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STATE	STATE PROJECT REFERENCE NO.	SHEET NO	TOTAL SHEETS
N.C.	34522.1.3 (R-3100A)	1	37

STATE PROJ. NO.	F.A. PROJ. NO.	DESCRIPTION
34522.1.3	STP-0016(52)	P.E.
		RW & UTIL.

NOTE: SEE SHEET 2A 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. *34522.1.3 (R-3100A)* F.A. PROJ. *STP-0016(52)*

COUNTY *CATAWBA*

PROJECT DESCRIPTION *NC 16 FROM NORTH OF SR 1814 (CALDWELL RD.) TO SR 1895 (TOWER RD.)*

INVENTORY

CAUTION NOTICE

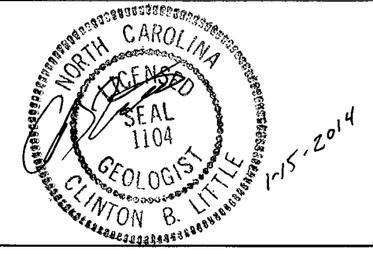
THE SUBSURFACE INFORMATION AND THE SUBSURFACE INVESTIGATION ON WHICH IT IS BASED WERE MADE FOR THE PURPOSE OF STUDY, PLANNING, AND DESIGN, AND NOT FOR CONSTRUCTION OR PAY PURPOSES. THE VARIOUS FIELD BORING LOGS, ROCK CORES, AND SOIL TEST DATA AVAILABLE MAY BE REVIEWED OR INSPECTED IN RALEIGH BY CONTACTING THE N. C. DEPARTMENT OF TRANSPORTATION, GEOTECHNICAL ENGINEERING UNIT AT (919) 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
J.K. STICKNEY
C.L. SMITH

INVESTIGATED BY *J.E. BEVERLY*
CHECKED BY *C.B. LITTLE*
SUBMITTED BY *C.B. LITTLE*
DATE *NOVEMBER 2013*



CONTRACT:

ID: R-3100A

DRAWN BY: *J.E. BEVERLY*

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.

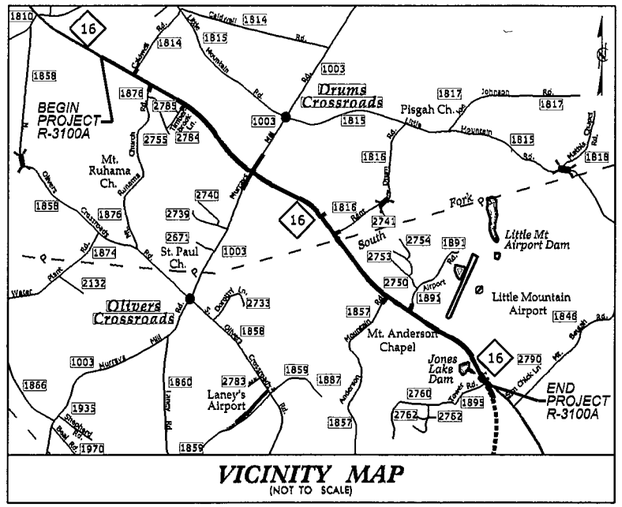
TIP PROJECT: R-3100A

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	R-3100A	2A	37

STATE PROJ. NO.	F. A. PROJ. NO.	DESCRIPTION
34522.1.3	STP-0016(52)	P.E.
34522.2.3	STP-0016(52)	R/W, UTIL.

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

CATAWBA COUNTY



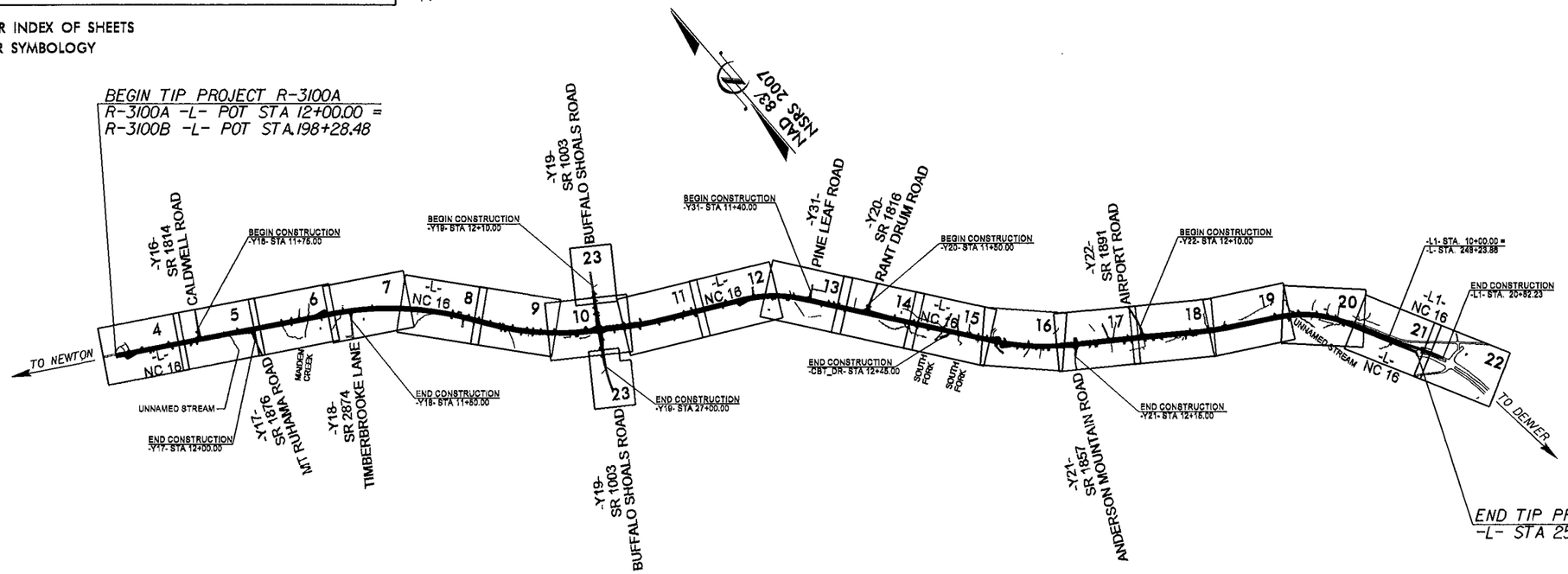
VICINITY MAP
(NOT TO SCALE)

R/W SUBMITTAL

LOCATION: NC 16 FROM NORTH OF SR 1814 (CALDWELL ROAD) TO SR 1895 (TOWER ROAD)

TYPE OF WORK: GRADING, PAVING, DRAINAGE, AND CULVERTS

SEE SHEET 1-A FOR INDEX OF SHEETS
SEE SHEET 1-B FOR SYMBOLOGY



THIS PROJECT IS NOT WITHIN ANY MUNICIPAL BOUNDARIES.
CLEARING ON THIS PROJECT SHALL BE PERFORMED TO THE LIMITS ESTABLISHED BY _____.
THIS IS A PARTIAL CONTROLLED-ACCESS PROJECT WITH ACCESS BEING LIMITED TO POINTS AS SHOWN ON THE PLANS.

NCDOT CONTACT:
BRENDA L. MOORE, P.E.
ENGINEERING COORDINATION
ROADWAY DESIGN UNIT

CONTRACT:

GRAPHIC SCALES

PLANS 50 25 0 50 100
PROFILE (HORIZONTAL) 50 25 0 50 100
PROFILE (VERTICAL) 10 5 0 10 20

DESIGN DATA

ADT 2014 = 10,100
ADT 2034 = 18,700
DHV = 10 %
D = 60 %
T = 9 % *
V = 60 MPH
* TTST 4% DUAL 5%
FUNC CLASS =
RURAL ARTERIAL
REGIONAL TIER

PROJECT LENGTH

LENGTH ROADWAY TIP PROJECT R-3100A = 4.781 MILES
TOTAL LENGTH OF TIP PROJECT R-3100A = 4.781 MILES

Prepared In the Office of:

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2012 STANDARD SPECIFICATIONS

RIGHT OF WAY DATE:
AUGUST 30, 2013

LETTING DATE:
AUGUST 18, 2015

TIM JORDAN, PE
PROJECT ENGINEER

RICK MOORE, PE
HYDRAULICS PROJECT ENGINEER

ROADWAY DESIGN ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

SIGNATURE: P.E.

HYDRAULICS ENGINEER

SIGNATURE: P.E.

DIVISION OF HIGHWAYS
STATE OF NORTH CAROLINA

P.E.
STATE HIGHWAY DESIGN ENGINEER

$$DATE$$
$$TIME$$
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bevertlu AT GEH266095

PROJECT REFERENCE NO.	SHEET NO.
34522.1.3 (R-3100A)	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-7-5, A-7-6)	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							
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				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	6 MX		NP	10 MX	10 MX	11 MN	11 MN	10 MX	10 MX	11 MN	11 MN			
GROUP INDEX	0		0	0		4 MX		8 MX	12 MX	16 MX	No MX			
USUAL TYPES OF MAJOR MATERIALS	STONE FRAGS. GRAVEL, AND SAND		FINE SAND	SILTY OR CLAYEY GRAVEL AND SAND				SILTY SOILS		CLAYEY SOILS				
GEN. RATING AS A SUBGRADE	EXCELLENT TO GOOD							FAIR TO POOR				FAIR TO POOR	POOR	UNSUITABLE

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

CONSISTENCY OR DENSENESS

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

TEXTURE OR GRAIN SIZE

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

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

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

SOIL MOISTURE - CORRELATION OF TERMS

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

PLASTICITY

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

COLOR

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

GRADATION

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

ANGULARITY OF GRAINS

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

MINERALOGICAL COMPOSITION

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

COMPRESSIBILITY

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

PERCENTAGE OF MATERIAL

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

GROUND WATER

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

MISCELLANEOUS SYMBOLS

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

ABBREVIATIONS

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

SAMPLE ABBREVIATIONS

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

EQUIPMENT USED ON SUBJECT PROJECT

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

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

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

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

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

ROCK DESCRIPTION

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

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

WEATHERING

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

ROCK HARDNESS

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

FRACTURE SPACING

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

BEDDING

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

INDURATION

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

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

TERMS AND DEFINITIONS

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

AQUIFER - A WATER BEARING FORMATION OR STRATA.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

BENCH MARK:

ELEVATION: FT.

NOTES:
BORING ELEVATIONS WERE OBTAINED FROM THE R3100A_PS_DTM.TIN FILE.

STRATIGRAPHY IS THROUGH THE BORINGS FOR PROFILES

REVISED 09/23/09

Sheet 2 A

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION

PAT MCCRORY
GOVERNOR

ANTHONY J. TATA
SECRETARY

October 24, 2013

STATE PROJECT: 34522.1.3 (R-3100A)
F.A. PROJECT: STP-0016(52)
COUNTY: Catawba
DESCRIPTION: NC 16 from North of SR 1814 (Caldwell Rd.) to SR 1895 (Tower Rd.)

SUBJECT: Geotechnical Report – Inventory

This report presents the findings for the proposed multi-lane widening of NC 16 in Catawba County. Beginning and ending station limits for this section of the project are from -L- Sta. 12+00 to 253+80. The project begins just north of Caldwell Rd. (toward Newton) and trends southeasterly to its terminus north of Tower Rd. in the direction of Denver. Distance traversed from beginning to end is 4.6 miles.

The geotechnical field investigation was conducted in the month of June 2013. An ATV mounted CME 550X drill machine equipped with automatic drop hammer was utilized to perform test boring along the proposed corridor. The following survey lines are addressed in this report.

Line	**Station**
-L-	12+00 – 253+80
-L1-	10+00 – 23+18.4
-Y16-	10+00 – 13+75
-Y17-	10+00 – 12+00
-Y18-	10+00 – 11+50
-Y19-	13+50 – 27+00
-Y20-	11+50 – 13+45
-Y21-	10+00 – 12+15
-Y22-	12+10 – 14+00
-Y31-	11+40 – 12+95
-CBT_DR-	10+00 – 12+28
-DR1-	10+00 – 12+67

MAILING ADDRESS:
NC DEPARTMENT OF TRANSPORTATION
DIRECTOR OF PRECONSTRUCTION
1538 MAIL SERVICE CENTER
RALEIGH NC 27699-1538

TELEPHONE: 919-707-2540
FAX: 919-715-5361

WEBSITE: WWW.NCDOT.GOV

LOCATION:
TRANSPORTATION BUILDING
1 SOUTH WILMINGTON STREET
RALEIGH NC

Areas of Special Geotechnical Interest:

1. *Groundwater:*

There were few instances in which groundwater was encountered during the course of this investigation. The vast majority of borings were dry after 24 hours. The following boring locations encountered groundwater:

-L- Station / Offset	**Relationship of groundwater to proposed grade**
32+93, 50'RT	below grade
47+60, 65'LT	below grade
207+70, 17'LT	possible water in cut left of boring
212+57, 45'LT	below grade
215+30, 10'LT	below grade
246+00, 55'LT	above grade in cut left of -L-
249+00 60'LT	above grade in cut left of -L-

2. *Crystalline Rock:*

Rock was only encountered in two instances. Borings at station 242+60, 55' LT and 246+00, 55' LT each encountered rock 18 feet below ground surface. In each instance rock is below proposed grade.

3. *High PI Soils: (PI's 28 and greater)*

Even though clayey soils are common along the project corridor, high PI clay soils were sporadic in occurrence. The following boring locations encountered high PI soils within 3 feet of proposed grade:

-L- Station / Offset	**AASHTO Soil Type**	**PI Value**
57+31, 47' LT	A-7-5	32
93+53, 35' RT	A-7-5	35
129+24, 63' LT	A-7-5	30
147+75, 30' LT	A-7-5	35
218+00, 65' RT	A-7-5	38

4. *Alluvial Soils:*

There are few occurrences of alluvial soils along the project corridor. Most are the result of small creeks and drainage features that are of little significance or concern. Known alluvial soils types are very soft to medium stiff clays (A-7-5), medium stiff silt (A-5), and very loose sand (A-2-4).

Physiography / Geology:

The project area is in rural southeastern Catawba County between the cities of Newton and Denver. Topography is flat to rolling and traverses along woods, open fields, and residential structures.

Geologically the site lies in the Inner Piedmont and Kings Mountain Belt with micaceous residual soil types originating predominantly from mica schist (CZms) parent rock.

Soil Properties:

1. *Residual Soils:*

These soils are derived from in place weathering of parent materials. They occur in a variety of consistencies, classifications, and stratigraphic sequences. Residual soils are further subdivided into clays, silts, and sands. In most instances residual soils in this area are micaceous with mica amounts ranging from trace to high.

Clays are a prominent soil type along the project corridor. They are found as surface soils and subsoils. Typically they consist of medium stiff to very stiff sandy silty and/or silty sandy clay in the AASHTO classifications of A-7-5, A-7-6, and A-6. Clay soils appear well drained with a plasticity index ranging from 11 to 38. Corresponding liquid limit ranges are between 28 and 81.

Silts are also common and typically consist of medium stiff to very stiff clayey sandy silt. AASHTO classifications are A-4, and A-5. Silts may occur at all depth ranges.

Sands occur less frequently than other residual soil types. None the less they are found throughout the project corridor and at varying depths in the stratigraphic sequence. Sands are typically described as medium dense to very dense clayey silt sand and clayey sand with AASHTO classifications of A-2-4, and A-2-5.

2. *Alluvial Soils:*

Alluvial soils originate from water transportation and deposition in a floodplain environment. Alluvial deposits along the project corridor are limited to creeks and drainage features. They are typically shallow with known soil types of very soft to stiff silty sandy clay (A-7-5), medium stiff clayey sandy silt (A-5), and very loose clayey sand (A-2-4).

3. *Fill Soils:*

Roadway embankment fill soils are present beneath existing NC 16 and its connectors. Roadway fill soils are predominantly comprised of medium stiff silty sandy clay (A-7, A-6), and medium stiff sandy silt (A-4).

Sheet 2B

An area of artificial fill was noted left of -L- station 212+57. This fill in this area resulted from clearing of the lot by the property owner. Fill contains mostly disturbed and re-distributed soil that is very soft to soft silty sandy clay (A-6). Depth of artificial fill is approximately 9 feet.

Wells:

The majority if not all of the residential and business structures along the project corridor rely on well water. There were a number of discovered wells which lie within construction limits, and others in between construction and proposed right of way. In some instances construction limits and right of way boundaries will result in the loss of the primary residence or business structure leaving an abandoned well outside proposed DOT limits. The following list is of wells that are know to exist in each of these instances. It is possible that there are additional wells that went undetected during our investigation.

Well Station Location (-L-)	**Notes (ie. within construction limits, etc.)**
RT of 28+20	House likely condemned, well outside R/W
RT of 40+50	House likely condemned, well outside R/W
RT of 43+55	Well lies within limits
LT of 81+15	House likely condemned, well outside R/W
RT of 85+50	House likely condemned, well outside R/W
RT of 88+90	House likely condemned, well outside R/W
RT of 91+50	House likely condemned, well outside R/W
LT of 93+50 – 98+00	Group of houses likely condemned, well outside R/W
LT of 102+00 – 108+00	Group of houses likely condemned, well outside R/W
LT of 134+50 – 137+00	Group of houses likely condemned, well outside R/W
LT of 156+75	Well lies within limits
LT of 158+70	House likely condemned, well outside R/W
LT of 169+50	House likely condemned, well outside R/W
LT of 178+30	Well lies within limits
RT of 180+90	House likely condemned, well outside R/W
RT of 183+30	House likely condemned, well outside R/W
RT of 183+60	Well lies within limits
LT of 199+00	House likely condemned, well outside R/W

Culverts:

There are four proposed culvert extensions along this section of NC 16. A single boring was performed on the inlet side of each culvert location. Vicinity soils typically consist of 3 -4 feet of alluvium in the form very soft to soft silty sandy clay (A-7-5) or very loose clayey sand (A-2-4) overlying residual medium stiff to very stiff clayey sandy silt (A-4, A-5) with some mica. Culvert locations are as follows:

-L- 47+57.25
-L- 165+35.45
-L- 168+22.86
-L- 230+73.41

PROJECT REFERENCE	SHEET NO.
R-3100A	4

ROADWAY DESIGN ENGINEER

HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

HATCH MOTT MACDONALD I & E, LLC
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McKIM & CREED, 333 NORTH FRONT STREET, WILMINGTON, NORTH CAROLINA 28401, TEL: (910) 343-1246 FAX: (910) 763-8226

GRAPHIC SCALE
25' 0 25' 50'

SEE PROFILE SHEET 24

NAD 83/NSRS 2007

15+00

20+00

SCOTT L & ANGELA R LEATHERMAN
DB 1917 PG 1155
DB 2209 PG 1862

CHARLES R & TINA H RAMSEY
DB 1837 PG 1067

BEGIN TIP PROJECT R-3100A
R-3100A -L- POT STA 12+00.00 =
R-3100B -L- POT STA 198+28.48

-L- POT Sta. 10+00.00

TIMOTHY H & VICKIE M DRUM
DB 2567 PG 1396
PB 48 PG 116

TIMOTHY HOWARD DRUM
DB 1814 PG 436
DB 2172 PG 1125
PB 23 PG 219

MICHAEL D & JULIE D CARROLL
DB 2767 PG 429

ELISSA D BARNES & DANNY A CALDWELL
DB 2559 PG 1666

WAYNE H RINK
DB 2975 PG 1253

BARBARA DRUM ROBINSON TRUSTEE
DB 2890 PG 1507

THOMAS C JR & JACQUELYN M HEWITT
DB 1613 PG 858

DAVID LEE STEWART
DB 1746 PG 879

ROADWAY EMBANKMENT FILL

RESIDUAL

-BL-35

-BL-36

MATCHLINE -L- STA 24+00 SEE SHEET NO. 5

beverly AT GEH266095
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PROJECT REFERENCE	SHEET NO.
R-3100A	5
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

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GRAPHIC SCALE 0 25' 50'

SEE PROFILE SHEET 24 & 33

MATCHLINE -L- STA 24+00.00 SEE SHEET NO. 4

MATCHLINE -L- STA 38+00.00 SEE SHEET NO. 6

NAD 83/NSRS 2007

-Y16- POT Sta. 10+00.00

BEGIN CONSTRUCTION
-Y16- POT Sta. 11+75.00

-L- POT Sta. 37+10.67
-Y17- PC Sta. 10+00.00

END CONSTRUCTION
-Y17- POC Sta. 12+00.00

-Y17- PT Sta. 13+20.00

-L- POT Sta. 27+51.09
-Y16-1 POT Sta. 13+75.00

GPS R3100AB-7

-BL-37

BM#10 -BL-
STA 227+49 238'LT
ELEV.= 998.97'

