILTY CLAY (A-7-6)
RED-BRN STIFF TO HARD MOIST MED. PLASTIC SANDY SILTY CLAY (A-7-6) W/PEBBLES
TRIASSIC
48" RCP
24" RCP
EXISTING US 220 NBL ROADWAY FILL over TRIASSIC
EXISTING GROUND PROFILE: ALONG -L- (42' RT.)

MA Engineering CONSULTANTS, INC.
598 East Chatham Street Suite 137 Cary, NC 27511
Phone: 919.297.0220 Fax: 919.297.0221

PROJECT REFERENCE NO.	SHEET NO.
R-3421C	34
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PIPE HYDRAULIC DATA
DRAINAGE STRUCTURE NO. 181

DRAINAGE AREA	= 48.0	AC
DESIGN FREQUENCY	= 50	YRS
DESIGN DISCHARGE	= 83.0	CFS
DESIGN HW ELEVATION	= 339.9	FT
100 YEAR DISCHARGE	= 97.0	CFS
100 YEAR HW ELEVATION	= 340.5	FT
OVERTOPPING FREQUENCY	= 500+	YRS
OVERTOPPING DISCHARGE	= 140.0+	CFS
OVERTOPPING ELEVATION	= 343.4	FT

PIPE HYDRAULIC DATA
DRAINAGE STRUCTURE NO. 186

DRAINAGE AREA	= 5.8	AC
DESIGN FREQUENCY	= 50	YRS
DESIGN DISCHARGE	= 16.0	CFS
DESIGN HW ELEVATION	= 337.5	FT
100 YEAR DISCHARGE	= 17.0	CFS
100 YEAR HW ELEVATION	= 337.6	FT
OVERTOPPING FREQUENCY	= 200+	YRS
OVERTOPPING DISCHARGE	= 36.0	CFS
OVERTOPPING ELEVATION	= 340.6	FT

18-JUL-2007 13:13

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598 East Chatham Street Suite 137 Cary, NC 27511
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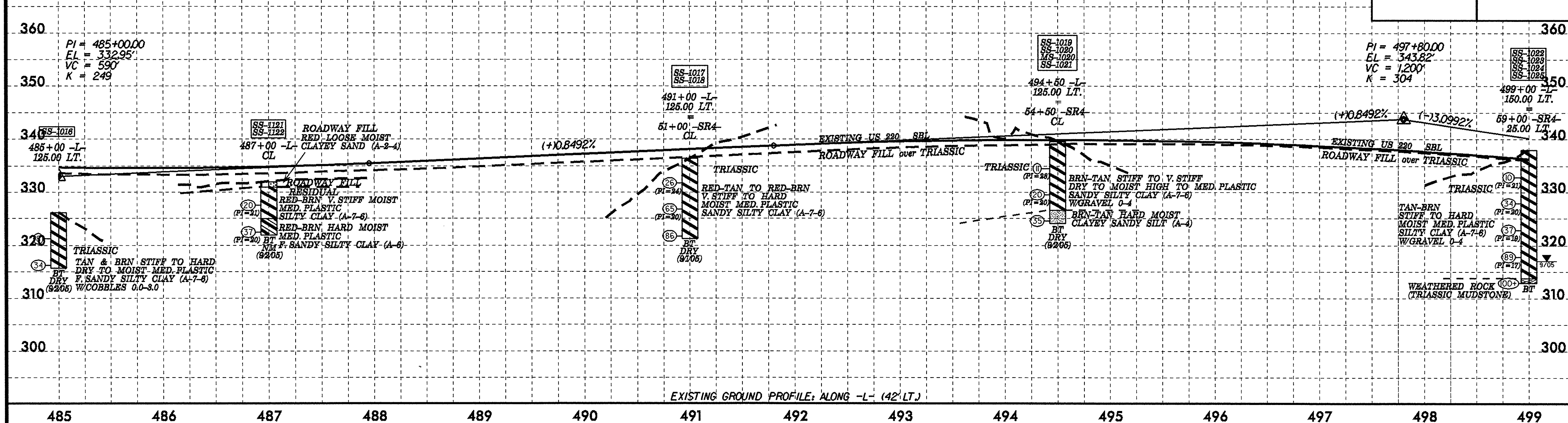
PROJECT REFERENCE NO.	SHEET NO.
R-3421C	35

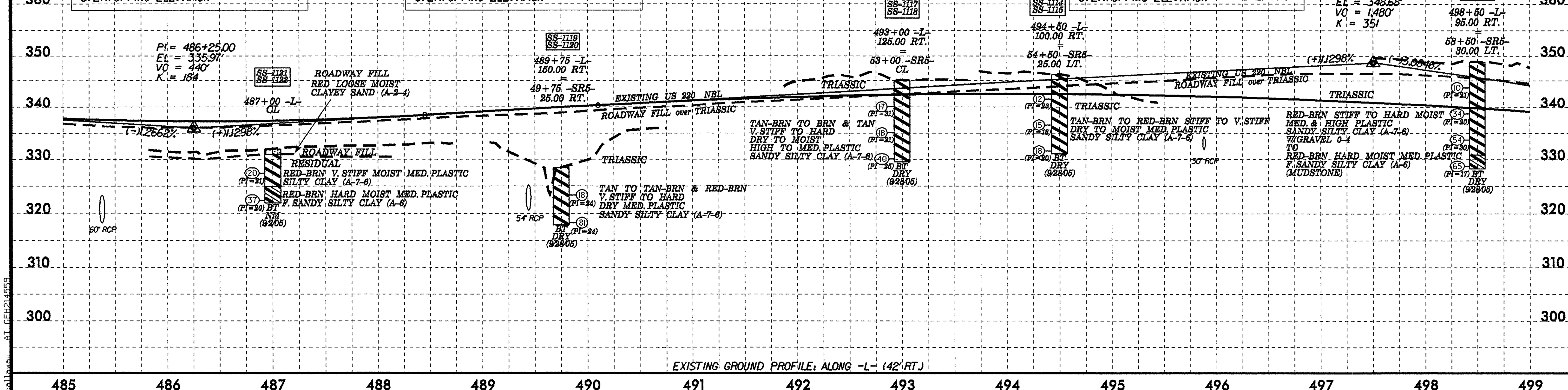
ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

BM# 36
-L- STA 497+62.98 (533.66' RT)
ELEV. 387.55





PIPE HYDRAULIC DATA
DRAINAGE STRUCTURE NO.194

DRAINAGE AREA	= 75.0	AC
DESIGN FREQUENCY	= 50	YRS
DESIGN DISCHARGE	= 126.0	CFS
DESIGN HW ELEVATION	= 325.2	FT
100 YEAR DISCHARGE	= 146.0	CFS
100 YEAR HW ELEVATION	= 326.2	FT
OVERTOPPING FREQUENCY	= 500+	YRS
OVERTOPPING DISCHARGE	= 211.0+	CFS
OVERTOPPING ELEVATION	= 334.3	FT

PIPE HYDRAULIC DATA
DRAINAGE STRUCTURE NO.199

DRAINAGE AREA	= 53.4	AC
DESIGN FREQUENCY	= 50	YRS
DESIGN DISCHARGE	= 89.0	CFS
DESIGN HW ELEVATION	= 328.2	FT
100 YEAR DISCHARGE	= 103.0	CFS
100 YEAR HW ELEVATION	= 328.8	FT
OVERTOPPING FREQUENCY	= 500+	YRS
OVERTOPPING DISCHARGE	= 149.0+	CFS
OVERTOPPING ELEVATION	= 334.3	FT

PIPE HYDRAULIC DATA
DRAINAGE STRUCTURE NO.204

DRAINAGE AREA	= 4.5	AC
DESIGN FREQUENCY	= 50	YRS
DESIGN DISCHARGE	= 23.0	CFS
DESIGN HW ELEVATION	= 339.0	FT
100 YEAR DISCHARGE	= 25.0	CFS
100 YEAR HW ELEVATION	= 339.2	FT
OVERTOPPING FREQUENCY	= 100+	YRS
OVERTOPPING DISCHARGE	= 26.0	CFS
OVERTOPPING ELEVATION	= 342.1	FT

18-JUL-2007 13:14

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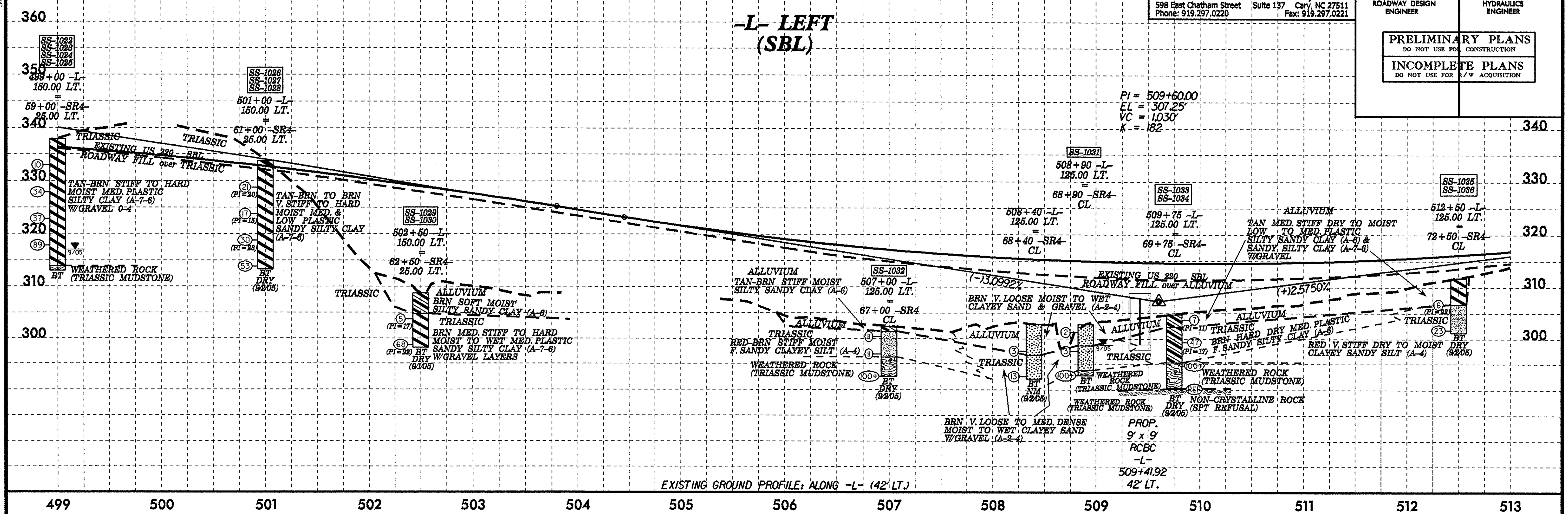
PROJECT REFERENCE NO.	SHEET NO.
R-3421C	36
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

-L- LEFT (SBL)



SS-1022 SS-1023 SS-1024 SS-1025
499+00 -L- 150.00 LT. = 59+00 -SR4- 25.00 LT.
SS-1026 SS-1027 SS-1028
501+00 -L- 150.00 LT. = 61+00 -SR4- 25.00 LT.
SS-1029 SS-1030
502+50 -L- 150.00 LT. = 62+50 -SR4- 25.00 LT.
TRIASSIC
EXISTING US 220 - SBL ROADWAY FILL over TRIASSIC
TAN-BRN STIFF TO HARD MOIST MED. PLASTIC SILTY CLAY (A-7-6) W/GRAVEL 0-4
WEATHERED ROCK (TRIASSIC MUDSTONE)
TAN-BRN TO BRN V. STIFF TO HARD MOIST MED. & LOW PLASTIC SANDY SILTY CLAY (A-7-6)
ALLUVIUM BRN SOFT MOIST SILTY SANDY CLAY (A-6)
BRN MED. STIFF TO HARD MOIST TO WET MED. PLASTIC SANDY SILTY CLAY (A-7-6) W/GRAVEL LAYERS
PI = 509+60.00 EL = 307.25' VC = 1,030' K = 182
SS-1031
508+90 -L- 125.00 LT. = 68+90 -SR4- CL
508+40 -L- 125.00 LT. = 68+40 -SR4- CL
SS-1033 SS-1034
509+75 -L- 125.00 LT. = 69+75 -SR4- CL
SS-1032
507+00 -L- 125.00 LT. = 67+00 -SR4 CL
SS-1035 SS-1036
512+50 -L- 125.00 LT. = 72+50 -SR4- CL
ALLUVIUM TAN-BRN STIFF MOIST SILTY SANDY CLAY (A-6)
TRIASSIC RED-BRN STIFF MOIST F. SANDY CLAYEY SILT (A-4)
WEATHERED ROCK (TRIASSIC MUDSTONE)
(-)3.0992%
(+)2.5750%
EXISTING US 220 SBL ROADWAY FILL over ALLUVIUM
BRN V. LOOSE MOIST TO WET CLAYEY SAND & GRAVEL (A-2-4)
ALLUVIUM TAN MED. STIFF DRY TO MOIST LOW TO MED. PLASTIC SILTY SANDY CLAY (A-6) & SANDY SILTY CLAY (A-7-6) W/GRAVEL
TRIASSIC BRN HARD DRY MED. PLASTIC F. SANDY SILTY CLAY (A-6)
RED V. STIFF DRY TO MOIST DRY CLAYEY SANDY SILT (A-4)
WEATHERED ROCK (TRIASSIC MUDSTONE)
NON-CRYSTALLINE ROCK (SPT REFUSAL)
BRN V. LOOSE TO MED. DENSE MOIST TO WET CLAYEY SAND W/GRAVEL (A-2-4)
PROP. 9' x 9' RCBC -L- 509+41.92 42' LT.
EXISTING GROUND PROFILE: ALONG -L- (42' LT.)
499 500 501 502 503 504 505 506 507 508 509 510 511 512 513

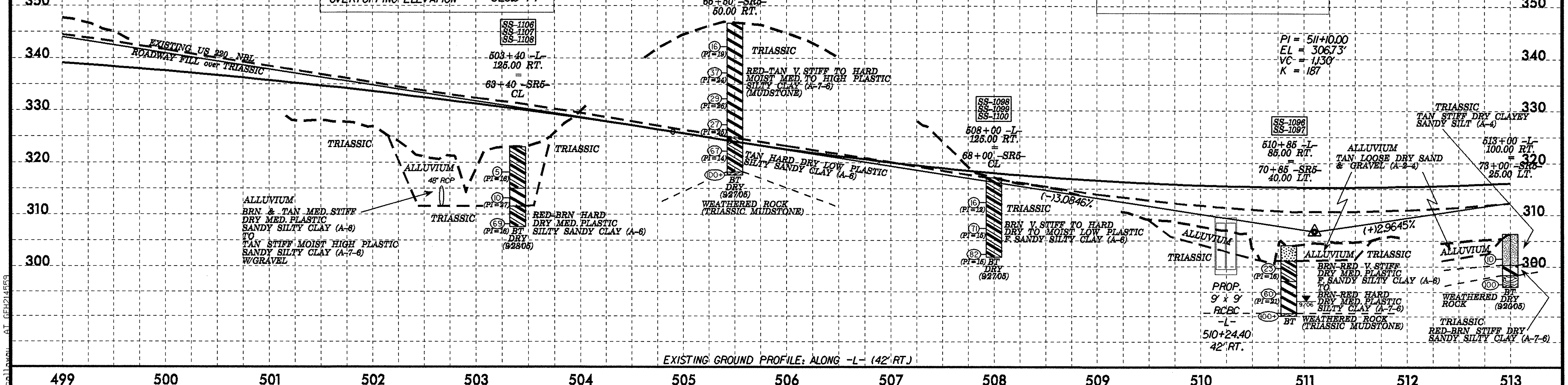
-L- RIGHT (NBL)

PIPE HYDRAULIC DATA
DRAINAGE STRUCTURE NO. 211

DRAINAGE AREA	= 29.7 AC
DESIGN FREQUENCY	= 50 YRS
DESIGN DISCHARGE	= 50.0 CFS
DESIGN HW ELEVATION	= 320.8 FT
100 YEAR DISCHARGE	= 60.0 CFS
100 YEAR HW ELEVATION	= 321.2 FT
OVERTOPPING FREQUENCY	= 500+ YRS
OVERTOPPING DISCHARGE	= 90.0 CFS
OVERTOPPING ELEVATION	= 328.8 FT

CULVERT HYDRAULIC DATA

DESIGN DISCHARGE	= 1500 CFS
DESIGN FREQUENCY	= 50 YRS
DESIGN HW ELEVATION	= 310.7 FT
BASE DISCHARGE	= 1700 CFS
BASE FREQUENCY	= 100 YRS
BASE HW ELEVATION	= 312.0 FT
OVERTOPPING DISCHARGE	= 2100 CFS
OVERTOPPING FREQUENCY	= 200+ YRS
OVERTOPPING ELEVATION	= 315.3 FT



SS-1101 SS-1102 SS-1103 SS-1104 SS-1105
505+50 -L- 175.00 RT. = 65+50 -SR5- 50.00 RT.
SS-1106 SS-1107 SS-1108
503+40 -L- 125.00 RT. = 63+40 -SR5- CL
EXISTING US 220 NBL ROADWAY FILL over TRIASSIC
TRIASSIC
RED-TAN V. STIFF TO HARD MOIST MED. TO HIGH PLASTIC SILTY CLAY (A-7-6) (MUDSTONE)
TAN HARD DRY LOW PLASTIC SILTY SANDY CLAY (A-6)
WEATHERED ROCK (TRIASSIC MUDSTONE)
ALLUVIUM 48" RCP
ALLUVIUM BRN. & TAN MED. STIFF DRY MED. PLASTIC SANDY SILTY CLAY (A-6) TO TAN STIFF MOIST HIGH PLASTIC SANDY SILTY CLAY (A-7-6) W/GRAVEL
RED-BRN HARD DRY MED. PLASTIC SILTY SANDY CLAY (A-6)
PI = 511+10.00 EL = 306.73' VC = 1,130' K = 187
SS-1098 SS-1099 SS-1100
508+00 -L- 125.00 RT. = 68+00 -SR5- CL
SS-1096 SS-1097
510+85 -L- 85.00 RT. = 70+85 -SR5- 40.00 LT.
513+00 -L- 100.00 RT. = 73+00 -SR5- 25.00 LT.
(-)3.0846%
(+)2.9645%
TRIASSIC BRN V. STIFF TO HARD DRY TO MOIST LOW PLASTIC F. SANDY SILTY CLAY (A-6)
ALLUVIUM TAN LOOSE DRY SAND & GRAVEL (A-2-4)
TRIASSIC TAN STIFF DRY CLAYEY SANDY SILT (A-4)
ALLUVIUM / TRIASSIC BRN-RED V. STIFF DRY MED. PLASTIC F. SANDY SILTY CLAY (A-6) TO BRN-RED HARD DRY MED. PLASTIC SILTY CLAY (A-7-6)
WEATHERED ROCK (TRIASSIC MUDSTONE)
TRIASSIC RED-BRN STIFF DRY SANDY SILTY CLAY (A-7-6)
PROP. 9' x 9' RCBC -L- 510+24.40 42' RT.
EXISTING GROUND PROFILE: ALONG -L- (42' RT.)
499 500 501 502 503 504 505 506 507 508 509 510 511 512 513

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MA Engineering CONSULTANTS, INC.
598 East Chatham Street Suite 137 Cary, NC 27511
Phone: 919.297.0220 Fax: 919.297.0221

PROJECT REFERENCE NO.	SHEET NO.
R-3421C	37
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

-L- LEFT (SBL)

BM# 37
-L- STA 518+46.30 (376.59' RT)
ELEV. 320.60

SS-1037
SS-1038
514+75 -L-
126.00 LT.
=
74+76 -SR4-
CL

TRIASSIC
RED-TAN STIFF MOIST MED. PLASTIC F. SANDY SILTY CLAY (A-7-6) W/PEBBLES (14, PI=16)
RED-TAN TO BRN-RED HARD MOIST LOW PLASTIC SANDY SILTY CLAY (A-6) W/PEBBLES (33, PI=12)
(85) BT NM (9/2005)

EXISTING US 220 SBL ROADWAY FILL over TRIASSIC

SS-1039
SS-1040
SS-1041
SS-1042
519+85 -L-
126.00 LT.
=
79+85 -SR4-
CL

TRIASSIC
YELLOW-TAN TO RED & RED-BRN TO OLIVE-TAN V. STIFF TO HARD DRY TO MOIST LOW & MED. PLASTIC SANDY SILTY CLAY (A-7-6, A-7-5, A-6) W/GRAVEL LAYERS & ROUNDED PEBBLES TO COBBLES (17, PI=20; 21, PI=12; 33, PI=12)
(100+) BT DRY (9/2005) WEATHERED ROCK (TRIASSIC MUDSTONE)

(-)12.5750%

PI = 522+00.00
EL = 339.18'
VC = 260'
K = 183

-L- Sta. 524+12.85 (42' LT.) LB =
-SBL2- Sta. 524+12.85 LA
EL. 347.68

SS-1043
SS-1044
SS-1046
SS-1046
521+90 -L-
126.00 LT.
=
81+90 -SR4-
CL

TRIASSIC
YELLOW-TAN TO BRN & OLIVE TO RED STIFF TO V. STIFF DRY TO MOIST MED. TO HIGH PLASTIC SANDY SILTY CLAY (A-7-6) W/GRAVEL & CRUSHED PEBBLES & COBBLES (15, PI=29; 22, PI=17; 22, PI=16)
(100+) BT DRY (9/2005) WEATHERED ROCK (TRIASSIC MUDSTONE)

(+)3.9956%

EXISTING US 220 SBL ROADWAY FILL over TRIASSIC

-SBL2- (SBL)

SS-1047
SS-1048
SS-1049
524+98.59 -L-
125.00 LT.
=
85+00 -SR4-
CL

TRIASSIC
YELLOW-TAN & TAN TO RED-BRN & OLIVE V. STIFF DRY TO MOIST HIGH TO MED. PLASTIC SILTY CLAY (A-7-5, A-7-6) (20, PI=37; 17, PI=24)
(23, PI=19) BT DRY (9/2005)

EXISTING GROUND PROFILE: ALONG -L- (42' LT.)

EXISTING GROUND PROFILE: ALONG -SBL2- CENTERLINE.

-L- RIGHT (NBL)

513+00 -L-
100.00 RT.
=
73+00 -SR6-
25.00 LT.

EXISTING US 220 NBL ROADWAY FILL over TRIASSIC

TRIASSIC
TAN STIFF DRY CLAYEY SANDY SILT (A-4)
RED-BRN STIFF DRY SANDY SILTY CLAY (A-7-6)
(100) WEATHERED ROCK
BT DRY (9/2005)

SS-1096
516+25 -L-
100.00 RT.
=
76+25 -SR6-
25.00 LT.

TRIASSIC
ORANGE-TAN TO TAN-BRN V. STIFF DRY CLAYEY SANDY SILT (A-4) (24)
(100+) BT DRY (9/2005) WEATHERED ROCK

SS-1093
SS-1094
520+00 -L-
100.00 RT.
=
80+00 -SR6-
25.00 LT.

TRIASSIC
ORANGE-RED TO TAN & BRN-TAN STIFF TO V. STIFF DRY HIGH TO LOW PLASTIC SANDY SILTY CLAY (A-7-6) (12, PI=29; 23, PI=16)
BT DRY (9/2005)

PI = 524+05.00
EL = 345.12'
VC = 190'
K = 184

-L- Sta. 523+98.40 (42' RT.) LB =
-NBL2- Sta. 523+98.40 LA
EL. 345.14

SS-1090
SS-1091
SS-1092
523+00 -L-
100.00 RT.
=
83+00 -SR6-
25.00 LT.

(+)2.9645%

EXISTING US 220 NBL ROADWAY FILL over TRIASSIC

TRIASSIC
ORANGE-RED TO RED & BRN-TAN STIFF TO HARD DRY HIGH TO MED. PLASTIC SANDY SILTY CLAY (A-7-6) (30, PI=30; 14, PI=26; 41, PI=19)
BT NM (9/2005)

(-)3.9989%

-NBL2- (NBL)

SS-1087
SS-1088
SS-1089
526+01.20 -L-
90.00 RT.
=
86+00 -SR6-
35.00 LT.

TRIASSIC
TAN TO BRN STIFF TO HARD DRY LOW TO MED. PLASTIC SANDY SILTY CLAY (A-7-5, A-7-6) W/GRAVEL 0-2 (12, PI=16; 27, PI=28; 45, PI=22)
BT DRY (9/2005)

EXISTING GROUND PROFILE: ALONG -L- (42' RT.)

EXISTING GROUND PROFILE: ALONG -NBL2- CENTERLINE.

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rcollaway AT GEH21459

MA Engineering CONSULTANTS, INC.
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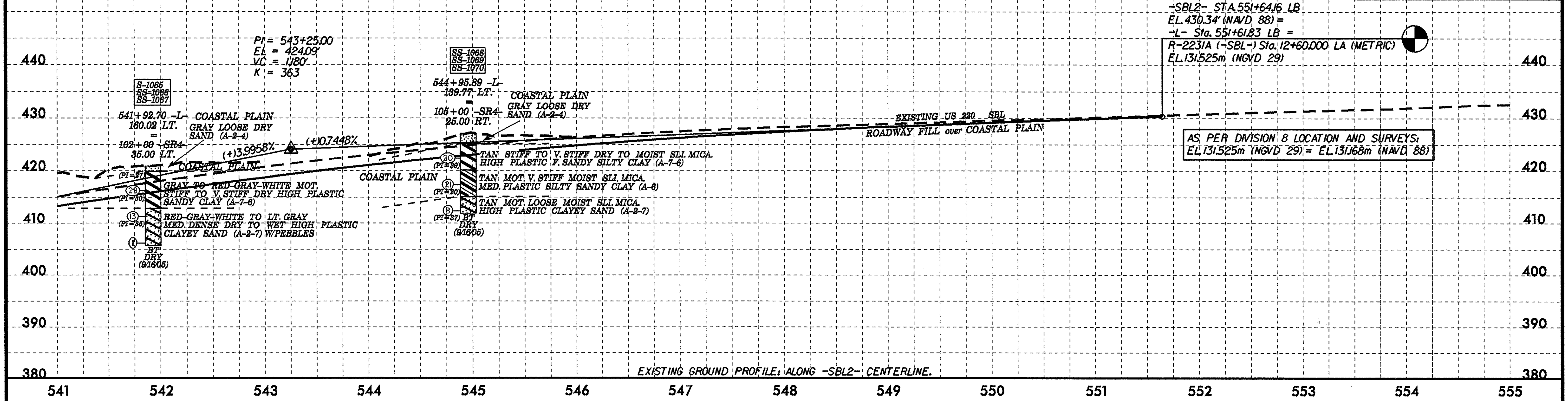
Phone: 919.297.0220 Fax: 919.297.0221

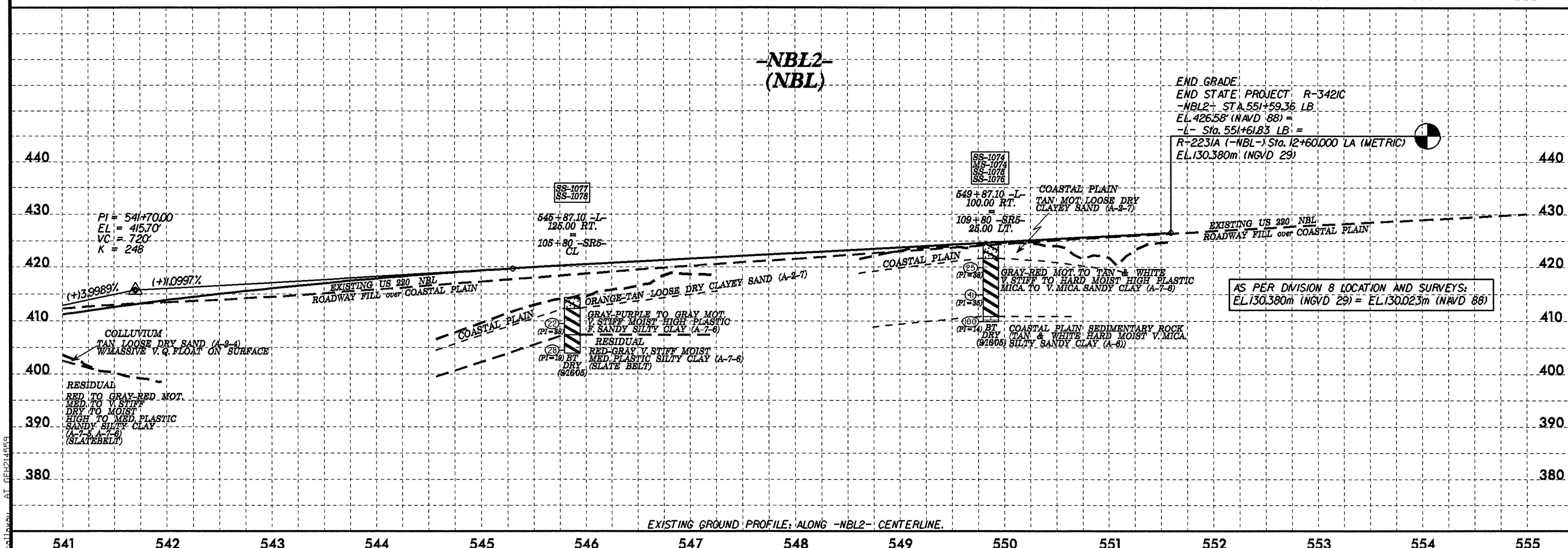
PROJECT REFERENCE NO.	SHEET NO.
R-3421C	39
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION



BM# 38
-L- STA 541+46.22 (263.02' LT)
ELEV. 416.80
-SBL2-
(SBL)
PI = 543+25.00
EL = 424.09'
VC = 1180'
K = 363
S-1065
SS-1066
SS-1067
541+92.70 -L- 160.02' LT.
=
102+00 -SR4-
35.00 LT.
COASTAL PLAIN
GRAY LOOSE DRY SAND (A-2-4)
(+)3.9958%
(+)0.7448%
COASTAL PLAIN
GRAY TO RED-GRAY-WHITE MOT.
STIFF TO V. STIFF DRY HIGH PLASTIC
SANDY CLAY (A-7-6)
RED-GRAY-WHITE TO LT. GRAY
MED. DENSE DRY TO WET HIGH PLASTIC
CLAYEY SAND (A-2-7) W/PEBBLES
BT
DRY
(9/16/05)
SS-1068
SS-1069
SS-1070
544+95.89 -L-
139.77 LT.
=
105+00 -SR4-
25.00 RT.
COASTAL PLAIN
GRAY LOOSE DRY
SAND (A-2-4)
COASTAL PLAIN
TAN STIFF TO V. STIFF DRY TO MOIST SLI. MICA.
HIGH PLASTIC F. SANDY SILTY CLAY (A-7-6)
TAN MOT. V. STIFF MOIST SLI. MICA.
MED. PLASTIC SILTY SANDY CLAY (A-6)
TAN MOT. LOOSE MOIST SLI. MICA.
HIGH PLASTIC CLAYEY SAND (A-2-7)
BT
DRY
(9/16/05)
EXISTING US 220 SBL
ROADWAY FILL over COASTAL PLAIN
END STATE PROJECT R-3421C
END GRADE
-SBL2- STA. 551+64.16 LB
EL. 430.34' (NAVD 88) =
-L- Sta. 551+61.83 LB =
R-2231A (-SBL-) Sta. 12+60.000 LA (METRIC)
EL. 131.525m (NGVD 29)
AS PER DIVISION 8 LOCATION AND SURVEYS:
EL. 131.525m (NGVD 29) = EL. 131.168m (NAVD 88)
EXISTING GROUND PROFILE: ALONG -SBL2- CENTERLINE.
440
430
420
410
400
390
380
541
542
543
544
545
546
547
548
549
550
551
552
553
554
555



-NBL2-
(NBL)
PI = 541+70.00
EL = 415.70'
VC = 720'
K = 248
(+)3.9989%
(+)1.0997%
COLLUVIUM
TAN LOOSE DRY SAND (A-2-4)
W/MASSIVE V. Q. FLOAT ON SURFACE
RESIDUAL
RED TO GRAY-RED MOT.
MED. TO V. STIFF
DRY TO MOIST
HIGH TO MED. PLASTIC
SANDY SILTY CLAY
(A-7-5, A-7-6)
(SLATEBELT)
EXISTING US 220 NBL
ROADWAY FILL over COASTAL PLAIN
SS-1077
SS-1078
545+87.10 -L-
125.00 RT.
=
105+80 -SR5-
CL
COASTAL PLAIN
ORANGE-TAN LOOSE DRY CLAYEY SAND (A-2-7)
GRAY-PURPLE TO GRAY MOT.
V. STIFF MOIST HIGH PLASTIC
F. SANDY SILTY CLAY (A-7-6)
RESIDUAL
RED-GRAY V. STIFF MOIST
MED. PLASTIC SILTY CLAY (A-7-6)
(SLATE BELT)
BT
DRY
(9/16/05)
SS-1074
MS-1074
SS-1075
SS-1076
549+87.10 -L-
100.00 RT.
=
109+80 -SR5-
25.00 LT.
COASTAL PLAIN
TAN MOT. LOOSE DRY
CLAYEY SAND (A-2-7)
COASTAL PLAIN
GRAY-RED MOT. TO TAN & WHITE
V. STIFF TO HARD MOIST HIGH PLASTIC
MICA. TO V. MICA. SANDY CLAY (A-7-6)
BT
DRY
(9/16/05)
COASTAL PLAIN SEDIMENTARY ROCK
(TAN & WHITE HARD MOIST V. MICA.
SILTY SANDY CLAY (A-6))
END GRADE
END STATE PROJECT R-3421C
-NBL2- STA. 551+59.36 LB
EL. 426.58' (NAVD 88) =
-L- Sta. 551+61.83 LB =
R-2231A (-NBL-) Sta. 12+60.000 LA (METRIC)
EL. 130.380m (NGVD 29)
EXISTING US 220 NBL
ROADWAY FILL over COASTAL PLAIN
AS PER DIVISION 8 LOCATION AND SURVEYS:
EL. 130.380m (NGVD 29) = EL. 130.023m (NAVD 88)
EXISTING GROUND PROFILE: ALONG -NBL2- CENTERLINE.
440
430
420
410
400
390
380
541
542
543
544
545
546
547
548
549
550
551
552
553
554
555

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PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PIPE HYDRAULIC DATA

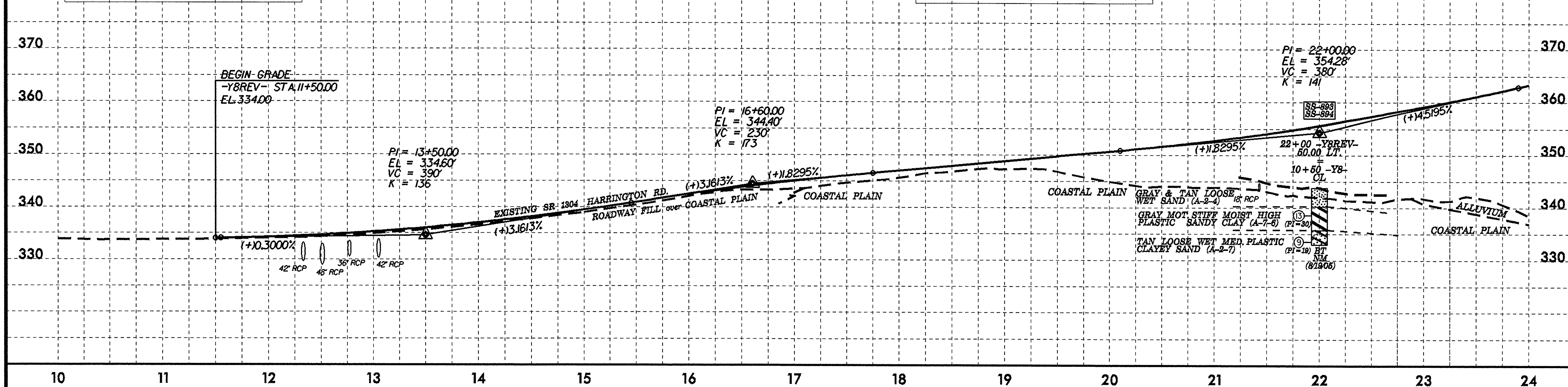
DRAINAGE STRUCTURE NO. 256-259

DRAINAGE AREA	= 252±	AC
DESIGN FREQUENCY	= 10	YRS
DESIGN DISCHARGE	= 180.0	CFS
DESIGN HW ELEVATION	= 333.0	FT
100 YEAR DISCHARGE	= 420.0	CFS
100 YEAR HW ELEVATION	= 334.2	FT
OVERTOPPING FREQUENCY	= 10+	YRS
OVERTOPPING DISCHARGE	= 240.0	CFS
OVERTOPPING ELEVATION	= 333.6	FT

PIPE HYDRAULIC DATA

DRAINAGE STRUCTURE NO. 263

DRAINAGE AREA	= 0.5	AC
DESIGN FREQUENCY	= 25	YRS
DESIGN DISCHARGE	= 2.4	CFS
DESIGN HW ELEVATION	= 346.4	FT
100 YEAR DISCHARGE	= 2.8	CFS
100 YEAR HW ELEVATION	= 346.5	FT
OVERTOPPING FREQUENCY	= 500+	YRS
OVERTOPPING DISCHARGE	= 3.9+	CFS
OVERTOPPING ELEVATION	= 350.3	FT

