



February 20, 2025

Stantec
801 Jones Franklin Road, Suite 300
Raleigh, North Carolina 27606

Attention: Mr. Ricky Greene, PE
Senior Project Manager

Reference: **Pavement and Subgrade Investigation Report**
NC 9 from US 74 Alt to Henderson/Buncombe County Line
Bat Cave
Henderson County, North Carolina
TIP No. W-0920
S&ME Project No. 24350796
NC PE Firm License No. F-0176

S&ME has completed the evaluation of the pavement and subgrade investigation for this project and presents the following.

The proposed work consists of repairing NC-9 from US 74 Alt to the Henderson/Buncombe County line and the associated grading and pavement work.

The subgrade beneath the existing roadway consists of Inner Piedmont residual soils and roadway embankment soils. The predominant soils encountered were classified as sandy silt (A-4) and silty sand (A-2-4).

Anticipated borrow will likely consist of Inner Piedmont sandy silt and silty sand.

The length of this project is 1.967 miles.

Overall, the pavement for -L- is in fair to poor condition. Pavement surface distresses are characterized as low severity transverse cracking and low to moderate severity fatigue cracking, with few areas exhibiting moderate severity longitudinal cracking and high severity fatigue cracking.



AREAS OF SPECIAL GEOTECHNICAL INTEREST

A. Highly Plastic Clays:

There were no locations where clays with a PI of 26 or greater were found.

B. Trapped Water within the Pavement:

There were no locations where trapped water within the pavement was found.

C. Soils with a High Moisture Content

There were no locations where soils with high moisture content were found.

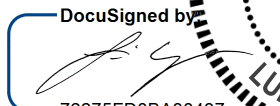
D. Pavements which Have Been or May Have Been Damaged

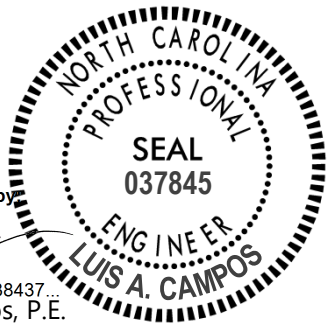
The following locations are areas where the landslides/debris flows have destroyed pavements or likely compromised the integrity of the pavements, or where water flow along shoulders has undermined the pavement section.

LINE	STATION RANGE
-L-	10+00 to 34+00
-L-	50+00 to 54+00
-L-	68+00 to 71+50
-L-	76+00 to 85+00

LAC/SEM/KHH

ATTACHMENT 1: Pavement and Subgrade Inventory 22

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Luis A. Campos, P.E.
Senior Geotechnical Engineer




Stacie E. Mitchell P.E.
Senior Geotechnical Engineer

PROJECT: 18314.1045035

REFERENCE: W-0920

CONTENTS

SHEET NO.	DESCRIPTION
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2	LEGEND (SOIL & ROCK)
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STATE OF NORTH CAROLINA

DEPARTMENT OF TRANSPORTATION

DIVISION OF HIGHWAYS

GEOTECHNICAL ENGINEERING UNIT

ROADWAY

SUBSURFACE INVESTIGATION

COUNTY HENDERSON

PROJECT DESCRIPTION GRADING, DRAINAGE, PAVING,
AND RETAINING WALLS

PAVEMENT AND SUBGRADE INVENTORY

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	W-0920	1	22

CAUTION NOTICE

THE SUBSURFACE INFORMATION AND THE SUBSURFACE INVESTIGATION ON WHICH IT IS BASED WERE MADE FOR THE PURPOSE OF PREPARING THE SCOPE OF WORK TO BE INCLUDED IN THE REQUEST FOR PROPOSAL. 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.

SOIL AND ROCK BOUNDARIES WITHIN A BOREHOLE ARE BASED ON GEOTECHNICAL INTERPRETATION UNLESS ENCOUNTERED IN A SAMPLE. INTERPRETED BOUNDARIES MAY NOT NECESSARILY REFLECT ACTUAL SUBSURFACE CONDITIONS BETWEEN SAMPLED STRATA AND BOREHOLE INFORMATION MAY NOT NECESSARILY REFLECT ACTUAL SUBSURFACE CONDITIONS BETWEEN BORINGS. 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 PERFORM INDEPENDENT SUBSURFACE INVESTIGATIONS AND MAKE INTERPRETATIONS AS NECESSARY TO CONFIRM CONDITIONS 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

C. COGDILL

C. PAYNE

L. CAMPOS

INVESTIGATED BY S&ME, INC.