MICHAEL D & JULIE D CARROLL
DB 2767 PG 429

ERIC C & ANNETTE H LEE
DB 2054 PG 774

JERRY R WARREN
DB 2152 PG 187
PB 47 PG 103

DAVID L STEWART
DB 2899 PG 1370
PB 47 PG 103

DAVID LEE STEWART
DB 1746 PG 879

-Y17-
PI Sta. 11+60.16
Δ = 6° 11' 00.1" (LT)
D = 1° 55' 56.3"
L = 320.00'
T = 160.16'
R = 2,965.15'

beverly AT 0EH266095
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PROJECT REFERENCE	SHEET NO.
R-3100A	6

ROADWAY DESIGN ENGINEER

HYDRAULICS ENGINEER

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GRAPHIC SCALE
0 25' 50'

SEE PROFILE SHEET 25

MATCHLINE -L- STA 38+00.00 SEE SHEET NO. 5

MATCHLINE -L- STA 52+00.00 SEE SHEET NO. 7

NAD 83/NSRS 2007

-L-
PIs Sta 52+08.00
Θs = 0° 36' 24.6"
Ls = 120.00'
LT = 80.00'
ST = 40.00'

PI Sta 64+61.32
Δ = 24° 10' 39.5" (RT)
D = 1° 00' 41.0"
L = 2,390.51'
T = 1,213.31'
R = 5,665.00'
SE = 03
RO = 120'

-L- TS Sta. 51+28.00

BM#11-BL-
STA 245+71.64'LT
ELEV.= 968.11'

-BL-38

-BL-39

-L- S 60°17'13.0" E

ERIC C & ANNETTE H LEE
DB 2054 PG 774

RICKY M & KATHY C GOODSON
DB 2407 PG 189

ALBERT S & WANDA C JARRETT
DB 1278 PG 888
DB 2124 PG 1837
PB 18 PG 86

MARK B & MITZI Y STORY
DB 1538 PG 157
DB 2580 PG 1600
DB 2580 PG 1603
DB 2663 PG 1177

PHIL C & KAREN V RICE
DB 2564 PG 1814

BRIAN N & TONY M POOLE
DB 1671 PG 343
DB 1681 PG 343
DB 2695 PG 482

MARK D & KELLY B SHUBERT
DB 2002 PG 1654
PB 27 PG 191

JOHNNIE D & JEANETTE S SHUBERT
DB 2002 PG 17
DB 2006 PG 697
PB 27 PG 190
PB 27 PG 191

RESIDUAL

ROADWAY EMBANKMENT FILL

PIPE SIZE AND TYPE CHANGES FROM 15" RCP TO 15" HDPE TO 15" RCP AT UNKNOWN POINT

N 62°48'28" W 222.35'

N 62°48'28" W 164.88'

S 80°32'09" E 404.74'

N 37°04'27" E 276.98'

N 37°08'17" E 247.39'

N 37°08'17" E 188.61'

S 37°38'10" W 258.79'

S 83°08'22" E 43.63'

S 7°31'59" E 102.97'

S 37°23'41" E 129.55'

S 8°08'32" E 101.35'

N 8°08'32" W 63.02'

S 85°51'28" W 102.27'

bbeverly AT GEH266095
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PROJECT REFERENCE	SHEET NO.
R-3100A	7
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

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MCKIM & CREED
ENGINEERS | PLANNERS | SURVEYORS
340 NORTH PEDEN STREET
WILMINGTON, NORTH CAROLINA 28401
TEL (910) 343-1066 FAX (910) 793-4282

GRAPHIC SCALE
25' 0 25' 50'

SEE PROFILE SHEET 25 & 33

NAD 83/NSRS 2007

MATCHLINE -L- STA 52+00.00 SEE SHEET NO. 6

MATCHLINE -L- STA 65+50.00 SEE SHEET NO. 8

55+00 60+00 65+00

-L- SC Sta. 52+48.00

-L- POC Sta. 55+51.07
-Y18- POT Sta. 10+00.00

-Y18- POT Sta. 13+00.00

END CONSTRUCTION
-Y18- POT Sta. 11+50.00

-BL-40

-BL-41

MARK B & MITZIY STORY
DB 1338 PG 157
DB 2580 PG 1600
DB 2580 PG 1603
DB 2663 PG 1177

JOE L & DOROTHY H STAMEY
DB 1593 PG 568

MARK B & MITZIY STORY
DB 2663 PG 1179
PB 61 PG 137

DANNY A & ELISSA D BARNES
DB 2559 PG 1663
PB 41 PG 52

MARY CALDWELL BEATTY
NO DEED REF

MARK B & MITZIY STORY
DB 2580 PG 1600

ERIC J & MELISSA N. WEISS
DB 2927 PG 1542
STONE PB 27 PG 190

JOHN M & BEVERLY A HILTON
DB 2731 PG 1756
PB 27 PG 190

ANDREW C & CRYSTAL A HOYLE
DB 2034 PG 765
PB 27 PG 190

ANNA MARIE STEWART
DB 2131 PG 535
PB 27 PG 190

DWIGHT EUGENE TABOR
DB 2781 PG 1876
PB 27 PG 190

LINELLE LINEBERGER WILLIAMS
DB 1540 PG 421

RESIDUAL
ALLUVIUM
ROADWAY EMBANKMENT FILL

-L-	
PIs Sta 52+08.00	PI Sta 64+61.32
Θs = 0° 36' 24.6"	Δ = 24° 10' 39.5" (RT)
Ls = 120.00'	D = 1° 00' 41.0"
LT = 80.00'	L = 2,390.51'
ST = 40.00'	T = 1,213.31'
	R = 5,665.00'
	SE = 03
	RO = 120'

beverly AT GEH2660095
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15-OCT-2013 09:57

PROJECT REFERENCE	SHEET NO.
R-3100A	8

ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER

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343 NORTH FRONT STREET
WILMINGTON, NORTH CAROLINA 28401
TEL: (910) 343-1344 FAX: (910) 793-4288

GRAPHIC SCALE
25' 0 25' 50'

SEE PROFILE SHEET 26

NAD 83/NSRS 2007

MATCHLINE -L- STA 65+50.00 SEE SHEET NO. 7

MATCHLINE -L- STA 79+00.00 SEE SHEET NO. 9

70+00

75+00

MARY CALDWELL BEATTY
NO DEED REF

SAMUEL R & RUBERTA L BALLARD
DB 2019 PG 1281

GROEN REALTY LLC
DB 2672 PG 857

MARK B & MITZIY STORY
DB 2580 PG 1600

FRANK L & VERA C CALDWELL
DB 2958 PG 312
DB 2958 PG 315

LARRY G & GLENDA W SIGMON
DB 2917 PG 567

-L- CS Sta. 76+38.51

-L- ST Sta. 77+58.51

-BL-42

RESIDUAL

ROADWAY EMBANKMENT FILL

LINELLE LINEBERGER WILLIAMS
DB 1540 PG 421

BM#12 -BL-
STA 268+02 264'RT
ELEV.= 1043.28'

BURKE FAMILY PROPERTIES LTD
DB 3015 PG 1032
TRACT 3

EZRA B DRUM
DB 2222 PG 853
PB 4 PG 88

-L-

PI Sta 64+61.32	PIs Sta 76+78.51
Δ = 24° 10' 39.5" (RT)	θs = 0° 36' 24.6"
D = 1° 00' 41.0"	Ls = 120.00'
L = 2,390.51'	LT = 80.00'
T = 1,213.31'	ST = 40.00'
R = 5,665.00'	
SE = 03	
RO = 120'	

PROJECT REFERENCE	SHEET NO.
R-3100A	9

ROADWAY DESIGN ENGINEER

HYDRAULICS ENGINEER

PRELIMINARY PLANS
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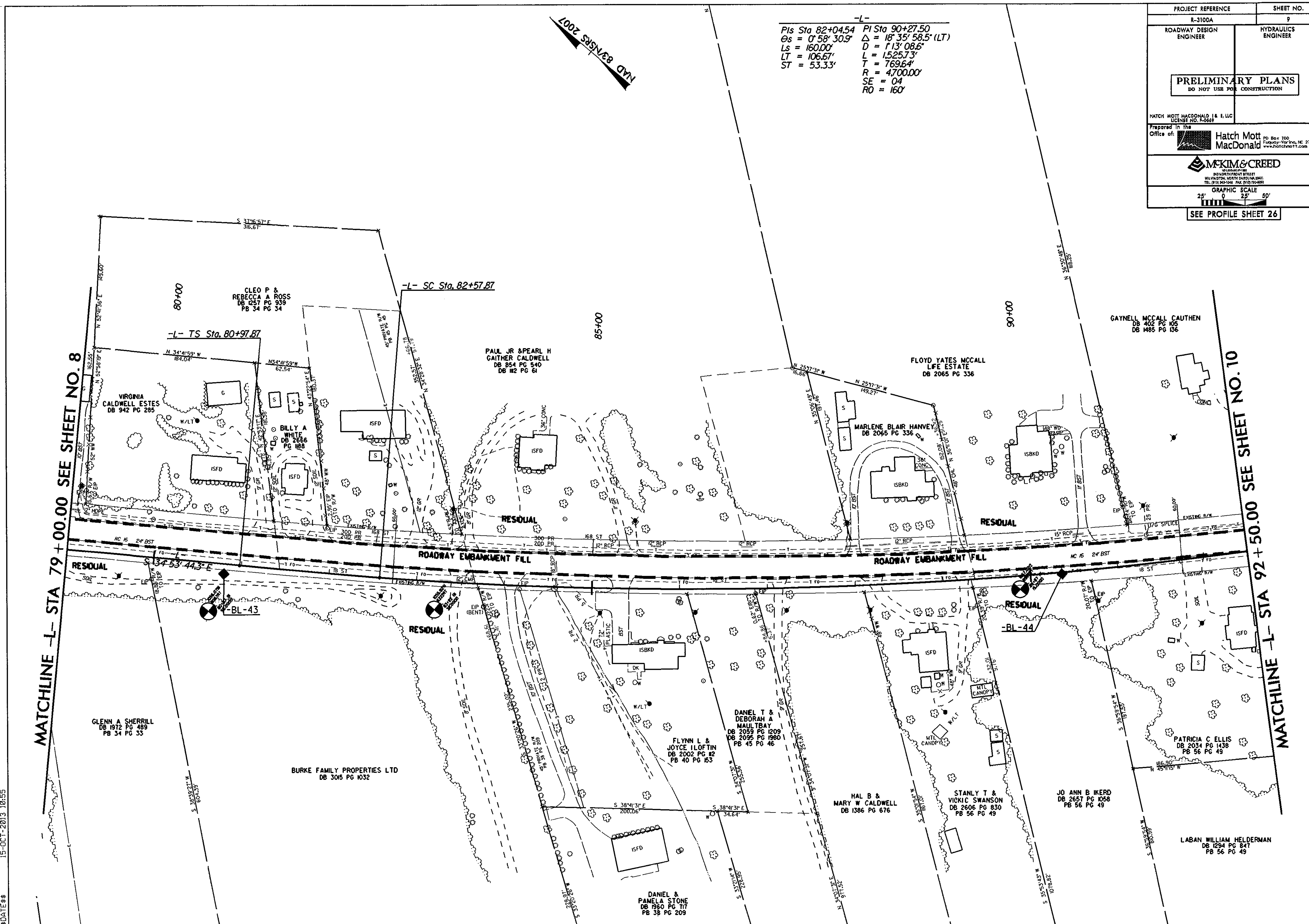
McKIM & CREED
243 NORTH FRONT STREET
WILMINGTON, NORTH CAROLINA 28401

GRAPHIC SCALE 25' 0 25' 50'

SEE PROFILE SHEET 26



ebeverly AT GEH266095
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$$DATE$$ 15-OCT-2013 10:55

PROJECT REFERENCE	SHEET NO.
R-3100A	10

ROADWAY DESIGN ENGINEER

HYDRAULICS ENGINEER

PRELIMINARY PLANS
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LICENSE NO. F-0669

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McKIM & CREED
ENGINEERS PLLC
333 NORTH FRONT STREET
WILMINGTON, NORTH CAROLINA 28401
TEL: (910) 343-1568 FAX: (910) 772-8288

GRAPHIC SCALE
0 25' 50'

SEE PROFILE SHEET 27 & 34

-L-
PI Sta 90+27.50
Δ = 18° 35' 58.5" (LT)
D = 1° 13' 08.6"
L = 1,525.73'
T = 769.64'
R = 4,700.00'
SE = 04
RO = 160'

PIs Sta 98+36.93
Θs = 0° 58' 30.9"
Ls = 160.00'
LT = 106.67'
ST = 53.33'

PIs Sta 105+53.70
Θs = 0° 38' 03.4"
Ls = 120.00'
LT = 80.00'
ST = 40.00'

PI Sta 109+04.95
Δ = 6° 34' 23.5" (LT)
D = 1° 03' 25.6"
L = 621.80'
T = 311.24'
R = 5,420.00'
SE = 03
RO = 120'

-Y19-
PI Sta 18+77.72
Δ = 1° 36' 13.7" (LT)
D = 1° 00' 18.7"
L = 159.55'
T = 79.78'
R = 5,700.00'

NAD 83/NSRS 2007

MATCHLINE -Y19- STA 15+00.00 SEE SHEET NO. 23

MATCHLINE -L- STA 92+50.00 SEE SHEET NO. 9

MATCHLINE -L- STA 106+50.00 SEE SHEET NO. 11

MATCHLINE -Y19- STA 24+50.00 SEE SHEET NO. 23

GAYNELL MCCALL CAUTHEN
DB 621 PG 224

NORMA TUCKER MCCALL
DB 611 PG 357
DB 1485 PG 136
PB 21 PG 292

DRUM HOWARD TRACY
DB 2711 PG 1054
PB 59 PG 117

HOWARD TRACY DRUM
DB 2008E PG 1208
DB 448 PG 348

LARRY DAVID DRUM
DB 2717 PG 1060
PB 59 PG 117

LARRY D DRUM
DB 2717 PG 1060
DB 2719 PG 1291
PB 59 PG 117

DENISE D WRIGHT
DB 2717 PG 1074
PB 59 PG 117

SANDRA ARLAND HEWIT PRICE
DB 394 PG 518

JERRY W & JANE GILBERT
DB 1369 PG 846
PB 19 PG 93

DIXIE STECK
DB 2701 PG 247

CHARLES JR (& KAREN) FRESCO
DB 2973 PG 1481

TONY W & CHARLOTTE L WALKER
DB 20 PG 853

DWIGHT V & BETTY JO I CALDWELL
DB 898 PG 418

BELLSOUTH TELECOMMUNICATIONS INC
DB 1380 PG 270

PEA RIDGE INVESTMENTS LLC
DB 2390 PG 452
PB 56 PG 49

LABAN WILLIAM HELDERMAN
DB 1294 PG 847
PB 56 PG 49

ROBERT K & KAREN M WILKINSON
DB 2180 PG 445
PB 40 PG 107

LARRY E & LINDA C CALDWELL
DB 390 PG 509
DB 915 PG 64
DB 915 PG 76
PB 54 PG 88

-L- CS Sta. 97+83.60
-L- ST Sta. 99+43.60
-L- TS Sta. 104+73.70
-L- SC Sta. 105+93.70
-Y19- PC Sta. 17+97.94
-Y19- PT Sta. 19+57.50
-L- POT Sta. 101+38.91
-Y19- EOT Sta. 20+32.18

GPS R3100AB-9

BM#13 -BL-
STA 294+34 403'RT
ELEV.= 1063.90'

ROADWAY EMBANKMENT FILL
RESIDUAL
ALLUVIUM

★ PROPOSED SIGNAL

beverly AT GEH26609S
C:\projects\R3100A_GEO_RDWY_CATAWBA\CADD_GEOTECH\PlanProf\R3100A_rdy_pshl0.dgn
$$DATE$$ 15-OCT-2013 10:58

PROJECT REFERENCE	SHEET NO.
R-3100A	11
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

HATCH MOTT MACDONALD I & I, LLC
LICENSE NO. F-0669

Prepared in the Office of: Hatch Mott MacDonald, PO Box 7001, Fuquay-Varina, NC 27526, www.hatchmott.com

McKIM & CREED, NC LICENSE #1981, 363 NORTH FRONT STREET, WILMINGTON, NORTH CAROLINA 28401, TEL (910) 343-1266 FAX (910) 772-0282

GRAPHIC SCALE
0 25' 50'

SEE PROFILE SHEET 27

NAD 83/NSRS 2007

MATCHLINE -L- STA 106+50.00 SEE SHEET NO. 10

MATCHLINE -L- STA 120+00.00 SEE SHEET NO. 12

HOWARD TRACY DRUM
DB 2008E PG 208
DB 448 PG 348

OLLIE GERTRUDE BOSTI MAJOR
DB 854 PG 343

RECIL H & DENISE D WRIGHT
DB 2301PG 869

FRANKIE S DETTER & WANDA D EADES
DB 1939 PG 1323

JOSEPH BRENT MITCHELL
DB 2683 PG 1496
PB 65 PG 180

ANDREW P & LESLIE C HANELLIN
DB 2868 PG 74

VICKY CAMPBELL WHITMIRE
DB 1044 PG 119
DB 1380 PG 314

KELLY C MOOSE & DEBORAH C PROPST
DB 2853 PG 631
DB 2853 PG 633
BACK REFS:
DB 462 PG 7
DB 1727 PG 963

RONALD D JR & RHONDA W JUSTICE
DB 2179 PG 112
DB 2704 PG 1275
PB 62 PG 137

ELMER UDEAN & NANCY B BURKE
DB 2718 PG 935
DB 62 PG 137

ELMER UDEAN & NANCY B BURKE
DB 2718 PG 935
DB 62 PG 137

-L- ST Sta. 113+35.51
-L- CS Sta. 112+15.51

BM#14 -BL-
STA 312+92 184'LT
ELEV.= 1044.72'

-L-

PI Sta 109+04.95	PIs Sta 112+55.51
Δ = 6° 34' 23.5" (LT)	Θs = 0° 38' 03.4"
D = 1° 03' 25.6"	Ls = 120.00'
L = 621.80'	LT = 80.00'
T = 311.24'	ST = 40.00'
R = 5,420.00'	
SE = 03	
RO = 120'	

beverly AT GEH2660095
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PROJECT REFERENCE	SHEET NO.
R-3100A	12

ROADWAY DESIGN ENGINEER

HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

HATCH MOTT MACDONALD I & I, LLC
LICENSE NO. F-0669

Prepared in the Office of: Hatch Mott MacDonald, PO Box 700, Fuquay-Varina, NC 27526, www.hatchmott.com

McKIM & CREED, ENGINEERS, PLLC, 243 NORTH FRONT STREET, WILMINGTON, NORTH CAROLINA 28401, TEL. (910) 343-1916 FAX. (910) 763-8428

GRAPHIC SCALE 25' 0 25' 50'

SEE PROFILE SHEET 28

NAD 83/NSRS 2007

MATCHLINE -L- STA 120+00.00 SEE SHEET NO. 11

MATCHLINE -L- STA 133+50.00 SEE SHEET NO. 13

-L- TS Sta. 127+02.05

-L- SC Sta. 129+42.05

ANDREW P & LESLIE C HANELLIN
DB 2818 PG 74

ELMER U & NANCY B BURKE
DB 3021PG 866

ELMER UDEAN & NANCY B BURKE
DB 2718 PG 935
DB 62 PG 137

KENNETH E & LOVENIA S KEEVER
DB 606 PG 602
DB 940 PG 356

LOVENIA STORY KEEVER
DB 2009E PG 0438
DB 340 PG 483

LAHRUE JONES HOLLAND
DB 2961PG 248

HECHT DEVELOPMENT CO INC
DB 2873 PG 264
PB 68 PG 194
LOT 1

HECHT DEVELOPMENT CO INC
DB 2873 PG 264
PB 68 PG 194
COMMON SPACE

HECHT DEVELOPMENT CO INC
DB 2873 PG 264
PB 68 PG 194
LOTS 9A-12A

-BL-47

ROADWAY EMBANKMENT FILL

RESIDUAL

EXISTING R/W

EXISTING R/W=PROP.LINE

15' SEPTIC EASEMENT PB 68 PG 194

FORCED MAIN DISTRIBUTION BOX

FORCED MAIN VAULT

ELECTRICAL BOX

TOP=1012.96' LID BOLTED

TOP=1000.62' LID BOLTED

5'CONC HW TOP=1015.31'

ISBKD

ISFD

CONC POOL

BLK WALLS

MTL CANOPY

G

W/L

SITE/TYPE UNKNOWN

CARTON DR

HENLOCK ST

N 57°34'14" W 293.76'

N 24°17'04" E 351.88'

N 24°17'04" E 212.16'

N 24°17'04" E 200.05'

N 56°40'41" W 421.96'

N 60°09'26" W 125.76'

N 62°38'07" W 153.91'

N 57°56'02" W 178.04'

S 55°32'01" E 72.75'

S 55°28'47" E 60.91'

S 55°32'45" E 85.90'

S 55°33'02" E 178.37'

S 53°03'53" E 76.07'

S 50°18'56" E 130.33'

S 31°01'14" W 283.28'

S 31°01'14" W 274.58'

S 31°01'14" W 275.00'

S 31°01'42" W 275.00'

S 37°10'45" W 166.28'