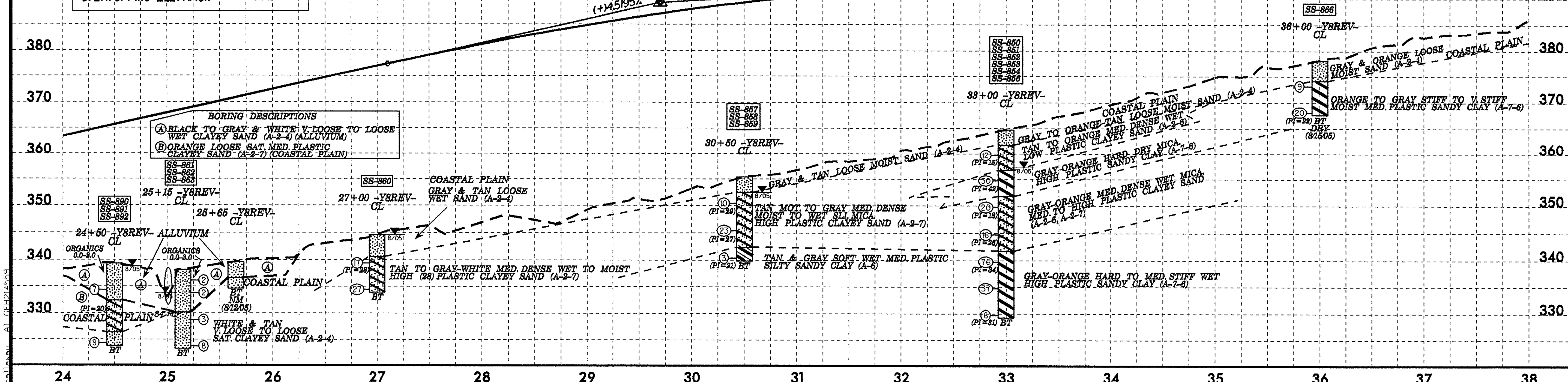


-Y8REV-
400
390
380
370
360
350
340
330
BEGIN GRADE
-Y8REV- STA. 11+50.00
EL. 334.00
PI = 13+50.00
EL = 334.60'
VC = 390'
K = 136
PI = 16+60.00
EL = 344.40'
VC = 230'
K = 173
PI = 22+00.00
EL = 354.28'
VC = 380'
K = 141
(+)0.3000%
(+)3.1613%
(+)1.8295%
(+)4.5195%
42" RCP
48" RCP
36" RCP
42" RCP
EXISTING SR 1304 HARRINGTON RD.
ROADWAY FILL over COASTAL PLAIN
COASTAL PLAIN
SS-893
SS-894
22+00 -Y8REV-
60.00' LT.
10+50 -Y8-
CL
GRAY & TAN LOOSE WET SAND (A-2-4)
18" RCP
GRAY MOT. STIFF MOIST HIGH PLASTIC SANDY CLAY (A-7-6)
TAN LOOSE WET MED. PLASTIC CLAYEY SAND (A-2-7)
ALLUVIUM
BT
NM
(8/19/05)
10 11 12 13 14 15 16 17 18 19 20 21 22 23 24

PIPE HYDRAULIC DATA

DRAINAGE STRUCTURE NO. 265

DRAINAGE AREA	= 157.0	AC
DESIGN FREQUENCY	= 25	YRS
DESIGN DISCHARGE	= 260.0	CFS
DESIGN HW ELEVATION	= 340.2	FT
100 YEAR DISCHARGE	= 370.0	CFS
100 YEAR HW ELEVATION	= 342.7	FT
OVERTOPPING FREQUENCY	= 500+	YRS
OVERTOPPING DISCHARGE	= 520+	CFS
OVERTOPPING ELEVATION	= 356.2	FT



-Y8REV-
410
400
390
380
370
360
350
340
330
PI = 29+70.00
EL = 389.08'
VC = 520'
K = 161
PI = 37+70.00
EL = 399.38'
VC = 340'
K = 140
(+)4.5195%
(+)1.2875%
(+)3.7217%
BEGIN BRIDGE
-Y8REV- STA. 33+07 +/-
END BRIDGE
-Y8REV- STA. 35+14 +/-
BORING DESCRIPTIONS
Ⓐ BLACK TO GRAY & WHITE V. LOOSE TO LOOSE WET CLAYEY SAND (A-2-4) (ALLUVIUM)
Ⓑ ORANGE LOOSE SAT. MED. PLASTIC CLAYEY SAND (A-2-7) (COASTAL PLAIN)
SS-890 SS-891 SS-892
24+50 -Y8REV- CL
SS-861 SS-862 SS-863
25+15 -Y8REV- CL
25+65 -Y8REV- CL
SS-860
27+00 -Y8REV- CL
SS-857 SS-858 SS-859
30+50 -Y8REV- CL
SS-850 SS-851 SS-852 SS-853 SS-854 SS-855
33+00 -Y8REV- CL
SS-866
36+00 -Y8REV- CL
ALLUVIUM
ORGANICS 0.0-2.0
ORGANICS 0.0-3.0
COASTAL PLAIN
WHITE & TAN V. LOOSE TO LOOSE SAT. CLAYEY SAND (A-2-4)
COASTAL PLAIN GRAY & TAN LOOSE WET SAND (A-2-4)
TAN TO GRAY-WHITE MED. DENSE WET TO MOIST HIGH (28) PLASTIC CLAYEY SAND (A-2-7)
GRAY & TAN LOOSE MOIST SAND (A-2-4)
TAN MOT. TO GRAY MED. DENSE MOIST TO WET SLI. MICA. HIGH PLASTIC CLAYEY SAND (A-2-7)
TAN & GRAY SOFT WET MED. PLASTIC SILTY SANDY CLAY (A-6)
COASTAL PLAIN
TAN LOOSE MOIST SAND (A-2-4)
GRAY TO ORANGE TAN TO ORANGE MED. DENSE WET LOW PLASTIC CLAYEY SAND (A-2-6)
GRAY-ORANGE HARD DRY MICA. HIGH PLASTIC SANDY CLAY (A-7-6)
GRAY-ORANGE MED. DENSE WET MICA. MED. TO HIGH PLASTIC CLAYEY SAND (A-2-6, A-2-7)
GRAY-ORANGE HARD TO MED. STIFF WET HIGH PLASTIC SANDY CLAY (A-7-6)
GRAY & ORANGE LOOSE MOIST SAND (A-2-4)
ORANGE TO GRAY STIFF TO V. STIFF MOIST MED. PLASTIC SANDY CLAY (A-7-6)
BT
NM
(8/12/05)
DRY
(8/15/05)
24 25 26 27 28 29 30 31 32 33 34 35 36 37 38

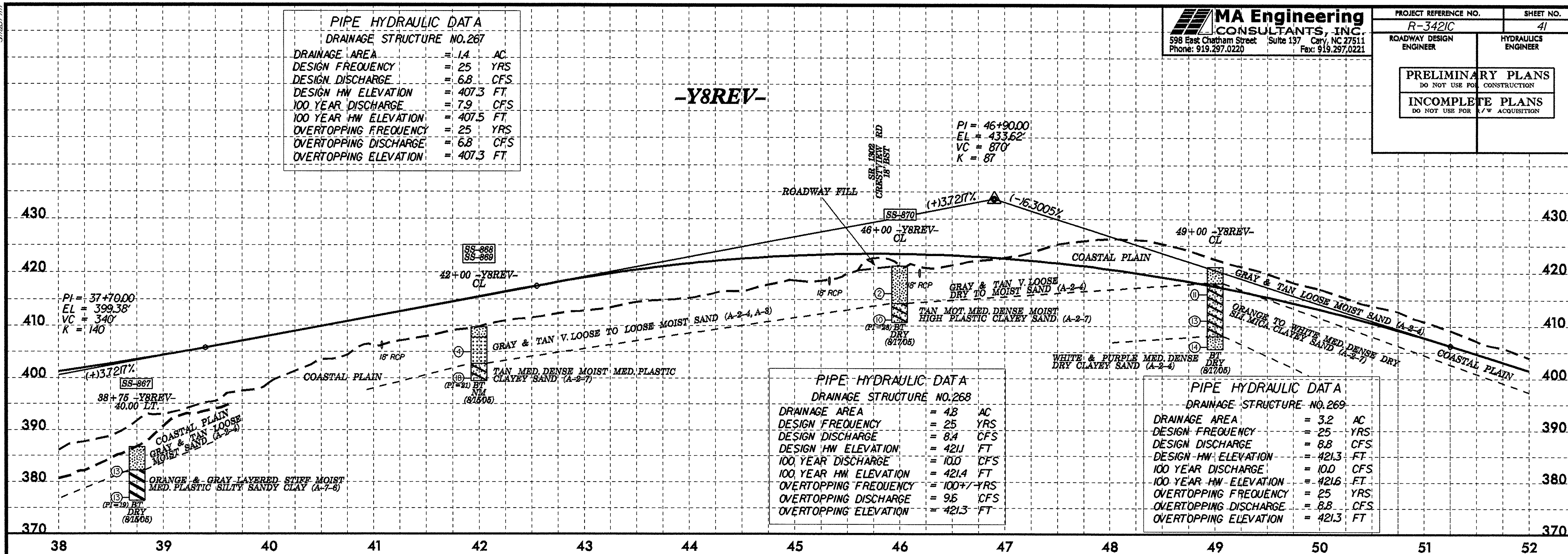
MA Engineering CONSULTANTS, INC.
598 East Chatham Street Suite 137 Cary, NC 27511
Phone: 919.297.0220 Fax: 919.297.0221

PROJECT REFERENCE NO.	SHEET NO.
R-3421C	41
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

-Y8REV-



PIPE HYDRAULIC DATA
DRAINAGE STRUCTURE NO. 267

DRAINAGE AREA	= 1.4	AC
DESIGN FREQUENCY	= 25	YRS
DESIGN DISCHARGE	= 6.8	CFS
DESIGN HW ELEVATION	= 407.3	FT
100 YEAR DISCHARGE	= 7.9	CFS
100 YEAR HW ELEVATION	= 407.5	FT
OVERTOPPING FREQUENCY	= 25	YRS
OVERTOPPING DISCHARGE	= 6.8	CFS
OVERTOPPING ELEVATION	= 407.3	FT

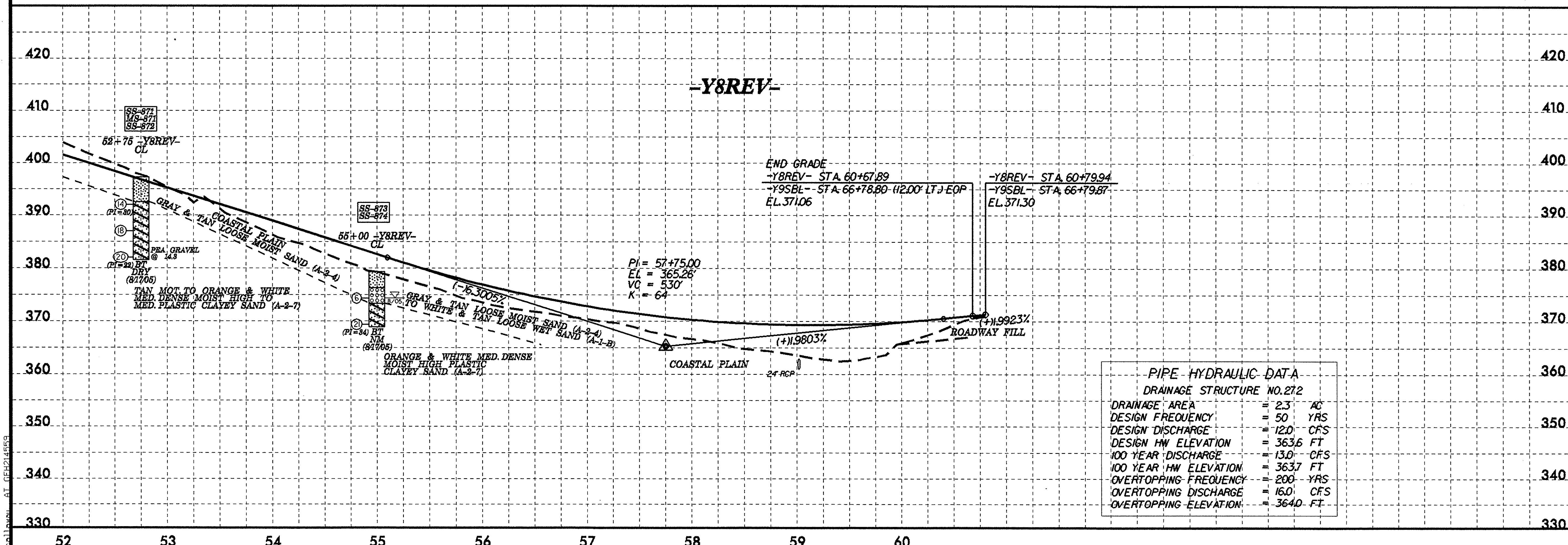
PIPE HYDRAULIC DATA
DRAINAGE STRUCTURE NO. 268

DRAINAGE AREA	= 4.8	AC
DESIGN FREQUENCY	= 25	YRS
DESIGN DISCHARGE	= 8.4	CFS
DESIGN HW ELEVATION	= 421.1	FT
100 YEAR DISCHARGE	= 10.0	CFS
100 YEAR HW ELEVATION	= 421.4	FT
OVERTOPPING FREQUENCY	= 100+/-	YRS
OVERTOPPING DISCHARGE	= 9.5	CFS
OVERTOPPING ELEVATION	= 421.3	FT

PIPE HYDRAULIC DATA
DRAINAGE STRUCTURE NO. 269

DRAINAGE AREA	= 3.2	AC
DESIGN FREQUENCY	= 25	YRS
DESIGN DISCHARGE	= 8.8	CFS
DESIGN HW ELEVATION	= 421.3	FT
100 YEAR DISCHARGE	= 10.0	CFS
100 YEAR HW ELEVATION	= 421.6	FT
OVERTOPPING FREQUENCY	= 25	YRS
OVERTOPPING DISCHARGE	= 8.8	CFS
OVERTOPPING ELEVATION	= 421.3	FT

-Y8REV-



PIPE HYDRAULIC DATA
DRAINAGE STRUCTURE NO. 272

DRAINAGE AREA	= 2.3	AC
DESIGN FREQUENCY	= 50	YRS
DESIGN DISCHARGE	= 12.0	CFS
DESIGN HW ELEVATION	= 363.6	FT
100 YEAR DISCHARGE	= 13.0	CFS
100 YEAR HW ELEVATION	= 363.7	FT
OVERTOPPING FREQUENCY	= 200	YRS
OVERTOPPING DISCHARGE	= 16.0	CFS
OVERTOPPING ELEVATION	= 364.0	FT

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MA Engineering CONSULTANTS, INC.
598 East Chatham Street Suite 137 Cary, NC 27511
Phone: 919.297.0220 Fax: 919.297.0221

PROJECT REFERENCE NO.	SHEET NO.
R-3421C	42
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

-Y9NBL-

BEGIN GRADE
-Y9NBL- STA 0+00.00 (66' RT.)
-L- STA 419+82.28
-NBL- STA 419+87.44 (42' RT.)
EL. 409.03

SS-1215
SS-1216
SS-1217
SS-1218
SS-1219

0+32.96 -Y9NBL-
82.87 LT.
=
73+50 -SR2-
CL

COASTAL PLAIN
GRAY & TAN V. LOOSE DRY SAND (A-2-4)
GRAY & TAN LOOSE DRY SAND (A-1-B)
ORANGE MED. DENSE MOIST CLAYEY SAND (A-2-4)
ORANGE-TAN-GRAY MOT. TO ORANGE MED. DENSE MOIST SLI. MICA HIGH TO LOW PLASTIC CLAYEY SAND (A-2-7, A-2-6)
(4) (25) (27) (PI=27) (23) (PI=16) (15) (PI=12) (18) (PI=12) BT DRY (10/6/06)

(+)2.906%

SS-1220
SS-1221

3+61.11 -Y9NBL-
45.60 LT.
=
70+90 -SR2-
45.00 LT.

PI = 3+00.00
EL = 417.75'
VC = 600'
K = 246

ARTIFICIAL FILL
OLIVE-TAN LOOSE DRY SILTY CLAYEY SAND (A-2-4)
COASTAL PLAIN
(6) (20) BT DRY (10/6/06)
TAN LOOSE TO MED. DENSE DRY TO MOIST SAND (A-3)

(+)0.4700%

PI = 7+00.00
EL = 419.63'
VC = 200'
K = 336

(+)0.4700%
(+)1.0650%

EXISTING US 220 NBL
ROADWAY FILL over COASTAL PLAIN

SS-1224
SS-1225

PI = 11+00.00
EL = 423.89'
VC = 500'
K = 174

10+25 -Y9NBL-
92.00 LT.
=
68+76 -SR2-
CL

(+)1.0650%
(-)1.8106%

EXISTING US 220 NBL
ROADWAY FILL over COASTAL PLAIN

COASTAL PLAIN
WHITE & PINK V. STIFF DRY MICA MED. PLASTIC SILTY, SANDY CLAY (A-7-6)
(5) (15) (PI=18) BT DRY (9/11/06)

COASTAL PLAIN
GRAY & TAN LOOSE DRY SAND (A-1-B)
ORANGE MED. DENSE MOIST MED. PLASTIC CLAYEY SAND (A-2-7)
(2) (13) (PI=21) BT DRY (9/11/06)

SS-1226

13+50 -Y9NBL-
92.00 LT.
=
60+60 -SR2-
CL

0 1 2 3 4 5 6 7 8 9 10 11 12 13 14
380 390 400 410 420 430

-Y9NBL-

PIPE HYDRAULIC DATA
DRAINAGE STRUCTURE NO.30

DRAINAGE AREA	= 11.3	AC
DESIGN FREQUENCY	= 50	YRS
DESIGN DISCHARGE	= 31.0	CFS
DESIGN HW ELEVATION	= 401.3	FT
100 YEAR DISCHARGE	= 37.0	CFS
100 YEAR HW ELEVATION	= 401.8	FT
OVERTOPPING FREQUENCY	= 100+	YRS
OVERTOPPING DISCHARGE	= 41.0	CFS
OVERTOPPING ELEVATION	= 402.2	FT

BM# 31
-Y9NBL- STA 20+47.00 (57.4.28' LT)
ELEV. 411.00

PI = 17+60.00
EL = 411.94'
VC = 300'
K = 354

EXISTING US 220 NBL
ROADWAY FILL over COASTAL PLAIN

SS-1227
SS-1228

16+75 -Y9NBL-
92.00 LT.
=
57+25 -SR2-
CL

(-)1.8106%
(-)0.9621%

COASTAL PLAIN
GRAY & TAN LOOSE TO MED. DENSE DRY SLI. MICA, CLAYEY SAND (A-2-4)
GRAY & TAN LOOSE TO MED. DENSE DRY SLI. MICA CLAYEY SAND (A-2-4)
TAN V. STIFF DRY SLI. MICA MED. PLASTIC SANDY CLAY (A-7-6)
(15) (19) (PI=20) BT DRY (10/6/06)

30" RCP

SS-1229

19+50 -Y9NBL-
92.00 LT.
=
54+50 -SR2-
CL

COASTAL PLAIN
GRAY & TAN LOOSE TO MED. DENSE DRY CLAYEY SAND (A-2-4)
WHITE-TAN MED. DENSE DRY LOW PLASTIC CLAYEY SAND (A-2-6)
(20) (2) (PI=12) BT DRY (10/6/06)

SS-1230

22+50 -Y9NBL-
60.00 LT.

COASTAL PLAIN
TAN LOOSE DRY SAND (A-2-4)
TAN & WHITE MED. DENSE DRY MED. PLASTIC CLAYEY SAND (A-2-6)
(7) (16) (PI=18) BT DRY (10/6/06)

EXISTING US 220 NBL
ROADWAY FILL over COASTAL PLAIN

CBR-2
SS-1232
SS-1233
SS-1234
SS-1235

26+60 -Y9NBL-
92.00 LT.
=
47+50 -SR2-
CL

COASTAL PLAIN
GRAY & TAN V. LOOSE DRY SAND (A-2-4)
TAN & WHITE TO PINK & PURPLE TO LT. OLIVE MED. DENSE DRY TO WET MED. PLASTIC CLAYEY SAND (A-2-7, A-2-6)
(3) (17) (PI=20) (15) (PI=18) (14) (PI=18) (12) (PI=18) BT NM (10/6/06)

14 15 16 17 18 19 20 21 22 23 24 25 26 27 28
360 370 380 390 400 410 420 430

5/29/2008

18-JUL-2007 13:59
rcallaway AT GEH214559

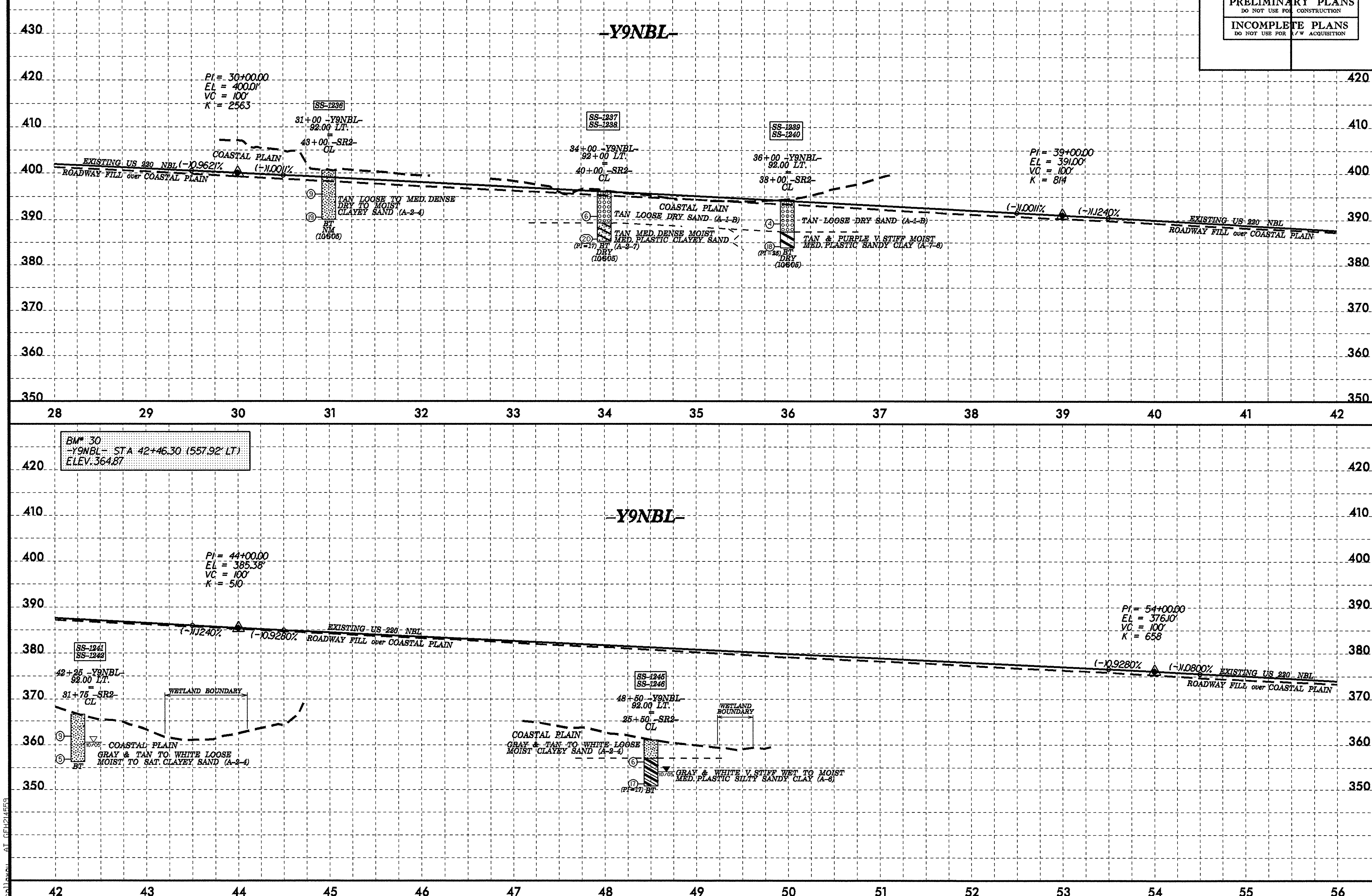
PROJECT REFERENCE NO.	SHEET NO.
R-3421C	43

MA Engineering Consultants, Inc.
598 East Chatham Street Suite 137 Cary, NC 27511
Phone: 919.297.0220 Fax: 919.297.0221

ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION



18-JUL-2007 14:04

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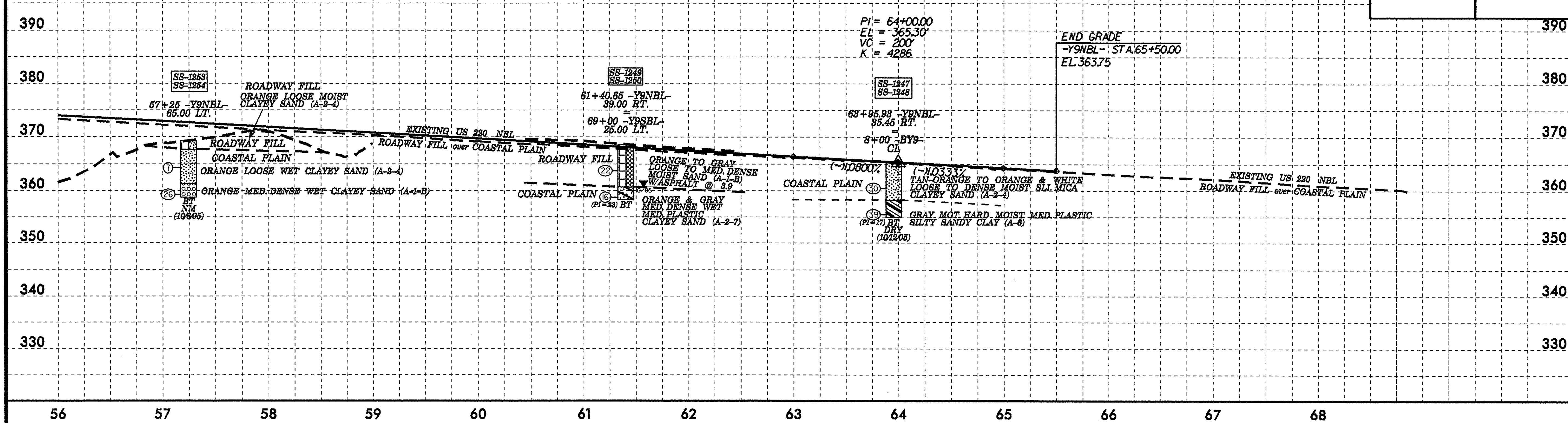
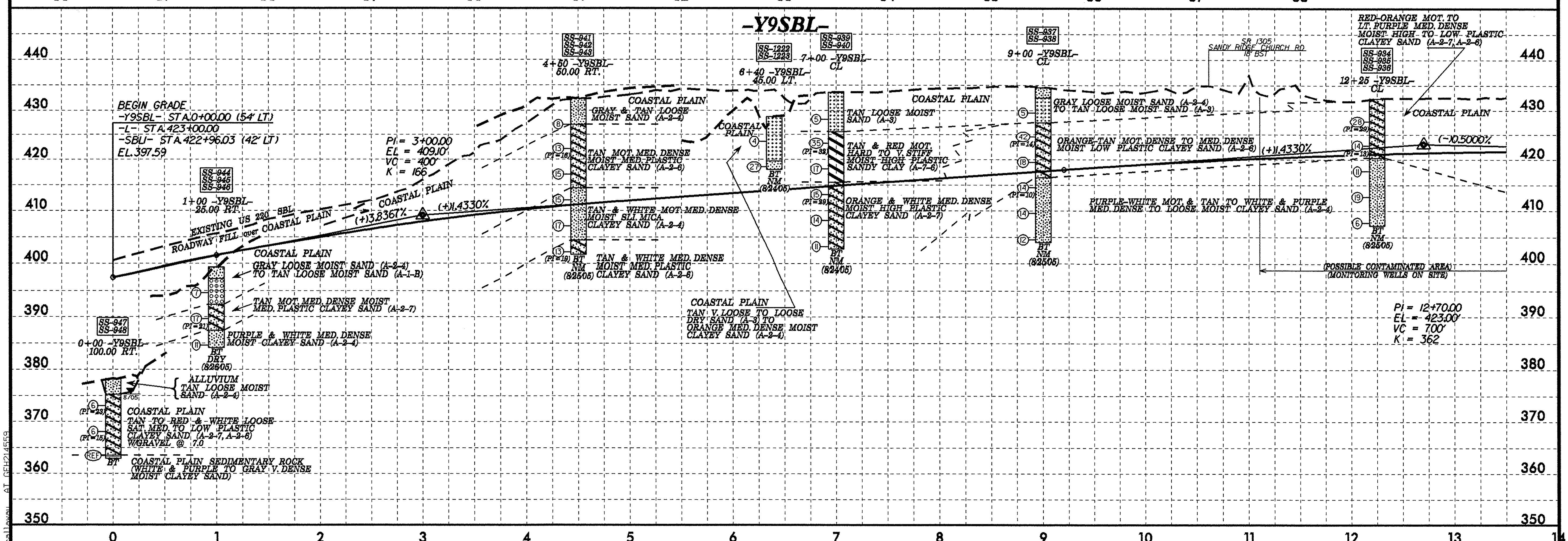
Phone: 919.297.0220 Fax: 919.297.0221

PROJECT REFERENCE NO.	SHEET NO.
R-3421C	44
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION





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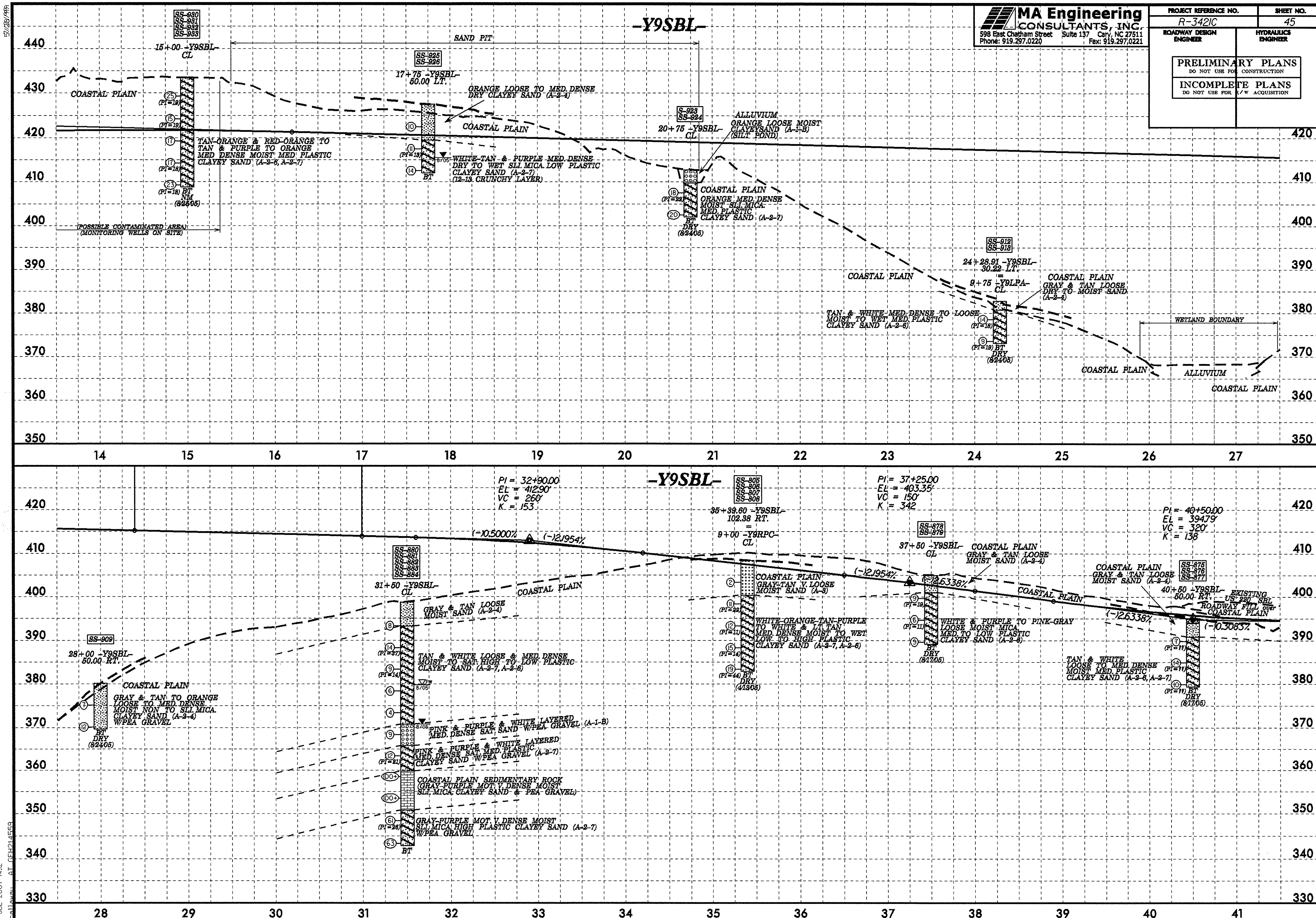

MA Engineering CONSULTANTS, INC.
598 East Chatham Street Suite 137 Cary, NC 27511
Phone: 919.297.0220 Fax: 919.297.0221
PROJECT REFERENCE NO. R-3421C
SHEET NO. 45
ROADWAY DESIGN ENGINEER
HYDRAULICS ENGINEER
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION
INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION
-Y9SBL-
SAND PIT
15+00 -Y9SBL- CL
COASTAL PLAIN
TAN-ORANGE & RED-ORANGE TO TAN & PURPLE TO ORANGE MED DENSE MOIST MED PLASTIC CLAYEY SAND (A-2-6, A-2-7)
(POSSIBLE CONTAMINATED AREA) (MONITORING WELLS ON SITE)
17+75 -Y9SBL- 50.00 LT.
ORANGE LOOSE TO MED. DENSE DRY CLAYEY SAND (A-2-4)
WHITE-TAN & PURPLE MED. DENSE DRY TO WET SLI. MICA. LOW PLASTIC CLAYEY SAND (A-2-7) (12-13, CRUNCHY LAYER)
20+75 -Y9SBL- CL
ALLUVIUM ORANGE LOOSE MOIST CLAYEYSAND (A-1-B) (SILT POND)
COASTAL PLAIN ORANGE MED. DENSE MOIST SLI. MICA. MED. PLASTIC CLAYEY SAND (A-2-7)
24+28.91 -Y9SBL- 30.22 LT. = 9+75 -Y9LPA- CL
COASTAL PLAIN GRAY & TAN LOOSE DRY TO MOIST SAND (A-2-4)
TAN & WHITE MED. DENSE TO LOOSE MOIST TO WET MED. PLASTIC CLAYEY SAND (A-2-6)
WETLAND BOUNDARY
ALLUVIUM
PI = 32+90.00 EL = 412.90' VC = 260' K = 153
PI = 37+25.00 EL = 403.35' VC = 150' K = 342
PI = 40+50.00 EL = 394.79' VC = 320' K = 138
28+00 -Y9SBL- 50.00 RT.
GRAY & TAN TO ORANGE LOOSE TO MED. DENSE MOIST NON TO SLI. MICA. CLAYEY SAND (A-2-4) W/PEA GRAVEL
31+50 -Y9SBL- CL
GRAY & TAN LOOSE MOIST SAND (A-2-4)
TAN & WHITE LOOSE & MED. DENSE MOIST TO SAT. HIGH TO LOW PLASTIC CLAYEY SAND (A-2-7, A-2-6)
PINK & PURPLE & WHITE LAYERED MED. DENSE SAT. SAND W/PEA GRAVEL (A-1-B)
PINK & PURPLE & WHITE LAYERED MED. DENSE SAT. MED. PLASTIC CLAYEY SAND W/PEA GRAVEL (A-2-7)
COASTAL PLAIN SEDIMENTARY ROCK (GRAY-PURPLE MOT. V. DENSE MOIST SLI. MICA. CLAYEY SAND & PEA GRAVEL)
GRAY-PURPLE MOT. V. DENSE MOIST SLI. MICA. HIGH PLASTIC CLAYEY SAND (A-2-7) W/PEA GRAVEL
35+39.60 -Y9SBL- 102.38 RT. = 9+00 -Y9RPC- CL
COASTAL PLAIN GRAY-TAN V. LOOSE MOIST SAND (A-3)
WHITE-ORANGE-TAN-PURPLE TO WHITE & LT. TAN MED. DENSE MOIST TO WET LOW TO HIGH PLASTIC CLAYEY SAND (A-2-7, A-2-6)
37+50 -Y9SBL- CL
COASTAL PLAIN GRAY & TAN LOOSE MOIST SAND (A-2-4)
WHITE & PURPLE TO PINK-GRAY LOOSE MOIST MICA. MED. TO LOW PLASTIC CLAYEY SAND (A-2-6)
COASTAL PLAIN GRAY & TAN LOOSE MOIST SAND (A-2-4)
40+50 -Y9SBL- 50.00 RT.
EXISTING US 220 SBL ROADWAY FILL over COASTAL PLAIN
TAN & WHITE LOOSE TO MED. DENSE MOIST MED. PLASTIC CLAYEY SAND (A-2-6, A-2-7)
(-)0.5000% (-)1.1954% (-)1.6336% (-)0.3083%

