

PROJECT: 50092.1.FSI REFERENCE: W-5520

SEE SHEET 4 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.	W-5520	1	29

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# ROADWAY SUBSURFACE INVESTIGATION

COUNTY UNION  
PROJECT DESCRIPTION US 74 SUPERSTREET  
CONVERSION FROM FAIRVIEW ROAD  
TO WESLEY CHAPEL STOUTS ROAD  
**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

L. CAMPOS

K. HILL

M. KEATTS

S. LANEY

T. MILLER

J. WELLS

INVESTIGATED BY S&ME, INC.

DRAWN BY M. KEATTS

CHECKED BY S. LANEY

SUBMITTED BY S&ME, INC.

DATE AUGUST 2016



SIGNATURE \_\_\_\_\_ DATE 8/10/2016

SIGNATURE \_\_\_\_\_ DATE \_\_\_\_\_

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 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...

SOIL LEGEND AND AASHTO CLASSIFICATION
GENERAL CLASS., GRANULAR MATERIALS (<= 35% PASSING #200), SILT-CLAY MATERIALS (> 35% PASSING #200), ORGANIC MATERIALS

TEXTURE OR GRAIN SIZE
U.S. STD. SIEVE SIZE, BOULDER (BLDR.), COBBLE (COB.), GRAVEL (GR.), COARSE SAND (CSE. SD.), FINE SAND (F. SD.), SILT (SL.), CLAY (CL.)

SOIL MOISTURE - CORRELATION OF TERMS
SOIL MOISTURE SCALE (ATTERBERG LIMITS), FIELD MOISTURE DESCRIPTION, GUIDE FOR FIELD MOISTURE DESCRIPTION

PLASTICITY
NON PLASTIC, SLIGHTLY PLASTIC, MODERATELY PLASTIC, HIGHLY PLASTIC

COLOR
DESCRIPTIONS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YELLOW-BROWN, BLUE-GRAY).

GRADATION
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.

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 WHEN THEY ARE CONSIDERED OF SIGNIFICANCE.

COMPRESSIBILITY
SLIGHTLY COMPRESSIBLE, MODERATELY COMPRESSIBLE, HIGHLY COMPRESSIBLE

PERCENTAGE OF MATERIAL
ORGANIC MATERIAL, GRANULAR SOILS, SILT - CLAY SOILS, OTHER MATERIAL

GROUND WATER
WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING, STATIC WATER LEVEL AFTER 24 HOURS, PERCHED WATER, SATURATED ZONE, OR WATER BEARING STRATA

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

RECOMMENDATION SYMBOLS
UNDERCUT EXCAVATION, UNCLASSIFIED EXCAVATION - UNSUITABLE WASTE, UNCLASSIFIED EXCAVATION - ACCEPTABLE DEGRADABLE ROCK

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, HL. - HIGHLY

EQUIPMENT USED ON SUBJECT PROJECT
DRILL UNITS: CME-45C, CME-55, CME-550, VANE SHEAR TEST, PORTABLE HOIST, CME-45B
ADVANCING TOOLS: CLAY BITS, 6" CONTINUOUS FLIGHT AUGER, 8" HOLLOW AUGERS, HARD FACED FINGER BITS, TUNG-CARBIDE INSERTS, CASING w/ ADVANCER, TRICONE STEEL TEETH, TRICONE TUNG-CARB., CORE BIT

ROCK DESCRIPTION
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.

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.

NON-CRYSTALLINE ROCK (NCR)
FINE TO COARSE GRAIN METAMORPHIC AND NON-COASTAL PLAIN SEDIMENTARY ROCK THAT WOULD YIELD SPT REFUSAL IF TESTED.

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, VERY SLIGHT (V SLI.), SLIGHT (SLI.), MODERATE (MOD.), MODERATELY SEVERE (MOD. SEV.), SEVERE (SEV.), VERY SEVERE (V SEV.), COMPLETE

ROCK HARDNESS
VERY HARD, HARD, MODERATELY HARD, MEDIUM HARD, SOFT, VERY SOFT

FRACTURE SPACING, BEDDING
TERM, SPACING, TERM, THICKNESS

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

TERMS AND DEFINITIONS
ALLUVIUM (ALLUV.), AQUIFER, ARENACEOUS, ARGILLACEOUS, ARTESIAN, CALCAREOUS (CALC.), COLLUVIUM, CORE RECOVERY (REC.), DIKE, DIP, DIP DIRECTION (DIP AZIMUTH), FAULT, FISSILE, FLOAT, FLOOD PLAIN (FP), FORMATION (FM), JOINT, LEDGE, LENS, MOTTLED (MOT.), PERCHED WATER, RESIDUAL (RES.) SOIL, RESIDUAL (RES.) SOIL, SAPROLITE (SAP.), SILL, SLICKENSIDE, STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT), STRATA CORE RECOVERY (SRCR.), STRATA ROCK QUALITY DESIGNATION (SRQD.), TOPSOIL (TS.)

BENCH MARK: ELEVATION: FEET

NOTES:
DATE: 8-15-14

August 10, 2016

STATE PROJECT: Geotechnical Report - Inventory  
 F.A. PROJECT: 50092.1.FS1 (W-5520)  
 COUNTY: Union  
 DESCRIPTION: US 74 (Independence Boulevard) Superstreet Conversion from 800 feet west of Fairview Road to 800 feet east of Wesley Chapel Stouts Road

SUBJECT: Geotechnical Report - Inventory

**Project Description**

Project information is based on e-mail and telephone communication between Jim Beck, PE of DRMP, Inc. (DRMP) and Stewart Laney, PE of S&ME, Inc. between January 2014 and May 2016. Preliminary Plans prepared by DRMP and electronic Microstation files of the plans, cross sections, and profiles were provided as attachments to the e-mail correspondence.

We understand DRMP is preparing final construction documents for the proposed superstreet conversion project from Station 106+30 to Station 429+40 of US 74 – Independence Boulevard in Union County, North Carolina. Based on the plans, the project will provide substantial improvements to four major intersections of US 74: Indian Trail-Fairview Road/Indian Trail Road South (SR 1008), Unionville-Indian Trail Road (SR 1367), Faith Church Road (SR 1518), and Sardis Church Road (SR 1515)/Wesley Chapel-Stouts Road (SR 1377). The improvements will include appropriate motor vehicular capacity upgrades, quality provisions for all modes of travel, access management improvements, and aesthetic considerations. Additionally, the project will include additional through and turn lanes, widening and extension of existing turn lanes, and modification and installation of traffic signals. The existing roadways that will be widened will require shallow (sliver) fills and cuts, with the widenings and U-turn areas requiring maximum cuts on the order of 10 feet and maximum fills on the order of 5 feet.

In order to explore the general subsurface conditions at the project site, S&ME drilled a total of eighteen (18) soil test borings and eight (8) pavement investigation borings as shown on Sheets 5 through 12 between August 18 and 22, 2014. The borings locations were selected and located in the field by S&ME personnel using a handheld Global Positioning System (GPS) unit.

A truck-mounted CME-45B drill rig was used to advance the borings with hollow-stem, continuous flight augers. Standard Penetration Tests (SPT tests) were performed at designated intervals in the soil test borings in general accordance with ASTM D1586 to provide an index for estimating soil strength and density and to provide samples for soil classification. SPT tests were performed with a hydraulic automatic hammer (Autohammer). All boreholes were backfilled with soil cuttings after drilling was completed.

The following alignments were investigated for this project:

<u>Line</u>	<u>Station (+/-)</u>		
-L1-	106+30	to	126+50
-L2-	205+10	to	226+15
-L3-	303+20	to	326+50
-L4-	401+20	to	429+40
-Y2-	12+50	to	15+50

**Areas of Special Geotechnical Interest**

The following existing subsurface conditions have been identified as areas of special interest for the project. These conditions and their impacts to the project are further discussed in the S&ME Roadway Subsurface Recommendations Report dated August 2016 and Recommendations Letter Report dated August 2016.

Plastic Soils: Some soil samples selected for laboratory testing had Plasticity Indexes of 25 or greater. Based on the field soil classifications we do expect that some of these soils will be encountered at several locations along the project alignment. Based on the soil test borings, medium to highly plastic A-7-5 and A-7-6 soils (PI of 25 or greater) should be anticipated at the following locations. Some undercutting and replacement or stabilizing of these materials may be required at these locations.

<u>Line</u>	<u>Station (+/-)</u>			<u>Offset</u>
-L1-	106+30	to	108+50	RT
-L1-	124+25	to	126+50	LT
-L2-	205+10	to	207+50	RT
-L2-	223+80	to	226+15	LT
-L3-	303+20	to	306+20	RT
-L3-	323+50	to	326+50	LT

**Physiography, Geology and Surface Water**

The project site is located between Station 10+00 and Station 429+40 of US 74 - Independence Boulevard in Union County to the northwest of Monroe, North Carolina. The topography in the area is generally flat to gently rolling. The project area is generally developed with commercial business with some undeveloped wooded areas in between.

Geologically, the project area is located within the Carolina Slate Belt of the Piedmont Physiographic Province. The Carolina Slate Belt is a rock formation which extends from Georgia to North Carolina and parts of Virginia. Over geologic time, the volcanic and sedimentary rocks which originally covered the Belt area were subjected to metamorphism, heat, and pressure. The metamorphic process gave rise to the primary rock types seen today in this region which are referred to as metavolcanics. These metavolcanics include dacitic, rhyolitic, and andesitic flows along with tuffs and breccias. The metasediments found in the region include argillite and slate, the latter for which the belt is named.

The major portion of the bedrock in the Piedmont is covered with a varying thickness of residual soil which has been derived by chemical decomposition and physical weathering of the underlying rock. Residual soils developed during the weathering of this bedrock consist predominately of micaceous sandy silts and silty sands which grade to clayey silts and silty clays with nearness to the ground surface. The thickness of the residual soils can vary from only a few feet to in excess of 100 feet.

The boundary between the residual soil and the underlying bedrock is not sharply defined. Generally, a transition zone consisting of very hard soil to soft rock, appropriately classified as "weathered rock," is found. Within the transition zone, large boulders or lenses of relatively "fresh" rock which are generally much harder than the surrounding material often exist. The irregular bedrock surface is basically a consequence of differential weathering of the various minerals and joint patterns of the rock mass.

### Soil Properties

Generalized subsurface conditions for the project are described below. For more detailed soil descriptions and stratifications at a particular test location, the respective profile and cross section should be reviewed.

The soil test borings generally consisted of roadway embankment material, alluvial soils, residual soils, and weathered rock to the boring termination depths.

**Pavement Section:** A pavement section was encountered in 8 borings that consisted of asphalt with thickness ranging from 7 to 19.25 inches over ABC Stone with thickness ranging from 6.5 to 13.25 inches.

**Roadway Embankment Soils:** Roadway embankment soils were encountered in all of the soil test borings except one to depths ranging from of 3 to 12 feet below the existing ground surface. The roadway embankment soils generally consisted of tan, orange, brown, red and gray silty clays and clays (A-7-5 and A-7-6), brown orange and orange brown sandy clays (A-6), orange tan and tan brown sandy silts (A-4) and brown gray silty sand (A-2-4). N-values of 3 to 26 bpf recorded in the roadway embankment soils. The roadway embankment soil samples selected for laboratory testing exhibit a liquid limit ranging from 40 to 57 and a plasticity index from 10 to 29.

**Alluvial Soils:** Alluvial soils were encountered in one boring below the roadway embankment soils and extended to a depth of 8 feet. The alluvial soils consisted of gray clay (A-7-6) with an N-value of 3 bpf.

**Residual Soils:** Beneath the roadway embankment, or at the ground surface, residual soils were encountered in most borings. The residual soils generally consisted of sandy clay (A-6), silty clays and clays (A-7-5 and A-7-6), sandy silts (A-4), and silts (A-5). N-values ranged from 4 to 57 bpf in the residual soils.

**Weathered Rock:** Beneath the residual soils in five of the borings, weathered rock was encountered at depths ranging from 5.5 to 8 feet below the existing ground surface. The weathered rock was sampled as schist.

### Ground Water

Ground water level measurements were attempted in the borings at the completion of drilling. Ground water was not encountered in any of the soil test borings performed.

### Closure

S&ME, Inc. appreciates the opportunity to provide our services on this project. Please contact us if you have any questions regarding this report or if we may be of further assistance.

Sincerely,

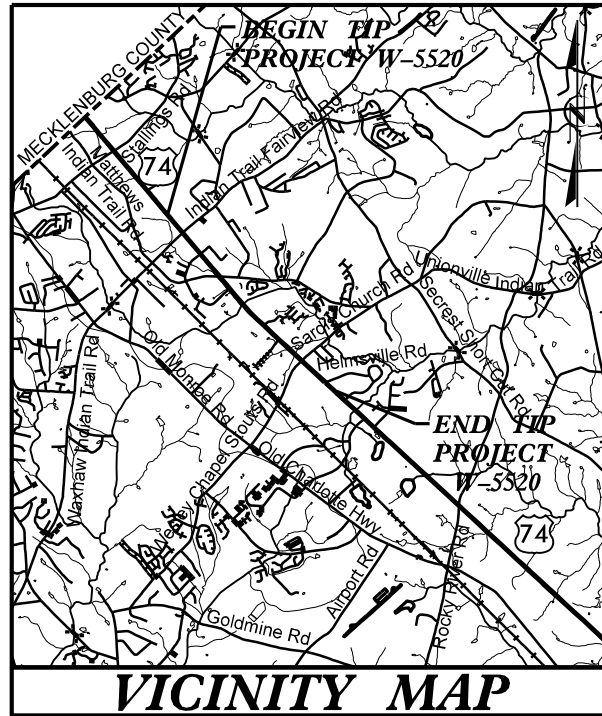
**S&ME, Inc.**



Luis A. Campos, P.E.  
Project Engineer

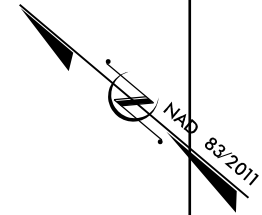
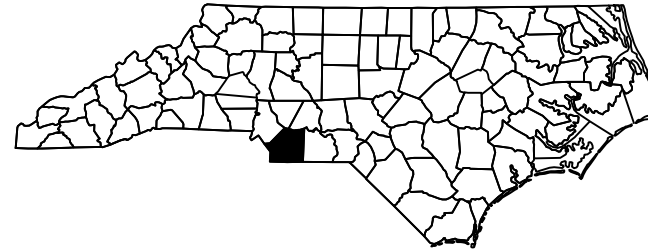


Kristen H. Hill, P.E., P.G.  
Senior Geotechnical Engineer

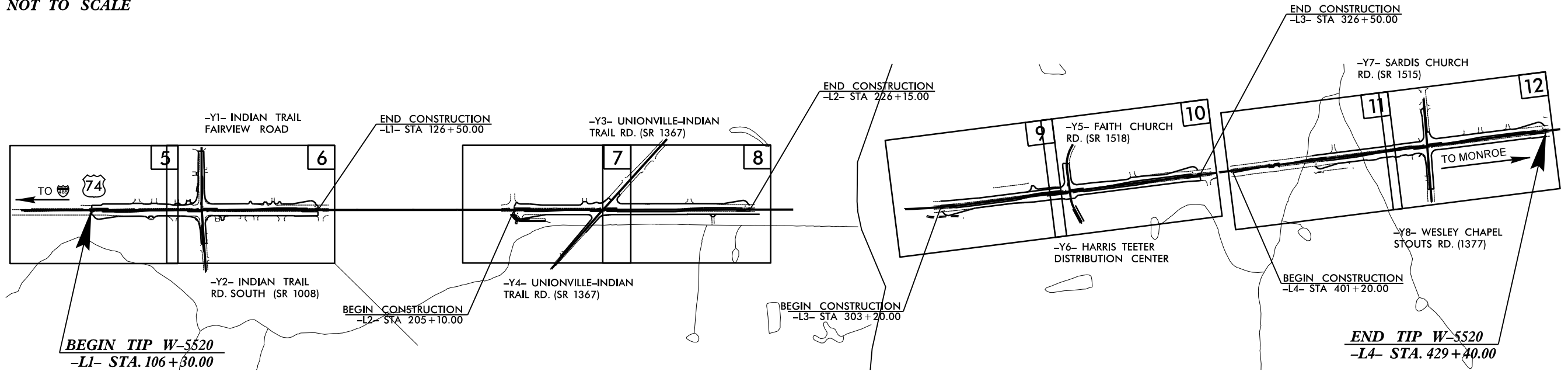


**VICINITY MAP**

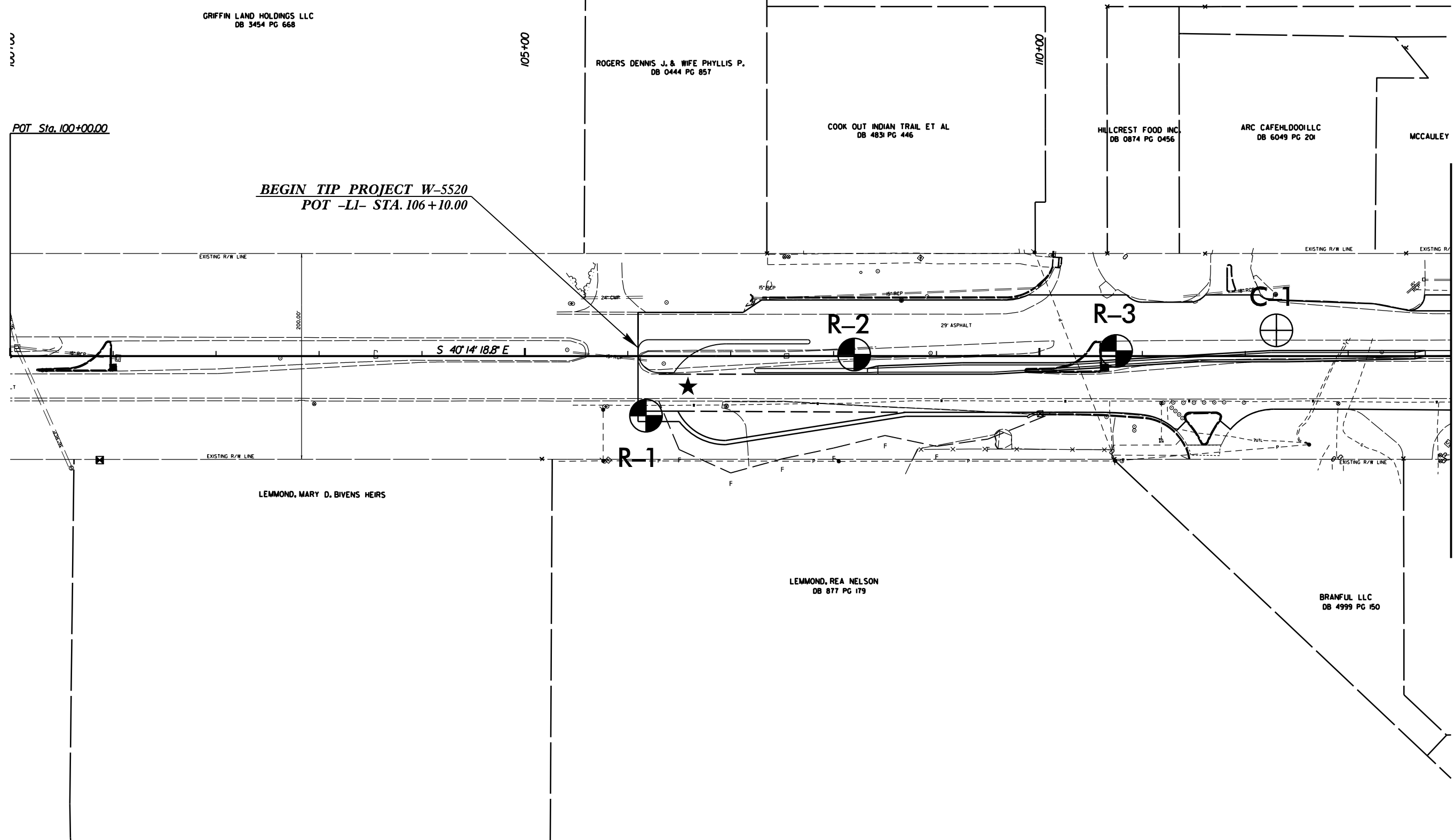
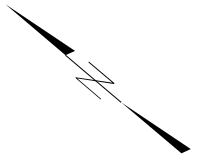
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R/W SHEET NO.	
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<b>INCOMPLETE PLANS</b> DO NOT USE FOR R/W ACQUISITION	
<b>DOCUMENT NOT CONSIDERED FINAL</b> UNLESS ALL SIGNATURES COMPLETED	



