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SEE SHEET 3 FOR PLAN SHEET LAYOUT
AT TIME OF INVESTIGATION

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

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	U-5724	1	21

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APPENDICES

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**ROADWAY
SUBSURFACE INVESTIGATION**

COUNTY WAYNE
PROJECT DESCRIPTION REALIGNMENT OF SR 1709
(CENTRAL HEIGHTS RD) AT BERKELEY
BOULEVARD

INVENTORY

CAUTION NOTICE

THE SUBSURFACE INFORMATION AND THE SUBSURFACE INVESTIGATION ON WHICH IT IS BASED WERE MADE FOR THE PURPOSE OF STUDY, PLANNING AND DESIGN, AND NOT FOR CONSTRUCTION OR PAY PURPOSES. THE VARIOUS FIELD BORING LOGS, ROCK CORES AND SOIL TEST DATA AVAILABLE MAY BE REVIEWED OR INSPECTED IN RALEIGH BY CONTACTING THE N. C. DEPARTMENT OF TRANSPORTATION, GEOTECHNICAL ENGINEERING UNIT AT (919) 707-6850. THE SUBSURFACE PLANS AND REPORTS, FIELD BORING LOGS, ROCK CORES AND SOIL TEST DATA ARE NOT 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 THE PROJECT. THE CONTRACTOR SHALL HAVE NO CLAIM FOR ADDITIONAL COMPENSATION OR FOR AN EXTENSION OF TIME FOR ANY REASON RESULTING FROM THE ACTUAL CONDITIONS ENCOUNTERED AT THE SITE DIFFERING FROM THOSE INDICATED IN THE SUBSURFACE INFORMATION.

- NOTES:
- THE INFORMATION CONTAINED HEREIN IS NOT IMPLIED OR GUARANTEED BY THE N. C. DEPARTMENT OF TRANSPORTATION AS ACCURATE NOR IS IT CONSIDERED PART OF THE PLANS, SPECIFICATIONS OR CONTRACT FOR THE PROJECT.
 - BY HAVING REQUESTED THIS INFORMATION, THE CONTRACTOR SPECIFICALLY WAIVES ANY CLAIMS FOR INCREASED COMPENSATION OR EXTENSION OF TIME BASED ON DIFFERENCES BETWEEN THE CONDITIONS INDICATED HEREIN AND THE ACTUAL CONDITIONS AT THE PROJECT SITE.

PERSONNEL

CAROLINA DRILLING

HILL, M.J.

HOGLEN, J.R.

INVESTIGATED BY FALCON ENG.

DRAWN BY HUNSBERGER, W. S.

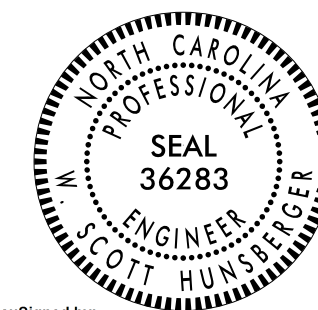
CHECKED BY HAMM, J.R. 1/4/18

SUBMITTED BY FALCON ENG.

DATE MAY 2019

REFERENCE: U-5724

PROJECT: 54016



DocuSigned by:
W. Scott Hunsberger 5/29/2019
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SIGNATURE DATE

DOCUMENT NOT CONSIDERED FINAL
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NORTH CAROLINA DEPARTMENT OF TRANSPORTATION DIVISION OF HIGHWAYS GEOTECHNICAL ENGINEERING UNIT

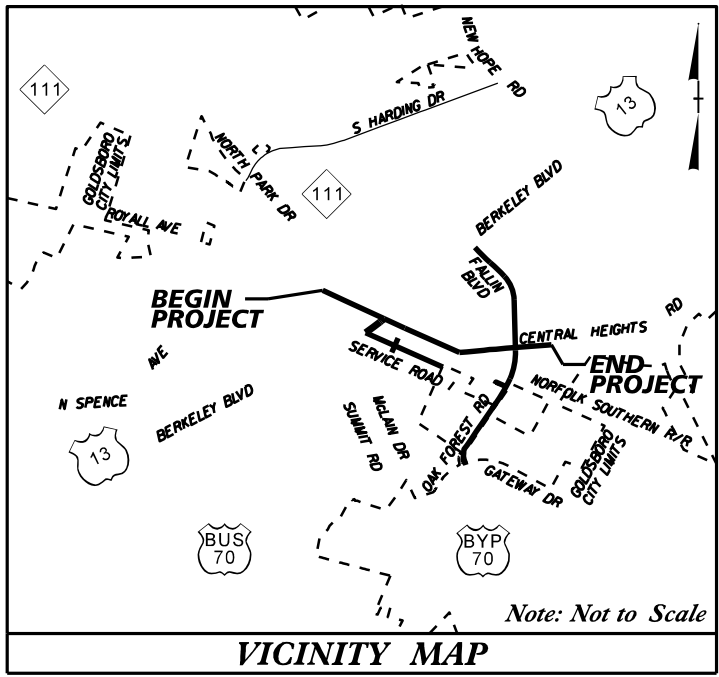
SUBSURFACE INVESTIGATION

SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

SOIL DESCRIPTION										GRADATION										ROCK DESCRIPTION										TERMS AND DEFINITIONS																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																													
<p>SOIL IS CONSIDERED 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 THE STANDARD PENETRATION TEST (AASHTO T 206, ASTM D1586). SOIL CLASSIFICATION IS BASED ON THE AASHTO SYSTEM. BASIC DESCRIPTIONS GENERALLY INCLUDE THE FOLLOWING: CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. FOR EXAMPLE, <i>VERY STIFF, GRAY, SILTY CLAY, MOIST WITH INTERBEDDED FINE SAND LAYERS, HIGHLY PLASTIC, A-7-6</i></p>										<p>WELL GRADED - INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM FINE TO COARSE. UNIFORMLY GRADED - INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE. GAP-GRADED - INDICATES A MIXTURE OF UNIFORM PARTICLE SIZES OF TWO OR MORE SIZES.</p>										<p>HARD ROCK IS NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT REFUSAL IF TESTED, 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:</p>										<p>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, SUCH 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 DISLOGGED 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 (ROD) - 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 (SROD) - 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.</p>																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																													
<p>SOIL LEGEND AND AASHTO CLASSIFICATION</p> <table border="1" style="width: 100%; text-align: center;"> <tr> <th rowspan="2">GENERAL CLASS.</th> <th colspan="7">GRANULAR MATERIALS (≤ 35% PASSING #200)</th> <th colspan="7">SILT-CLAY MATERIALS (> 35% PASSING #200)</th> <th colspan="6">ORGANIC MATERIALS</th> </tr> <tr> <th>A-1</th><th>A-1-b</th><th>A-3</th><th>A-2-4</th><th>A-2-5</th><th>A-2-6</th><th>A-2-7</th> <th>A-4</th><th>A-5</th><th>A-6</th><th>A-7</th> <th>A-1, A-2</th><th>A-3</th><th>A-4, A-5</th><th>A-6, A-7</th> <th>A-1, A-2</th><th>A-3</th><th>A-4, A-5</th><th>A-6, A-7</th> </tr> <tr> <th>GROUP CLASS.</th> <td>A-1-a</td><td>A-1-b</td><td>A-3</td><td>A-2-4</td><td>A-2-5</td><td>A-2-6</td><td>A-2-7</td> <td>A-4</td><td>A-5</td><td>A-6</td><td>A-7</td> <td>A-1, A-2</td><td>A-3</td><td>A-4, A-5</td><td>A-6, A-7</td> <td>A-1, A-2</td><td>A-3</td><td>A-4, A-5</td><td>A-6, A-7</td> </tr> <tr> <th>SYMBOL</th> <td colspan="7">[Pattern]</td> <td colspan="7">[Pattern]</td> <td colspan="6">[Pattern]</td> </tr> <tr> <th>% PASSING #10 #40 #200</th> <td>50 MX 30 MX 15 MX</td><td>50 MX 25 MX</td><td>51 MN 10 MX</td><td>35 MX 35 MX</td><td>35 MX 35 MX</td><td>35 MX 35 MX</td><td>35 MX 35 MX</td> <td>36 MN 36 MN</td><td>36 MN 36 MN</td><td>36 MN 36 MN</td><td>36 MN 36 MN</td> <td>GRANULAR SOILS</td><td>SILT-CLAY SOILS</td><td colspan="6">MUCK, PEAT</td> </tr> <tr> <th>MATERIAL PASSING #40 LL PI</th> <td colspan="7">-</td><td>40 MX 10 MN</td><td>41 MN 11 MN</td><td>40 MX 11 MN</td><td>41 MN 11 MN</td><td>40 MX 11 MN</td><td>41 MN 11 MN</td><td colspan="6">SOILS WITH LITTLE OR MODERATE AMOUNTS OF ORGANIC MATTER</td> </tr> <tr> <th>GROUP INDEX</th> <td colspan="7">0</td><td>0</td><td>4 MX</td><td>8 MX</td><td>12 MX</td><td>16 MX</td><td>NO MX</td><td colspan="6">HIGHLY ORGANIC SOILS</td> </tr> <tr> <th>USUAL TYPES OF MAJOR MATERIALS</th> <td colspan="2">STONE FRAGS. GRAVEL, AND SAND</td><td colspan="2">FINE SAND</td><td colspan="3">SILTY OR CLAYEY GRAVEL AND SAND</td><td colspan="3">SILTY SOILS</td><td colspan="3">CLAYEY SOILS</td><td colspan="6">HIGHLY ORGANIC SOILS</td> </tr> <tr> <th>GEN. RATING AS SUBGRADE</th> <td colspan="7">EXCELLENT TO GOOD</td><td colspan="3">FAIR TO POOR</td><td colspan="3">FAIR TO POOR</td><td colspan="3">POOR</td><td colspan="3">UNSUITABLE</td> </tr> <tr> <td colspan="10">PI OF A-7-5 SUBGROUP IS ≤ LL - 30 ; PI OF A-7-6 SUBGROUP IS > LL - 30</td> <td colspan="10"></td> <td colspan="10"></td> <td colspan="10"></td> </tr> <tr> <td colspan="10"> <p>CONSISTENCY OR DENSENESS</p> <table border="1" style="width: 100%;"> <tr> <th>PRIMARY SOIL TYPE</th> <th>COMPACTNESS OR CONSISTENCY</th> <th>RANGE OF STANDARD PENETRATION RESISTANCE (N-VALUE)</th> <th>RANGE OF UNCONFINED COMPRESSIVE STRENGTH (TONS/FT²)</th> </tr> <tr> <td>GENERALLY GRANULAR MATERIAL (NON-COHESSIVE)</td> <td>VERY LOOSE LOOSE MEDIUM DENSE DENSE VERY DENSE</td> <td>< 4 4 TO 10 10 TO 30 30 TO 50 > 50</td> <td>N/A</td> </tr> <tr> <td>GENERALLY SILT-CLAY MATERIAL (COHESSIVE)</td> <td>VERY SOFT SOFT MEDIUM STIFF STIFF VERY STIFF HARD</td> <td>< 2 2 TO 4 4 TO 8 8 TO 15 15 TO 30 > 30</td> <td>< 0.25 0.25 TO 0.5 0.5 TO 1.0 1 TO 2 2 TO 4 > 4</td> </tr> </table> </td> <td colspan="10"> <p>MISCELLANEOUS SYMBOLS</p> <table border="1" style="width: 100%;"> <tr> <td></td> <td>ROADWAY EMBANKMENT (RE) WITH SOIL DESCRIPTION</td> <td></td> <td>DIP & DIP DIRECTION OF ROCK STRUCTURES</td> <td></td> <td>SOIL SYMBOL</td> <td></td> <td>TEST BORING</td> <td></td> <td>SLOPE INDICATOR INSTALLATION</td> </tr> <tr> <td></td> <td>ARTIFICIAL FILL (AF) OTHER THAN ROADWAY EMBANKMENT</td> <td></td> <td>AUGER BORING</td> <td></td> <td>CONE PENETROMETER TEST</td> <td></td> <td>CORE BORING</td> <td></td> <td>SOUNDING ROD</td> </tr> <tr> <td></td> <td>INFERRED SOIL BOUNDARY</td> <td></td> <td>MONITORING WELL</td> <td></td> <td>PIEZOMETER INSTALLATION</td> <td></td> <td>TEST BORING WITH CORE</td> <td></td> <td>SPT N-VALUE</td> </tr> <tr> <td></td> <td>INFERRED ROCK LINE</td> <td></td> <td>ALLUVIAL SOIL BOUNDARY</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </table> </td> <td colspan="10"> <p>ROCK HARDNESS</p> <table border="1" style="width: 100%;"> <tr> <th>VERY HARD</th> <td>CANNOT BE SCRATCHED BY KNIFE OR SHARP PICK. BREAKING OF HAND SPECIMENS REQUIRES SEVERAL HARD BLOWS OF THE GEOLOGIST'S PICK.</td> </tr> <tr> <th>HARD</th> <td>CAN BE SCRATCHED BY KNIFE OR PICK ONLY WITH DIFFICULTY. HARD HAMMER BLOWS REQUIRED TO DETACH HAND SPECIMEN.</td> </tr> <tr> <th>MODERATELY HARD</th> <td>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.</td> </tr> <tr> <th>MEDIUM HARD</th> <td>CAN BE GROOVED OR GOUGED 0.05 INCHES DEEP BY FIRM PRESSURE OF KNIFE OR PICK POINT. CAN BE EXCAVATED IN SMALL CHIPS TO PIECES 1 INCH MAXIMUM SIZE BY HARD BLOWS OF THE POINT OF A GEOLOGIST'S PICK.</td> </tr> <tr> <th>SOFT</th> <td>CAN BE GROOVED 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.</td> </tr> <tr> <th>VERY SOFT</th> <td>CAN BE CARVED WITH KNIFE. 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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 PIECES 1 INCH MAXIMUM SIZE BY HARD BLOWS OF THE POINT OF A GEOLOGIST'S PICK.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
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<p>COLOR</p> <p>DESCRIPTIONS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YELLOW-BROWN, BLUE-BROWN). MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE.</p>										<p>BENCH MARK:</p> <p>BORING ELEVATIONS TAKEN FROM U5724_Is.tin.tin DATED 10/2016 ELEVATION: FEET</p>										<p>NOTES:</p> <p>FIAD - FILLED IMMEDIATELY AFTER DRILLING</p>																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																							

TIP PROJECT: U-5724

SEE SHEET 1A FOR INDEX OF SHEETS
SEE SHEET 1B FOR CONVENTIONAL PLAN SHEET SYMBOLS



STATE OF NORTH CAROLINA DIVISION OF HIGHWAYS

WAYNE COUNTY

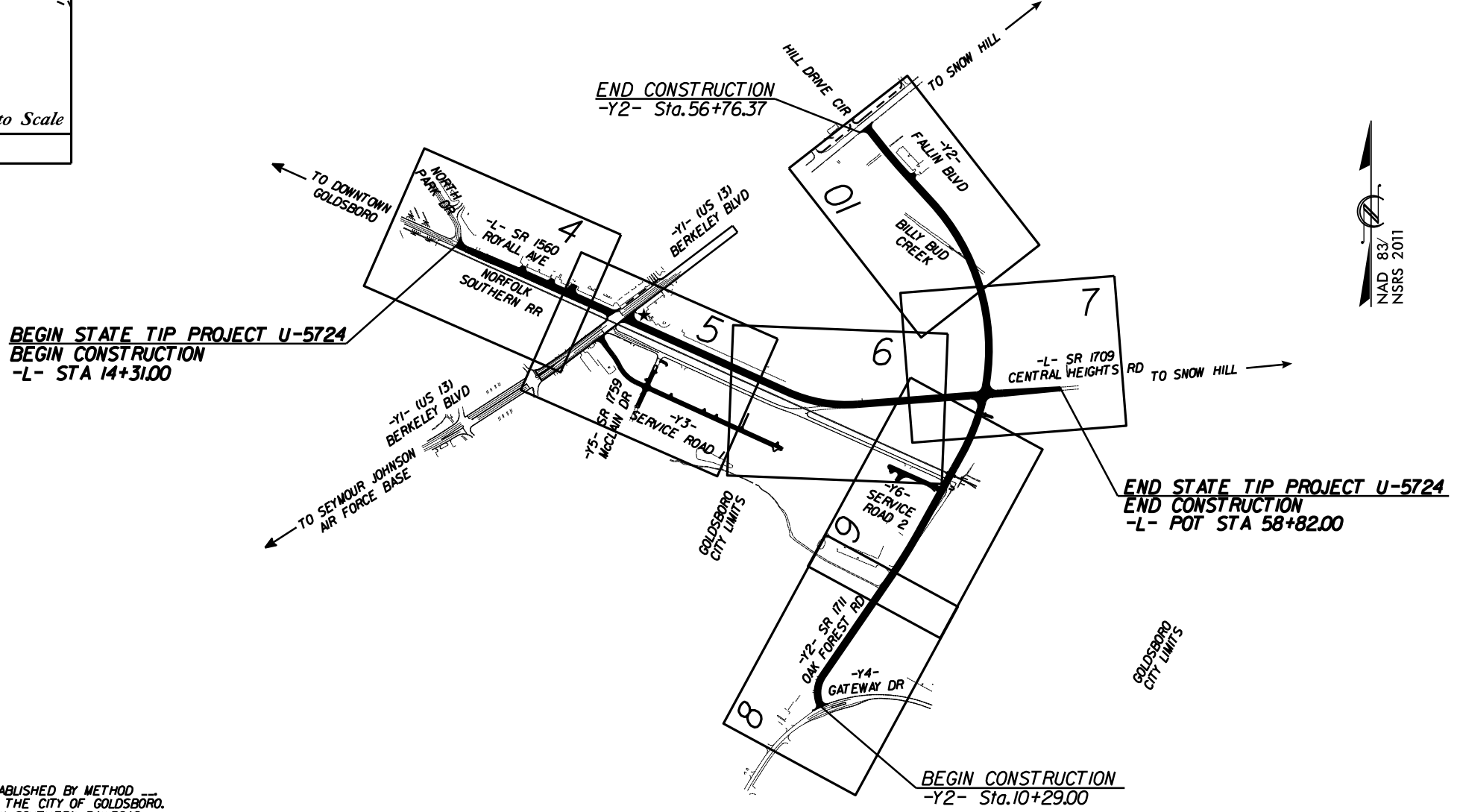
STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	U-5724	3	21
STATE PROJ. NO.	F.A. PROJ. NO.	DESCRIPTION	
54016.1.FR1	NNP-0013 (42)	PE	