DRAWN BY C. CHANDLER

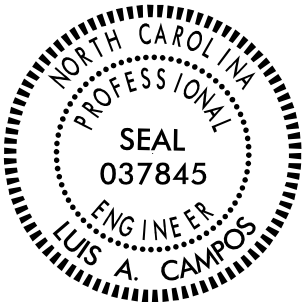
CHECKED BY K. HILL

SUBMITTED BY L. CAMPOS

DATE FEBRUARY 2025



8848 RED OAK BLVD
SUITE A
CHARLOTTE, NC 28217
(704) 523-4726



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SIGNATURE DATE

DOCUMENT NOT CONSIDERED FINAL
UNLESS ALL SIGNATURES COMPLETED

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																			
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 (ASTM 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>										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.										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:										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 (RQD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE. SAPROLITE (SAP.) - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT ROCK. SILL - AN INTRUSIVE BODY OF IGNEOUS ROCK OF APPROXIMATELY UNIFORM THICKNESS AND RELATIVELY THIN COMPARED WITH ITS LATERAL EXTENT, THAT HAS BEEN EMPLACED PARALLEL TO THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS. SLICKENSIDE - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE. STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT) - NUMBER OF BLOWS (N OR BPF) OF A 140 LB. HAMMER FALLING 30 INCHES REQUIRED TO PRODUCE A PENETRATION OF 1 FOOT INTO SOIL WITH A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER. SPT REFUSAL IS PENETRATION EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS. STRATA CORE RECOVERY (SREC.) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE. STRATA ROCK QUALITY DESIGNATION (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.																			
SOIL LEGEND AND AASHTO CLASSIFICATION										ANGULARITY OF GRAINS										WEATHERED ROCK (WR)										NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT N VALUES > 100 BLOWS PER FOOT IF TESTED.																			
MINERALOGICAL COMPOSITION										CRYSTALLINE ROCK (CR)										FINE TO COARSE GRAIN IGNEOUS AND METAMORPHIC ROCK THAT WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES GRANITE, GNEISS, GABBRO, SCHIST, ETC.										NON-CRYSTALLINE ROCK (NCR)										FINE TO COARSE GRAIN METAMORPHIC AND NON-COASTAL PLAIN SEDIMENTARY ROCK THAT WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES PHYLLITE, SLATE, SANDSTONE, ETC.									
COMPRESSIONIBILITY										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																			
PERCENTAGE OF MATERIAL										GROUND WATER										VERY SLIGHT (V SL.)										ROCK GENERALLY FRESH, JOINTS STAINED, SOME JOINTS MAY SHOW THIN CLAY COATINGS IF OPEN. CRYSTALS ON A BROKEN SPECIMEN FACE SHINE BRIGHTLY. ROCK RINGS UNDER HAMMER BLOWS IF OF A CRYSTALLINE NATURE.																			
ORGANIC MATERIAL										WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING										SLIGHT (SL.)										ROCK GENERALLY FRESH, JOINTS STAINED AND DISCOLORATION EXTENDS INTO ROCK UP TO 1 INCH. OPEN JOINTS MAY CONTAIN CLAY. IN GRANITOID ROCKS SOME OCCASIONAL FELDSPAR CRYSTALS ARE DULL AND DISCOLORED. CRYSTALLINE ROCKS RING UNDER HAMMER BLOWS.																			
TRACE OF ORGANIC MATTER										STATIC WATER LEVEL AFTER 24 HOURS										MODERATE (MOD.)										SIGNIFICANT PORTIONS OF ROCK SHOW DISCOLORATION AND WEATHERING EFFECTS. IN GRANITOID ROCKS, MOST FELDSPARS ARE DULL AND DISCOLORED, SOME SHOW CLAY. ROCK HAS DULL SOUND UNDER HAMMER BLOWS AND SHOWS SIGNIFICANT LOSS OF STRENGTH AS COMPARED WITH FRESH ROCK.																			
LITTLE ORGANIC MATTER										PERCHED WATER, SATURATED ZONE, OR WATER BEARING STRATA										MODERATELY SEVERE (MOD. SEV.)										ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. IN GRANITOID ROCKS, ALL FELDSPARS DULL AND DISCOLORED AND A MAJORITY SHOW KAOLINIZATION. ROCK SHOWS SEVERE LOSS OF STRENGTH AND CAN BE EXCAVATED WITH A GEOLOGIST'S PICK. ROCK GIVES "CLUNK" SOUND WHEN STRUCK. IF TESTED, WOULD YIELD SPT REFUSAL																			
MODERATELY ORGANIC										MISCELLANEOUS SYMBOLS										SEVERE (SEV.)										ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC CLEAR AND EVIDENT BUT REDUCED IN STRENGTH TO STRONG SOIL. IN GRANITOID ROCKS ALL FELDSPARS ARE KAOLINIZED TO SOME EXTENT. SOME FRAGMENTS OF STRONG ROCK USUALLY REMAIN. IF TESTED, WOULD YIELD SPT N VALUES > 100 BPF																			
HIGHLY ORGANIC										ROADWAY EMBANKMENT (RE) WITH SOIL DESCRIPTION										VERY SEVERE (V SEV.)										ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC ELEMENTS ARE DISCERNIBLE BUT MASS IS EFFECTIVELY REDUCED TO SOIL STATUS, WITH ONLY FRAGMENTS OF STRONG ROCK REMAINING. SAPROLITE IS AN EXAMPLE OF ROCK WEATHERED TO A DEGREE THAT ONLY MINOR VESTIGES OF ORIGINAL ROCK FABRIC REMAIN. IF TESTED, WOULD YIELD SPT N VALUES < 100 BPF																			