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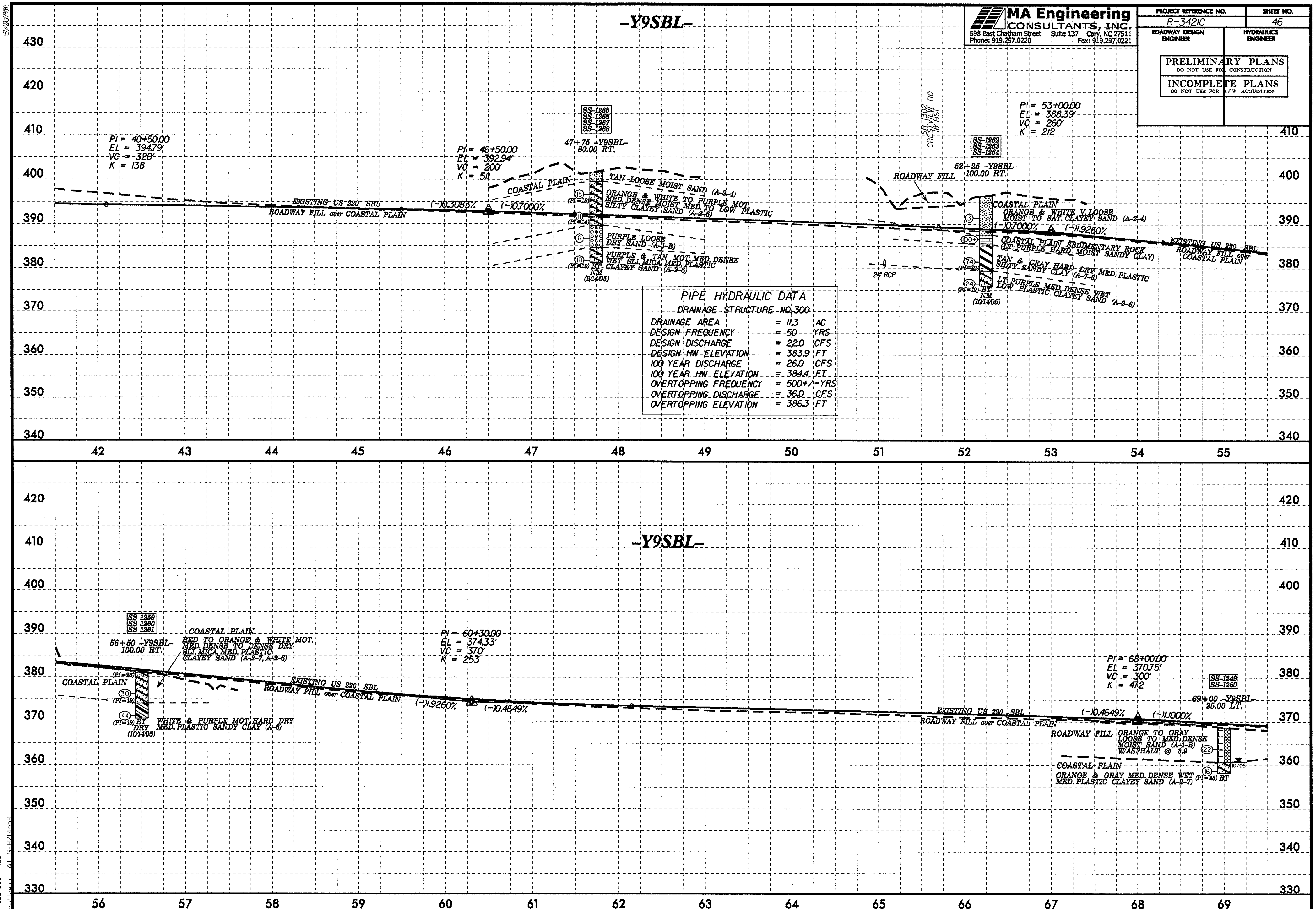
Phone: 919.297.0220 Fax: 919.297.0221

PROJECT REFERENCE NO.	SHEET NO.
R-3421C	46
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION


-Y9SBL-
PI = 40+50.00
EL = 394.79'
VC = 320'
K = 138
PI = 46+50.00
EL = 392.94'
VC = 200'
K = 511
SS-1265
SS-1266
SS-1267
SS-1268
47+75 -Y9SBL-
80.00 RT.
COASTAL PLAIN
TAN LOOSE MOIST SAND (A-2-4)
ORANGE & WHITE TO PURPLE MOT. MED. DENSE MOIST MED. TO LOW PLASTIC SILTY CLAYEY SAND (A-2-6)
PURPLE LOOSE DRY SAND (A-1-B)
PURPLE & TAN MOT. MED. DENSE WET SLI. MICA MED. PLASTIC CLAYEY SAND (A-2-6)
BT
NM
(9/14/05)
EXISTING US 220 SBL
ROADWAY FILL over COASTAL PLAIN
(-)0.3083%
(-)0.7000%
SR 1302 CRESTVIEW RD 18' BST
ROADWAY FILL
24" RCP
SS-1262
SS-1263
SS-1264
52+25 -Y9SBL-
100.00 RT.
PI = 53+00.00
EL = 388.39'
VC = 260'
K = 212
COASTAL PLAIN
ORANGE & WHITE V. LOOSE MOIST TO SAT. CLAYEY SAND (A-2-4)
(-)0.7000%
(-)1.9260%
COASTAL PLAIN SEDIMENTARY ROCK
LT. PURPLE HARD MOIST SANDY CLAY)
TAN & GRAY HARD DRY MED. PLASTIC SILTY SANDY CLAY (A-7-6)
LT. PURPLE MED. DENSE WET LOW PLASTIC CLAYEY SAND (A-2-6)
BT
NM
(10/14/05)
EXISTING US 220 SBL
ROADWAY FILL over COASTAL PLAIN
-Y9SBL-
SS-1259
SS-1260
SS-1261
56+50 -Y9SBL-
100.00 RT.
COASTAL PLAIN
RED TO ORANGE & WHITE MOT. MED. DENSE TO DENSE DRY SLI. MICA MED. PLASTIC CLAYEY SAND (A-2-7, A-2-6)
COASTAL PLAIN
BT WHITE & PURPLE MOT. HARD DRY MED. PLASTIC SANDY CLAY (A-6)
(10/14/05)
PI = 60+30.00
EL = 374.33'
VC = 370'
K = 253
EXISTING US 220 SBL
ROADWAY FILL over COASTAL PLAIN
(-)1.9260%
(-)0.4649%
PI = 68+00.00
EL = 370.75'
VC = 300'
K = 472
(-)0.4649%
(+)1.1000%
SS-1249
SS-1250
69+00 -Y9SBL-
25.00 LT.
EXISTING US 220 SBL
ROADWAY FILL over COASTAL PLAIN
ROADWAY FILL ORANGE TO GRAY LOOSE TO MED. DENSE MOIST SAND (A-1-B) W/ASPHALT @ 3.9
COASTAL PLAIN
ORANGE & GRAY MED. DENSE WET MED. PLASTIC CLAYEY SAND (A-2-7)
BT

PIPE HYDRAULIC DATA
DRAINAGE STRUCTURE NO. 300

DRAINAGE AREA	= 11.3	AC
DESIGN FREQUENCY	= 50	YRS
DESIGN DISCHARGE	= 22.0	CFS
DESIGN HW ELEVATION	= 383.9	FT
100 YEAR DISCHARGE	= 26.0	CFS
100 YEAR HW ELEVATION	= 384.4	FT
OVERTOPPING FREQUENCY	= 500+/-	YRS
OVERTOPPING DISCHARGE	= 36.0	CFS
OVERTOPPING ELEVATION	= 386.3	FT

18-JUL-2007 14:19

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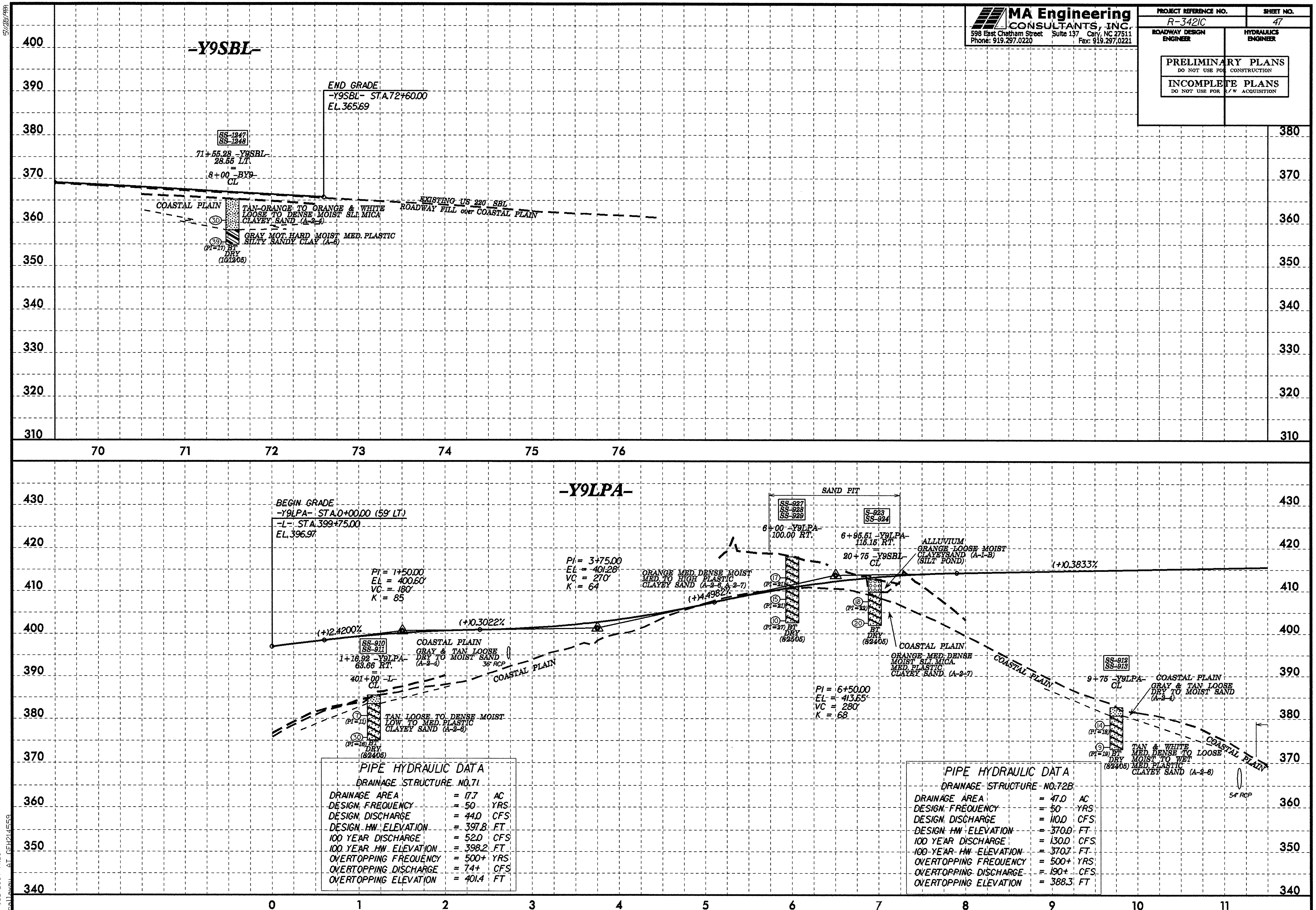
Phone: 919.297.0220 Fax: 919.297.0221

PROJECT REFERENCE NO.	SHEET NO.
R-3421C	47
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION



-Y9SBL-
END GRADE
-Y9SBL- STA.72+60.00
EL.365.69
SS-1247
SS-1248
71+55.28 -Y9SBL-
28.55 LT.
8+00 -BY9-
CL
COASTAL PLAIN
TAN-ORANGE TO ORANGE & WHITE LOOSE TO DENSE MOIST SLI. MICA CLAYEY SAND (A-2-4)
GRAY MOT. HARD MOIST MED. PLASTIC SILTY SANDY CLAY (A-6)
EXISTING US 220 SBL
ROADWAY FILL over COASTAL PLAIN
BT
DRY
(10/12/05)
70
71
72
73
74
75
76
-Y9LPA-
BEGIN GRADE
-Y9LPA- STA.0+00.00 (59' LT.)
-L- STA.399+75.00
EL.396.97
PI = 1+50.00
EL = 400.60'
VC = 180'
K = 85
(+)2.4200%
(+)0.3022%
SS-910
SS-911
1+16.92 -Y9LPA-
63.66 RT.
401+00 -L-
CL
COASTAL PLAIN
GRAY & TAN LOOSE DRY TO MOIST SAND (A-3-4)
36" RCP
TAN LOOSE TO DENSE MOIST LOW TO MED. PLASTIC CLAYEY SAND (A-2-6)
BT
DRY
(8/24/05)
PI = 3+75.00
EL = 401.28'
VC = 270'
K = 64
(+)4.4982%
ORANGE MED. DENSE MOIST MED. TO HIGH PLASTIC CLAYEY SAND (A-2-6, A-2-7)
SAND PIT
SS-927
SS-928
SS-929
6+00 -Y9LPA-
100.00 RT.
BT
DRY
(8/25/05)
S-923
SS-924
6+95.51 -Y9LPA-
116.15 RT.
20+75 -Y9SBL-
CL
ALLUVIUM
ORANGE LOOSE MOIST CLAYEYSAND (A-1-B)
(SILT POND)
BT
DRY
(8/24/05)
COASTAL PLAIN
ORANGE MED. DENSE MOIST SLI. MICA. MED. PLASTIC CLAYEY SAND (A-2-7)
PI = 6+50.00
EL = 413.65'
VC = 280'
K = 68
(+)0.3833%
SS-912
SS-913
9+76 -Y9LPA-
CL
COASTAL PLAIN
GRAY & TAN LOOSE DRY TO MOIST SAND (A-3-4)
TAN & WHITE MED. DENSE TO LOOSE MOIST TO WET MED. PLASTIC CLAYEY SAND (A-2-6)
BT
DRY
(8/24/05)
54" RCP
0
1
2
3
4
5
6
7
8
9
10
11

PIPE HYDRAULIC DATA
DRAINAGE STRUCTURE NO.71

DRAINAGE AREA	= 17.7	AC
DESIGN FREQUENCY	= 50	YRS
DESIGN DISCHARGE	= 44.0	CFS
DESIGN HW ELEVATION	= 397.8	FT
100 YEAR DISCHARGE	= 52.0	CFS
100 YEAR HW ELEVATION	= 398.2	FT
OVERTOPPING FREQUENCY	= 500+	YRS
OVERTOPPING DISCHARGE	= 74+	CFS
OVERTOPPING ELEVATION	= 401.4	FT

PIPE HYDRAULIC DATA
DRAINAGE STRUCTURE NO.72B

DRAINAGE AREA	= 47.0	AC
DESIGN FREQUENCY	= 50	YRS
DESIGN DISCHARGE	= 110.0	CFS
DESIGN HW ELEVATION	= 370.0	FT
100 YEAR DISCHARGE	= 130.0	CFS
100 YEAR HW ELEVATION	= 370.7	FT
OVERTOPPING FREQUENCY	= 500+	YRS
OVERTOPPING DISCHARGE	= 190+	CFS
OVERTOPPING ELEVATION	= 388.3	FT

18-JUL-2007 14:20

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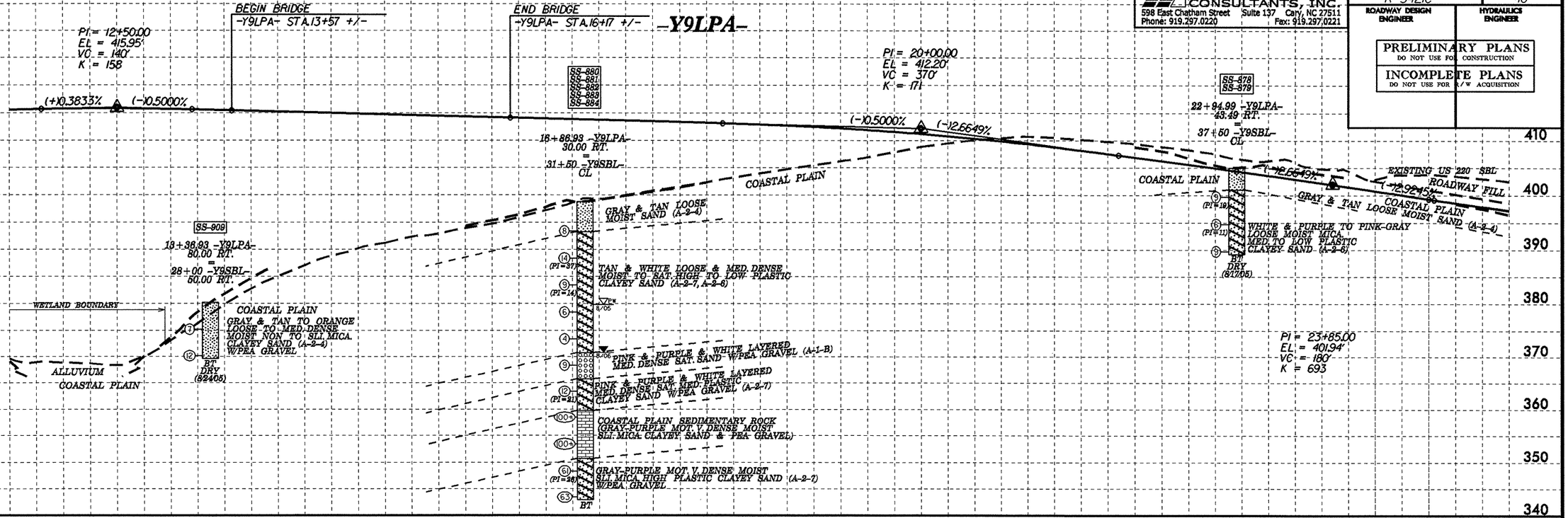
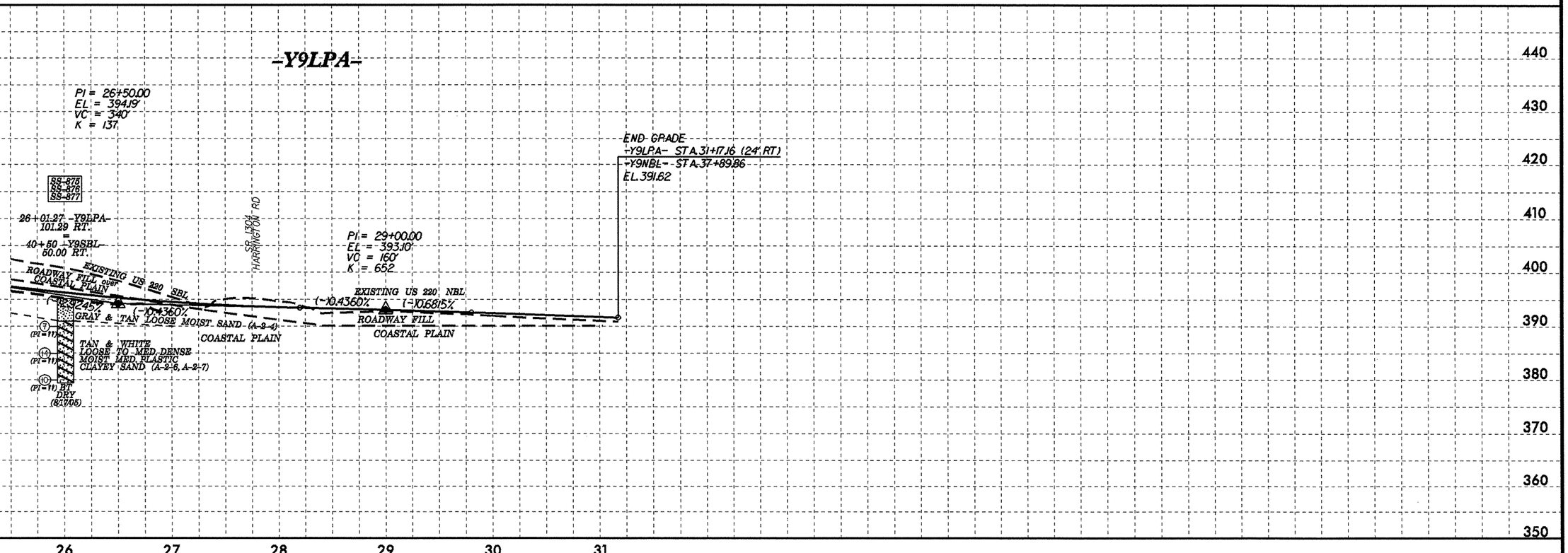
PROJECT REFERENCE NO.	SHEET NO.
R-3421C	48

ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION





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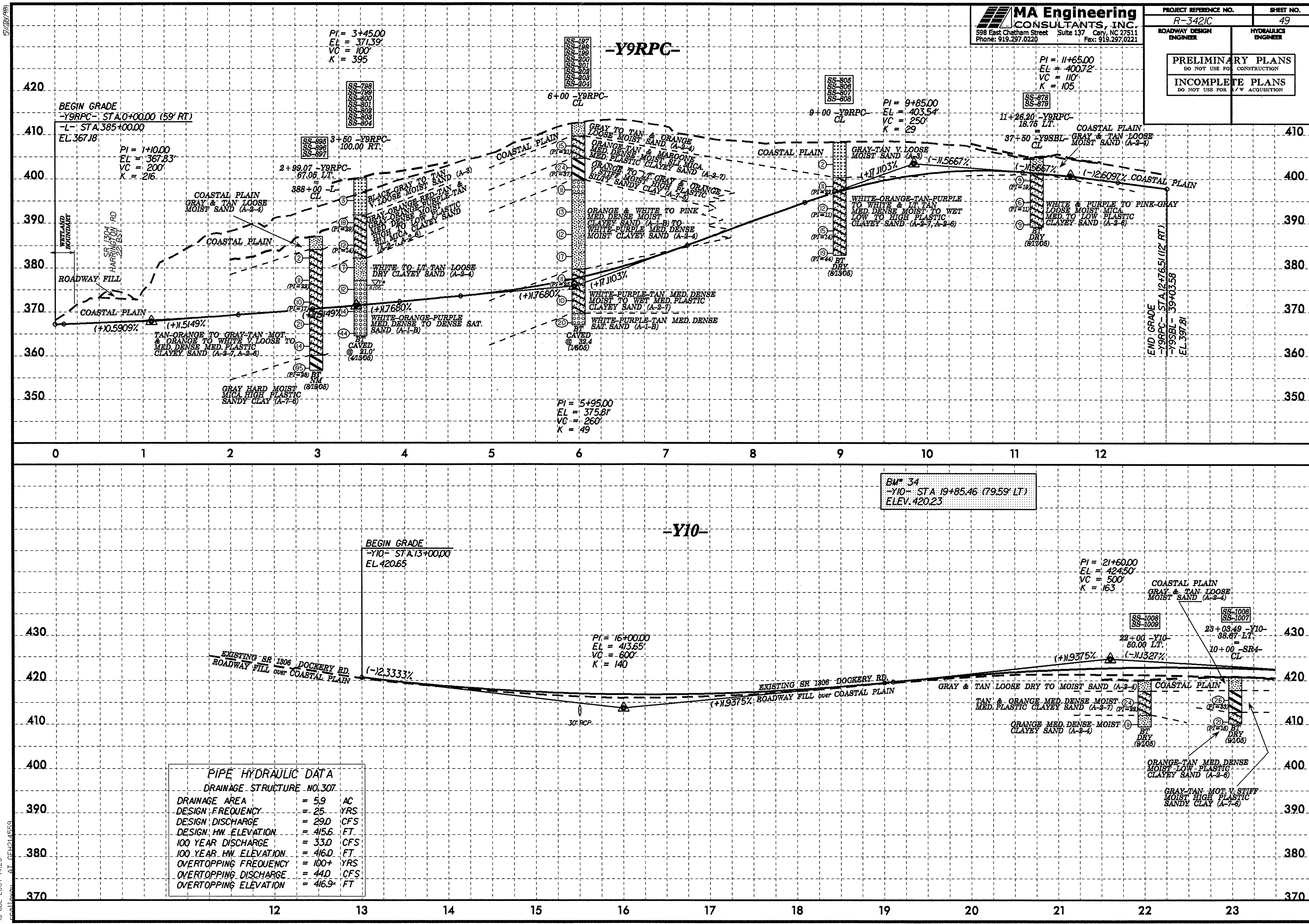
roadway at GEH214559

5/18/06



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PROJECT REFERENCE NO. R-3421C
SHEET NO. 49
ROADWAY DESIGN ENGINEER
HYDRAULICS ENGINEER
PRELIMINARY PLANS DO NOT USE FOR CONSTRUCTION
INCOMPLETE PLANS DO NOT USE FOR R/W ACQUISITION
-Y9RPC-
BEGIN GRADE -Y9RPC- STA.0+00.00 (59' RT) -L- STA.385+00.00 EL.367.18
PI = 1+10.00 EL = 367.83' VC = 200' K = 216
PI = 3+45.00 EL = 371.39' VC = 100' K = 395
PI = 5+95.00 EL = 375.81' VC = 260' K = 49
PI = 9+85.00 EL = 403.54' VC = 250' K = 29
PI = 11+65.00 EL = 400.72' VC = 110' K = 105
(+)0.5909% (+)1.5149% (+)1.7680% (+)11.103% (-)1.5667% (-)2.6097%
END GRADE -Y9RPC- STA.12+76.51 (112' RT) -Y9SBL- 39+03.58 EL.397.81
COASTAL PLAIN
ROADWAY FILL
WETLAND BOUNDARY
SR 1304 HARRINGTON RD
-Y10-
BEGIN GRADE -Y10- STA.13+00.00 EL.420.65
PI = 16+00.00 EL = 413.65' VC = 600' K = 140
PI = 21+60.00 EL = 424.50' VC = 500' K = 163
(-)2.3333% (+)1.9375% (-)1.1327%
BM# 34 -Y10- STA 19+85.46 (79.59' LT) ELEV. 420.23
EXISTING SR 1306 DOCKERY RD. ROADWAY FILL over COASTAL PLAIN
30" RCP

PIPE HYDRAULIC DATA

DRAINAGE STRUCTURE NO. 307

DRAINAGE AREA	= 5.9	AC
DESIGN FREQUENCY	= 25	YRS
DESIGN DISCHARGE	= 29.0	CFS
DESIGN HW ELEVATION	= 415.6	FT
100 YEAR DISCHARGE	= 33.0	CFS
100 YEAR HW ELEVATION	= 416.0	FT
OVERTOPPING FREQUENCY	= 100+	YRS
OVERTOPPING DISCHARGE	= 44.0	CFS
OVERTOPPING ELEVATION	= 416.9±	FT

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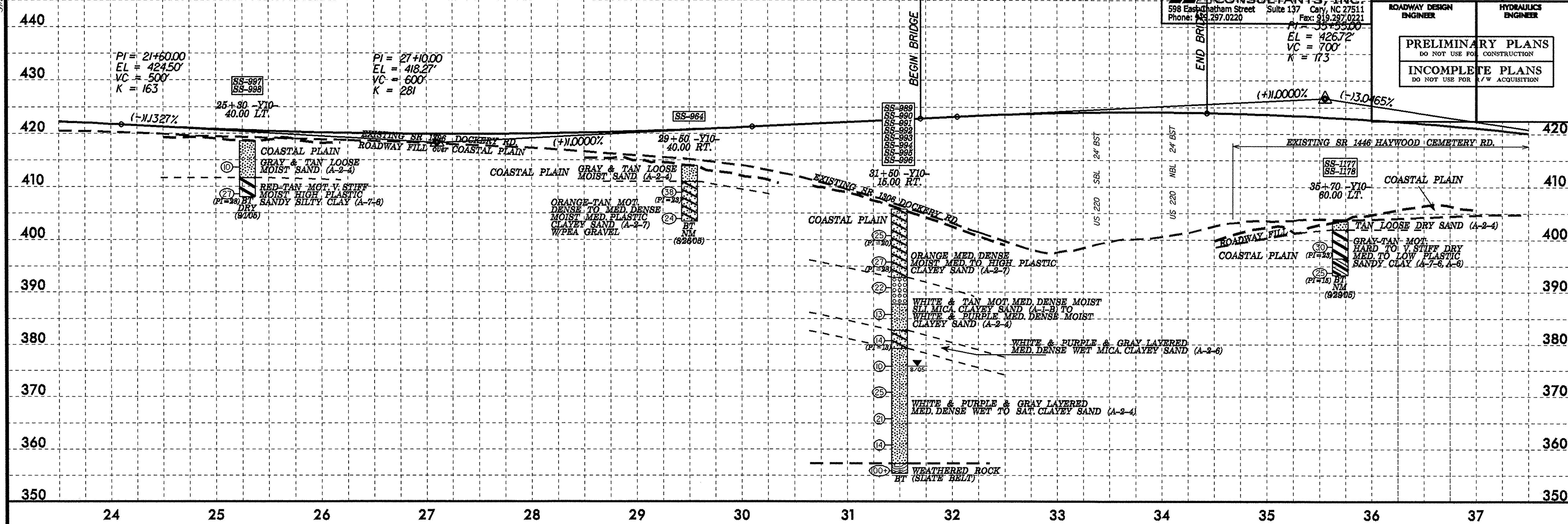
PROJECT REFERENCE NO.	SHEET NO.
R-3421C	50
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

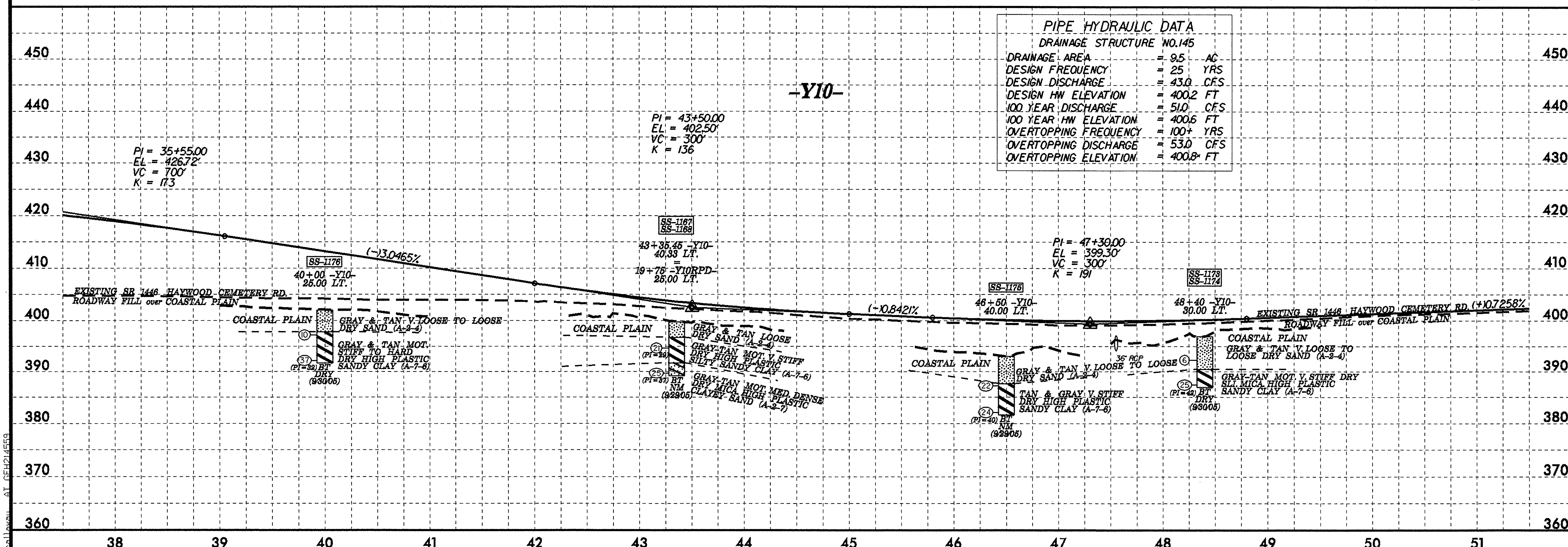
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION



PI = 21+60.00
EL = 424.50'
VC = 500'
K = 163
PI = 27+10.00
EL = 418.27'
VC = 600'
K = 281
PI = 35+55.00
EL = 426.72'
VC = 700'
K = 173
(-)1.1327%
(+)1.0000%
(+)1.0000%
(-)3.0465%
BEGIN BRIDGE
END BRIDGE
SS-997
SS-998
25+30 -Y10-
40.00 LT.
SS-964
29+50 -Y10-
40.00 RT.
SS-989 SS-990 SS-991 SS-992 SS-993 SS-994 SS-995 SS-996
31+50 -Y10-
15.00 RT.
SS-1177
SS-1178
35+70 -Y10-
60.00 LT.
EXISTING SR 1306 DOCKERY RD.
ROADWAY FILL over COASTAL PLAIN
EXISTING SR 1446 HAYWOOD CEMETERY RD.
COASTAL PLAIN
GRAY & TAN LOOSE MOIST SAND (A-2-4)
RED-TAN MOT. V. STIFF MOIST HIGH PLASTIC SANDY SILTY CLAY (A-7-6)
BT DRY (9/1/05)
GRAY & TAN LOOSE MOIST SAND (A-2-4)
ORANGE-TAN MOT. DENSE TO MED. DENSE MOIST MED. PLASTIC CLAYEY SAND (A-2-7) W/PEA GRAVEL
BT NM (8/26/05)
ORANGE MED. DENSE MOIST MED. TO HIGH PLASTIC CLAYEY SAND (A-2-7)
WHITE & TAN MOT. MED. DENSE MOIST SLI. MICA. CLAYEY SAND (A-1-B) TO WHITE & PURPLE MED. DENSE MOIST CLAYEY SAND (A-2-4)
WHITE & PURPLE & GRAY LAYERED MED. DENSE WET MICA. CLAYEY SAND (A-2-6)
WHITE & PURPLE & GRAY LAYERED MED. DENSE WET TO SAT. CLAYEY SAND (A-2-4)
WEATHERED ROCK BT (SLATE BELT)
US 220 SBL 24' BST
US 220 NBL 24' BST
ROADWAY FILL
TAN LOOSE DRY SAND (A-2-4)
GRAY-TAN MOT. HARD TO V. STIFF DRY MED. TO LOW PLASTIC SANDY CLAY (A-7-6, A-6)
BT NM (9/29/05)
440 430 420 410 400 390 380 370 360 350
24 25 26 27 28 29 30 31 32 33 34 35 36 37

-Y10-



PI = 35+55.00
EL = 426.72'
VC = 700'
K = 173
PI = 43+50.00
EL = 402.50'
VC = 300'
K = 136
PI = 47+30.00
EL = 399.30'
VC = 300'
K = 191
(-)3.0465%
(-)0.8421%
(+)0.7258%
SS-1176
40+00 -Y10-
25.00 LT.
SS-1167
SS-1168
43+35.45 -Y10-
40.33 LT.
=
19+75 -Y10RPD-
25.00 LT.
SS-1175
46+50 -Y10-
40.00 LT.
SS-1173
SS-1174
48+40 -Y10-
30.00 LT.
EXISTING SR 1446 HAYWOOD CEMETERY RD.
ROADWAY FILL over COASTAL PLAIN
COASTAL PLAIN
GRAY & TAN V. LOOSE TO LOOSE DRY SAND (A-2-4)
GRAY & TAN MOT. STIFF TO HARD DRY HIGH PLASTIC SANDY CLAY (A-7-6)
BT DRY (9/30/05)
GRAY & TAN LOOSE DRY SAND (A-2-4)
GRAY-TAN MOT. V. STIFF DRY HIGH PLASTIC SILTY SANDY CLAY (A-7-6)
GRAY-TAN MOT. MED. DENSE DRY MICA. HIGH PLASTIC CLAYEY SAND (A-2-7)
BT NM (9/29/05)
GRAY & TAN V. LOOSE TO LOOSE DRY SAND (A-2-4)
TAN & GRAY V. STIFF DRY HIGH PLASTIC SANDY CLAY (A-7-6)
BT NM (9/29/05)
36" RCP
GRAY & TAN V. LOOSE TO LOOSE DRY SAND (A-2-4)
GRAY-TAN MOT. V. STIFF DRY SLI. MICA. HIGH PLASTIC SANDY CLAY (A-7-6)
BT DRY (9/30/05)
450 440 430 420 410 400 390 380 370 360
38 39 40 41 42 43 44 45 46 47 48 49 50 51

PIPE HYDRAULIC DATA

DRAINAGE STRUCTURE NO.145

DRAINAGE AREA	= 9.5	AC
DESIGN FREQUENCY	= 25	YRS
DESIGN DISCHARGE	= 43.0	CFS
DESIGN HW ELEVATION	= 400.2	FT
100 YEAR DISCHARGE	= 51.0	CFS
100 YEAR HW ELEVATION	= 400.6	FT
OVERTOPPING FREQUENCY	= 100+	YRS
OVERTOPPING DISCHARGE	= 53.0	CFS
OVERTOPPING ELEVATION	= 400.8	FT

19-JUL-2007 09:29

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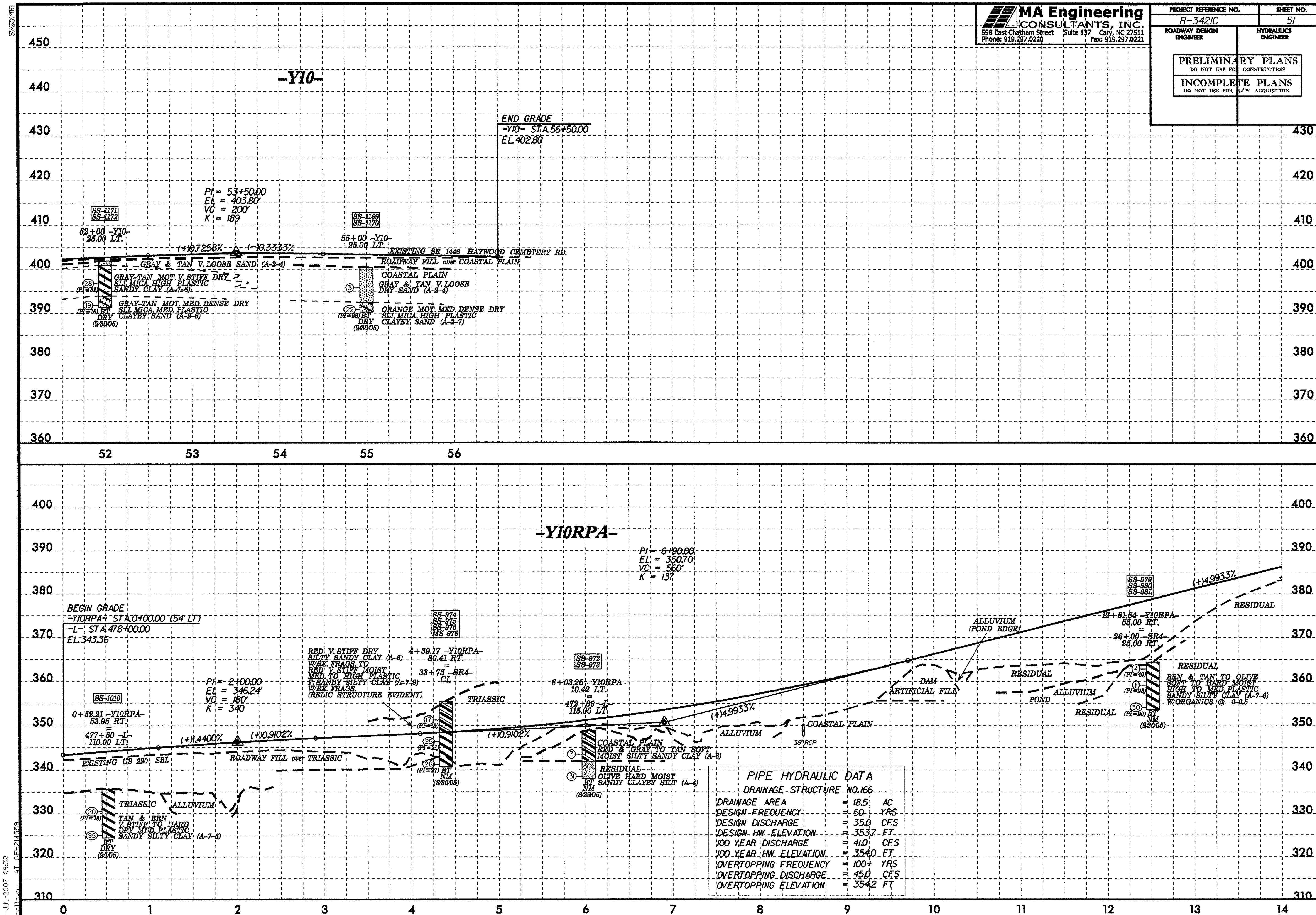
Phone: 919.297.0220 Fax: 919.297.0221

PROJECT REFERENCE NO.	SHEET NO.
R-3421C	51

ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION



PIPE HYDRAULIC DATA

DRAINAGE STRUCTURE NO.166

DRAINAGE AREA	= 18.5	AC
DESIGN FREQUENCY	= 50	YRS
DESIGN DISCHARGE	= 35.0	CFS
DESIGN HW ELEVATION	= 353.7	FT
100 YEAR DISCHARGE	= 41.0	CFS
100 YEAR HW ELEVATION	= 354.0	FT
OVERTOPPING FREQUENCY	= 100+	YRS
OVERTOPPING DISCHARGE	= 45.0	CFS
OVERTOPPING ELEVATION	= 354.2	FT

19-JUL-2007 09:32

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PROJECT REFERENCE NO.	SHEET NO.
R-3421C	52

ROADWAY DESIGN ENGINEER

HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

5/1/2007 9:19:09 AM

-Y10RPA-

END GRADE
-Y10RPA- STA. 24+45.27
-Y10- STA. 28+03.63 (20.00' LT.) EOP
EL. 420.76

PI = 20+30.00
EL = 417.61'
VC = 400'
K = 94

(+)0.7585%

(+)1.4933%

(+)0.7585%

(-)3.9867%

SR H306 - DOCKERY RD - 22' BST
-Y10RPA- STA. 24+65.59
-Y10- STA. 28+00.00
EL. 419.95

COASTAL PLAIN
GRAY & TAN LOOSE MOIST SILTY SAND (A-2-4)

SS-982
SS-983
SS-984
SS-985
MS-986
SS-986

14+72.86 -Y10RPA-
106.22 RT.
=
23+75 -SR4-
25.00 LT.