DOCUMENT NOT CONSIDERED FINAL
UNLESS ALL SIGNATURES COMPLETED

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

LOCATION: SR 1560 (ROYALL AVENUE) FROM NORTH PARK DRIVE TO US 13 (BERKELEY BOULEVARD) AND SR 1709 (CENTRAL HEIGHTS ROAD) FROM US 13 (BERKELEY BOULEVARD) TO SR 1711 (OAK FOREST ROAD)

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

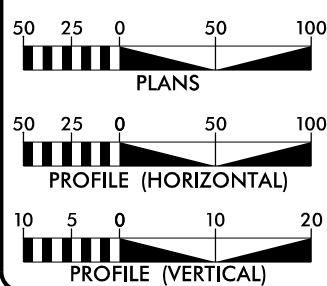


NCDOT CONTACT: JERRY PAGE
DIVISION 4, PROJECT MANAGER
(252) 237-6164

★ TRAFFIC SIGNAL

CLEARING ON THIS PROJECT SHALL BE PERFORMED TO THE LIMITS ESTABLISHED BY METHOD ---
A PORTION OF THIS PROJECT IS WITHIN THE MUNICIPAL BOUNDARIES OF THE CITY OF GOLDSBORO.
A PORTION OF THIS PROJECT IS WITHIN THE RIGHT-OF-WAY OF NORFOLK SOUTHERN RAILROAD.
THIS IS A PARTIAL CONTROLLED-ACCESS PROJECT WITH ACCESS BEING LIMITED TO POINTS AS SHOWN ON THE PLANS.

GRAPHIC SCALES



DESIGN DATA

AADT 2016 = 9,300
AADT 2040 = 12,300
K = 9%
D = 55%
T = 3%*
V = 50 MPH

CLASSIFICATION:
URBAN COLLECTOR

* 1% TTST 2% DUAL
SUB-REGIONAL TIER

PROJECT LENGTH

LENGTH ROADWAY TIP PROJECT U-5724 = 0.825 MILES
TOTAL LENGTH TIP PROJECT U-5724 = 0.825 MILES

PLANS PREPARED FOR THE NCDOT BY:

Kimley»Horn

2012 STANDARD SPECIFICATIONS

RIGHT OF WAY DATE:
APRIL 28, 2017

LETTING DATE:
SEPTEMBER 28, 2018

CHARLES NUCKOLS, P.E.
PROJECT ENGINEER

JASON D. LAWING, P.E.
PROJECT DESIGN ENGINEER

HYDRAULICS ENGINEER

SIGNATURE: _____ P.E.
ROADWAY DESIGN ENGINEER

SIGNATURE: _____ P.E.

DIVISION OF HIGHWAYS
STATE OF NORTH CAROLINA



\$DATE\$

CONTRACT:



Roadway Subsurface Investigation Report - Inventory

Realignment of SR 1709 (Central Heights Road) at Berkeley Boulevard
Wayne County, North Carolina
WBS: 54016.1.FR1 TIP: U-5724
Falcon Project No.: G16025.00

Prepared for:

Kimley-Horn & Associates
 200 South Tryon Street, Suite 200
 Charlotte, NC 28202

Submitted by:

Falcon Engineering, Inc.
 1210 Trinity Road, Suite 110
 Cary, North Carolina 27513
 (919) 871-0800
 www.falconengineers.com

May 29, 2019

WBS: 54016.1.FR1
TIP: U-5724
COUNTY: Wayne
DESCRIPTION: Realignment of SR 1709 (Central Heights Road) at Berkeley Boulevard
SUBJECT: Roadway Subsurface Investigation – Inventory

PROJECT DESCRIPTION

This project consists of approximately 2.5 miles of proposed new grading, realignment, new roadway and widening in Wayne County, North Carolina. Central Heights Road will be realigned to the north side of the Norfolk Southern Railroad track to avoid crossing over the tracks and improve traffic flow. Included in the realignment will be the extension of Fallin Boulevard from US 13 (Berkeley Road) to Oak Forest Road. Tie-ins and minor improvements to -Y- lines and small drives are also included at various locations.

The investigation was conducted between September 21st and 26th, 2016 in general accordance with our Proposal to Provide Geotechnical Engineering Services, dated November 9, 2015. The recommendations provided in this report are based solely on our site reconnaissance, soil test borings and laboratory test data, engineering evaluation of these data, and generally accepted soil and foundation engineering practices and principles.

A total of forty-one (41) Standard Penetration Test (SPT) borings were drilled for the proposed roadway alignments. All SPT borings were drilled using a BK-51 drill rig equipped with 2 ¼-inch inside diameter hollow-stem augers and an automatic hammer. Thirteen (13) additional hand auger borings were performed along the proposed alignments where utilities, vegetation, and/or topographical features restricted drilling access. At each location, a hand auger Rod Sounding was performed using equipment meeting NCDOT specifications, consisting of 5 foot long sections of ½ inch diameter, smooth steel rods, ¾ inch diameter steel couplers, and an approximately 16 pound slide hammer with a 30 inch maximum drop height. The number of hammer drops required to drive the rod one foot were recorded as the increment blow count. Representative soil samples, collected with a split-barrel sampler or hand auger, were selected for laboratory testing to verify visual field classifications. In addition, bulk samples were collected for standard Proctor compaction and California Bearing Ratio testing.





The following alignments, totaling approximately 2.0 miles were explicitly investigated.

<u>Alignment</u>	<u>Station (ft)</u>
-L- (Royall Ave. /Central Heights Rd.)	14+31 – 58+82
-Y2- (Fallin Boulevard)	10+29 – 56+76
-Y3- (US 17)	10+32 – 25+58
-Y6- (Service Road 2)	10+20 – 14+09

AREAS OF SPECIAL GEOTECHNICAL INTEREST

- I. The following locations contain very soft/very loose soils with a SPT N-value or Sounding Rod blows per foot less than 4 near the ground surface:

<u>Station (ft)</u>	<u>Alignment</u>
25+00	-L-
32+00	-L-
44+00	-L-
49+00 – 55+00	-L-
27+00 – 37+00	-Y2-
43+00 – 46+00	-Y2-

- II. Shallow ground water was encountered along a majority of the project and may cause groundwater related stability problems during construction.
- III. The following section contains organic soils which have the potential to cause embankment/subgrade and/or slope stability problems during construction:

<u>Station (ft)</u>	<u>Alignment</u>
50+50 to 53+50	-L-

PHYSIOGRAPHY AND GEOLOGY

The project site is in the Coastal Plain Physiographic Province of North Carolina. According to the *Geologic Map of North Carolina* (1985), the site is underlain by a single major geologic unit in the Coastal Plain Physiographic Province. The primary unit is the Black Creek Formation (**Kb**) of the Cretaceous Period.

The Black Creek Formation is noted to consist of clay, gray to black, lignitic; containing thin beds and laminae of fine-grained micaceous sand and thick lenses of cross-bedded sand. Glauconitic, fossiliferous clayey sand lenses in upper part.

Existing site topography is very flat in the general project vicinity, typical of this region of the Coastal Plain. Drainage swales and ditches parallel existing roadway alignments, and carry roadway drainage toward various natural drainage features. Much of the site is surrounded by residential, agricultural, and commercial properties. The new road construction will occur predominantly in agricultural fields with various sections through or abutting existing residential and commercial land uses.

SOIL PROPERTIES

Soils encountered along the project corridor consist of Roadway Embankment fills and Undivided Coastal Plain soils.

Existing pavement was encountered and consisted of bituminous concrete with an average thickness of 0.3 feet. Some areas of the pavement were underlain by Aggregate Base Course material varying in thickness from 0.6 to 0.7 feet.

Roadway Embankment soils were encountered at the ground surface beneath and adjacent to existing roadways. These consist of up to 4.4 feet of moist to saturated, very loose to dense, clayey, silty and clean sands (A-1-b, A-2-4).

Undivided Coastal Plain soils were encountered beneath the Roadway Embankment fills, or at the ground surface outside of existing embankment footprints. These soils consist of moist to saturated, very loose to dense, sands and silts (A-1-b, A-2-4, A-2-6, A-3) with trace to little organics and moist to saturated, very soft to soft, sandy silt and clay (A-4, A-6).

Cultivated soils were encountered in agricultural fields at the ground surface along the proposed roadway extension of Fallin Boulevard to depths of 1.0 feet. The cultivated soils were visually observed to contain only trace organics. However, areas with larger amounts of organic content may be present.





GROUNDWATER PROPERTIES

Groundwater levels were measured at the time of boring completion, and in some cases after a waiting period of at least 24 hours. Borings drilled within and in close proximity to existing roadways, and within residential areas were backfilled immediately after completion due to safety considerations.

Numerous unnamed ditches drain the site to the west into Stoney Creek.

Detailed groundwater measurements are included in the attached subsurface profiles and noted areas of shallow groundwater are included in the Areas of Special Geotechnical Interest earlier in this report.

ADDITIONAL LABORATORY TESTING

The following bulk samples were obtained:

<u>Sample</u>	<u>Location</u>	<u>Depth (ft)</u>	<u>Test</u>
BS-1	27+81, 43'LT, -L-	0.0 - 5.0	California Bearing Ratio, Standard Proctor
BS-2	43+99, 34'LT, -L-	0.0 - 5.0	California Bearing Ratio, Standard Proctor
BS-3	53+00, CL, -Y2-	1.0 - 5.0	California Bearing Ratio, Standard Proctor
BS-4	17+56, CL, -Y3-	0.0 - 5.0	California Bearing Ratio, Standard Proctor

Classification test results for bulk samples are included in the subsurface profiles and cross sections and Standard Proctor and California Bearing Ratio (CBR) data is attached in the Appendix.

CLOSING

Falcon appreciates the opportunity to have provided our geotechnical engineering services for the above referenced project. If you have any questions concerning the contents of this report or need additional information, please do not hesitate to contact our office.

FALCON ENGINEERING, INC.

Report Prepared By:

Report Reviewed By:

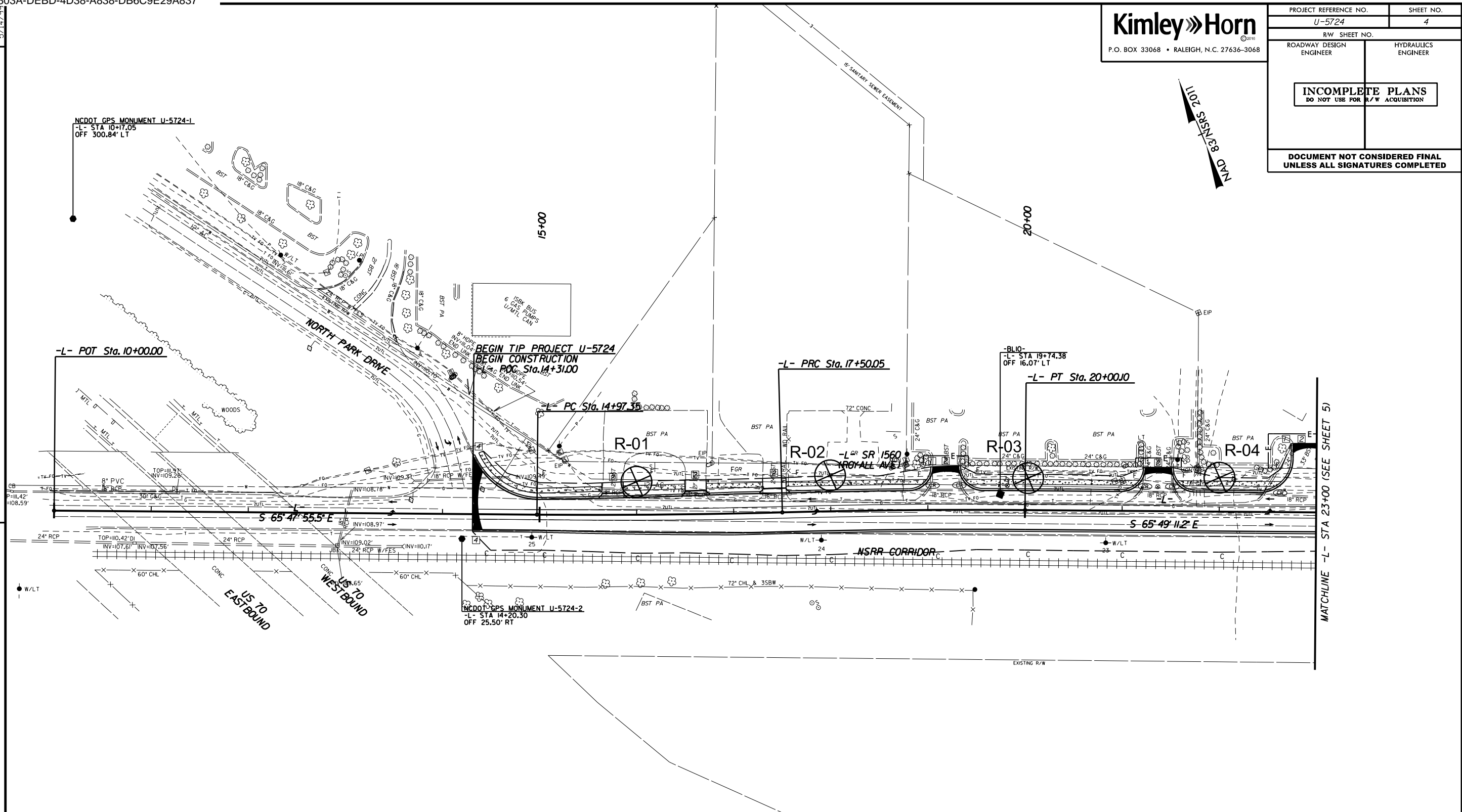
W. Scott Hunsberger, PE
Geotechnical Engineer

Jeremy R. Hamm, PE
Geotechnical Engineering Manager



PROJECT REFERENCE NO. U-5724	SHEET NO. 4
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
INCOMPLETE PLANS DO NOT USE FOR R/W ACQUISITION	
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED	

REVISIONS



DATUM DESCRIPTION

THE LOCALIZED COORDINATE SYSTEM DEVELOPED FOR THIS PROJECT IS BASED ON THE STATE PLANE COORDINATES ESTABLISHED BY NCGS FOR "U-5724-2"

WITH NAD 83/NA 2011 STATE PLANE GRID COORDINATES OF
 NORTHING: 595362.848(±ft) EASTING: 2316632.989(±ft)
 ELEVATION: 111.932(±ft)