SOILS WITH LITTLE OR MODERATE AMOUNTS OF ORGANIC MATTER										ARTIFICIAL FILL (AF) OTHER THAN ROADWAY EMBANKMENT										COMPLETE										ROCK REDUCED TO SOIL. ROCK FABRIC NOT DISCERNIBLE, OR DISCERNIBLE ONLY IN SMALL AND SCATTERED CONCENTRATIONS. QUARTZ MAY BE PRESENT AS DIKES OR STRINGERS. SAPROLITE IS ALSO AN EXAMPLE.																			
GROUP INDEX										INFERRED SOIL BOUNDARY										ROCK HARDNESS										VERY HARD																			
USUAL TYPES OF MAJOR MATERIALS										INFERRED ROCK LINE										HARD										CANNOT BE SCRATCHED BY KNIFE OR SHARP PICK. BREAKING OF HAND SPECIMENS REQUIRES SEVERAL HARD BLOWS OF THE GEOLOGIST'S PICK.																			
GEN. RATING AS SUBGRADE										ALLUVIAL SOIL BOUNDARY										MODERATELY HARD										CAN BE SCRATCHED BY KNIFE OR PICK. GOUGES OR GROOVES TO 0.25 INCHES DEEP CAN BE EXCAVATED BY HARD BLOW OF A GEOLOGIST'S PICK. HAND SPECIMENS CAN BE DETACHED BY MODERATE BLOWS.																			
PI OF A-7-5 SUBGROUP IS ≤ LL - 30; PI OF A-7-6 SUBGROUP IS > LL - 30										RECOMMENDATION SYMBOLS										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.																			
CONSISTENCY OR DENSENESS										UNCLASSIFIED EXCAVATION - UNSUITABLE WASTE										SOFT										CAN BE GROVED OR GOUGED READILY BY KNIFE OR PICK. CAN BE EXCAVATED IN FRAGMENTS FROM CHIPS TO SEVERAL INCHES IN SIZE BY MODERATE BLOWS OF A PICK POINT. SMALL, THIN PIECES CAN BE BROKEN BY FINGER PRESSURE.																			
PRIMARY SOIL TYPE										UNCLASSIFIED EXCAVATION - ACCEPTABLE DEGRADABLE ROCK										VERY SOFT										CAN BE CARVED WITH KNIFE. CAN BE EXCAVATED READILY WITH POINT OF PICK. PIECES 1 INCH OR MORE IN THICKNESS CAN BE BROKEN BY FINGER PRESSURE. CAN BE SCRATCHED READILY BY FINGER NAIL.																			
COMPACTNESS OR CONSISTENCY										ABBREVIATIONS										FRACURE SPACING										BEDDING																			
RANGE OF STANDARD PENETRATION RESISTANCE (N-VALUE)										AR - AUGER REFUSAL										TERM										THICKNESS																			
RANGE OF UNCONFINED COMPRESSIVE STRENGTH (TONS/FT²)										BT - BORING TERMINATED										VERY WIDE										MORE THAN 10 FEET																			
GENERAL										CL - CLAY										WIDE										3 TO 10 FEET																			
MODERATE										CPT - CONE PENETRATION TEST										MODERATELY CLOSE										1 TO 3 FEET																			
DENSE										CSE - COARSE										CLOSE										0.16 TO 1 FOOT																			
VERY DENSE										DMT - DILATOMETER TEST										VERY CLOSE										LESS THAN 0.16 FEET																			
GENERAL										DPT - DYNAMIC PENETRATION TEST										SOIL MOISTURE SCALE (ATTERBERG LIMITS)										FIELD MOISTURE DESCRIPTION																			
SOFT										PM - VOID RATIO										SOIL MOISTURE SCALE (ATTERBERG LIMITS)										FIELD MOISTURE DESCRIPTION																			
MEDIUM STIFF										F - FINE										SOIL MOISTURE SCALE (ATTERBERG LIMITS)										FIELD MOISTURE DESCRIPTION																			
STIFF										FOSS. - FOSSILIFEROUS										SOIL MOISTURE SCALE (ATTERBERG LIMITS)										FIELD MOISTURE DESCRIPTION																			
VERY STIFF										FRAC. - FRACTURED, FRACTURES										SOIL MOISTURE SCALE (ATTERBERG LIMITS)										FIELD MOISTURE DESCRIPTION																			
HARD										FRAG. - FRAGMENTS										SOIL MOISTURE SCALE (ATTERBERG LIMITS)										FIELD MOISTURE DESCRIPTION																			
GENERAL										HI. - HIGHLY										SOIL MOISTURE SCALE (ATTERBERG LIMITS)										FIELD MOISTURE DESCRIPTION																			
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GUIDE FOR FIELD MOISTURE DESCRIPTION										PLASTICITY										SOIL MOISTURE SCALE (ATTERBERG LIMITS)										FIELD MOISTURE DESCRIPTION																			
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GUIDE FOR FIELD MOISTURE DESCRIPTION										PLASTICITY										SOIL MOISTURE SCALE (ATTERBERG LIMITS)										FIELD MOISTURE DESCRIPTION																			
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GUIDE FOR FIELD MOISTURE DESCRIPTION										PLASTICITY										SOIL MOISTURE SCALE (ATTERBERG LIMITS)										FIELD MOISTURE DESCRIPTION																			
GUIDE FOR FIELD MOISTURE DESCRIPTION										PLASTICITY										SOIL MOISTURE SCALE (ATTERBERG LIMITS)										FIELD MOISTURE DESCRIPTION																			
GUIDE FOR FIELD MOISTURE DESCRIPTION										PLASTICITY										SOIL MOISTURE SCALE (ATTERBERG LIMITS)										FIELD MOISTURE DESCRIPTION																			
GUIDE FOR FIELD MOISTURE DESCRIPTION										PLASTICITY										SOIL MOISTURE SCALE (ATTERBERG LIMITS)										FIELD MOISTURE DESCRIPTION																			
GUIDE FOR FIELD MOISTURE DESCRIPTION										PLASTICITY										SOIL MOISTURE SCALE (ATTERBERG LIMITS)										FIELD MOISTURE DESCRIPTION																			
GUIDE FOR FIELD MOISTURE DESCRIPTION																																																	