PROJECT REFERENCE NO.	SHEET NO.
W-5520	5
R/W SHEET NO.	
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DO NOT USE FOR CONSTRUCTION	



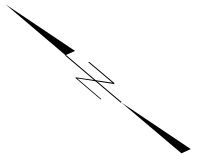
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MATCH LINE -LI- STA. 114 + 00 SEE SHEET 6

REVISIONS

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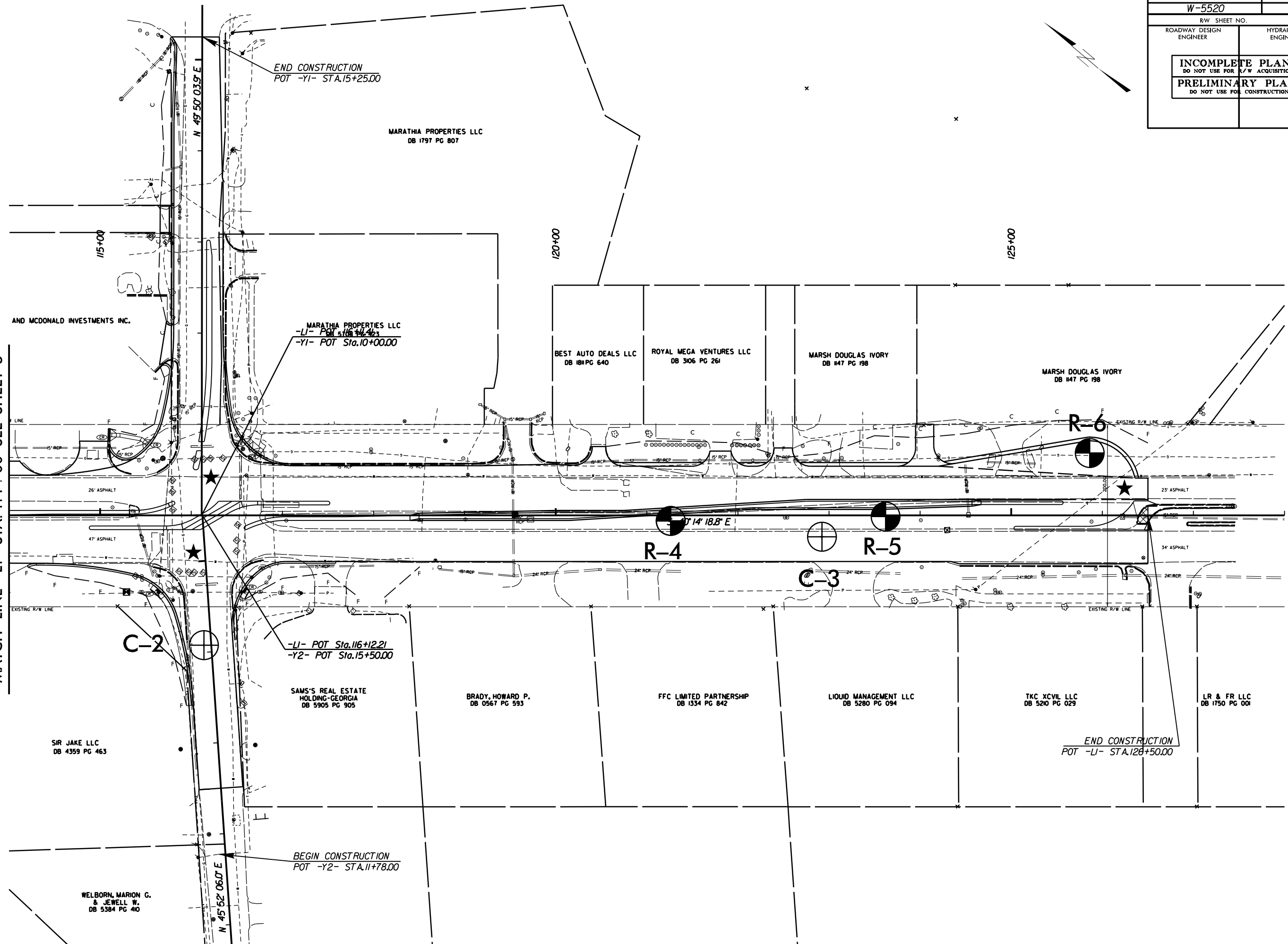
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MATCH LINE -L1- STA. 114+00 SEE SHEET 5

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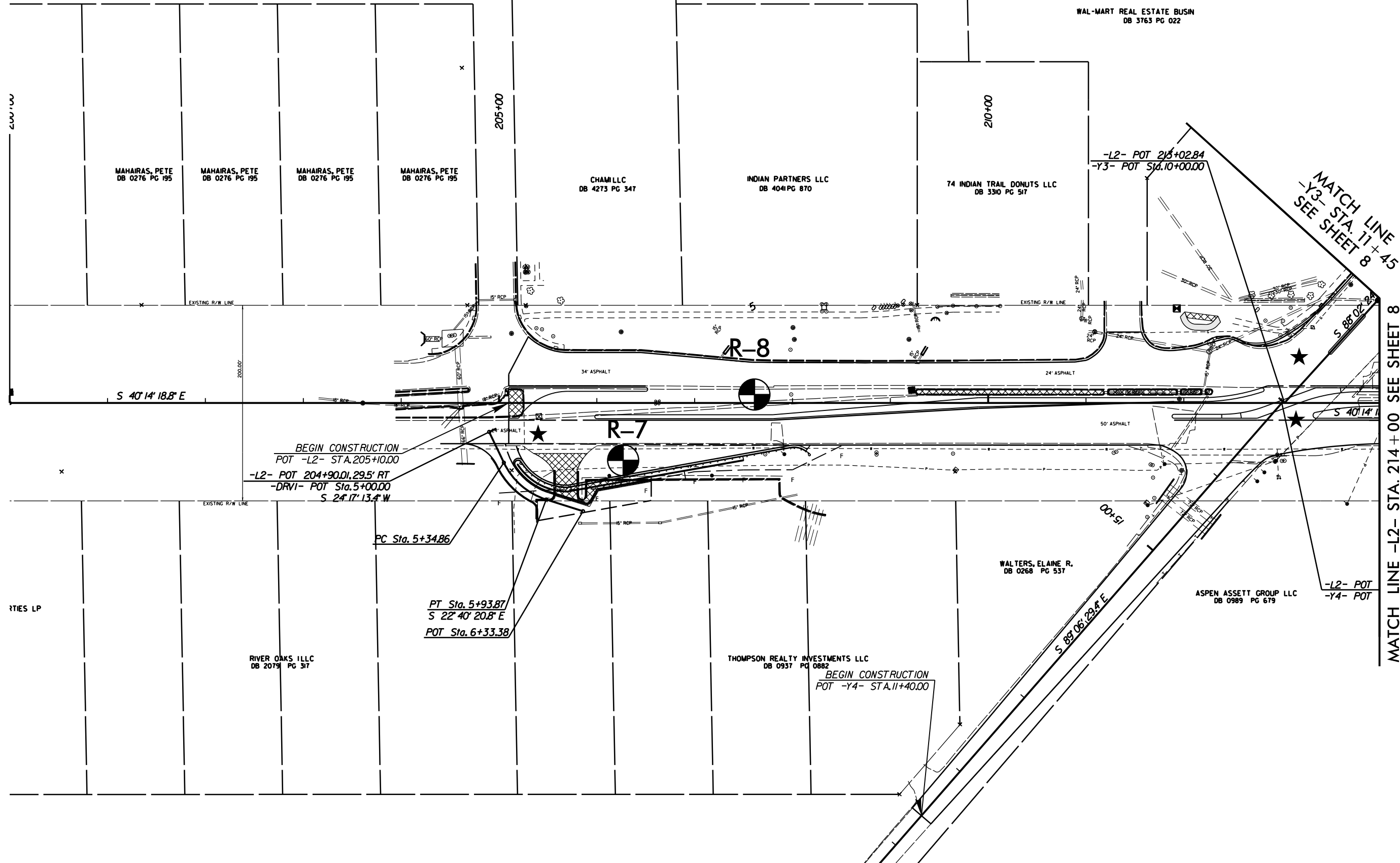


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 PI Sta 5+66J3  
 $\Delta = 46^\circ 57' 34.3" (RT)$   
 $D = 79^\circ 34' 38.9"$   
 $L = 59.0'$   
 $T = 31.28'$   
 $R = 72.00'$   
 e = EXISTING

PROJECT REFERENCE NO. <b>W-5520</b>	SHEET NO. <b>7</b>
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
<b>INCOMPLETE PLANS</b> DO NOT USE FOR R/W ACQUISITION	
<b>PRELIMINARY PLANS</b> DO NOT USE FOR CONSTRUCTION	

WAL-MART REAL ESTATE BUSIN  
DB 3763 PG 022



**MATCH LINE**  
 -Y3- STA. 11+45  
 SEE SHEET 8

**MATCH LINE -L2- STA. 214+00 SEE SHEET 8**

REVISIONS

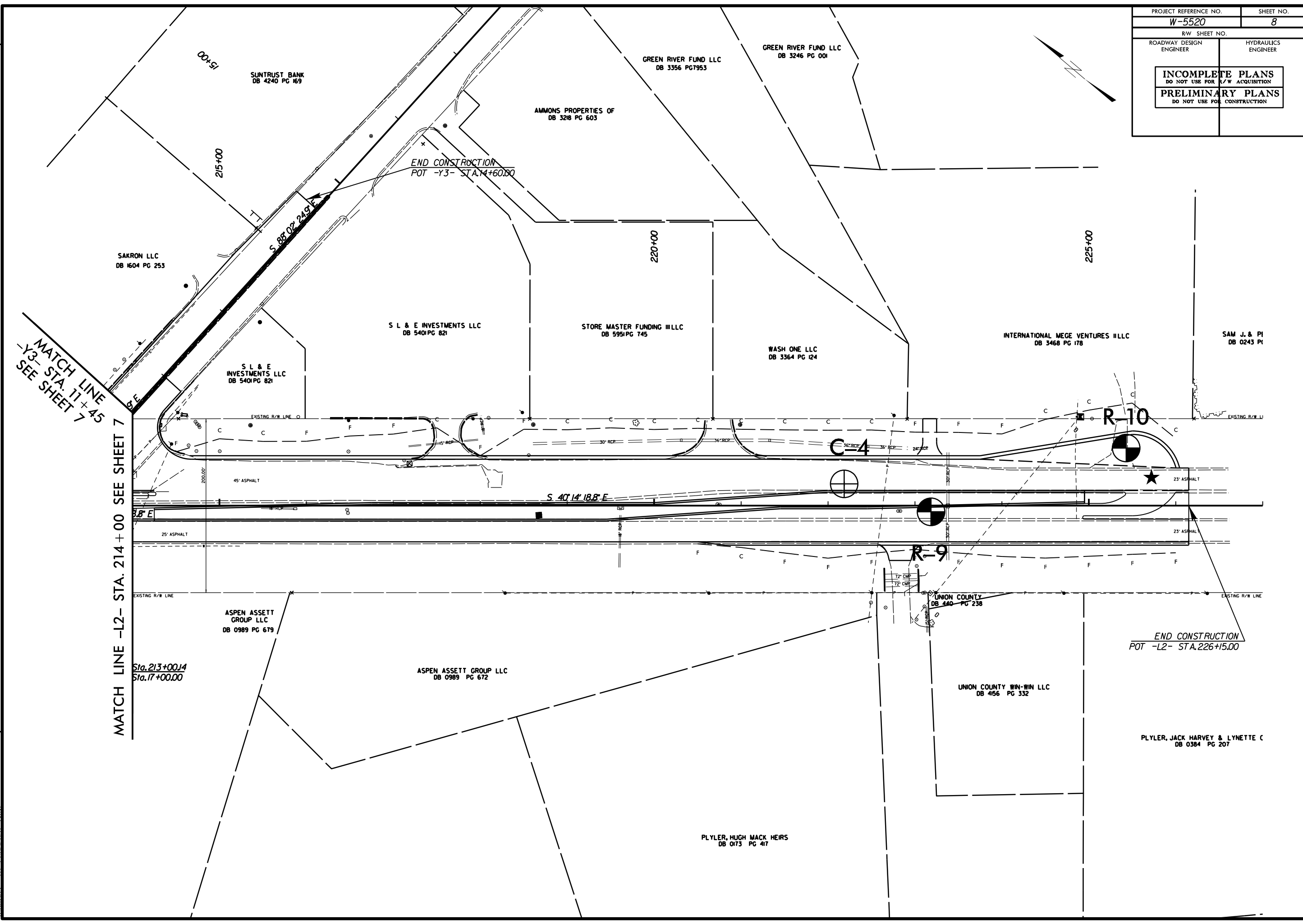
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PROJECT REFERENCE NO.	SHEET NO.
W-5520	8
R/W SHEET NO.	
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<b>PRELIMINARY PLANS</b> DO NOT USE FOR CONSTRUCTION	

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REVISIONS



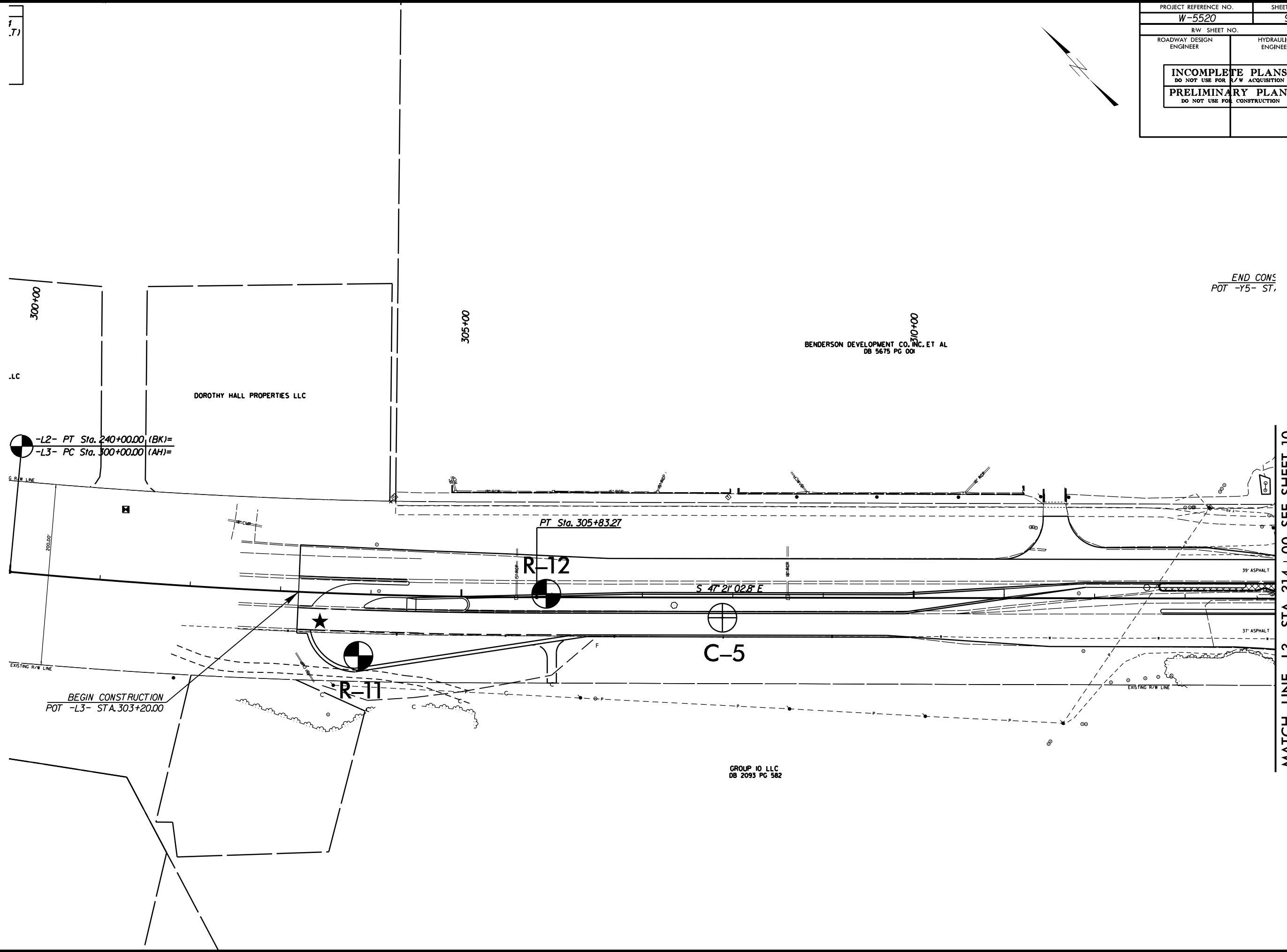
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MATCH LINE -Y3- STA. 11+45 SEE SHEET 7

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Sta. 17+00.00

PROJECT REFERENCE NO. <b>W-5520</b>	SHEET NO. <b>9</b>
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
<b>INCOMPLETE PLANS</b> DO NOT USE FOR R/W ACQUISITION <b>PRELIMINARY PLANS</b> DO NOT USE FOR CONSTRUCTION	

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MATCH LINE -L3- STA. 314+00 SEE SHEET 10

REVISIONS

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-L2- PT Sta. 240+00.00 (BK)=  
-L3- PC Sta. 300+00.00 (AH)=

BEGIN CONSTRUCTION  
POT -L3- STA. 303+20.00

PT Sta. 305+83.27

S 47° 21' 02.8" E

C-5

R-11

R-12

BENDERSON DEVELOPMENT CO., INC. ET AL  
DB 5675 PG 001

GROUP 10 LLC  
DB 2093 PG 582

DOROTHY HALL PROPERTIES LLC

.LC

300+00

305+00

310+00

39' ASPHALT

37' ASPHALT

R/W LINE

EXISTING R/W LINE

EXISTING R/W LINE

PROJECT REFERENCE NO.	SHEET NO.
W-5520	10
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
<b>INCOMPLETE PLANS</b> DO NOT USE FOR R/W ACQUISITION	
<b>PRELIMINARY PLANS</b> DO NOT USE FOR CONSTRUCTION	

Y5-	-Y6-
PI Sta. 11+93.42	PI Sta. 11+93.42
$\Delta = 46^\circ 34.2' (RT)$	$\Delta = 20^\circ 57' 46.6' (RT)$
$D = 05^\circ 54.9'$	$D = 20^\circ 50' 05.4'$
$L = 09'$	$L = 100.61'$
$T = 95'$	$T = 50.88'$
$R = 0.00'$	$R = 275.00'$
STING	e = EXISTING

PERSON DEVELOPMENT CO., INC. ET AL  
DB 5675 PG 001

EIG UNION TOWN LLC  
DB 6155 PG 045

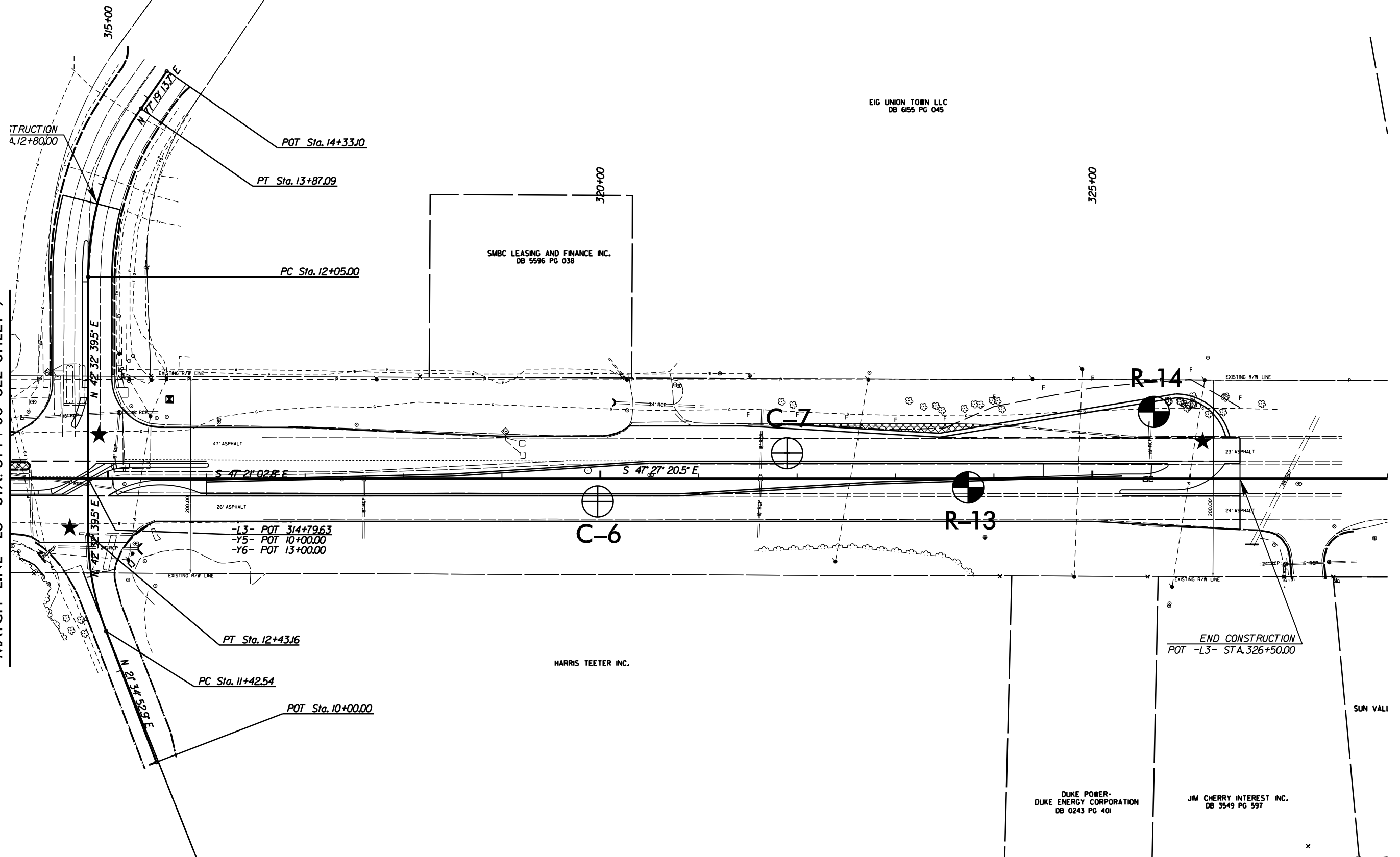
SMBC LEASING AND FINANCE INC.  
DB 5596 PG 038

HARRIS TEETER INC.