THE AVERAGE COMBINED GRID FACTOR USED ON THIS PROJECT (GROUND TO GRID) IS: 0.999875296

THE N.C. LAMBERT GRID BEARING AND LOCALIZED HORIZONTAL GROUND DISTANCE FROM "U-5724-2" TO -L- STATION 15+00.00 IS
 S 83°32'26.45"E 83.68'

ALL LINEAR DIMENSIONS ARE LOCALIZED HORIZONTAL DISTANCES
 VERTICAL DATUM USED IS NAVD 88

-L-

PI Sta 16+23.71	PI Sta 18+75.09
$\Delta = 2'00''19.3''$ (LT)	$\Delta = 1'59''03.6''$
$D = 0'47''36.9''$	$D = 0'47''36.9''$
$L = 252.70'$	$L = 250.05'$
$T = 126.36'$	$T = 125.04'$
$R = 7,220.00'$	$R = 7,220.00'$
SE = NC	SE = NC
DS = 50	DS = 50

REMOVAL OF EXISTING ASPHALT PAVEMENT

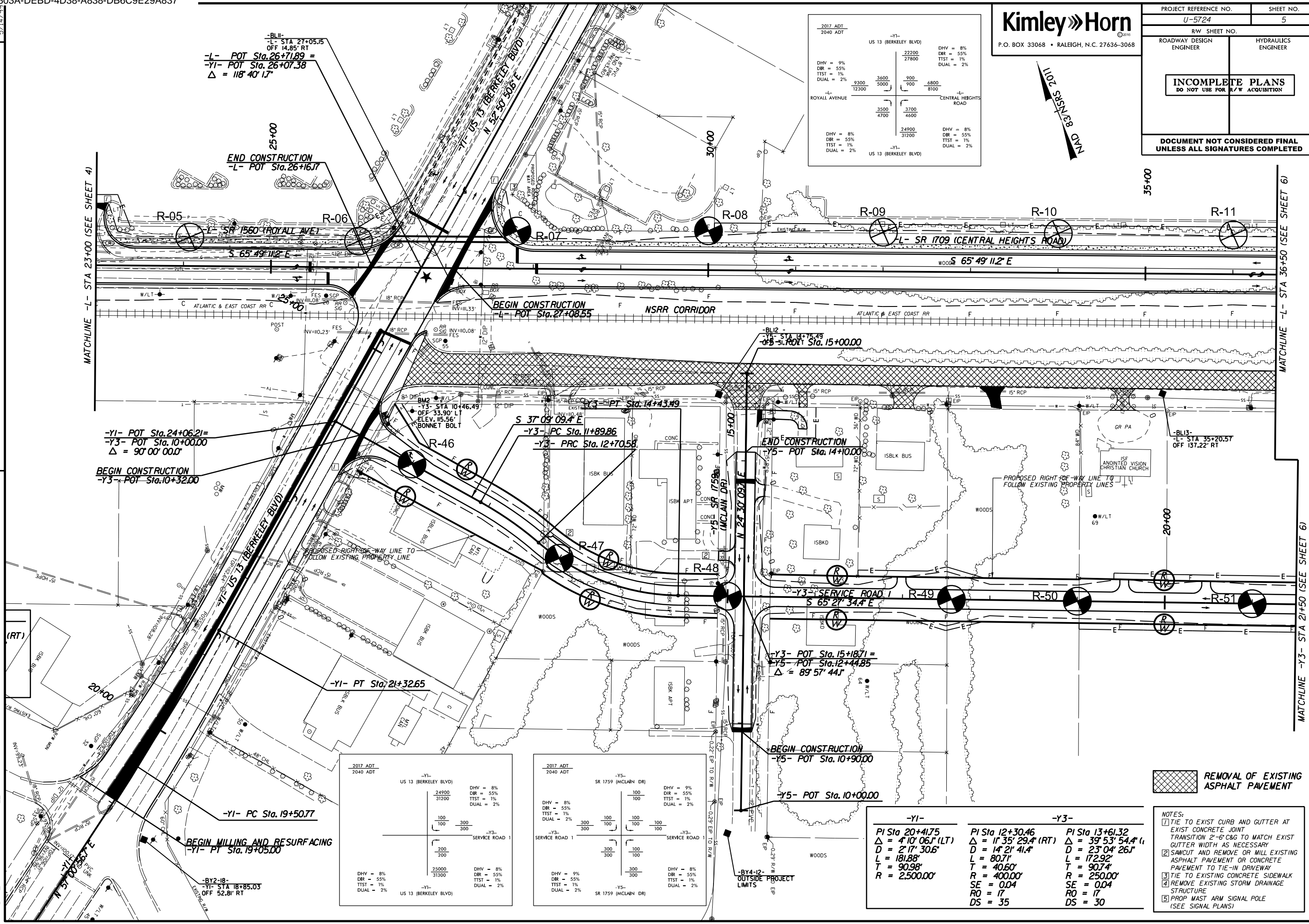
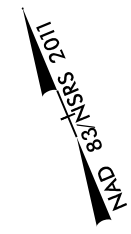
- NOTES:
- TIE TO EXIST CURB AND GUTTER AT EXIST CONCRETE JOINT
TRANSITION 2'-6" C&G TO MATCH EXIST GUTTER WIDTH AS NECESSARY
 - SAWCUT AND REMOVE OR MILL EXISTING ASPHALT PAVEMENT OR CONCRETE PAVEMENT TO TIE-IN DRIVEWAY
 - TIE TO EXISTING CONCRETE SIDEWALK
 - CURB AND GUTTER END TREATMENT

\$FILE\$

\$DATE\$

PROJECT REFERENCE NO. U-5724	SHEET NO. 5
RW SHEET NO.	HYDRAULICS ENGINEER
ROADWAY DESIGN ENGINEER	
INCOMPLETE PLANS DO NOT USE FOR R/W ACQUISITION	
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED	

2017 ADT 2040 ADT	-Y1- US 13 (BERKELEY BLVD)	DHV = 9% DIR = 55% TTST = 1% DUAL = 2%	22200 27800	DHV = 8% DIR = 55% TTST = 1% DUAL = 2%
9300 12300	3600 5000	900 900	6800 8100	
3500 4700	3700 4600	24900 31200		DHV = 8% DIR = 55% TTST = 1% DUAL = 2%
	-Y1- US 13 (BERKELEY BLVD)			



MATCHLINE -L- STA 23+00 (SEE SHEET 4)

MATCHLINE -L- STA 36+50 (SEE SHEET 6)

MATCHLINE -Y3- STA 21+50 (SEE SHEET 6)

-Y1- POT Sta. 24+06.21 =
 -Y3- POT Sta. 10+00.00
 Δ = 90° 00' 00.0"

BEGIN CONSTRUCTION
 -Y3- POT Sta. 10+32.00

-Y1- PC Sta. 19+50.77
 BEGIN MILLING AND RESURFACING
 -Y1- PT Sta. 19+05.00

-BY2-18-
 -Y1- STA 18+85.03
 OFF 52.8' RT

2017 ADT 2040 ADT	-Y1- US 13 (BERKELEY BLVD)	DHV = 8% DIR = 55% TTST = 1% DUAL = 2%	24900 31200	DHV = 8% DIR = 55% TTST = 1% DUAL = 2%
100 100	300 300	100 100	100 100	
200 200	25000 31300	300 300		DHV = 8% DIR = 55% TTST = 1% DUAL = 2%
	-Y1- US 13 (BERKELEY BLVD)			

2017 ADT 2040 ADT	-Y5- SR 1759 (MCLAIN DR)	DHV = 9% DIR = 55% TTST = 1% DUAL = 2%	100 100	DHV = 9% DIR = 55% TTST = 1% DUAL = 2%
300 300	100 100	100 100	100 100	
300 300	300 300	100 100		DHV = 9% DIR = 55% TTST = 1% DUAL = 2%
	-Y5- SR 1759 (MCLAIN DR)			

-Y1-
 PI Sta 20+41.75
 Δ = 4' 10' 06.7" (LT)
 D = 2' 17' 30.6"
 L = 181.88'
 T = 90.98'
 R = 2,500.00'

-Y3-
 PI Sta 12+30.46
 Δ = 1' 35' 29.4" (RT)
 D = 14' 21' 41.4"
 L = 80.71'
 T = 40.60'
 R = 400.00'
 SE = 0.04
 RO = 17
 DS = 35

PI Sta 13+61.32
 Δ = 39' 53' 54.4" (L)
 D = 23' 04' 26.7"
 L = 172.92'
 T = 90.74'
 R = 250.00'
 SE = 0.04
 RO = 17
 DS = 30

REMOVAL OF EXISTING ASPHALT PAVEMENT

- NOTES:
- TIE TO EXIST CURB AND GUTTER AT EXIST CONCRETE JOINT TRANSITION 2'-6" C&G TO MATCH EXIST GUTTER WIDTH AS NECESSARY
 - SAWCUT AND REMOVE OR MILL EXISTING ASPHALT PAVEMENT OR CONCRETE PAVEMENT TO TIE-IN DRIVEWAY
 - TIE TO EXISTING CONCRETE SIDEWALK
 - REMOVE EXISTING STORM DRAINAGE STRUCTURE
 - PROP MAST ARM SIGNAL POLE (SEE SIGNAL PLANS)

REVISIONS

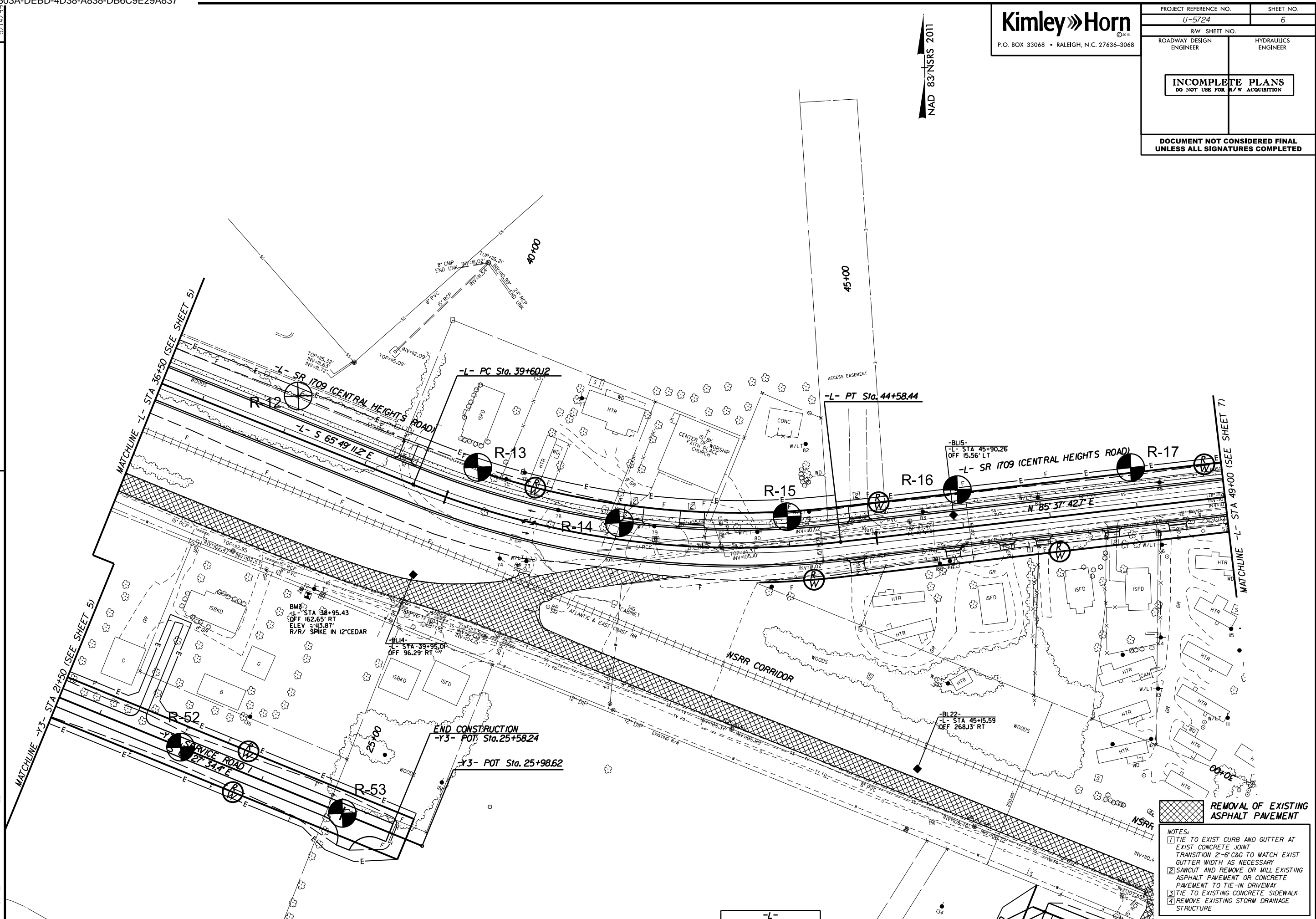
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PROJECT REFERENCE NO. U-5724	SHEET NO. 6
RW SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
INCOMPLETE PLANS DO NOT USE FOR R/W ACQUISITION	
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED	

NAD 83/NSRS 2011

REVISIONS

\$FILE\$
\$DATE\$



REMOVAL OF EXISTING ASPHALT PAVEMENT

NOTES:

- TIE TO EXIST CURB AND GUTTER AT EXIST CONCRETE JOINT
TRANSITION 2'-6" C&G TO MATCH EXIST GUTTER WIDTH AS NECESSARY
- SAWCUT AND REMOVE OR MILL EXISTING ASPHALT PAVEMENT OR CONCRETE PAVEMENT TO TIE-IN DRIVEWAY
- TIE TO EXISTING CONCRETE SIDEWALK
- REMOVE EXISTING STORM DRAINAGE STRUCTURE

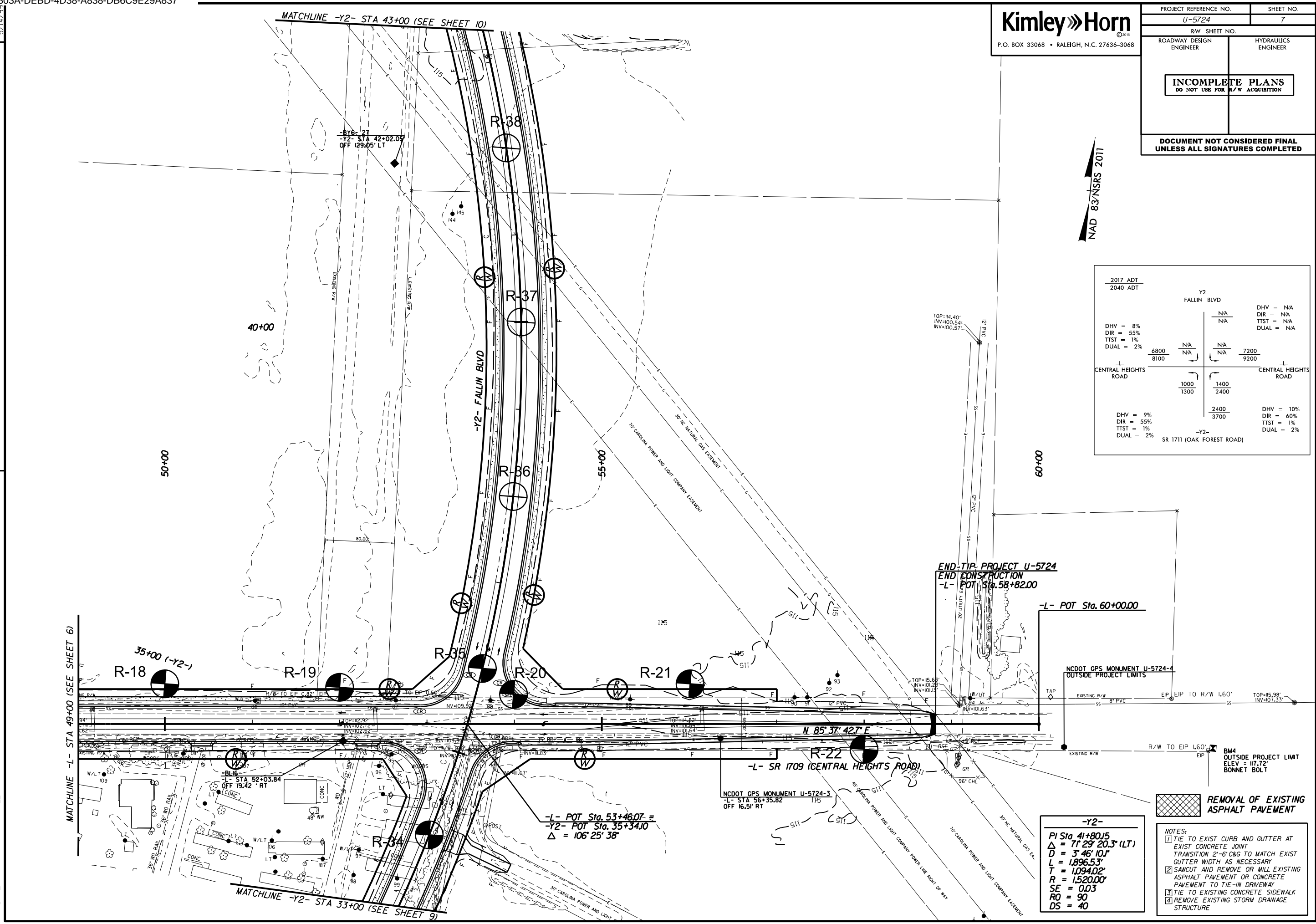
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RW SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
INCOMPLETE PLANS DO NOT USE FOR R/W ACQUISITION	
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED	