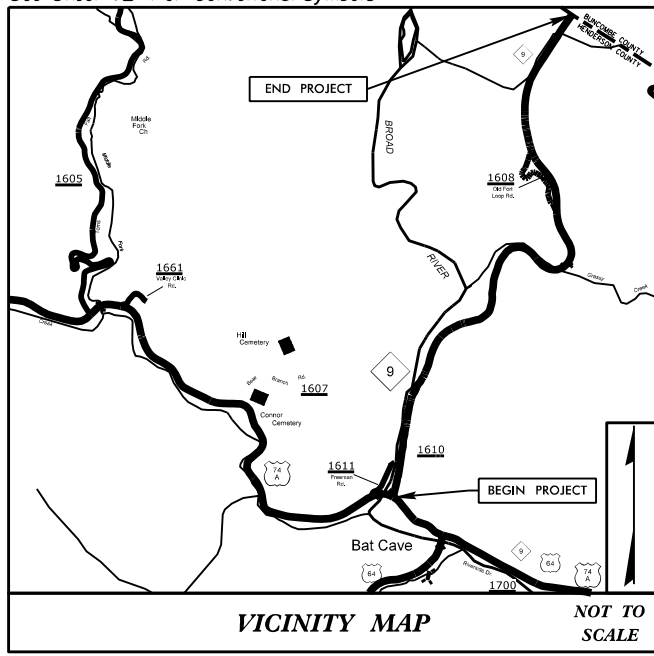
09/08/09

\$\$\$SYTIME\$\$\$\$\$DDN\$\$\$\$\$USERNAME\$\$\$\$\$

TIP PROJECT: W-0920

CONTRACT: ???

See Sheet 1A For Index of Sheets
See Sheet 1B For Conventional Symbols



VICINITY MAP NOT TO SCALE

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

HENDERSON COUNTY

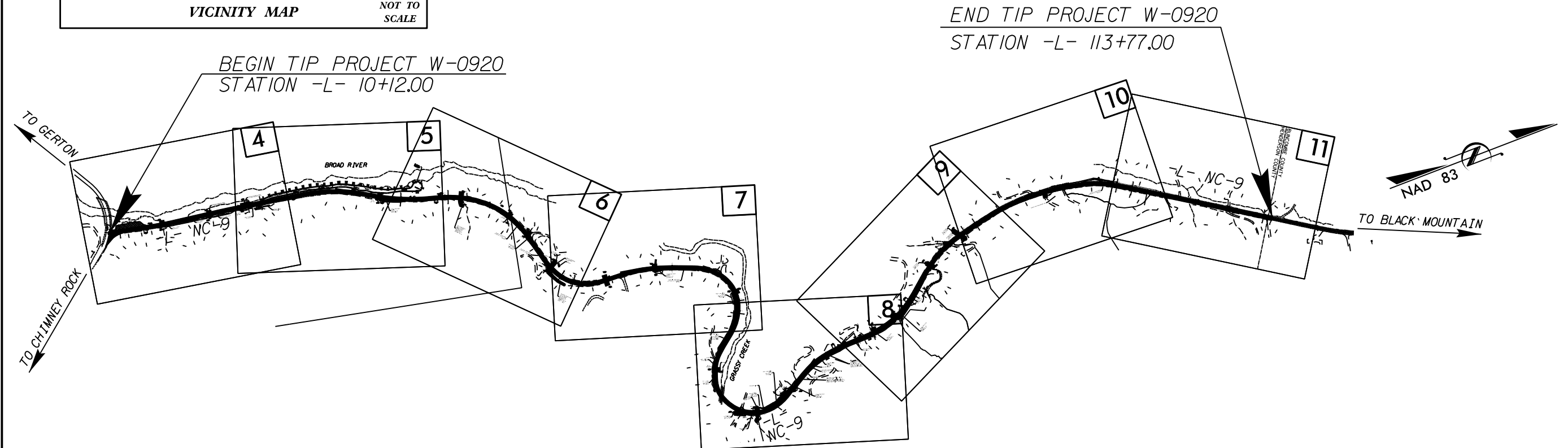
LOCATION: NC-9 FROM US 74 ALT TO
HENDERSON/BUNCOMBE COUNTY LINE

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

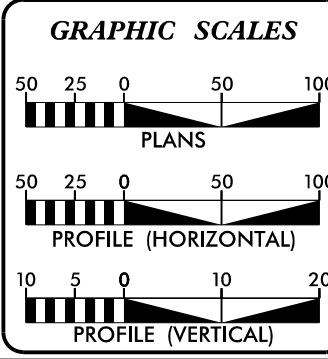
STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	W-0920	3	
STATE PROJ. NO.	P.A. PROJ. NO.	DESCRIPTION	
18314.1045035		PE	



PRE-HYDRO PLAN SET



DESIGN EXCEPTION FOR SPEED, HORIZONTAL CURVATURE AND HORIZONTAL SIGHT DISTANCE(?)
CLEARING ON THIS PROJECT SHALL BE PERFORMED TO THE LIMITS ESTABLISHED BY METHOD III
THIS IS A NO CONTROL OF ACCESS PROJECT



DESIGN DATA

ADT 2025 =	1000
K =	N/A
D =	N/A
T =	7%
V =	45 MPH
FUNC CLASSIFICATION =	MAJOR COLLECTOR REGIONAL TIER

PROJECT LENGTH

LENGTH ROADWAY TIP PROJECT W-0920	=	1.967 MILES
TOTAL LENGTH TIP PROJECT W-0920	=	1.967 MILES

PREPARED IN THE OFFICES OF:
SUNGATE DESIGN GROUP, P.A.