-L-

PIs Sta 128+62.07	PI Sta 133+78.54
θs = 2° 51' 53.2"	Δ = 20° 36' 55.2" (RT)
Ls = 240.00'	D = 2° 23' 14.4"
LT = 160.02'	L = 863.53'
ST = 80.02'	T = 436.49'
	R = 2,400.00'
	SE = 06
	RO = 240'

beverly AT GEH2660895
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$$DATE$$ 15-OCT-2013 11:01

PROJECT REFERENCE	SHEET NO.
R-3100A	13
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

HATCH MOTT MACDONALD I & E, LLC
LICENSE NO. F-0669

Prepared in the Office of: Hatch Mott MacDonald PO Box 700 Fuquay-Varina, NC 27526 www.hatchmott.com

McKIM & CREED
333 NORTH PINEY STREET
WILMINGTON, NORTH CAROLINA 28401
TEL: (910) 343-1344 FAX: (910) 772-8021

GRAPHIC SCALE
25' 0 25' 50'

SEE PROFILE SHEET 28 & 34

NAD 83/NSRS 2007

MATCHLINE -L- STA 133+50.00 SEE SHEET NO. 12

MATCHLINE -L- STA 146+50.00 SEE SHEET NO. 14

-Y31- POT Sta. 10+00.00

BEGIN CONSTRUCTION
-Y31- POT Sta. 11+40.00

-L- ST Sta. 140+45.58

-L- CS Sta. 138+05.58

-L- POS Sta. 140+43.68
-Y31- POT Sta. 12+95.00

BM#15 -BL-
STA 332+97 240'LT
ELEV.= 985.04'

-BL-48

-BL-49

HECHT DEVELOPMENT CO INC
DB 2873 PG 264
PB 68 PG 194
LOTS 9A-12A

CREEK PLAZA LLC
DB 2761PG 639

EVEY LENA ISENHOWER HEIRS
DB 698 PG 349

JEFFREY W & GINA J AUTON
DB 2838 PG 205
PB 16 PG 265

LARRY A & PATRICIA L DAVIS
DB 2561PG 126
PB 21PG 243

EVAN M OWENBY
DB 2546 PG 800
PB 16 PG 265

DANIEL H & NATINE C NEBERGER
DB 1863 PG 345
PB 16 PG 265

SHEILA ANNETTE JOHNSON
DB 2810 PG 441
PB 16 PG 265

MARCOS M & TERESA CHAVEZ
DB 1904PG 475
PB 16 PG 265

LORI A REARDON
DB 1918PG 191
PB 16 PG 265

LAWRENCE P & DORIS M STORY
DB 2311PG 197
PB 45 PG 147

LAWRENCE A STORY
DB 2996 PG 513
PB 45 PG 147

LARRY JONES HOLLAND
DB 2882PG 248

JUDY BEARD JONES
DB 2627 PG 979

CARROL M & MELLONEE B OWENBY
DB 1628 PG 257
DB 1683 PG 586
PB 28 PG 54

ELMER U & NANCY B BURKE
DB 1477 PG 266

-L-

PI Sta 133+78.54	PIs Sta 138+85.60
Δ = 20° 36' 55.2" (RT)	θs = 2° 51' 53.2"
D = 2° 23' 14.4"	Ls = 240.00'
L = 863.53'	LT = 160.02'
T = 436.49'	ST = 80.02'
R = 2,400.00'	
SE = 06	
RO = 240'	

beverly AT GEH2660895
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$$DATE$$ 15-OCT-2013 11:05

PROJECT REFERENCE	SHEET NO.
R-3100A	14

ROADWAY DESIGN ENGINEER

HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

HATCH MOTT MACDONALD I & I, LLC
LICENSE NO. P-0669

Prepared in the Office of:
Hatch Mott MacDonald
PO Box 200
Pudding Ford, NC 27526
www.hatchmott.com

McKIM & CREED
ENGINEERS-BUILT SINCE 1945
240 NORTH PIKE STREET
WILKINSTON, NORTH CAROLINA 28501
TEL: (910) 343-1062 FAX: (910) 343-1604

GRAPHIC SCALE
25' 0 25' 50'

SEE PROFILE SHEET 29 & 35

NAD 83/NSRS 2007

MATCHLINE -L- STA 146+50.00 SEE SHEET NO. 13

MATCHLINE -L- STA 160+00.00 SEE SHEET NO. 15

BEGIN CONSTRUCTION
-Y20- POT Sta. 11+50.00

-Y20- POT Sta. 10+00.00

-L- POT Sta. 151+02.30
-Y20- POT Sta. 13+45.00

ELMER U & NANCY B BURKE
DB 2592 PG 1644
PB 16 PG 265

JOHN W & ANNA P MULL
DB 1367 PG 374

ELMER U & NANCY B BURKE
DB 1988 PG 101
PB 16 PG 265

NORMA GOSNELL SLUDER
DB 1448 PG 774

AARON T & KRISTY H BURKE
DB 1947 PG 1057
DB 2013 PG 1540
PB 16 PG 265

JOHN WALTER WILKINSON
DB 2893 PG 1248

MAXINE WILKINSON BUMGARNER
DB 2634 PG 1271

MICHAEL L & DEBRA C GILBERT
DB 1476 PG 447

ELMER U & NANCY B BURKE
DB 1477 PG 266

ELMER U & NANCY B BURKE
DB 2592 PG 1644
DB 2602 PG 1
PB 16 PG 265

DAVID E & FAYE B JOHNSON
DB 1560 PG 127
PB 23 PG 164

DAVEY ANDREW BUMGARNER
DB 1560 PG 125
PB 23 PG 164

BM#16 -BL-
STA 352+13 175'RT
ELEV.=938.35'

RESIDUAL

ALLUVIUM

ROADWAY EMBANKMENT FILL

BANKMENT FILL

NC HWY 16 22' BST

150+00

155+00

160+00

cbeverly
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$$DATE$$ 15 OCT 2013 09:38

PROJECT REFERENCE	SHEET NO.
R-3100A	15

ROADWAY DESIGN ENGINEER

HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

HATCH MOTT MACDONALD J & S, LLC
LICENSE NO. F-0669

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McKIM & CREED, ENGINEERS PLLC, 343 NORTH FRONT STREET, WILMINGTON, NORTH CAROLINA 28401, TEL (910) 343-1646 FAX (910) 763-8428

GRAPHIC SCALE
25' 0 25' 50'

SEE PROFILE SHEET 29 & 35

NAD 83/NSRS 2007

N 38°56'30" E 35.50'

N 28°04'19" W 74.87'

N 28°48'52" W 235.00'

N 38°54'52" E 46.75'

N 25°41'08" E 152.00'

N 38°54'52" E 423.00'

N 53°02'46" E 950.35'

S 52°59'45" E 922.06'

N 56°36'17" E 80.50'

N 33°48'52" W 167.35'

N 33°54'25" W 167.28'

MATCHLINE -L- STA 160+00.00 SEE SHEET NO. 14

MATCHLINE -L- STA 173+50.00 SEE SHEET NO. 16

160+00

165+00

170+00

MAXINE WILKINSON BUMGARNER DB 2857 PG 1271

EDWARD M & KATHLEEN STOLARCYK JR DB 1884 PG 909

ELMER U & NANCY B BURKE DB 2204 PG 1569

REBECCA REINHARDT DUFFEY DB 1225 PG 611

NANCY DRUM JOSEY DB 2853 PG 990

LINEBERGER LINDA S DB 2876 PG 700

DAVEY ANDREW BUMGARNER DB 1560 PG 825 PB 23 PG 164

ELMER U & NANCY B BURKE DB 1276 PG 460 PB 20 PG 137

ELMER U & NANCY B BURKE DB 1577 PG 48

ELMER U & NANCY B BURKE DB 2864 PG 798

PROPERTY LINE FOLLOWS CENTER OF MOUNTAIN CREEK

ISFD

2SBKD

ISBKD

G

GAZEBO

MTL CANOPY

W/L

ALLUVIAL

RESIDUAL

ROADWAY EMBANKMENT FILL

NC HWY 16 22' BST

20' BST

15" RCP

18" RCP

24" RCP

18" WD

45BW

BK COLUMN

BRK COLUMN

U/G SPLICE

EXISTING R/W

2-9' x 8' CONC BOX CULVERTS

CONC HW&WW

CBT_DR

N 16° 32' 34" W

S 77° 08' 16" W

-BL-52

-BL-53

-L- POT Sta. 166+50.00

-CBT_DR- POT Sta. 10+00.00

-CBT_DR- PC Sta. 10+36.85

-CBT_DR- PT Sta. 11+22.46

-CBT_DR- PC Sta. 11+73.99

END CONSTRUCTION
-CBT_DR- PT Sta. 12+28.12

-CBT_DR- POT Sta. 12+45.00

GROUND LIGHTS

ELECTRIC MOTOR

BM#17 -BL-
STA 366+53 208'RT
ELEV.=902.19'

TROUT LAKE CREEK

S 52°08'25" W 482.28'

S 36°56'32" E

S 53°02'46" W

-CBT_DR-

PI Sta 10+85.00	PI Sta 12+02.29
Δ = 65° 23' 59.1" (RT)	Δ = 41° 21' 09.0" (LT)
D = 76° 23' 39.7"	D = 76° 23' 39.7"
L = 85.61'	L = 54.13'
T = 48.15'	T = 28.30'
R = 75.00'	R = 75.00'

Beverly AT GEH266095
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$$DATE$$ 16-OCT-2013 07:41

PROJECT REFERENCE	SHEET NO.
R-3100A	16

ROADWAY DESIGN ENGINEER

HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

HATCH MOTT MACDONALD I & E, LLC
LICENSE NO. P-0669

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McKIM & CREED, 252 NORTH FRONT STREET, WILMINGTON, NORTH CAROLINA 28401, TEL: (910) 343-1346 FAX: (910) 763-8428

GRAPHIC SCALE
25' 0 25' 50'

SEE PROFILE SHEET 30 & 36

-L-
Pls Sta 175+55.58
Θs = 1° 09' 21.7"
Ls = 160.00'
LT = 106.67'
ST = 53.34'

Pl Sta 181+55.37
Δ = 15° 41' 39.2" (LT)
D = 1° 26' 42.1"
L = 1,086.08'
T = 546.46'
R = 3,965.00'
SE = 04
RO = 160'

Pls Sta 187+48.32
Θs = 1° 09' 21.7"
Ls = 160.00'
LT = 106.67'
ST = 53.34'

NAD 83/NSRS 2007

MATCHLINE -L- STA 173+50.00 SEE SHEET NO. 15

MATCHLINE -L- STA 187+50.00 SEE SHEET NO. 17

175+00

180+00

185+00

JOSEPH C & GLENDA W WINTERS
DB 1447 PG 658
PB 21 PG 62
DB 35 PG 124

HERBERT CECIL SHOEMAKER
DB 1937 PG 980

HAZELENE WHITWORTH WILKINSON
DB 811 PG 87

VIVIAN JOY POPE
DB 811 PG 87

GREGORY B & ANITA R HILTON
DB 1362 PG 265
PB 19 PG 61
PB 25 PG 65

WINSTON F & BESSIE WILKINSON
DB 680 PG 485
DB 1363 PG 54
DB 1606 PG 451
PB 19 PG 61
PB 25 PG 65

MT. ANDERSON BAPTIST CHURCH TRUSTEES OF
DB 1435 PG 434
DB 1757 PG 40

ELMER U & NANCY B BURKE
DB 2620 PG 903

REGINALD STEVEN WILKINSON SR
DB 1867 PG 54
DB 2818 PG 479

PHILLIP H & LINDA S COOPER
DB 2661 PG 1

KENNETH E TUCKER
DB 2223 PG 1201

TANYA C PARSONS
DB 2691 PG 1962
PB 57 PG 106

-L- SC Sta. 176+08.91

-L- CS Sta. 186+94.98

-L- POT Sta. 175+55.00

-DRI- POT Sta. 10+00.00

-DRI- PC Sta. 10+69.42

-DRI- PT Sta. 11+15.75

-DRI- PC Sta. 11+81.45

-DRI- PT Sta. 12+14.87

-DRI- PT Sta. 12+67.20

-DRI- PC Sta. 12+28.19

-L- TS Sta. 174+48.91

GPS R3100AB-11

-DRI-
Pl Sta 10+94.40
Δ = 53° 05' 39.7" (LT)
D = 114° 35' 29.6"
L = 46.33'
T = 24.98'
R = 50.00'

Pl Sta 11+98.81
Δ = 38° 17' 30.4" (LT)
D = 114° 35' 29.6"
L = 33.42'
T = 17.36'
R = 50.00'

Pl Sta 12+52.93
Δ = 89° 23' 55.6" (RT)
D = 229° 10' 59.2"
L = 39.01'
T = 24.74'
R = 25.00'

eberwily
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16-OCT-2013 07:44
$$DATE$$
AT GEH2660095

PROJECT REFERENCE	SHEET NO.
R-3100A	17

ROADWAY DESIGN ENGINEER

HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

HATCH MOTT MACDONALD I & E, LLC
LICENSE NO. P-0669

Prepared In the Office of: Hatch Mott MacDonald, PO Box 700, Fuquay-Varina, NC 27526, www.hatchmott.com

McKIM & CREED
NC LICENSE #1087
263 NORTH FRONT STREET
WILMINGTON, NORTH CAROLINA 28401
TEL: (910) 343-1266 FAX: (910) 790-9888

GRAPHIC SCALE
25' 0 25' 50'

SEE PROFILE SHEET 30 & 35

NAD 83/NSRS 2007

MATCHLINE -L- STA 187+50.00 SEE SHEET NO. 16

MATCHLINE -L- STA 201+00.00 SEE SHEET NO. 18

MT ANDERSON BAPTIST CHURCH TRUSTEES OF
DB 1435 PG 434
DB 1757 PG 40

GARLAND L & RONDA G GOODSON
DB 2978 PG 1368

-L- ST Sta. 188+54.98

END CONSTRUCTION
-Y21- POC Sta. 12+15.00

-Y21- PC Sta. 11+96.23

-Y21- PT Sta. 14+14.04

-Y21- POT Sta. 14+50.00

-BY21-116

-L- POT Sta. 190+18.97

-Y21- POT Sta. 10+00.00

GPS R3100AB-12

-BL-54

BM#18 -BL-
STA 390+50 287'RT
ELEV.=950.65'

RESIDUAL

ROADWAY EMBANKMENT FILL

TANYA C PARSONS
DB 2691 PG 1962
PB 51 PG 106

THOMAS B & HEATHER H THOMAS
DB 2902 PG 569
PB 65 PG 98

DAVID KEITH BLACKBURN
DB 2702 PG 451
PB 65 PG 98

BANDYS CROSS ROADS VOLUNTEER FIRE DEPARTMENT
DB 2981 PG 1781

EVELYN L CALDWELL
DB 1466 PG 177
PB 21 PG 182

JEFFREY W & GINA J AUTON
DB 3038 PG 1048
PB 21 PG 182

-L-	
PI Sta 181+55.37	PIs Sta 187+48.32
Δ = 15° 41' 39.2" (LT)	Θs = 1° 09' 21.7"
D = 1° 26' 42.1"	Ls = 160.00'
L = 1,086.08'	LT = 106.67'
T = 546.46'	ST = 53.34'
R = 3,965.00'	
SE = 04	
RO = 160'	

-Y21-	
PI Sta 13+06.46	
Δ = 21° 46' 49.5" (LT)	
D = 9° 59' 58.9"	
L = 217.81'	
T = 110.24'	
R = 572.98'	

beverly AT GEH266095
C:\projects\R3100A_GEO_ROWY_CATAWBA\CADD_GEOTECH\PienProf\R3100A_rdy_psh17.dgn
$$$DATE$$$ 16-OCT-2013 07:46

PROJECT REFERENCE	SHEET NO.
R-3100A	18

ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

HATCH MOTT MACDONALD J & F, LLC
LICENSE NO. F-0669

Prepared in the Office of: Hatch Mott MacDonald, PO Box 700, Fuquay-Varina, NC 27526, www.hatchmott.com

McKIM & CREED, 343 NORTH FRONT STREET, WILMINGTON, NORTH CAROLINA 28401, TEL. (910) 343-1066, FAX. (910) 790-9382

GRAPHIC SCALE 25' 0 25' 50'

SEE PROFILE SHEET 31 & 35

NAD 83/NSRS 2007

BM#19 -BL-
STA 411+32 392'LT
ELEV.=1023.86'

MATCHLINE -L- STA 201+00.00 SEE SHEET NO. 17

MATCHLINE -L- STA 215+00.00 SEE SHEET NO. 19

-BY22-119

MARY E SHERRILL
DB 1791 PG 1053

-Y22- POT Sta. 10+00.00

-Y22- PC Sta. 10+36.71

BEGIN CONSTRUCTION
-Y22- POC Sta. 12+10.00

PAUL G & DEBORAH G THOMPSON
DB 1158 PG 489

-Y22- PT Sta. 13+11.31

LITTLE MOUNTAIN AIRPORT ASSOCIATES INC
DB 1388 PG 582
DB 1586 PG 850
DB 2465 PG 1762
DB 2605 PG 1854
DB 2701 PG 579

NCDOT
DB 2673
PG 1977

-L- POT Sta. 202+30.68
-Y22- POT Sta. 14+00.00

MT ANDERSON BAPTIST CHURCH
DB 467 PG 709
PB 21 PG 182

JEFFREY W & GINA J AUTON
DB 3038 PG 1048
PB 21 PG 182

PATRICIA C LITTLE
DB 2953 PG 641
PB 21 PG 182

BILLY D BUFF
DB 297 PG 945
PB 20 PG 38

JOSEPH EVERETT BAKER
DB 2295 PG 357
PB 53 PG 119

BILLY D & JOY F BUFF
DB 2295 PG 355
PB 53 PG 119

JOSEPH E & AMBER W BAKER
DB 2296 PG 357
PB 53 PG 119

-L- TS Sta. 211+36.52

-L- SC Sta. 212+56.52

-BL-55

-BL-56

-Y22-
PI Sta 11+75.55
Δ = 20° 53' 56.9" (RT)
D = 7° 36' 38.8"
L = 274.60'
T = 138.84'
R = 752.83'

-L-

PIs Sta 212+16.52	PI Sta 215+55.88
Θs = 0° 31' 49.9"	Δ = 5° 17' 24.0" (LT)
Ls = 120.00'	D = 0° 53' 03.1"
LT = 80.00'	L = 598.29'
ST = 40.00'	T = 299.36'
	R = 6,480.00'
	SE = 0.3
	RO = 120'

ROADWAY EMBANKMENT FILL

RESIDUAL

ISFD

ISBKD

ANDERSON BAPTIST CH

PROJECT REFERENCE	SHEET NO.
R-3100A	19

ROADWAY DESIGN ENGINEER

HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

HATCH MOTT MACDONALD, I & E, LLC
LICENSE NO. P-0669

Prepared in the Office of: Hatch Mott MacDonald, PO Box 100, Raleigh-Wake, NC 27529, www.hatchmott.com

MCKIM & CREED
ENGINEERING
243 NORTH FRONT STREET
WILMINGTON, NORTH CAROLINA 28401
TEL. (910) 343-1646 FAX. (910) 763-8338

GRAPHIC SCALE
25' 0 25' 50'

SEE PROFILE SHEET 31

NAD 83/NSRS 2007

MATCHLINE -L- STA 215+00.00 SEE SHEET NO. 18

MATCHLINE -L- STA 229+00.00 SEE SHEET NO. 20

LITTLE MOUNTAIN AIRPORT ASSOCIATES INC
DB 1388 PG 582
DB 1586 PG 850
DB 2465 PG 1762
DB 2605 PG 1854
DB 2701PG 579

DWAYNE RAY CALDWELL
DB 2579 PG 1531

JOSEPH E & AMBER W BAKER
DB 2295 PG 357
PB 53 PG 119

CUSHMAN PROPERTIES LLC
DB 2135 PG 1206

ISBKD

ISFD

215+00

220+00

225+00

N 37°30'04" E 466.44'

S 45°23'49" W 96.63'

S 45°23'49" W 31.86'

S 6° 17' 59.5" E

-L- CS Sta. 218+54.81

-L- ST Sta. 219+74.81

-L- TS Sta. 225+70.95

-L- SC Sta. 228+10.95

-BL-57

-BL-58

RESIDUAL

FILL

ROADWAY EMBANKMENT FILL

EXISTING R/W

12' ST

24" RCP

18" RCP

15" RCP

48" CONC

NC 16 23' BST

-L-

PI Sta 215+55.88	PIs Sta 218+94.81	PIs Sta 227+30.97	PI Sta 233+81.93
Δ = 5° 17' 24.0" (LT)	θs = 0° 31' 49.9"	θs = 2° 57' 48.9"	Δ = 27° 39' 09.8" (RT)
D = 0° 53' 03.1"	Ls = 120.00'	Ls = 240.00'	D = 2° 28' 10.7"
L = 598.29'	LT = 80.00'	LT = 160.02'	L = 1,119.70'
T = 299.36'	ST = 40.00'	ST = 80.02'	T = 570.98'
R = 6,480.00'			R = 2,320.00'
SE = 03			SE = 06
RO = 120'			RO = 240'