NAD 83/NSRS 2011

2017 ADT 2040 ADT	-Y2- FALLIN BLVD		DHV = NA DIR = NA TTST = NA DUAL = NA
DHV = 8% DIR = 55% TTST = 1% DUAL = 2%	6800 8100	N/A N/A	7200 9200
-L- CENTRAL HEIGHTS ROAD	1000 1300	1400 2400	-L- CENTRAL HEIGHTS ROAD
DHV = 9% DIR = 55% TTST = 1% DUAL = 2%	-Y2- SR 1711 (OAK FOREST ROAD)		DHV = 10% DIR = 60% TTST = 1% DUAL = 2%

REVISIONS

\$FILE\$
\$DATE\$



-Y2-

PI Sta 41+80.15
Δ = 71° 29' 20.3" (LT)
D = 3' 46' 10.1"
L = 1,896.53'
T = 1,094.02'
R = 1,520.00'
SE = 0.03
RO = 90
DS = 40

- REMOVAL OF EXISTING ASPHALT PAVEMENT**
- NOTES:
- TIE TO EXIST CURB AND GUTTER AT EXIST CONCRETE JOINT TRANSITION 2'-6" C&G TO MATCH EXIST GUTTER WIDTH AS NECESSARY
 - SAWCUT AND REMOVE OR MILL EXISTING ASPHALT PAVEMENT OR CONCRETE PAVEMENT TO TIE-IN DRIVEWAY
 - TIE TO EXISTING CONCRETE SIDEWALK
 - REMOVE EXISTING STORM DRAINAGE STRUCTURE

MATCHLINE -L- STA 49+00 (SEE SHEET 6)

MATCHLINE -Y2- STA 33+00 (SEE SHEET 9)

MATCHLINE -Y2- STA 43+00 (SEE SHEET 10)

END-TIP PROJECT U-5724
 END CONSTRUCTION
 -L- POT Sta. 58+82.00

-L- POT Sta. 60+00.00

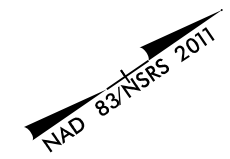
NCDOT GPS MONUMENT U-5724-4
 OUTSIDE PROJECT LIMITS

NCDOT GPS MONUMENT U-5724-3
 -L- STA 56+35.82
 OFF 16.51' RT

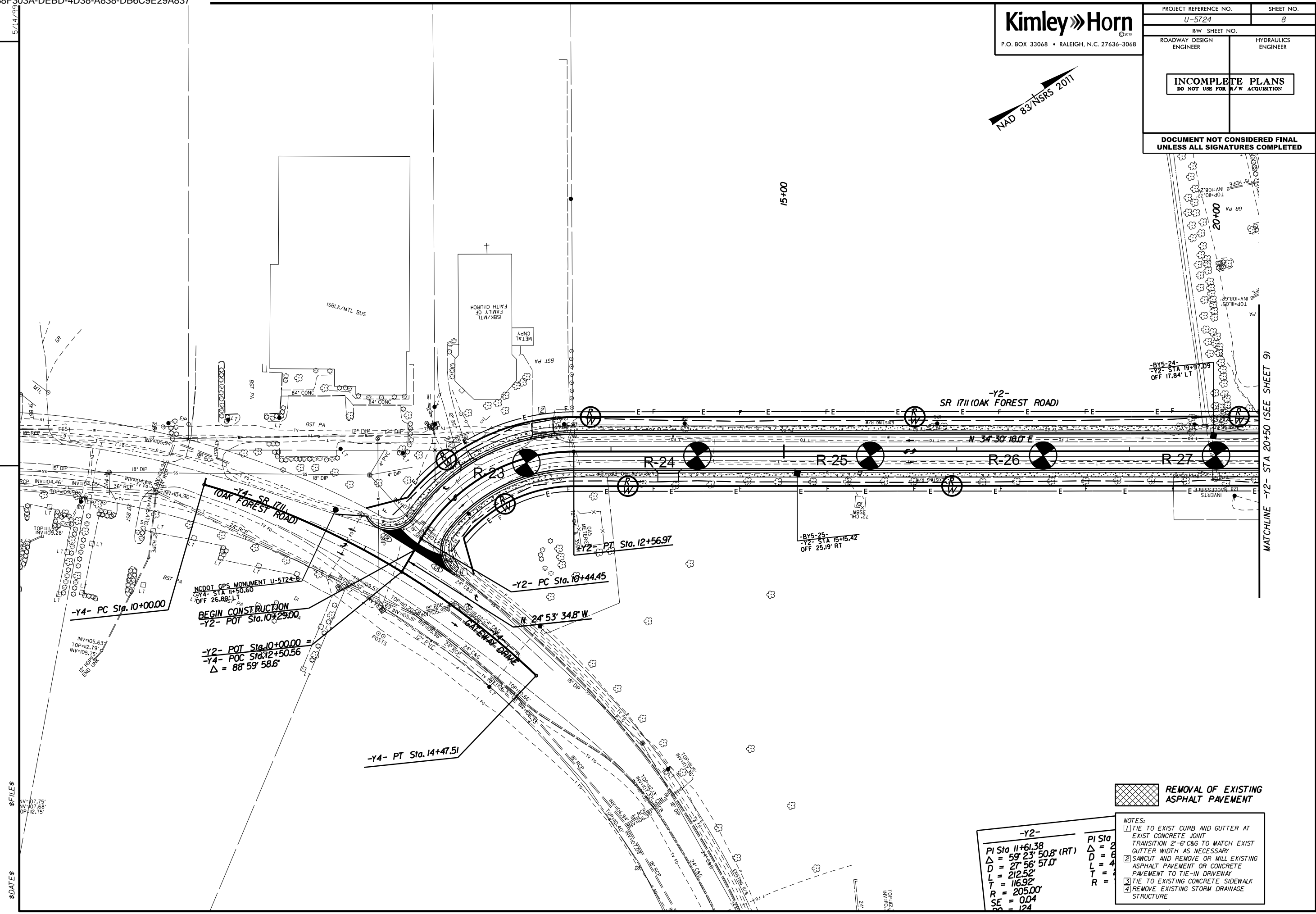
-L- POT Sta. 53+46.07 =
 -Y2- POT Sta. 35+34.10
 Δ = 106° 25' 38"

BM4
 OUTSIDE PROJECT LIMIT
 ELEV = 117.72'
 BONNET BOLT

PROJECT REFERENCE NO. U-5724	SHEET NO. 8
RW SHEET NO.	HYDRAULICS ENGINEER
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
INCOMPLETE PLANS DO NOT USE FOR R/W ACQUISITION	
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED	



REVISIONS



\$FILE\$

\$DATE\$

REMOVAL OF EXISTING ASPHALT PAVEMENT

-Y2-	
PI Sta 11+61.38	PI Sta
$\Delta = 59^{\circ} 23' 50.8''$ (RT)	$\Delta = 2$
D = 27' 56' 57.0"	D = 6
L = 212.52'	L = 4
T = 116.92'	T = 4
R = 205.00'	R = 4
SE = 0.04	
SS = 124	

NOTES:
 1] TIE TO EXIST CURB AND GUTTER AT EXIST CONCRETE JOINT
 TRANSITION 2'-6" C&G TO MATCH EXIST GUTTER WIDTH AS NECESSARY
 2] SAWCUT AND REMOVE OR MILL EXISTING ASPHALT PAVEMENT OR CONCRETE PAVEMENT TO TIE-IN DRIVEWAY
 3] TIE TO EXISTING CONCRETE SIDEWALK
 4] REMOVE EXISTING STORM DRAINAGE STRUCTURE

5/14/99

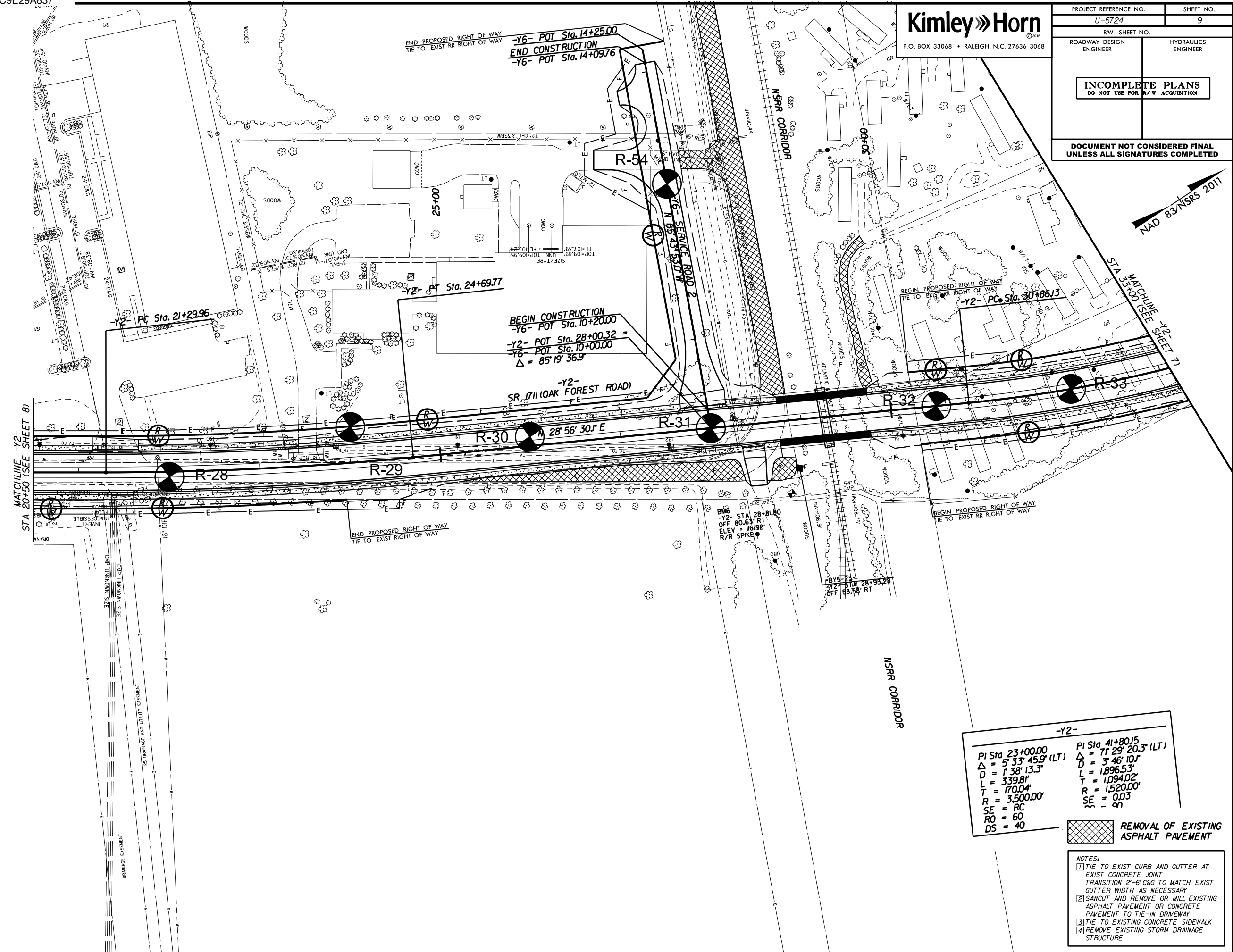
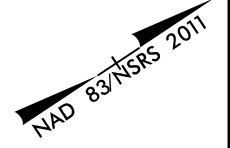
REVISIONS

\$FILE\$

\$DATE\$

Kimley»Horn
P.O. BOX 33068 • RALEIGH, N.C. 27636-3068

PROJECT REFERENCE NO. U-5724	SHEET NO. 9
RW SHEET NO.	HYDRAULICS ENGINEER
ROADWAY DESIGN ENGINEER	
INCOMPLETE PLANS DO NOT USE FOR R/W ACQUISITION	
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED	



BEGIN CONSTRUCTION
-Y6- POT Sta. 10+20.00
-Y2- POT Sta. 28+00.32 =
-Y6- POT Sta. 10+00.00
 $\Delta = 85' 19' 36.9"$

-Y2-

PI Sta. 23+00.00 $\Delta = 5' 33' 45.9"$ (LT) D = 1' 38' 13.3" L = 339.81' T = 170.04' R = 3,500.00' SE = RC RO = 60 DS = 40	PI Sta. 41+80.15 $\Delta = 71' 29' 20.3"$ (LT) D = 3' 46' 10.1" L = 1,896.53' T = 1,094.02' R = 1,520.00' SE = 0.03 ~ - an
--	---

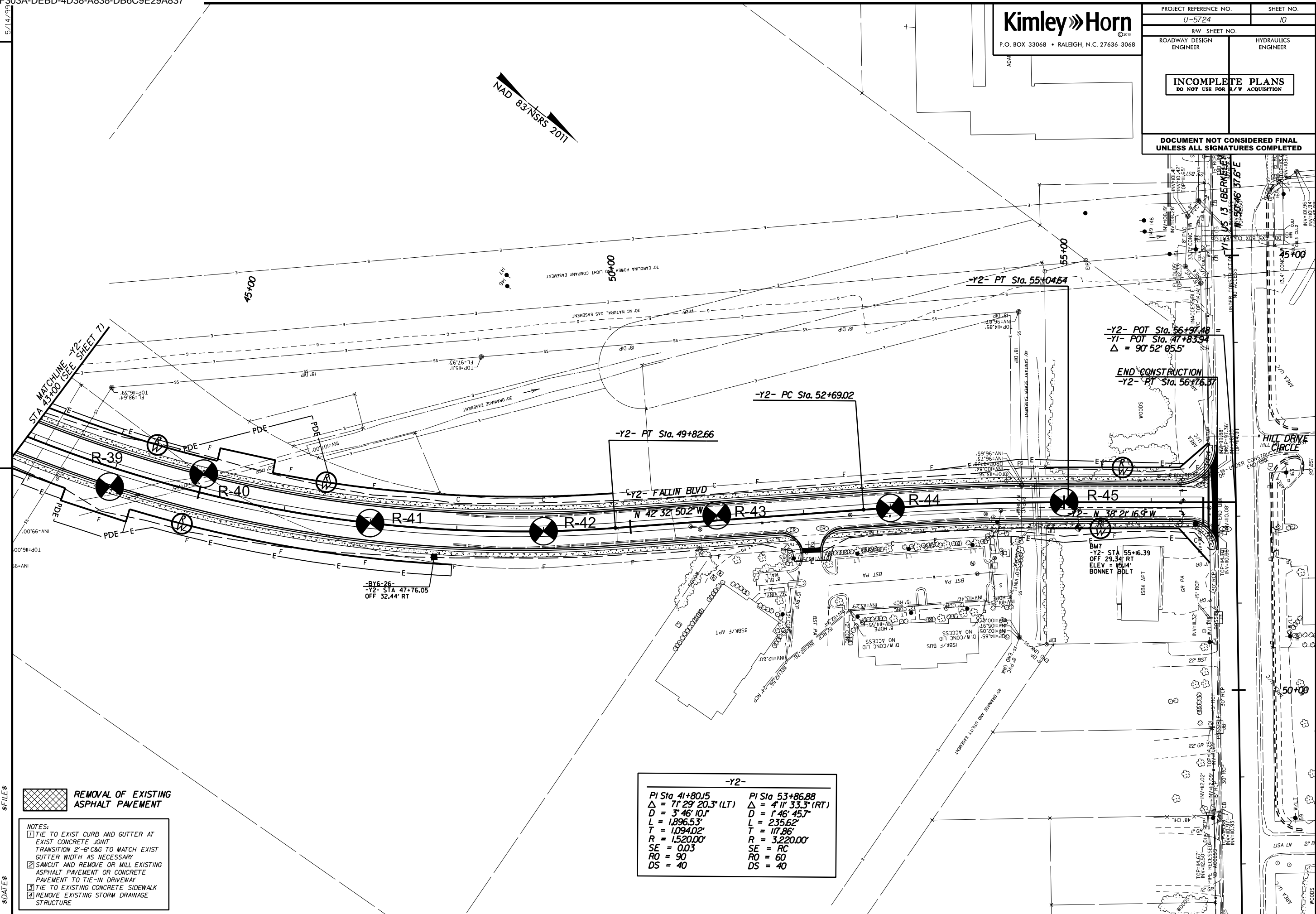
REMOVAL OF EXISTING ASPHALT PAVEMENT

- NOTES:**
- 1] TIE TO EXIST CURB AND GUTTER AT EXIST CONCRETE JOINT TRANSITION 2'-5" C&G TO MATCH EXIST GUTTER WIDTH AS NECESSARY
 - 2] SAWCUT AND REMOVE OR MILL EXISTING ASPHALT PAVEMENT OR CONCRETE PAVEMENT TO TIE-IN DRIVEWAY
 - 3] TIE TO EXISTING CONCRETE SIDEWALK
 - 4] REMOVE EXISTING STORM DRAINAGE STRUCTURE