Stantec
Stantec Consulting Services Inc.
801 Jones Franklin Road
Suite 300
Raleigh, NC 27606
Tel. (919) 351-6866
Fax. (919) 851-7024
www.stantec.com
License No. F-0872

8848 RED OAK BLVD
SUITE A
CHARLOTTE, NC 28217
(704) 523-4726

FOR THE NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

2024 STANDARD SPECIFICATIONS
3R GUIDELINES

RIGHT OF WAY DATE:
JANUARY 1, 2025

LETTING DATE:
MARCH 14, 2025

STEVE SMALLWOOD, P.E.
PROJECT ENGINEER

A. DEAN SARVIS, P.E.
PROJECT DESIGN ENGINEER

JOSH B DEYTON, P.E.
NCDOT DIVISION 14 CONTACT

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

DOCUMENT NOT CONSIDERED FINAL
UNLESS ALL SIGNATURES COMPLETED

HYDRAULICS ENGINEER

SIGNATURE: _____

ROADWAY ENGINEER

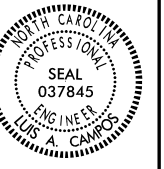
SIGNATURE: _____

SEAL
26971
NORTH CAROLINA
ENGINEER
JOSHUA G. DALTON

SEAL
022037
NORTH CAROLINA
ENGINEER
STEPHEN T. SMALLWOOD

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION

8/17/99

PROJECT REFERENCE NO.	SHEET NO.
W-0920	4
RW SHEET NO.	
GEOTECHNICAL ENGINEER	HYDRAULICS ENGINEER
	
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED	

-L-	
PI Sta 13+93.30	PI Sta 19+00.48
$\Delta = 4'14'' 52.0''$ (LT)	$\Delta = 1'07'' 42.6''$ (RT)
D = 2' 47' 41.7"	D = 0' 41' 55.4"
L = 151.98'	L = 161.51'
T = 76.03'	T = 80.76'
R = 2,050.00'	R = 8,200.00'
SE = .02	SE = .02