COASTAL PLAIN
GRAY & TAN LOOSE DRY SILTY SAND (A-2-4)

COASTAL PLAIN

(+)1.4933%

(10) (PI=26)
GRAY-TAN STIFF TO V. STIFF MOIST MICA, HIGH PLASTIC SILTY SANDY CLAY (A-7-6)

(16) (PI=32)

RESIDUAL

(10) (PI=37)

(11) (PI=46) BT
NM
(8/2006)

RESIDUAL
OLIVE & TAN STIFF MOIST HIGH PLASTIC F. SANDY SILTY CLAY (A-7-5)

SS-999
SS-1000
MS-1000
SS-1001
SS-1002

17+52.62 -Y10RPA-
147.26 RT.
=
20+50 -SR4-
CL

RED-TAN MOT. V. STIFF TO HARD MOIST MICA, HIGH PLASTIC SANDY CLAY (A-7-5, A-7-6)

(45) (PI=44)

(20) (PI=35)

WHITE LOOSE WET MED. PLASTIC CLAYEY SAND (A-2-6)

(8) (PI=19)

E/OS

(45) (PI=22) BT
GRAY-TAN MOT. HARD MOIST MED. PLASTIC SILTY F. SANDY CLAY (A-6)

SS-987
SS-988
MS-988

18+60 -Y10RPA-
50.00 LT.

COASTAL PLAIN

(19)

(23) (PI=37)

(12) (PI=28) BT
NM
(8/2006)

RESIDUAL
OLIVE-RED STIFF MOIST HIGH PLASTIC SILTY SANDY CLAY (A-7-6) (SLATE BELT)

COASTAL PLAIN
GRAY & TAN LOOSE DRY SAND (A-2-4)

TAN TO GRAY-TAN MOT. V. STIFF MOIST SLI. MICA, HIGH PLASTIC SANDY CLAY (A-7-6)

COASTAL PLAIN

-Y10RPD-

BEGIN GRADE
-Y10RPD- STA. 0+00.00 ((54' RT)
-L- STA. 479+55.00
EL. 344.21

PI = 1+55.00
EL = 346.18'
VC = 140'
K = 206

SS-1126
SS-1127
SS-1128

0+80.81 -Y10RPD-
70.79 LT.
=
38+76 -SR5-
CL

ARTIFICIAL FILL
BRN & RED-BRN V. SOFT TO MED. STIFF MOIST HIGH PLASTIC SANDY SILTY CLAY (A-7-6)

(+)1.2710%

(+)0.5910%

EXISTING US 220 NBL ROADWAY FILL over TRIASSIC

TRIASSIC

(2) (PI=31)

(6) (PI=32)

TRIASSIC
BRN STIFF TO V. STIFF MOIST MED. PLASTIC SANDY SILTY CLAY (A-7-5)

(15) (PI=38) BT
DRY
(9/2005)

SS-1129
SS-1130
SS-1131
SS-1132
SS-1133

4+21.46 -Y10RPD-
76.30 LT.
=
35+60 -SR5-
CL

ARTIFICIAL FILL

TRIASSIC
RED-BRN STIFF MOIST MED. PLASTIC F. SANDY SILTY CLAY (A-7-6) (SLATE BELT CONGLOMERATE)

(13) (PI=18)

(27) (PI=14)

RED-BRN V. STIFF MOIST (+)0.5910%
LOW TO MED. PLASTIC SANDY SILTY CLAY (A-6) (SLATE BELT PHILLITE)

(23) (PI=18)

(11) (PI=19)

RED-BRN HARD MOIST MED. PLASTIC SILTY CLAY (A-7-6) (MUDSTONE)

(19) (PI=18) BT
NM
(9/2005)

RED-BRN HARD MOIST MED. PLASTIC F. SANDY SILTY CLAY (A-6) (SLATE BELT CONGLOMERATE)

SS-1134
SS-1135
SS-1136
SS-1137
SS-1138
SS-1139

7+37.78 -Y10RPD-
158.83 LT.
=
32+60 -SR5-
80.00 RT.

RESIDUAL
WHITE-TAN TO OLIVE & RED-BRN STIFF TO HARD DRY TO MOIST LOW TO HIGH PLASTIC SILTY CLAY (A-7-5, A-7-6, A-6)

(PI=22)

(18) (PI=18)

(12) (PI=26)

(16) (PI=26)

(52) (PI=17)

(31) (PI=18) BT
NM
(9/2005)

ARTIFICIAL FILL

DAM

RESIDUAL

(+)4.2800%

ALLUVIUM OVER RESIDUAL

POND

RESIDUAL

SS-1147
SS-1148
SS-1149

SS-1163
SS-1164

10+60 -Y10RPD-
CL

10+00 -Y10RPD-
CL

COASTAL PLAIN
GRAY & TAN LOOSE DRY SAND (A-2-4)

COASTAL PLAIN (PI=42)

(20) (PI=42)

(16) (PI=26) BT
NM
(9/2005)

COASTAL PLAIN
GRAY-TAN MOT. TO WHITE & TAN MOT. MED. DENSE MOIST TO WET HIGH PLASTIC CLAYEY SAND (A-2-7)

(18) (PI=18)

(11) (PI=54)

(30) (PI=28) BT
DRY
(9/2005)

SS-1149
SS-1144
SS-1145
SS-1146

COASTAL PLAIN
TAN V. STIFF MOIST HIGH PLASTIC SANDY CLAY (A-7-6) W/GRAVEL @ 3.0

12+75 -Y10RPD-
CL

(+)4.2800%

COASTAL PLAIN
GRAY & TAN V. LOOSE TO LOOSE DRY SAND (A-2-4)

COASTAL PLAIN

(4)

(20) (PI=30)

(20) (PI=26)

(43) (PI=28) BT
DRY
(9/2005)

COASTAL PLAIN
RESIDUAL

WHITE-TAN TO RED-BRN STIFF TO HARD, DRY TO MOIST MED. TO HIGH PLASTIC SILTY CLAY (A-7-5, A-7-6)

RESIDUAL

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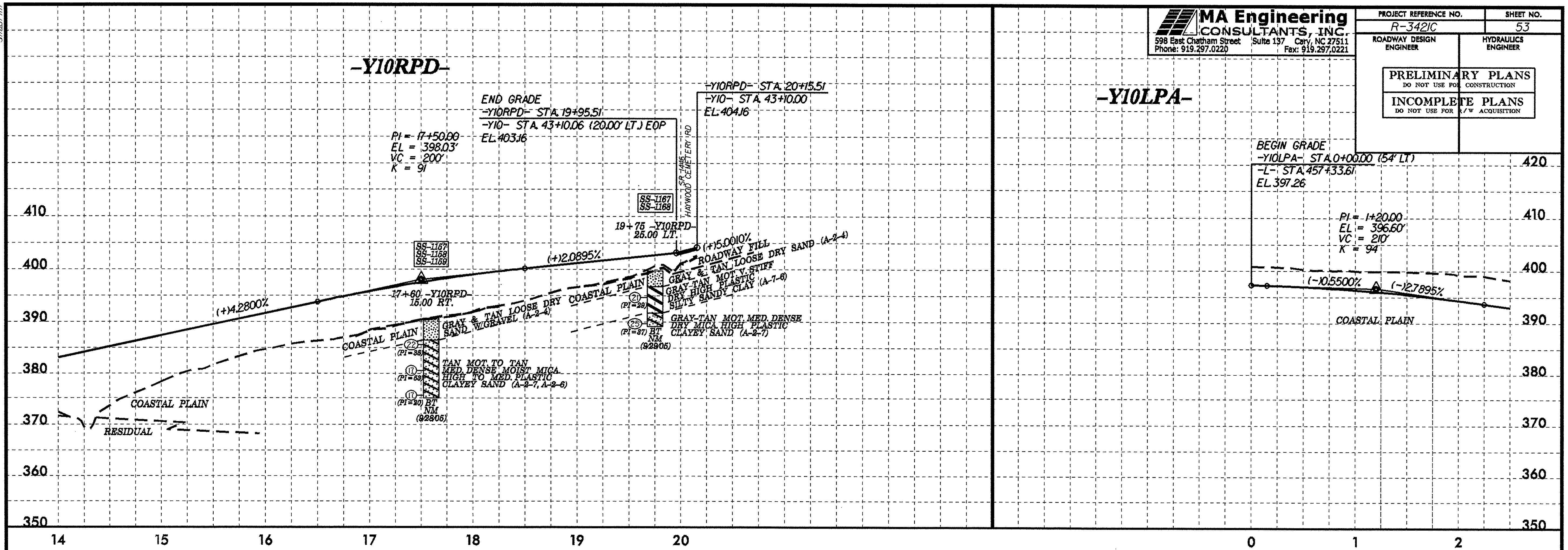
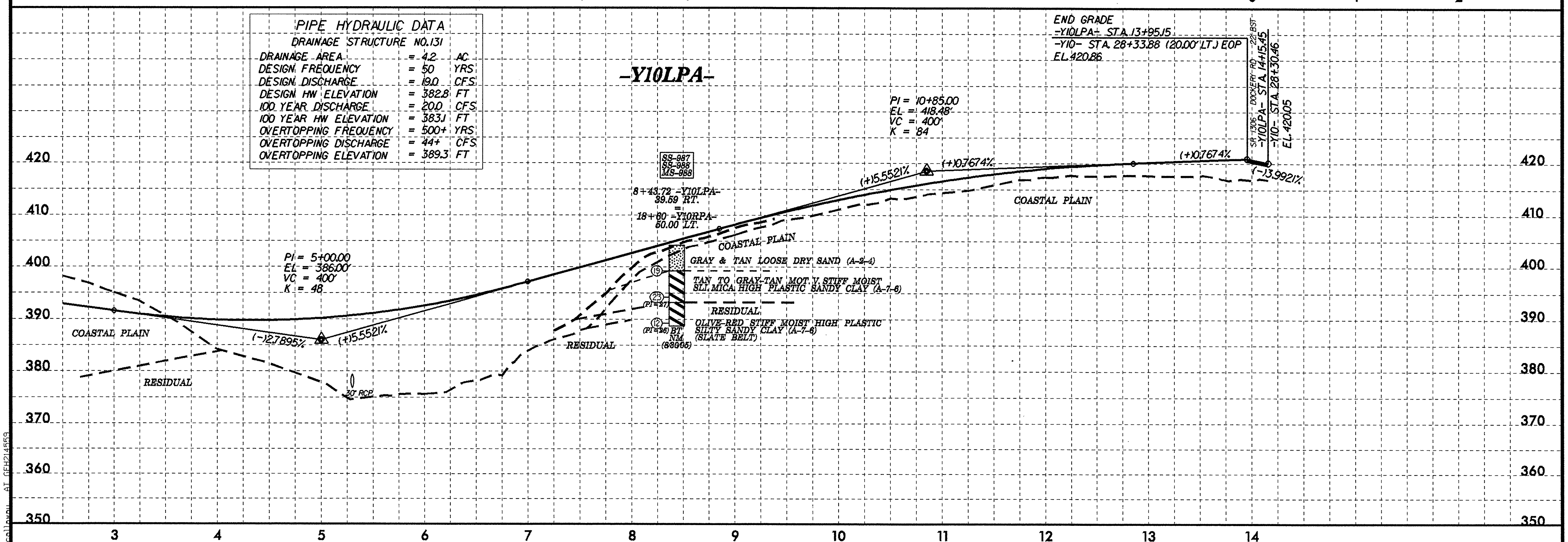
PROJECT REFERENCE NO.	SHEET NO.
R-3421C	53
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION



-Y10RPD-
END GRADE
-Y10RPD- STA. 19+95.51
-Y10- STA. 43+10.06 (20.00' LT.) EOP
EL. 403.16
-Y10RPD- STA. 20+15.51
-Y10- STA. 43+10.00
EL. 404.16
PI = 17+50.00
EL = 398.03'
VC = 200'
K = 91
SS-1167
SS-1168
SS-1169
SR 1486 HAYWOOD CEMETERY RD
19+75 -Y10RPD-
25.00' LT.
17+60 -Y10RPD-
15.00' RT.
(+)4.2800%
(+)2.0895%
(+)5.0010%
ROADWAY FILL
GRAY & TAN LOOSE DRY SAND (A-2-4)
GRAY-TAN MOT. V. STIFF DRY HIGH PLASTIC SILTY SANDY CLAY (A-7-6)
GRAY-TAN MOT. MED. DENSE DRY MICA HIGH PLASTIC CLAYEY SAND (A-2-7)
GRAY & TAN LOOSE DRY COASTAL PLAIN SAND W/GRAVEL (A-2-4)
TAN MOT. TO TAN MED. DENSE MOIST MICA HIGH TO MED. PLASTIC CLAYEY SAND (A-2-7, A-2-6)
BT NM (9/28/05)
COASTAL PLAIN
RESIDUAL
-Y10LPA-
BEGIN GRADE
-Y10LPA- STA. 0+00.00 (54' LT.)
-L- STA. 457+33.61
EL. 397.26
PI = 1+20.00
EL = 396.60'
VC = 210'
K = 94
(-)0.5500%
(-)2.7895%
COASTAL PLAIN
350
360
370
380
390
400
410
420
14
15
16
17
18
19
20
0
1
2



-Y10LPA-
END GRADE
-Y10LPA- STA. 13+95.15
-Y10- STA. 28+33.88 (20.00' LT.) EOP
EL. 420.86
SR 1306 - DOCKERY RD - 22' BST
-Y10LPA- STA. 14+15.45
-Y10- STA. 28+30.46
EL. 420.05
PI = 10+85.00
EL = 418.48'
VC = 400'
K = 84
(+)5.5521%
(+)0.7674%
(-)3.9921%
SS-987
SS-988
MS-988
8+43.72 -Y10LPA-
39.59' RT.
=
18+60 -Y10RPA-
60.00' LT.
COASTAL PLAIN
GRAY & TAN LOOSE DRY SAND (A-2-4)
TAN TO GRAY-TAN MOT. V. STIFF MOIST SLT. MICA HIGH PLASTIC SANDY CLAY (A-7-6)
RESIDUAL
OLIVE-RED STIFF MOIST HIGH PLASTIC SILTY SANDY CLAY (A-7-6) (SLATE BELT)
BT NM (8/8/05)
PI = 5+00.00
EL = 386.00'
VC = 400'
K = 48
(-)2.7895%
(+)5.5521%
30" RCP
COASTAL PLAIN
RESIDUAL
350
360
370
380
390
400
410
420
3
4
5
6
7
8
9
10
11
12
13
14

PIPE HYDRAULIC DATA
DRAINAGE STRUCTURE NO. 131

DRAINAGE AREA	= 4.2	AC
DESIGN FREQUENCY	= 50	YRS
DESIGN DISCHARGE	= 19.0	CFS
DESIGN HW ELEVATION	= 382.8	FT
100 YEAR DISCHARGE	= 20.0	CFS
100 YEAR HW ELEVATION	= 383.1	FT
OVERTOPPING FREQUENCY	= 500+	YRS
OVERTOPPING DISCHARGE	= 44+	CFS
OVERTOPPING ELEVATION	= 389.3	FT

19-JUL-2007 09:43

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ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER

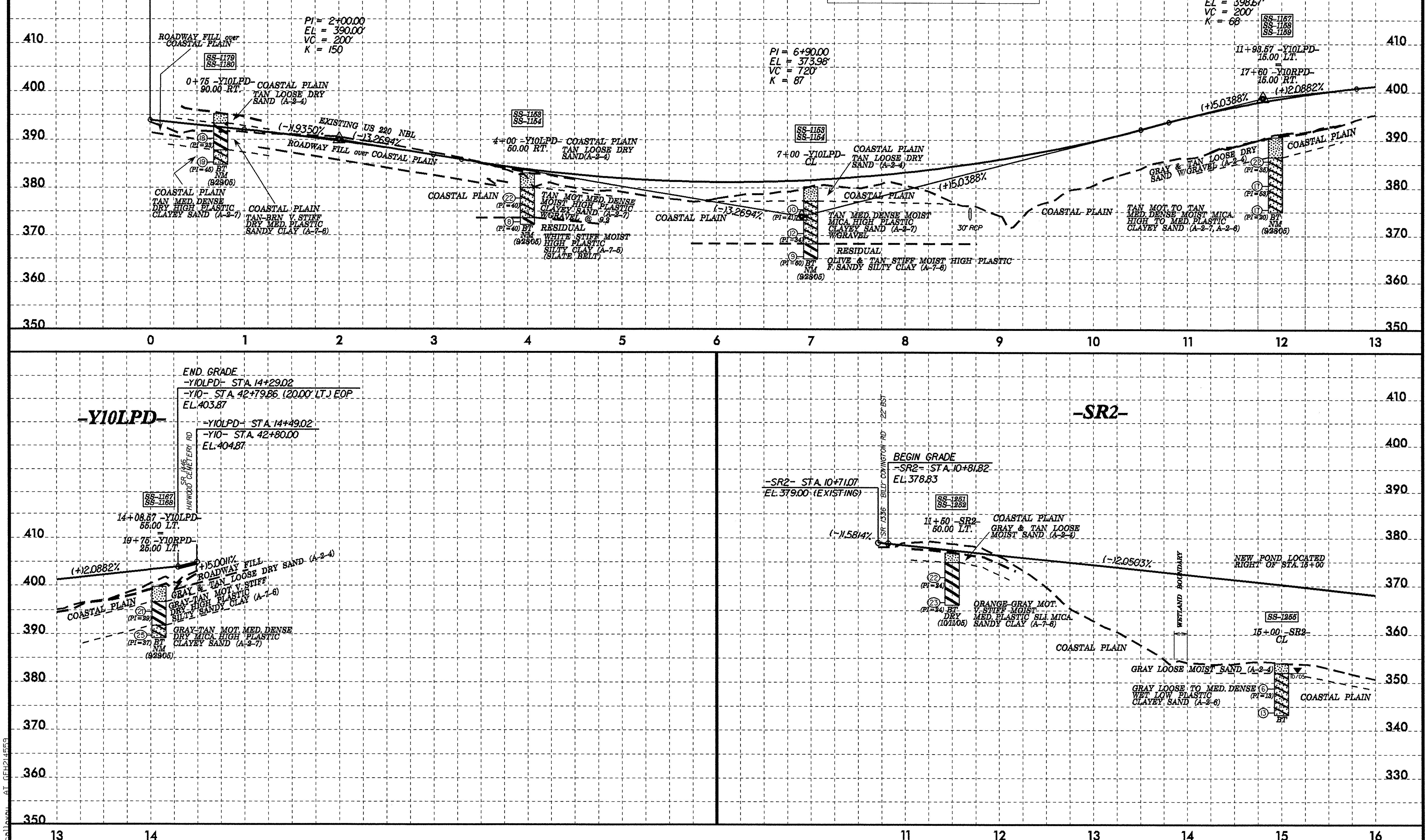
PRELIMINARY PLANS DO NOT USE FOR CONSTRUCTION

INCOMPLETE PLANS DO NOT USE FOR R/W ACQUISITION

PIPE HYDRAULIC DATA

DRAINAGE STRUCTURE NO.152

DRAINAGE AREA	= 12.5	AC
DESIGN FREQUENCY	= 50	YRS
DESIGN DISCHARGE	= 23.0	CFS
DESIGN HW ELEVATION	= 376.6	FT
100 YEAR DISCHARGE	= 27.0	CFS
100 YEAR HW ELEVATION	= 376.9	FT
OVERTOPPING FREQUENCY	= 500+	YRS
OVERTOPPING DISCHARGE	= 39+	CFS
OVERTOPPING ELEVATION	= 382.0	FT



PROJECT REFERENCE NO.	SHEET NO.
R-3421C	55

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ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

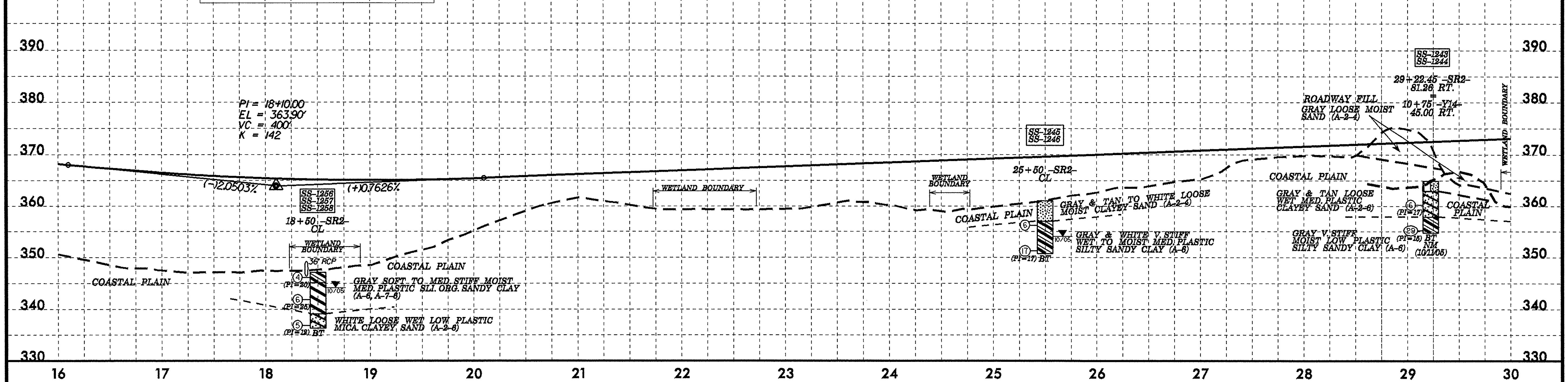
INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PIPE HYDRAULIC DATA

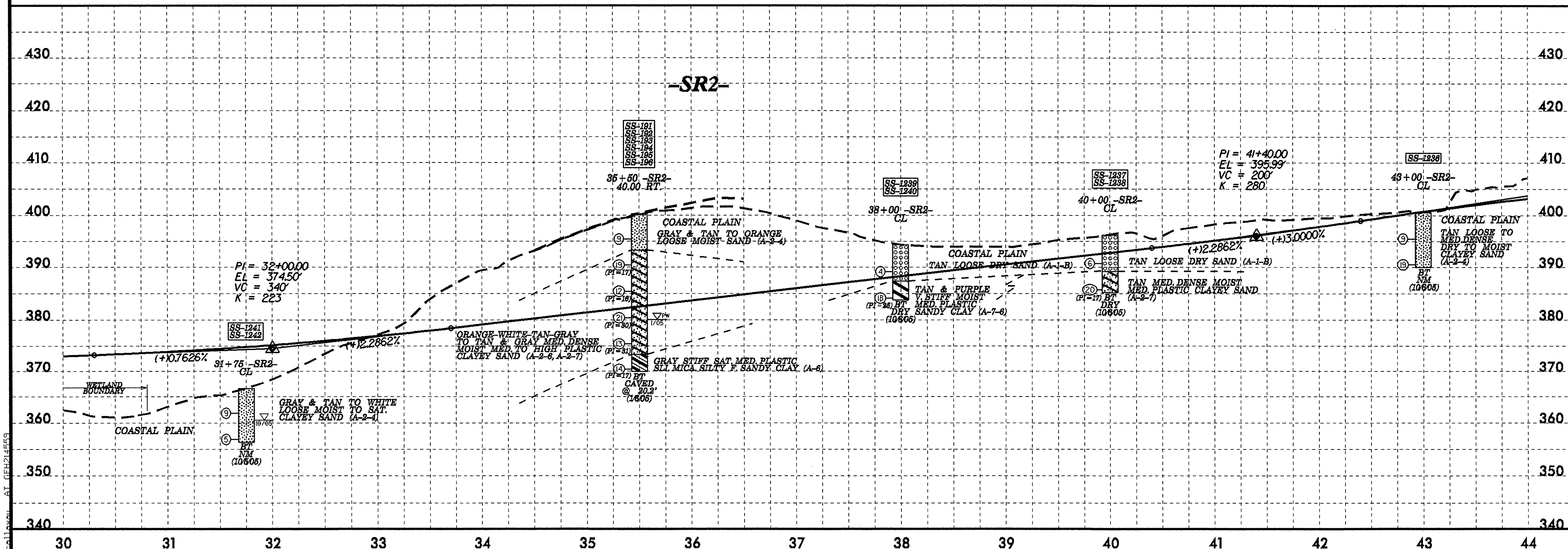
DRAINAGE STRUCTURE NO. 282

DRAINAGE AREA	= 6.9	AC
DESIGN FREQUENCY	= 25	YRS
DESIGN DISCHARGE	= 33.0	CFS
DESIGN HW ELEVATION	= 352.5	FT
100 YEAR DISCHARGE	= 39.0	CFS
100 YEAR HW ELEVATION	= 353.0	FT
OVERTOPPING FREQUENCY	= 500+	YRS
OVERTOPPING DISCHARGE	= 55+	CFS
OVERTOPPING ELEVATION	= 366.2	FT

-SR2-



-SR2-



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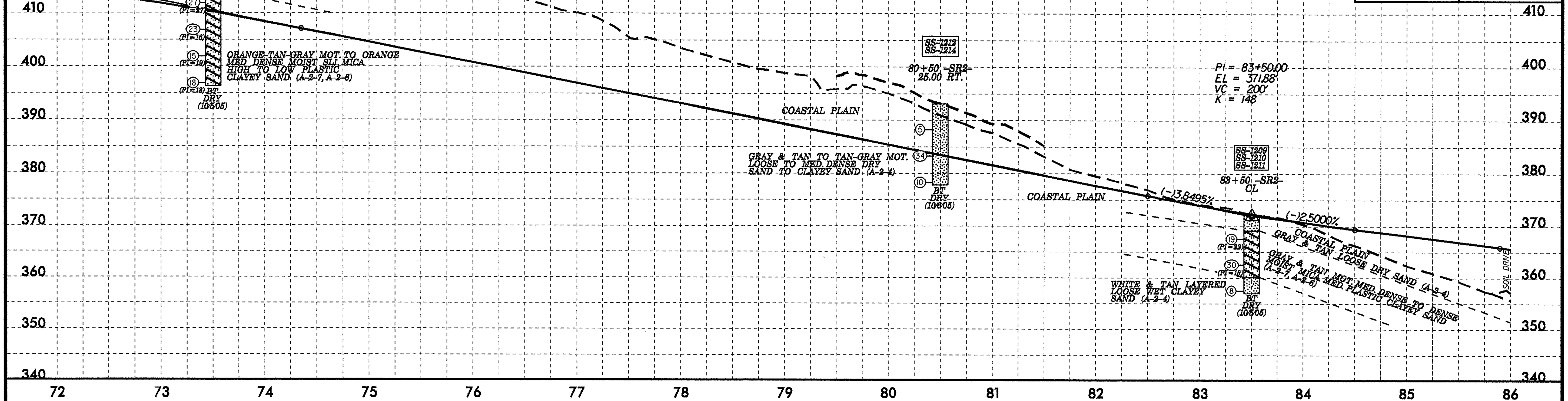
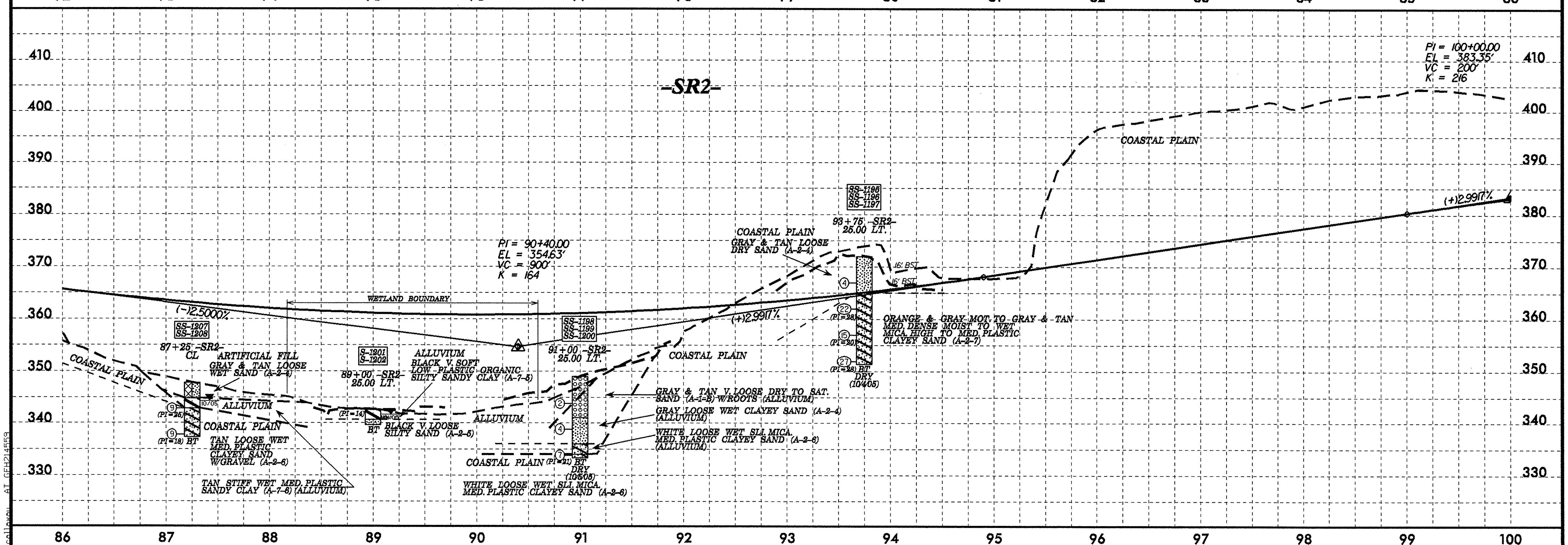
PROJECT REFERENCE NO.	SHEET NO.
R-3421C	57
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION





19-JUL-2007 09:58

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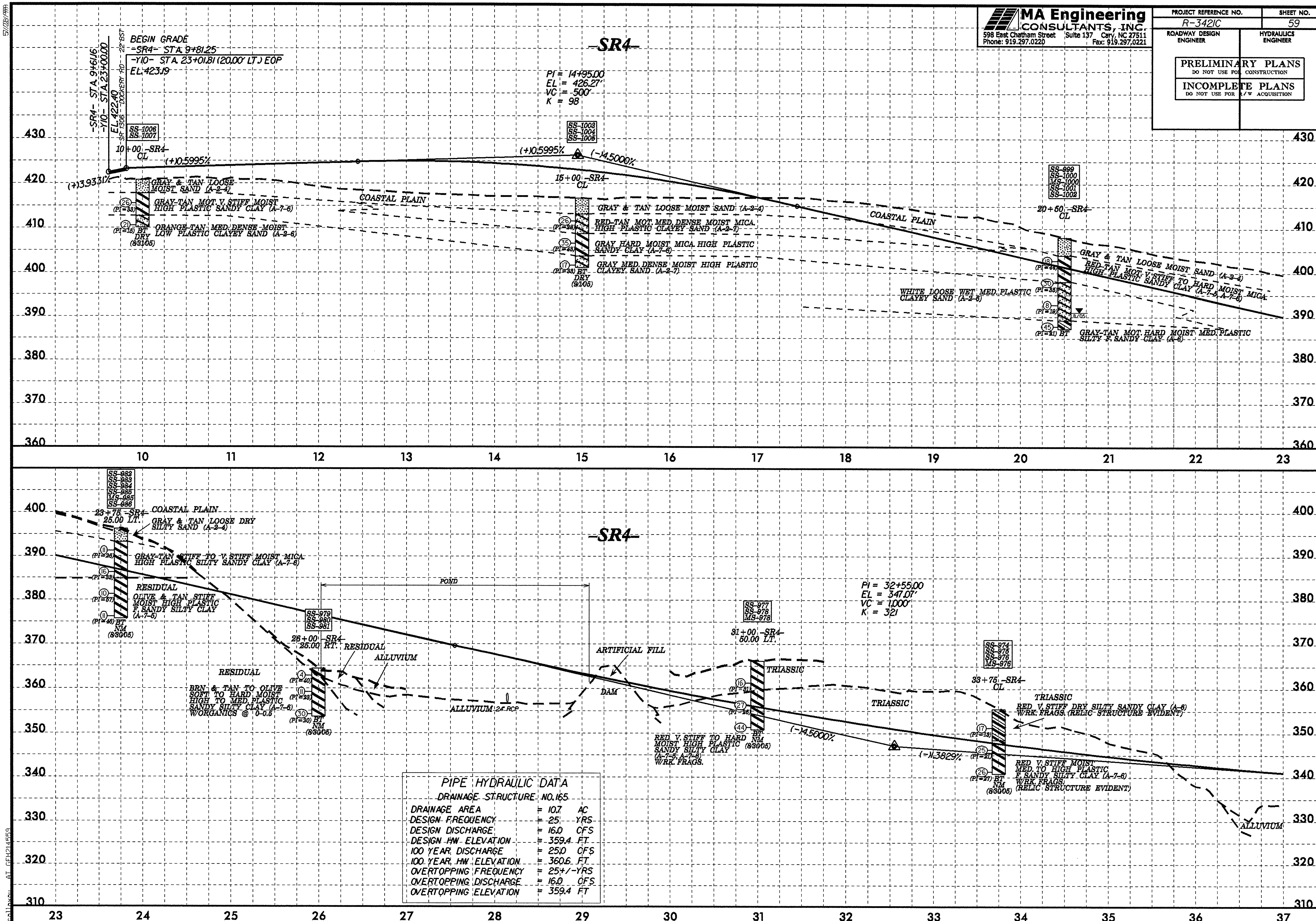
PROJECT REFERENCE NO.	SHEET NO.
R-3421C	59
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION



-SR4-
BEGIN GRADE
-SR4- STA. 9+81.25
-Y10- STA. 23+01.81 (20.00' LT.) EOP
EL. 423.19
-SR4- STA. 9+61.6
-Y10- STA. 23+00.00
EL. 422.40
PI = 14+95.00
EL = 426.27'
VC = 500'
K = 98
(+)0.5995%
(-)4.5000%
(-)3.9331%
10+00 -SR4- CL
15+00 -SR4- CL
20+50 -SR4- CL
COASTAL PLAIN
GRAY & TAN LOOSE MOIST SAND (A-2-4)
GRAY-TAN MOT. V. STIFF MOIST HIGH PLASTIC SANDY CLAY (A-7-6)
ORANGE-TAN MED. DENSE MOIST LOW PLASTIC CLAYEY SAND (A-2-6)
RED-TAN MOT. MED. DENSE MOIST MICA. HIGH PLASTIC CLAYEY SAND (A-2-7)
GRAY HARD MOIST MICA. HIGH PLASTIC SANDY CLAY (A-7-6)
GRAY MED. DENSE MOIST HIGH PLASTIC CLAYEY SAND (A-2-7)
RED-TAN MOT. V. STIFF TO HARD MOIST MICA. HIGH PLASTIC SANDY CLAY (A-7-5, A-7-6)
WHITE LOOSE WET MED. PLASTIC CLAYEY SAND (A-2-6)
GRAY-TAN MOT. HARD MOIST MED. PLASTIC SILTY F. SANDY CLAY (A-6)
PI = 32+55.00
EL = 347.07'
VC = 1,000'
K = 321
23+75 -SR4- 25.00 LT.
GRAY & TAN LOOSE DRY SILTY SAND (A-2-4)
GRAY-TAN STIFF TO V. STIFF MOIST MICA. HIGH PLASTIC SILTY SANDY CLAY (A-7-6)
RESIDUAL
OLIVE & TAN STIFF MOIST HIGH PLASTIC F. SANDY SILTY CLAY (A-7-5)
POND
26+00 -SR4- 25.00 RT.
ALLUVIUM
BRN. & TAN TO OLIVE SOFT TO HARD MOIST HIGH TO MED. PLASTIC SANDY SILTY CLAY (A-7-6) W/ORGANICS @ 0-0.5'
ALLUVIUM 24" RCP
ARTIFICIAL FILL
DAM
31+00 -SR4- 50.00 LT.
TRIASSIC
RED V. STIFF TO HARD MOIST HIGH PLASTIC SANDY SILTY CLAY (A-7-5, A-7-6) W/RK. FRAGS.
(-)4.5000%
(-)1.3829%
33+75 -SR4- CL
RED V. STIFF DRY SILTY SANDY CLAY (A-6) W/RK. FRAGS. (RELIC STRUCTURE EVIDENT)
RED V. STIFF MOIST MED. TO HIGH PLASTIC F. SANDY SILTY CLAY (A-7-6) W/RK. FRAGS. (RELIC STRUCTURE EVIDENT)

PIPE HYDRAULIC DATA
DRAINAGE STRUCTURE NO. 165

DRAINAGE AREA	= 10.7	AC
DESIGN FREQUENCY	= 25	YRS
DESIGN DISCHARGE	= 16.0	CFS
DESIGN HW ELEVATION	= 359.4	FT
100 YEAR DISCHARGE	= 25.0	CFS
100 YEAR HW ELEVATION	= 360.6	FT
OVERTOPPING FREQUENCY	= 25+/-	YRS
OVERTOPPING DISCHARGE	= 16.0	CFS
OVERTOPPING ELEVATION	= 359.4	FT

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PIPE HYDRAULIC DATA		
DRAINAGE STRUCTURE NO.182		
DRAINAGE AREA	= 97.0	AC
DESIGN FREQUENCY	= 50	YRS
DESIGN DISCHARGE	= 140.0	CFS
DESIGN HW ELEVATION	= 335.0	FT
100 YEAR DISCHARGE	= 160.0	CFS
100 YEAR HW ELEVATION	= 335.6	FT
OVERTOPPING FREQUENCY	= 200+	YRS
OVERTOPPING DISCHARGE	= 240.0	CFS
OVERTOPPING ELEVATION	= 337.7	FT

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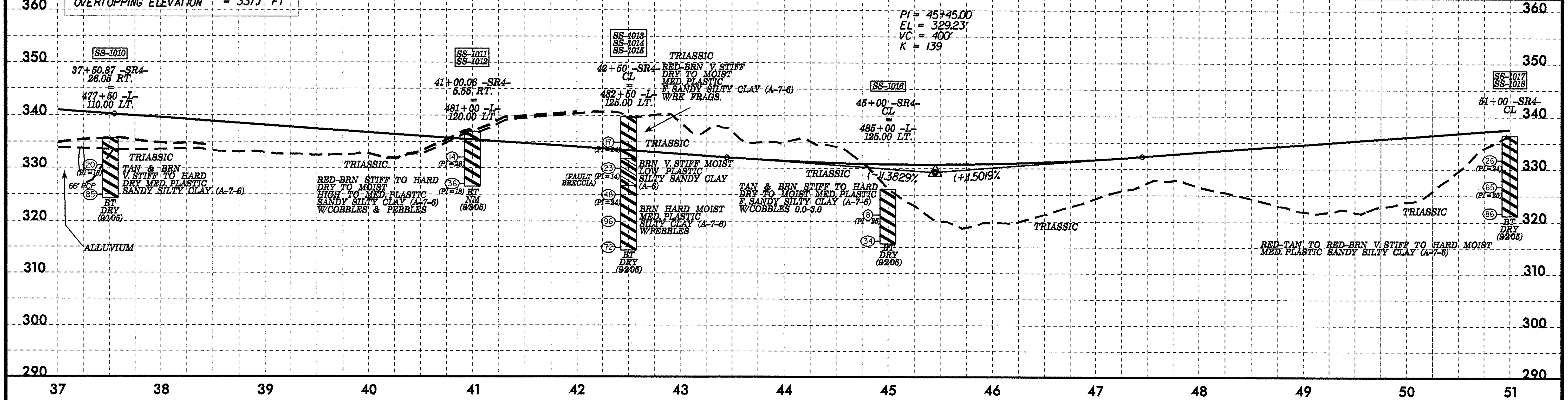
PROJECT REFERENCE NO.	SHEET NO.
R-3421C	60
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

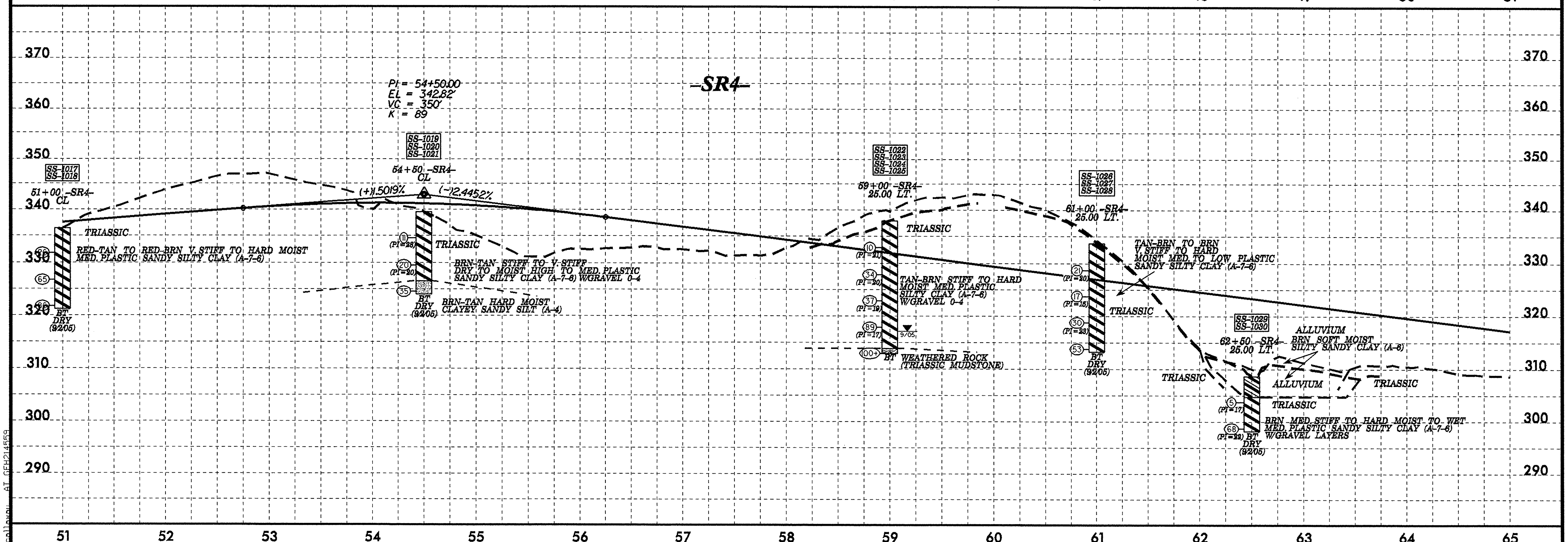
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

-SR4-



-SR4-



19-JUL-2007 10:15

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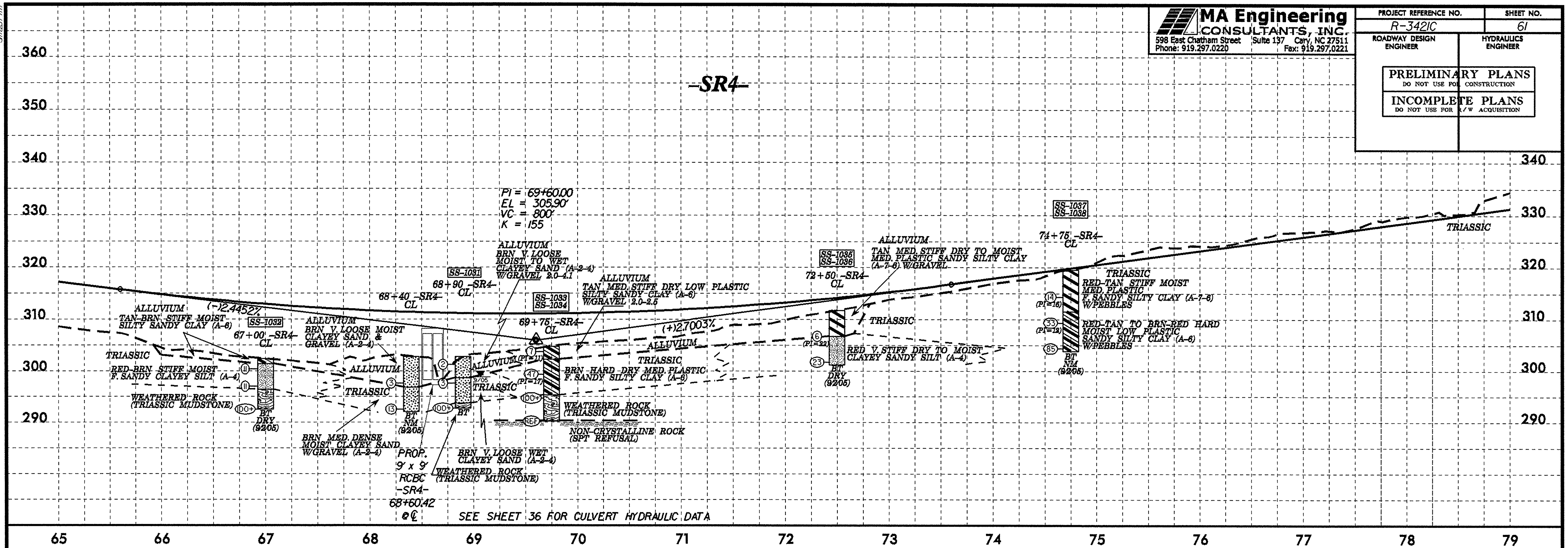
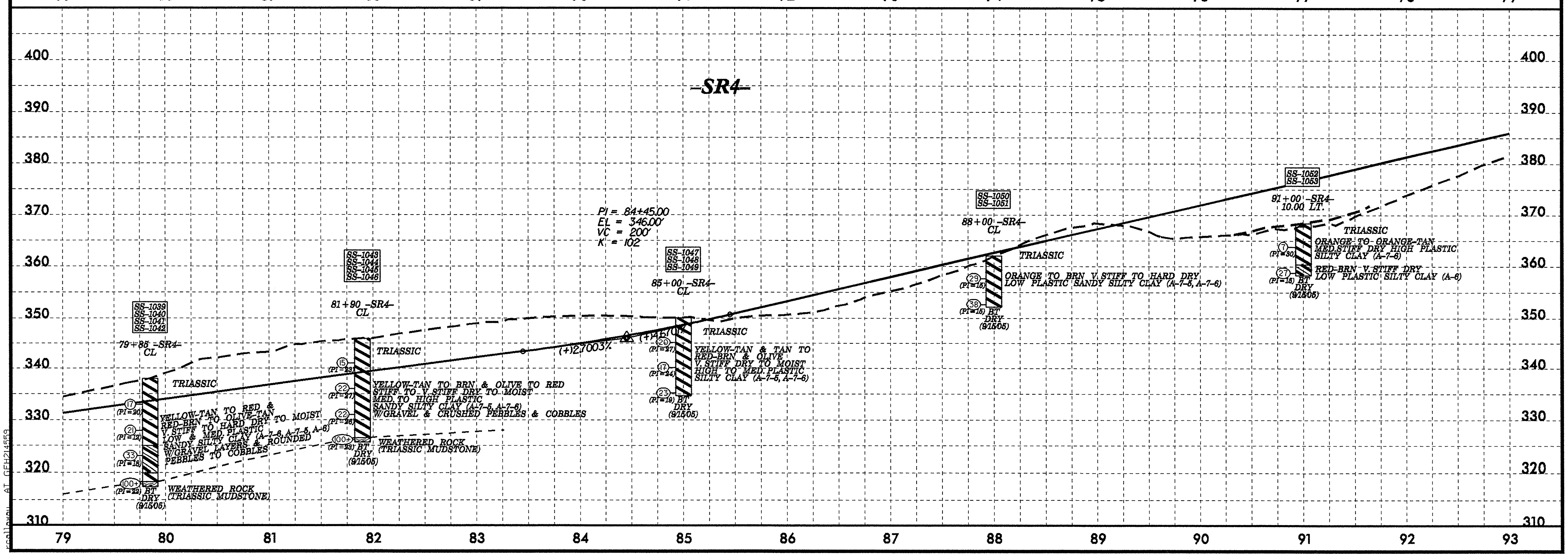
PROJECT REFERENCE NO.	SHEET NO.
R-3421C	61
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION





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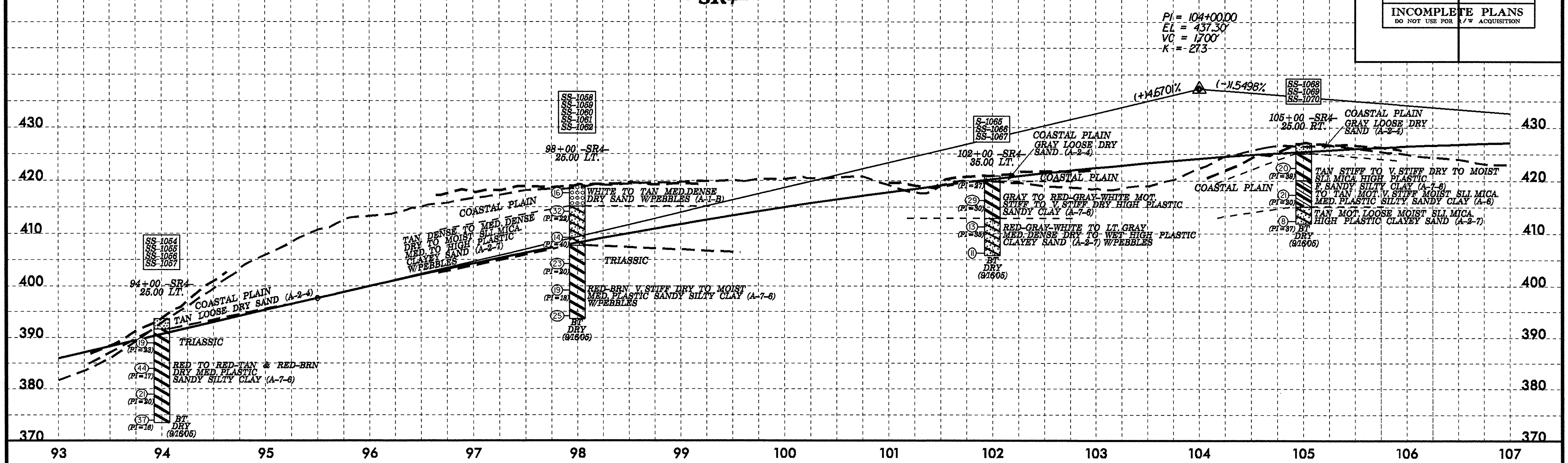
PROJECT REFERENCE NO.	SHEET NO.
R-3421C	62
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

-SR4-

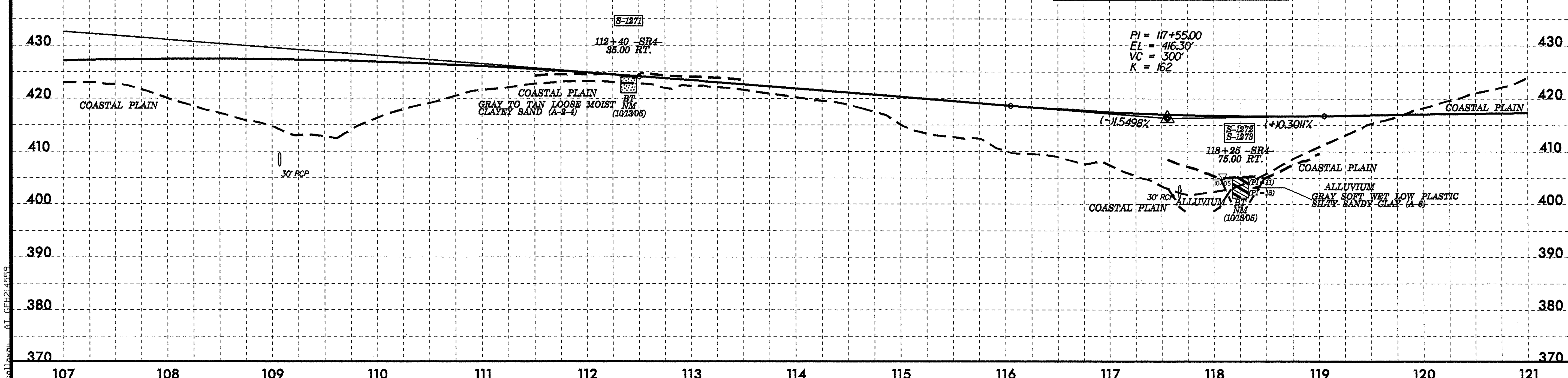


PIPE HYDRAULIC DATA		
DRAINAGE STRUCTURE NO. 247		
DRAINAGE AREA	= 3.8	AC
DESIGN FREQUENCY	= 25	YRS
DESIGN DISCHARGE	= 19.0	CFS
DESIGN HW ELEVATION	= 418.6	FT
100 YEAR DISCHARGE	= 22.0	CFS
100 YEAR HW ELEVATION	= 418.9	FT
OVERTOPPING FREQUENCY	= 500+	YRS
OVERTOPPING DISCHARGE	= 51+	CFS
OVERTOPPING ELEVATION	= 425.0	FT

PIPE HYDRAULIC DATA		
DRAINAGE STRUCTURE NO. 312		
DRAINAGE AREA	= 15.7	AC
DESIGN FREQUENCY	= 25	YRS
DESIGN DISCHARGE	= 22.0	CFS
DESIGN HW ELEVATION	= 405.5	FT
100 YEAR DISCHARGE	= 35.0	CFS
100 YEAR HW ELEVATION	= 406.4	FT
OVERTOPPING FREQUENCY	= 500+	YRS
OVERTOPPING DISCHARGE	= 50+	CFS
OVERTOPPING ELEVATION	= 416.7	FT

-SR4-

PI = 104+00.00
EL = 437.30'
VC = 1,700'
K = 273



19-JUL-2007 10:30

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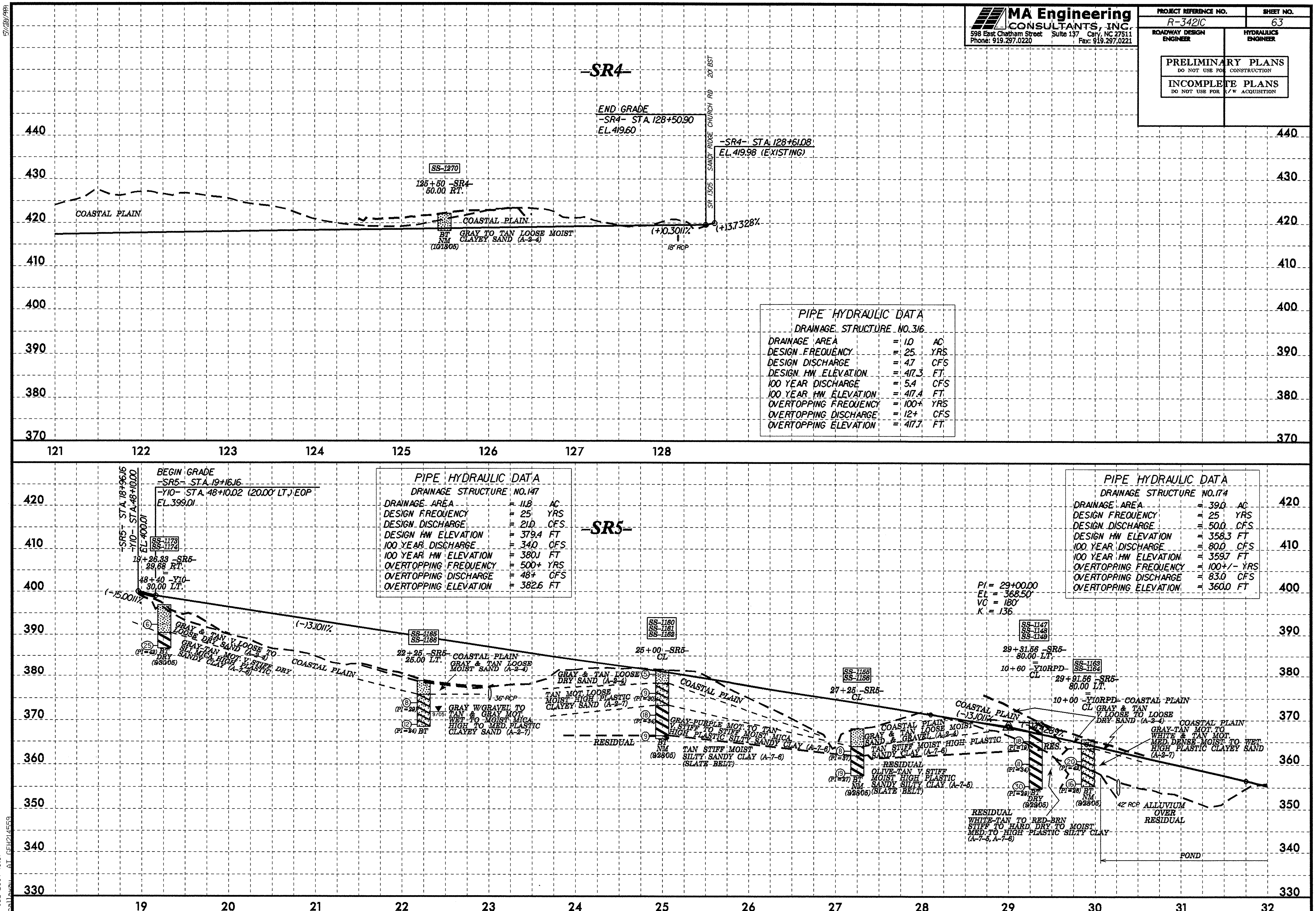
PROJECT REFERENCE NO.	SHEET NO.
R-3421C	63
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION



PIPE HYDRAULIC DATA
DRAINAGE STRUCTURE NO. 316

DRAINAGE AREA	= 1.0 AC
DESIGN FREQUENCY	= 25 YRS
DESIGN DISCHARGE	= 4.7 CFS
DESIGN HW ELEVATION	= 417.3 FT
100 YEAR DISCHARGE	= 5.4 CFS
100 YEAR HW ELEVATION	= 417.4 FT
OVERTOPPING FREQUENCY	= 100+ YRS
OVERTOPPING DISCHARGE	= 12+ CFS
OVERTOPPING ELEVATION	= 417.7 FT

PIPE HYDRAULIC DATA
DRAINAGE STRUCTURE NO. 147

DRAINAGE AREA	= 11.8 AC
DESIGN FREQUENCY	= 25 YRS
DESIGN DISCHARGE	= 21.0 CFS
DESIGN HW ELEVATION	= 379.4 FT
100 YEAR DISCHARGE	= 34.0 CFS
100 YEAR HW ELEVATION	= 380.1 FT
OVERTOPPING FREQUENCY	= 500+ YRS
OVERTOPPING DISCHARGE	= 48+ CFS
OVERTOPPING ELEVATION	= 382.6 FT

PIPE HYDRAULIC DATA
DRAINAGE STRUCTURE NO. 174

DRAINAGE AREA	= 39.0 AC
DESIGN FREQUENCY	= 25 YRS
DESIGN DISCHARGE	= 50.0 CFS
DESIGN HW ELEVATION	= 358.3 FT
100 YEAR DISCHARGE	= 80.0 CFS
100 YEAR HW ELEVATION	= 359.7 FT
OVERTOPPING FREQUENCY	= 100+/- YRS
OVERTOPPING DISCHARGE	= 83.0 CFS
OVERTOPPING ELEVATION	= 360.0 FT

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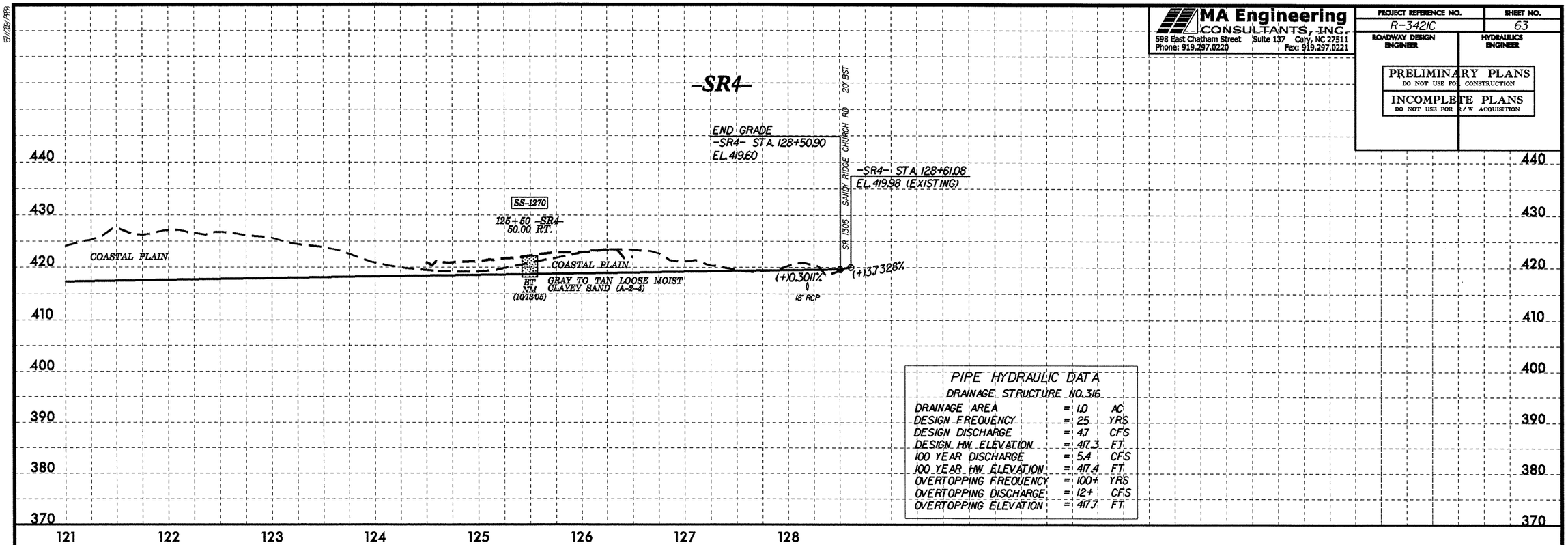
PROJECT REFERENCE NO.	SHEET NO.
R-3421C	63

ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

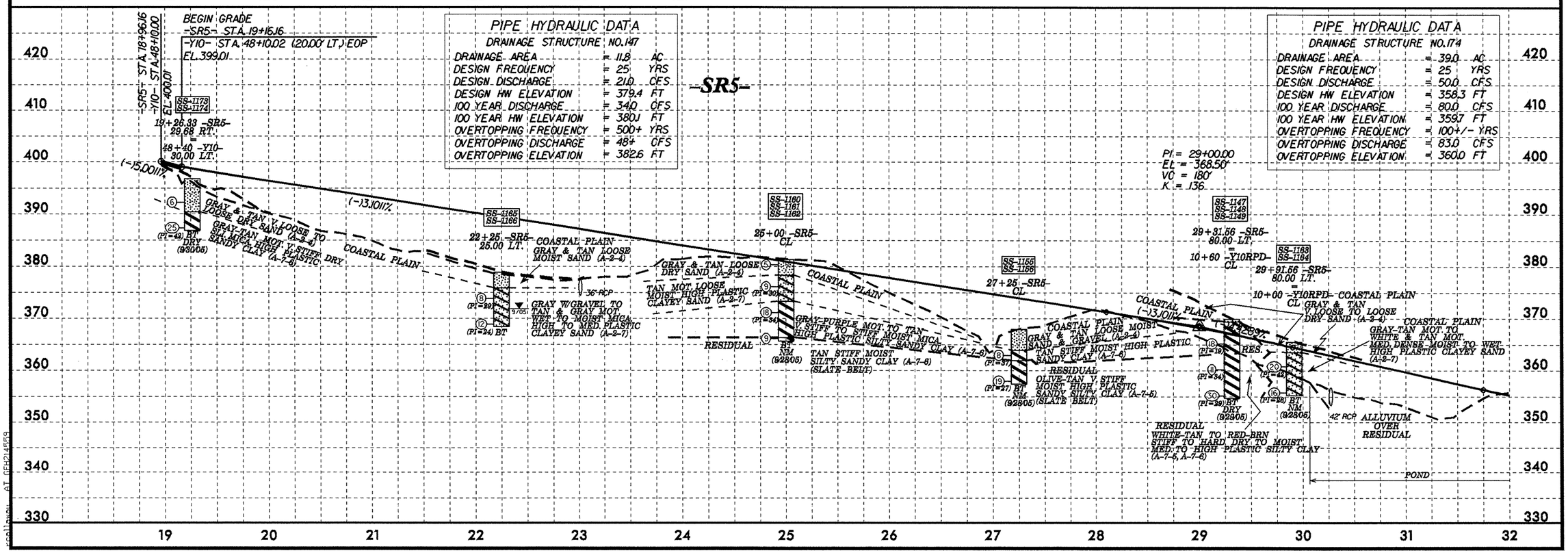
INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

5/28/99



PIPE HYDRAULIC DATA
DRAINAGE STRUCTURE NO. 316

DRAINAGE AREA	= 1.0	AC
DESIGN FREQUENCY	= 25	YRS
DESIGN DISCHARGE	= 4.7	CFS
DESIGN HW ELEVATION	= 417.3	FT.
100 YEAR DISCHARGE	= 5.4	CFS
100 YEAR HW ELEVATION	= 417.4	FT.
OVERTOPPING FREQUENCY	= 100+	YRS
OVERTOPPING DISCHARGE	= 12+	CFS
OVERTOPPING ELEVATION	= 417.7	FT.



PIPE HYDRAULIC DATA
DRAINAGE STRUCTURE NO. 147

DRAINAGE AREA	= 11.8	AC
DESIGN FREQUENCY	= 25	YRS
DESIGN DISCHARGE	= 21.0	CFS
DESIGN HW ELEVATION	= 379.4	FT
100 YEAR DISCHARGE	= 34.0	CFS
100 YEAR HW ELEVATION	= 380.1	FT
OVERTOPPING FREQUENCY	= 500+	YRS
OVERTOPPING DISCHARGE	= 48+	CFS
OVERTOPPING ELEVATION	= 382.6	FT

PIPE HYDRAULIC DATA
DRAINAGE STRUCTURE NO. 174

DRAINAGE AREA	= 39.0	AC
DESIGN FREQUENCY	= 25	YRS
DESIGN DISCHARGE	= 50.0	CFS
DESIGN HW ELEVATION	= 358.3	FT
100 YEAR DISCHARGE	= 80.0	CFS
100 YEAR HW ELEVATION	= 359.7	FT
OVERTOPPING FREQUENCY	= 100+/-	YRS
OVERTOPPING DISCHARGE	= 83.0	CFS
OVERTOPPING ELEVATION	= 360.0	FT

19-JUL-2007 10:44

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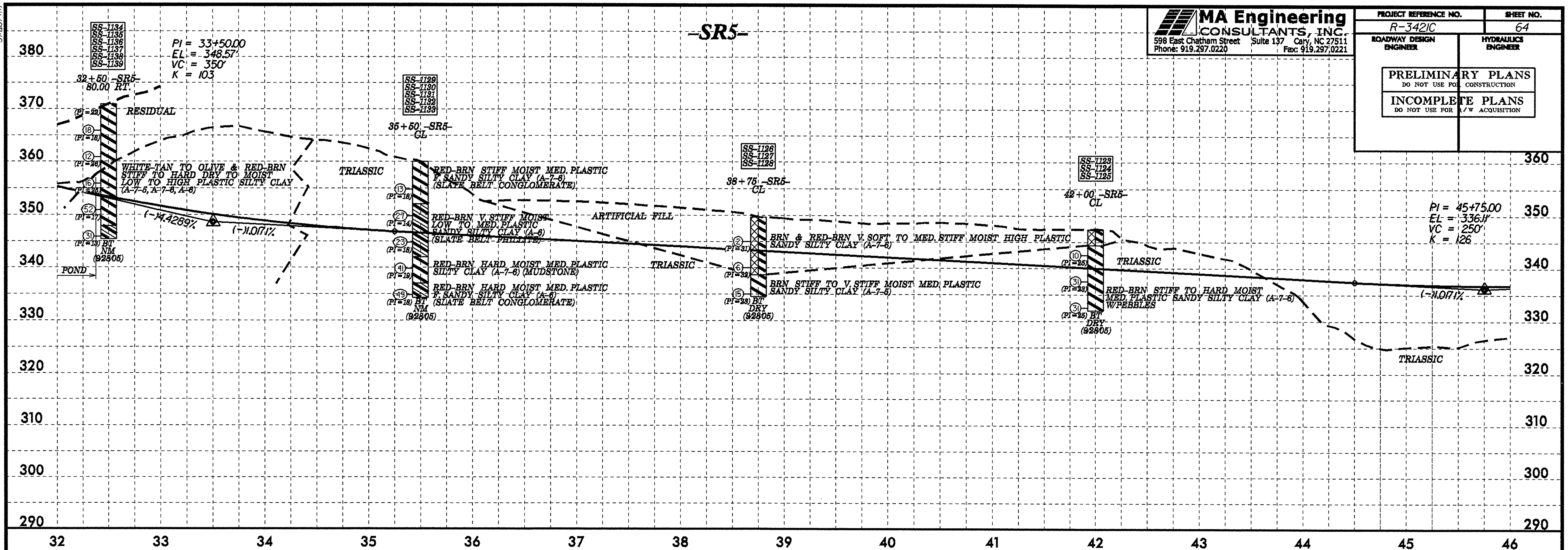
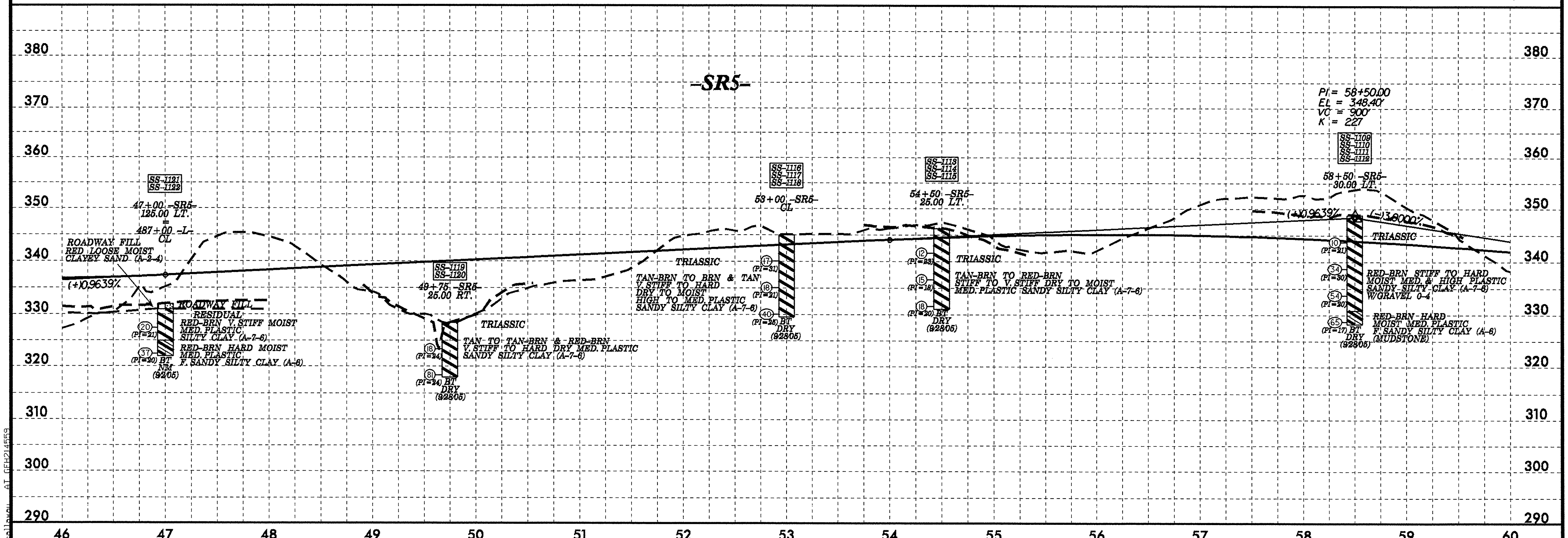
PROJECT REFERENCE NO.	SHEET NO.
R-3421C	64
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION





19-JUL-2007 10:45

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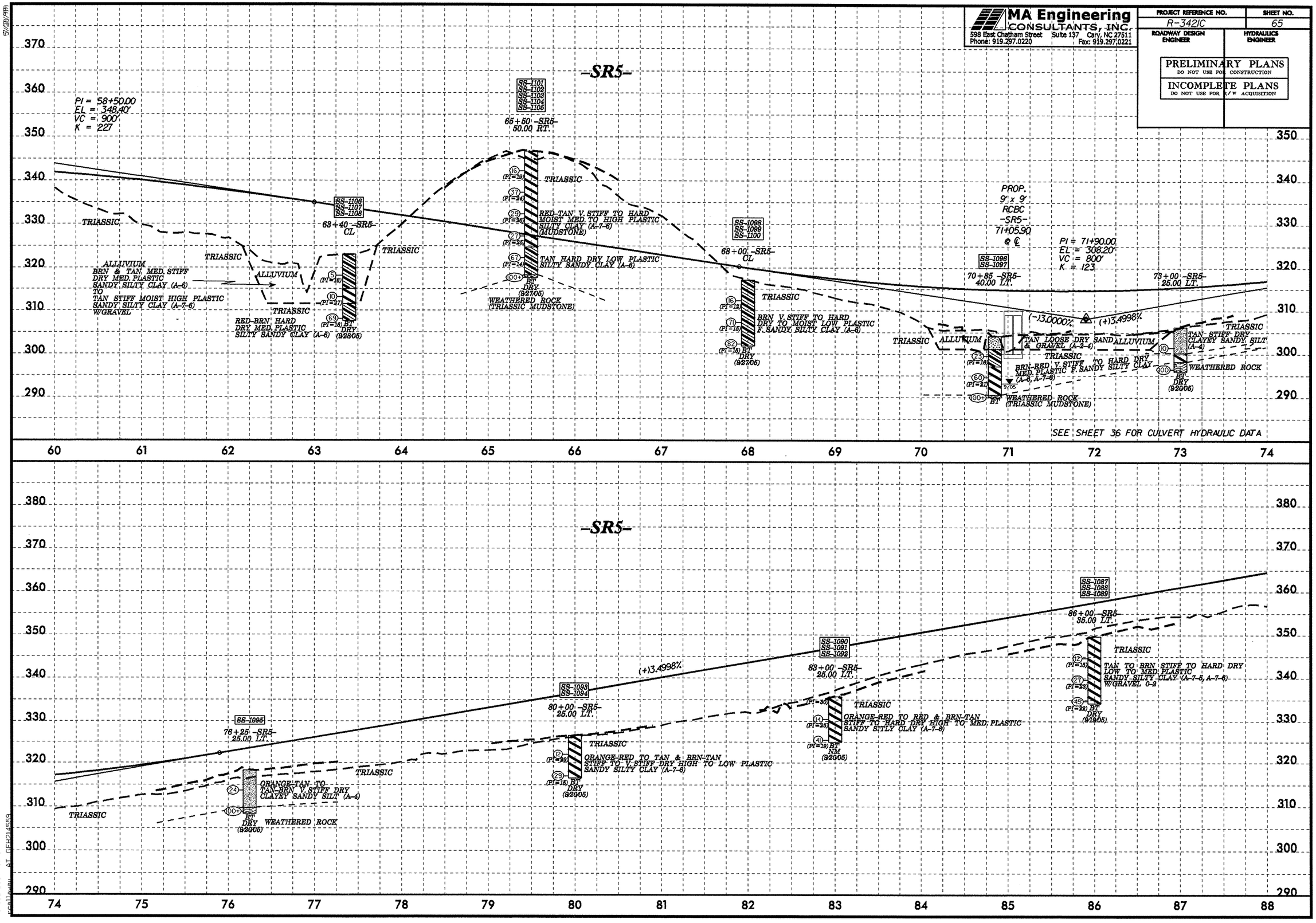
PROJECT REFERENCE NO.	SHEET NO.
R-3421C	65

ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION



19-JUL-2007 10:46
rgallaway AT GEH214559

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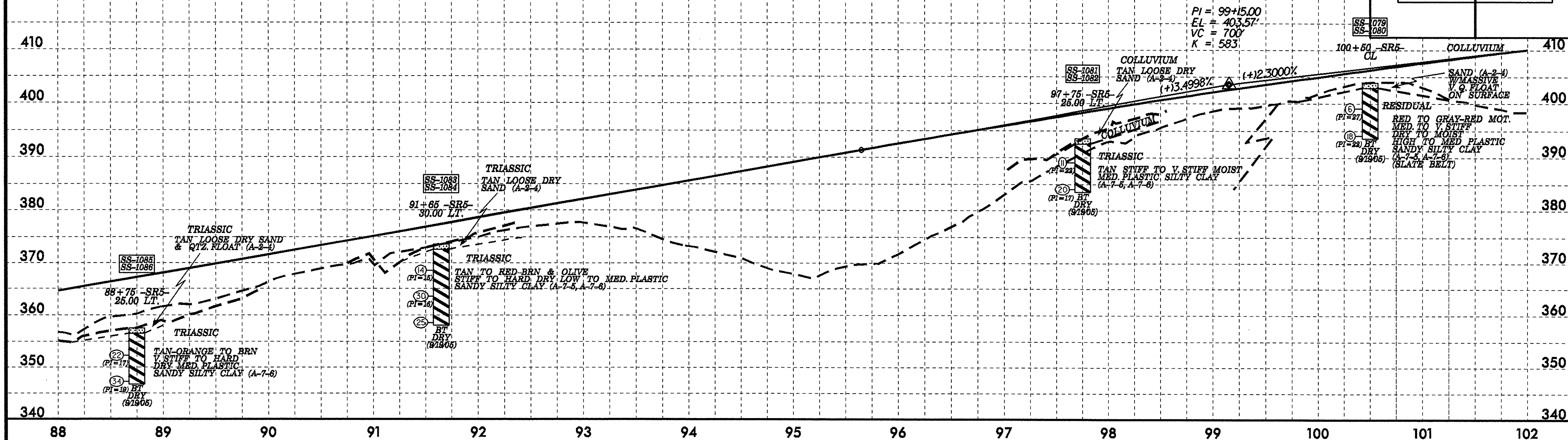
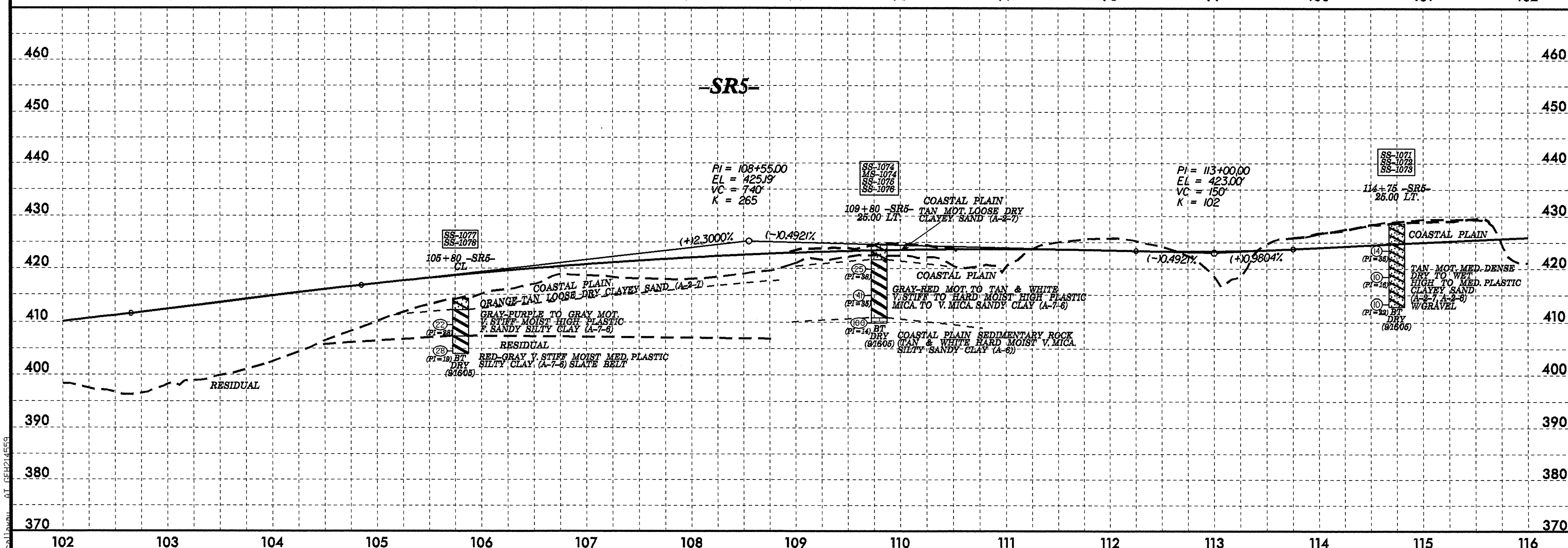
PROJECT REFERENCE NO.	SHEET NO.
R-3421C	66
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION





19-JUL-2007 10:58

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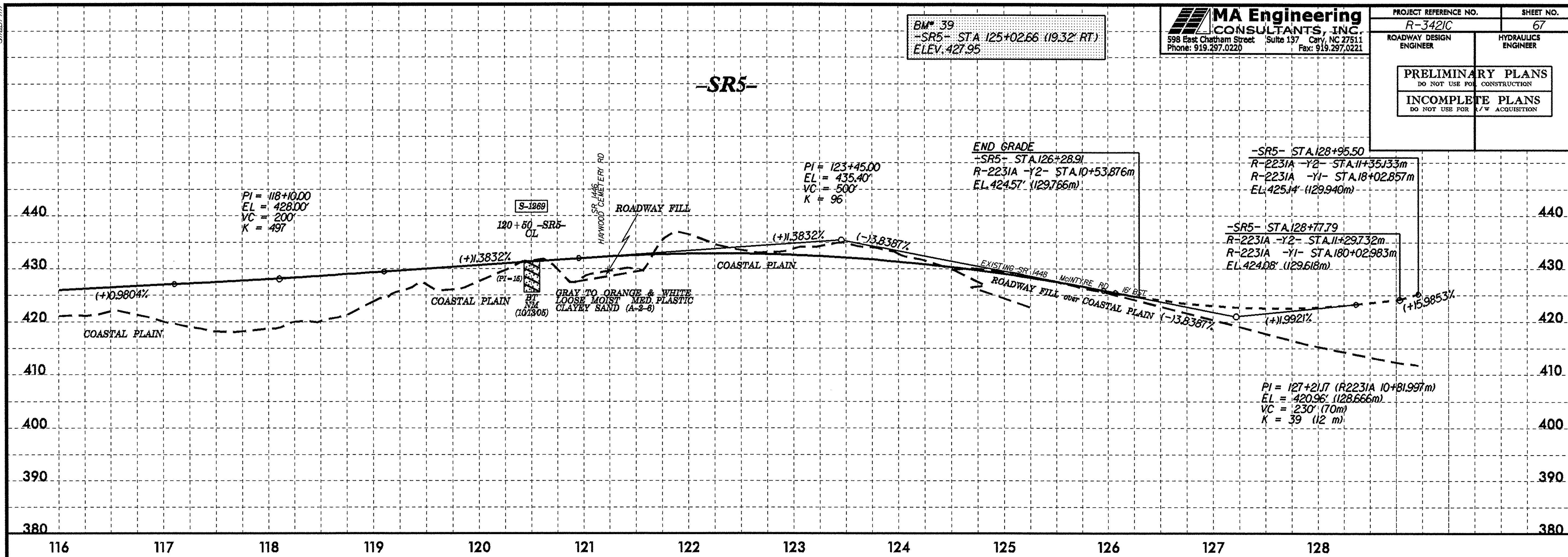
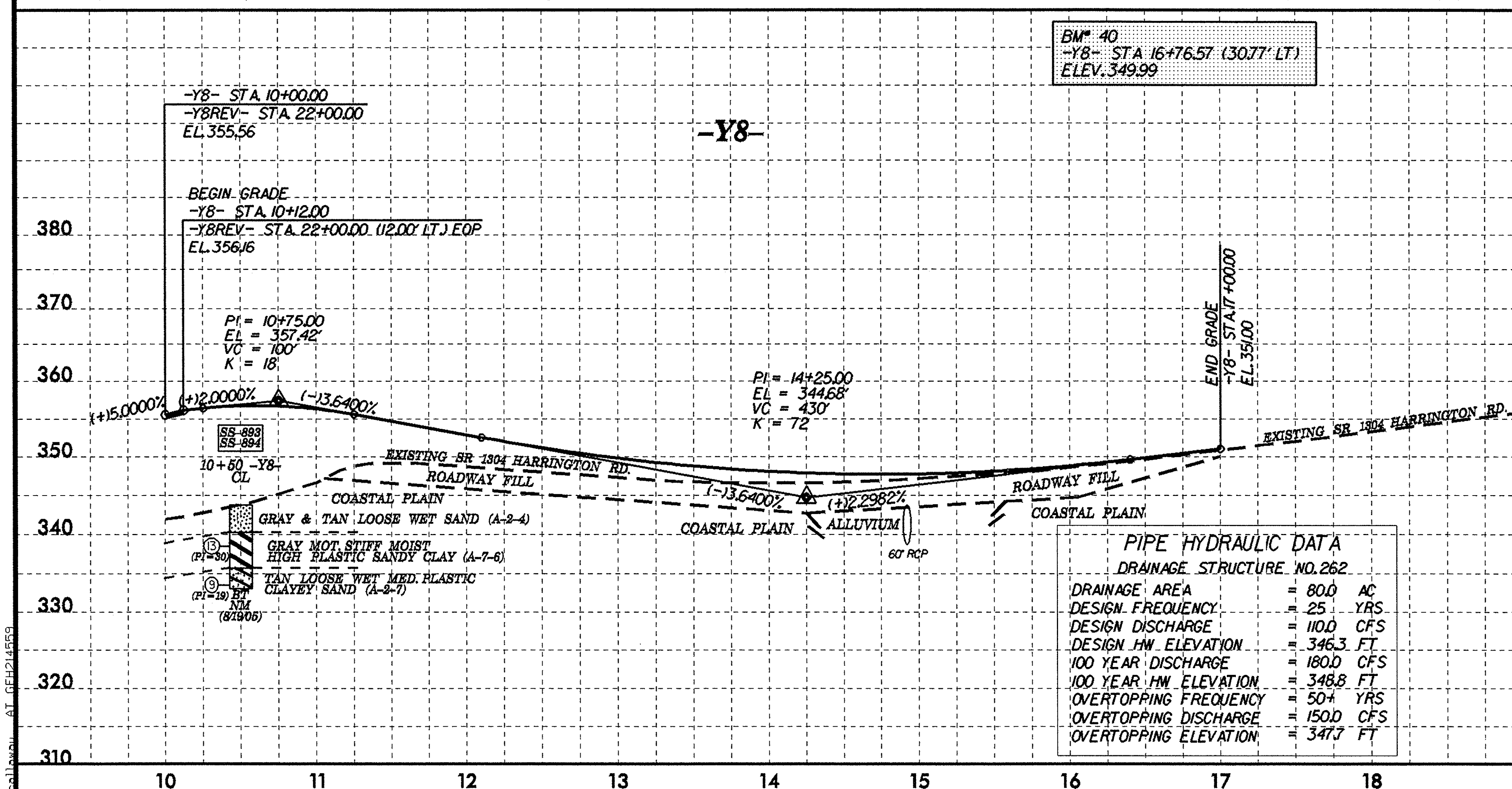
PROJECT REFERENCE NO.	SHEET NO.
R-3421C	67
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

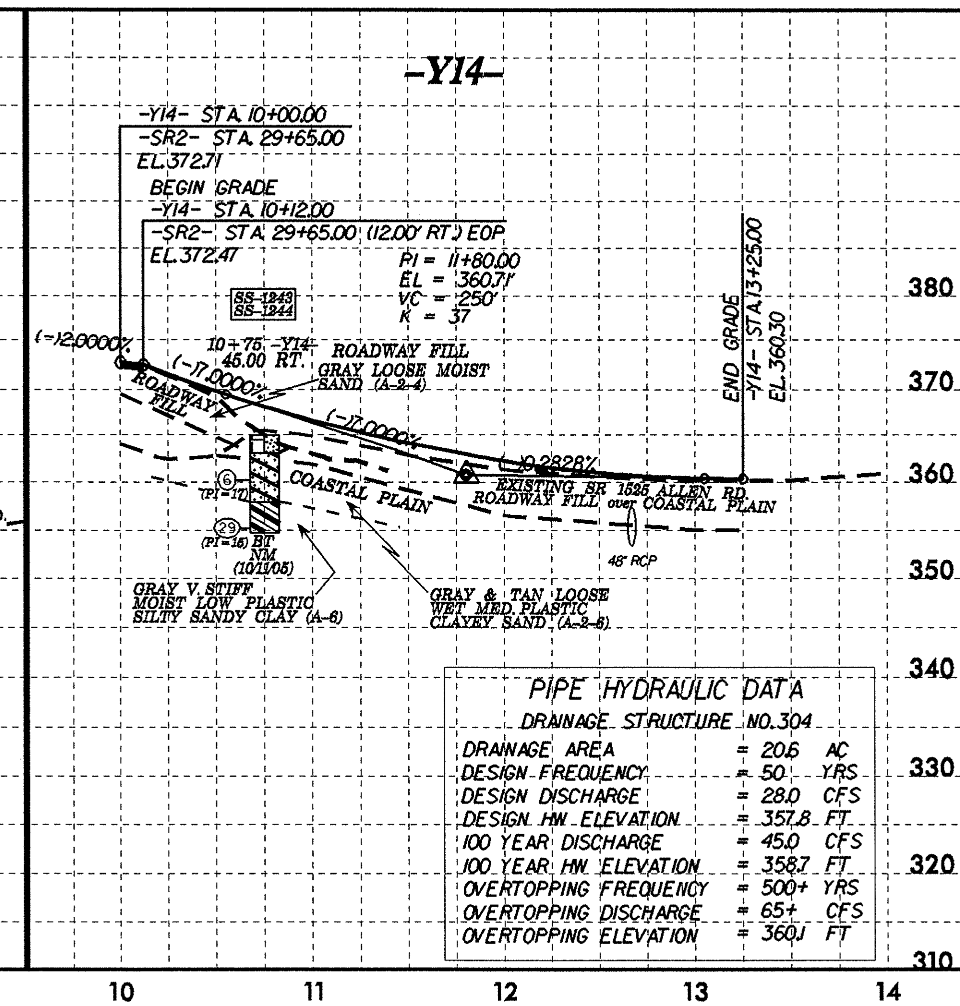
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION


BM# 39
-SR5- STA 125+02.66 (19.32' RT)
ELEV. 427.95
-SR5-
PI = 118+10.00
EL = 428.00'
VC = 200'
K = 497
S-1269
120+50 -SR5- CL
SR 1446 HAYWOOD CEMETERY RD
ROADWAY FILL
PI = 123+45.00
EL = 435.40'
VC = 500'
K = 96
END GRADE
-SR5- STA 126+28.91
R-2231A -Y2- STA 10+53.876m
EL 424.57' (129.766m)
-SR5- STA 128+95.50
R-2231A -Y2- STA 11+35.133m
R-2231A -Y1- STA 18+02.857m
EL 425.14' (129.940m)
-SR5- STA 128+77.79
R-2231A -Y2- STA 11+29.732m
R-2231A -Y1- STA 180+02.983m
EL 424.08' (129.618m)
(+)0.9804%
(+)1.3832%
(+)1.3832%
(-)3.8387%
(-)3.8387%
(+)1.9921%
(+)15.9853%
COASTAL PLAIN
COASTAL PLAIN
COASTAL PLAIN
GRAY TO ORANGE & WHITE LOOSE MOIST MED. PLASTIC CLAYEY SAND (A-2-6)
EXISTING SR 1446 McINTYRE RD
ROADWAY FILL over COASTAL PLAIN
PI = 127+21.17 (R2231A 10+81.997m)
EL = 420.96' (128.666m)
VC = 230' (70m)
K = 39 (12 m)
440
430
420
410
400
390
380
116
117
118
119
120
121
122
123
124
125
126
127
128


BM# 40
-Y8- STA 16+76.57 (30.77' LT)
ELEV. 349.99
-Y8-
-Y8- STA 10+00.00
-Y8REV- STA 22+00.00
EL 355.56
BEGIN GRADE
-Y8- STA 10+12.00
-Y8REV- STA 22+00.00 (12.00' LT) EOP
EL 356.16
PI = 10+75.00
EL = 357.42'
VC = 100'
K = 18
PI = 14+25.00
EL = 344.68'
VC = 430'
K = 72
END GRADE
-Y8- STA 17+00.00
EL 351.00
(+)5.0000%
(+)2.0000%
(-)13.6400%
(-)13.6400%
(+)12.2982%
SS-893
SS-894
10+50 -Y8- CL
EXISTING SR 1304 HARRINGTON RD.
ROADWAY FILL
COASTAL PLAIN
ALLUVIUM
60" RCP
GRAY & TAN LOOSE WET SAND (A-2-4)
GRAY MOT. STIFF MOIST HIGH PLASTIC SANDY CLAY (A-7-6)
TAN LOOSE WET MED. PLASTIC CLAYEY SAND (A-2-7)
380
370
360
350
340
330
320
310
10
11
12
13
14
15
16
17
18

PIPE HYDRAULIC DATA		
DRAINAGE STRUCTURE NO. 262		
DRAINAGE AREA	= 80.0	AC
DESIGN FREQUENCY	= 25	YRS
DESIGN DISCHARGE	= 110.0	CFS
DESIGN HW ELEVATION	= 346.3	FT
100 YEAR DISCHARGE	= 180.0	CFS
100 YEAR HW ELEVATION	= 348.8	FT
OVERTOPPING FREQUENCY	= 50+	YRS
OVERTOPPING DISCHARGE	= 150.0	CFS
OVERTOPPING ELEVATION	= 347.7	FT


-Y14-
-Y14- STA 10+00.00
-SR2- STA 29+65.00
EL 372.71
BEGIN GRADE
-Y14- STA 10+12.00
-SR2- STA 29+65.00 (12.00' RT) EOP
EL 372.47
PI = 11+80.00
EL = 360.71'
VC = 250'
K = 37
SS-1243
SS-1244
10+75 -Y14- 45.00 RT.
ROADWAY FILL
GRAY LOOSE MOIST SAND (A-2-4)
(-)2.0000%
(-)17.0000%
(-)17.0000%
(-)0.2828%
END GRADE
-Y14- STA 13+25.00
EL 360.30
COASTAL PLAIN
EXISTING SR 1525 ALLEN RD.
ROADWAY FILL over COASTAL PLAIN
48" RCP
GRAY V. STIFF MOIST LOW PLASTIC SILTY SANDY CLAY (A-6)
GRAY & TAN LOOSE WET MED. PLASTIC CLAYEY SAND (A-2-6)
10
11
12
13
14

PIPE HYDRAULIC DATA		
DRAINAGE STRUCTURE NO. 304		
DRAINAGE AREA	= 20.6	AC
DESIGN FREQUENCY	= 50	YRS
DESIGN DISCHARGE	= 28.0	CFS
DESIGN HW ELEVATION	= 357.8	FT
100 YEAR DISCHARGE	= 45.0	CFS
100 YEAR HW ELEVATION	= 358.7	FT
OVERTOPPING FREQUENCY	= 500+	YRS
OVERTOPPING DISCHARGE	= 65+	CFS
OVERTOPPING ELEVATION	= 360.1	FT

19-JUL-2007 10:59

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PROJECT REFERENCE NO.	SHEET NO.
R-3421C	68

ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PIPE HYDRAULIC DATA

DRAINAGE STRUCTURE NO. 296

DRAINAGE AREA	= 3.7	AC
DESIGN FREQUENCY	= 25	YRS
DESIGN DISCHARGE	= 10.0	CFS
DESIGN HW ELEVATION	= 413.1	FT
100 YEAR DISCHARGE	= 12.0	CFS
100 YEAR HW ELEVATION	= 413.3	FT
OVERTOPPING FREQUENCY	= 500+	YRS
OVERTOPPING DISCHARGE	= 17+	CFS
OVERTOPPING ELEVATION	= 414.2	FT

-Y15-

END GRADE
-Y15- STA. 12+21.03
-Y8REV- STA. 45+80.53 (12.00' RT.) EOP
EL. 423.20

-Y15- STA. 12+33.21
-Y8REV- STA. 45+81.95
EL. 423.44

BEGIN GRADE
-Y15- STA. 12+45.40
-Y8REV- STA. 45+84.06 (12.00' LT.) EOP
EL. 423.40

BEGIN GRADE
-Y15- STA. 10+25.00
EL. 427.05

PI = 13+00.00
EL = 423.13'
VC = 100'
K = 39

PI = 14+50.00
EL = 418.55'
VC = 150'
K = 120

PI = 16+35.00
EL = 415.22'
VC = 190'
K = 49

END GRADE
-Y15- STA. 17+30.00
EL. 409.80

SS-870
12+86.35 -Y16-
17.78 RT.
=
46+00 -Y8REV-
CL

EXISTING SR 1302 CRESTVIEW RD.
(-)1.9640%
ROADWAY FILL over COASTAL PLAIN
(+)1.9640%
(-)0.3280%
(-)10.4945%
(-)13.0533%
(-)13.05%
EXISTING SR 1302 CRESTVIEW RD.
(-)1.8000%
(-)1.8000%
ROADWAY FILL over COASTAL PLAIN
(-)15.7053%

COASTAL PLAIN
GRAY & TAN V. LOOSE
DRY TO MOIST SAND (A-2-4)

TAN MOT. MED. DENSE MOIST
HIGH PLASTIC CLAYEY SAND (A-2-7)
(PI=38) BT
DRY
(8/17/06)

2' RCP

SS-1262
SS-1263
SS-1264

18+59.95 -Y15-
67.81 RT.
=
52+25 -Y9SBL-
100.00 RT.

24' BST
SBL
US 220
ROADWAY FILL

EXISTING SR 1302 CRESTVIEW RD.
ROADWAY FILL over COASTAL PLAIN

COASTAL PLAIN
ORANGE & WHITE
V. LOOSE MOIST TO SAT.
CLAYEY SAND (A-2-4)

COASTAL PLAIN SEDIMENTARY ROCK
(LT. PURPLE HARD MOIST SANDY CLAY)
TAN & GRAY HARD DRY MED. PLASTIC
SILTY SANDY CLAY (A-7-6)

LT. PURPLE MED. DENSE WET
LOW PLASTIC CLAYEY SAND (A-2-6) (PI=19)
BT
NM
(10/14/05)

-Y16-

-Y16- STA. 10+00.00
-SR2- STA. 51+05.00
EL. 409.79

BEGIN GRADE
-Y16- STA. 10+12.00
-SR2- STA. 51+05.00 (12.00' RT.) EOP
EL. 409.55

END GRADE
-Y16- STA. 12+50.00
EL. 418.00

PI = 10+37.00
EL = 409.93'
VC = 40'
K = 11

PI = 11+50.00
EL = 415.75'
VC = 180'
K = 62

SS-1281
12+50 -Y16-
50.00 LT.

EXISTING SR 1433 NORTH SIDE DR.
(+)5.1504%
(+)12.2500%
ROADWAY FILL
(-)12.0000%
(+)1.5200%
ROADWAY FILL
COASTAL PLAIN

COASTAL PLAIN
GRAY TO ORANGE & TAN
V. LOOSE TO LOOSE DRY
SAND (A-3)
BT
NM
(10/1/05)

-Y18-

-Y18- STA. 10+00.00
-SR5- STA. 119+50.00
EL. 429.94'

BEGIN GRADE
-Y18- STA. 10+12.00
-SR5- STA. 119+50.00 (12.00' RT.) EOP
EL. 429.04'

END GRADE
-Y18- STA. 12+00.00
EL. 415.95

S-1269
10+05 -Y18-
99.83 LT.
=
120+60 -SR5-
CL

PI = 11+10.00
EL = 420.27'
VC = 180'
K = 43

(PI=16)
(-)11.5000%
BT
NM
(10/13/05)

ROADWAY FILL
SR 1446
HAYWOOD CEMETERY RD
(-)4.9400%
(-)14.5000%
EXISTING SR 1446 HAYWOOD CEMETERY RD.
ROADWAY FILL over COASTAL PLAIN

COASTAL PLAIN
GRAY TO ORANGE & WHITE
LOOSE MOIST MED. PLASTIC
CLAYEY SAND (A-2-6)

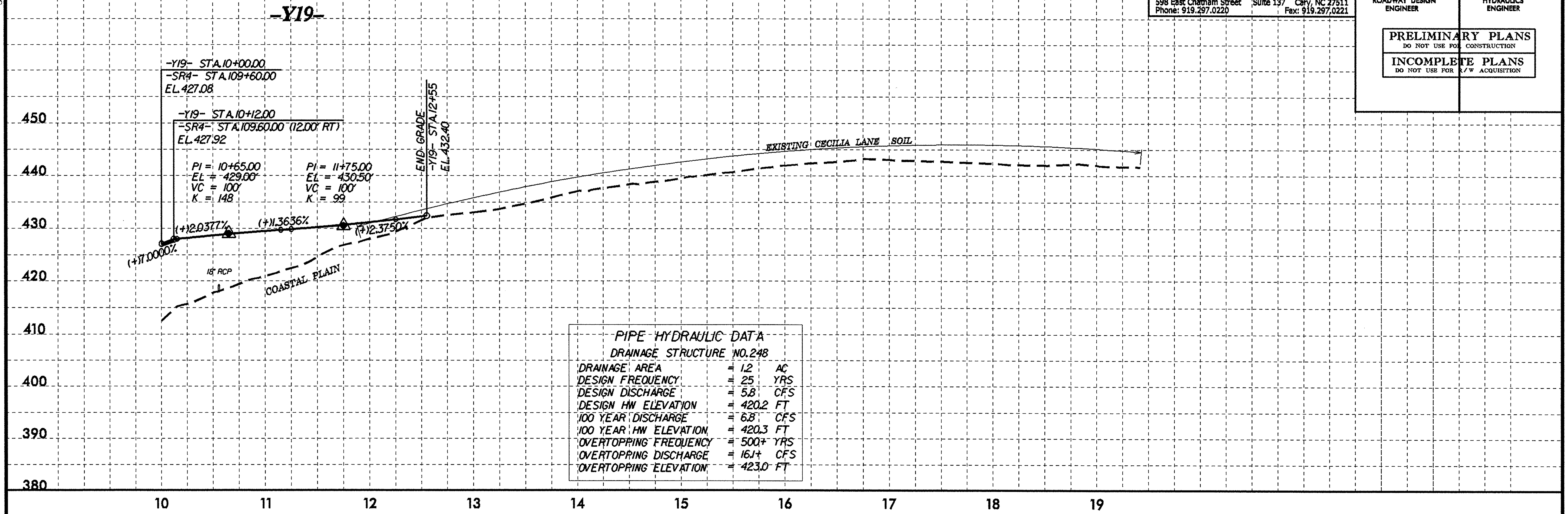
MA Engineering CONSULTANTS, INC.
598 East Chatham Street Suite 137 Cary, NC 27511
Phone: 919.297.0220 Fax: 919.297.0221

PROJECT REFERENCE NO.	SHEET NO.
R-3421C	69
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

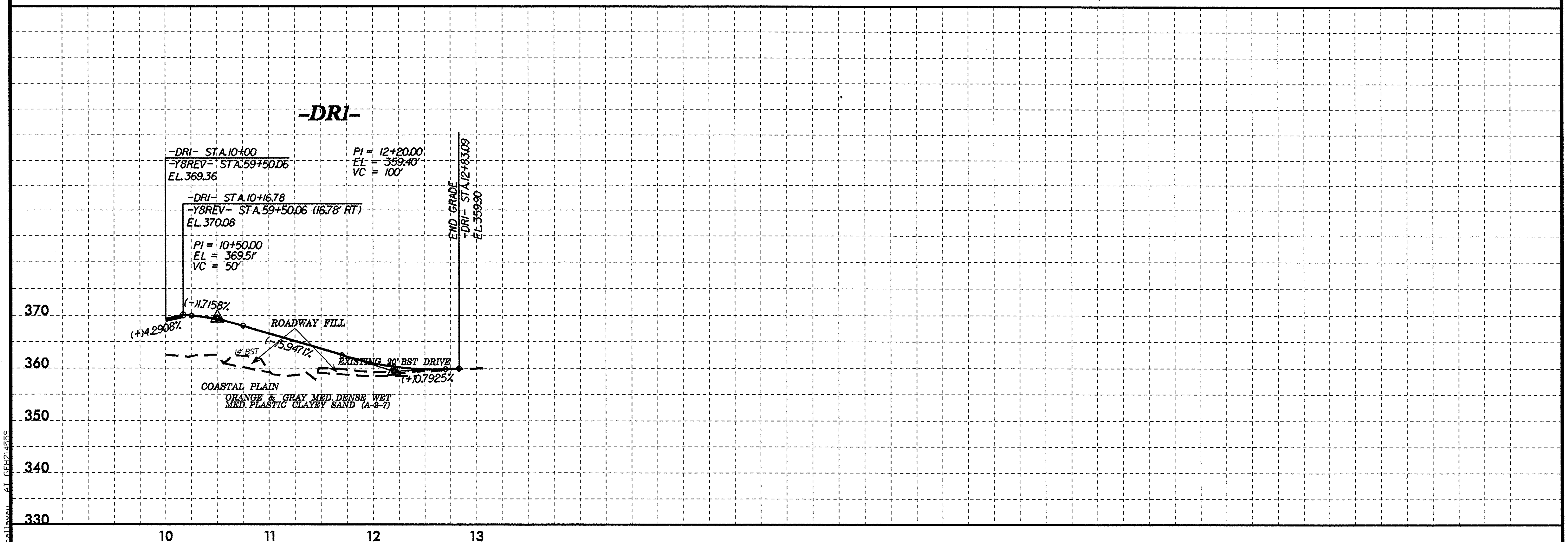
INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

-Y19-



PIPE HYDRAULIC DATA		
DRAINAGE STRUCTURE NO.248		
DRAINAGE AREA	= 1.2	AC
DESIGN FREQUENCY	= 25	YRS
DESIGN DISCHARGE	= 5.8	CFS
DESIGN HW ELEVATION	= 420.2	FT
100 YEAR DISCHARGE	= 6.8	CFS
100 YEAR HW ELEVATION	= 420.3	FT
OVERTOPPING FREQUENCY	= 500+	YRS
OVERTOPPING DISCHARGE	= 16.1+	CFS
OVERTOPPING ELEVATION	= 423.0	FT