PROJECT REFERENCE	SHEET NO.
R-3100A	20

ROADWAY DESIGN ENGINEER

HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

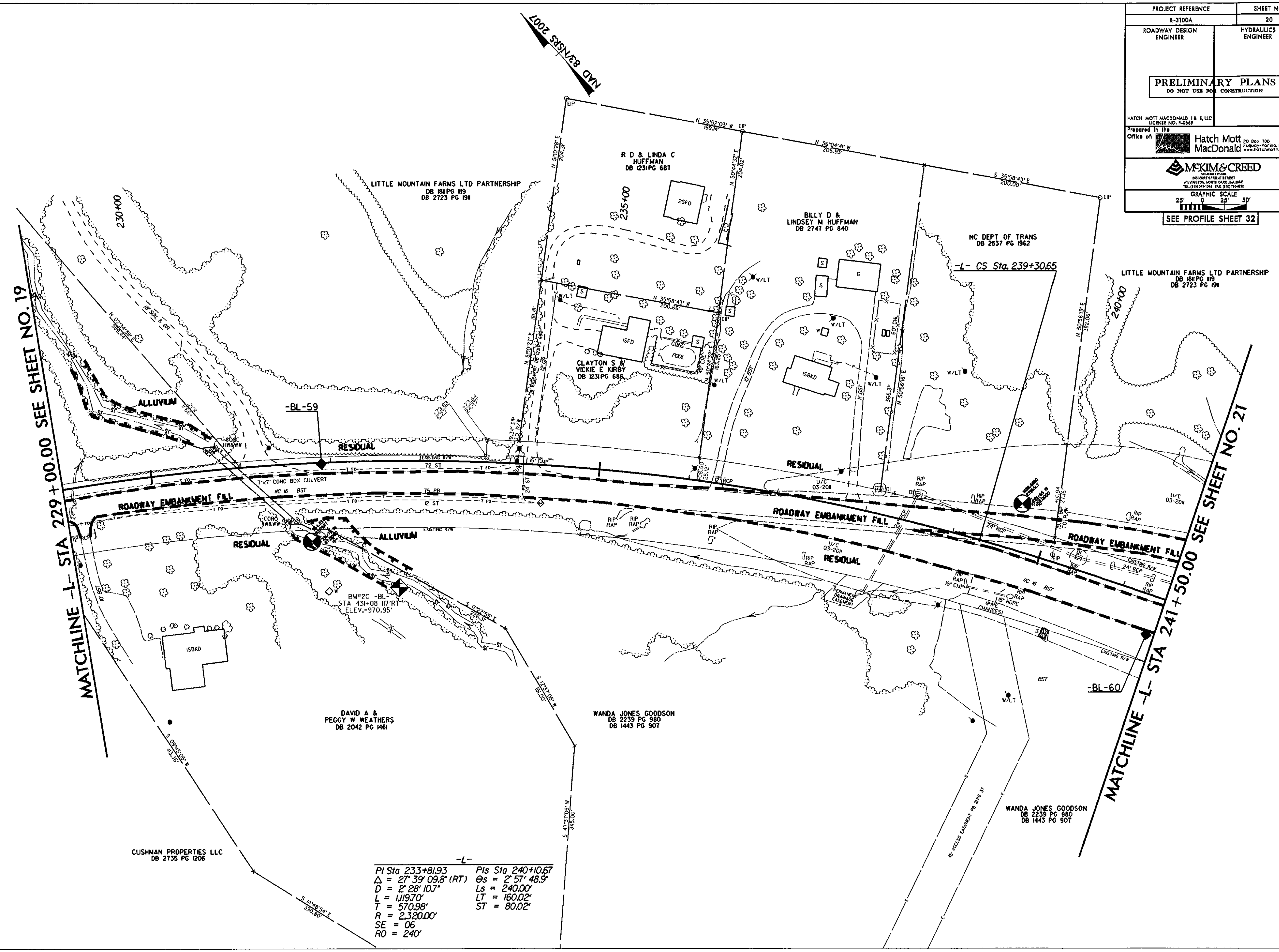
HATCH MOTT MACDONALD I & E, LLC
LICENSE NO. F-0669

Prepared in the Office of: Hatch Mott MacDonald
PO Box 700
Fuquay-Varina, NC 27526
www.hatchmott.com

McKIM & CREED
245 NORTH FRONT STREET
WILMINGTON, NORTH CAROLINA 28401

GRAPHIC SCALE
25' 0 25' 50'

SEE PROFILE SHEET 32



-L-

PI Sta 233+81.93	PIs Sta 240+10.67
Δ = 27° 39' 09.8" (RT)	Θs = 2° 57' 48.9"
D = 2° 28' 10.7"	Ls = 240.00'
L = 1,119.70'	LT = 160.02'
T = 570.98'	ST = 80.02'
R = 2,320.00'	
SE = .06	
RO = 240'	

cbeverly AT GEH26095
C:\projects\R3100A_GEO_RDWY_CATAWBA\CADD_GEOTECH\PlanProf\R3100A_rdy_psh20.dgn
16-OCT-2013 10:24
$$DATE$$

PROJECT REFERENCE	SHEET NO.
R-3100A	21

ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

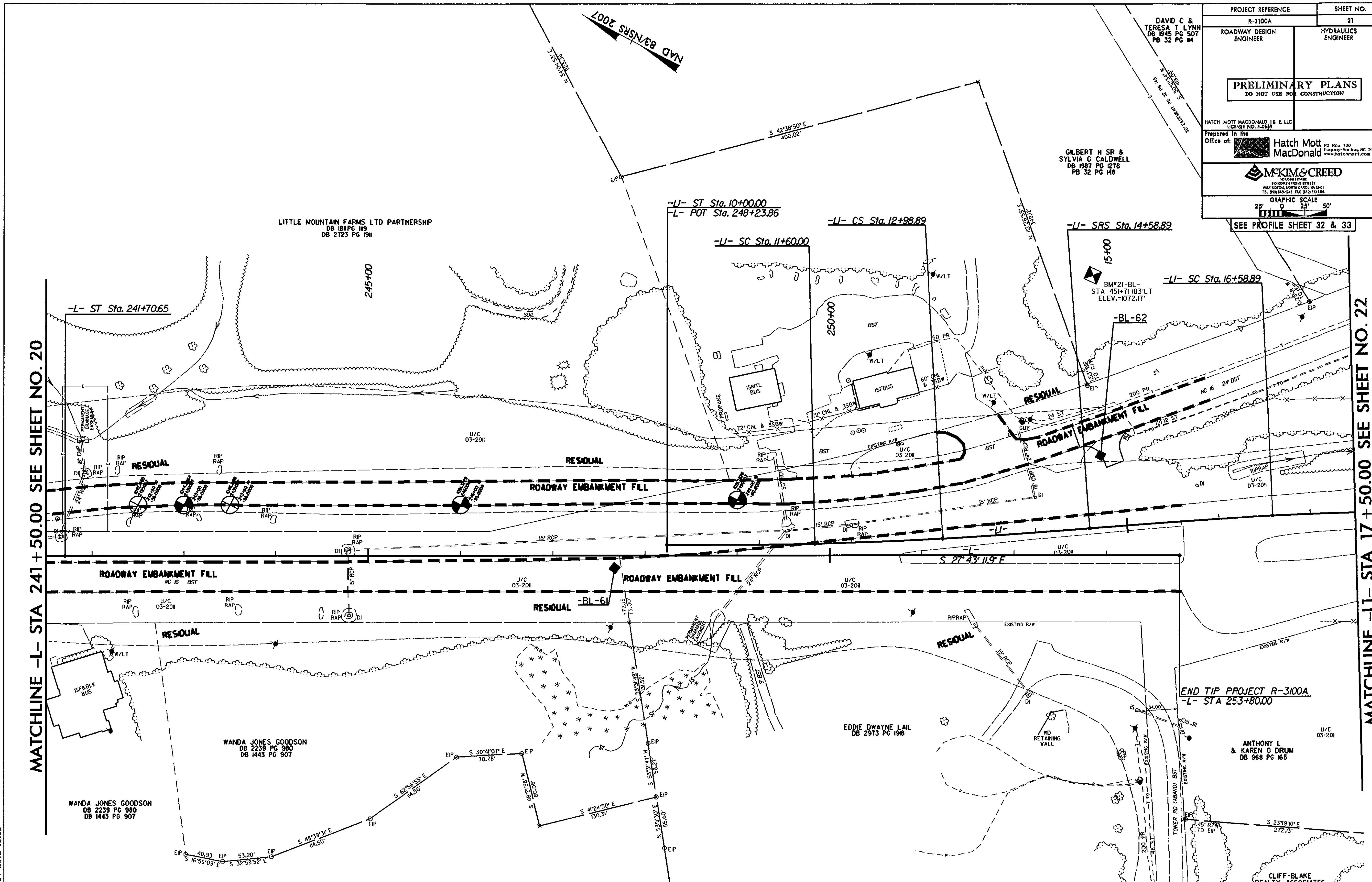
HATCH MOTT MACDONALD I & E, LLC
LICENSE NO. F-0669

Prepared in the Office of: Hatch Mott MacDonald, PO Box 700, Fuquay-Varina, NC 27526, www.hatchmott.com

McKIM & CREED
243 NORTH FRONT STREET
WILMINGTON, NORTH CAROLINA

GRAPHIC SCALE 25' 0 25' 50'

SEE PROFILE SHEET 32 & 33



-L1-

Pls Sta 11+06.67	PI Sta 12+29.45	Pls Sta 13+52.22	Pls Sta 15+92.23	PI Sta 18+60.76
Θs = 1° 10' 41.9"	Δ = 2° 02' 44.5" (LT)	Θs = 1° 10' 41.9"	Θs = 1° 32' 02.5"	Δ = 6° 11' 14.5" (RT)
Ls = 160.00'	D = 1° 28' 22.4"	Ls = 160.00'	Ls = 200.00'	D = 1° 32' 02.5"
LT = 106.67'	L = 138.89'	LT = 106.67'	LT = 133.34'	L = 403.34'
ST = 53.34'	T = 69.45'	ST = 53.34'	ST = 66.67'	T = 201.87'
	R = 3,890.00'			R = 3,735.00'
	SE = 04			SE = 05
	RO = 160'			RO = 200'

-L-

PI Sta 233+81.93	Pls Sta 240+10.67
Δ = 27° 39' 09.8" (RT)	Θs = 2° 57' 48.9"
D = 2° 28' 10.7"	Ls = 240.00'
L = 1,119.70'	LT = 160.02'
T = 570.98'	ST = 80.02'
R = 2,320.00'	
SE = 06	
RO = 240'	

cbeverly AT GEH26095
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$$DATE$$ 16-OCT-2013 10:30

PROJECT REPERENCE	SHEET NO.
R-3100A	22

ROADWAY DESIGN ENGINEER

HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

HATCH MOTT MACDONALD J & E, LLC
LICENSE NO. F-0469

Prepared in the Office of:
Hatch Mott MacDonald
PO Box 100
Tuscaloosa, NC 27526
www.hatchmott.com

McKIM&CREED
343 NORTH FRONT STREET
WILMINGTON, NORTH CAROLINA 28401
TEL (910) 343-0646 FAX (910) 799-4035

GRAPHIC SCALE
25' 0 25' 50'

SEE PROFILE SHEET 33

NAD 83/NSRS 2007

MATCHLINE -L1- STA 17+50.00 SEE SHEET NO. 21

DAVID C & TERESA T LYNN DB 1945 PG 507 PB 32 PG 84

LEONARD MCALISTER DB 2035 PG 1980 PB 32 PG 114

MARY ANNE HOGUE DB 3023 PG 1151 PB 29 PG 191

TONY KAYE MOORE DB 2062 PG 1721

CHARLES HILTON DB 2965 PG 854 PB 44 PG 71

AMOS C JR & LAJUNE S BROWN DB 2204 PG 1581 PB 30 PG 204

ANTHONY L & KAREN O DRUM DB 968 PG 165

CLIFF-BLAKE REALTY ASSOCIATES DB 1936 PG 1335

-BL-63

-BY24-125

-BY23-123

-BY23-122

END CONSTRUCTION -L1- PCC Sta. 20+62.23

-L1- PT Sta. 23+18.40

20+00

NC 16 84" BST

NC 16 NBL BST (U/C)

NC 16 SBL BST (U/C)

SR 1595 TOWER RD 24" BST

72" RCP

15" RCP

12" RCP

10' BRICK HW TOP=1033.31

60" WW & ISBW

30" C&G MTL

RIP RAP

SOIL

EXISTING R/W

PERMANENT DRAINAGE EASEMENT

U/C 03-2011

-L1-

PI Sta 18+60.76	PI Sta 21+90.40
Δ = 6° 11' 14.5" (RT)	Δ = 5° 03' 38.5" (RT)
D = 1° 32' 02.5"	D = 1° 58' 31.9"
L = 403.34'	L = 256.17'
T = 201.87'	T = 128.17'
R = 3,735.00'	R = 2,900.26'
SE = 06	

Beverly AT GEH26695
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16-OCT-2013 10:36
$$DATE$$

PROJECT REFERENCE	SHEET NO.
R-3100A	23
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

HATCH MOTT MACDONALD, I & I, LLC
LICENSE NO. F-0669

Prepared in the Office of: Hatch Mott MacDonald, PO Box 700, Fuquay-Varina, NC 27526, www.hatchmott.com

McKIM & CREED
ENGINEERING
345 NORTH FRONT STREET
WILMINGTON, NORTH CAROLINA 28401
TEL: (910) 343-1104 FAX: (910) 793-8385

GRAPHIC SCALE
25' 0 25' 50'

SEE PROFILE SHEET 34

MATCHLINE -Y19- STA 24+50.00 SEE SHEET NO. 10

-Y19-
PI Sta 27+54.52
Δ = 9°04' 21.6" (LT)
D = 2°22' 55.8"
L = 380.86'
T = 190.83'
R = 2,405.21'

-Y19- PC Sta. 25+63.69

25+00

NAD 83/NSRS 2007

REMOVE

SPECIAL CUT DITCH SEE DETAIL D

SPECIAL LATERAL V DITCH SEE DETAIL H

LARRY E & LINDA C CALDWELL
DB 390 PG 509
DB 915 PG 64
DB 915 PG 76
PB 54 PG 88

ROBERT K & KAREN M WILKINSON
DB 2180 PG 445
PB 40 PG 107

N 74°23'03" W 386.94'

END CONSTRUCTION
-Y19- POT Sta. 27+00.00

RETAIN

ROLAND E & RUTH M EDWARDS
DB 1992 PG 1458
PB 40 PG 107

S 73°02'40" E 408.48'

S 36°53'22" W 174.35'

CRAIG WATSON SR & LINDA C GRIGG
DB 939 PG 611

N 69°15'19" W 338.14'

-Y19- PT Sta. 29+44.55

S 73°00'34" E 410.38'

S 22° 37' 33.8" W

GERALDINE MCCALL NEWTON
DB 665 PG 65
PB 40 PG 107

-BY19-112

S 74°09'07" E 383.30'

N 69°15'19" W 252.53'

SEE PROFILE SHEET 34

EIP

GPS R3100AB-10

-Y19- POT Sta. 10+00.00

N 46°51'09" W 231.05'

+65.15 30.60' 6.22' EIP TO R/W

200 PR 200 THC

60.00'

N 31°28'51" E 170.01'

J D JR & JANICE M GOODSON
DB 1030 PG 133

EXISTING R/W

22' BST

BUFFALO SHOALS RD SR 1003

EXISTING R/W

LINELLE LINEBERGER WILLIAMS
DB 430 PG 59

S 80°59'56" E 644.82'

BEGIN CONSTRUCTION
-Y19- POT Sta. 12+10.00

N 46°51'09" W 228.00'

EIP 2.08' R/W TO EIP

+54.50 52.01'

-Y19- S 31° 48' 00.2" W

8" SOIL

BEGIN GRADE
-Y19- POT Sta. 13+15.00

15" RCP

SOIL

BRENDA CAUTHEN HILDEBRAN
DB 1330 PG 400

JUANITA BOGLE REINHARDT
DB 2868 PG 1420

N 46°51'09" W 228.00'

+94.90 30.60' L&R R/W TO EIP

2 PR

12" CMP

11" BST

GAYNELL MCCALL CAUTHEN
DB 621 PG 224

N 31°28'51" E 169.20'

30' ACCESS EASEMENT DB 2868 PG 1420

S 68°47'53" E 407.26'

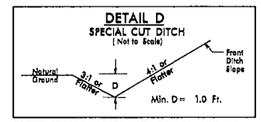
48" PLASTIC

HOWARD TRACY DRUM
DB 20088 PG 1208
DB 148 PG 348

15+00

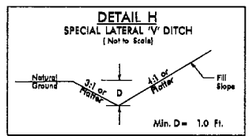
MATCHLINE -Y19- STA 15+00.00 SEE SHEET NO. 10

DETAIL D
SPECIAL CUT DITCH
[Not to Scale]



FROM STA. 25+00 TO STA. 25+75 -Y19- LT
FROM STA. 26+75 TO STA. 27+00 -Y19- LT
FROM STA. 25+00 TO STA. 25+75 -Y19- RT

DETAIL H
SPECIAL LATERAL 'V' DITCH
[Not to Scale]



FROM STA. 25+75 TO STA. 26+75 -Y19- LT
FROM STA. 25+75 TO STA. 27+00 -Y19- RT

5/28/99

PROJECT REFERENCE NO.	SHEET NO.
R-3100A	24
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

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

-L-

BEGIN GRADE
STA. 12+00.00
EL = 984.93'

SS-86
SS-87

1520RT
L
15+20.00-R-1
70' RT

1002.1000

(18) (22) (19) (13)

DRY, BT 6-26-18

PI = 17+00.00
EL = 1,004.14'
VC = 330'
K = 215

(+)3.8420%

(+)2.3083%

RESIDUAL - STIFF TO VERY STIFF TAN-RED-BROWN SILTY SANDY CLAY (A-7-5), LITTLE TO HIGHLY MICACEOUS, MOIST

1920RT
L
19+20.00 R 1
60' RT

1010.9000

DRY, BT 6-26-13

PI = 20+60.00
EL = 1,012.45'
VC = 190'
K = 216

(+)2.3083%

(+)11.4289%

RESIDUAL - MEDIUM DENSE TO VERY DENSE RED-BROWN-GRAY SILTY CLAYEY SAND (A-2-4, A-2-5), WITH SOME MICA TO HIGHLY MICACEOUS, DRY

SS-84
SS-85

2180RT
L
21+80.00 R 1
40' RT

1017.5000

(66) (31) (25) (53)

DRY, BT 6/24/13

SEE PLAN SHEET 4

10+00 11+00 12+00 13+00 14+00 15+00 16+00 17+00 18+00 19+00 20+00 21+00 22+00 23+00

1060 1050 1040 1030 1020 1010 1000 990 980 970

-L-

PIPE HYDRAULIC DATA
60" RCP- Sta. 32+90 -L-

DRAINAGE AREA	= 40.3	AC
DESIGN FREQUENCY	= 50	YRS
DESIGN DISCHARGE	= 61.05	CFS
DESIGN HW ELEVATION	= 995.30	FT
100 YEAR DISCHARGE	= 67.3	CFS
100 YEAR HW ELEVATION	= 995.55	FT
OVERTOPPING FREQUENCY	= 0 > 500	YRS
OVERTOPPING DISCHARGE	= 300	CFS
OVERTOPPING ELEVATION	= 1005.67	FT

PI = 25+10.00
EL = 1,018.88'
VC = 210'
K = 241

(+)11.4289%

(-)11.5113%

-L- STA 27+51.09
-Y16- STA 13+75.00
(SR 1814) CALDWELL RD

2780RT
L
27+80.00 R 1
40' RT

1008.7000

(66) (31) (25) (33)

RESIDUAL, VERY DENSE, RED-BROWN SILTY CLAYEY SAND (A-2-5), DRY

RESIDUAL, MEDIUM DENSE GRAY-WHITE-TAN SILTY SAND (A-2-4), DRY

DRY, BT 6-26-13

PI = 30+40.00
EL = 1,010.87'
VC = 230'
K = 1364

(-)11.5113%

(-)11.6800%

SS-82
SS-83

PI = 33+40.00
EL = 1,005.83'
VC = 180'
K = 3121

(-)11.6800%

(-)11.6223%

3293RT
L
32+93.00 R 1
50' RT

989.3000

(8) (10)

06/13

RESIDUAL - MEDIUM STIFF TAN-BROWN-GRAY SILTY SANDY CLAY (A-7-6) WITH SOME MICA, MOIST

RESIDUAL, MEDIUM DENSE TAN-BROWN-GRAY CLAYEY SILTY SAND (A-2-4) WITH TRACE MICA, MOIST TO WET

3610RT
L
35+10.00 R 1
45' RT

995.7000

(15) (11)