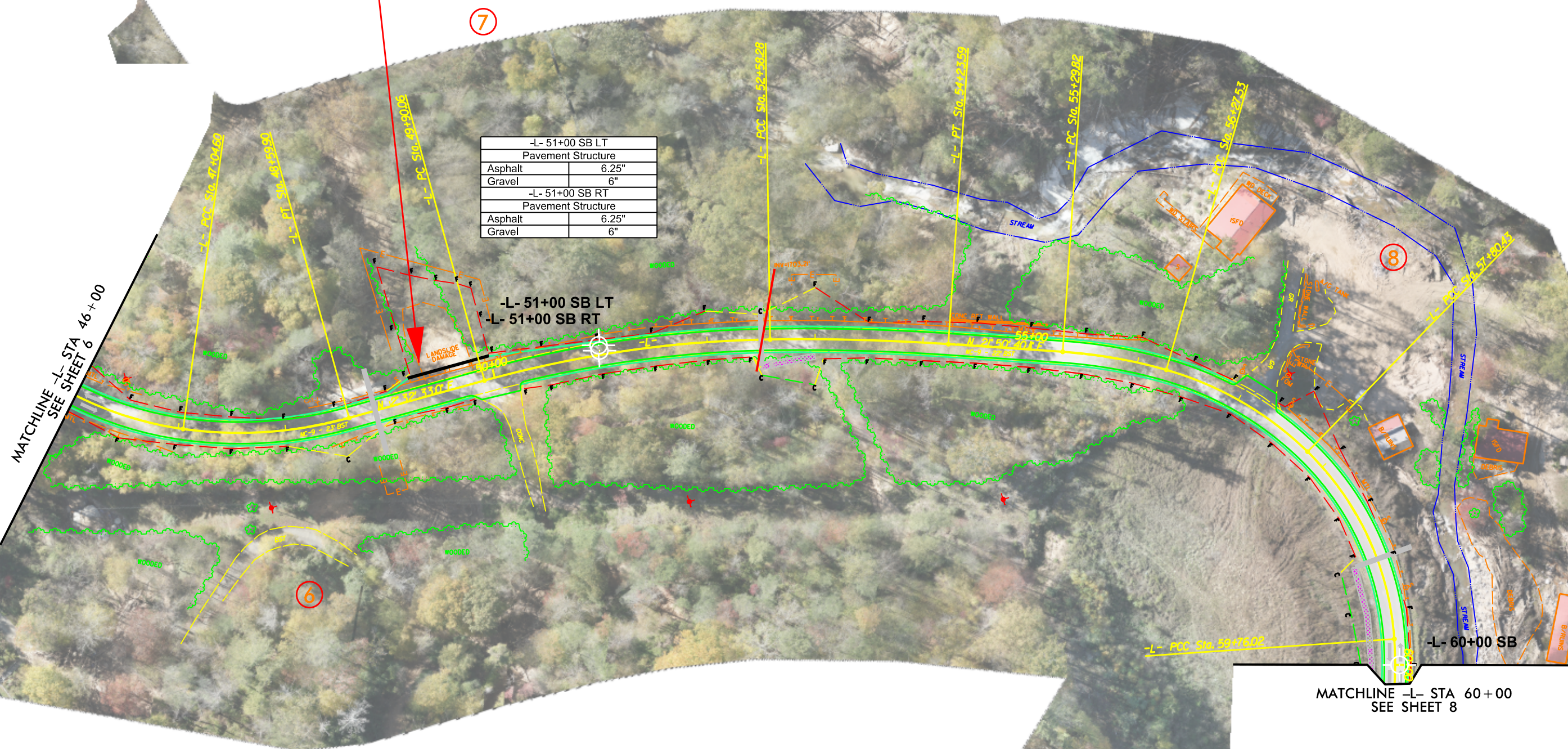
NAD 83

MATCHLINE -L- STA 21+00
SEE SHEET 5

BEGIN TIP PROJECT W-0920
-L- STA 10+12.00

SYTIME\$\$\$\$\$
\$\$\$\$\$SYTIME\$\$\$\$\$

NCDOT SITE 3

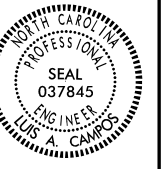


-L- 51+00 SB LT	
Pavement Structure	
Asphalt	6.25"
Gravel	6"
-L- 51+00 SB RT	
Pavement Structure	
Asphalt	6.25"
Gravel	6"

-L- 60+00 SB	
Pavement Structure	
Asphalt	8"
Gravel	5"

8/17/99

MATCHLINE -L- STA 60+00 SEE SHEET 7

PROJECT REFERENCE NO.		SHEET NO.	
W-0920		8	
RW SHEET NO.		HYDRAULICS ENGINEER	
GEOTECHNICAL ENGINEER		ENGINEER	
			
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED			

NAD 83

MATCHLINE SEE SHEET 9
STA 60+00

NCDOT
SITE 4

-L- 77+00 SB	
Pavement Structure	
Asphalt	9"
Gravel	5"

-L- 65+00 SB	
Pavement Structure	
Asphalt	9.75"
Gravel	15"

-L- 74+00 SB LT		-L- 74+00 SB RT	
Pavement Structure		Pavement Structure	
Asphalt	8.5"	Asphalt	8.75"
Gravel	6"	Gravel	6"

-L- 72+00 SB	
Pavement Structure	
Asphalt	9"
Gravel	5"

-L- 69+00 SB	
Pavement Structure	
Asphalt	8.5"
Gravel	4"

NCDOT
SITE 5

SYTIME\$\$\$\$\$
\$\$\$\$\$SYTIME\$\$\$\$\$

END TIP PROJECT W-0920

-L- STA 113+77.00

-L- 110+00 SB	
Pavement Structure	
Asphalt	5"
Macadam Bituminous	7"