-DR1-



19-JUL-2007 11:01

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	Line or Boring ID
MS-189	90 RT	193+00	28.40-29.90				0.0	0.0	0.0	0.0		0	0	16.2	-	
			BY9													
SS-1247	CL	8+00	3.80-5.30	A-2-4(0)	24	4	43.5	38.0	0.3	18.3	99	76	19	-	-	BY9
SS-1248	CL	8+00	8.80-10.30	A-6(9)	34	17	14.0	26.1	21.5	38.4	100	93	66	-	-	BY9
			L													
SS-796	25 RT	356+00	4.40-5.90	A-2-7(3)	44	26	51.9	15.0	4.0	29.1	98	66	33	-	-	L
SS-797	25 RT	356+00	9.40-10.90	A-6(2)	38	19	43.6	20.4	6.9	29.1	96	71	36	-	-	L
SS-813	CL	358+00	1.00-2.50	A-2-4(0)	16	NP	66.0	22.5	2.4	9.1	100	62	13	-	-	L
CBR-1	CL	358+00	3.00-5.00	A-3(0)	17	NP	58.9	33.8	3.3	4.0	96	65	9	-	-	L
SS-814	CL	358+00	3.80-5.30	A-3(0)	18	NP	65.2	28.0	1.8	5.0	92	56	8	-	-	L
SS-815	CL	358+00	8.80-10.30	A-2-7(3)	49	26	56.3	11.9	3.6	28.2	100	63	33	-	-	L
SS-816	100 RT	361+00	9.10-10.60	A-2-6(0)	30	13	49.9	24.3	3.6	22.1	99	73	27	-	-	L
SS-817	100 RT	361+00	14.10-15.60	A-2-7(2)	41	21	48.9	19.3	3.6	28.2	98	68	33	-	-	L
MS-817	100 RT	361+00	14.10-15.60				0.0	0.0	0.0	0.0		0	0	13.9	-	L
SS-818	100 RT	361+00	19.10-20.60	A-2-4(0)	19	NP	60.8	25.8	3.4	10.1	96	57	16	-	-	L
SS-819	100 RT	361+00	24.10-25.60	A-2-7(1)	42	23	68.2	10.9	2.8	18.1	97	48	21	-	-	L
SS-820	100 RT	361+00	29.10-30.00	A-1-b(0)	26	5	75.3	11.3	3.4	10.1	99	43	14	-	-	L
SS-821	100 RT	361+00	34.10-35.60	A-1-b(0)	27	6	73.2	11.9	2.8	12.1	87	37	14	-	-	L
SS-822	100 RT	361+00	39.10-40.60	A-2-7(6)	59	38	52.5	13.1	2.2	32.2	98	63	35	-	-	L
SS-823	100 RT	364+00	3.50-5.00	A-2-6(2)	39	21	52.3	19.9	3.6	24.1	99	64	29	-	-	L
SS-824	100 RT	364+00	8.50-10.00	A-2-4(0)	26	8	49.9	29.4	2.6	18.1	100	74	23	-	-	L
SS-825	100 RT	364+00	18.50-20.00	A-2-7(1)	42	19	68.9	7.3	5.7	18.0	98	44	24	-	-	L
SS-826	100 RT	364+00	23.50-25.00	A-2-6(1)	38	16	54.9	14.0	7.0	24.0	91	53	30	-	-	L
SS-827	100 RT	364+00	28.50-30.00	A-2-6(0)	40	16	71.7	8.5	3.7	16.0	97	39	20	-	-	L
SS-828	100 RT	364+00	38.50-40.00	A-2-6(0)	31	12	69.4	12.2	4.3	14.0	95	41	18	-	-	L
SS-829	100 RT	364+00	43.50-45.00	A-2-6(0)	32	11	73.6	9.0	4.3	13.0	94	39	17	-	-	L
SS-830	100 RT	364+00	53.50-55.00	A-1-b(0)	23	NP	60.9	25.4	4.7	9.0	84	40	13	-	-	L
SS-831	100 RT	366+50	9.00-10.50	A-3(0)	19	NP	64.5	28.3	3.2	4.0	99	65	9	-	-	L
SS-832	100 RT	366+50	14.00-15.50	A-2-7(2)	44	22	60.1	12.0	3.8	24.0	98	53	28	-	-	L
SS-833	100 RT	366+50	19.00-20.50	A-2-6(1)	38	19	49.9	21.1	4.9	24.0	97	78	29	-	-	L
SS-834	100 RT	366+50	29.00-30.50	A-2-6(0)	28	11	61.6	16.6	3.7	18.0	91	53	21	-	-	L
SS-835	100 RT	366+50	39.00-40.50	A-2-4(0)	20	NP	71.2	13.9	4.8	10.0	100	72	15	-	-	L
SS-836	100 RT	366+50	49.00-50.50	A-1-b(0)	25	NP	77.1	10.1	2.8	10.0	97	43	13	-	-	L
SS-837	100 RT	366+50	59.00-60.50	A-1-b(0)	29	6	76.5	8.7	4.8	10.0	92	35	15	-	-	L
SS-838	100 RT	366+50	63.00-64.50	A-1-b(0)	19	NP	67.2	21.1	3.6	8.0	92	46	13	-	-	L
SS-839	100 RT	369+50	9.30-10.80	A-1-b(0)	23	4	69.6	15.1	3.2	12.0	91	44	15	-	-	L
SS-840	100 RT	369+50	19.30-20.80	A-2-4(0)	24	6	62.9	16.3	5.7	15.0	95	55	21	-	-	L
SS-841	100 RT	369+50	29.30-30.80	A-2-4(0)	30	8	71.6	11.0	4.3	13.0	90	35	17	-	-	L
SS-842	100 RT	369+50	39.30-40.80	A-2-4(0)	27	8	79.5	7.3	3.2	10.0	91	25	13	-	-	L
SS-843	100 RT	369+50	49.30-50.80	A-2-7(2)	51	26	65.7	7.8	2.4	24.0	93	45	25	-	-	L
SS-844	140 RT	371+60	4.40-5.90	A-2-6(1)	36	19	58.7	16.6	2.4	22.2	96	61	24			L
SS-845	140 RT	371+60	9.40-10.90	A-2-6(1)	38	21	69.1	10.6	1.1	19.2	97	47	21			L
SS-846	140 RT	371+60	39.40-40.90	A-7-6(3)	41	19	48.0	15.1	8.6	28.3	98	57	40			L
SS-847	25 LT	373+50	4.30-5.80	A-2-4(0)	22	7	61.8	20.6	2.5	15.1	95	53	19			L
SS-848	25 LT	373+50	9.30-10.80	A-2-4(0)	28	8	43.4	30.9	7.6	18.1	98	75	26	-	-	L
SS-849	CL	376+85	3.80-5.30	A-2-4(0)	20	4	62.4	18.0	6.5	13.1	98	56	20	-	-	L
SS-864	25 LT	381+65	4.00-5.50	A-6(8)	35	20	24.0	25.1	16.8	34.1	100	87	55	-	-	L
SS-865	25 LT	381+65	8.20-9.70	A-7-6(10)	52	32	38.1	14.4	8.4	39.2	96	73	47	-	-	L
S-902	CL	382+75	0.00-1.00	A-5(2)	69	NP	28.5	20.7	30.7	20.1	98	81	53	-	17.6	L
S-903	CL	382+75	1.00-2.00	A-2-4(0)	37	NP	50.7	25.1	8.1	16.1	98	67	26	-	5.9	L
S-904	CL	382+75	2.00-3.00	A-2-4(0)	21	NP	64.7	20.3	4.9	10.1	96	52	16	-	2.3	L
SS-885	CL	383+00	8.90-10.40	A-7-6(17)	53	36	25.9	18.2	6.6	49.2	100	86	57	-	-	L
SS-886	CL	384+00	0.50-2.00	A-2-6(1)	38	19	55.9	15.8	2.2	26.1	95	58	28	-	-	L
SS-887	CL	384+00	3.50-5.00	A-2-6(0)	30	12	58.3	16.1	3.5	22.1	95	57	25	-	-	L
SS-888	CL	384+00	6.00-9.00	A-2-6(1)	32	19	47.0	22.5	8.3	22.1	95	66	31	-	-	L
SS-889	CL	384+00	8.50-10.00	A-7-6(24)	55	35	13.1	17.9	10.8	58.3	100	94	72	-	-	L
SS-895	CL	388+00	8.90-10.40	A-2-7(1)	42	22	60.7	12.0	3.2	24.1	96	56	27	-	-	L
SS-896	CL	388+00	13.90-15.40	A-2-6(1)	39	17	62.1	10.6	3.2	24.1	98	60	27	-	-	L
SS-897	CL	388+00	28.90-30.40	A-7-6(9)	44	28	26.1	27.5	8.1	38.2	100	86	49	-	-	L
SS-898	CL	391+00	8.70-10.20	A-2-7(2)	47	25	68.7	7.1	3.0	21.1	100	57	25	-	-	L
SS-899	CL	391+00	18.70-20.20	A-2-7(1)	45	18	56.3	13.5	6.1	24.1	93	45	30	-	-	L
SS-900	CL	391+00	28.70-30.20	A-2-7(1)	45	24	59.9	12.3	5.7	22.1	84	42	25	-	-	L
SS-901	CL	391+00	33.70-35.20	A-1-b(0)	25	3	74.5	11.4	4.1	10.1	97	44	15	-	-	L
SS-908	CL	397+00	9.00-10.50	A-6(2)	36	17	27.9	32.1	7.7	32.3	89	71	38	-	-	L
SS-905	CL	397+75	3.50-5.00	A-2-6(0)	26	11	67.6	14.4	2.8	15.3	97	49	18	-	-	L
SS-906	CL	397+75	8.50-10.00	A-1-b(0)	19	NP	88.0	8.6	1.4	2.0	96	27	4	-	-	L
SS-907	CL	397+75	13.50-15.00	A-7-6(21)	47	28	15.6	11.7	20.2	52.5	100	89	76	-	-	L
SS-910	CL	401+00	3.80-5.30	A-2-6(0)	28	11	66.2	12.6	1.0	20.2	98	58	22	-	-	L
SS-911	CL	401+00	8.80-10.30	A-2-6(0)	32	16	67.9	10.5	1.4	20.2	100	69	23	-	-	L
SS-916	CL	409+00	4.00-5.50	A-2-4(0)	26	9	59.8	19.1	2.9	18.2	93	56	21	-	-	L
SS-917	CL	409+00	9.00-10.50	A-2-4(0)	29	10	78.6	8.6	2.7	10.1	95	33	13	-	-	L
SS-918	CL	409+00	14.00-15.50	A-6(1)	36	15	39.2	28.7	9.9	22.2	99	68	36	-	-	L
SS-919	CL	409+00	19.00-20.50	A-1-b(0)	23	NP	74.2	13.8	1.8	10.1	97	43	13	-	-	L
SS-920	CL	412+00	3.00-4.50	A-2-7(3)	51	28	56.8	10.4	4.5	28.3	90	51	31	-	-	L

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	Line or Boring ID
SS-921	CL	412+00	9.00-14.00	A-2-7(1)	49	25	69.7	7.7	1.4	21.2	93	42	22	-	-	L
SS-922	CL	412+00	14.00-15.50	A-2-6(1)	39	17	47.4	22.4	8.0	22.2	98	66	32	-	-	L
S-1274	100 LT	432+00	0.00-1.00	NOT ENOUGH MATERIAL TO TEST											18.4	L
SS-1203	5 LT	435+00	4.00-5.50	A-2-4(0)	26	7	55.6	20.0	4.3	20.1	97	63	25	-	-	L
MS-1204	5 LT	435+00	9.00-10.50				0.0	0.0	0.0	0.0		0	0	21.3	-	L
SS-1204	5 LT	435+00	9.00-10.50	A-2-6(1)	40	17	60.3	11.3	4.2	24.1	92	51	27	-	-	L
SS-1205	5 LT	435+00	14.00-15.50	A-2-4(0)	23	5	57.7	22.5	6.7	13.1	92	55	21	-	-	L
SS-1206	5 LT	435+00	19.00-20.50	A-6(6)	38	21	37.8	19.9	10.2	32.1	98	70	46	-	-	L
SS-949	110 LT	439+00	0.00-1.50	A-2-4(0)	21	NP	65.7	18.0	6.3	10.1	96	53	17	-	-	L
SS-950	110 LT	439+00	4.00-5.50	A-2-4(0)	18	3	62.1	20.2	4.5	13.1	98	59	19	-	-	L
SS-951	110 LT	439+00	9.00-10.50	A-2-6(2)	38	20	45.3	24.9	5.6	24.2	95	68	31	-	-	L
SS-952	110 LT	442+50	9.00-10.50	A-2-7(1)	48	21	61.9	12.2	5.7	20.2	95	45	26	-	-	L
SS-953	110 LT	442+50	19.00-20.50	A-2-7(1)	52	33	72.7	6.9	1.2	19.2	90	38	19	-	-	L
SS-954	125 LT	445+50	3.90-5.40	A-7-6(3)	47	24	49.7	15.2	6.9	28.3	94	59	36	-	-	L
SS-955	125 LT	445+50	8.90-10.40	A-2-7(2)	47	25	55.6	11.7	5.5	27.3	91	47	31	-	-	L
SS-956	125 LT	445+50	18.90-20.40	A-2-4(0)	25	NP	57.6	24.7	5.6	12.1	98	75	21	-	-	L
SS-957	125 LT	445+50	28.90-30.40	A-1-b(0)	27	6	77.2	9.3	4.4	9.1	95	37	14	-	-	L
SS-1192	CL	446+00	3.90-5.40	A-2-6(0)	30	14	59.0	17.2	5.5	18.3	93	54	25	-	-	L
SS-1193	CL	446+00	8.90-10.40	A-2-6(0)	33	13	52.4	19.9	6.4	21.3	91	56	27	-	-	L
SS-1194	CL	446+00	13.90-15.40	A-2-4(0)	28	8	63.6	16.0	5.2	15.2	96	55	21	-	-	L
SS-958	125 LT	447+50	4.10-5.60	A-2-7(4)	59	34	58.4	7.6	2.7	31.3	95	51	33	-	-	L
SS-959	125 LT	447+50	9.10-10.60	A-2-4(0)	26	8	61.4	16.0	7.5	15.2	90	45	22	-	-	L
SS-961	125 LT	447+50	29.10-31.40	A-2-4(0)	25	NP	71.4	14.0	4.4	10.1	100	65	17	-	-	L
SS-962	125 LT	447+50	39.10-41.40	A-2-6(0)	39	16	59.0	14.6	7.2	19.2	78	39	22	-	-	L
SS-962A	130 LT	449+40	8.90-10.40	A-6(2)	40	17	42.1	19.6	6.0	32.3	99	83	39	-	-	L
SS-963	100 LT	452+00	9.20-10.70	A-2-6(2)	35	18	48.5	17.2	9.1	25.3	95	61	35	-	-	L
SS-965	190 LT	464+25	4.10-5.60	A-2-6(1)	37	18	38.8	26.7	11.3	23.2	89	68	33	-	-	L
SS-966	190 LT	464+25	4.10-5.60	A-7-5(32)	66	26	2.4	8.3	52.9	36.4	100	99	93	-	-	L
SS-967	190 LT	464+25	14.10-15.60	A-7-5(13)	50	16	10.1	21.0	38.6	30.3	100	94	73	-	-	L
SS-1140	150 RT	467+75	4.30-5.80	A-7-5(42)	81	51	13.8	9.3	13.0	63.9	98	90	77	-	-	L
SS-1141	150 RT	467+75	9.30-10.80	A-7-5(23)	56	26	13.0	5.2	20.0	61.9	98	88	81	-	-	L
SS-968	90 LT	469+00	4.00-5.50	A-7-5(8)	50	14	27.7	18.4	33.7	20.2	99	79	60	-	-	L
SS-969	90 LT	469+00	9.00-10.50	A-7-6(15)	44	16	8.1	18.2	33.3	40.4	100	95	84	-	-	L
SS-970	90 LT	469+00	14.00-15.50	A-6(2)	37	15	30.4	22.7	18.5	28.4	75	56	38	-	-	L
SS-971	90 LT	469+00	19.00-20.50	A-4(1)	36	10	40.6	21.7	19.5	18.3	91	62	39	-	-	L
SS-972	115 LT	472+00	4.40-5.90	A-6(4)	38	16	32.5	15.2	19.9	32.5	86	70	46	-	-	L
SS-973	115 LT	472+00	9.40-10.90	A-4(4)	34	8	21.3	14.0	34.3	30.4	85	71	62	-	-	L
SS-1010	110 LT	477+50	4.20-5.70	A-7-6(12)	45	18	17.7	8.3	33.4	40.6	89	76	68	-	-	L
SS-1011	120 LT	481+00	4.00-5.50	A-7-6(13)	56	28	15.0	12.4	21.8	50.8	73	64	55	-	-	L
SS-1012	120 LT	481+00	9.00-10.50	A-7-6(11)	41	18	11.8	17.9	31.8	38.6	89	82	67	-	-	L
SS-1013	125 LT	482+50	3.80-5.30	A-7-6(19)	47	24	8.1	14.8	32.4	44.7	98	93	79	-	-	L
SS-1014	125 LT	482+50	8.80-10.30	A-6(3)	39	14	25.2	18.9	29.5	26.4	73	59	44	-	-	L
SS-1015	125 LT	482+50	13.80-15.30	A-7-6(25)	46	24	2.8	4.5	35.8	56.9	100	98	94	-	-	L
SS-1016	125 LT	485+00	3.80-5.30	A-7-6(17)	52	25	9.7	13.2	32.4	44.7	86	80	70	-	-	L
SS-1121	CL	487+00	3.50-5.00	A-7-6(19)	45	21	4.9	6.5	43.6	44.9	95	91	86	-	-	L
SS-1122	CL	487+00	8.50-10.00	A-6(14)	40	20	11.0	17.6	36.7	34.7	98	92	74	-	-	L
			NBL1													
SS-914	40 RT	405+00	4.50-6.00	A-2-7(2)	47	23	63.6	7.9	2.2	26.3	93	42	27	-	-	NBL1
SS-915	40 RT	405+00	9.50-11.00	A-7-6(5)	50	31	49.9	14.9	6.9	28.3	96	63	36	-	-	NBL1
			SR2													
SS-1251	50 LT	11+50	4.20-5.70	A-7-6(6)	46	24	43.0	15.3	5.4	36.4	100	79	43	-	-	SR2
SS-1252	50 LT	11+50	9.20-10.70	A-7-6(5)	43	24	36.4	24.2	7.1	32.4	100	82	42	-	-	SR2
SS-1255	CL	15+00	4.20-5.70	A-2-6(0)	29	13	52.4	18.8	5.6	23.3	98	65	30	-	-	SR2
SS-1256	CL	18+50	0.00-1.50	A-6(5)	38	20	34.9	21.9	9.8	33.4	99	77	46	-	-	SR2
SS-1257	CL	18+50	4.30-5.80	A-7-6(8)	43	25	33.6	22.4	9.6	34.4	100	78	48	-	-	SR2
SS-1258	CL	18+50	9.30-10.80	A-2-6(0)	31	12	50.2	24.0	5.7	20.2	100	64	27	-	-	SR2
SS-1245	CL	25+50	3.80-5.30	A-2-4(0)	21	6	60.7	18.5	6.7	14.2	94	51	22	-	-	SR2
SS-1246	CL	25+50	8.80-10.30	A-6(3)	34	17	39.1	23.4	10.2	27.3	100	75	42	-	-	SR2
SS-1241	CL	33+75	3.70-5.20	A-2-4(0)	24	9	69.9	13.4	1.5	15.2	93	42	17	-	-	SR2
SS-1242	CL	33+75	8.70-10.20	A-2-4(0)	21	7	65.9	16.2	4.8	13.1	94	46	20	-	-	SR2
SS-191	40 RT	35+50	3.90-5.40	A-2-4(0)	19	NP	69.6	20.8	0.5	9.1	98	52	11	-	-	SR2
SS-192	40 RT	35+50	8.90-10.40	A-2-6(1)	38	17	56.9	13.9	1.0	28.2	84	48	26	-	-	SR2
SS-193	40 RT	35+50	13.90-15.40	A-2-6(1)	37	16	64.4	8.2	1.2	26.2	97	50	29	-	-	SR2
SS-194	40 RT	35+50	23.90-25.40	A-2-7(3)	51	30	47.8	21.3	0.7	30.2	96	59	30	-	-	SR2
SS-195	40 RT	35+50	23.90-25.40	A-2-7(2)	54	31	68.4	7.3	1.1	23.1	95	44	24	-	-	SR2
SS-196	40 RT	35+50	28.90-30.40	A-6(8)	33	17	1.0	53.3	13.5	32.2	100	99	61	-	-	SR2
SS-1239	CL	38+00	4.20-5.70	A-1-b(0)	16	NP	75.3	17.6	2.0	5.1	94	44	8	-	-	SR2
SS-1240	CL	38+00	9.20-10.70	A-7-6(5)	47	25	45.2	13.4	2.9	38.4	96	71	40	-	-	SR2
SS-1237	CL	40+00	4.50-6.00	A-1-b(0)	18	NP	80.2	13.1	0.6	6.1	82	26	7	-	-	SR2
SS-1238	CL	40+00	9.50-10.00	A-2-6(1)	36	17	58.4	12.1	2.1	27.3	93	61	29	-	-	SR2
SS-1236	CL	43+00	4.10-5.60	A-2-4(0)	28	9	60.9	16.3	3.6	19.2	85	47	21	-	-	SR2
CBR-2	CL	47+50	8.00-10.00	A-2-6(1)	38	20	59.3	13.1	5.5	22.1	92	47	27	-	-	SR2
SS-1232	CL	47+50	8.80-10.30	A-2-7(2)	50	25	61.0	8.3	3.4	27.3	81	49	26	-	-	SR2
SS-1233	CL	47+50	13.80-15.30	A-2-7(1)	42	19	62.8	9.1	4.9	23.3	79	34	23	-	-	SR2

SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC	Line or Boring ID
							C.SAND	F.SAND	SILT	CLAY	10	40	200			
SS-1234	CL	47+50	18.80-20.30	A-2-6(0)	33	16	71.2	10.3	2.3	16.2	90	35	18	-	-	SR2
SS-1235	CL	47+50	23.80-25.30	A-2-6(1)	36	18	54.5	18.5	2.7	24.3	99	63	29	-	-	SR2
SS-1229	CL	54+50	8.90-10.40	A-2-6(0)	33	12	60.7	15.4	2.7	21.2	93	50	23	-	-	SR2
SS-1227	CL	57+25	4.30-5.80	A-2-4(0)	24	8	64.9	15.2	3.7	16.2	94	53	20	-	-	SR2
SS-1228	CL	57+25	9.30-10.50	A-7-6(3)	42	20	40.3	21.8	6.5	31.3	99	80	39	-	-	SR2
SS-1226	CL	60+50	9.30-10.80	A-2-7(2)	43	21	55.9	13.4	2.3	28.3	99	64	31	-	-	SR2
SS-1224	CL	63+75	4.40-5.90	A-1-b(0)	17	NP	74.7	17.0	2.2	6.1	98	49	10	-	-	SR2
SS-1225	CL	63+75	9.40-10.90	A-7-6(11)	43	16	13.1	25.3	21.1	40.4	100	93	71	-	-	SR2
SS-1220	45 LT	70+30	4.00-5.50	A-3(0)	18	NP	68.1	23.8	3.1	5.0	100	58	10	-	-	SR2
SS-1221	45 LT	70+30	9.00-10.50	A-3(0)	17	NP	64.5	28.1	3.4	4.0	100	65	10	-	-	SR2
SS-1215	CL	73+50	9.30-10.80	A-2-4(0)	24	8	50.8	24.8	3.3	21.1	94	65	25	-	-	SR2
SS-1216	CL	73+50	14.30-15.80	A-2-7(3)	53	27	57.0	10.3	2.5	30.1	97	53	33	-	-	SR2
SS-1217	CL	73+50	19.30-20.80	A-2-6(1)	37	16	60.2	14.7	5.0	20.1	99	65	26	-	-	SR2
SS-1218	CL	73+50	24.30-25.80	A-2-7(1)	41	19	70.6	7.5	3.8	18.1	94	37	22	-	-	SR2
SS-1219	CL	73+50	29.30-30.80	A-2-6(0)	34	13	61.7	12.7	5.5	20.1	96	57	26	-	-	SR2
SS-1212	25 RT	80+50	3.80-5.30	A-2-4(0)	19	1	73.6	20.1	2.3	4.0	96	51	8	-	-	SR2
SS-1214	25 RT	80+50	13.80-15.30	A-2-4(0)	24	4	73.1	10.6	3.2	13.1	97	51	17	-	-	SR2
SS-1209	CL	83+50	3.60-5.10	A-2-7(2)	46	22	56.6	9.8	3.4	30.1	92	53	32	-	-	SR2
SS-1210	CL	83+50	8.60-10.10	A-2-6(1)	39	18	59.3	11.4	2.1	27.1	97	54	29	-	-	SR2
SS-1211	CL	83+50	13.60-15.10	A-2-4(0)	31	10	49.1	23.2	3.6	24.1	98	75	28	-	-	SR2
SS-1207	CL	87+25	4.00-5.50	A-7-6(5)	51	25	49.2	10.5	5.1	35.1	96	61	40	-	-	SR2
SS-1208	CL	87+25	9.00-10.50	A-2-6(1)	39	18	62.6	12.2	4.1	21.1	89	48	24	-	-	SR2
S-1201	25 LT	89+00	1.50-2.00	A-7-5(6)	62	14	31.1	20.7	30.1	18.1	96	77	49	-	-	SR2
S-1202	25 LT	89+00	2.00-3.00	A-2-5(0)	42	NP	59.3	19.8	13.9	7.0	95	55	22	-	-	SR2
SS-1198	25 LT	91+00	4.20-5.70	A-1-b(0)	14	NP	74.0	18.8	1.2	6.0	96	50	8	-	-	SR2
SS-1199	25 LT	91+00	9.20-10.70	A-2-4(0)	20	7	59.3	20.7	4.9	15.1	95	59	21	-	-	SR2
SS-1200	25 LT	91+00	14.20-15.70	A-2-6(1)	39	21	60.5	11.9	2.4	25.1	96	55	27	-	-	SR2
SS-1195	25 LT	93+75	9.10-10.60	A-2-7(3)	50	28	56.6	13.6	3.4	26.4	91	52	29	-	-	SR2
SS-1196	25 LT	93+75	14.10-15.60	A-2-7(1)	44	20	62.0	10.1	1.5	26.4	96	55	27	-	-	SR2
SS-1197	25 LT	93+75	19.10-20.50	A-2-7(3)	45	28	49.2	17.7	5.7	27.4	91	58	32	-	-	SR2
SS-1190	CL	102+00	4.00-5.50	A-2-7(2)	50	25	65.1	9.9	2.6	22.3	97	48	25	-	-	SR2
SS-1191	CL	102+00	9.00-10.50	A-2-7(0)	43	15	65.9	13.5	3.3	17.2	94	38	21	-	-	SR2
S-1188	25 LT	104+25	2.00-4.70	A-2-5(0)	45	NP	60.2	17.0	12.6	10.1	93	54	23	-	-	SR2
SS-1189	25 LT	104+25	4.70-6.20	A-1-b(0)	36	NP	65.1	20.9	3.9	10.1	85	46	14	-	-	SR2
SS-1186	50 RT	108+50	3.90-5.40	A-2-4(0)	14	NP	67.1	24.0	3.8	5.1	96	56	11	-	-	SR2
SS-1187	50 RT	108+50	8.90-10.40	A-2-7(3)	51	27	53.0	15.5	3.0	28.4	96	62	31	-	-	SR2
SS-1184	CL	112+40	4.20-5.70	A-2-6(0)	34	11	69.2	9.2	3.3	18.3	98	53	23	-	-	SR2
SS-1185	CL	112+40	9.20-10.70	A-2-4(0)	30	8	69.3	13.8	3.8	13.2	94	43	17	-	-	SR2
SS-1182	CL	116+25	4.00-5.50	A-3(0)	17	NP	67.4	25.6	2.9	4.0	93	52	8	-	-	SR2
SS-1183	CL	116+25	9.00-10.50	A-2-7(2)	42	21	49.1	18.3	4.3	28.2	96	64	33	-	-	SR2
SS-1181	CL	119+00	9.00-10.50	A-2-6(1)	40	19	60.0	13.0	2.8	24.2	98	65	28	-	-	SR2
			SR4													
SS-1006	CL	10+00	4.20-5.70	A-7-6(16)	62	33	39.4	5.5	6.4	48.7	100	67	57	-	-	SR4
SS-1007	CL	10+00	9.20-10.70	A-2-6(1)	34	15	61.5	15.5	2.6	20.3	100	64	25	-	-	SR4
SS-1003	CL	15+00	4.10-5.60	A-2-7(3)	53	28	58.0	8.4	4.2	29.4	95	54	33	-	-	SR4
SS-1004	CL	15+00	9.10-10.60	A-7-6(11)	66	43	45.3	11.5	3.7	39.6	96	66	42	-	-	SR4
SS-1005	CL	15+00	14.10-15.60	A-2-7(4)	57	33	56.0	11.1	2.4	30.5	92	56	31	-	-	SR4
SS-999	CL	20+50	4.20-5.70	A-7-5(25)	75	44	33.1	7.7	8.5	50.7	100	75	60	-	-	SR4
MS-1000	CL	20+50	9.20-10.70				0.0	0.0	0.0	0.0		0	0	13.0	-	SR4
SS-1000	CL	20+50	9.20-10.70	A-7-6(6)	56	35	43.6	19.9	4.1	32.5	98	71	36	-	-	SR4
SS-1001	CL	20+50	14.20-15.70	A-2-6(1)	38	19	58.2	13.5	4.0	24.3	95	63	29	-	-	SR4
SS-1002	CL	20+50	19.20-20.70	A-6(13)	37	21	8.9	28.4	22.1	40.6	100	95	72	-	-	SR4
SS-982	25 LT	23+75	1.00-2.50	A-2-4(0)	14	NP	50.2	30.2	11.5	8.1	97	66	22	-	-	SR4
SS-983	25 LT	23+75	4.00-5.50	A-7-6(9)	42	26	30.4	21.1	14.0	34.5	98	79	50	-	-	SR4
SS-984	25 LT	23+75	9.00-10.50	A-7-6(8)	51	33	34.3	22.9	4.3	38.5	98	83	43	-	-	SR4
MS-985	25 LT	23+75	14.00-15.50				0.0	0.0	0.0	0.0		0	0	42.9	-	SR4
SS-985	25 LT	23+75	14.00-15.50	A-7-5(66)	91	57	1.2	6.1	23.7	69.0	100	99	96	-	-	SR4
SS-986	25 LT	23+75	19.00-20.50	A-7-5(48)	82	46	4.7	10.3	36.3	48.7	100	97	88	-	-	SR4
SS-979	25 RT	26+00	0.50-2.00	A-7-6(24)	68	40	23.7	9.7	17.8	48.7	92	77	63	-	-	SR4
SS-980	25 RT	26+00	4.20-5.70	A-7-6(18)	49	23	14.2	8.3	20.7	56.8	96	87	75	-	-	SR4
SS-981	25 RT	26+00	9.20-10.70	A-7-6(18)	47	20	13.4	6.5	21.3	58.8	100	89	83	-	-	SR4
SS-977	50 LT	31+00	3.80-5.30	A-7-5(23)	64	31	13.6	12.4	27.4	46.7	88	79	70	-	-	SR4
SS-978	50 LT	31+00	8.80-10.30	A-7-6(26)	55	26	2.8	8.9	29.4	58.8	96	94	88	-	-	SR4
MS-978	50 LT	31+00	8.80-10.30				0.0	0.0	0.0	0.0		0	0	19.3	-	SR4
SS-974	CL	33+75	3.20-4.70	A-6(3)	37	13	22.1	13.6	29.8	34.5	65	54	44	-	-	SR4
SS-975	CL	33+75	8.20-9.70	A-7-6(13)	45	21	11.2	7.3	51.1	30.4	80	73	67	-	-	SR4
MS-976	CL	33+75	13.20-14.70				0.0	0.0	0.0	0.0		0	0	15.1	-	SR4
SS-976	CL	33+75	13.20-14.70	A-7-6(24)	51	27	4.5	6.9	35.9	52.7	93	90	84	-	-	SR4
SS-1017	CL	51+00	3.70-5.20	A-7-6(13)	53	24	11.2	9.1	33.0	46.7	73	66	60	-	-	SR4
SS-1018	CL	51+00	8.70-10.20	A-7-6(11)	42	20	5.7	6.5	35.0	52.8	71	68	64	-	-	SR4
SS-1019	CL	54+50	4.00-5.50	A-7-6(20)	56	28	19.9	6.1	33.4	40.6	94	77	71	-	-	SR4
MS-1020	CL	54+50	9.00-10.50				0.0	0.0	0.0	0.0		0	0	14.7	-	SR4
SS-1020	CL	54+50	9.00-10.50	A-7-6(19)	48	20	7.1	6.1	52.3	34.5	94	88	84	-	-	SR4
SS-1021	CL	54+50	14.00-15.50	A-4(2)	34	8	20.7	29.6	35.4	14.2	97	85	54	-	-	SR4

SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC	Line or Boring ID
							C.SAND	F.SAND	SILT	CLAY	10	40	200			
SS-1022	25 LT	59+00	4.10-5.60	A-7-6(17)	48	21	6.5	10.6	40.3	42.6	89	85	76	-	-	SR4
SS-1023	25 LT	59+00	9.10-10.60	A-7-6(17)	44	20	0.6	6.1	40.5	52.8	87	87	83	-	-	SR4
SS-1024	25 LT	59+00	14.10-15.60	A-7-6(22)	46	19	0.8	3.7	44.8	50.8	99	99	97	-	-	SR4
SS-1025	25 LT	59+00	19.10-20.60	A-7-6(18)	41	17	0.8	8.9	37.5	52.8	100	100	94	-	-	SR4
SS-1026	25 LT	61+00	3.90-5.40	A-7-6(10)	43	20	15.2	23.8	28.5	32.5	91	84	59	-	-	SR4
SS-1027	25 LT	61+00	8.90-10.40	A-7-6(3)	44	15	22.7	18.7	32.2	26.4	68	56	43	-	-	SR4
SS-1028	25 LT	61+00	13.90-15.40	A-7-6(16)	44	23	8.7	17.9	34.8	38.6	94	88	74	-	-	SR4
SS-1029	25 LT	62+50	4.00-9.00	A-7-6(9)	41	17	19.5	10.2	35.8	34.5	87	74	63	-	-	SR4
SS-1030	25 LT	62+50	9.00-10.50	A-7-6(23)	45	22	2.8	4.3	48.2	44.7	99	97	94	-	-	SR4
SS-1032	CL	67+00	1.00-2.50	A-4(7)	33	9	8.5	10.4	42.5	38.6	98	94	82	-	-	SR4
SS-1031	CL	68+90	0.50-2.00	A-2-4(0)	22	6	42.9	25.0	9.8	22.4	81	66	28	-	-	SR4
SS-1033	CL	69+75	0.00-1.50	A-6(3)	28	11	24.4	23.2	22.0	30.5	95	80	52	-	-	SR4
SS-1034	CL	69+75	4.40-5.90	A-6(14)	40	17	7.5	12.4	45.5	34.6	100	94	83	-	-	SR4
SS-1035	CL	72+50	4.00-5.50	A-7-6(14)	45	22	18.5	9.8	29.1	42.7	95	84	70	-	-	SR4
SS-1036	CL	72+50	9.00-10.50	A-4(3)	33	10	22.8	14.4	38.4	24.4	82	67	54	-	-	SR4
SS-1037	CL	74+75	4.20-5.70	A-7-6(14)	44	16	7.3	15.2	47.0	30.5	98	93	80	-	-	SR4
SS-1038	CL	74+75	9.20-10.70	A-6(7)	35	12	9.3	23.2	41.1	26.4	95	90	70	-	-	SR4
SS-1039	CL	79+85	4.00-5.50	A-7-6(11)	42	20	19.2	17.8	26.5	36.4	96	86	63	-	-	SR4
SS-1040	CL	79+85	9.00-10.50	A-7-5(7)	43	12	17.2	19.2	37.2	26.3	90	77	61	-	-	SR4
SS-1041	CL	79+85	14.00-15.50	A-6(10)	40	18	15.1	17.4	34.7	32.8	92	83	66	-	-	SR4
SS-1042	CL	79+85	19.00-20.50	A-7-6(24)	44	22	0.0	2.3	44.5	53.2	100	100	99	-	-	SR4
SS-1043	CL	81+90	3.90-5.40	A-7-5(14)	55	23	14.7	12.5	25.7	47.1	85	76	64	-	-	SR4
SS-1044	CL	81+90	8.90-10.40	A-7-6(23)	56	27	7.6	11.7	33.7	47.1	93	88	79	-	-	SR4
SS-1045	CL	81+90	13.90-15.40	A-7-6(20)	50	26	6.6	9.8	34.5	49.1	89	84	77	-	-	SR4
SS-1046	CL	81+90	18.90-20.40	A-7-6(23)	43	23	2.5	6.6	41.9	49.1	100	99	93	-	-	SR4
SS-1047	CL	85+00	3.90-5.40	A-7-5(29)	58	27	3.2	6.9	39.3	50.6	97	94	90	-	-	SR4
SS-1048	CL	85+00	8.90-10.40	A-7-6(22)	49	24	3.4	3.4	40.5	52.6	91	88	86	-	-	SR4
SS-1049	CL	85+00	13.90-15.40	A-7-6(21)	43	19	0.6	2.8	31.9	64.7	100	100	97	-	-	SR4
SS-1050	CL	88+00	3.30-4.80	A-7-5(12)	49	15	12.3	8.5	34.7	44.5	88	79	73	-	-	SR4
SS-1051	CL	88+00	8.30-9.80	A-7-6(10)	41	15	10.1	11.5	33.9	44.5	89	81	72	-	-	SR4
SS-1052	10 LT	91+00	3.60-5.10	A-7-6(27)	59	30	8.7	7.3	33.5	50.6	96	91	82	-	-	SR4
SS-1053	10 LT	91+00	8.60-10.10	A-6(15)	37	15	1.6	7.5	36.3	54.6	100	99	93	-	-	SR4
SS-1054	25 LT	94+00	3.70-5.20	A-7-6(23)	51	23	4.5	5.9	37.0	52.6	97	94	89	-	-	SR4
SS-1055	25 LT	94+00	8.70-10.20	A-7-6(19)	44	17	0.8	5.1	41.5	52.6	100	100	96	-	-	SR4
SS-1056	25 LT	94+00	13.70-15.20	A-7-6(15)	47	20	14.4	15.0	30.2	40.5	96	83	73	-	-	SR4
SS-1057	25 LT	94+00	18.70-20.20	A-7-6(12)	44	16	6.7	18.6	38.3	36.4	92	86	74	-	-	SR4
S-1058	25 LT	98+00	0.50-4.00	A-1-b(0)	15	NP	55.1	28.8	7.0	9.1	69	44	13	-	-	SR4
SS-1059	25 LT	98+00	4.00-5.50	A-2-7(2)	43	22	49.2	16.0	2.4	32.4	77	48	28	-	-	SR4
SS-1060	25 LT	98+00	4.00-5.50	A-2-7(4)	65	40	55.8	14.0	0.9	29.4	92	44	29	-	-	SR4
SS-1061	25 LT	98+00	14.00-15.50	A-7-6(20)	46	20	4.3	8.1	43.1	44.5	100	98	90	-	-	SR4
SS-1062	25 LT	98+00	19.00-20.50	A-7-6(15)	47	18	9.3	9.3	42.9	38.5	93	86	79	-	-	SR4
S-1065	35 LT	102+00	1.00-3.60	A-7-6(10)	53	27	34.4	14.2	5.0	46.5	96	71	51	-	-	SR4
SS-1066	35 LT	102+00	3.60-5.10	A-7-6(10)	52	30	29.9	20.2	7.4	42.5	93	75	48	-	-	SR4
SS-1067	35 LT	102+00	8.60-10.10	A-2-7(4)	57	35	50.6	15.2	0.9	33.4	90	55	32	-	-	SR4
SS-1068	25 RT	105+00	3.70-5.20	A-7-6(35)	62	39	7.1	11.9	20.3	60.7	100	96	84	-	-	SR4
SS-1069	25 RT	105+00	8.70-10.20	A-6(2)	37	20	40.7	19.6	10.3	29.3	86	60	36	-	-	SR4
SS-1070	25 RT	105+00	13.70-15.20	A-2-7(5)	62	37	57.4	10.1	1.1	31.3	97	55	32	-	-	SR4
S-1271	35 RT	112+40	1.00-3.00	A-2-4(0)	15	NP	59.1	25.3	9.6	6.1	98	62	19			SR4
S-1272	75 RT	118+25	1.00-2.00	A-6(1)	33	11	45.2	18.1	20.6	16.1	92	65	37			SR4
S-1273	75 RT	118+25	2.00-4.00	A-6(2)	37	15	42.9	15.9	14.9	26.2	93	67	41			SR4
S-1270	50 RT	125+50	3.00-4.00	NOT ENOUGH MATERIAL TO TEST												SR4
			SR5													
SS-1165	25 LT	22+25	4.00-5.50	A-2-7(4)	45	29	50.3	15.3	6.1	28.2	96	62	35	-	-	SR5
SS-1166	25 LT	22+25	9.00-10.50	A-2-7(3)	41	24	40.6	27.1	6.0	26.2	98	78	34	-	-	SR5
SS-1160	CL	25+00	0.00-1.50	A-2-4(0)	13	NP	58.7	28.0	7.2	6.1	88	54	15	-	-	SR5
SS-1161	CL	25+00	4.20-5.70	A-2-7(4)	53	30	55.1	9.2	2.1	33.6	96	56	35	-	-	SR5
SS-1162	CL	25+00	9.20-10.70	A-7-6(10)	54	34	41.3	9.9	14.2	34.6	88	58	45	-	-	SR5
SS-1155	CL	27+25	4.00-5.50	A-7-6(19)	66	37	32.6	8.0	7.8	51.5	96	74	58	-	-	SR5
SS-1156	CL	27+25	9.00-10.50	A-7-5(27)	57	27	7.6	5.4	21.0	66.0	100	95	87	-	-	SR5
S-1134	80 RT	32+50	0.00-2.00	A-7-5(29)	59	22	0.8	1.2	35.1	62.9	100	99	99	-	-	SR5
SS-1135	80 RT	32+50	4.00-5.50	A-7-5(20)	50	16	1.2	4.5	38.6	55.7	100	99	96	-	-	SR5
SS-1136	80 RT	32+50	9.00-10.50	A-7-5(32)	60	26	1.0	1.6	39.6	57.7	100	99	98	-	-	SR5
SS-1137	80 RT	32+50	14.00-15.50	A-7-5(30)	58	25	0.4	3.9	44.1	51.5	100	100	97	-	-	SR5
SS-1138	80 RT	32+50	19.00-20.50	A-7-6(19)	46	17	1.9	3.9	38.6	55.7	100	99	95	-	-	SR5
SS-1139	80 RT	32+50	24.00-25.50	A-6(15)	39	13	0.4	2.1	41.9	55.7	100	100	98	-	-	SR5
SS-1129	CL	35+50	4.20-5.70	A-7-6(15)	43	18	8.1	10.8	40.6	40.6	95	90	80	-	-	SR5
SS-1130	CL	35+50	9.20-10.70	A-6(7)	38	14	18.3	15.2	40.2	26.4	85	74	60	-	-	SR5
SS-1131	CL	35+50	14.20-15.70	A-6(9)	39	18	12.2	11.8	35.5	40.6	79	72	62	-	-	SR5
SS-1132	CL	35+50	19.20-20.70	A-7-6(19)	41	19	1.2	8.9	45.2	44.6	100	99	94	-	-	SR5
SS-1133	CL	35+50	24.20-25.70	A-6(12)	40	18	8.9	10.8	35.7	44.6	85	79	71	-	-	SR5
SS-1126	CL	38+75	3.70-5.20	A-7-6(25)	60	31	14.2	9.3	27.8	48.7	96	85	76	-	-	SR5
SS-1127	CL	38+75	8.70-10.20	A-7-6(26)	60	32	11.6	8.3	31.4	48.7	93	85	76	-	-	SR5
SS-1128	CL	38+75	13.70-15.20	A-7-5(22)	53	23	7.1	9.9	46.5	36.5	96	91	83	-	-	SR5
SS-1123	CL	42+00	3.90-5.40	A-7-6(18)	52	25	14.7	8.6	35.9	40.9	92	81	72	-	-	SR5