DUKE POWER-  
DUKE ENERGY CORPORATION  
DB 0243 PG 401

JIM CHERRY INTEREST INC.  
DB 3549 PG 597

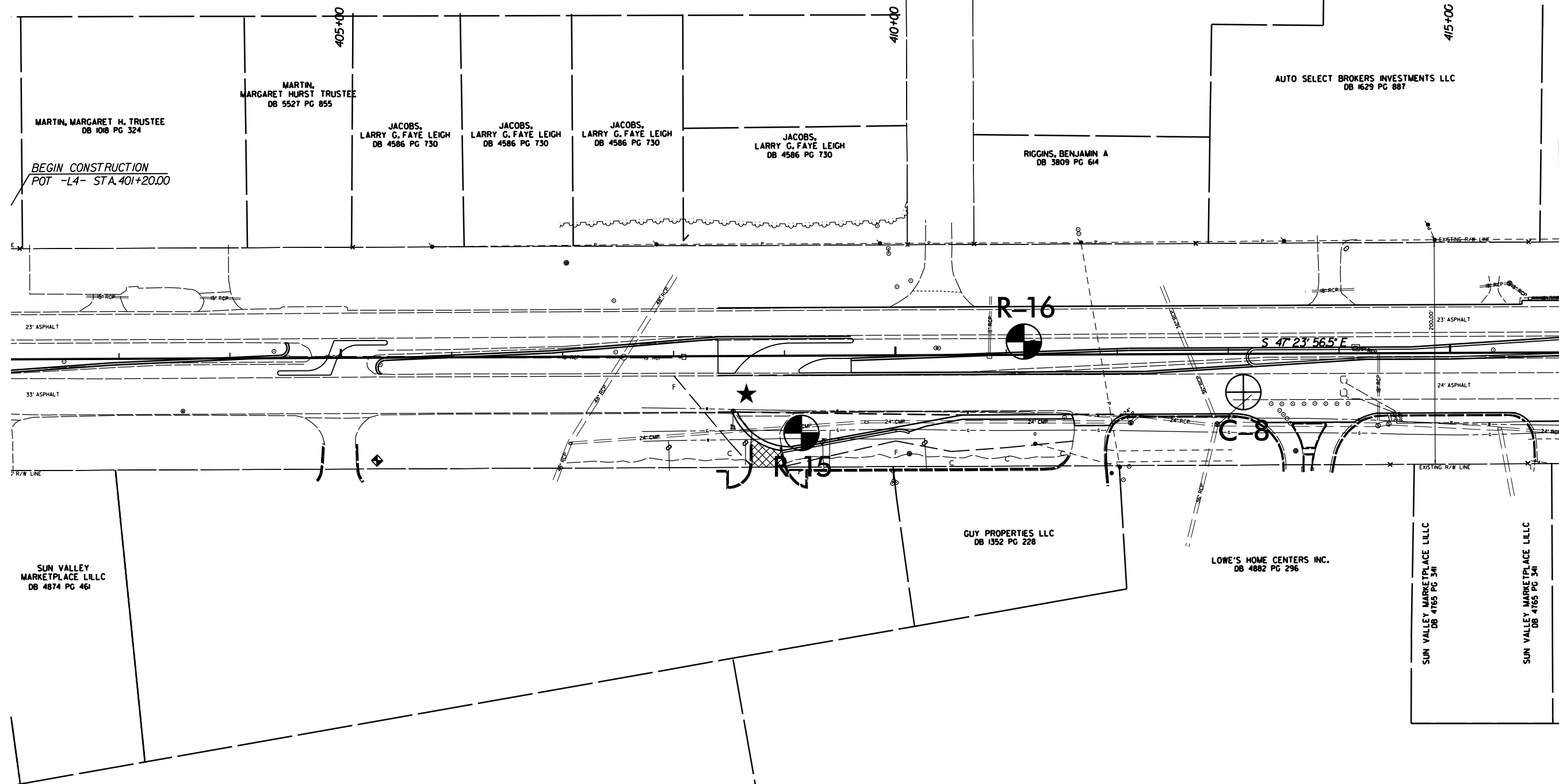
MATCH LINE -L3- STA. 314+00 SEE SHEET 9



REVISIONS

8/17/99  
 15-JUN-2016 09:04  
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PROJECT REFERENCE NO.	SHEET NO.
W-5520	11
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
<b>INCOMPLETE PLANS</b> DO NOT USE FOR R/W ACQUISITION	
<b>PRELIMINARY PLANS</b> DO NOT USE FOR CONSTRUCTION	

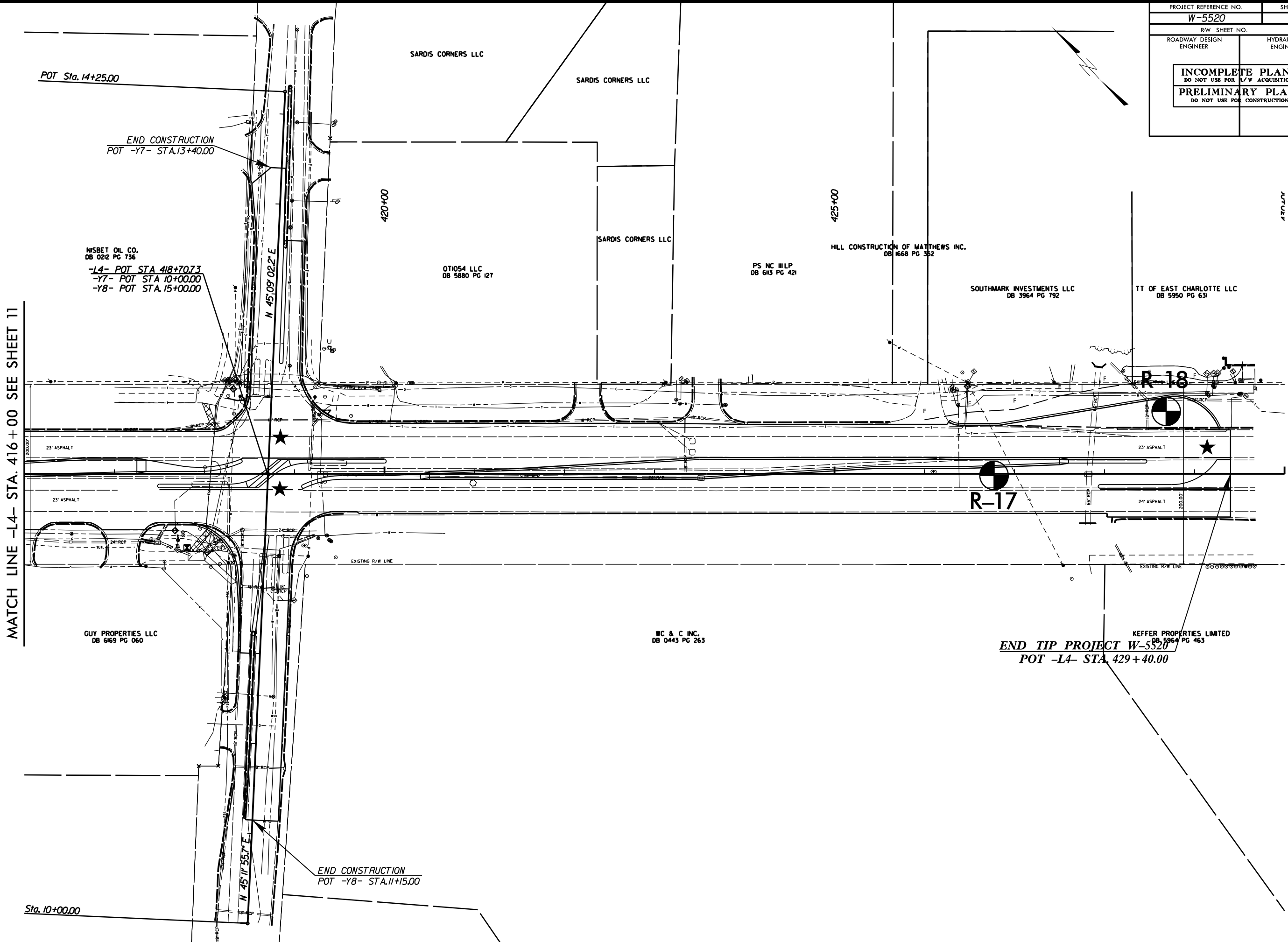


REVISIONS

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 8/17/99  
 11

POT  
00+01

PROJECT REFERENCE NO.	SHEET NO.
W-5520	12
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
<b>INCOMPLETE PLANS</b> DO NOT USE FOR R/W ACQUISITION <b>PRELIMINARY PLANS</b> DO NOT USE FOR CONSTRUCTION	



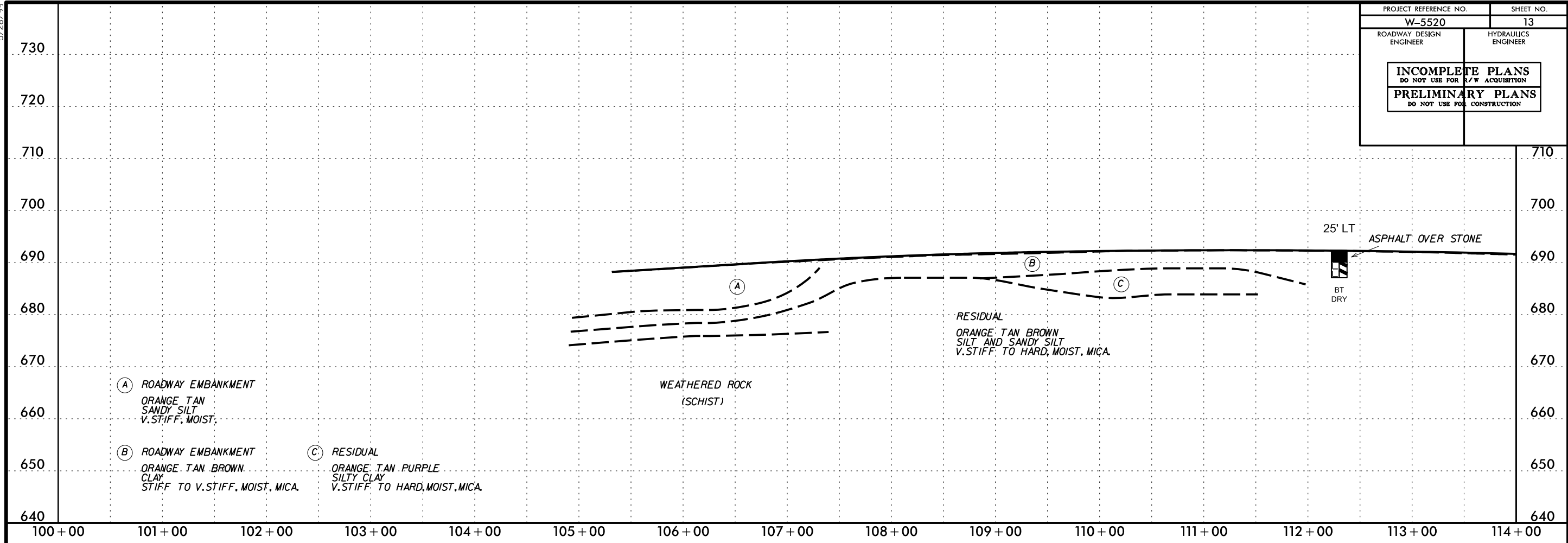
MATCH LINE -L4- STA. 416 + 00 SEE SHEET 11

REVISIONS

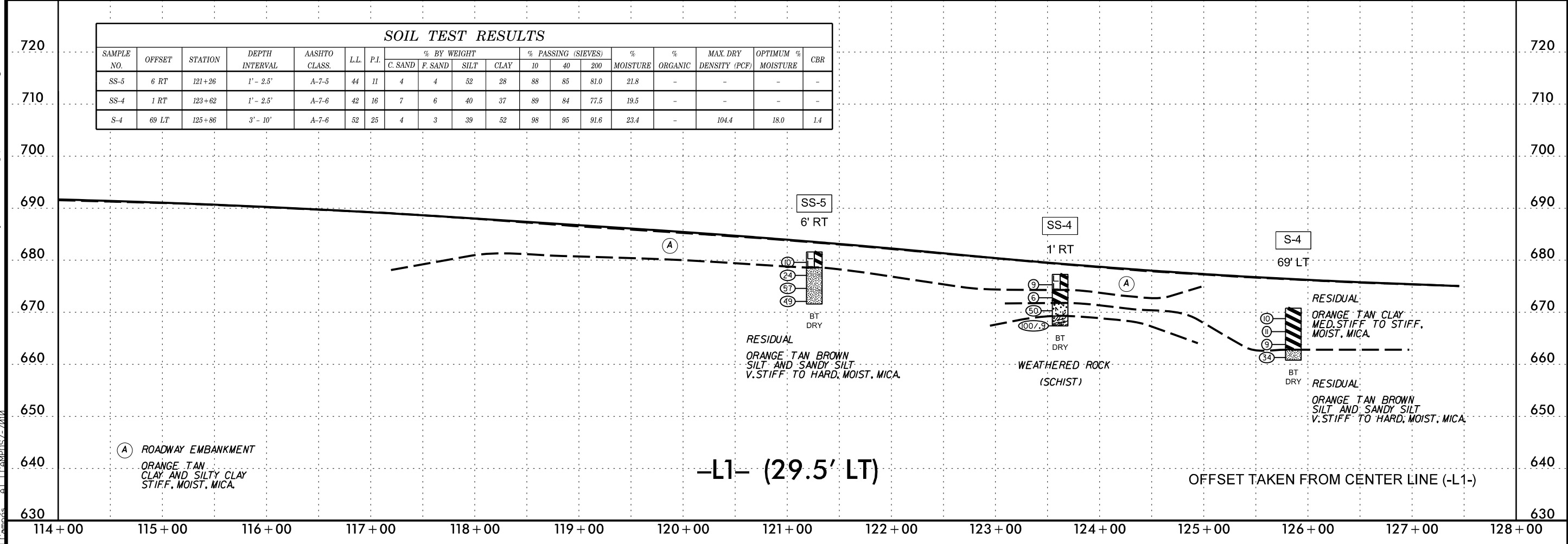
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 8/17/99

Sta. 10+00.00

**END TIP PROJECT W-5520**  
 POT -L4- STA. 429 + 40.00

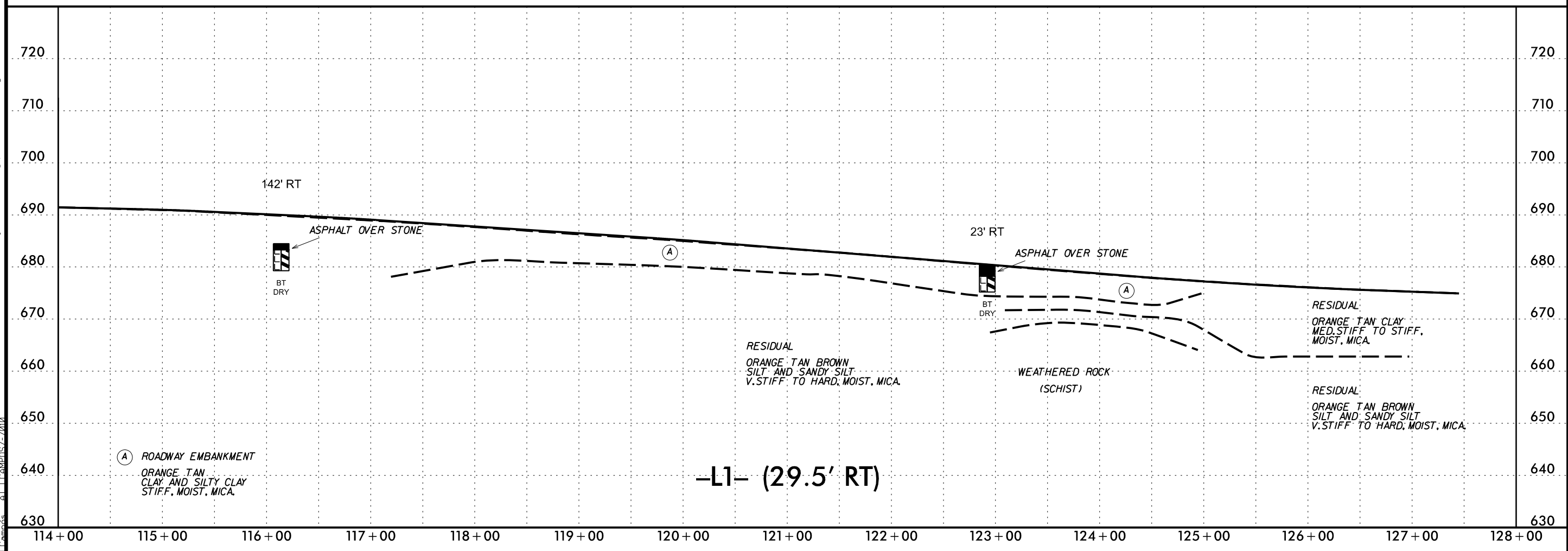
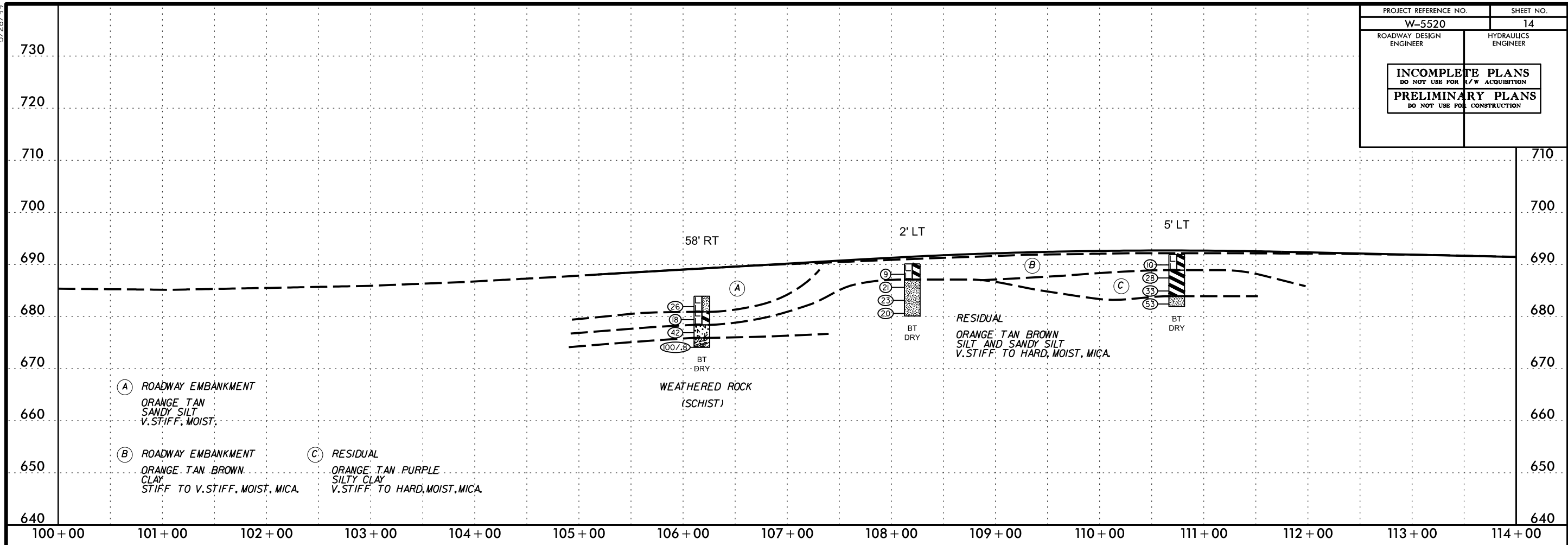