RESIDUAL - MEDIUM DENSE RED-TAN CLAYEY SILTY SAND (A-2-5),

DRY, BT 6/26/13

SEE PLAN SHEET 5

23+00 24+00 25+00 26+00 27+00 28+00 29+00 30+00 31+00 32+00 33+00 34+00 35+00 36+00 37+00

1050 1040 1030 1020 1010 1000 990 980 970 960

19-NOV-2013 GMT
C:\projects\R3100A_GEO_RDwy_CATAWBA\CADD_GEOTECH\PlanProf\R3100A_GEO_pf_024.dgn
ehayworth

5/28/99

PROJECT REFERENCE NO.	SHEET NO.
R-3100A	25

ROADWAY DESIGN ENGINEER

HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

24" RCP Sta. 42+50 -L-

DRAINAGE AREA	= 13.1	AC
DESIGN FREQUENCY	= 50	YRS
DESIGN DISCHARGE	= 19.5	CFS
DESIGN HW ELEVATION	= 988.1	FT
100 YEAR DISCHARGE	= 21.5	CFS
100 YEAR HW ELEVATION	= 988.6	FT
OVERTOPPING FREQUENCY	= 100<O<500	YRS
OVERTOPPING DISCHARGE	= 35	CFS
OVERTOPPING ELEVATION	= 990.5	FT

CULVERT HYDRAULIC DAT

DESIGN DISCHARGE	= 350	
DESIGN FREQUENCY	= 50	
DESIGN HW ELEVATION	= 970.0	
BASE DISCHARGE	= 410	
BASE FREQUENCY	= 100	
BASE HW ELEVATION	= 970.9	
OVERTOPPING DISCHARGE	= 1100	
OVERTOPPING FREQUENCY	= 0 > 500	
OVERTOPPING ELEVATION	= 984.9	

-L-

-L- STA. 37+10.67
-Y17- STA. 10+00.00
(SR 1876) MT RUHAMA RD

SS-81
3855RT
L
38+55.00 R 1
52' RT
996.1000

RESIDUAL, MEDIUM DENSE RED-TAN-BROWN CLAYEY SILTY SAND (A-2-6) WITH SOME MICA, MOIST
DRY, BT 6-26-13

SS-79
SS-80
4342LT
L
43+42.00 R 1
70' LT
989.9000

(-)1.622%
(-)1.6986%
24" RCP
RESIDUAL - STIFF RED-BROWN SILTY SANDY CLAY (A-7-5) WITH TRACE MICA, MOIST
RESIDUAL - STIFF TAN-BROWN CLAYEY SANDY SILT (A-5), MOIST
DRY, BT 6-26-13

PI = 46+90.00
EL = 983.65'
VC = 330'
K = 116

(-)1.6986%
(+)1.1564%

SS-77
SS-78
4760LT
L
47+60.00 R 1
66' LT
968.6000

PI = 50+80.00
EL = 988.16'
VC = 450'
K = 221

(+)1.1564%

STA. 47+57.25 -L-
7'x8' RCBC
RESIDUAL, MEDIUM STIFF GRAY-WHITE CLAYEY SANDY SILT (A-5) WITH SOME MICA, MOIST
RESIDUAL, MEDIUM STIFF BROWN-GRAY-WHITE CLAYEY SANDY SILT (A-5), MOIST

SEE PLAN SHEET 6

1030 1020 1010 1000 990 980 970 960 950 940

37+00 38+00 39+00 40+00 41+00 42+00 43+00 44+00 45+00 46+00 47+00 48+00 49+00 50+00 51+00

-L-

-L- STA. 55+51.07
-Y18- STA. 10+00.00
(SR 2874) TIMBERBROOKE LN

SS-75
SS-76
5260RT
L
52+60.00 R 1
47' RT
997.1000

+3.1955%
RESIDUAL, MEDIUM DENSE TAN-WHITE CLAEY SILTY SAND (A-2-5), HIGHLY MICACEOUS, MOIST
RESIDUAL, STIFF GRAY-WHITE CLAYEY SANDY SILT (A-5), MOIST TO WET
DRY, BT 6-26-13

SS-73
SS-74
5731LT
L
57+31.00 R 1
47' LT
1007.1000

(+)3.1955%
RESIDUAL - HARD TO VERY STIFF RED-BROWN CLAYEY SANDY SILT (A-4) WITH SOME MICA TO HIGHLY MICACEOUS, DRY
RESIDUAL - MEDIUM DENSE TAN-YELLOW WHITE CLAYEY SILTY SAND (A-2-4), MOIST
RESIDUAL, MEDIUM DENSE SILTY SAND (A-2-4), HIGHLY MICACEOUS, MOIST
DRY, BT 6-26-13

SS-72
6000LT
L
60+00.00 R 1
55' LT
1020.8000

DRY, BT 6-26-13

6258LT
L
62+58.00 R 1
65' LT
1028.4000

DRY, BT 6-25-13

(A) ALLUVIAL, STIFF BROWN SILTY SANDY CLAY (A-7-5), HIGH PI, MOIST

SEE PLAN SHEET 7

1050 1040 1030 1020 1010 1000 990 980 970 960

51+00 52+00 53+00 54+00 55+00 56+00 57+00 58+00 59+00 60+00 61+00 62+00 63+00 64+00 65+00

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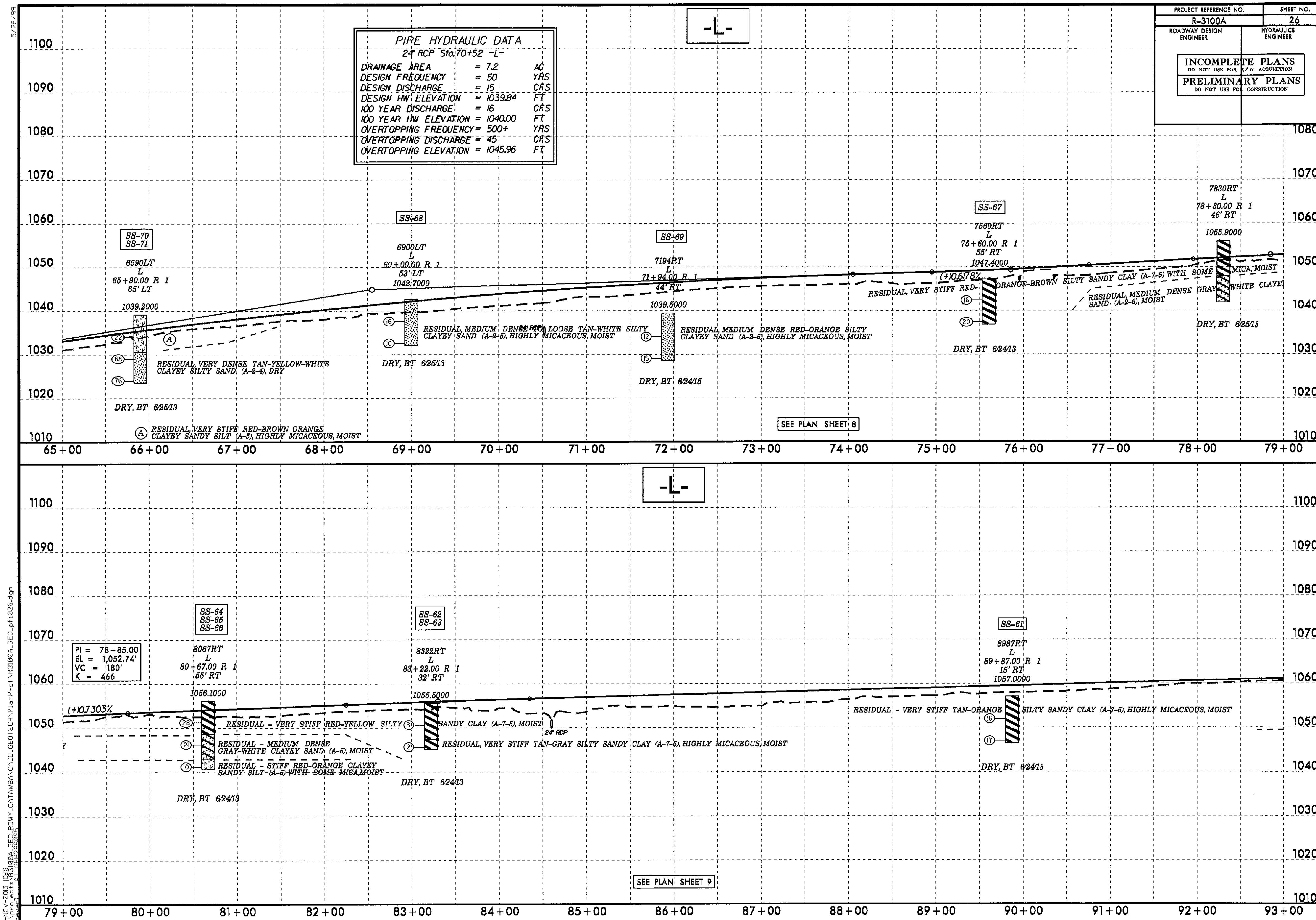
chowell



PROJECT REFERENCE NO. R-3100A
SHEET NO. 26
ROADWAY DESIGN ENGINEER
HYDRAULICS ENGINEER
INCOMPLETE PLANS DO NOT USE FOR R/W ACQUISITION
PRELIMINARY PLANS DO NOT USE FOR CONSTRUCTION
-L-
PIPE HYDRAULIC DATA
24" RCP Sta.70+52 -L-
DRAINAGE AREA = 7.2 AC
DESIGN FREQUENCY = 50 YRS
DESIGN DISCHARGE = 15 CFS
DESIGN HW ELEVATION = 1039.84 FT
100 YEAR DISCHARGE = 16 CFS
100 YEAR HW ELEVATION = 1040.00 FT
OVERTOPPING FREQUENCY = 500+ YRS
OVERTOPPING DISCHARGE = 45 CFS
OVERTOPPING ELEVATION = 1045.96 FT
SS-70 SS-71
6590LT L 65+90.00 R 1 65' LT
1039.2000
RESIDUAL, VERY DENSE TAN-YELLOW-WHITE CLAYEY SILTY SAND (A-2-4), DRY
DRY, BT 6/25/13
RESIDUAL, VERY STIFF RED-BROWN-ORANGE CLAYEY SANDY SILT (A-5), HIGHLY MICACEOUS, MOIST
SS-68
6900LT L 69+00.00 R 1 53' LT
1042.7000
RESIDUAL, MEDIUM DENSE TO LOOSE TAN-WHITE SILTY CLAYEY SAND (A-2-5), HIGHLY MICACEOUS, MOIST
DRY, BT 6/25/13
SS-69
7194RT L 71+94.00 R 1 44' RT
1039.5000
RESIDUAL, MEDIUM DENSE RED-ORANGE SILTY CLAYEY SAND (A-2-5), HIGHLY MICACEOUS, MOIST
DRY, BT 6/24/15
SEE PLAN SHEET 8
SS-67
7560RT L 75+60.00 R 1 55' RT
1047.4000
(+)0.6178%
RESIDUAL, VERY STIFF RED-ORANGE-BROWN SILTY SANDY CLAY (A-7-5) WITH SOME MICA, MOIST
DRY, BT 6/24/13
7830RT L 78+30.00 R 1 46' RT
1055.9000
RESIDUAL, MEDIUM DENSE GRAY-WHITE CLAYEY SAND (A-2-6), MOIST
DRY, BT 6/25/13
65+00 66+00 67+00 68+00 69+00 70+00 71+00 72+00 73+00 74+00 75+00 76+00 77+00 78+00 79+00
-L-
PI = 78+85.00
EL = 1,052.74'
VC = 180'
K = 466
(+)0.7303%
SS-64 SS-65 SS-66
8067RT L 80+67.00 R 1 55' RT
1056.1000
RESIDUAL - VERY STIFF RED-YELLOW SILTY SANDY CLAY (A-7-5), MOIST
RESIDUAL - MEDIUM DENSE GRAY-WHITE CLAYEY SAND (A-5), MOIST
RESIDUAL - STIFF RED-ORANGE CLAYEY SANDY SILT (A-5) WITH SOME MICA, MOIST
DRY, BT 6/24/13
SS-62 SS-63
8322RT L 83+22.00 R 1 32' RT
1055.5000
RESIDUAL, VERY STIFF TAN-GRAY SILTY SANDY CLAY (A-7-5), HIGHLY MICACEOUS, MOIST
DRY, BT 6/24/13
24" RCP
SS-61
8987RT L 89+87.00 R 1 15' RT
1057.0000
RESIDUAL - VERY STIFF TAN-ORANGE SILTY SANDY CLAY (A-7-5), HIGHLY MICACEOUS, MOIST
DRY, BT 6/24/13
SEE PLAN SHEET 9
79+00 80+00 81+00 82+00 83+00 84+00 85+00 86+00 87+00 88+00 89+00 90+00 91+00 92+00 93+00
1010 1020 1030 1040 1050 1060 1070 1080 1090 1100

5/28/99

PROJECT REFERENCE NO.	SHEET NO.
R-3100A	27
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

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

-L-

PI = 96+15.00
EL = 1,062.75'
VC = 330'
K = 283

PI = 101+25.00
EL = 1,071.39'
VC = 480'
K = 199

PI = 105+50.00
EL = 1,068.35'
VC = 370'
K = 901

-L- STA 101+38.91
-Y19- STA 20+38.18
(SR 1003) BUFFALO SHOALS RD

(+)1.6941%
(-)0.7153%
(-)0.7153%
(-)0.3047%
(-)0.30

SS-59
SS-60

9383RT
L
93+53.00 R 1
35' RT

1057.8000

RESIDUAL - STIFF RED-TAN SANDY CLAY (A-7-5), HIGH PI, MOIST

RESIDUAL - MEDIUM STIFF TO STIFF TAN-WHITE SILTY SANDY CLAY (A-7-6), HIGHLY MICACEOUS, MOIST

DRY, BT 6/24/13

SS-56
SS-57
SS-58

9590RT
L
95+90.00 R 1
77' RT

1054.4000

DRY, BT 6/24/13

(A) ALLUVIAL - MEDIUM STIFF BLACK CLAYEY SANDY SILT (A-5) WITH ORGANICS (10.6%), MOIST
(B) ALLUVIAL - MEDIUM STIFF GRAY-TAN SILTY SANDY CLAY (A-7-6), MOIST
(C) ALLUVIAL - MEDIUM STIFF TAN-WHITE, CLAYEY SANDY SILT (A-5), WITH SOME MICA, MOIST

SEE PLAN SHEET 10

93+00 94+00 95+00 96+00 97+00 98+00 99+00 100+00 101+00 102+00 103+00 104+00 105+00 106+00 107+00

1110 1100 1090 1080 1070 1060 1050 1040 1030 1020

-L-

PIPE HYDRAULIC DATA
24" RCP Sta.110+63 -L-

DRAINAGE AREA	= 7.9	AC
DESIGN FREQUENCY	= 50	YRS
DESIGN DISCHARGE	= 20	CFS
DESIGN HW ELEVATION	= 1057.78	FT
100 YEAR DISCHARGE	= 21	CFS
100 YEAR HW ELEVATION	= 1058.10	FT
OVERTOPPING FREQUENCY	= 100>500	YRS
OVERTOPPING DISCHARGE	= 61	CFS
OVERTOPPING ELEVATION	= 1067.86	FT

PIPE HYDRAULIC DATA
18" RCP Sta.113+91 -L-

DRAINAGE AREA	= 2.2	AC
DESIGN FREQUENCY	= 50	YRS
DESIGN DISCHARGE	= 6	CFS
DESIGN HW ELEVATION	= 1058.58	FT
100 YEAR DISCHARGE	= 6.6	CFS
100 YEAR HW ELEVATION	= 1058.67	FT
OVERTOPPING FREQUENCY	= 0 > 500	YRS
OVERTOPPING DISCHARGE	= 25	CFS
OVERTOPPING ELEVATION	= 1064.37	FT

105+50.00
= 1,068.35'
= 370'
= 901

PI = 111+90.00
EL = 1,066.40'
VC = 180'
K = 380

PI = 113+70.00
EL = 1,065.00'
VC = 180'
K = 573

SS-54
SS-55

11220LT
L
112+20.00 R 1
55' LT

1057.6000

SS-52
SS-53

11622LT
L
116+22.00 R 1
65' LT

1051.5000

SS-51

11925RT
L
119+26.00 R 1
50' RT

1076.3000

10907RT
L
109+07.00 R 1
64' RT

1060.1000

(-)0.3047%
(-)0.7778%
(-)0.7778%
(-)0.4636%
47%

RESIDUAL - VERY STIFF TO STIFF RED-ORANGE-TAN CLAYEY SANDY SILT (A-6) WITH SOME MICA, MOIST

DRY, BT 6/24/13

RESIDUAL, MEDIUM STIFF TO STIFF RED-ORANGE-TAN CLAYEY SANDY SILT (A-6), HIGHLY MICACEOUS, MOIST

DRY, BT 6/24/13

RESIDUAL, VERY STIFF RED-BROWN CLAYEY SANDY SILT (A-4), MOIST

RESIDUAL, MEDIUM DENSE TAN-BROWN CLAYEY SILTY SAND (A-2-4), HIGHLY MICACEOUS, MOIST

DRY, BT 6/24/13

667.3 WEATHERED ROCK

DRY, BT 6/24/13

(A) RESIDUAL - STIFF TO HARD RED-BROWN CLAYEY SANDY SILT (A-6), HIGHLY MICACEOUS, DRY

SEE PLAN SHEET 11

107+00 108+00 109+00 110+00 111+00 112+00 113+00 114+00 115+00 116+00 117+00 118+00 119+00 120+00 121+00

1110 1100 1090 1080 1070 1060 1050 1040 1030 1020

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5/28/99

PROJECT REFERENCE NO.	SHEET NO.
R-3100A	28
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

PIPE HYDRAULIC DATA
18" RCP Sta. 129+52 -L-

DRAINAGE AREA	= 3.8	AC
DESIGN FREQUENCY	= 50	YRS
DESIGN DISCHARGE	= 13.5	CFS
DESIGN HW ELEVATION	= 1014.14	FT
100 YEAR DISCHARGE	= 14	CFS
100 YEAR HW ELEVATION	= 1014.55	FT
OVERTOPPING FREQUENCY	= 100<X<500	YRS
OVERTOPPING DISCHARGE	= 25	CFS
OVERTOPPING ELEVATION	= 1022.03	FT

-L-

12160RT
L
121+60.00 R 1
40' RT
1067.4000

RESIDUAL, STIFF TO HARD GRAY-WHITE-TAN SANDY SILT (A-4), DRY

WEATHERED ROCK

100/.8
100/.8
100/.7
100/.6
100/.7

DRY, BT 6/24/13

SS-50

12573LT
L
125+73.00 R 1
60' LT
1038.5000

RESIDUAL - HARD TO VERY STIFF TAN-BROWN CLAYEY SANDY SILT (A-4) WITH SOME MICA, DRY

46
34

DRY, BT 6/24/13

SS-48
SS-49

PI = 129+70.00
EL = 1,018.58'
VC = 180'
K = 161

12924LT
L
129+24.00 R 1
63' LT
1014.6000

PI = 132+25.00
EL = 1,008.48'
VC = 330'
K = 800

10 RESIDUAL, STIFF RED-BROWN SILTY SANDY CLAY (A-7-6), HIGH PI, MOIST

11 RESIDUAL, STIFF TAN-ORANGE CLAYEY SANDY SILT (A-5) WITH SOME MICA, MOIST

DRY, BT 6/24/13

SS-47

13317LT
L
133+17.00 R 1
65' LT
996.7000

RESIDUAL, VERY STIFF TAN-ORANGE CLAYEY SANDY SILT (A-5) WITH SOME MICA, DRY 11
28

DRY, BT 6/24/13

SEE PLAN SHEET 12

-L-

SS-45
SS-46

13696LT
L
135+96.00 R 1
10' LT
989.1000

14 RESIDUAL - STIFF RED-BROWN SANDY SILTY CLAY (A-7-6), DRY
10

DRY, BT 6/24/13

PI = 139+00.00
EL = 978.96'
VC = 500'
K = 285

(-)4.37333%
(-)2.61589%

-L- STA 140+43.68
-Y31- STA 12+95.00
PINE LEAF RD

SS-43
SS-44

14775LT
L
147+75.00 R 1
30' LT
954.8000

RESIDUAL, STIFF RED-YELLOW-ORANGE SILTY SANDY CLAY (A-7-6), HIGH PI, MOIST 11
RESIDUAL, STIFF TAN-YELLOW CLAYEY SANDY SILT (A-5), MOIST TO WET 10

DRY, BT 6/24/13

SEE PLAN SHEET 13

5/28/99

PROJECT REFERENCE NO.	SHEET NO.
R-3100A	29
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

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

-L-

-L- STA 151+02.30
-Y20- STA 13+45.00
(SR 1816) RANT DRUM RD

HYDRAULIC DATA
FOR Sta.152+00 -L-

	= 31.2	AC
NCY	= 50	YRS
GE	= 51.9	CFS
VATION	= 941.75	FT
ARGE	= 67.2	CFS
LEVATION	= 942.83	FT
REQUENCY	= 100<0<500	YRS
SCHARGE	= 85	CFS
EVATION	= 944.3	FT