PROJECT REFERENCE NO. U-5724	SHEET NO. 10
RW SHEET NO.	HYDRAULICS ENGINEER
ROADWAY DESIGN ENGINEER	
INCOMPLETE PLANS DO NOT USE FOR R/W ACQUISITION	
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED	



REVISIONS



-Y2- POT Sta. 56+97.48 =
-Y1- POT Sta. 47+83.94
 $\Delta = 90^\circ 52' 05.5''$

END CONSTRUCTION
-Y2- PT Sta. 56+76.57

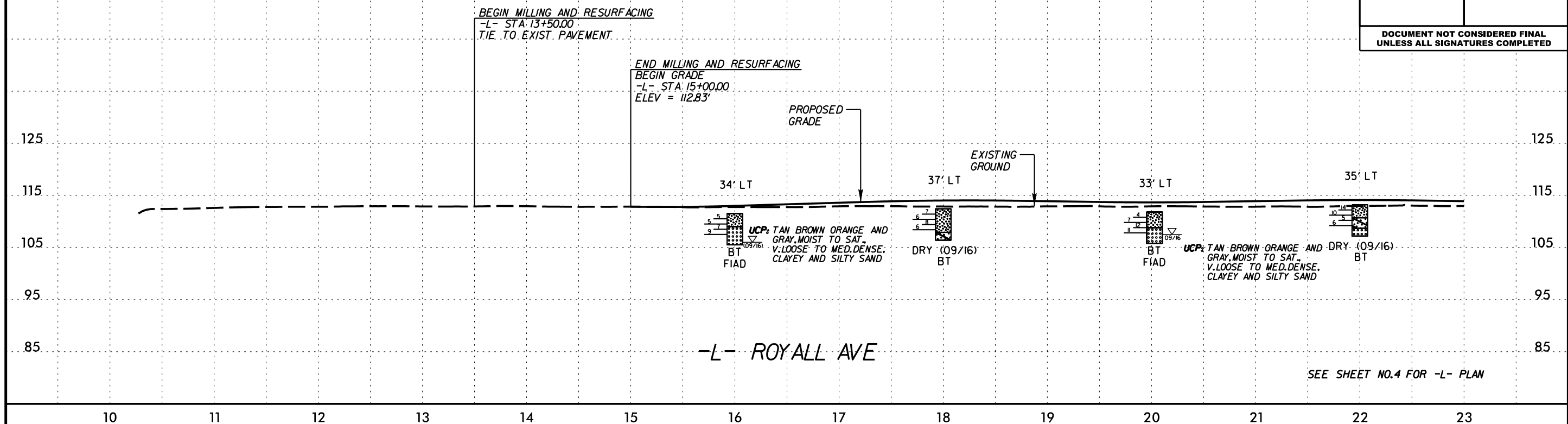
-Y2-	
PI Sta 41+80.15	PI Sta 53+86.88
$\Delta = 71^\circ 29' 20.3''$ (LT)	$\Delta = 41^\circ 33.3''$ (RT)
D = 3' 46' 10.1"	D = 1' 46' 45.7"
L = 1,896.53'	L = 235.62'
T = 1,094.02'	T = 117.86'
R = 1,520.00'	R = 3,220.00'
SE = 0.03	SE = RC
RO = 90	RO = 60
DS = 40	DS = 40

REMOVAL OF EXISTING ASPHALT PAVEMENT

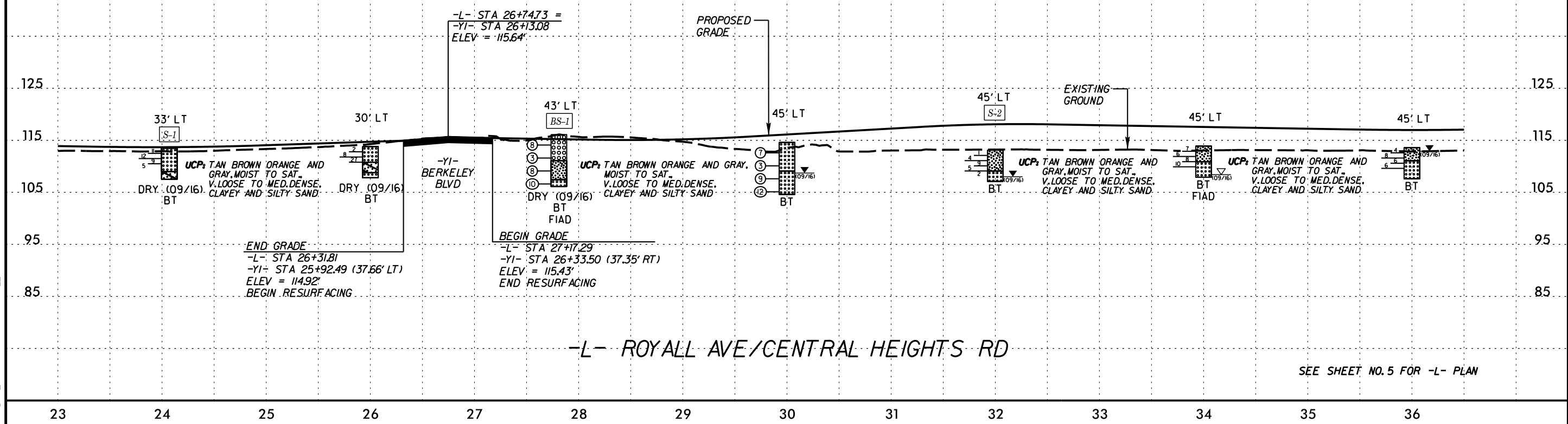
- NOTES:
- TIE TO EXIST CURB AND GUTTER AT EXIST CONCRETE JOINT
TRANSITION 2'-6" C&G TO MATCH EXIST GUTTER WIDTH AS NECESSARY
 - SAWCUT AND REMOVE OR MILL EXISTING ASPHALT PAVEMENT OR CONCRETE PAVEMENT TO TIE-IN DRIVEWAY
 - TIE TO EXISTING CONCRETE SIDEWALK
 - REMOVE EXISTING STORM DRAINAGE STRUCTURE

\$FILE\$

\$DATE\$



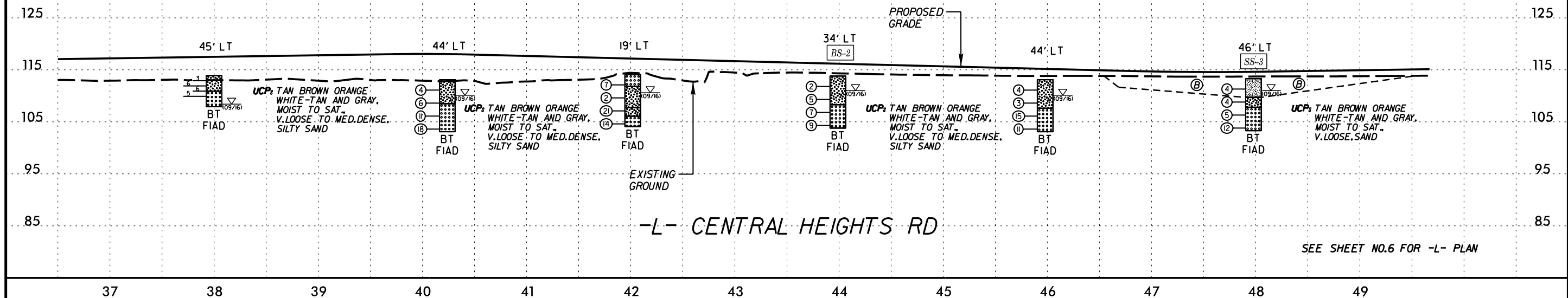
SOIL TEST RESULTS															
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
S-1	33 FT LT	24+07	0.9'-2.5'	A-3	19	5	-	-	-	-	-	-	21.0	9.1	-
BS-1	43 FT LT	27+81	0.0'-5.0'	A-1-b	ND	NP	-	-	-	-	-	-	4.3	5.7	-
S-2	45 FT LT	32+00	1.0'-3.2'	A-2-4	23	8	-	-	-	-	-	-	27.6	12.8	-



BM *3
 R/R SPIKE IN 12" CEDAR
 -L- STA 38+95.52 (167.65' RT)
 ELEV = 113.87'

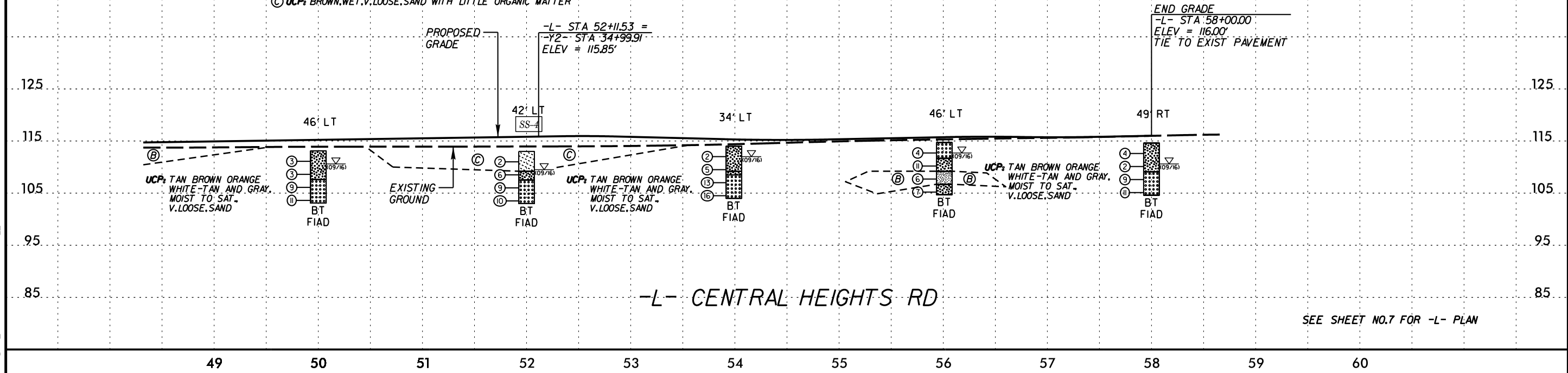
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	LL	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
BS-2	34 FT LT	43+99	0.0'-5.0'	A-2-4	17	3	-	-	-	-	-	-	20.0	14.8	-
SS-3	46 FT LT	47+98	1.0'-2.5'	A-4	18	6	-	-	-	-	-	-	36.5	11.5	-

ⓑ UCP: GRAY AND BROWN, MOIST TO WET, MED. STIFF, SANDY SILT



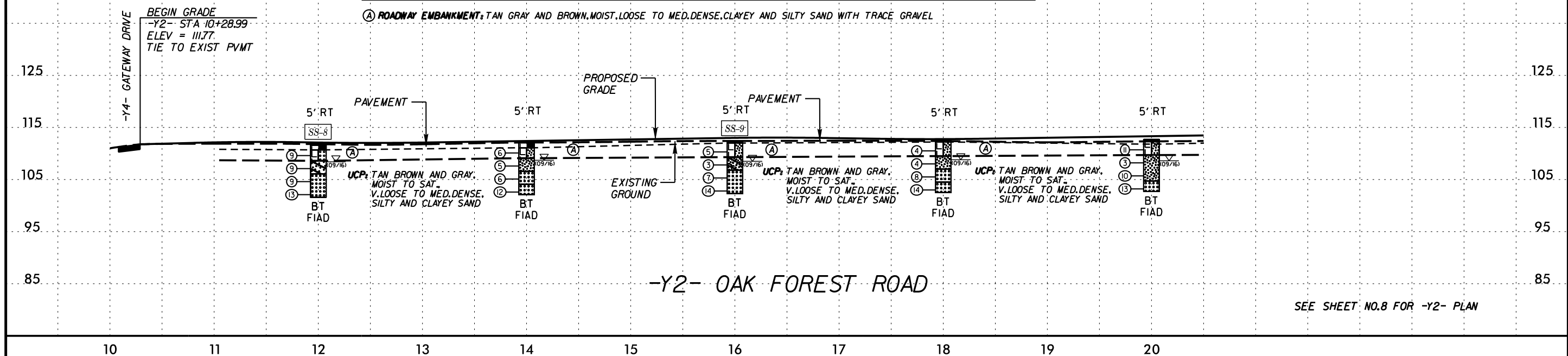
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	LL	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
SS-4	42 FT LT	52+00	1.0'-2.5'	-	-	-	-	-	-	-	-	-	-	4	-

ⓑ UCP: GRAY AND BROWN, MOIST TO WET, MED. STIFF, SANDY SILT
 ⓒ UCP: BROWN, WET, V. LOOSE, SAND WITH LITTLE ORGANIC MATTER



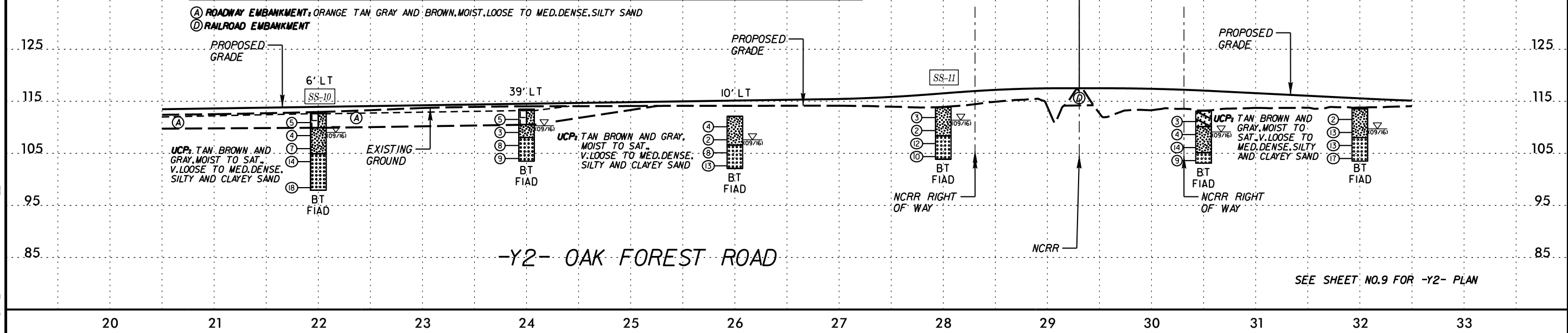
SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
SS-8	5 FT RT	12+00	1.0'-2.5'	A-1-b	15	NP	-	-	-	-	67	48	18	3.9	-
SS-9	5 FT RT	16+00	1.0'-2.5'	A-2-4	25	9	-	-	-	-	97	66	23	13.7	-