SOIL TEST RESULTS																		
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC	MAX DRY DENSITY (PCF)	OPTIMUM % MOISTURE	CBR
							C. SAND	F. SAND	SILT	CLAY	10	40	200					
SS-5	6 RT	121+26	1' - 2.5'	A-7-5	44	11	4	4	52	28	88	85	81.0	21.8	-	-	-	-
SS-4	1 RT	123+62	1' - 2.5'	A-7-6	42	16	7	6	40	37	89	84	77.5	19.5	-	-	-	-
S-4	69 LT	125+86	3' - 10'	A-7-6	52	25	4	3	39	52	98	95	91.6	23.4	-	104.4	18.0	1.4

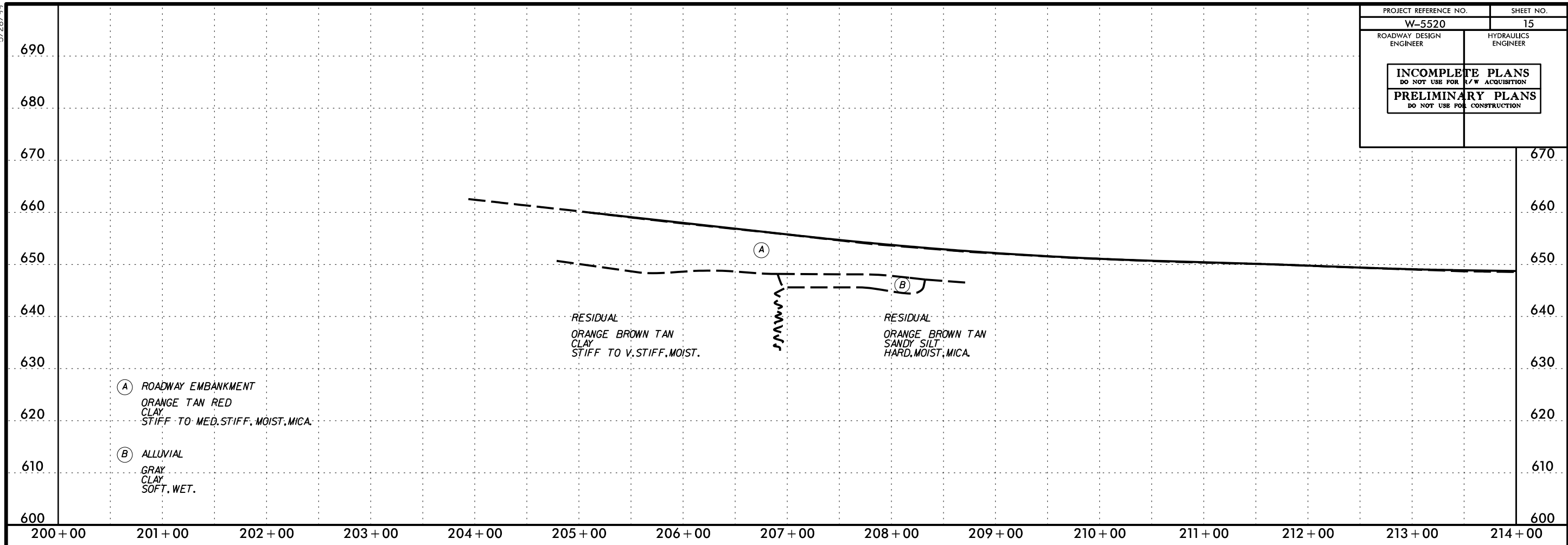


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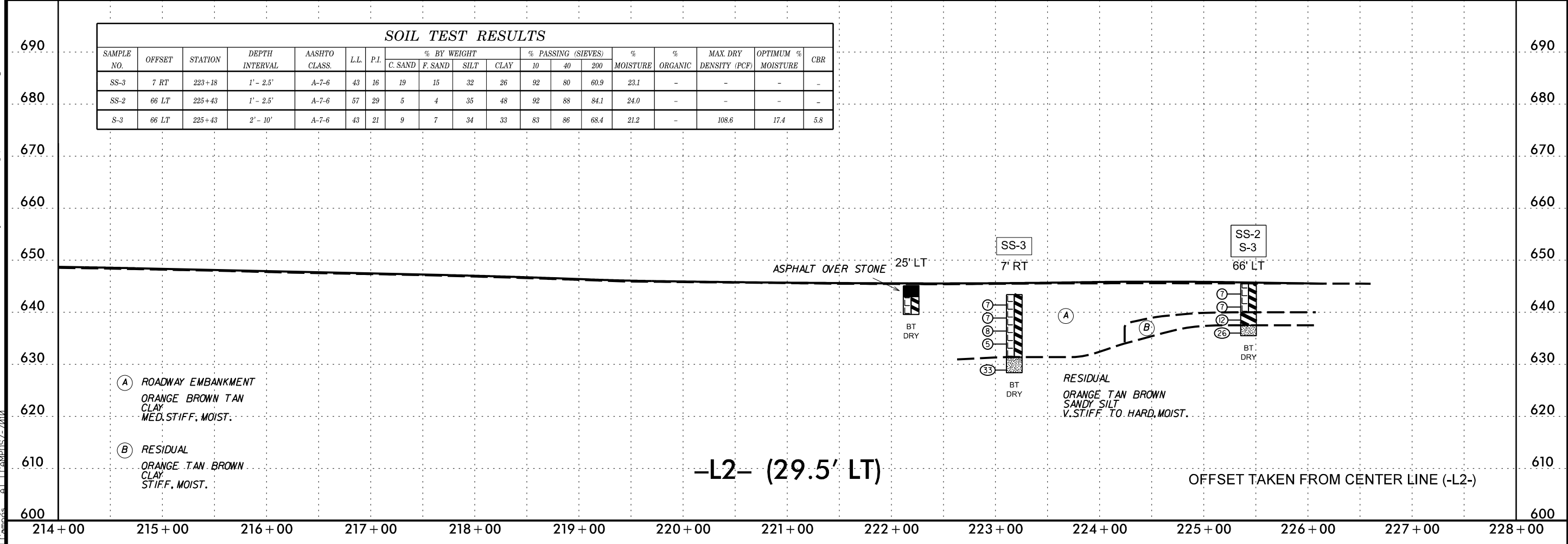
PROJECT REFERENCE NO.	SHEET NO.
W-5520	14
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
<b>INCOMPLETE PLANS</b> DO NOT USE FOR ACQUISITION	
<b>PRELIMINARY PLANS</b> DO NOT USE FOR CONSTRUCTION	



10 AUG 2016 11:55  
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 14-075 W-5520 US 74\CADD\_GEO\TECH\Project\W5520\_Rdy\_psh\_Inv\_14\_SWE.dgn



SOIL TEST RESULTS																		
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	LL	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC	MAX DRY DENSITY (PCF)	OPTIMUM % MOISTURE	CBR
							C. SAND	F. SAND	SILT	CLAY	10	40	200					
SS-3	7 RT	223+18	1' - 2.5'	A-7-6	43	16	19	15	32	26	92	80	60.9	23.1	-	-	-	-
SS-2	66 LT	225+43	1' - 2.5'	A-7-6	57	29	5	4	35	48	92	88	84.1	24.0	-	-	-	-
S-3	66 LT	225+43	2' - 10'	A-7-6	43	21	9	7	34	33	83	86	68.4	21.2	-	108.6	17.4	5.8



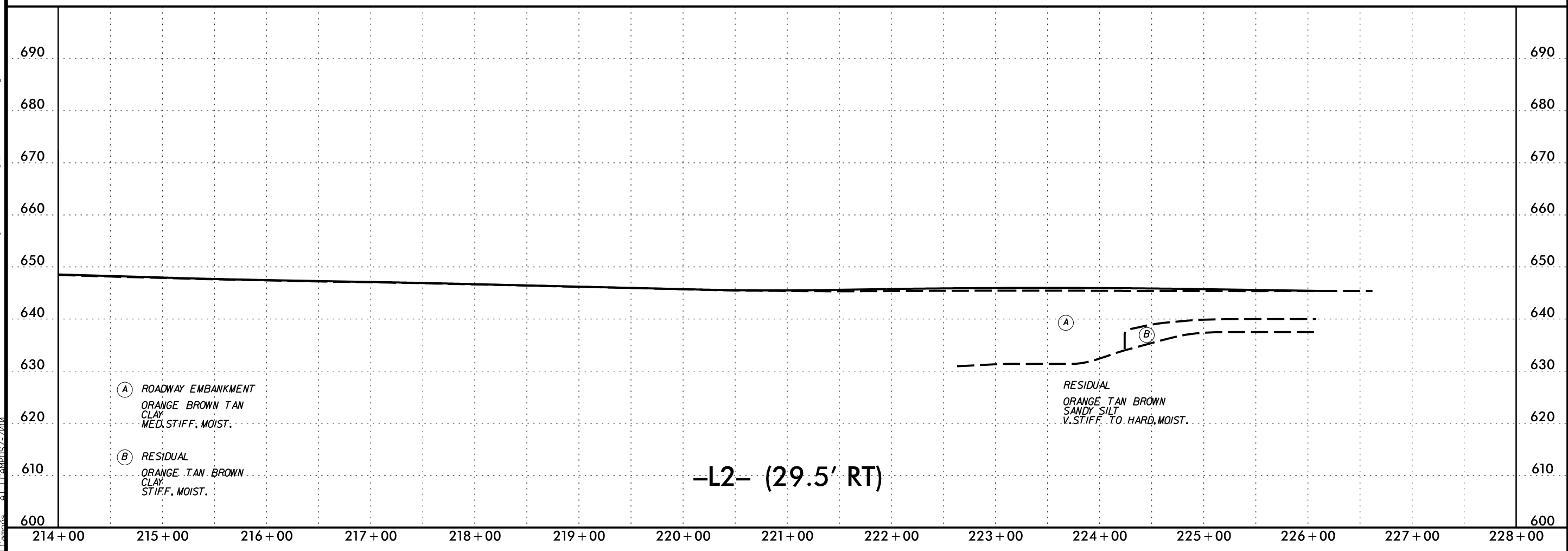
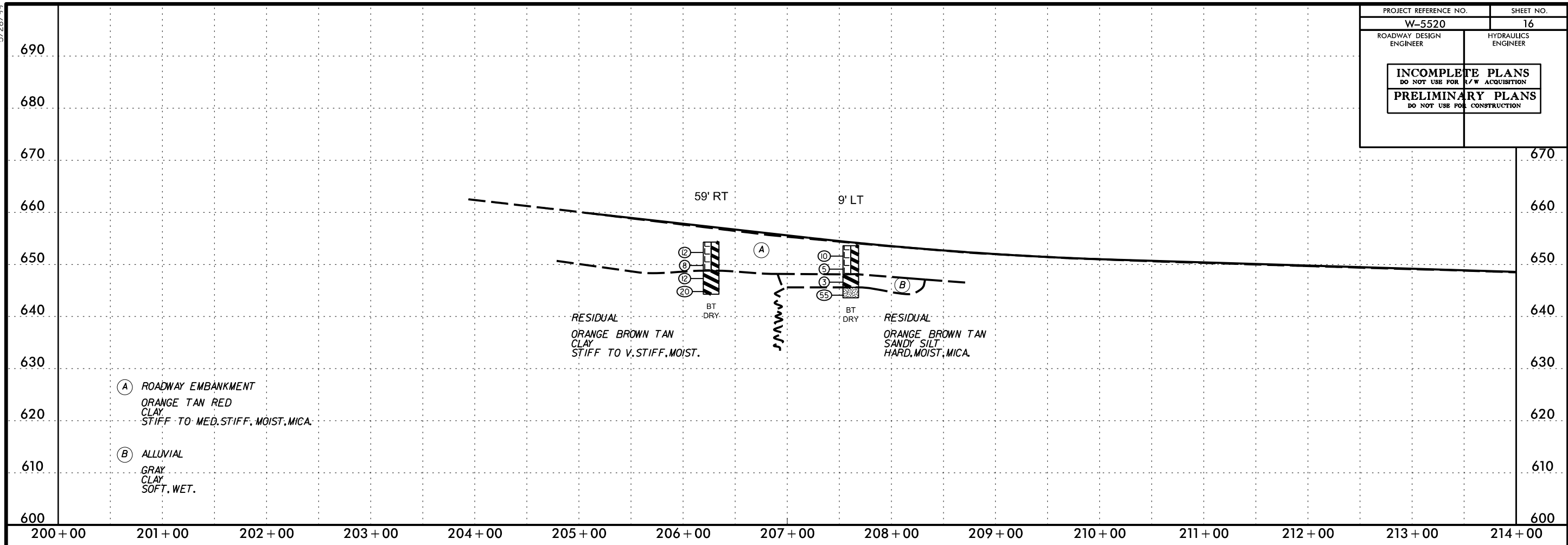
-L2- (29.5' LT)

OFFSET TAKEN FROM CENTER LINE (-L2-)

5/28/99  
 10 AUG 2016 12:04  
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 15. SWE.dgn  
 15. SWE.dgn

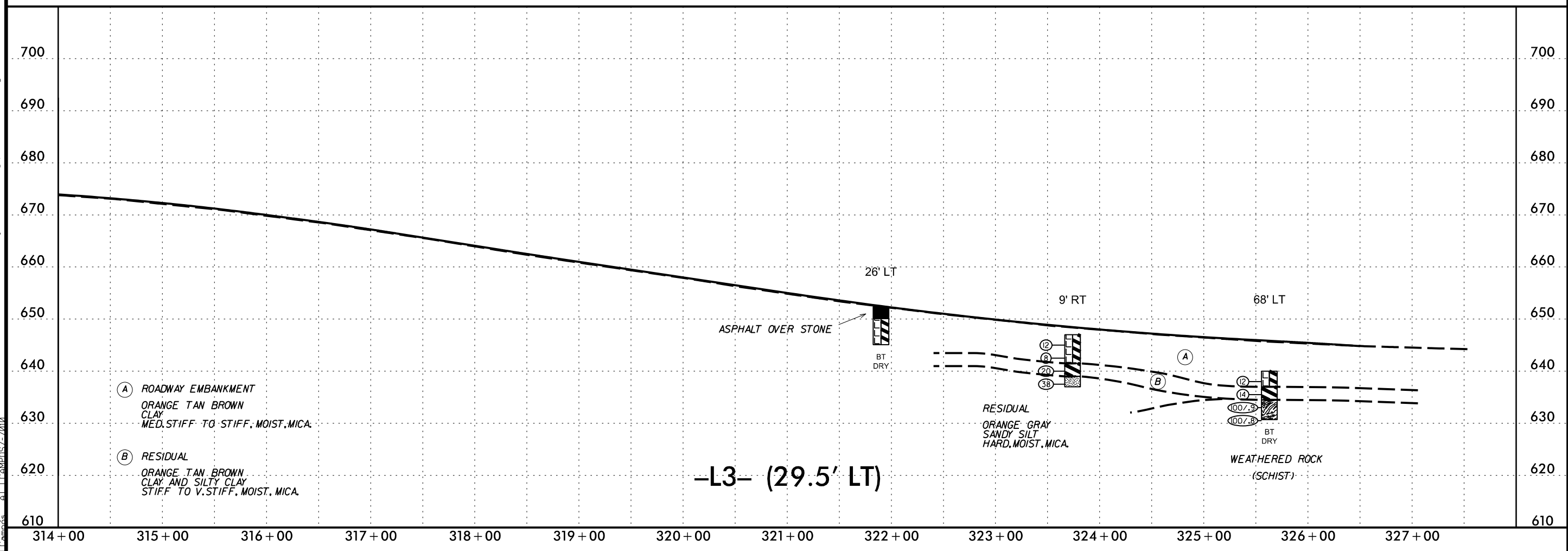
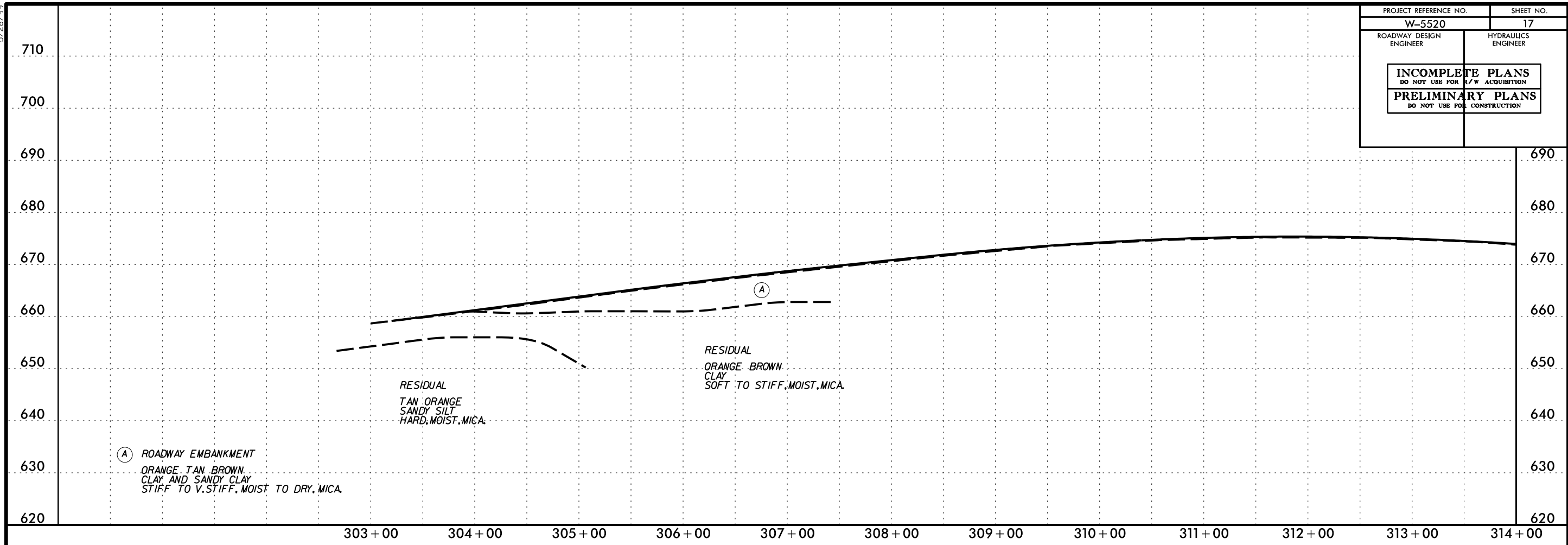


PROJECT REFERENCE NO.	SHEET NO.
W-5520	16
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
<b>INCOMPLETE PLANS</b> DO NOT USE FOR ACQUISITION	
<b>PRELIMINARY PLANS</b> DO NOT USE FOR CONSTRUCTION	