SS-41
SS-42

15525LT
L
155+25.00 R 1
70' LT
943.1000

(-)2.6159%

RESIDUAL, STIFF RED-BROWN SILTY SANDY CLAY (A-7-5), MOIST
10
9
10
7
RESIDUAL, STIFF RED-BROWN-YELLOW CLAYEY SANDY SILT (A-4), MOIST

DRY, BT 6/24/13

SS-38
SS-39
SS-40

15765LT
L
157+65.00 R 1
20' LT
931.7000

10
7
10
12
RESIDUAL, MEDIUM STIFF TO STIFF RED-BROWN-GRAY SANDY CLAYEY SILT (A-5) WITH SOME MICA, MOIST

DRY, BT 6/24/13

SEE PLAN SHEET 14

149+00 150+00 151+00 152+00 153+00 154+00 155+00 156+00 157+00 158+00 159+00 160+00 161+00 162+00 163+00

980 970 960 950 940 930 920 910 900 890

-L-

PI = 166+65.00
EL = 906.63'
VC = 750'
K = 115

SS-36
SS-37

16510RT
L
165+10.00 R 1
80' RT
893.7000

ALLUVIAL, VERY SOFT BROWN SILTY SANDY CLAY (A-7-5), MOIST
1
RESIDUAL, VERY SOFT TO STIFF RED-ORANGE CLAYEY SANDY SILT (A-6), SAT.
10
DRY, BT 6/24/13

SS-35

16845RT
L
168+45.00 R 1
85' RT
895.1000

ALLUVIAL, SOFT, BROWN SILTY SANDY CLAY, (A-7), MOIST
24
RESIDUAL, STIFF TO VERY STIFF TAN-BROWN CLAYEY SANDY SILT (A-4) WITH SOME MICA, MOIST
100/.9
WEATHERED ROCK
BT 6/24/13

SEE PLAN SHEET 15

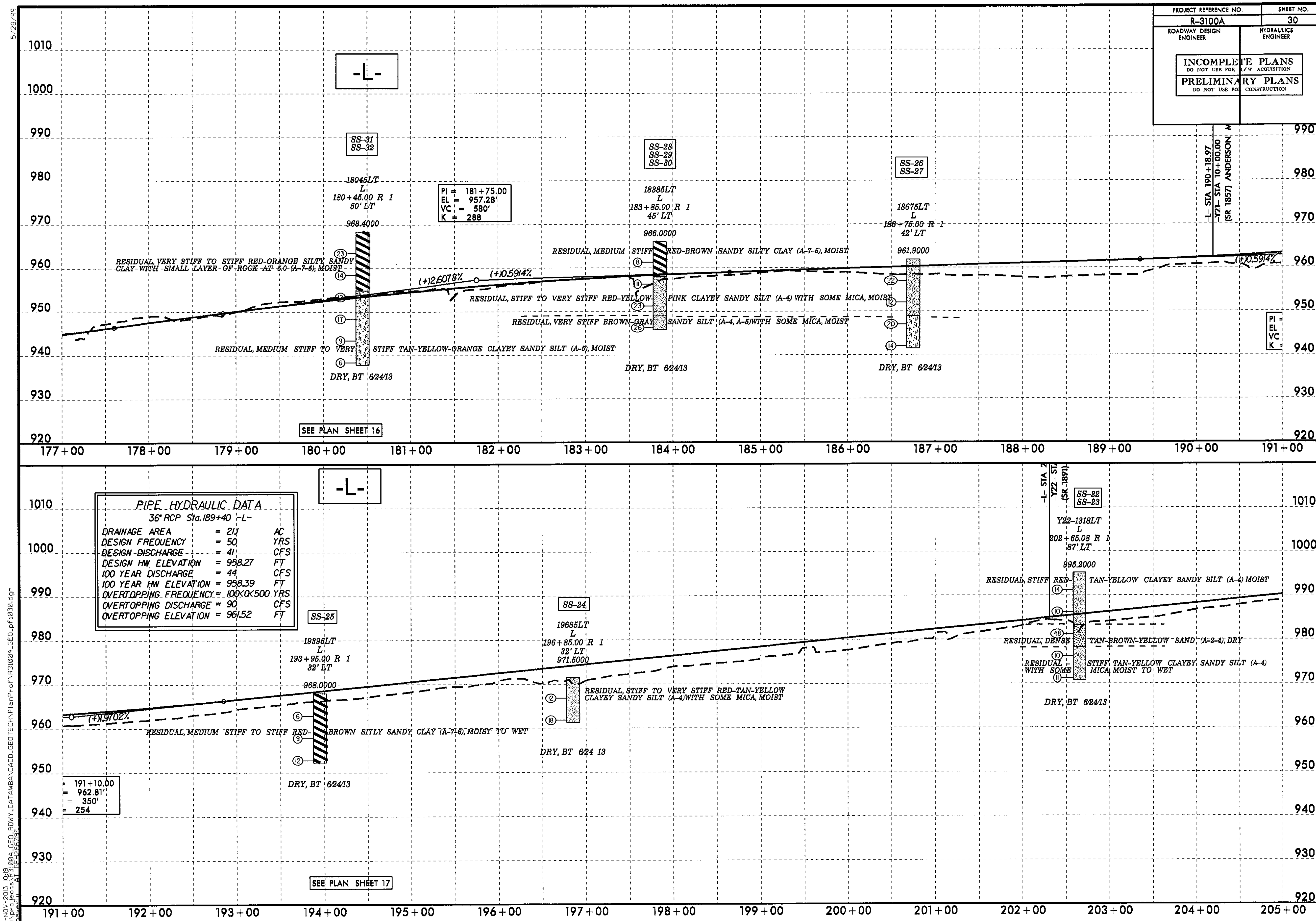
PI = 175+35.00
EL = 940.59'
VC = 450'
K = 347

17630LT
L
176+30.00 R 1
25' LT
945.2000

(+)3.9034%
(+)2.6078%
5
RESIDUAL - MEDIUM STIFF TO VERY STIFF RED-BROWN SILTY SANDY CLAY (A-7-6), MOIST
24
19
RESIDUAL - MEDIUM DENSE TAN-BROWN-ORANGE CLAYEY SILTY SAND (A-2-4), MOIST
12
DRY, BT 6/24/13

163+00 164+00 165+00 166+00 167+00 168+00 169+00 170+00 171+00 172+00 173+00 174+00 175+00 176+00 177+00

950 940 930 920 910 900 890 880 870 860



PROJECT REFERENCE NO. R-3100A
SHEET NO. 30
ROADWAY DESIGN ENGINEER
HYDRAULICS ENGINEER
INCOMPLETE PLANS DO NOT USE FOR R/W ACQUISITION
PRELIMINARY PLANS DO NOT USE FOR CONSTRUCTION
-L-
SS-31 SS-32
18045LT L 180+45.00 R 1 50' LT
968.4000
PI = 181+75.00 EL = 957.28' VC = 580' K = 288
(+)2.6078%
(+)0.5914%
RESIDUAL, VERY STIFF TO STIFF RED-ORANGE SILTY SANDY CLAY WITH SMALL LAYER OF ROCK AT 6.0 (A-7-5), MOIST
RESIDUAL, MEDIUM STIFF TO VERY STIFF TAN-YELLOW-ORANGE CLAYEY SANDY SILT (A-5), MOIST
DRY, BT 6/24/13
SS-28 SS-29 SS-30
18385LT L 183+85.00 R 1 45' LT
966.0000
RESIDUAL, MEDIUM STIFF RED-BROWN SANDY SILTY CLAY (A-7-5), MOIST
RESIDUAL, STIFF TO VERY STIFF RED-YELLOW-PINK CLAYEY SANDY SILT (A-4) WITH SOME MICA, MOIST
RESIDUAL, VERY STIFF BROWN-GRAY SANDY SILT (A-4, A-5) WITH SOME MICA, MOIST
DRY, BT 6/24/13
SS-26 SS-27
18675LT L 186+75.00 R 1 42' LT
961.9000
DRY, BT 6/24/13
-L- STA 190+18.97 -Y21- STA 10+00.00 (SR 1857) ANDERSON
(+)0.5914%
SEE PLAN SHEET 16
177+00 178+00 179+00 180+00 181+00 182+00 183+00 184+00 185+00 186+00 187+00 188+00 189+00 190+00 191+00
-L-
PIPE HYDRAULIC DATA
36" RCP Sta. 189+40 -L-
DRAINAGE AREA = 21.1 AC
DESIGN FREQUENCY = 50 YRS
DESIGN DISCHARGE = 41 CFS
DESIGN HW ELEVATION = 958.27 FT
100 YEAR DISCHARGE = 44 CFS
100 YEAR HW ELEVATION = 958.39 FT
OVERTOPPING FREQUENCY = 100<X<500 YRS
OVERTOPPING DISCHARGE = 90 CFS
OVERTOPPING ELEVATION = 961.52 FT
SS-25
19395LT L 193+95.00 R 1 32' LT
968.0000
(+)1.9702%
RESIDUAL, MEDIUM STIFF TO STIFF RED-BROWN SITLY SANDY CLAY (A-7-6), MOIST TO WET
DRY, BT 6/24/13
SS-24
19685LT L 196+85.00 R 1 32' LT
971.5000
RESIDUAL, STIFF TO VERY STIFF RED-TAN-YELLOW CLAYEY SANDY SILT (A-4) WITH SOME MICA, MOIST
DRY, BT 6/24 13
-L- STA -Y22- STA (SR 1891)
SS-22 SS-23
Y22-1318LT L 202+65.08 R 1 87' LT
995.2000
RESIDUAL, STIFF RED-TAN-YELLOW CLAYEY SANDY SILT (A-4) MOIST
RESIDUAL, DENSE TAN-BROWN-YELLOW SAND (A-2-4), DRY
RESIDUAL - STIFF, TAN-YELLOW CLAYEY SANDY SILT (A-4) WITH SOME MICA, MOIST TO WET
DRY, BT 6/24/13
191+10.00 962.81' 350' 254
SEE PLAN SHEET 17
191+00 192+00 193+00 194+00 195+00 196+00 197+00 198+00 199+00 200+00 201+00 202+00 203+00 204+00 205+00

5/28/99

PROJECT REFERENCE NO.	SHEET NO.
R-3100A	31
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

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

-L-

SS-19
SS-20
SS-21

PI = 209+25.00
EL = 998.57'
VC = 320'
K = 206

20770LT
L
207+70.00 R 1
17' LT

995.5000

(+)1.9702%

(+)0.4143%

RESIDUAL, MEDIUM DENSE RED-ORANGE SILTY SANDY CLAY (A-2-6), MOIST

RESIDUAL, VERY STIFF GRAY SILTY SANDY CLAY (A-6), MOIST

RESIDUAL, MEDIUM STIFF RED-ORANGE-YELLOW SANDY CLAYEY SILT, (A-7-6), MOIST TO WET

SEE PLAN SHEET 18

SS-17
SS-18

21257LT
L
212+67.00 R 1
45' LT

999.7000

(+)0.4143%

ARTIFICIAL FILL, VERY SOFT GRAY SILTY SANDY CLAY (A-6), MOIST

ARTIFICIAL FILL, VERY SOFT RED-ORANGE-TAN SANDY CLAYEY SILT (A-6)

RESIDUAL, VERY SOFT RED-ORANGE-TAN SANDY CLAYEY SILT (A-6), MOIST TO WET

PI = 214+15.00
EL = 1000.60'
VC = 460'
K = 352

SS-14
SS-15
SS-16

21530LT
L
215+30.00 R 1
10' LT

(+)0.8920%

993.3000

ROADWAY EMBANKMENT, SOFT BROWN-GRAY SILTY SANDY CLAY (A-6), MOIST TO WET

ALLUVIAL, SOFT BROWN-GRAY SILTY SANDY CLAY (A-6), MOIST TO WET

RESIDUAL, SOFT TO MEDIUM STIFF RED-ORANGE CLAYEY SANDY SILT (A-4), M

SS-12
SS-13

21800RT
L
218+00.00 R 1
65' RT

1006.9000

RESIDUAL, STIFF TO SANDY SILTY CLAY

RESIDUAL, STIFF TO TAN-YELLOW ORAN

DRY, BT 6/24/13

DESIGN FREQUENCY
DESIGN HW ELEVATION
BASE DISCHARGE
BASE FREQUENCY
BASE HW ELEVATION
OVERTOPPING DISCHARG
OVERTOPPING FREQUEN
OVERTOPPING ELEVATIO

-L-

VERY STIFF RED-BROWN (I-7-6), HIGH PI, MOIST

VERY STIFF GE SANDY SILTY CLAY (A-7-6), MOIST

(-)0.8920%

(-)1.3038%

22160RT
L
221+00.00 R 1
75' RT

998.1000

RESIDUAL, STIFF RED-BROWN SANDY SILTY CLAY (A-7), MOIST

DRY, BT 6/24/13

SEE PLAN SHEET 19

SS-10
SS-11

22400RT
L
224+00.00 R 1
75' RT

991.1000

RESIDUAL, MEDIUM STIFF RED-BROWN-YELLOW SANDY SILTY CLAY (A-7-5), MOIST

DRY, BT 6/24/13

SS-8
SS-9

22695RT
L
226+95.00 R 1
80' RT

985.5000

RESIDUAL, STIFF RED-ORANGE-YELLOW SANDY SILTY CLAY (A-7-5), DRY

RESIDUAL, STIFF TAN-ORANGE-BLACK CLAYEY SANDY SILT (A-5), DRY

DRY, BT 6/24/13

PI = 230+25.00
EL = 982.43'
VC = 810'
K = 126

(-)1.3038%

(+)5.1089%

SS-6
SS-7

23175RT
L
231+75.00 R 1
87' RT

964.3000

ALLUVIAL, VERY LOOSE GRAY CLAYEY SAND (A-2-4), DRY

RESIDUAL, MEDIUM STIFF BROWN-YELLOW-TAN CLAYEY SANDY SILT (A-5) WITH SOME MICA, MOIST

DRY, BT 6/24/13

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5/28/99

PROJECT REFERENCE NO.	SHEET NO.
R-3100A	32
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

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

-L-

RAULIC DATA

	= 340	CFS
	= 50	YRS
	= 969.9	FT
	= 400	CFS
	= 100	YRS
	= 970.7	FT
E	= 1200	CFS
CY	= 0 > 500	YRS
N	= 985.46	FT

RESIDUAL, MEDIUM STIFF BROWN-YELLOW-TAN CLAYEY SANDY SILT (A-5) WITH SOME MICA, MOIST

23965LT
L
239+65.00 R 1
52' LT
1028.9000

(+)5.1089%

(+)1.6935%

100/.5
100/.1
WEATHERED ROCK
DRY, BT 6/24/13

PI = 240+35.00
EL = 1,034.03'
VC = 790'
K = 231

SS-6
24250LT
L
242+50.00
55' LT
1042.2000

24300LT
L
243+00.00
55' LT
1044.2000

24350LT
L
243+50.00
55' LT
1046.2000

RESIDUAL HARD SDY SILT
100/.2
ROCK
DRY, AR 6/24/13
WEATHERED ROCK
CRYSTALLINE ROCK
DRY, AR 6/24/13
RESIDUAL, STIFF TO HARD TAN-BRN SANDY SILT WITH WEATHERED ROCK LAYERS (A-4), DRY
DRY, BT 6/24/13

24600LT
L
246+00.00 R 1
55' LT
1061.3000

ROADWAY EMBANKMENT
HARD RED-BROWN WEATHERED ROCK
100
RESIDUAL HARD TAN-BROWN GRAV CLAYEY SA
100/.5
10/.4
WEATHERED ROCK
CRYSTALLINE ROCK
AR 6/24/13

(A) ROADWAY EMBANKMENT - MEDIUM STIFF TO VERY STIFF RED-BROWN-TAN SILTY CLAY (A-7) AND SANDY SILT (A-4), DRY

233+00 234+00 235+00 236+00 237+00 238+00 239+00 240+00 241+00 242+00 243+00 244+00 245+00 246+00 247+00

1080 1070 1060 1050 1040 1030 1020 1010 1000 990

-L-

PI = 248+05.00
EL = 1,047.07'
VC = 550'
K = 224

-L- STA 248+23.86
-L- STA 10+00.00

SS-1
24900LT
L
249+00.00 R 1
60' LT
1051.8000

SILTY CLAY (A-7-5), DRY
(+)1.6935%
(-)0.7605%
SANDY SILT (A-4), DRY
RESIDUAL, MEDIUM STIFF TAN-BROWN SANDY SILTY CLAY (A-7-5), MOIST
DRY, BT 6/24/13

PI = 251+85.00
EL = 1,044.18'
VC = 210'
K = 258

(-)0.7605%
(-)1.5739%
(-)2.0625%

END GRADE
STA. 253+80.00
EL = 1,040.72'

PI = 253+00.00
EL = 1,042.37'

SEE PLAN SHEET 21

247+00 248+00 249+00 250+00 251+00 252+00 253+00

1090 1080 1070 1060 1050 1040 1030 1020 1010 1000

09-NOV-2011 10:20
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User:rbell
PSLT:PSLT_GEO
$$$$ICON=