SOIL TEST RESULTS

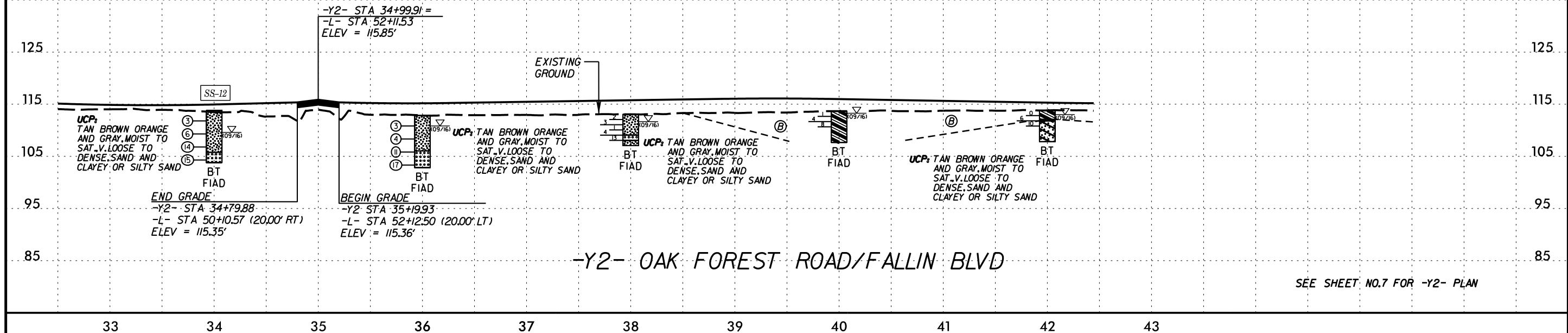
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
SS-10	6 FT RT	22+00	1.0'-2.5'	A-2-4	21	6	-	-	-	-	96	60	18	13.1	-
SS-11	0	28+00	1.0'-2.5'	A-2-4	22	5	-	-	-	-	99	66	19	16.6	-



SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
SS-12	0	34+00	1.0'-2.5'	A-2-4	21	4	-	-	-	-	99	66	14	30.3	-

- (B) UCP: GRAY, SAT. V. SOFT TO SOFT, SANDY CLAY WITH TRACE ORGANICS
- (C) UCP: TAN BROWN ORANGE AND GRAY, MOIST TO SAT. V. LOOSE TO DENSE, SAND AND CLAYEY OR SILTY SAND

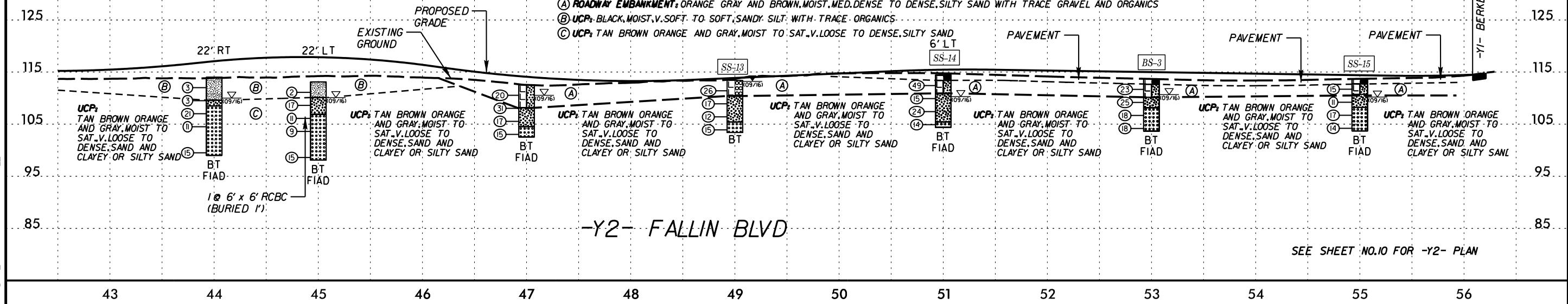


BM *7
 BONNET BOLT
 -Y2- STA 52+74.32 (29.34' RT)
 ELEV = 115.14'

SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
SS-13	0	49+00	1.0'-2.5'	A-1-b	ND	NP	-	-	-	-	87	47	10	9.7	-
SS-14	0	51+00	1.0'-2.5'	A-2-4	19	3	-	-	-	-	90	62	21	6.4	-
BS-3	0	53+00	1.0'-5.0'	A-2-4	ND	NP	-	-	-	-	-	-	17	8.4	-
SS-15	0	55+00	1.0'-2.5'	A-2-4	25	5	-	-	-	-	98	78	22	11.5	-

- (A) ROADWAY EMBANKMENT: ORANGE GRAY AND BROWN, MOIST, MED. DENSE TO DENSE, SILTY SAND WITH TRACE GRAVEL AND ORGANICS
- (B) UCP: BLACK, MOIST, V. SOFT TO SOFT, SANDY SILT WITH TRACE ORGANICS
- (C) UCP: TAN BROWN ORANGE AND GRAY, MOIST TO SAT. V. LOOSE TO DENSE, SILTY SAND



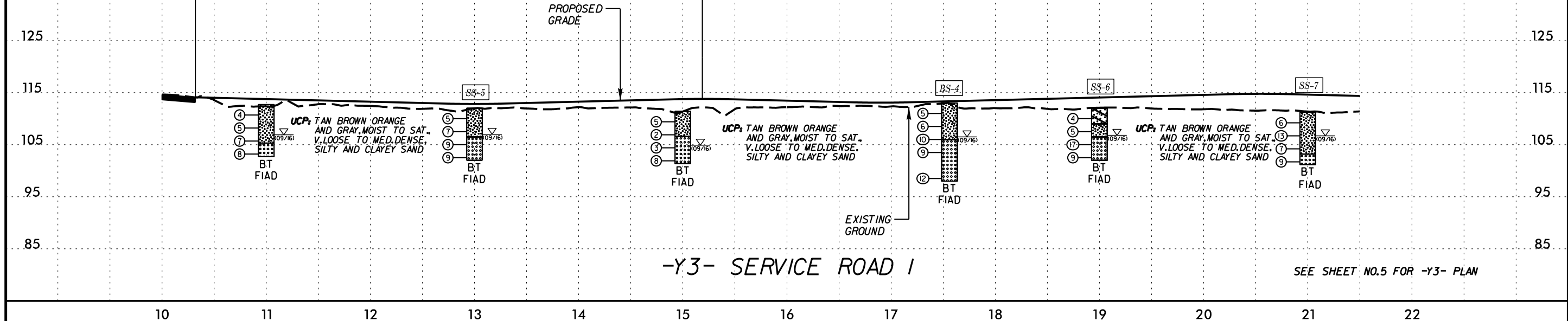
-Y1- BERKELEY BLVD

BM #2
 BONNET BOLT
 -Y3- STA 10+46.49 (33.90' LT)
 ELEV = 115.56'

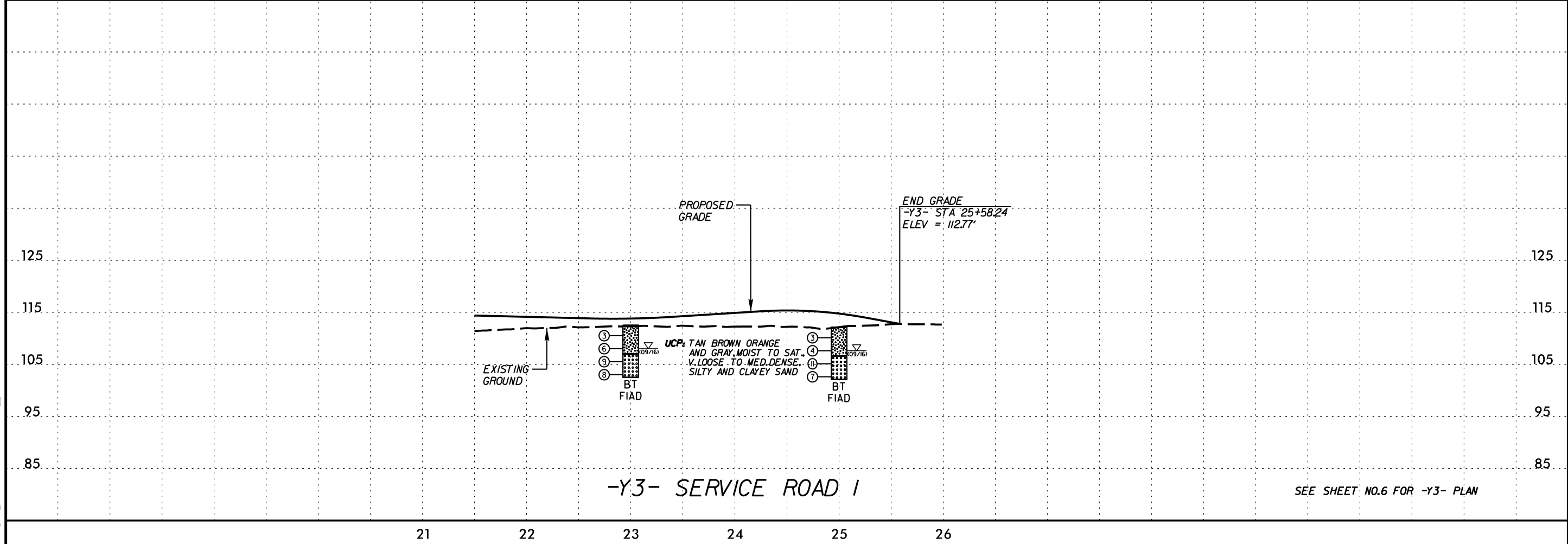
SOIL TEST RESULTS															
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
SS-5	0	13+00	1.0'-2.5'	A-2-4	22	9	-	-	-	-	-	-	29.3	11.0	-
BS-4	0	17+56	0.0'-5.0'	A-2-4	18	2	-	-	-	-	-	-	13.7	13.8	-
SS-6	0	19+00	1.0'-2.5'	A-2-6	31	15	-	-	-	-	-	-	25.7	14.0	-
SS-7	0	21+00	1.0'-2.5'	A-2-4	ND	NP	-	-	-	-	-	-	12.0	19.6	-

BEGIN GRADE
 -Y3- STA 10+32.00
 ELEV = 114.1'
 TIE TO EXIST PVMT

-Y3- STA 15+18.71
 -Y5- STA 12+44.85
 ELEV = 113.8'



SEE SHEET NO.5 FOR -Y3- PLAN

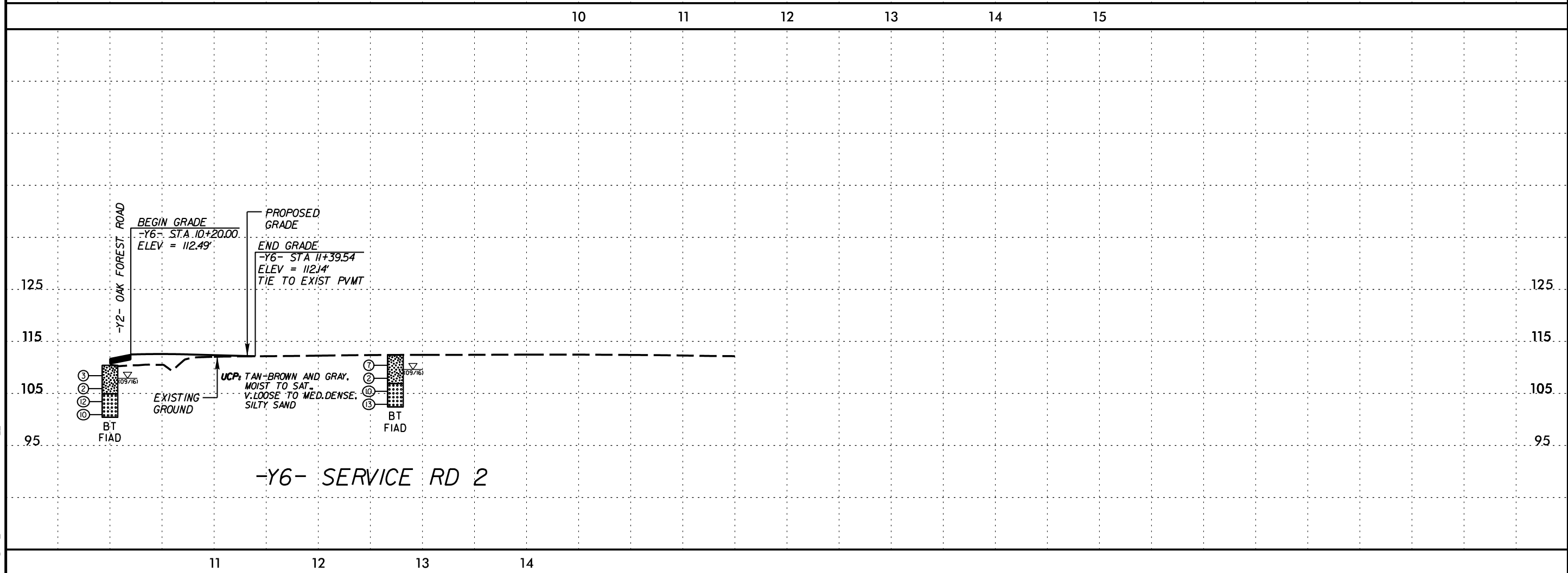
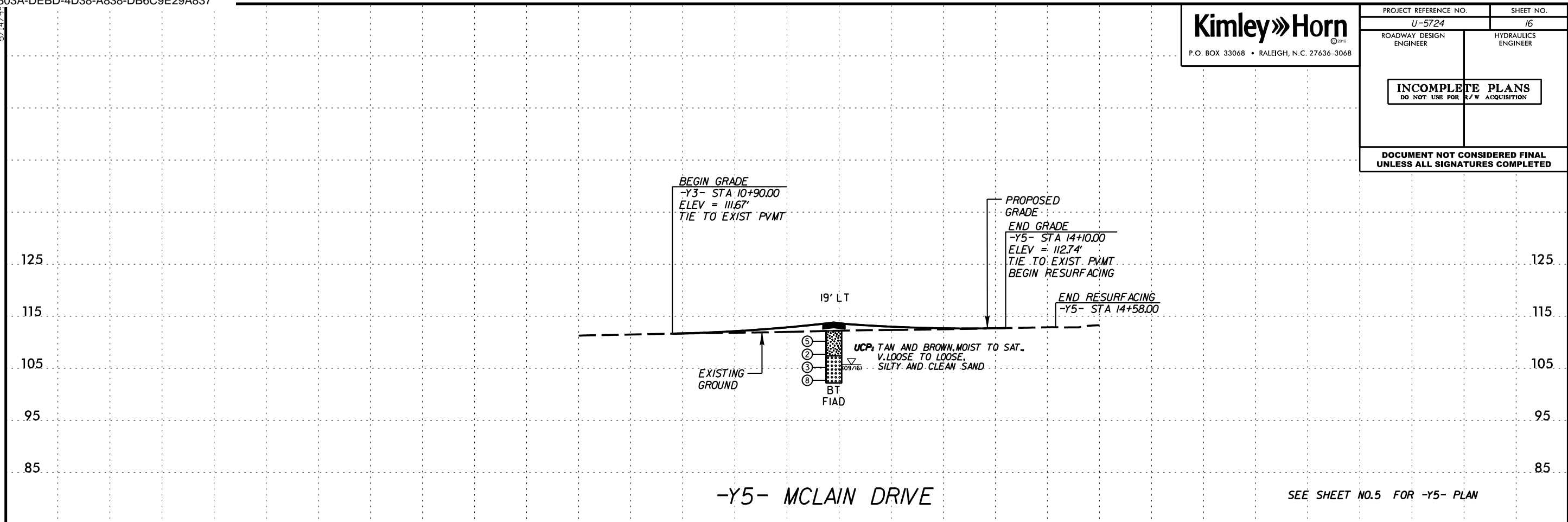


SEE SHEET NO.6 FOR -Y3- PLAN

\$DATE\$

PROJECT REFERENCE NO. U-5724	SHEET NO. 16
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
INCOMPLETE PLANS DO NOT USE FOR R/W ACQUISITION	
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED	

\$DATE\$



PROJECT REFERENCE NO.	SHEET NO.
U-5724	17

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

SUBSURFACE INVESTIGATION

*APPENDIX A
LABORATORY RESULTS*

PROJECT: REFERENCE: U-5724

PROJECT:

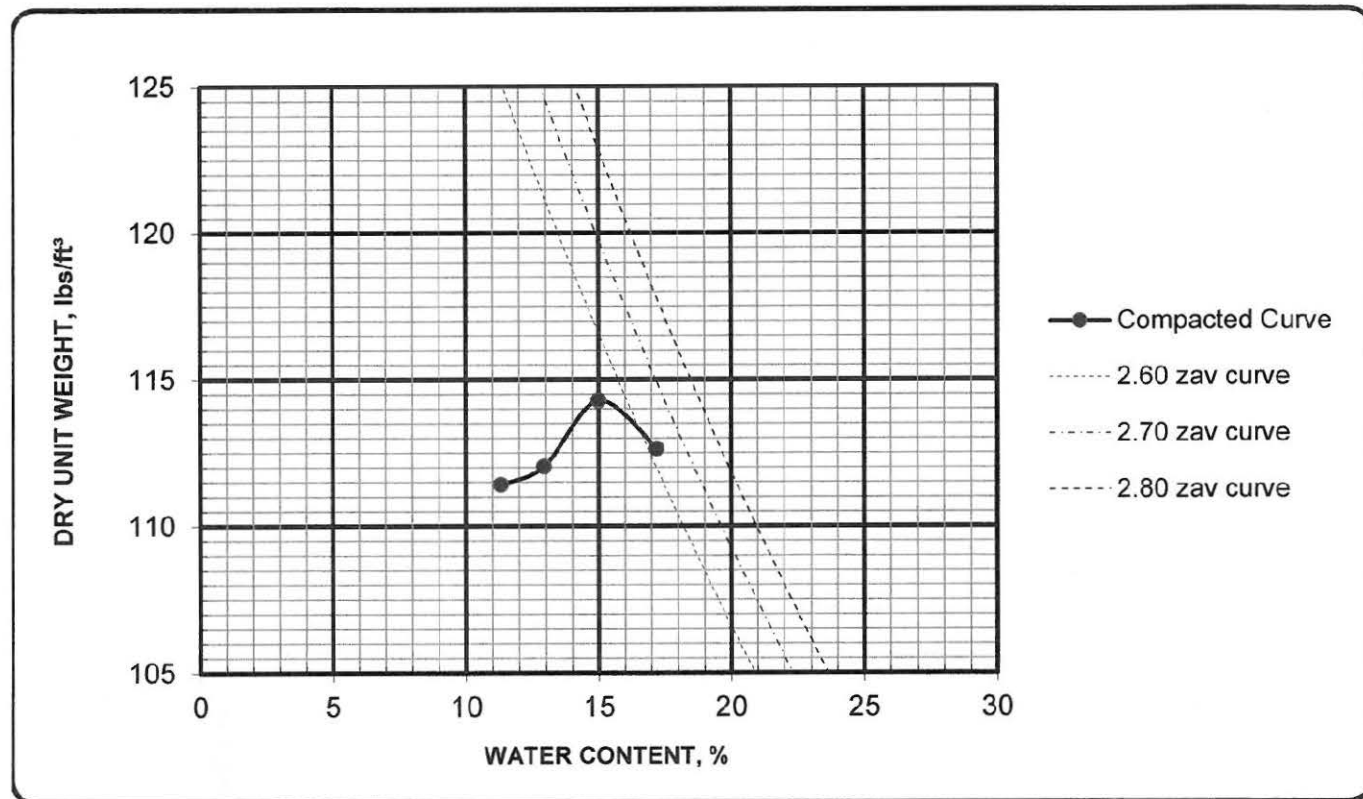
<i>WSH</i>	5/29/2019
INITIALS	DATE

October 24, 2016

**REPORT OF MOISTURE-DENSITY RELATIONS OF SOILS
USING A 5.5-LB RAMMER AND A 12-IN. DROP**
Performed in general accordance with AASHTO T 99, Method C
October 24, 2016



PROJECT NAME: U-5724 Fallin Boulevard Extension
PROJECT NUMBER: G16025.00
SAMPLE IDENTIFICATION: R-07, BS-1, 0-5'



MAXIMUM DENSITY, lbs/ft³: 114.3
OPTIMUM MOISTURE CONTENT, %: 15.0

AS-RECEIVED WATER CONTENT: 5.7
LIQUID LIMIT: ND
PLASTIC LIMIT: ND
PLASTICITY INDEX: NP
PERCENT FINER NO. 200 4.3
AASHTO CLASSIFICATION: A-1-b(0)

REMARKS:

Document ID: R-07, BS-1, 0-5' Laboratory Compaction

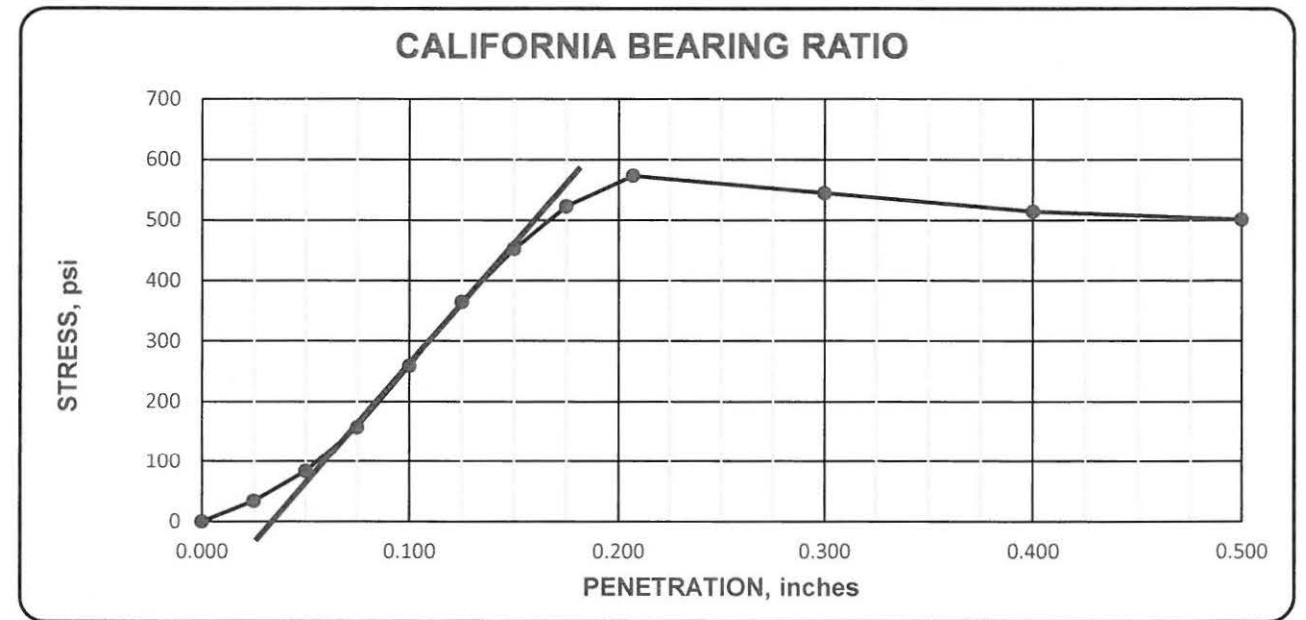
REVIEWED BY: John Dailly

Falcon Engineering 1210 Trinity Road Suite 110 Raleigh, NC 27607
Telephone: 919-871-0800 Fax: 919-871-0803 www.falconengineers.com



**REPORT OF CALIFORNIA BEARING RATIO (CBR)
OF LABORATORY-COMPACTED SOILS**
Performed in general accordance with AASHTO T 193

PROJECT NAME: U-5724 Fallin Boulevard Extension
PROJECT NUMBER: G16025.00
SAMPLE IDENTIFICATION: R-07, BS-1, 0-5'



Bearing Ratio: at 0.1 inches of penetration: 41.4
at 0.2 inches of penetration: 37.6

Compaction Method: AASHTO T 99, Method C
Maximum Dry Unit Weight, lbs/ft³: 114.3
Optimum Water Content, %: 15.0
Compacted Dry Unit Weight, lbs/ft³: 111.6
Compacted Water Content, %: 13.5
Compaction Percentage: 97.6
Water Content, Top one-inch after test, %: 11.5
Surcharge, lbs: 10
Immersion period, hours: 95
Swell, %: 0.0

Remarks: Soaked specimen

Reviewed by: John Dailly

Document ID: R-07, BS-1, 0-5' CBR

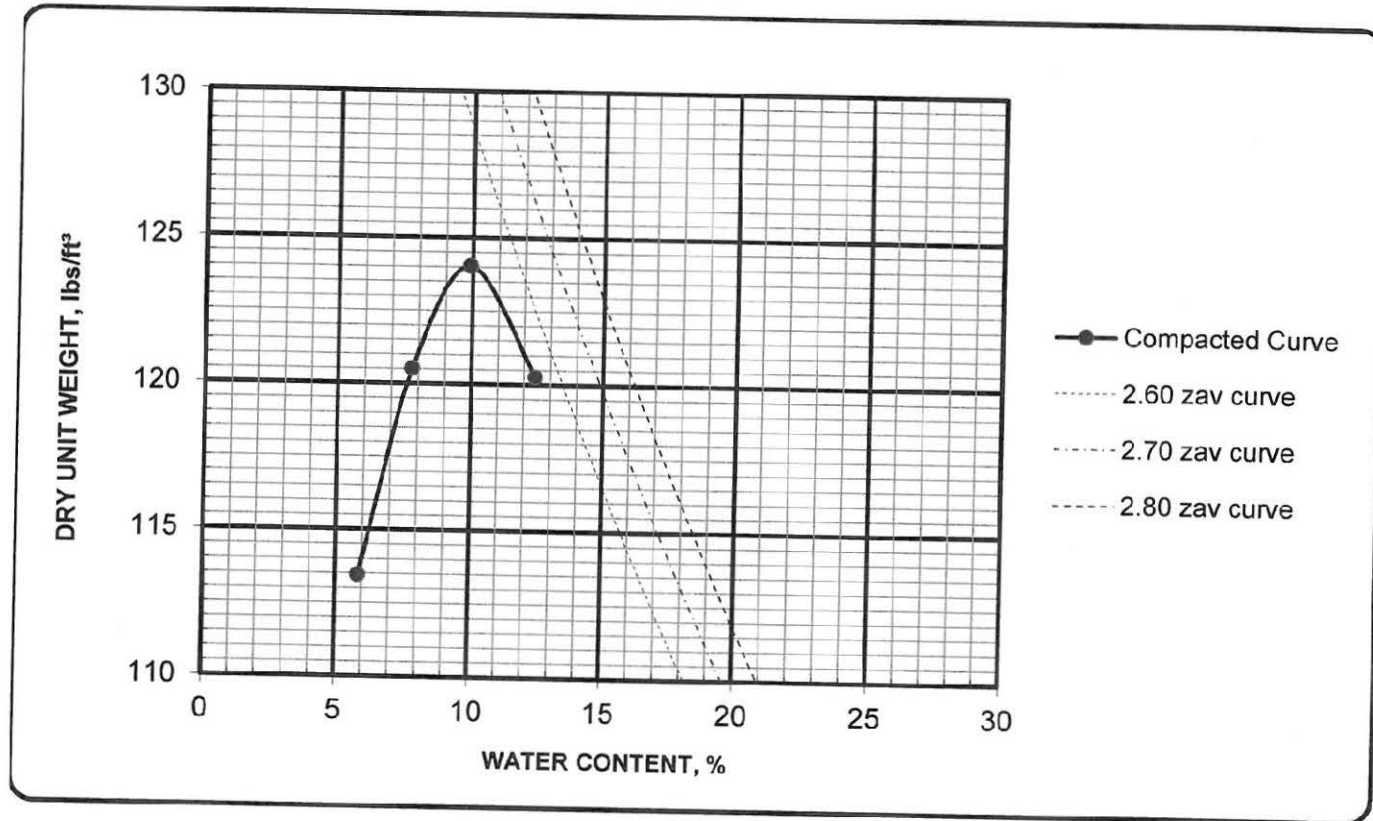
Falcon Engineering 1210 Trinity Rd. Suite 110 Raleigh, NC 27607
Telephone: 919-871-0800 Fax: 919-871-0803 www.falconengineers.com

October 24, 2016

REPORT OF MOISTURE-DENSITY RELATIONS OF SOILS
USING A 5.5-LB RAMMER AND A 12-IN. DROP
Performed in general accordance with AASHTO T 99, Method C
 October 24, 2016



PROJECT NAME: U-5724 Fallin Boulevard Extension
 PROJECT NUMBER: G16025.00
 SAMPLE IDENTIFICATION: R-15, BS-2, 0-5'



MAXIMUM DENSITY, lbs/ft³: 124.3
OPTIMUM MOISTURE CONTENT, %: 9.9
AS-RECEIVED WATER CONTENT: 14.8
LIQUID LIMIT: 17
PLASTIC LIMIT: 14
PLASTICITY INDEX: 3
PERCENT FINER NO. 200 20.0
AASHTO CLASSIFICATION: A-2-4(0)

REMARKS:

Document ID: R-15, BS-2, 0-5' Laboratory Compaction

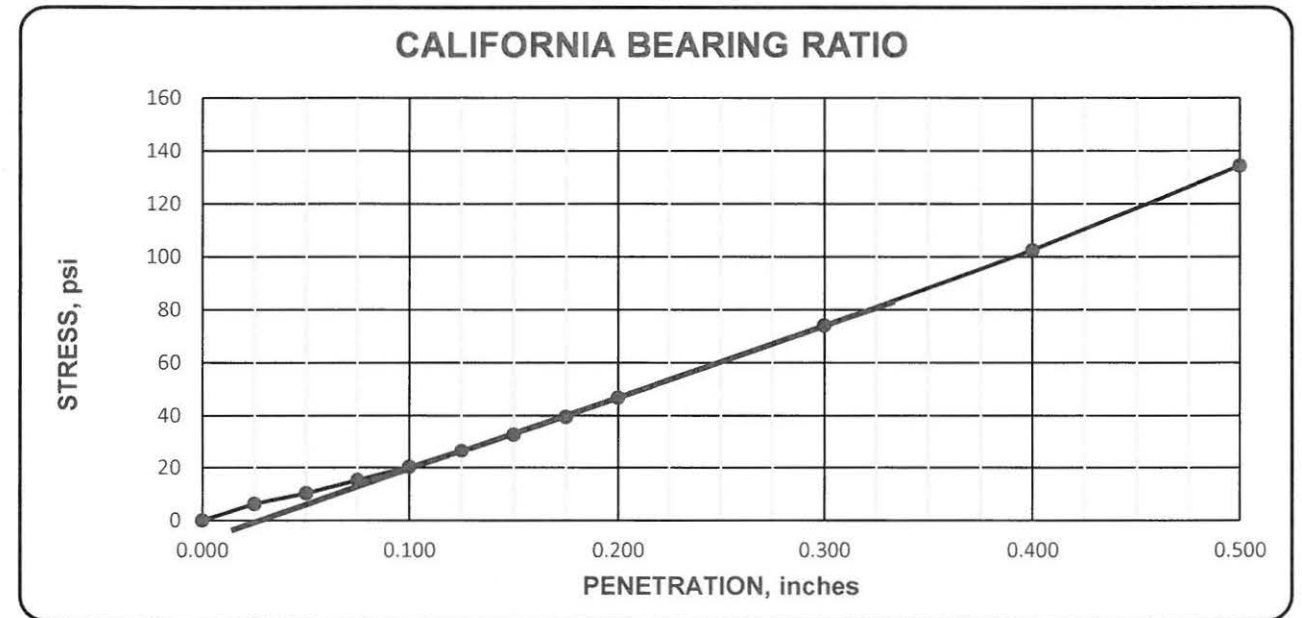
REVIEWED BY: John Saily

Falcon Engineering 1210 Trinity Road Suite 110 Raleigh, NC 27607
 Telephone: 919-871-0800 Fax: 919-871-0803 www.falconengineers.com



REPORT OF CALIFORNIA BEARING RATIO (CBR)
OF LABORATORY-COMPACTED SOILS
Performed in general accordance with AASHTO T 193

PROJECT NAME: U-5724 Fallin Boulevard Extension
 PROJECT NUMBER: G16025.00
 SAMPLE IDENTIFICATION: R-15, BS-2, 0-5'



Bearing Ratio: at 0.1 inches of penetration: 2.7
at 0.2 inches of penetration: 3.6

Compaction Method: AASHTO T 99, Method C
 Maximum Dry Unit Weight, lbs/ft³: 124.3
 Optimum Water Content, %: 9.9
 Compacted Dry Unit Weight, lbs/ft³: 122.0
 Compacted Water Content, %: 11.2
 Compaction Percentage: 98.1
 Water Content, Top one-inch after test, %: 11.7
 Surcharge, lbs: 10
 Immersion period, hours: 94
 Swell, %: -0.4