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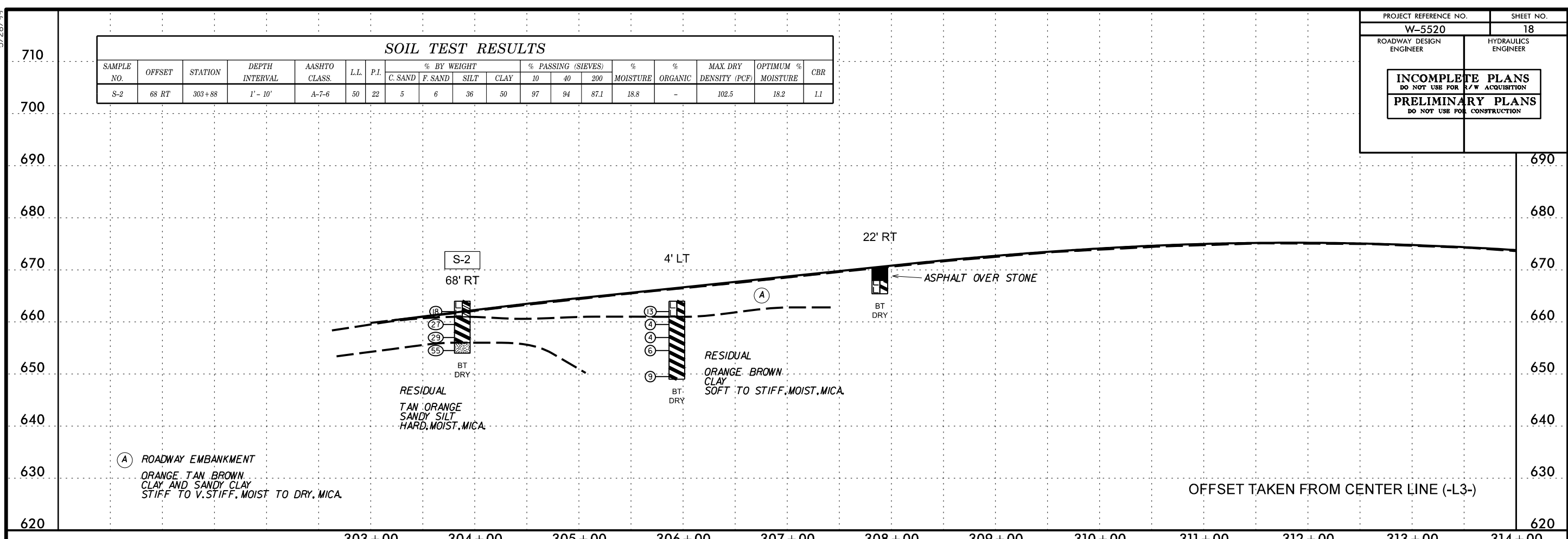
PROJECT REFERENCE NO.	SHEET NO.
W-5520	17
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
<b>INCOMPLETE PLANS</b> DO NOT USE FOR ACQUISITION	
<b>PRELIMINARY PLANS</b> DO NOT USE FOR CONSTRUCTION	



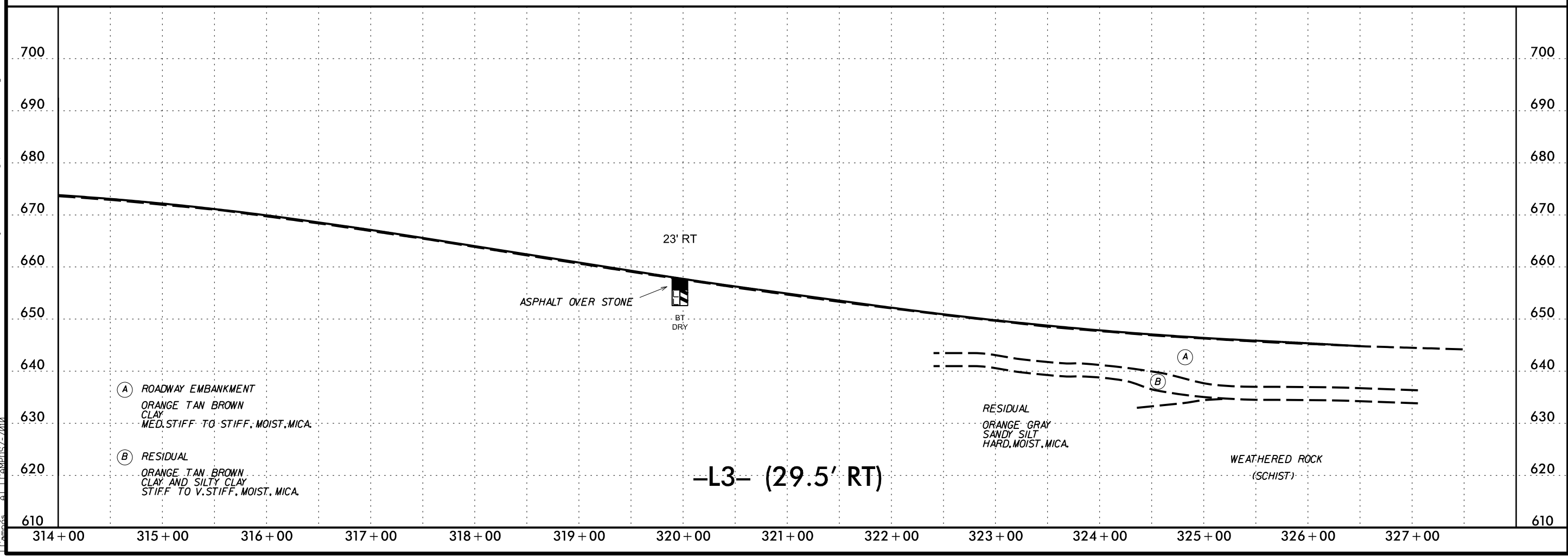
5/28/99

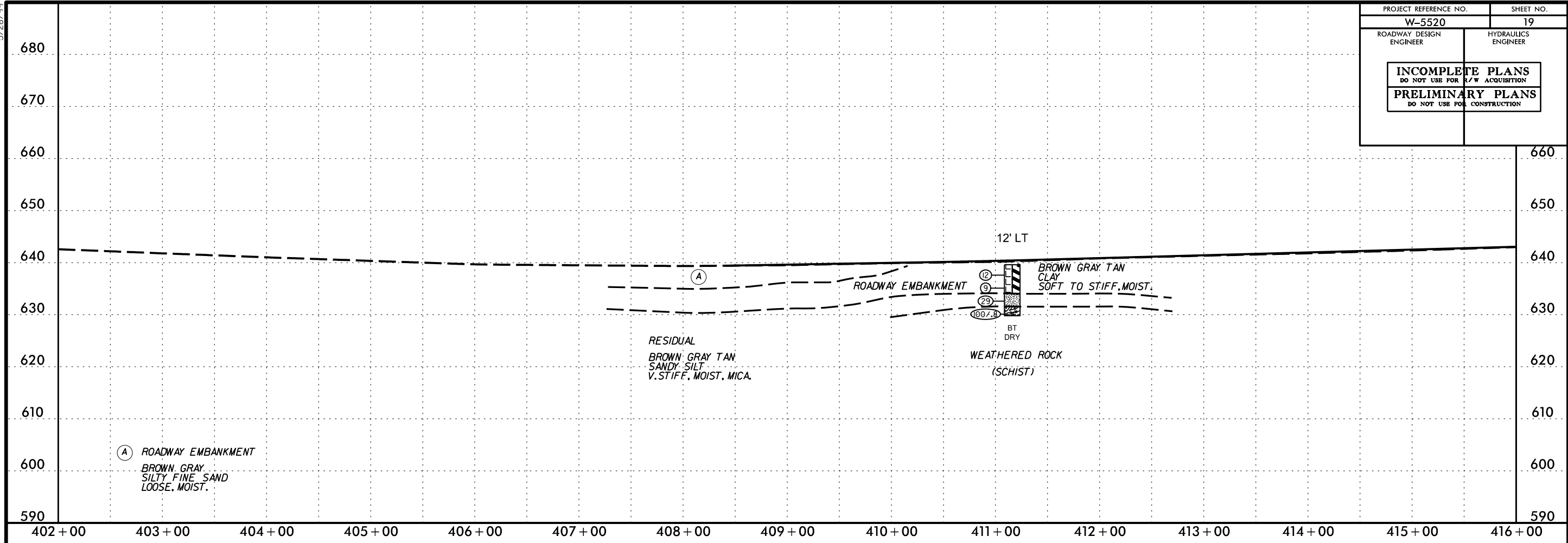
PROJECT REFERENCE NO.	SHEET NO.
W-5520	18
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
<b>INCOMPLETE PLANS</b> DO NOT USE FOR ACQUISITION <b>PRELIMINARY PLANS</b> DO NOT USE FOR CONSTRUCTION	

SOIL TEST RESULTS																		
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC	MAX DRY DENSITY (PCF)	OPTIMUM % MOISTURE	CBR
							C. SAND	F. SAND	SILT	CLAY	10	40	200					
S-2	68 RT	303+88	1' - 10'	A-7-6	50	22	5	6	36	50	97	94	87.1	18.8	-	102.5	18.2	L1

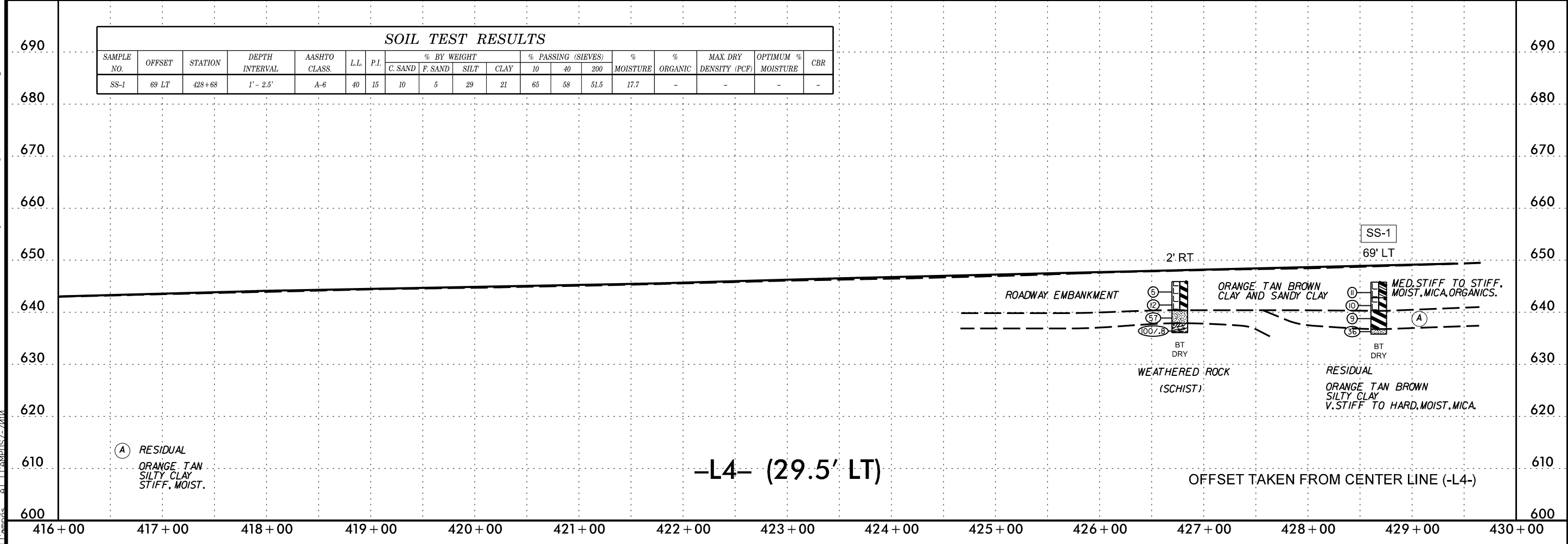


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 1335 AT CAMPUS 7-2010





SOIL TEST RESULTS																		
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	LL	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC	MAX DRY DENSITY (PCF)	OPTIMUM % MOISTURE	CBR
							C. SAND	F. SAND	SILT	CLAY	10	40	200					
SS-1	69 LT	428+68	1' - 2.5'	A-6	40	15	10	5	29	21	65	58	51.5	17.7	-	-	-	-

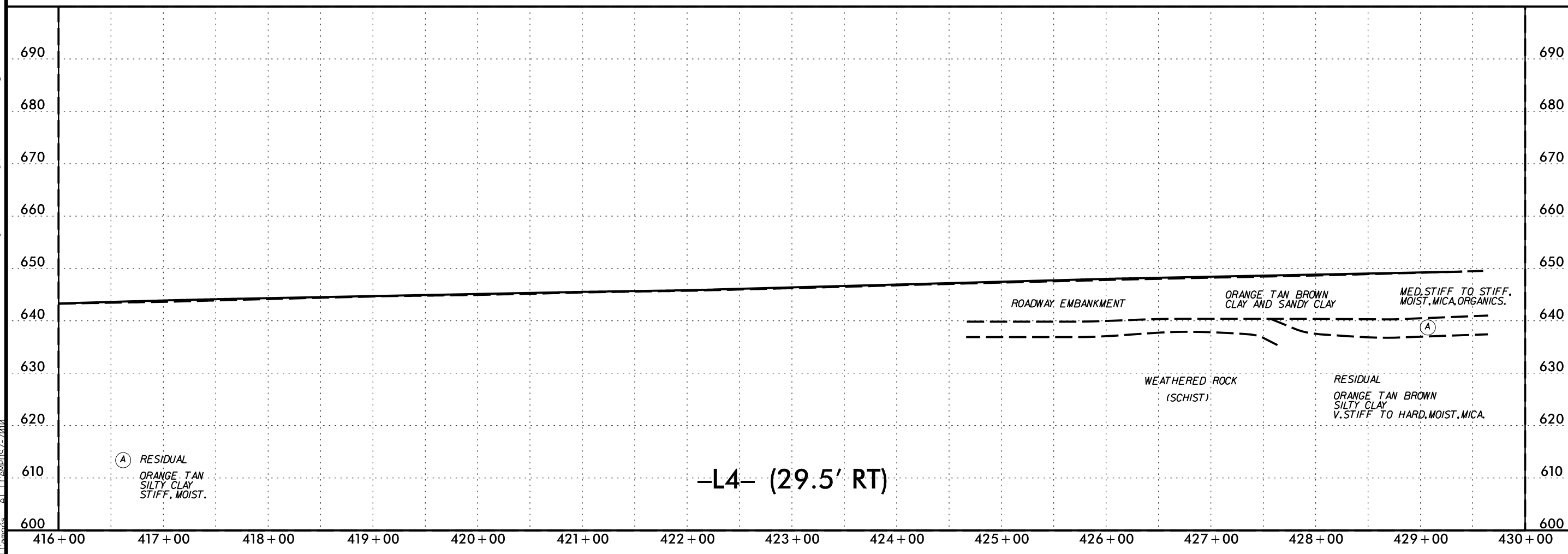
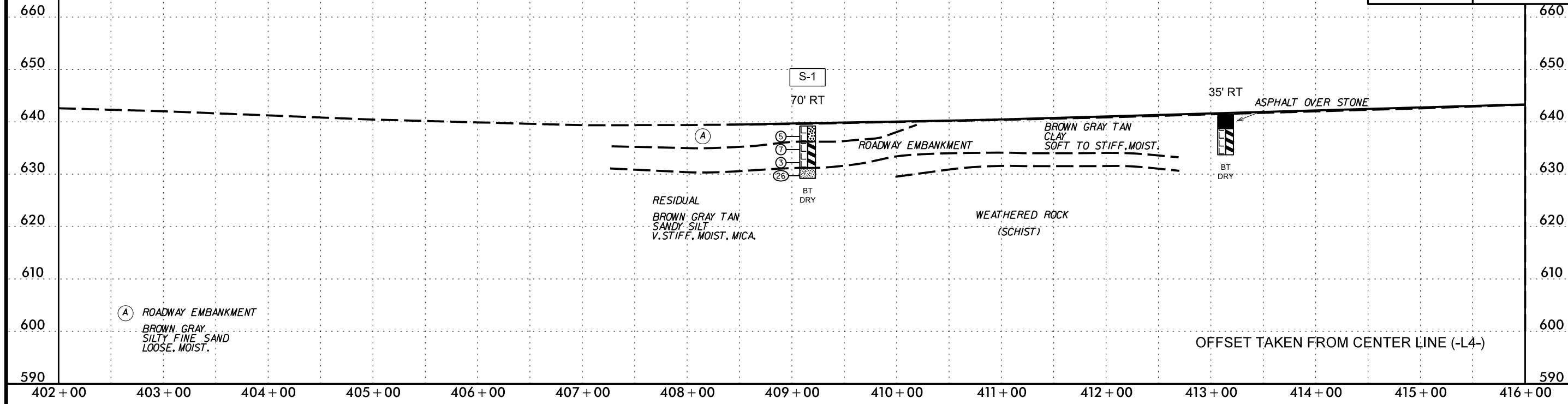


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 11/15/2016 10:00 AM

5/28/99

PROJECT REFERENCE NO.	SHEET NO.
W-5520	20
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
<b>INCOMPLETE PLANS</b> DO NOT USE FOR ACQUISITION <b>PRELIMINARY PLANS</b> DO NOT USE FOR CONSTRUCTION	

SOIL TEST RESULTS																		
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.L.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC	MAX. DRY DENSITY (PCF)	OPTIMUM % MOISTURE	CBR
							C. SAND	F. SAND	SILT	CLAY	10	40	200					
S-1	70 RT	409+15	1' - 10'	A-2-4	32	10	11	5	20	12	48	39	32.9	27.9	-	120.7	11.7	4.0



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**PAVEMENT INVESTIGATION DATA SHEET**

Project:	50092.1.FS1
TIP:	W-5520

Route:	US-74
County:	Union

Date:	8/26/2014
Notes By:	J. Wells

Position (Sta., Lane, Shldr.)	Cut/Fill (Est. of Amount)	Shoulder Width	Thickness									Pavement Structure Pavement Layering Description	Subgrade				Northing	Easting
			Offset Distance from white/yellow Line	Gross to Top of Soil	Nova Chip	Asphalt	Concrete	Stone	Stabilized Subgrade Soil	CTABC/Econocerte	Other		Description	AASHTO Classification	Soil Moisture	Auger Depth		
C-1 US 74 WB ISL -L1- Sta. 112+30 (25LT)				25.5"		15"		10.5"				asphalt over stone	roadway embankment orange red clay	A-7-6	M	5'	489,908	1,503,013
C-2 SR 1008 NB LTL Indian Trail-Fairview Road (-Y3-) -L1- Sta. 116+14 (142 RT)				13.5"		7"		6.5"				asphalt over stone	roadway embankment orange tan clay	A-7-6	M	5'	489,507	1,503,133
C-3 US 74 EB ISL -L1- Sta. 122+92 (23 RT)				26"		14"		12"				asphalt over stone	roadway embankment tan clay	A-7-6	M	5'	489,066	1,503,662
C-4 US 74 WB ISL -L2- Sta. 222+19 (25 LT)				24.5"		14.5"		10"				asphalt over stone	roadway embankment orange brown tan clay	A-7-6	M	5'	486,182	1,506,166
C-5 US 74 EB ISL -L3- Sta. 307+89 (22 RT)				28.5"		14.5"		14"				asphalt over stone	roadway embankment orange tan clay	A-7-6	M	5'	484,238	1,507,846
C-6 US 74 EB ISL -L3- Sta. 319+97 (23 RT)				25.25"		13.75"		11.5"				asphalt over stone	roadway embankment orange tan brown clay	A-7-6	M	5'	483,419	1,508,735
C-7 US 74 WB ISL -L3- Sta. 321+90 (26 LT)				27.5"		14.5"		13"				asphalt over stone	roadway embankment brown tan clay	A-7-6	M	5'	483,325	1,508,910
C-8 US 74 EB RTL -L4- Sta. 413+14 (35 RT)				32.5"		15.5"		17"				asphalt over stone	roadway embankment brown gray clay	A-7-6	M	5'	481,962	1,510,304

Notes:  
 OSL = Outside Lane      CTL = Center Turn Lane      OSS = Outside Shoulder      DEC = Deceleration Lane      GM = Grassed Median  
 ISL = Inside Lane      LTL = Left Turn Lane      ISS = Inside Shoulder  
 RTL = Right Turn Lane      PS = Paved Shoulder      ACC = Acceleration Lane      RE = Roadway Embankment Fill



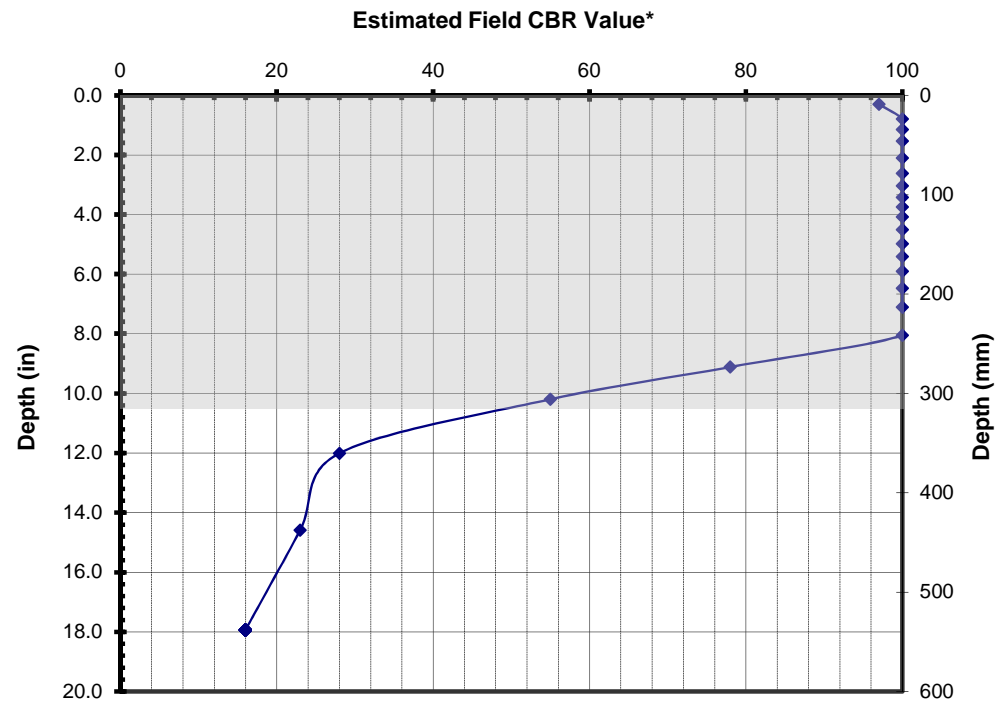
### KESSLER DCP TEST RESULTS

**Project Name:** W 5520 US-74      **Northing:** 489908  
**S&ME Project No.:** 1335-14-075      **Easting:** 1503013  
**Line:** -L1-  
**Station:** 112+30      **Personnel:** JERW  
**Offset:** 25 (Lt.)      **Date:** 8/22/2014  
**Test Location:** C-1  
**Thickness of Stone (in):** 10.5

Test Data	
No. of Blows	Cummulative Penetration (mm)
4	15
4	25
4	33
10	45
10	62
10	71
10	83
10	91
10	99
10	108
10	121
10	132
10	143
10	157
10	172
10	189
10	220
5	243
5	275
5	335
5	406
5	505

CBR - DCP Correlation for Soil Subgrade	
<input checked="" type="radio"/>	North Carolina Department of Transportation (Shin, et al 1989)
<input type="radio"/>	U.S. Army Corps of Engineers (Webster, et al 1992)
<input type="radio"/>	Piedmont Residual Soils (Coonse 1999)

Test Summary			
Stone		Soil Subgrade	
# Values	19	# Values	3
Average CBR	96	Average CBR	22
Weighted Average	93	Weighted Average	21
Max CBR	100	Max CBR	28
Min CBR	55	Min CBR	16



\* Stone Field CBR estimated using published NCDOT relationship. Subgrade Field CBR estimated using relationship indicated above.