PROJECT REFERENCE NO.	SHEET NO.
R-3100A	33

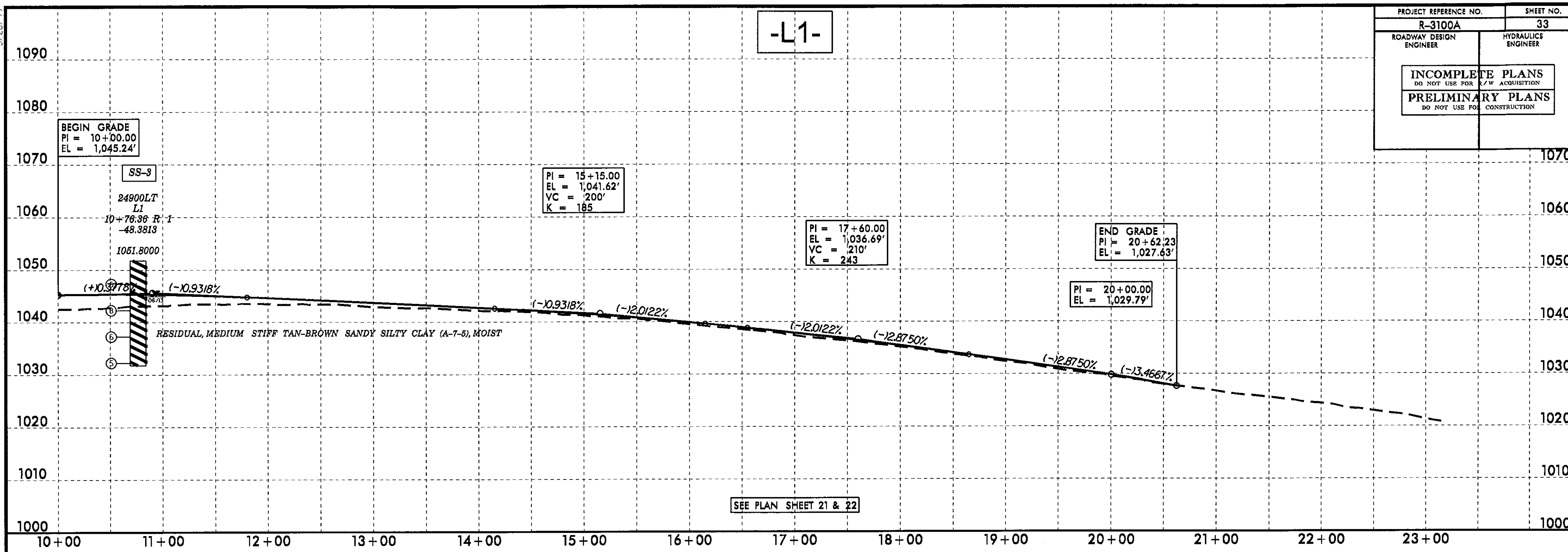
ROADWAY DESIGN ENGINEER

HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

-L1-

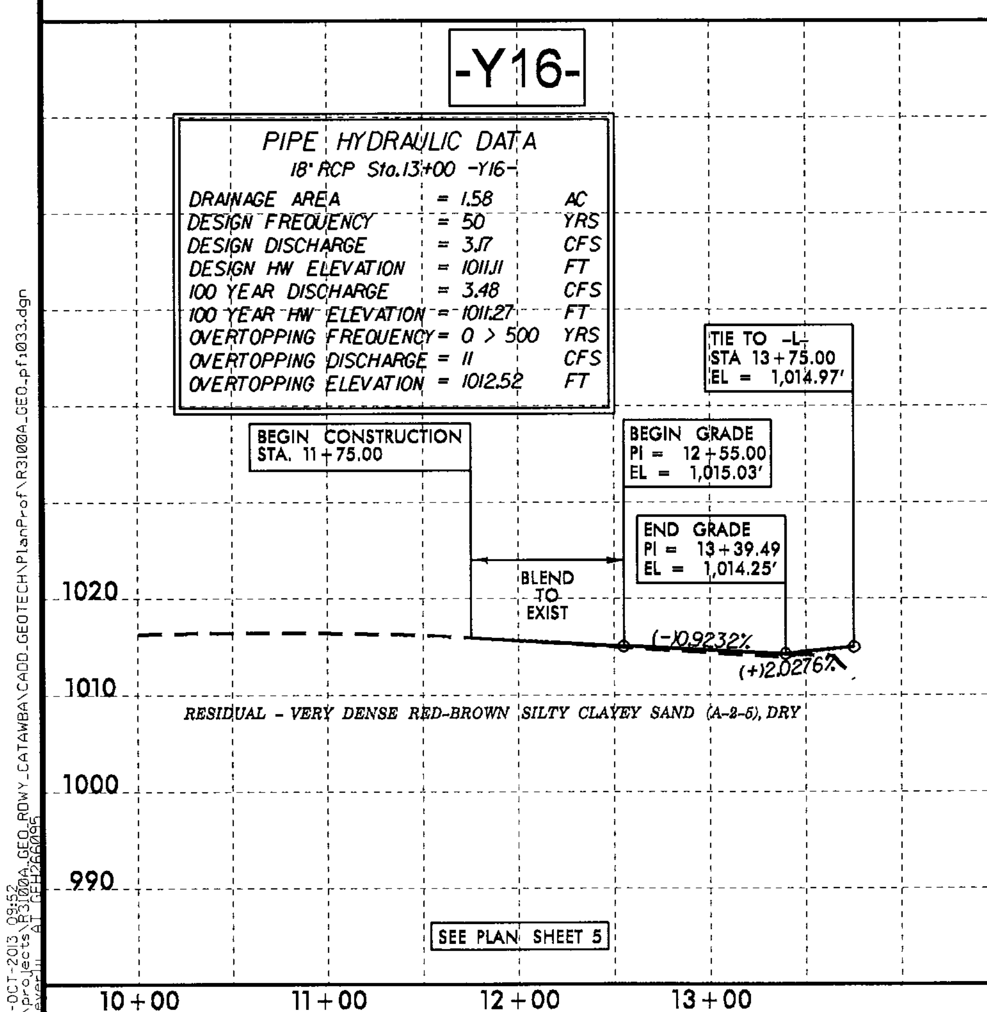


SEE PLAN SHEET 21 & 22

-Y16-

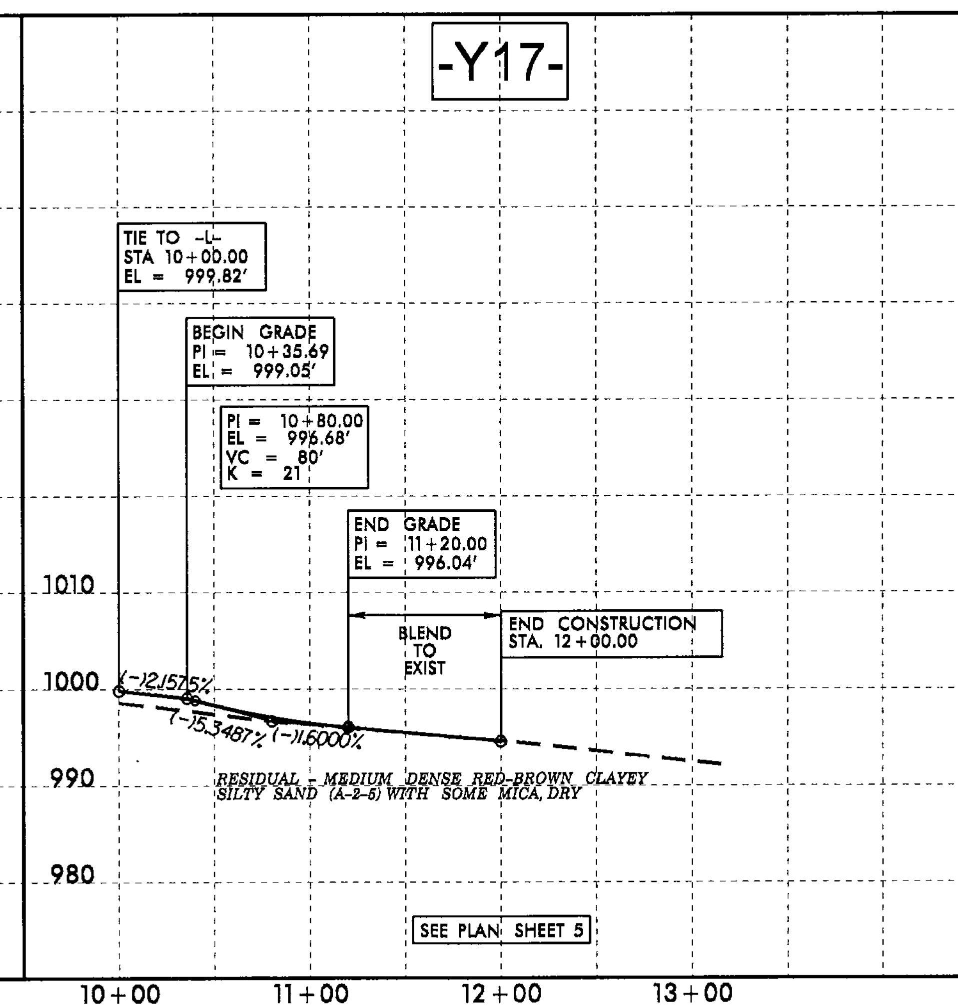
PIPE HYDRAULIC DATA
18" RCP Sta.13+00 -Y16-

DRAINAGE AREA	=	1.58	AC
DESIGN FREQUENCY	=	50	YRS
DESIGN DISCHARGE	=	3.17	CFS
DESIGN HW ELEVATION	=	1011.11	FT
100 YEAR DISCHARGE	=	3.48	CFS
100 YEAR HW ELEVATION	=	1011.27	FT
OVERTOPPING FREQUENCY	=	0 > 500	YRS
OVERTOPPING DISCHARGE	=	11	CFS
OVERTOPPING ELEVATION	=	1012.52	FT



SEE PLAN SHEET 5

-Y17-

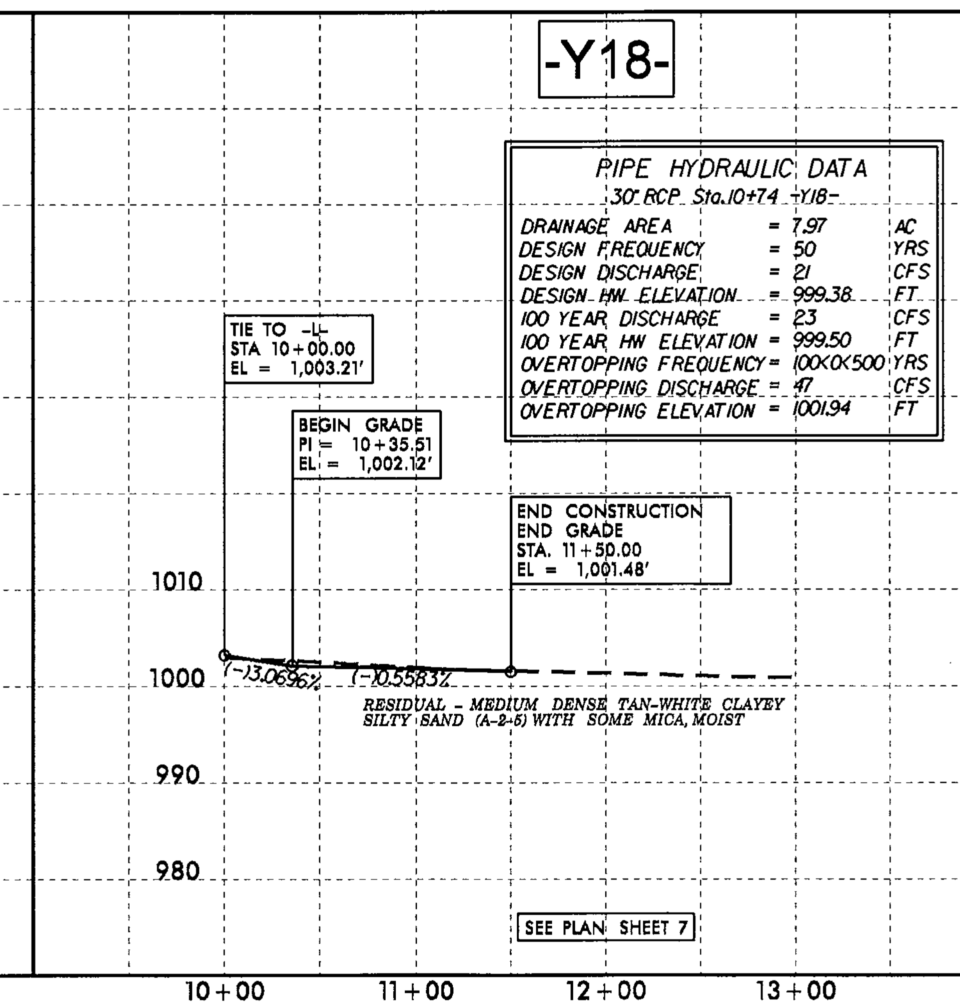


SEE PLAN SHEET 5

-Y18-

PIPE HYDRAULIC DATA
30" RCP Sta.10+74 -Y18-

DRAINAGE AREA	=	7.97	AC
DESIGN FREQUENCY	=	50	YRS
DESIGN DISCHARGE	=	21	CFS
DESIGN HW ELEVATION	=	999.38	FT
100 YEAR DISCHARGE	=	23	CFS
100 YEAR HW ELEVATION	=	999.50	FT
OVERTOPPING FREQUENCY	=	100<O<500	YRS
OVERTOPPING DISCHARGE	=	47	CFS
OVERTOPPING ELEVATION	=	1001.94	FT



SEE PLAN SHEET 7

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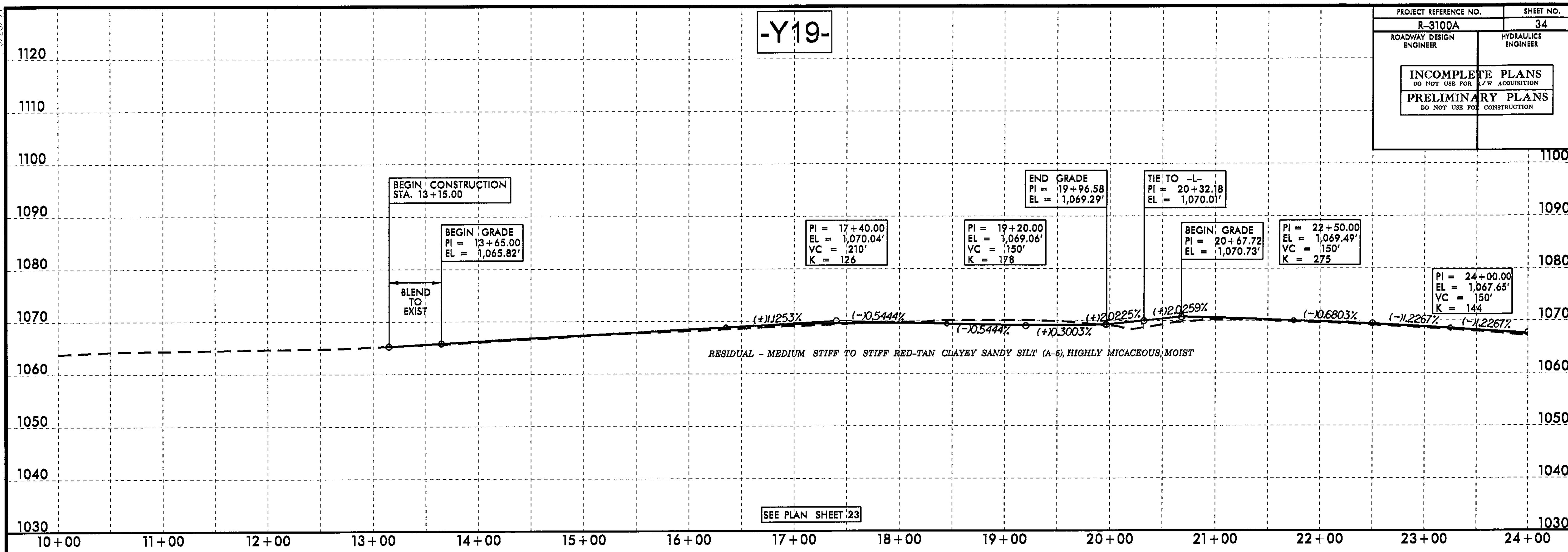
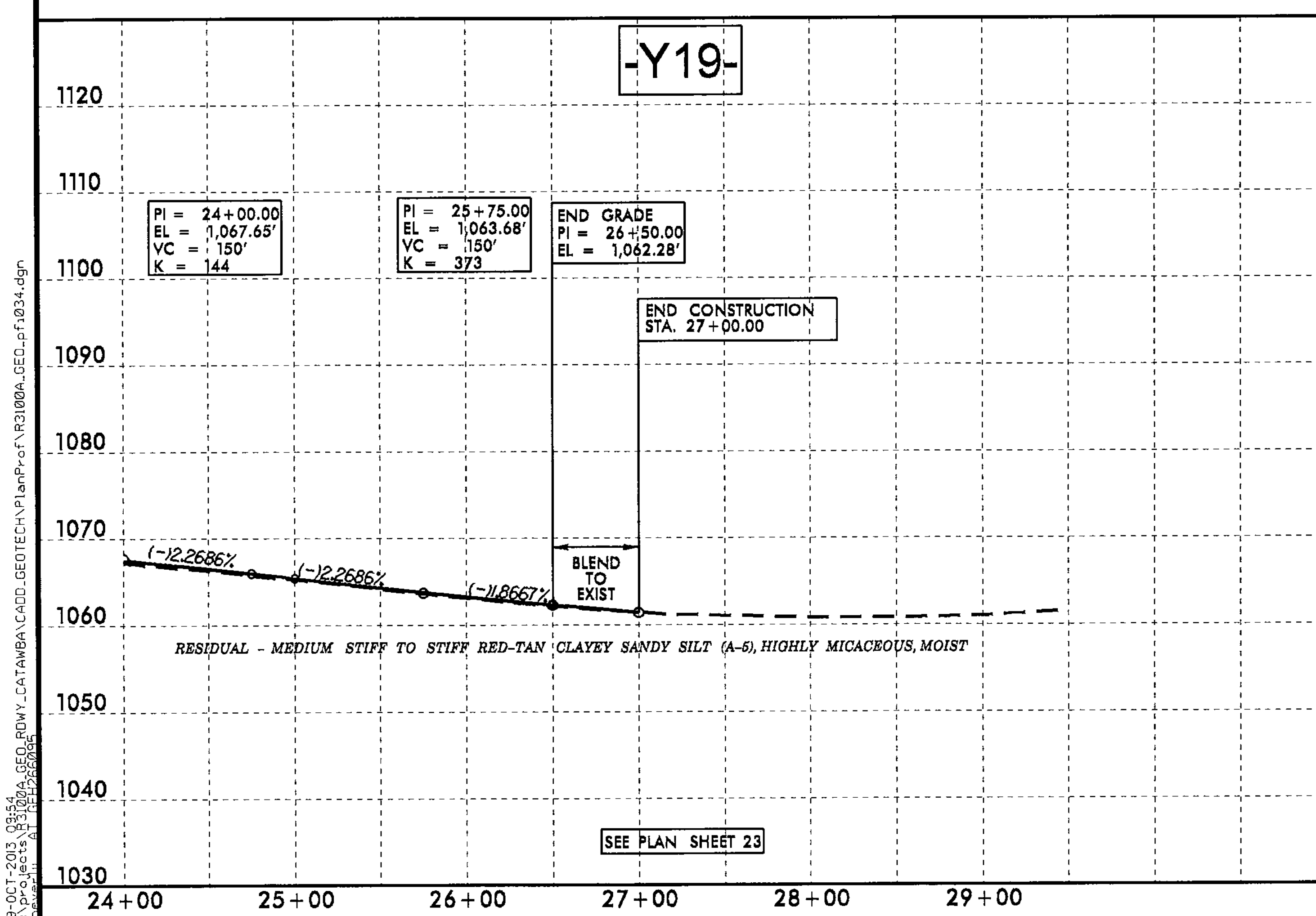
ebeverly AT GEH266095

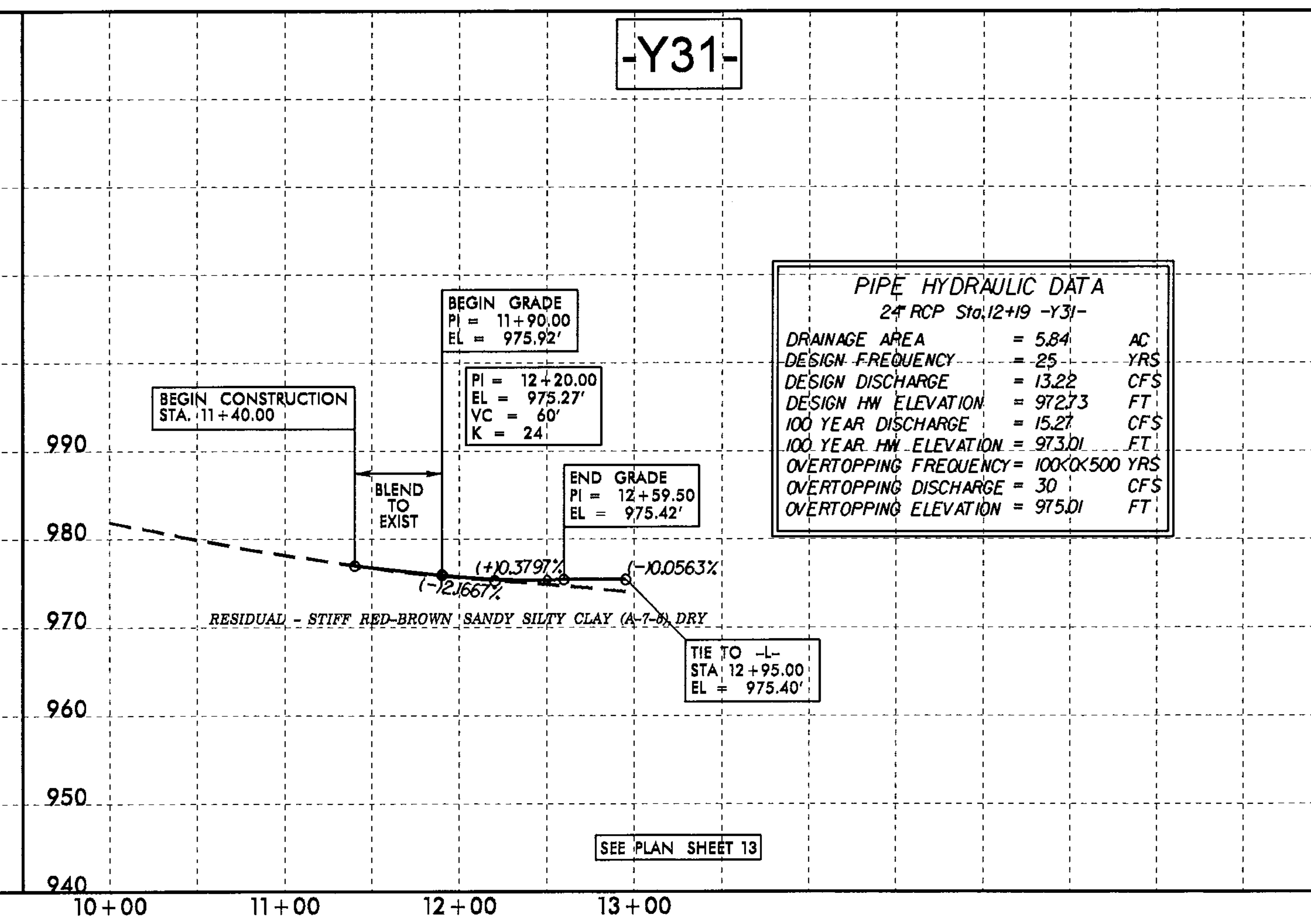
PROJECT REFERENCE NO.	SHEET NO.
R-3100A	34
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION







PIPE HYDRAULIC DATA
24" RCP Sta. 12+19 -Y31-

DRAINAGE AREA	= 5.84	AC
DESIGN FREQUENCY	= 25	YRS
DESIGN DISCHARGE	= 13.22	CFS
DESIGN HW ELEVATION	= 972.73	FT
100 YEAR DISCHARGE	= 15.27	CFS
100 YEAR HW ELEVATION	= 973.01	FT
OVERTOPPING FREQUENCY	= 100<Q<500	YRS
OVERTOPPING DISCHARGE	= 30	CFS
OVERTOPPING ELEVATION	= 975.01	FT