Remarks: Soaked specimen

Reviewed by: John Saily

Document ID: R-15, BS-2, 0-5' CBR-1

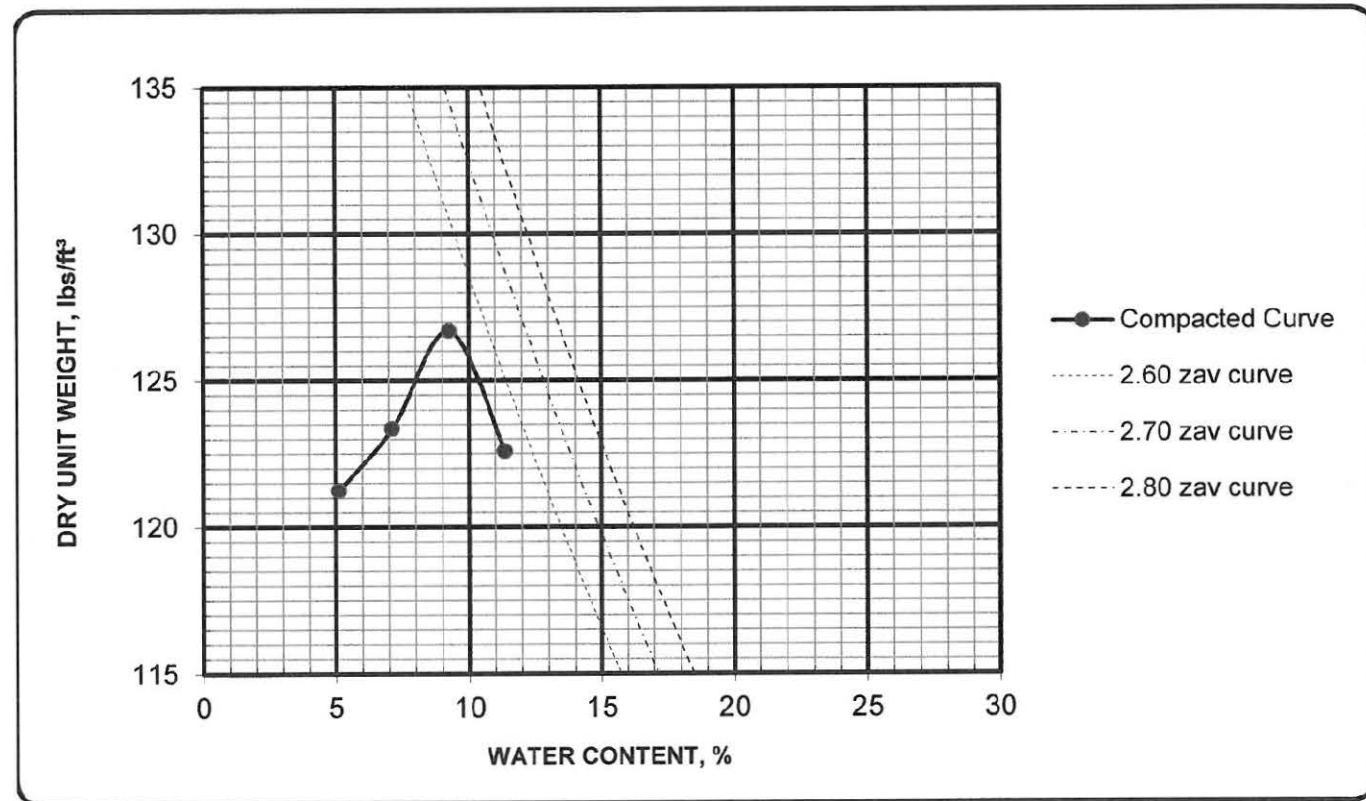
Falcon Engineering 1210 Trinity Rd. Suite 110 Raleigh, NC 27607
 Telephone: 919-871-0800 Fax: 919-871-0803 www.falconengineers.com

October 24, 2016

**REPORT OF MOISTURE-DENSITY RELATIONS OF SOILS
USING A 5.5-LB RAMMER AND A 12-IN. DROP**
Performed in general accordance with AASHTO T 99, Method C
October 24, 2016



PROJECT NAME: U-5724 Fallin Boulevard Extension
PROJECT NUMBER: G16025.00
SAMPLE IDENTIFICATION: R-44, BS-3, 0-5'



MAXIMUM DENSITY, lbs/ft³: 126.7 **AS-RECEIVED WATER CONTENT: 8.4**
OPTIMUM MOISTURE CONTENT, %: 9.3 **LIQUID LIMIT: ND**
PLASTIC LIMIT: ND
PLASTICITY INDEX: NP
PERCENT FINER NO. 200: 16.7
AASHTO CLASSIFICATION: A-2-4(0)

REMARKS:

Document ID: R-44, BS-3, 0-5' Laboratory Compaction

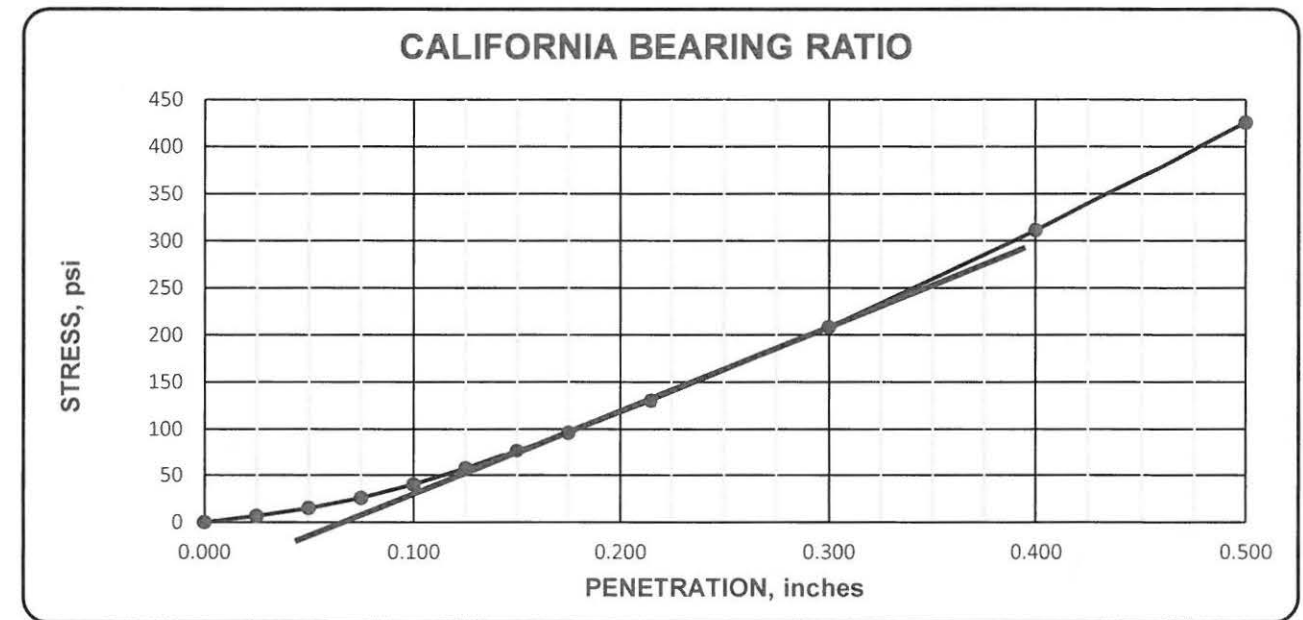
REVIEWED BY: John Dailly

Falcon Engineering 1210 Trinity Road Suite 110 Raleigh, NC 27607
Telephone: 919-871-0800 Fax: 919-871-0803 www.falconengineers.com



**REPORT OF CALIFORNIA BEARING RATIO (CBR)
OF LABORATORY-COMPACTED SOILS**
Performed in general accordance with AASHTO T 193

PROJECT NAME: U-5724 Fallin Boulevard Extension
PROJECT NUMBER: G16025.00
SAMPLE IDENTIFICATION: R-44, BS-3, 0-5'



Bearing Ratio: at 0.1 inches of penetration: 9.1
at 0.2 inches of penetration: 11.4

Compaction Method: AASHTO T 99, Method C
Maximum Dry Unit Weight, lbs/ft³: 126.7
Optimum Water Content, %: 9.3
Compacted Dry Unit Weight, lbs/ft³: 122.9
Compacted Water Content, %: 10.6
Compaction Percentage: 97.0
Water Content, Top one-inch after test, %: 10.7
Surcharge, lbs: 10
Immersion period, hours: 94
Swell, %: -0.6

Remarks: Soaked specimen

Reviewed by: John Dailly

Document ID: R-44, BS-3, 0-5' CBR

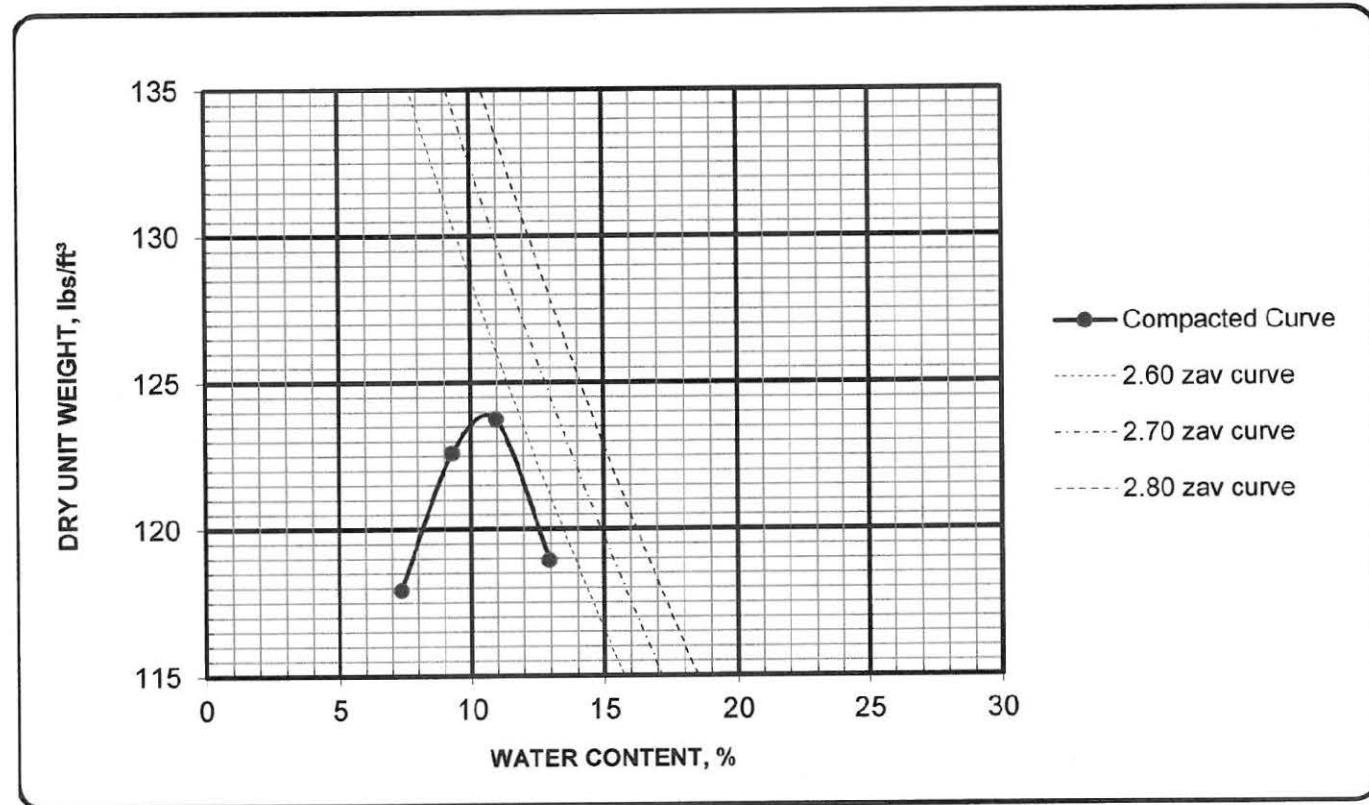
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October 24, 2016

**REPORT OF MOISTURE-DENSITY RELATIONS OF SOILS
USING A 5.5-LB RAMMER AND A 12-IN. DROP**
Performed in general accordance with AASHTO T 99, Method C
October 24, 2016



PROJECT NAME: U-5724 Fallin Boulevard Extension
PROJECT NUMBER: G16025.00
SAMPLE IDENTIFICATION: R-49, BS-4, 0-5'



MAXIMUM DENSITY, lbs/ft³: 124.0
OPTIMUM MOISTURE CONTENT, %: 10.6

AS-RECEIVED WATER CONTENT: 13.8
LIQUID LIMIT: 18
PLASTIC LIMIT: 16
PLASTICITY INDEX: 2
PERCENT FINER NO. 200: 13.7
AASHTO CLASSIFICATION: A-2-4(0)

REMARKS:

Document ID: R-49, BS-4, 0-5' Laboratory Compaction

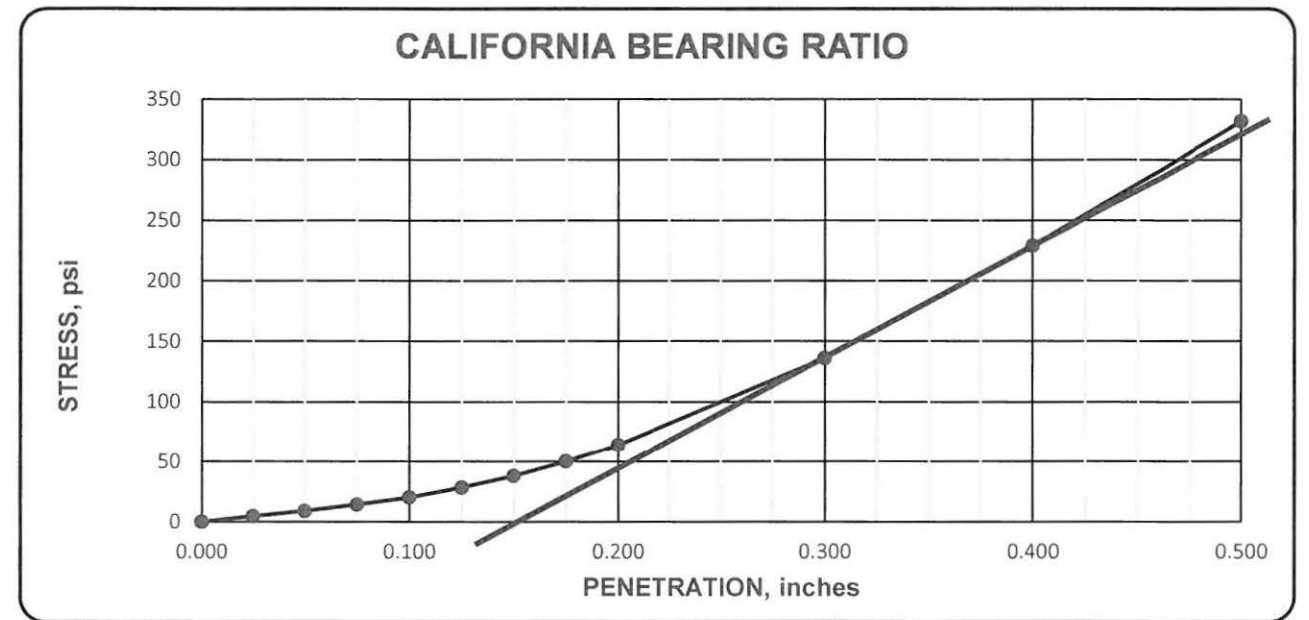
REVIEWED BY: John Saily

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**REPORT OF CALIFORNIA BEARING RATIO (CBR)
OF LABORATORY-COMPACTED SOILS**
Performed in general accordance with AASHTO T 193

PROJECT NAME: U-5724 Fallin Boulevard Extension
PROJECT NUMBER: G16025.00
SAMPLE IDENTIFICATION: R-49, BS-4, 0-5'



Bearing Ratio: at 0.1 inches of penetration: 10.1
at 0.2 inches of penetration: 12.4

Compaction Method: AASHTO T 99, Method C
Maximum Dry Unit Weight, lbs/ft³: 124.0
Optimum Water Content, %: 10.6
Compacted Dry Unit Weight, lbs/ft³: 121.1
Compacted Water Content, %: 11.7
Compaction Percentage: 97.7
Water Content, Top one-inch after test, %: 11.9
Surcharge, lbs: 10
Immersion period, hours: 94
Swell, %: -0.3

Remarks: Soaked specimen

Reviewed by: John Saily

Document ID: R-49, BS-4, 0-5' CBR

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