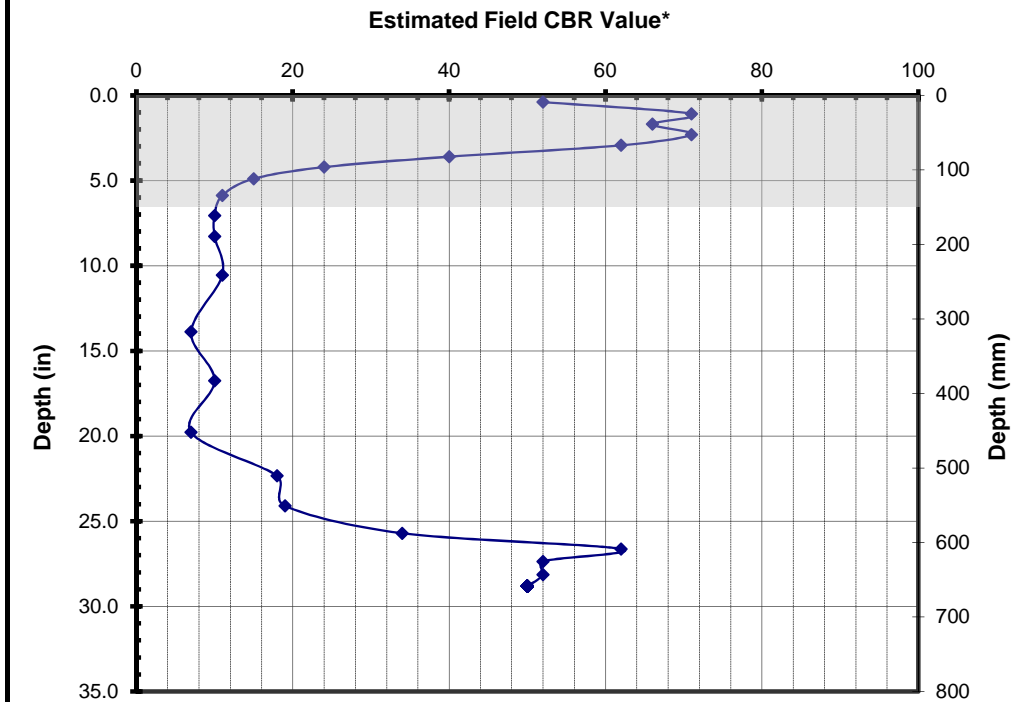
### KESSLER DCP TEST RESULTS

**Project Name:** W 5520 US-74      **Northing:** 489507  
**S&ME Project No.:** 1335-14-075      **Easting:** 1503133  
**Line:** -L1-  
**Station:** 116+14      **Personnel:** JERW  
**Offset:** 142 (Rt.)      **Date:** 8/22/2014  
**Test Location:** C-2  
**Thickness of Stone (in):** 6.5

Test Data	
No. of Blows	Cummulative Penetration (mm)
3	20
3	35
3	51
3	66
3	83
2	100
1	114
1	135
1	164
1	195
1	226
3	310
2	395
2	456
2	549
2	586
3	638
3	668
3	685
3	705
3	725
2	739

CBR - DCP Correlation for Soil Subgrade	
<input checked="" type="radio"/>	North Carolina Department of Transportation (Shin, et al 1989)
<input type="radio"/>	U.S. Army Corps of Engineers (Webster, et al 1992)
<input type="radio"/>	Piedmont Residual Soils (Coonse 1999)

Test Summary			
Stone		Soil Subgrade	
# Values	9	# Values	13
Average CBR	46	Average CBR	26
Weighted Average	42	Weighted Average	17
Max CBR	71	Max CBR	62
Min CBR	11	Min CBR	7



\* Stone Field CBR estimated using published NCDOT relationship. Subgrade Field CBR estimated using relationship indicated above.



### KESSLER DCP TEST RESULTS

Project Name: W 5520 US-74  
S&ME Project No.: 1335-14-075

Northing: 489066  
Easting: 1503662

Test Location: C-3  
Thickness of Stone (in): 12

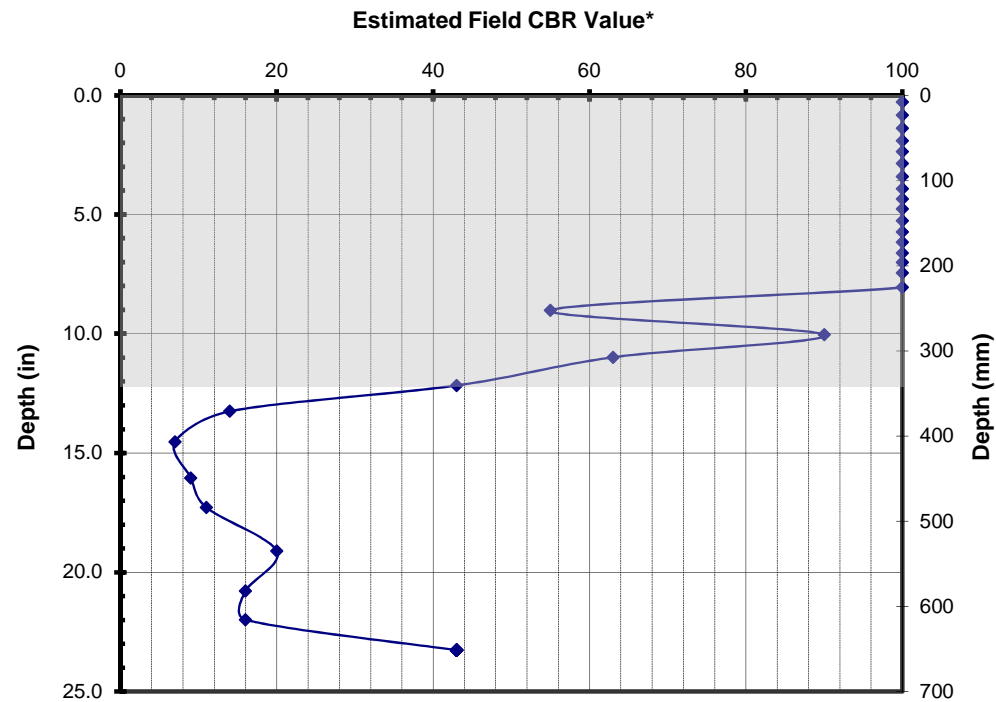
Line: -L1-  
Station: 122+92  
Offset: 23 (Rt.)

Personnel: JERW  
Date: 8/20/2014

Test Data	
No. of Blows	Cummulative Penetration (mm)
5	14
5	28
5	42
5	55
5	65
5	80
5	93
5	106
5	115
5	127
5	140
5	151
5	162
5	174
5	182
5	196
5	213
5	245
5	265
5	293
4	325
1	348
1	390
1	425
1	453
4	518
1	538
2	579
3	603

CBR - DCP Correlation for Soil Subgrade	
<input checked="" type="radio"/>	North Carolina Department of Transportation (Shin, et al 1989)
<input type="radio"/>	U.S. Army Corps of Engineers (Webster, et al 1992)
<input type="radio"/>	Piedmont Residual Soils (Coonse 1999)

Test Summary			
Stone		Soil Subgrade	
# Values	20	# Values	9
Average CBR	95	Average CBR	20
Weighted Average	91	Weighted Average	19
Max CBR	100	Max CBR	43
Min CBR	55	Min CBR	7



\* Stone Field CBR estimated using published NCDOT relationship.  
Subgrade Field CBR estimated using relationship indicated above.



### KESSLER DCP TEST RESULTS

Project Name: W 5520 US-74  
S&ME Project No.: 1335-14-075

Northing: 486183  
Easting: 1506166

Test Location: C-4  
Thickness of Stone (in): 10

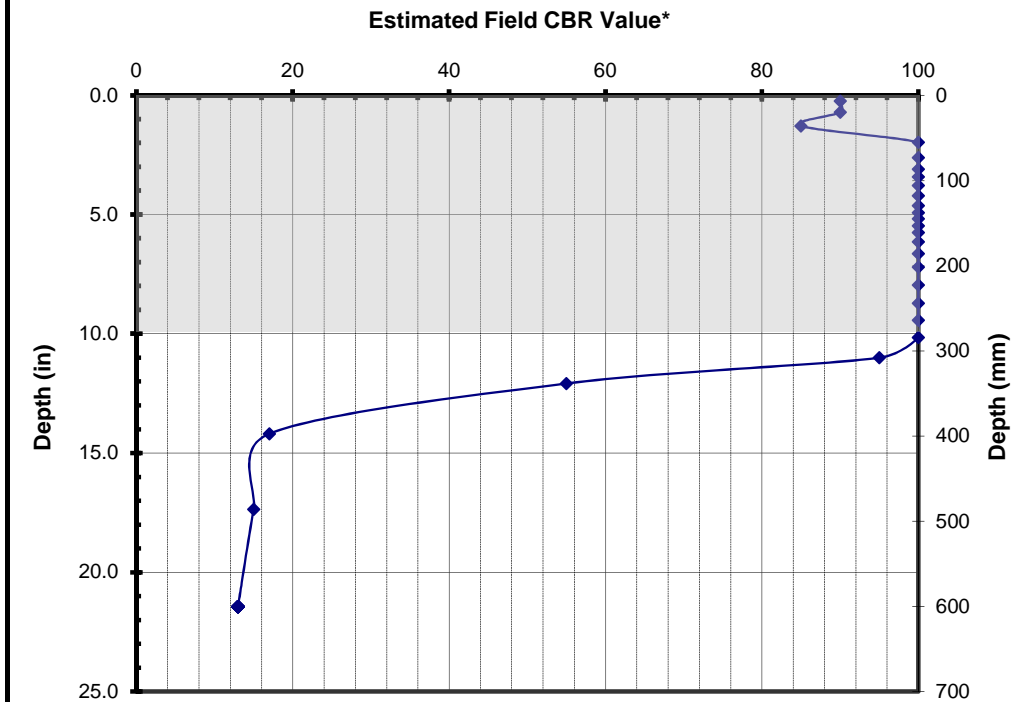
Line: -L2-  
Station: 222+19  
Offset: 25 (Lt.)

Personnel: JERW  
Date: 8/20/2014

Test Data	
No. of Blows	Cummulative Penetration (mm)
3	12
3	24
4	41
9	59
5	74
5	83
5	91
5	101
5	113
5	122
5	128
5	135
5	143
5	149
8	163
8	174
8	192
8	212
8	231
8	248
8	268
6	291
5	323
4	398
4	484
5	605

CBR - DCP Correlation for Soil Subgrade	
<input checked="" type="radio"/>	North Carolina Department of Transportation (Shin, et al 1989)
<input type="radio"/>	U.S. Army Corps of Engineers (Webster, et al 1992)
<input type="radio"/>	Piedmont Residual Soils (Coonse 1999)

Test Summary			
Stone		Soil Subgrade	
# Values	20	# Values	6
Average CBR	98	Average CBR	49
Weighted Average	98	Weighted Average	28
Max CBR	100	Max CBR	100
Min CBR	85	Min CBR	13



\* Stone Field CBR estimated using published NCDOT relationship.  
Subgrade Field CBR estimated using relationship indicated above.





**KESSLER DCP TEST RESULTS**

Project Name: W 5520 US-74  
S&ME Project No.: 1335-14-075

Northing: 484238  
Easting: 1507846

Test Location: C-5  
Thickness of Stone (in): 14

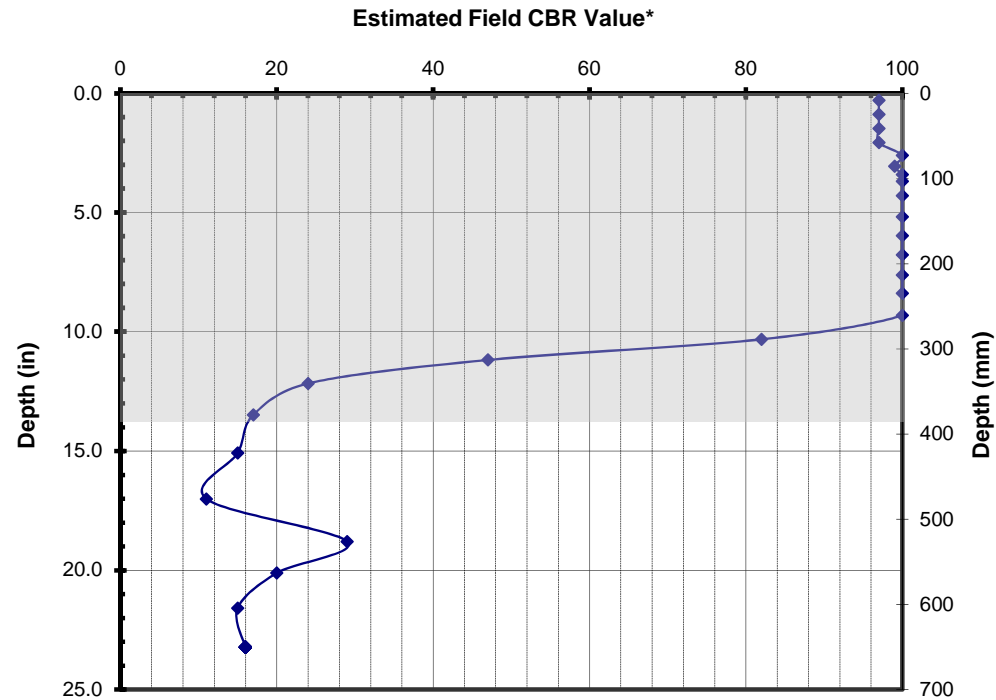
Line: -L3-  
Station: 307+89  
Offset: 22 (Rt.)

Personnel: JERW  
Date: 8/20/2014

Test Data	
No. of Blows	Cummulative Penetration (mm)
4	15
4	30
4	45
4	60
4	72
3	83
4	90
3	97
10	121
10	142
10	161
10	183
10	204
10	222
10	251
5	273
3	295
2	323
2	362
2	404
2	460
3	495
2	527
2	570
2	610

CBR - DCP Correlation for Soil Subgrade	
<input checked="" type="radio"/>	North Carolina Department of Transportation (Shin, et al 1989)
<input type="radio"/>	U.S. Army Corps of Engineers (Webster, et al 1992)
<input type="radio"/>	Piedmont Residual Soils (Coonse 1999)

Test Summary			
Stone		Soil Subgrade	
# Values	19	# Values	6
Average CBR	87	Average CBR	18
Weighted Average	80	Weighted Average	17
Max CBR	100	Max CBR	29
Min CBR	17	Min CBR	11



\* Stone Field CBR estimated using published NCDOT relationship.  
Subgrade Field CBR estimated using relationship indicated above.



**KESSLER DCP TEST RESULTS**

Project Name: W 5520 US-74  
S&ME Project No.: 1335-14-075

Northing: 483419  
Easting: 1508735

Test Location: C-6  
Thickness of Stone (in): 11.5

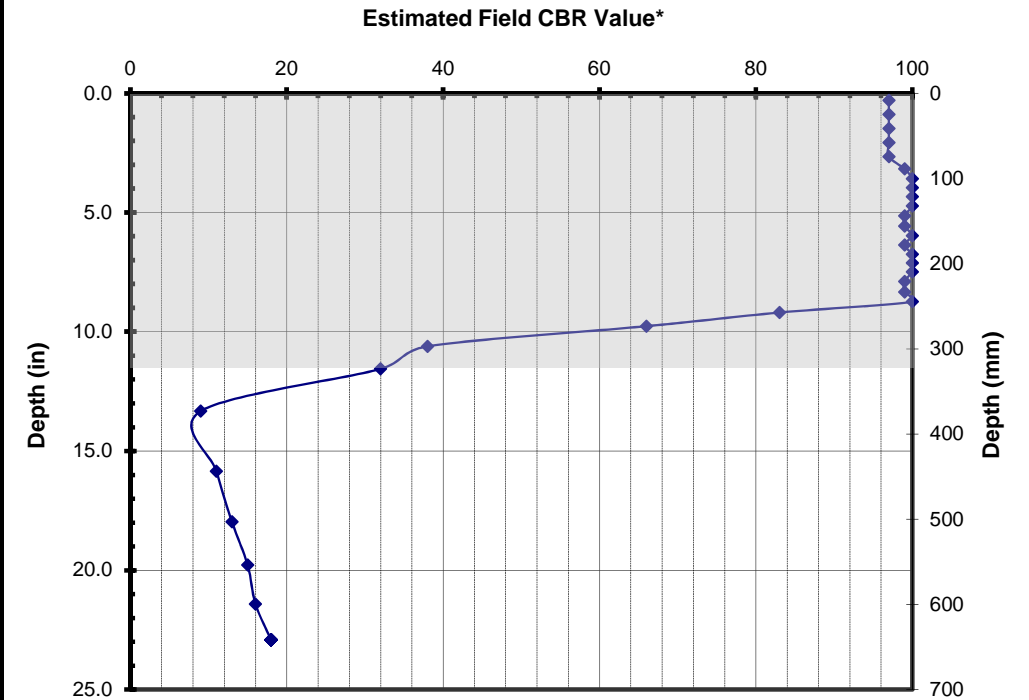
Line: -L3-  
Station: 319+98  
Offset: 23 (Rt.)