5/28/99

09-OCT-2013 09:54
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5/28/99

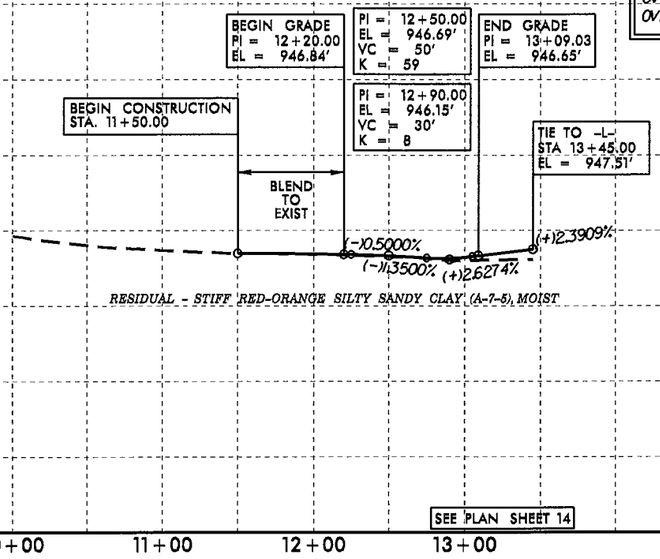
PROJECT REFERENCE NO.	SHEET NO.
R-3100A	35
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

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

-Y20-

PIPE HYDRAULIC DATA
36" RCP Sta. 12+70 -Y20-

DRAINAGE AREA	= 28.9	AC
DESIGN FREQUENCY	= 25	YRS
DESIGN DISCHARGE	= 55.1	CFS
DESIGN HW ELEVATION	= 945.08	FT
100 YEAR DISCHARGE	= 63.9	CFS
100 YEAR HW ELEVATION	= 945.80	FT
OVERTOPPING FREQUENCY	= 100X0X500	YRS
OVERTOPPING DISCHARGE	= 80	CFS
OVERTOPPING ELEVATION	= 947.00	FT



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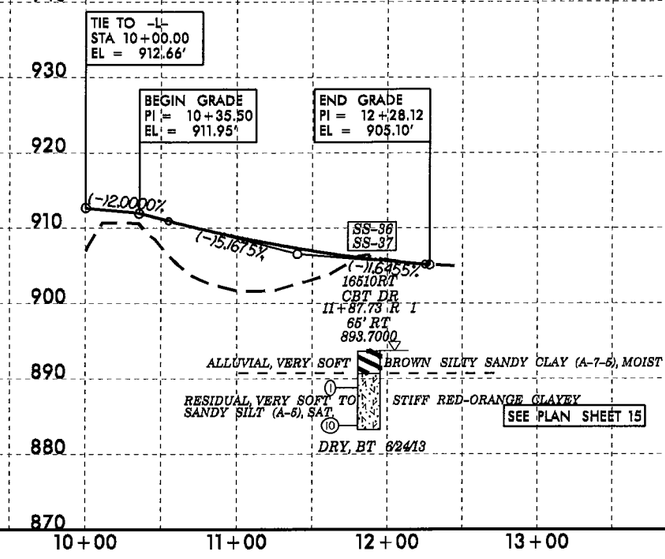
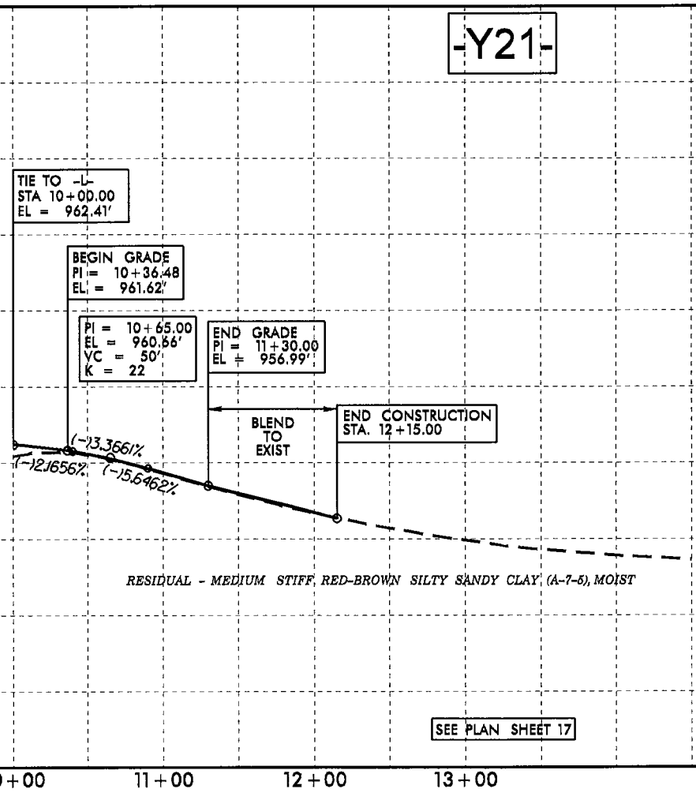
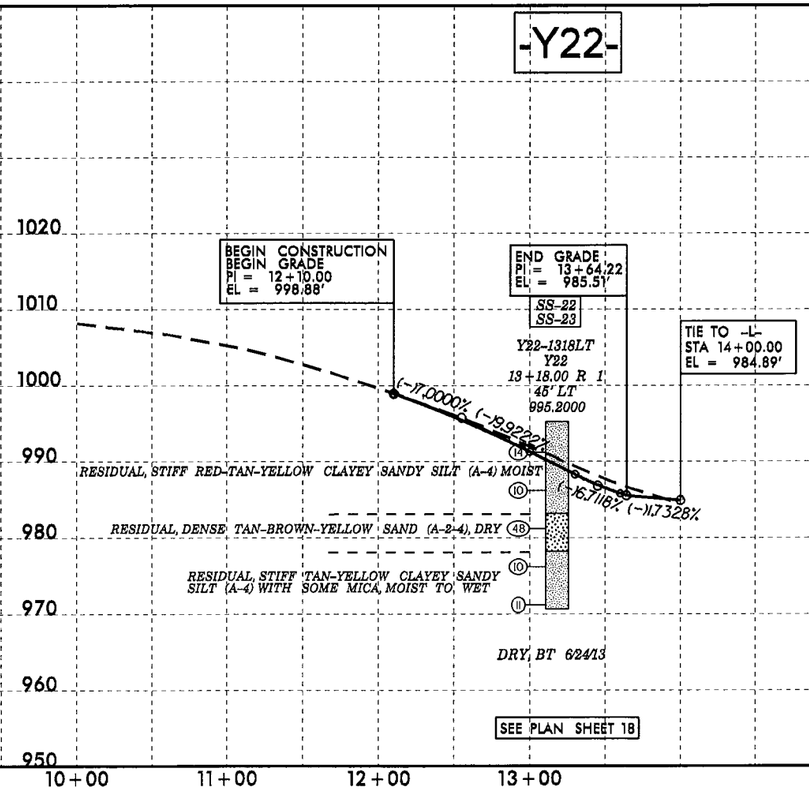


-Y21-



-Y22-



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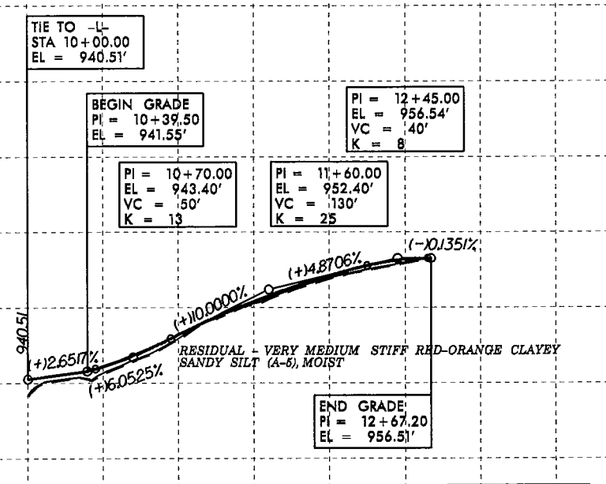
abevelle AT NEU06005

5/28/99

-DR1-

PROJECT REFERENCE NO.	SHEET NO.
R-3100A	36
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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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-1	60 LT	249+00	4.0-5.0	A-7-5(10)	46	16	9.3	30.3	22.0	38.4	100	96	67	-	-	L
SS-2	60 LT	240+00	9.0-10.0	A-7-5(18)	61	18	7.9	24.4	35.4	32.3	100	96	77	-	-	L
SS-3	60 LT	249+00	14.0-15.0	A-7-5(21)	65	15	2.4	19.4	51.9	26.3	100	99	87	-	-	L
SS-4	45 LT	246+00	9.6-10.6	A-4(0)	27	NP	12.7	50.7	26.5	10.1	81	78	40	-	-	L
SS-5	55 LT	242+50	0.0-6.0	A-4(0)	24	NP	9.5	62.0	20.4	8.1	94	90	37	-	-	L
S-6	87 RT	231+75	0.0-3.0	A-2-4(0)	23	NP	25.5	51.5	2.8	20.2	98	88	31	-	-	L
SS-7	87 RT	231+75	3.5-4.5	A-5(0)	49	NP	4.8	63.0	24.0	8.1	100	98	49	-	-	L
SS-8	80 RT	226+95	4.2-5.2	A-7-5(16)	63	23	15.4	17.0	17.2	50.5	90	82	65	-	-	L
SS-9	80 RT	226+95	9.2-10.2	A-5(9)	61	10	14.5	31.9	31.3	22.2	100	93	64	-	-	L
SS-10	80 RT	224+00	4.7-5.7	A-7-5(25)	58	26	5.7	16.8	21.0	56.6	100	97	83	-	-	L
SS-11	80 RT	224+00	9.7-10.7	A-7-5(30)	67	24	1.2	12.9	47.5	38.4	100	99	93	-	-	L
SS-12	65 RT	218+00	3.2-4.2	A-7-5(36)	69	38	4.5	12.9	13.8	68.8	98	96	84	-	-	L
SS-13	65 Rt	218+00	13.2-14.2	A-7-5(13)	62	11	6.5	34.4	34.8	24.3	100	97	74	-	-	L
SS-14	10 LT	215+30	4.3-5.3	A-6(10)	38	19	13.8	27.1	16.6	42.5	98	92	63	-	-	L
SS-15	10 LT	215+30	9.3-11.3	A-6(7)	39	18	17.2	32.2	18.2	32.4	100	92	56	-	-	L
SS-16	10 LT	215+30	14.3-15.3	A-4(0)	21	NP	26.3	22.3	33.2	18.2	91	73	54	-	-	L
SS-17	45 LT	212+57	4.0-5.0	A-6(3)	28	13	21.7	28.7	19.2	30.4	92	81	51	-	-	L
SS-18	45 LT	212+57	9.0-10.0	A-5(11)	47	10	5.7	23.9	46.2	24.3	100	98	80	-	-	L
SS-19	17 LT	207+70	5.8-6.8	A-7-5(20)	64	26	10.5	25.9	19.0	44.5	100	95	69	-	-	L
SS-20	17 LT	207+70	10.8-11.8	A-6(7)	31	16	14.6	30.4	18.6	36.4	98	90	62	-	-	L
SS-21	17 LT	207+70	15.8-16.8	A-7-5(13)	57	19	10.3	35.6	35.8	18.2	100	96	64	-	-	L
SS-22	45 LT	13+18	5.5-9.5	A-4(3)	39	8	10.3	47.2	24.3	18.2	100	97	53	-	-	Y-22
SS-23	45 LT	13+18	13.5-14.5	A-2-4(0)	21	NP	37.0	48.0	6.9	8.1	91	78	17	-	-	Y-22
SS-24	32 LT	196+85	4.2-5.2	A-4(1)	34	5	13.6	42.1	24.1	20.2	100	95	54	-	-	L
SS-25	65 LT	193+95	4.7-5.7	A-7-6(17)	52	23	11.1	23.5	14.8	50.6	100	94	72	-	-	L
SS-26	42 LT	186+75	4.4-5.4	A-4(5)	37	8	6.1	39.3	40.5	14.2	100	97	67	-	-	L
SS-27	42 LT	186+75	14.4-15.4	A-5(6)	41	10	6.5	34.8	36.4	22.3	100	98	66	-	-	L
SS-28	45 LT	183+85	4.2-5.2	A-7-5(32)	72	26	2.6	12.6	34.2	50.6	100	98	91	-	-	L
SS-29	45 LT	183+85	9.2-10.2	A-4(3)	36	5	3.4	49.2	31.2	16.2	100	99	64	-	-	L
SS-30	45 LT	183+85	19.2-20.2	A-4(0)	33	NP	14.3	51.6	26.1	8.0	98	91	47	-	-	L
SS-31	50 LT	180+45	4.5-5.5	A-7-5(12)	50	18	16.9	22.5	20.5	40.2	100	89	65	-	-	L
SS-32	50 LT	180+45	14.5-15.5	A-5(1)	46	NP	21.1	33.6	31.2	14.2	100	86	55	-	-	L
SS-33	25 LT	176+30	5.4-6.4	A-7-6(10)	44	18	12.4	26.7	14.7	46.2	95	88	63	-	-	L
SS-34	25 LT	176+30	15.4-16.4	A-2-4(0)	40	NP	20.7	54.4	12.9	12.0	92	81	33	-	-	L
SS-35	85 RT	168+45	4.3-5.3	A-4(0)	32	NP	33.1	33.1	15.7	18.1	100	81	41	-	-	L
SS-36	80 RT	165+10	4.4-5.4	A-7-5(10)	50	15	8.4	43.8	29.7	18.1	100	96	64	-	-	L
SS-37	80 RT	165+10	9.4-10.4	A-5(6)	51	9	18.9	30.1	28.9	22.1	100	89	59	-	-	L
SS-38	20 LT	157+65	3.5-4.5	A-5(2)	42	7	25.9	20.5	21.5	32.1	80	64	47	-	-	L
SS-39	20 LT	157+65	8.5-9.5	A-5(9)	47	7	3.6	24.5	41.8	30.1	100	98	82	-	-	L
SS-40	20 LT	157+65	13.5-14.5	A-5(2)	42	NP	4.4	36.9	42.6	16.1	93	92	69	-	-	L
SS-41	70 LT	155+25	4.5-5.5	A-7-5(13)	52	14	4.8	24.5	24.5	46.2	100	98	77	-	-	L
SS-42	70 LT	155+25	9.5-10.5	A-4(0)	37	NP	9.0	41.2	29.7	20.1	100	96	61	-	-	L
SS-43	30 LT	147+75	4.6-5.6	A-7-5(36)	81	35	8.0	14.1	15.7	62.2	100	94	82	-	-	L
SS-44	30 LT	147+75	9.6-10.6	A-5(2)	53	NP	20.1	28.1	25.7	26.1	97	85	58	-	-	L
SS-45	10 LT	135+95	4.8-5.8	A-7-5(32)	65	26	1.0	7.8	28.9	62.2	100	99	94	-	-	L
SS-46	10 LT	135+95	9.8-10.8	A-7-5(16)	53	14	2.6	22.1	37.1	38.2	100	99	84	-	-	L
SS-47	65 LT	133+17	4.7-5.7	A-5(0)	41	NP	24.5	39.8	15.7	20.1	97	83	47	-	-	L
SS-48	63 LT	129+24	5.4-6.4	A-7-5(27)	64	30	8.2	17.9	17.7	56.2	99	93	79	-	-	L
SS-49	63 LT	129+24	10.4-11.4	A-5(0)	46	NP	22.3	31.9	19.7	26.1	92	78	50	-	-	L
SS-50	60 LT	125+73	4.6-5.6	A-4(0)	34	NP	24.1	40.8	21.1	14.1	95	81	45	-	-	L
SS-51	50 RT	119+25	4.4-5.4	A-5(0)	41	NP	31.3	36.5	14.0	18.2	96	79	38	-	-	L
SS-52	65 LT	115+22	4.1-5.1	A-4(0)	39	NP	23.2	45.4	13.2	18.2	97	90	38	-	-	L
SS-53	65 LT	115+22	9.1-10.1	A-2-4(0)	37	NP	28.9	45.8	13.2	12.1	100	89	35	-	-	L
SS-54	55 LT	112+20	4.6-5.6	A-5(3)	44	10	31.3	22.2	18.3	28.3	96	74	49	-	-	L
SS-55	55 LT	112+20	9.6-10.6	A-5(0)	54	NP	35.9	26.4	25.5	12.1	92	69	40	-	-	L
SS-56	77 RT	98+90	0.0-3.0	A-5(0)	44	NP	33.9	28.7	21.3	16.1	92	70	39	-	-	L
SS-57	77 RT	95+90	4.7-5.7	A-7-6(9)	51	23	33.1	12.7	13.8	40.4	92	69	51	-	-	L
SS-58	77 RT	95+90	9.7-10.7	A-5(1)	45	5	39.0	19.6	25.3	16.1	95	67	44	-	-	L
SS-59	35 RT	93+53	4.3-5.3	A-7-5(28)	72	35	17.0	10.3	8.2	64.6	98	87	73	-	-	L
SS-60	35 RT	93+53	9.3-10.3	A-5(2)	52	10	40.0	18.6	21.3	20.2	96	67	43	-	-	L
SS-61	15 RT	89+87	4.5-5.5	A-7-5(4)	59	17	41.6	14.9	11.2	32.3	91	63	42	-	-	L
SS-62	32 RT	83+22	4.3-5.3	A-7-6(6)	51	24	38.5	16.8	4.3	40.4	94	68	44	-	-	L
SS-63	32 RT	83+22	9.3-10.3	A-7-5(3)	48	13	35.1	21.6	15.0	28.3	99	79	45	-	-	L
SS-64	55 RT	80+67	4.3-5.3	A-7-5(10)	52	19	28.3	15.1	12.2	44.4	98	79	58	-	-	L
SS-65	55 RT	80+67	9.3-10.3	A-2-6(1)	40	15	45.2	23.0	7.6	24.2	92	65	31	-	-	L
SS-66	55 RT	80+67	14.3-15.3	A-5(2)	67	NP	18.2	38.1	19.5	24.2	100	96	50	-	-	L
SS-67	55 RT	75+60	4.5-5.5	A-7-5(10)	61	21	27.9	20.8	15.0	36.3	97	80	54	-	-	L
SS-68	53 LT	69+00	9.6-10.6	A-2-5(0)	41	NP	55.5	16.8	11.6	16.1	93	53	28	-	-	L
SS-69	41 RT	71+94	4.9-5.9	A-2-5(0)	46	7	44.4	29.1	12.4	14.1	98	74	31	-	-	L
SS-70	65 LT	65+90	4.6-5.6	A-4(4)	38	10	19.6	32.9	21.3	26.2	100	91	54	-	-	L
SS-71	65 LT	65+90	9.6-10.6	A-2-4(0)	35	NP	35.7	35.7	16.4	12.1	98	76	35	-	-	L
SS-72	55 LT	60+00	4.6-5.6	A-4(0)	33	NP	24.4	37.9	23.5	14.1	97	85	45	-	-	L
SS-73	47 LT	57+31	4.3-5.3	A-7-5(16)	64	32	23.2	14.1	10.2	52.5	88	74	57	-	-	L

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-74	47 LT	57+31	9.3-10.3	A-2-4(0)	37	NP	43.4	35.5	13.0	8.1	90	70	25	-	-	L
SS-75	47 RT	52+50	4.7-5.7	A-2-5(0)	46	NP	52.5	12.1	19.3	16.1	75	42	29	-	-	L
SS-76	47 RT	52+50	14.7-15.7	A-5(0)	51	NP	34.1	16.3	27.3	22.2	86	65	46	-	-	L
SS-77	65 LT	47+60	2.1-3.1	A-5(2)	43	9	30.3	30.3	25.3	14.1	97	79	44	-	-	L
SS-78	65 LT	47+60	12.1-13.1	A-5(0)	53	NP	26.6	37.9	21.3	14.1	97	83	43	-	-	L
SS-79	70 LT	43+42	4.7-5.7	A-7-5(20)	61	25	4.6	29.1	19.9	46.4	100	98	73	-	-	L
SS-80	70 LT	43+42	9.7-10.7	A-5(0)	49	NP	34.7	29.9	19.3	16.1	93	72	39	-	-	L
SS-81	52 RT	38+55	4.7-5.7	A-2-5(0)	48	6	39.2	27.9	16.9	16.1	88	65	33	-	-	L
SS-82	50 RT	32+93	3.8-4.8	A-7-5(8)	56	22	31.1	22.6	16.0	30.3	97	79	49	-	-	L
SS-83	50 RT	32+93	8.8-9.8	A-2-4(0)	40	NP	40.4	36.3	13.2	10.1	95	72	28	-	-	L
SS-84	40 RT	21+80	4.3-5.3	A-2-5(0)	41	8	48.4	22.4	13.0	16.1	89	58	30	-	-	L
SS-85	40 RT	21+80	9.3-10.3	A-2-4(0)	33	NP	56.5	22.4	13.0	8.1	90	51	21	-	-	L
SS-86	70 RT	15+20	4.0-5.0	A-7-5(8)	48	15	20.2	26.2	29.4	24.2	100	90	59	-	-	L
SS-87	70 RT	15+20	14.0-15.0	A-7-5(3)	51	15	36.3	17.2	28.4	18.2	87	62	43	-	-	L