MATCHLINE -L- STA 103+00
SEE SHEET 10

BUNCOMBE COUNTY
HENDERSON COUNTY

HENDERSON COUNTY

PAVEMENT INVESTIGATION DATA SHEET

Project:	18314.1045035
TIP:	W-0920

Route:	NC 9 from US 74A to Buncombe County Line
County:	Henderson

Date:	1/21/2025
Notes By:	L. Campos

		Width				Thickness						Subgrade							GPS Coordinates	
Position (Sta.,Lane,Shldr.)	Cut/Fill (Est. of Amount) (ft)	Lane(s) (ft)	Shoulder(s) (ft)	Offset Distance (See Notes) (ft)	Crown "C" or Super "S"	Gross to Top of Soil	Asphalt (in.)	Cement-Treated Base Course (in.)	Gravel (in.)	Macadam (in.)	Pavement Layering	Description	Sample Number	AASHTO Classification	Soil Moisture	Probe Depth (ft)	Asphalt Notes	Northing	Easting	
-L- 33+00 SB RT	Cut 20	10.0	-	5 FYL	C	13.75	5.75	-	8.0	-	Asphalt Gravel	0.0 - 2.0 Residual, Brown Sandy Silt	-	A-4	M	2	Moderate Severity Fatigue Cracking	638,314	1,021,020	
-L- 33+00 SB LT	Cut 20	10.0	-	9 FYL	C	14.0	6.0	-	8.0	-	Asphalt Gravel	0.0 - 2.0 Residual, Brown Sandy Silt	-	A-4	M	2	Moderate Severity Fatigue Cracking	638,315	1,021,017	
-L- 42+00 SB	Cut 5	11.0	-	7 FYL	C	6.75	6.75	-	-	-	Asphalt	Refusal on Rock	-	-	M	0	High Severity Fatigue Cracking in Wheelpath	638,953	1,021,584	
-L- 51+00 SB RT	Cut 10	10.0	-	4 FYL	S	12.25	6.25	-	6.0	-	Asphalt Gravel	0.0 - 2.0 Residual, Orange Sandy Silt	-	A-4	M	2	Moderate Severity Fatigue Cracking in Wheelpath	639,566	1,022,063	
-L- 51+00 SB LT	Cut 10	10.0	-	9 FYL	S	12.25	6.25	-	6.0	-	Asphalt Gravel	0.0 - 2.0 Residual, Orange Sandy Silt	-	A-4	M	2	Moderate Severity Fatigue Cracking in Wheelpath	639,567	1,022,059	
-L- 60+00 SB	Fill 15	10.5	-	4 FYL	S	13	8.0	-	5.0	-	Asphalt Gravel	0.0 - 2.0 RE, Brown Sandy Silt	-	A-4	M	2	No Visible Distresses	640,182	1,022,570	
-L- 65+00 SB	Cut 10	11.0	1.0	5 FYL	S	9.75	9.75	-	15.0	-	Asphalt Gravel	0.0 - 2.0 Residual, Brown Silty Sand	-	A-2-4	M	2	No Visible Distresses	639,863	1,022,944	
-L- 69+00 SB	G	11.0	1.0	5 FYL	S	12.5	8.5	-	4.0	-	Asphalt Gravel	0.0 - 2.0 Residual, Brown Silty Sand	-	A-2-4	M	2	Low Severity Transverse Cracking	639,946	1,023,294	
-L- 72+00 SB	Cut 25	10.5	-	5 FYL	S	14.0	9	-	5.0	-	Asphalt Gravel	0.0 - 2.0 Residual, Brown Silty Sand	-	A-2-4	M	2	Low Severity Transverse Cracking	640,227	1,023,322	
-L- 74+00 SB RT	Cut 30	10.0	-	5 FYL	S	14.75	8.75	-	6.0	-	Asphalt Gravel	0.0 - 2.0 Residual, Tan Silty Sand	-	A-2-4	M	2	No Visible Distresses	640,398	1,023,221	
-L- 74+00 SB LT	Cut 30	10.0	-	8 FYL	S	14.5	8.5	-	6.0	-	Asphalt Gravel	0.0 - 2.0 Residual, Tan Silty Sand	-	A-2-4	-	2	No Visible Distresses	640,397	1,023,219	
-L- 77+00 SB	Fill 40	10.0	-	6 FYL	S	14.0	9.0	-	5.0	-	Asphalt Gravel	0.0 - 2.0 RE, Brown Sandy Silt	-	A-4	M	2	Low Severity Transverse and Fatigue Cracking, Moderate Severity Longitudinal Cracking	640,679	1,023,115	
-L- 81+50 SB	Cut 10	10.0	-	5 FYL	S	16.0	8.0	-	8.0	-	Asphalt Gravel	0.0 - 2.0 Residual, Tan Sandy Silt	-	A-4	M	2	Low Severity Transverse Cracking, Low Severity Fatigue Cracking	641,126	1,023,083	
-L- 84+20 SB	Cut 5	10.0	-	8 FYL	S	15.25	7.25	-	-	8.0	Asphalt Macadam	0.0 - 2.0 RE, Gray White Sandy Silt	-	A-4	M	2	Low Severity Transverse Cracking, Low Severity Fatigue Cracking	641,363	1,022,964	
-L- 86+00 SB RT	Fill 5	10.5	-	6 FYL	C	10.5	6.5	-	-	4.0	Asphalt Macadam	0.0 - 2.0 RE, Brown Tan Sandy Silt	-	A-4	M	2	Low Severity Transverse Cracking, Low Severity Fatigue Cracking	641,503	1,022,851	
-L- 86+00 SB LT	Fill 5	10.5	-	8 FYL	C	10.0	6.0	-	-	4.0	Asphalt Macadam	0.0 - 2.0 RE, Brown Tan Sandy Silt	-	A-4	M	2	Low Severity Transverse Cracking, Low Severity Fatigue Cracking	641,502	1,022,850	

Notes:
SB = Southbound
LT = Left Side of Lane
RT = Right Side of Lane
FYL = From Yellow Line
G = Grade
RE = Roadway Embankment



S&ME, Inc.
8848 Red Oak Boulevard, Suite A
Charlotte, North Carolina 28217

PAVEMENT INVESTIGATION DATA SHEET

Project:	18314.1045035
TIP:	W-0920

Route:	NC 9 from US 74A to Buncombe County Line
County:	Henderson

Date:	1/21/2025
Notes By:	L. Campos

[illegible]

Notes:

SB = Southbound
LT = Left Side of Lane
RT = Right Side of Lane

FYL = From Yellow Line
G = Grade
RE = Roadway Embankment



S&ME, Inc.
8848 Red Oak Boulevard, Suite A
Charlotte, North Carolina 28217

S&ME, Inc.