Personnel: JERW  
Date: 8/20/2014

Test Data	
No. of Blows	Cummulative Penetration (mm)
4	15
4	30
4	45
4	60
4	75
3	86
3	96
3	105
3	115
3	125
3	136
3	147
3	156
3	167
3	176
3	185
3	195
3	206
3	217
3	227
3	240
3	256
3	283
2	304
2	373
2	432
2	481
2	524
2	564
2	600

CBR - DCP Correlation for Soil Subgrade	
<input checked="" type="radio"/>	North Carolina Department of Transportation (Shin, et al 1989)
<input type="radio"/>	U.S. Army Corps of Engineers (Webster, et al 1992)
<input type="radio"/>	Piedmont Residual Soils (Coonse 1999)

Test Summary			
Stone		Soil Subgrade	
# Values	23	# Values	7
Average CBR	94	Average CBR	16
Weighted Average	90	Weighted Average	14
Max CBR	100	Max CBR	32
Min CBR	38	Min CBR	9



\* Stone Field CBR estimated using published NCDOT relationship.  
Subgrade Field CBR estimated using relationship indicated above.



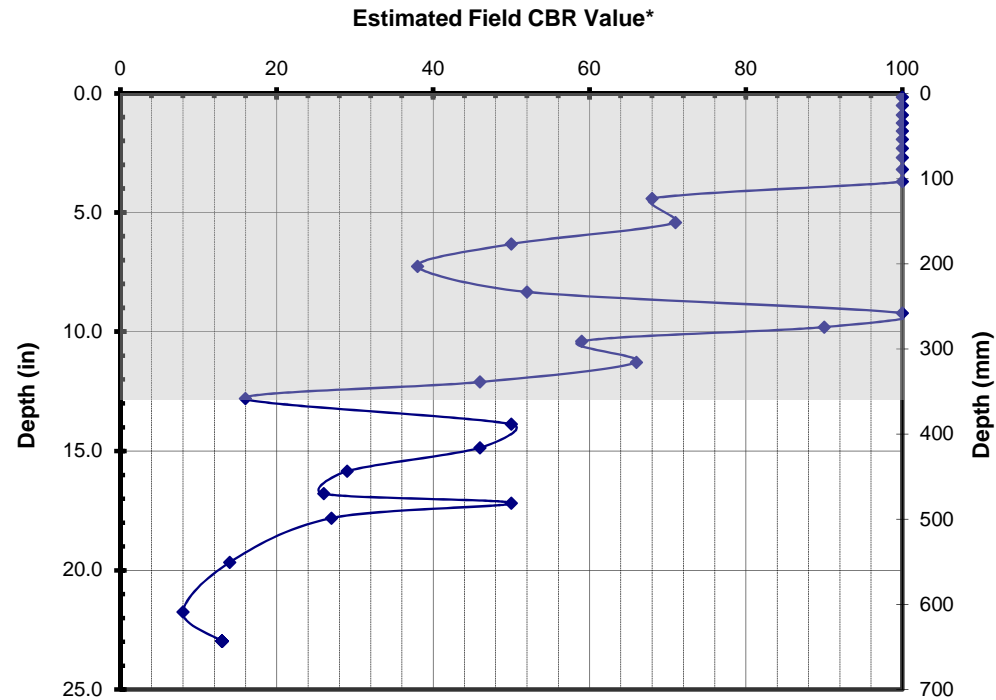
### KESSLER DCP TEST RESULTS

**Project Name:** W 5520 US-74      **Northing:** 483325  
**S&ME Project No.:** 1335-14-075      **Easting:** 1508910  
**Line:** -L3-  
**Station:** 321+90      **Personnel:** JERW  
**Offset:** 26 (Lt.)      **Date:** 8/19/2014  
**Test Location:** C-7  
**Thickness of Stone (in):** 13

Test Data	
No. of Blows	Cummulative Penetration (mm)
4	8
4	18
4	28
4	35
4	45
4	53
5	64
5	73
5	89
5	99
5	125
5	150
3	171
3	198
4	225
5	243
3	255
3	273
5	300
2	315
1	335
5	370
2	385
3	420
1	433
1	440
2	465
3	534
1	571
1	596

CBR - DCP Correlation for Soil Subgrade	
<input checked="" type="radio"/>	North Carolina Department of Transportation (Shin, et al 1989)
<input type="radio"/>	U.S. Army Corps of Engineers (Webster, et al 1992)
<input type="radio"/>	Piedmont Residual Soils (Coonse 1999)

Test Summary			
Stone		Soil Subgrade	
# Values	21	# Values	9
Average CBR	79	Average CBR	29
Weighted Average	71	Weighted Average	25
Max CBR	100	Max CBR	50
Min CBR	16	Min CBR	8



\* Stone Field CBR estimated using published NCDOT relationship.  
 Subgrade Field CBR estimated using relationship indicated above.



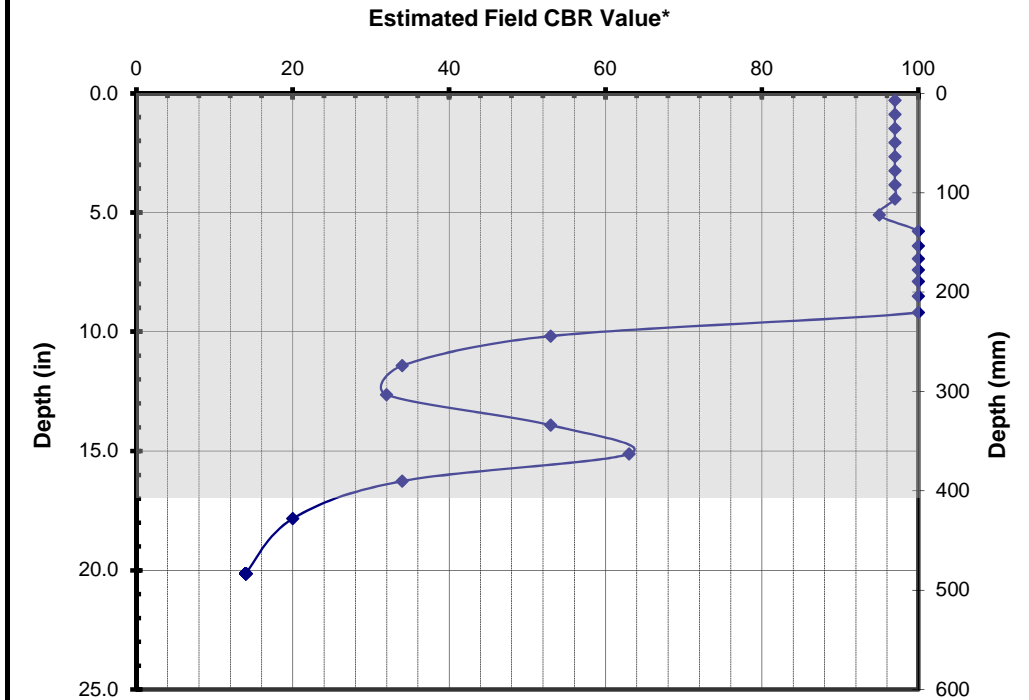
### KESSLER DCP TEST RESULTS

**Project Name:** W-5520 (US-74)      **Northing:** 481962  
**S&ME Project No.:** 1335-14-075      **Easting:** 1510304  
**Line:** -L4-  
**Station:** 413+14      **Personnel:** JERW  
**Offset:** 35 (Rt.)      **Date:** 8/18/2014  
**Test Location:** C-8  
**Thickness of Stone (in):** 17

Test Data	
No. of Blows	Cummulative Penetration (mm)
4	15
4	30
4	45
4	60
4	75
4	90
4	105
4	120
5	139
5	155
5	170
5	182
5	194
5	207
5	225
5	242
5	275
3	305
3	337
5	370
5	398
3	428
3	478
3	545

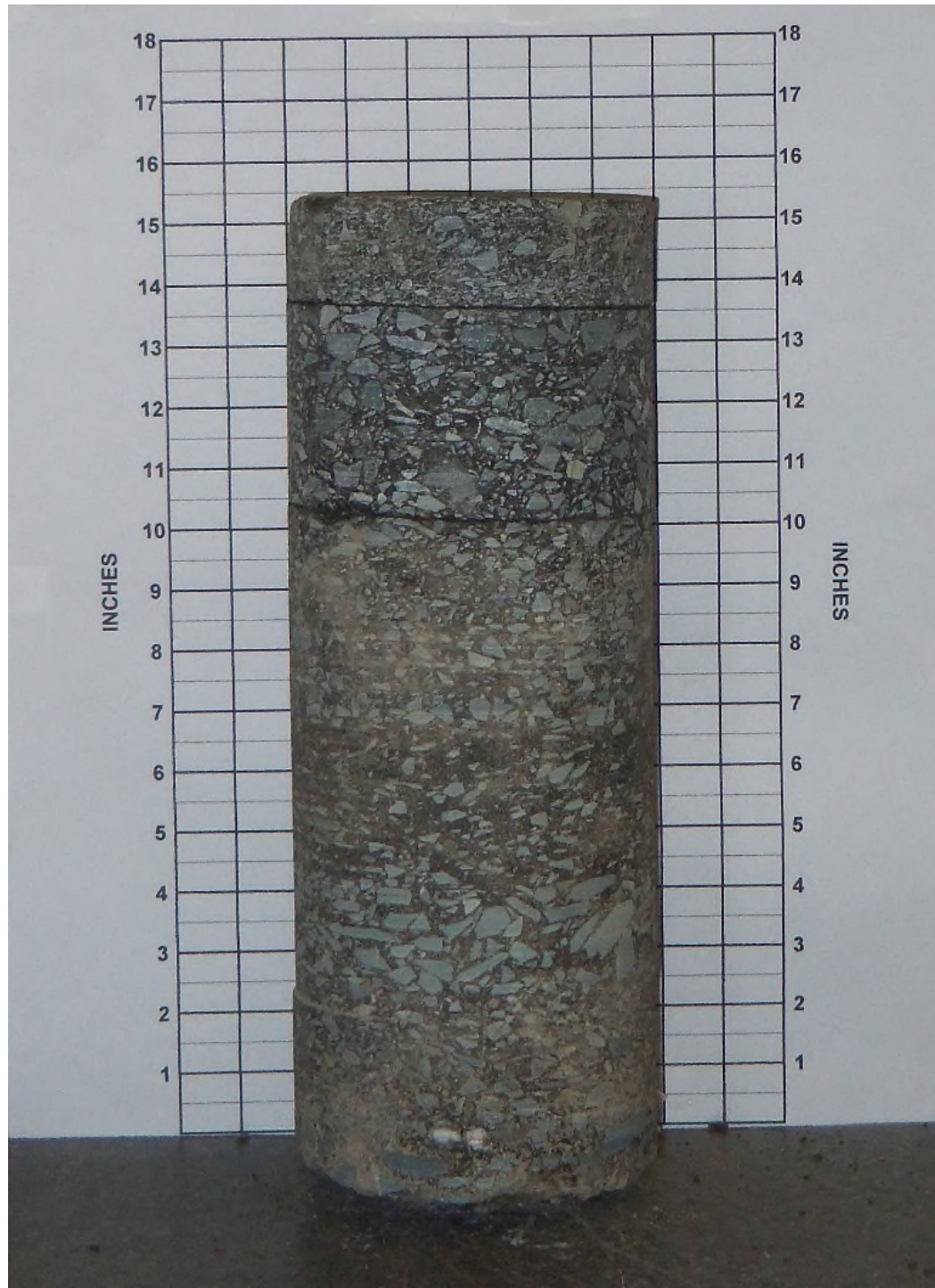
CBR - DCP Correlation for Soil Subgrade	
<input checked="" type="radio"/>	North Carolina Department of Transportation (Shin, et al 1989)
<input type="radio"/>	U.S. Army Corps of Engineers (Webster, et al 1992)
<input type="radio"/>	Piedmont Residual Soils (Coonse 1999)

Test Summary			
Stone		Soil Subgrade	
# Values	22	# Values	2
Average CBR	84	Average CBR	17
Weighted Average	75	Weighted Average	17
Max CBR	100	Max CBR	20
Min CBR	32	Min CBR	14



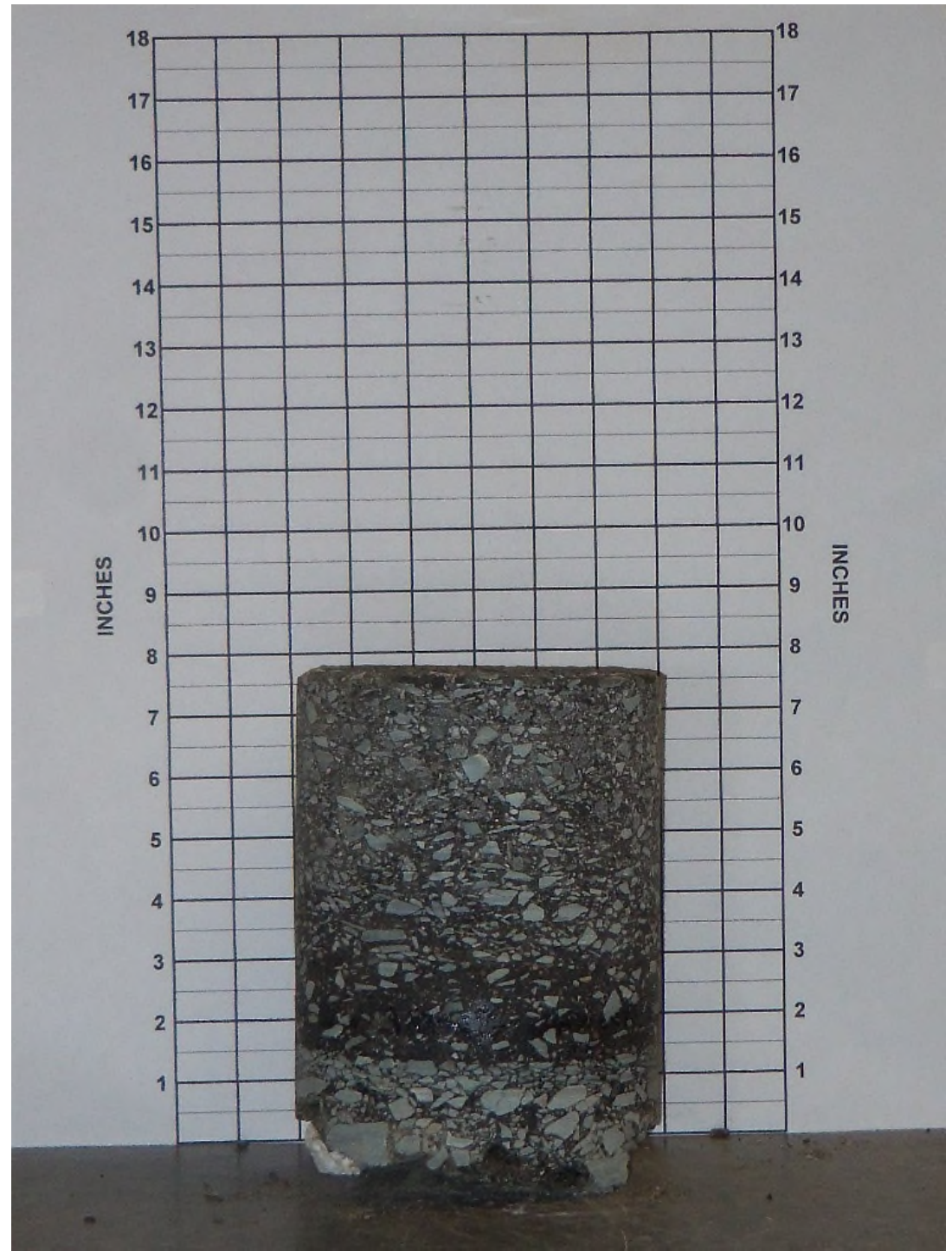
\* Stone Field CBR estimated using published NCDOT relationship.  
 Subgrade Field CBR estimated using relationship indicated above.

**Test Location:** C-1 Westbound Inside Lane (US 74)  
 N: 489908, E: 1503013  
 -L1- Sta. 112+30 (25' Lt.)



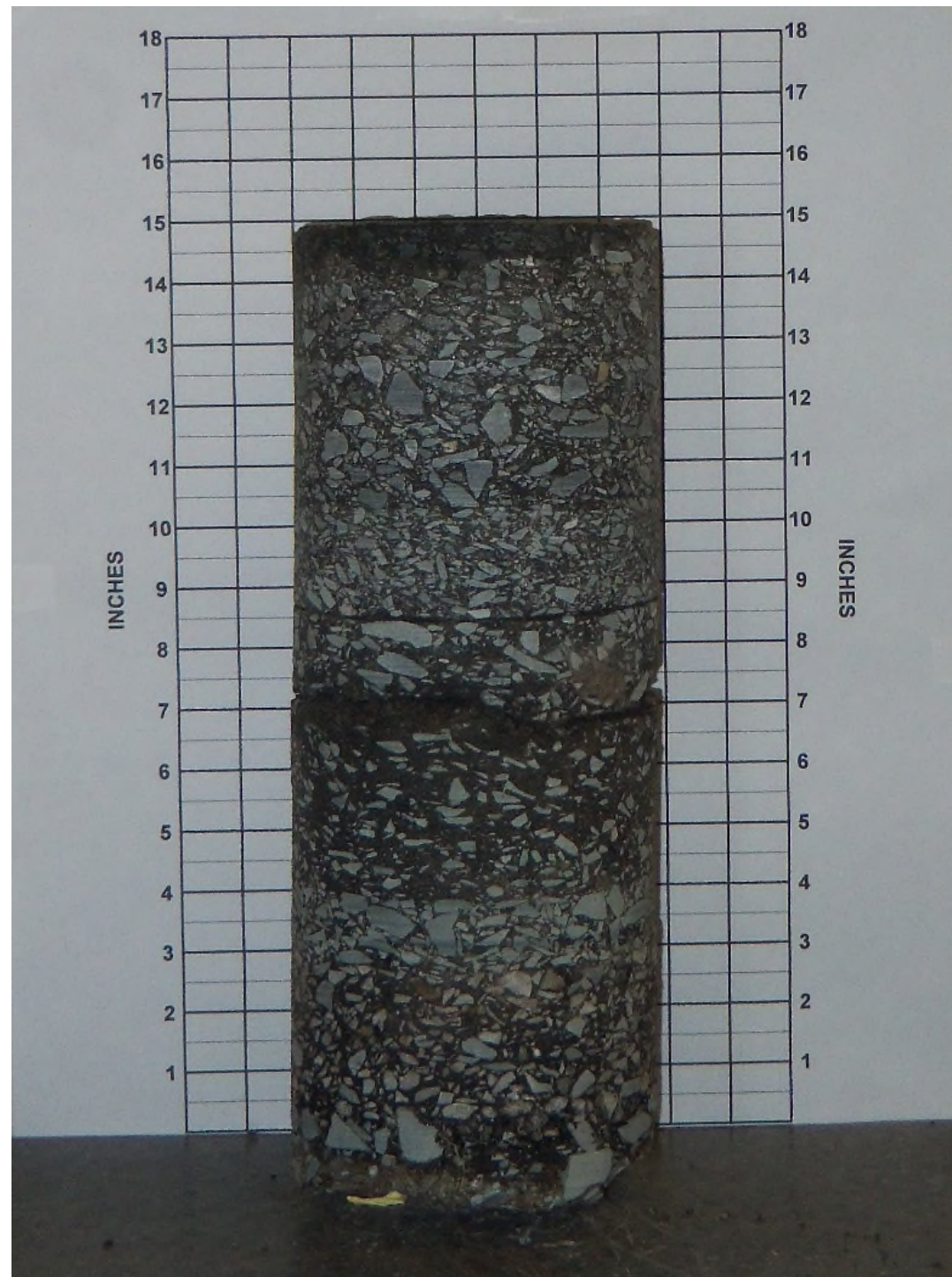
<b>Average Asphalt Thickness (inches)</b>	<b>15</b>
<b>Average ABC Thickness (inches)</b>	<b>10-1/2</b>
<b>Notes</b>	

**Test Location:** C-2 Northbound Left Turn Lane (Indian Trail-Fairview Road)  
 N: 489507, E: 1503133  
 -L1- Sta. 116+14 (142' Rt.)