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	Line or Boring ID
SS-1124	CL	42+00	8.90-10.40	A-7-6(18)	45	23	6.9	13.3	38.9	40.9	95	91	79	-	-	SR5
SS-1125	CL	42+00	13.90-15.40	A-7-6(23)	47	25	0.8	20.0	40.3	38.8	100	100	86	-	-	SR5
SS-1119	25 RT	49+75	4.10-5.60	A-7-6(21)	47	24	10.2	7.6	35.2	47.0	100	92	84	-	-	SR5
SS-1120	25 RT	49+75	9.10-10.60	A-7-6(25)	46	24	0.2	5.1	49.7	44.9	98	98	95	-	-	SR5
SS-1116	CL	53+00	4.00-5.50	A-7-6(14)	56	31	35.1	8.6	17.5	38.8	97	69	56	-	-	SR5
SS-1117	CL	53+00	9.00-10.50	A-7-6(14)	50	21	17.2	9.4	32.6	40.9	88	75	67	-	-	SR5
SS-1118	CL	53+00	14.00-15.50	A-7-6(21)	48	25	7.4	13.9	35.9	42.9	97	92	80	-	-	SR5
SS-1113	25 LT	54+50	3.60-5.10	A-7-6(16)	51	23	20.2	9.6	21.1	49.0	98	84	71	-	-	SR5
SS-1114	25 LT	54+50	8.60-10.10	A-7-6(19)	47	18	5.9	5.5	43.6	44.9	98	93	89	-	-	SR5
SS-1115	25 LT	54+50	13.60-15.10	A-7-6(23)	46	20	0.2	0.4	46.3	53.1	100	100	100	-	-	SR5
SS-1109	30 LT	58+50	4.10-5.60	A-7-6(20)	47	21	4.3	12.6	46.7	36.5	99	96	87	-	-	SR5
SS-1110	30 LT	58+50	9.10-10.60	A-7-6(34)	55	30	0.4	1.8	41.0	56.8	100	100	99	-	-	SR5
SS-1111	30 LT	58+50	14.10-15.60	A-7-6(11)	41	20	17.4	20.5	31.6	30.4	96	85	64	-	-	SR5
SS-1112	30 LT	58+50	19.10-20.60	A-6(12)	38	17	9.9	18.5	45.2	26.4	100	94	77	-	-	SR5
SS-1106	CL	63+40	3.90-5.40	A-6(12)	38	16	11.6	12.8	41.2	34.5	98	90	78	-	-	SR5
SS-1107	CL	63+40	8.90-10.40	A-7-6(11)	51	27	24.7	12.0	26.8	36.5	82	67	54	-	-	SR5
SS-1108	CL	63+40	13.50-15.40	A-6(8)	34	16	10.5	30.4	30.6	28.4	99	97	63	-	-	SR5
SS-1101	50RT	65+50	3.50-5.00	A-7-6(22)	47	19	0.8	4.7	43.4	51.1	100	99	97	-	-	SR5
SS-1102	50RT	65+50	8.50-10.00	A-7-6(27)	48	24	0.2	3.7	43.0	53.1	100	100	98	-	-	SR5
SS-1103	50RT	65+50	13.50-15.00	A-7-6(28)	49	26	1.2	5.1	42.6	51.1	100	99	96	-	-	SR5
SS-1104	50RT	65+50	18.50-20.00	A-7-6(28)	50	25	0.2	3.9	40.8	55.2	100	100	98	-	-	SR5
SS-1105	50RT	65+50	23.50-25.00	A-6(4)	35	14	22.5	20.2	32.8	24.5	76	63	48	-	-	SR5
SS-1098	CL	68+00	3.80-5.30	A-6(9)	34	12	3.9	23.9	45.7	26.6	100	97	80	-	-	SR5
SS-1099	CL	68+00	8.80-10.30	A-6(12)	35	15	2.2	19.2	47.9	30.6	100	99	85	-	-	SR5
SS-1100	CL	68+00	13.80-15.30	A-6(12)	36	15	3.9	20.4	41.0	34.7	99	97	81	-	-	SR5
SS-1096	40 LT	70+85	3.50-5.00	A-6(14)	40	16	6.3	12.3	48.6	32.8	100	95	85	-	-	SR5
SS-1097	40 LT	70+85	8.50-10.00	A-7-6(20)	41	21	1.4	8.0	47.6	43.0	98	97	91	-	-	SR5
SS-1095	25 LT	76+25	3.50-5.00	A-4(2)	35	8	20.5	27.8	37.4	14.3	90	78	51	-	-	SR5
SS-1093	25 LT	80+00	3.60-5.10	A-7-6(26)	57	29	5.7	5.7	39.4	49.1	91	87	82	-	-	SR5
SS-1094	25 LT	80+00	8.60-10.10	A-7-6(9)	41	15	12.5	17.2	43.7	26.6	88	80	66	-	-	SR5
S-1090	25 LT	83+00	0.00-3.00	A-7-6(36)	59	30	0.4	1.2	36.9	61.4	100	100	99	-	-	SR5
SS-1091	25 LT	83+00	4.30-5.80	A-7-6(29)	50	25	0.2	2.3	42.3	55.3	100	100	99	-	-	SR5
SS-1092	25 LT	83+00	9.30-10.80	A-7-6(12)	43	19	14.5	12.7	35.9	36.8	91	81	70	-	-	SR5
SS-1087	35 LT	86+00	4.00-5.50	A-7-5(10)	45	15	10.6	9.4	41.0	38.9	83	75	69	-	-	SR5
SS-1088	35 LT	86+00	9.00-10.50	A-7-6(25)	44	23	1.0	2.7	39.0	57.3	100	99	98	-	-	SR5
SS-1089	35 LT	86+00	14.00-15.50	A-7-6(13)	45	22	13.7	10.0	35.3	40.9	84	75	66	-	-	SR5
SS-1085	25 LT	88+75	4.50-5.90	A-7-6(19)	42	17	0.0	5.1	47.8	47.1	100	100	98	-	-	SR5
SS-1086	25 LT	88+75	9.30-10.80	A-7-6(19)	41	19	1.6	10.4	44.9	43.0	100	99	92	-	-	SR5
SS-1083	30 LT	91+65	4.00-5.50	A-7-5(19)	48	15	0.6	5.1	43.1	51.2	100	100	96	-	-	SR5
SS-1084	30 LT	91+65	9.00-10.50	A-7-6(16)	41	16	0.8	13.5	44.7	40.9	100	100	91	-	-	SR5
SS-1081	25 LT	97+75	3.50-5.00	A-7-5(23)	54	22	5.3	7.4	36.1	51.2	97	93	87	-	-	SR5
SS-1082	25 LT	97+75	8.50-10.00	A-7-6(17)	46	17	4.1	9.0	46.0	40.9	96	93	87	-	-	SR5
SS-1079	CL	100+50	3.80-5.30	A-7-5(28)	57	27	4.1	8.8	25.7	61.4	99	96	89	-	-	SR5
SS-1080	CL	100+50	8.80-10.30	A-7-6(18)	51	22	11.9	10.0	33.1	45.0	94	85	76	-	-	SR5
SS-1077	CL	105+80	3.90-5.30	A-7-6(24)	45	28	5.9	13.5	34.1	46.5	100	96	86	-	-	SR5
SS-1078	CL	105+80	8.90-10.40	A-7-6(20)	41	19	1.4	6.5	37.5	54.6	100	99	95	-	-	SR5
SS-1074	25 LT	109+80	3.80-5.30	A-7-6(20)	65	38	32.4	9.7	3.3	54.6	99	79	58	-	-	SR5
MS-1074	25 LT	109+80	3.80-5.30				0.0	0.0	0.0	0.0		0	0	12.3	-	SR5
SS-1075	25 LT	109+80	8.80-10.30	A-7-6(7)	57	35	49.5	9.5	1.5	39.4	92	60	38	-	-	SR5
SS-1076	25 LT	109+80	13.80-15.30	A-6(3)	27	14	26.6	31.9	14.3	27.3	100	84	46	-	-	SR5
SS-1071	25 LT	114+75	4.20-5.70	A-2-7(4)	49	35	58.7	7.9	1.0	32.4	95	53	32	-	-	SR5
SS-1072	25 LT	114+75	9.20-10.70	A-2-6(1)	33	16	61.6	13.2	0.9	24.3	96	58	25	-	-	SR5
SS-1073	25 LT	114+75	14.20-15.70	A-2-6(1)	40	22	55.3	16.6	0.8	27.3	88	52	26	-	-	SR5
S-1269	CL	120+50	1.00-6.00	A-2-6(0)	33	15	71.0	10.1	0.8	18.1	99	50	19			SR5
			Y10													
SS-1008	50 LT	22+00	4.10-5.60	A-2-7(2)	41	22	60.5	10.2	2.9	26.4	100	64	30	-	-	Y10
SS-1009	50 LT	22+00	9.10-10.50	A-2-4(0)	25	NP	58.7	21.5	3.6	16.2	100	83	21	-	-	Y10
SS-997	40 LT	25+30	4.00-5.50	A-2-4(0)	15	NP	64.0	22.8	5.1	8.1	100	60	18	-	-	Y10
SS-998	40 LT	25+30	9.00-10.50	A-7-6(18)	51	28	22.3	7.8	51.6	18.3	96	80	68	-	-	Y10
SS-964	40 RT	29+50	4.00-5.50	A-2-7(2)	48	23	61.1	9.3	3.3	26.3	90	45	29	-	-	Y10
SS-989	15 RT	31+50	4.00-5.50	A-2-7(1)	44	20	72.6	8.0	2.1	17.2	96	38	20	-	-	Y10
SS-990	15 RT	31+50	9.00-10.50	A-2-7(1)	51	28	71.3	10.5	2.9	15.2	96	36	19	-	-	Y10
SS-991	15 RT	31+50	14.00-15.50	A-1-b(0)	27	6	78.4	8.1	1.3	12.2	95	33	14	-	-	Y10
SS-992	15 RT	31+50	19.00-20.50	A-2-4(0)	24	NP	45.8	34.8	5.2	14.2	95	67	22	-	-	Y10
SS-993	15 RT	31+50	24.00-25.50	A-2-6(0)	34	13	63.7	9.5	7.5	19.3	87	45	26	-	-	Y10
SS-994	15 RT	31+50	29.00-30.50	A-2-4(0)	30	10	57.0	21.1	6.7	15.2	96	63	22	-	-	Y10
SS-995	15 RT	31+50	34.00-35.50	A-2-4(0)	30	8	75.6	8.0	2.2	14.2	94	40	16	-	-	Y10
SS-996	15 RT	31+50	44.00-45.50	A-2-4(0)	26	7	73.6	9.9	4.3	12.2	94	46	16	-	-	Y10
SS-1177	60 LT	35+70	3.80-5.30	A-7-6(7)	52	23	38.7	14.3	6.7	40.3	94	68	46	-	-	Y10
SS-1178	60 LT	35+70	8.80-10.30	A-6(4)	37	15	10.5	47.0	8.3	34.3	100	99	46	-	-	Y10
SS-1176	25 LT	40+00	8.80-10.30	A-7-6(9)	50	32	44.6	13.4	7.8	34.3	100	73	44	-	-	Y10
SS-1175	40 LT	46+50	9.90-11.40	A-7-6(7)	63	40	55.0	8.8	1.9	34.3	97	58	36	-	-	Y10
SS-1173	30 LT	48+40	3.60-5.10	A-2-4(0)	16	NP	57.0	24.7	6.3	12.1	97	60	20	-	-	Y10
SS-1174	30 LT	48+40	8.60-10.10	A-7-6(8)	64	42	51.8	9.3	2.6	36.3	95	60	38	-	-	Y10

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	Line or Boring ID
SS-1171	25 LT	52+00	4.10-5.60	A-7-6(7)	53	32	40.9	17.1	3.6	38.3	94	67	41	-	-	Y10
SS-1172	25 LT	52+00	9.10-10.60	A-2-6(2)	39	18	45.4	20.6	4.8	29.2	95	65	34	-	-	Y10
SS-1169	25 LT	55+00	3.60-5.10	A-2-4(0)	16	NP	70.1	22.6	2.3	5.0	98	54	19	-	-	Y10
SS-1170	25 LT	55+00	8.60-10.10	A-2-7(2)	50	28	64.5	7.9	2.4	25.2	97	47	28	-	-	Y10
			Y10LPD													
SS-1179	90 RT	0+75	4.00-5.50	A-7-6(7)	42	23	21.2	34.9	9.7	34.3	99	86	48	-	-	Y10LPD
SS-1180	90 RT	0+75	9.00-10.50	A-2-7(5)	67	45	61.9	8.0	0.9	29.2	97	48	30	-	-	Y10LPD
SS-1153	50 RT	4+00	4.20-5.70	A-2-7(5)	62	40	61.0	8.2	0.8	29.9	93	49	30	-	-	Y10LPD
SS-1154	50 RT	4+00	9.20-10.70	A-7-5(44)	71	40	3.3	6.0	30.9	59.8	100	98	93	-	-	Y10LPD
SS-1150	CL	7+00	3.80-5.30	A-2-7(6)	63	41	49.9	11.1	3.9	35.1	82	51	33	-	-	Y10LPD
SS-1151	CL	7+00	8.80-10.30	A-2-7(4)	53	34	44.8	22.2	5.2	27.8	94	70	33	-	-	Y10LPD
SS-1152	CL	7+00	13.80-15.30	A-7-6(54)	86	60	9.9	10.5	19.8	59.8	100	93	82	-	-	Y10LPD
			Y10RPA													
SS-987	50 LT	18+60	9.00-10.50	A-7-6(7)	44	27	32.9	22.3	8.3	36.5	96	78	45	-	-	Y10RPA
MS-988	50 LT	18+60	14.00-15.50				0.0	0.0	0.0	0.0		0	0	19.1	-	Y10RPA
SS-988	50 LT	18+60	14.00-15.50	A-7-6(19)	45	26	15.8	12.4	27.2	44.6	100	90	75	-	-	Y10RPA
			Y10RPD													
SS-1163	CL	10+00	3.80-5.30	A-2-7(4)	63	42	62.4	7.7	1.3	28.5	92	50	28	-	-	Y10RPD
SS-1164	CL	10+00	8.80-10.30	A-2-7(2)	41	26	59.2	16.2	4.3	20.4	95	56	25	-	-	Y10RPD
SS-1147	CL	10+60	3.70-5.20	A-7-5(25)	53	19	0.4	0.6	26.8	72.2	100	100	99	-	-	Y10RPD
SS-1148	CL	10+60	8.70-10.20	A-7-6(37)	62	34	3.3	4.5	26.2	66.0	100	98	94	-	-	Y10RPD
SS-1149	CL	10+60	13.70-15.20	A-7-5(34)	61	29	3.3	4.5	32.4	59.8	100	98	95	-	-	Y10RPD
SS-1143	CL	12+75	0.00-1.50	A-2-4(0)	12	NP	62.0	25.6	6.3	6.2	96	58	14	-	-	Y10RPD
SS-1144	CL	12+75	3.90-5.40	A-7-6(5)	53	30	50.3	7.8	4.7	37.1	90	56	38	-	-	Y10RPD
SS-1145	CL	12+75	8.30-9.80	A-7-5(29)	56	25	3.1	4.3	26.6	66.0	100	98	95	-	-	Y10RPD
SS-1146	CL	12+75	13.30-14.80	A-7-5(30)	58	25	1.4	4.3	30.3	63.9	100	99	96	-	-	Y10RPD
SS-1157	15 RT	17+60	4.10-5.60	A-2-7(5)	53	35	53.2	11.2	2.0	33.6	94	63	34	-	-	Y10RPD
SS-1158	15 RT	17+60	9.10-10.60	A-2-7(4)	80	53	68.4	4.9	0.2	26.5	93	37	25	-	-	Y10RPD
SS-1159	15 RT	17+60	14.10-15.60	A-2-6(1)	36	20	53.3	22.2	6.2	18.3	88	56	24	-	-	Y10RPD
SS-1167	25 LT	19+75	4.10-5.60	A-7-6(20)	52	29	15.3	16.1	18.1	50.4	99	88	72	-	-	Y10RPD
SS-1168	25 LT	19+75	9.10-10.60	A-2-7(5)	58	37	56.6	8.3	1.9	33.3	97	58	35	-	-	Y10RPD
			Y14													
SS-1243	45 RT	10+75	3.70-5.20	A-2-6(1)	33	17	52.6	19.8	5.4	22.2	97	62	30	-	-	Y14
SS-1244	45 RT	10+75	8.70-10.20	A-6(6)	31	15	12.9	35.4	15.3	36.4	100	94	61	-	-	Y14
			Y16													
SS-1231	50 LT	12+50	4.10-5.60	A-3(0)	18	NP	71.7	19.5	1.7	7.1	100	56	10	-	-	Y16
			Y8													
SS-893A	CL	10+50	4.20-5.70	A-7-6(15)	55	30	30.8	11.7	11.4	46.2	96	72	58	-	-	Y8
SS-894	CL	10+50	9.20-10.70	A-2-7(1)	44	19	63.4	9.8	5.6	21.1	96	46	27	-	-	Y8
			Y8 REV													
SS-890	CL	24+50	0.00-2.00	A-2-4(0)	15	NP	61.8	25.0	8.1	5.0	92	54	15	-	-	Y8 REV
SS-891	CL	24+50	4.00-5.50	A-2-4(0)	23	8	62.9	16.1	4.9	16.1	92	51	21	-	-	Y8 REV
SS-892	CL	24+50	9.00-10.50	A-2-7(1)	41	20	69.3	9.2	5.3	16.1	91	39	20	-	-	Y8 REV
SS-861	CL	25+15	1.00-2.50	A-2-4(0)	24	NP	52.4	27.6	10.9	9.0	90	60	21	-	-	Y8 REV
SS-862	CL	25+15	3.40-4.90	A-2-4(0)	22	3	36.1	37.6	10.2	16.1	85	65	27	-	-	Y8 REV
SS-863	CL	25+15	8.40-9.90	A-2-4(0)	28	9	66.7	12.2	7.0	14.1	90	44	20	-	-	Y8 REV
SS-860	CL	27+00	4.20-5.70	A-2-7(2)	48	28	66.1	8.0	4.8	21.1	94	44	25	-	-	Y8 REV
SS-857	CL	30+50	4.00-5.50	A-2-7(3)	52	29	52.4	12.4	6.0	29.2	88	50	32	-	-	Y8 REV
SS-858	CL	30+50	9.00-10.50	A-2-7(3)	49	27	53.8	14.9	4.2	27.1	92	54	30	-	-	Y8 REV
SS-859	CL	30+50	14.00-15.50	A-6(3)	39	21	42.6	18.0	10.3	29.1	92	64	38	-	-	Y8 REV
SS-850	CL	33+00	4.00-5.50	A-2-6(1)	32	15	58.2	15.6	5.1	21.1	94	53	26	-	-	Y8 REV
SS-851	CL	33+00	9.00-10.50	A-7-6(11)	60	42	45.9	11.0	4.9	38.2	98	70	43	-	-	Y8 REV
SS-852	CL	33+00	14.00-15.50	A-2-6(1)	35	18	36.2	31.4	4.2	28.1	100	88	33	-	-	Y8 REV
SS-853	CL	33+00	19.00-20.50	A-2-7(3)	44	26	53.3	15.6	5.0	26.1	97	60	31	-	-	Y8 REV
SS-854	CL	33+00	24.00-25.50	A-7-6(12)	50	34	35.7	15.6	7.5	41.2	97	73	49	-	-	Y8 REV
SS-856	CL	33+00	34.00-35.50	A-7-6(9)	51	31	47.3	6.7	7.8	38.2	96	67	45	-	-	Y8 REV
SS-866	CL	36+00	9.00-10.50	A-7-6(5)	50	22	47.8	7.6	8.4	36.1	94	58	43	-	-	Y8 REV
SS-867	40 LT	38+75	8.80-10.30	A-7-6(6)	41	19	25.9	26.9	13.1	34.1	100	81	50	-	-	Y8 REV
SS-868	CL	42+00	3.80-5.30	A-3(0)	18	NP	67.4	25.5	3.1	4.0	94	58	8	-	-	Y8 REV
SS-869	CL	42+00	8.80-10.30	A-2-7(1)	41	21	58.0	14.5	4.4	23.1	94	51	27	-	-	Y8 REV
SS-870	CL	46+00	9.10-10.60	A-2-7(2)	48	28	62.7	7.4	3.8	26.1	93	49	28	-	-	Y8 REV
MS-871	CL	52+75	4.30-5.80				0.0	0.0	0.0	0.0		0	0	16.5	-	Y8 REV
SS-871	CL	52+75	4.30-5.80	A-2-7(3)	44	30	55.9	10.9	5.0	28.1	90	50	31	-	-	Y8 REV
SS-872	CL	52+75	14.30-15.80	A-2-7(1)	43	22	62.7	12.1	6.1	19.1	79	34	21	-	-	Y8 REV
SS-873	CL	55+00	4.00-5.50	A-1-b(0)	17	NP	72.8	18.0	3.2	6.0	95	47	10	-	-	Y8 REV
SS-874	CL	55+00	9.00-10.50	A-2-7(4)	53	34	52.7	15.7	3.5	28.1	95	60	31	-	-	Y8 REV
			Y9LPA													
SS-927	100 RT	6+00	3.90-5.40	A-2-7(2)	43	21	59.5	11.3	4.9	24.2	96	52	29	-	-	Y9LPA
SS-928	100 RT	6+00	8.90-10.40	A-2-6(1)	40	21	71.1	8.8	1.9	18.2	93	41	20	-	-	Y9LPA
SS-929	100 RT	6+00	13.90-15.40	A-2-7(2)	50	27	66.8	7.1	3.9	22.2	96	39	26	-	-	Y9LPA
SS-912	CL	9+75	3.20-4.70	A-2-6(1)	39	18	45.1	26.1	2.6	26.3	99	72	31	-	-	Y9LPA
SS-913	CL	9+75	8.20-9.70	A-2-6(1)	38	19	65.3	12.5	3.0	19.2	95	49	22	-	-	Y9LPA
			Y9NBL													
SS-1230	50 LT	22+50	9.00-10.50	A-2-6(1)	38	18	65.6	11.0	2.1	21.2	88	42	22	-	-	Y9NBL

SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC	Line or Boring ID
							C.SAND	F.SAND	SILT	CLAY	10	40	200			
SS-1253	65 LT	57+25	4.00-5.50	A-2-4(0)	24	10	59.9	19.4	4.6	16.2	49	30	11	-	-	Y9NBL
SS-1254	65 LT	57+25	9.00-10.50	A-1-b(0)	24	5	73.4	13.3	1.1	12.1	97	49	14	-	-	Y9NBL
			Y9RPC													
SS-798	100 RT	3+50	4.10-5.60	A-3(0)	19	NP	78.4	15.3	2.3	4.0	100	51	7	-	-	Y9RPC
SS-799	100 RT	3+50	9.10-10.60	A-2-7(3)	54	29	68.6	3.2	3.1	25.1	100	43	29	-	-	Y9RPC
SS-800	100 RT	3+50	14.10-15.60	A-2-6(0)	38	14	57.7	19.8	7.4	15.0	100	58	26	-	-	Y9RPC
SS-801	100 RT	3+50	19.10-20.60	A-2-4(0)	25	NP	26.0	49.7	7.3	17.0	100	95	26	-	-	Y9RPC
SS-802	100 RT	3+50	24.10-25.60	A-1-b(0)	29	6	72.1	12.4	4.4	11.0	95	36	15	-	-	Y9RPC
SS-803	100 RT	3+50	29.10-30.60	A-1-b(0)	23	NP	77.9	10.5	2.6	9.0	97	44	12	-	-	Y9RPC
SS-804	100 RT	3+50	34.10-35.60	A-1-b(0)	21	NP	75.8	18.0	4.2	2.0	94	34	7	-	-	Y9RPC
SS-197	CL	6+00	4.20-5.70	A-2-7(1)	44	21	63.4	13.3	1.1	22.2	96	42	23	-	-	Y9RPC
SS-198	CL	6+00	9.20-10.70	A-7-5(33)	76	37	14.7	6.8	14.0	64.5	97	86	78	-	-	Y9RPC
SS-199	CL	6+00	14.20-15.70	A-1-b(0)	29	5	72.7	10.5	2.7	14.1	100	45	17	-	-	Y9RPC
SS-200	CL	6+00	19.20-20.70	A-2-4(0)	21	NP	48.3	36.7	0.9	14.1	87	58	14	-	-	Y9RPC
SS-201	CL	6+00	24.20-25.70	A-2-4(0)	35	10	72.7	10.5	2.7	14.1	97	34	17	-	-	Y9RPC
SS-202	CL	6+00	29.20-30.70	A-2-4(0)	33	8	54.4	18.9	2.5	24.2	95	70	26	-	-	Y9RPC
SS-203	CL	6+00	34.20-35.70	A-2-7(0)	48	25	77.3	4.8	1.7	16.1	100	30	18	-	-	Y9RPC
SS-204	CL	6+00	44.20-45.70	A-1-b(0)	24	4	74.3	17.5	0.1	8.1	97	26	9	-	-	Y9RPC
SS-805	CL	9+00	9.00-10.50	A-2-7(1)	42	22	70.3	6.3	3.3	20.0	97	39	23	-	-	Y9RPC
SS-806	CL	9+00	14.00-15.50	A-2-6(0)	31	11	74.4	10.3	2.2	13.0	98	31	16	-	-	Y9RPC
SS-807	CL	9+00	19.00-20.50	A-2-6(0)	33	14	77.6	5.8	3.6	13.0	78	21	14	-	-	Y9RPC
SS-808	CL	9+00	24.00-25.50	A-2-7(4)	68	44	65.6	6.7	3.6	24.0	93	42	26	-	-	Y9RPC
			Y9SBL													
SS-947	100 RT	0+00	4.20-5.70	A-2-7(2)	42	23	55.4	14.0	6.4	24.2	93	57	30	-	-	Y9SBL
SS-948	100 RT	0+00	9.20-10.70	A-2-6(0)	35	15	59.0	17.4	2.4	21.2	97	62	24	-	-	Y9SBL
SS-944	25 RT	1+00	3.80-9.30	A-1-b(0)	15	NP	73.5	16.5	3.9	6.1	98	50	11	-	-	Y9SBL
SS-945	25 RT	1+00	8.80-10.30	A-2-7(1)	41	21	63.6	10.1	4.0	22.2	91	46	25	-	-	Y9SBL
SS-946	25 RT	1+00	13.80-15.80	A-2-4(0)	30	10	63.3	16.3	4.2	16.2	98	56	21	-	-	Y9SBL
SS-941	50 RT	4+50	9.30-10.80	A-2-6(0)	34	16	61.3	14.8	4.6	19.2	90	57	22	-	-	Y9SBL
SS-942	50 RT	4+50	19.30-20.80	A-2-4(0)	24	3	68.4	16.8	1.7	13.1	98	51	15	-	-	Y9SBL
SS-943	50 RT	4+50	29.30-30.80	A-2-6(0)	38	19	77.4	6.9	1.6	14.1	96	30	16	-	-	Y9SBL
SS-1222	45 LT	6+40	4.20-5.70	A-3(0)	16	NP	68.3	25.8	1.9	4.0	100	61	8	-	-	Y9SBL
SS-1223	45 LT	6+40	9.20-10.70	A-2-4(0)	20	6	54.6	24.6	3.7	17.1	98	65	23	-	-	Y9SBL
SS-939	CL	7+00	9.40-10.90	A-7-6(9)	60	32	45.7	11.1	8.9	34.3	94	60	43	-	-	Y9SBL
SS-940	CL	7+00	19.40-20.90	A-2-7(2)	54	29	67.3	7.7	4.8	20.2	98	43	26	-	-	Y9SBL
SS-937	CL	9+00	9.00-10.50	A-2-6(0)	30	14	56.1	19.1	4.6	20.2	95	60	25	-	-	Y9SBL
SS-938	CL	9+00	24.00-25.50	A-2-4(0)	27	10	76.2	9.3	1.4	13.1	95	66	14	-	-	Y9SBL
SS-934	CL	12+25	3.60-5.10	A-2-7(2)	51	29	61.3	9.7	2.7	26.3	92	45	27	-	-	Y9SBL
SS-935	CL	12+25	8.60-10.10	A-2-6(0)	34	13	41.3	29.4	5.1	24.2	98	72	31	-	-	Y9SBL
SS-936	CL	12+25	13.60-15.10	A-2-4(0)	31	9	73.4	9.8	2.6	14.1	97	47	17	-	-	Y9SBL
SS-930	CL	15+00	3.20-4.70	A-2-6(1)	36	19	39.8	29.6	3.3	27.3	98	76	31	-	-	Y9SBL
SS-931	CL	15+00	8.20-9.70	A-2-6(0)	39	19	75.1	7.2	1.6	16.2	97	39	18	-	-	Y9SBL
SS-932	CL	15+00	18.20-19.70	A-2-7(1)	43	18	65.1	10.3	4.4	20.2	97	43	25	-	-	Y9SBL
SS-933	CL	15+00	23.20-24.70	A-2-6(1)	37	18	58.7	14.6	6.5	20.2	97	60	28	-	-	Y9SBL
SS-925	50 LT	17+75	4.00-5.50	A-2-4(0)	28	6	68.4	13.6	4.8	13.1	98	57	18	-	-	Y9SBL
SS-926	50 LT	17+75	9.00-10.50	A-2-6(0)	36	13	72.0	8.3	4.5	15.2	83	30	17	-	-	Y9SBL
S-923	CL	20+75	0.00-3.00	A-1-b(0)	19	NP	73.5	14.8	1.5	10.1	96	49	13	-	-	Y9SBL
SS-924	CL	20+75	4.20-5.70	A-2-7(2)	43	22	63.3	8.4	2.0	26.3	99	56	29	-	-	Y9SBL
SS-909	50 RT	28+00	9.00-10.50	A-2-4(0)	28	9	70.6	13.6	0.6	15.2	98	51	16	-	-	Y9SBL
SS-880	CL	31+50	9.40-10.90	A-2-7(4)	59	37	60.0	8.3	4.5	27.1	91	44	29	-	-	Y9SBL
SS-881	CL	31+50	14.40-15.90	A-2-6(1)	33	14	49.9	20.4	5.6	24.1	100	81	31	-	-	Y9SBL
SS-882	CL	31+50	29.40-30.90	A-1-b(0)	22	NP	79.7	9.9	2.3	8.0	91	33	10	-	-	Y9SBL
SS-883	CL	31+50	34.40-35.90	A-2-7(0)	43	21	77.3	6.1	2.5	14.1	81	21	14	-	-	Y9SBL
SS-884	CL	31+50	49.40-50.90	A-2-7(1)	42	26	66.5	9.8	2.6	21.1	96	43	24	-	-	Y9SBL
SS-878	CL	37+50	4.30-5.80	A-2-6(2)	37	19	54.0	14.9	5.0	26.1	97	62	32	-	-	Y9SBL
SS-879	CL	37+50	9.30-10.80	A-2-6(0)	31	11	73.2	7.5	5.2	14.1	97	43	20	-	-	Y9SBL
SS-875	50 RT	40+50	4.20-5.70	A-2-6(0)	38	20	64.8	10.3	4.8	20.1	74	34	19	-	-	Y9SBL
SS-876	50 RT	40+50	9.20-10.70	A-2-7(2)	48	25	67.9	6.1	1.9	24.1	96	46	26	-	-	Y9SBL
SS-877	50 RT	40+50	14.20-15.70	A-2-6(1)	34	15	44.9	25.4	4.6	25.1	100	83	31	-	-	Y9SBL
SS-1265	80 RT	47+75	3.90-5.40	A-2-6(1)	38	18	55.4	15.5	12.9	16.1	99	64	30			Y9SBL
SS-1266	80 RT	47+75	8.90-10.40	A-2-6(0)	35	14	63.7	11.5	4.6	20.2	93	47	24			Y9SBL
SS-1267	80 RT	47+75	13.90-15.40	A-1-b(0)	20	NP	78.8	10.7	2.4	8.1	80	31	9			Y9SBL
SS-1268	80 RT	47+75	18.90-20.40	A-2-6(1)	39	19	60.3	13.1	4.4	22.2	99	61	28			Y9SBL
S-1259	100 RT	56+50	0.00-3.90	A-2-7(2)	44	23	55.8	14.3	1.6	28.2	92	54	30			Y9SBL
SS-1260	100 RT	56+50	3.90-5.40	A-2-6(1)	37	19	53.4	17.3	3.0	26.2	97	65	29			Y9SBL
SS-1261	100 RT	56+50	8.90-10.40	A-6(5)	36	19	22.6	35.3	7.9	34.3	99	91	45			Y9SBL
SS-1262	100 RT	52+25	3.90-5.40	A-2-4(0)	25	8	65.7	17.5	2.6	14.1	99	53	18			Y9SBL
SS-1263	100 RT	52+25	13.90-15.40	A-7-6(11)	41	21	21.2	21.6	14.9	42.3	99	87	62			Y9SBL
SS-1264	100 RT	52+25	18.90-20.40	A-2-6(0)	31	12	54.6	21.2	4.0	20.2	100	74	26			Y9SBL
SS-1249	25 LT	69+00	3.90-5.40	A-1-b(0)	15	NP	68.7	17.7	5.6	8.1	95	49	15	-	-	Y9SBL
SS-1250	25 LT	69+00	8.90-10.40	A-2-7(2)	48	23	62.3	8.5	3.9	25.3	95	45	28	-	-	Y9SBL