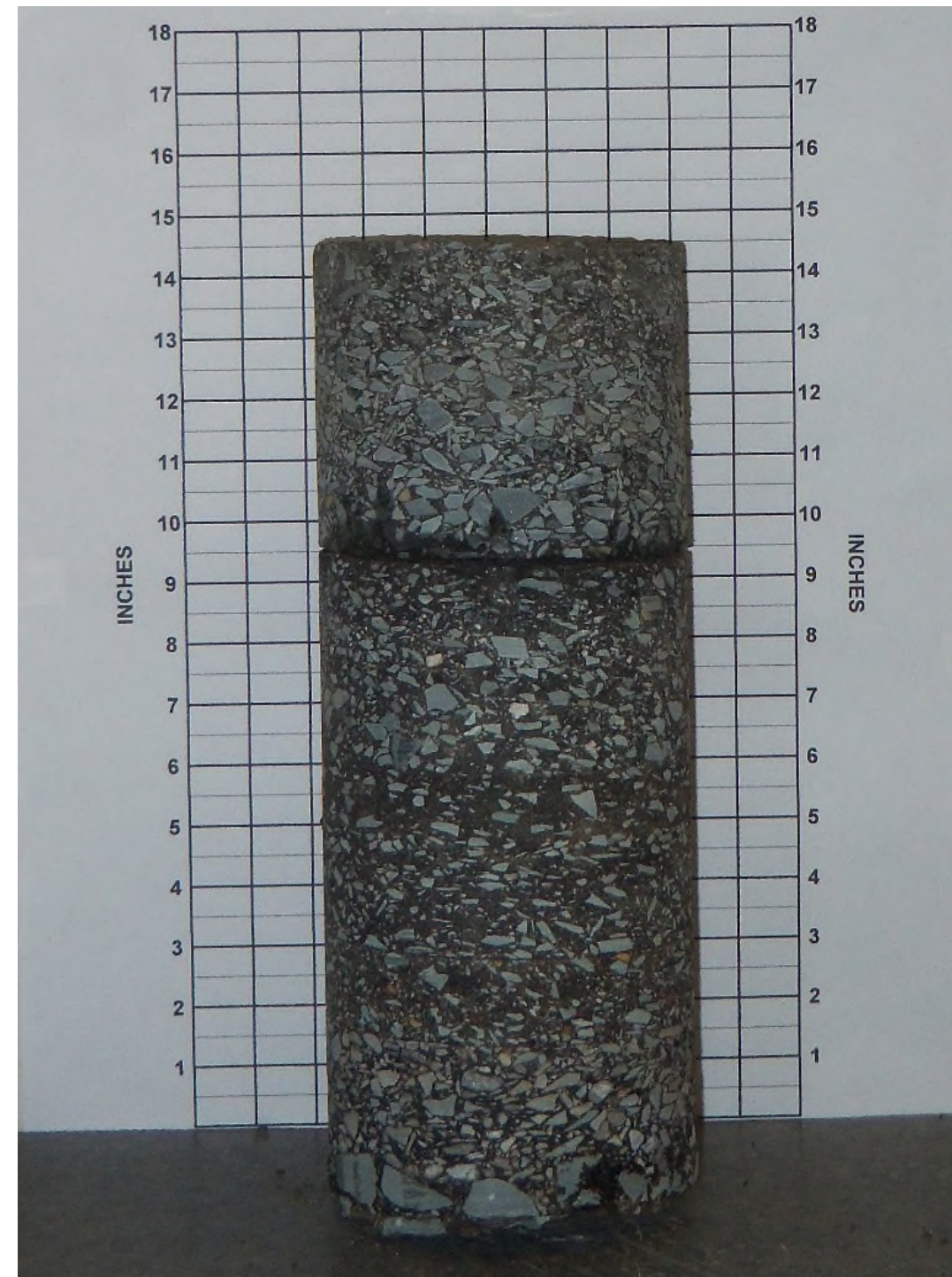
<b>Average Asphalt Thickness (inches)</b>	<b>7</b>
<b>Average ABC Thickness (inches)</b>	<b>6-1/2</b>
<b>Notes</b>	

**Test Location:** C-3 Eastbound Inside Lane (US 74)  
 N: 489066, E: 1503662  
 -L1- Sta. 122+92 (23' Rt.)



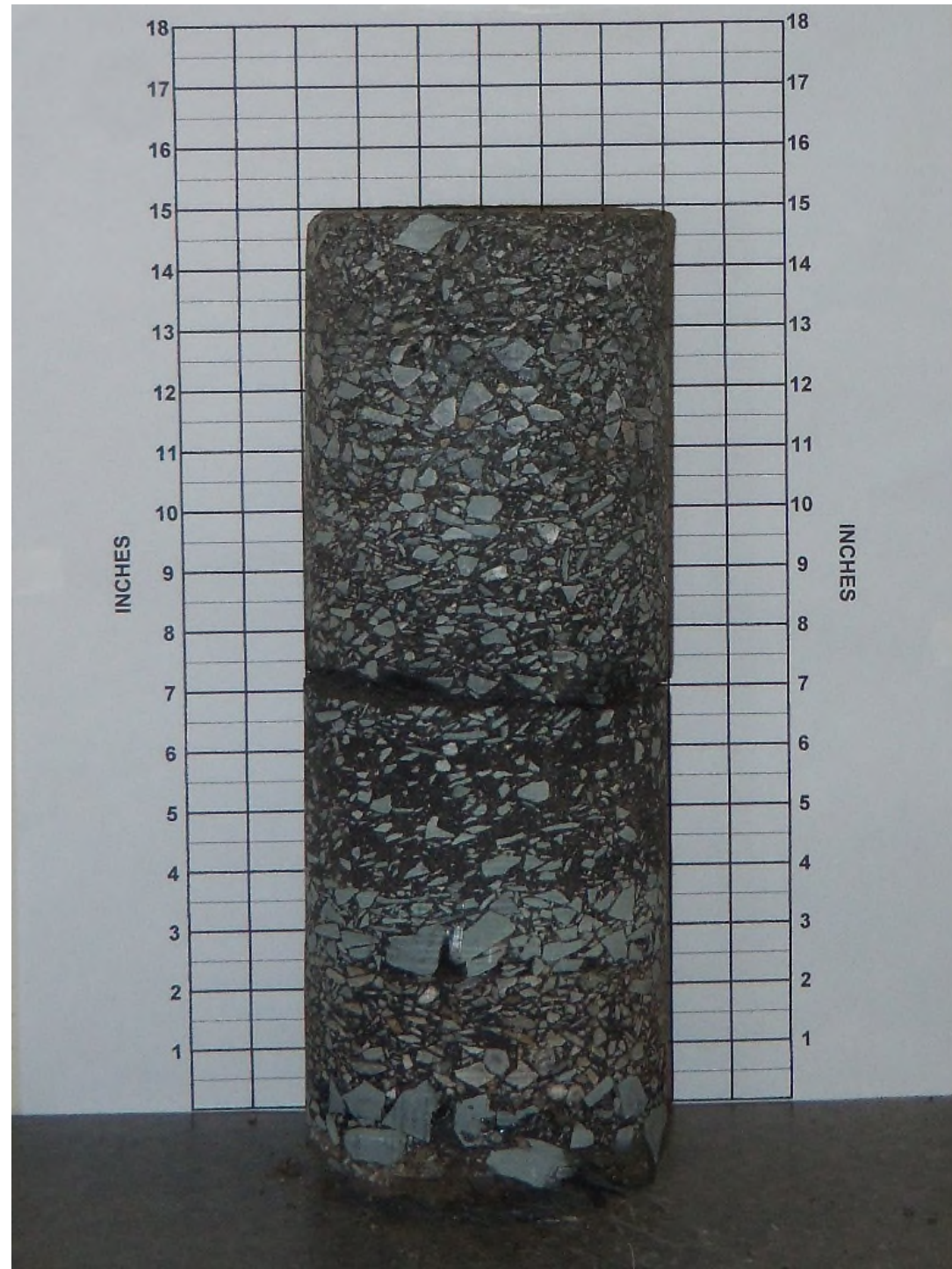
<b>Average Asphalt Thickness (inches)</b>	<b>14</b>
<b>Average ABC Thickness (inches)</b>	<b>12</b>
<b>Notes</b>	

**Test Location:** C-4 Westbound Inside Lane (US 74)  
 N: 486183, E: 1506166  
 -L2- Sta. 222+19 (25' Lt.)



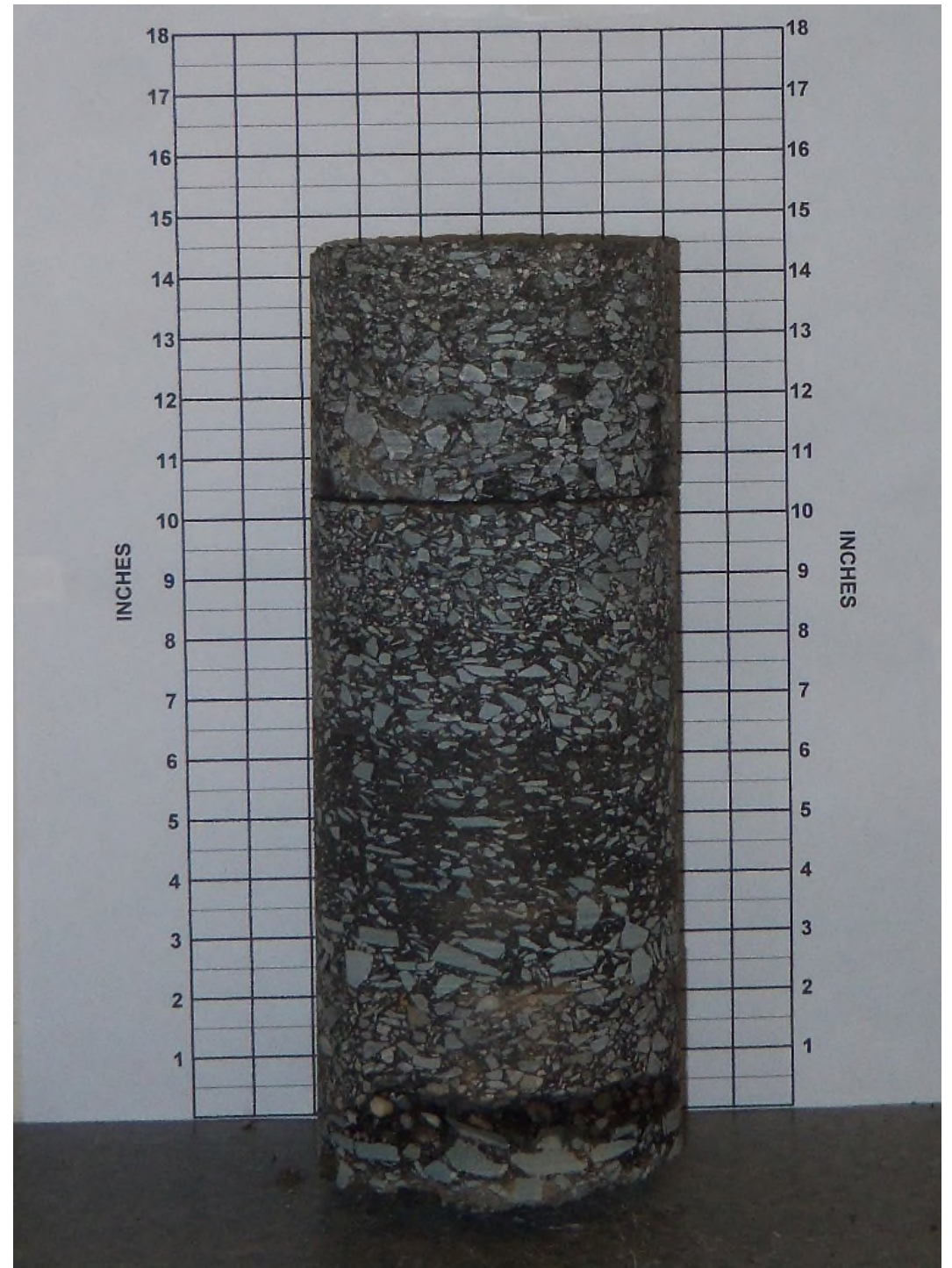
<b>Average Asphalt Thickness (inches)</b>	<b>14-½</b>
<b>Average ABC Thickness (inches)</b>	<b>10</b>
<b>Notes</b>	

**Test Location:** C-5 Eastbound Inside Lane (US 74)  
 N: 484238, E: 1507846  
 -L3- Sta. 307+89 (22' Rt.)



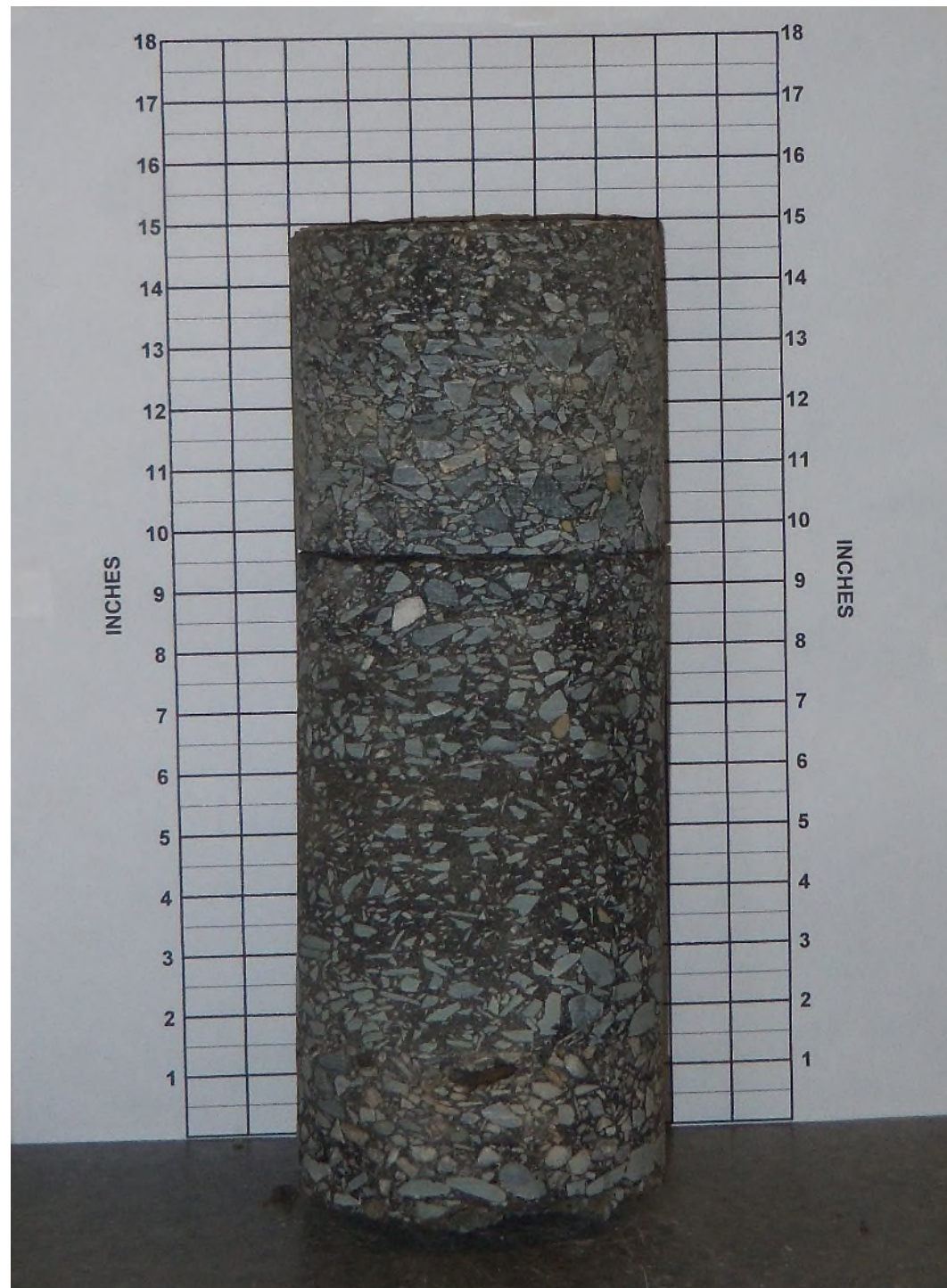
<b>Average Asphalt Thickness (inches)</b>	<b>14-½</b>
<b>Average ABC Thickness (inches)</b>	<b>14</b>
<b>Notes</b>	

**Test Location:** C-6 Eastbound Inside Lane (US 74)  
 N: 483419, E: 1508735  
 -L3- Sta. 319+97 (23' Rt.)



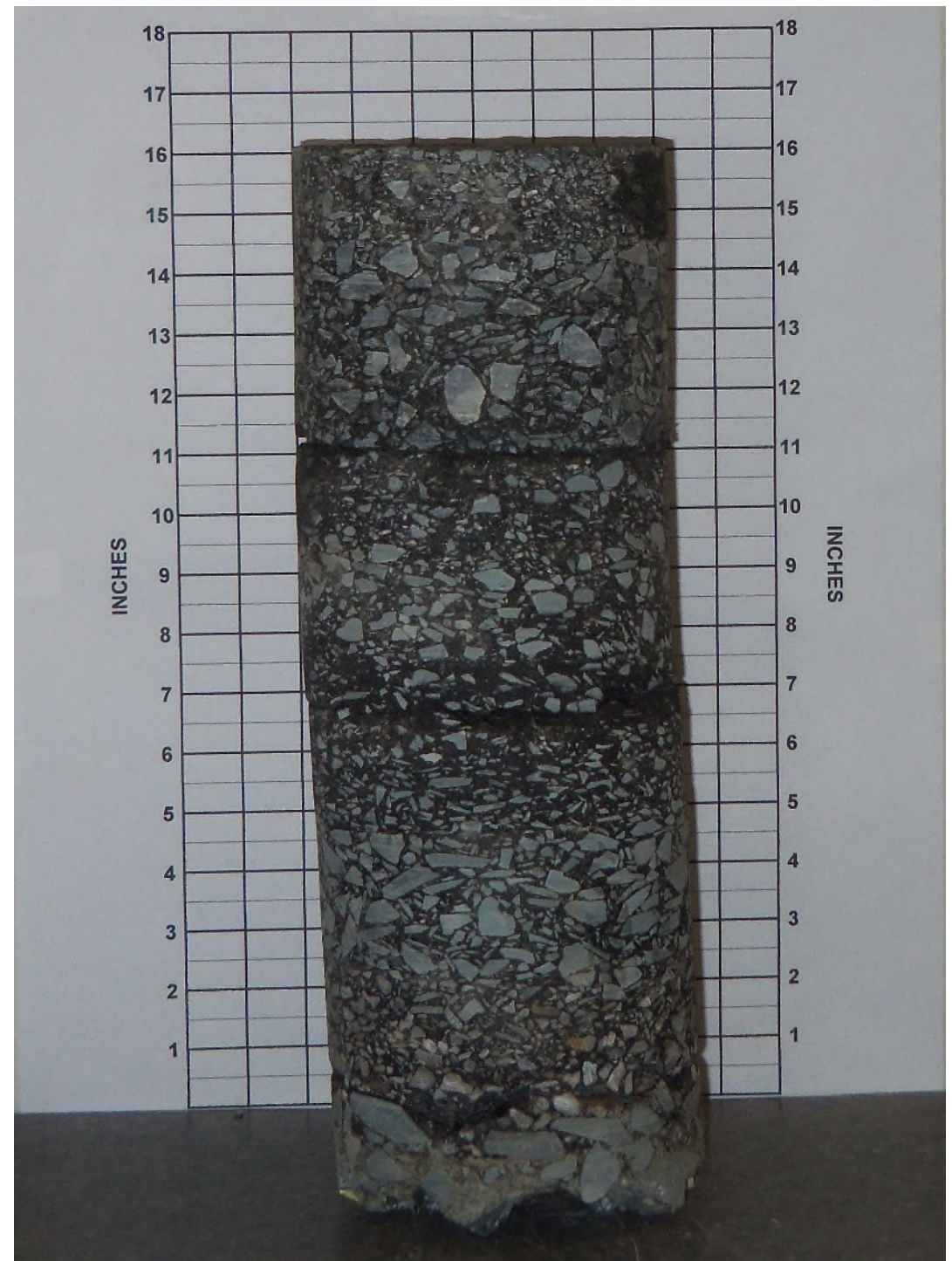
<b>Average Asphalt Thickness (inches)</b>	<b>13-¾</b>
<b>Average ABC Thickness (inches)</b>	<b>11-½</b>
<b>Notes</b>	

**Test Location:** C-7 Westbound Inside Lane (US 74)  
 N: 483325, E: 1508910  
 -L3- Sta. 321+90 (26' Lt.)



<b>Average Asphalt Thickness (inches)</b>	<b>14-½</b>
<b>Average ABC Thickness (inches)</b>	<b>13</b>
<b>Notes</b>	

**Test Location:** C-8 Eastbound Right Lane (US 74)  
 N: 481962, E: 1510304  
 -L4- Sta. 413+14 (35' Rt.)



<b>Average Asphalt Thickness (inches)</b>	<b>15-½</b>
<b>Average ABC Thickness (inches)</b>	<b>17</b>
<b>Notes</b>	