DYNAMIC CONE PENETROMETER DATA AND IN-SITU CBR							PROJECT NUMBER				TIP				ROUTE							
							24350796				W-0920				NC-9							
							COUNTY				GEOLOGIST				TECHNICIANS							
							HENDERSON				C. PAYNE				C. COGDILL							
TEST LOCATION DESCRIPTION							DATE RUN				CORRELATED CBR VALUES											
-L- 33+00 SB RT							1/24/2025															
DATUM		CUT / FILL		NORTHING			EASTING															
ABC		CUT		638,314			1,021,020															
CUMULATIVE PENETRATION IN CENTIMETERS																						
0.1		7.1		26.3		70.8																
0.3		7.3		27.0		71.3																
0.4		7.4		27.8		####																
0.6		7.5		28.3																		
0.9		7.6		28.7																		
1.1		7.8		29.2																		
1.2		7.9		29.6																		
1.5		8.0		30.1																		
1.7		8.3		30.5																		
2.0		8.5		31.0																		
2.1		8.7		31.4																		
2.2		8.8		31.8																		
2.3		9.1		32.5																		
2.5		9.2		33.1																		
2.6		9.5		33.5																		
2.8		9.8		34.2																		
2.9		10.3		35.0																		
3.0		10.6		36.1																		
3.2		11.0		36.7																		
3.3		11.3		37.1																		
3.4		11.5		37.9																		
3.5		11.9		38.6																		
3.6		12.2		39.4																		
3.7		12.6		41.1																		
3.8		12.9		42.0																		
3.9		13.4		42.8																		
4.0		13.9		43.9																		
4.1		14.2		45.1																		
4.2		14.6		46.6																		
4.3		15.0		47.8																		
4.4		15.3		49.1																		
4.5		15.9		51.3																		
4.6		16.2		53.6																		
4.7		16.7		55.0																		
4.8		17.1		57.1																		
4.9		17.5		58.9																		
5.0		17.8		60.1																		
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5.4		19.7		64.0																		
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5.6		20.4		64.9																		
5.7		20.9		65.6																		
5.8		21.4		66.0																		
5.9		22.3		66.7																		
6.0		22.9		67.5																		
6.2		23.4		67.9																		
6.3		23.8		68.5																		
6.5		24.5		69.0																		
6.7		25.0		69.4																		
6.9		25.4		69.9																		
7.0		25.9		70.2																		

0

4

8

12

16

20

24

28

32

36

40

44

48

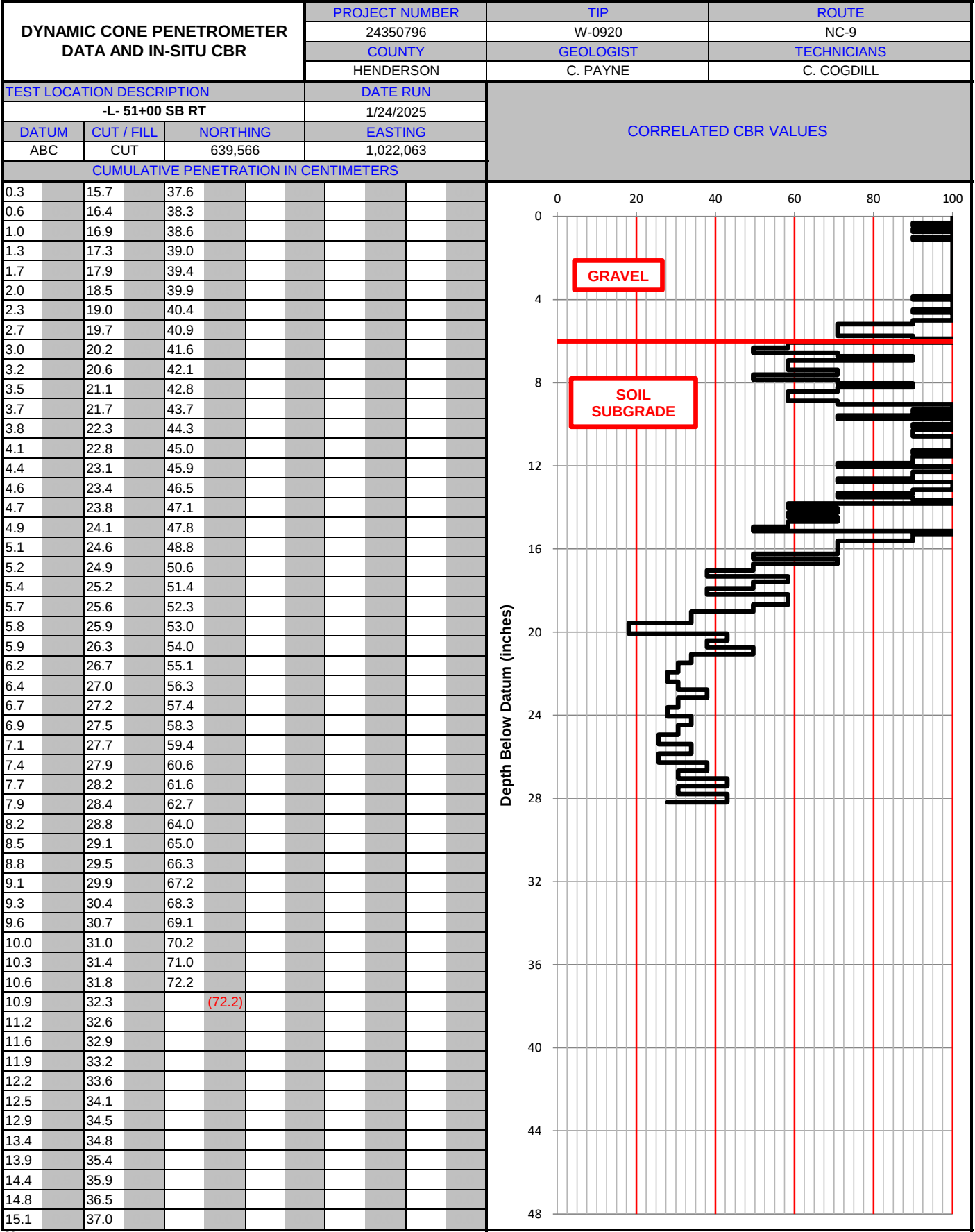
GRAVEL

SOIL SUBGRADE

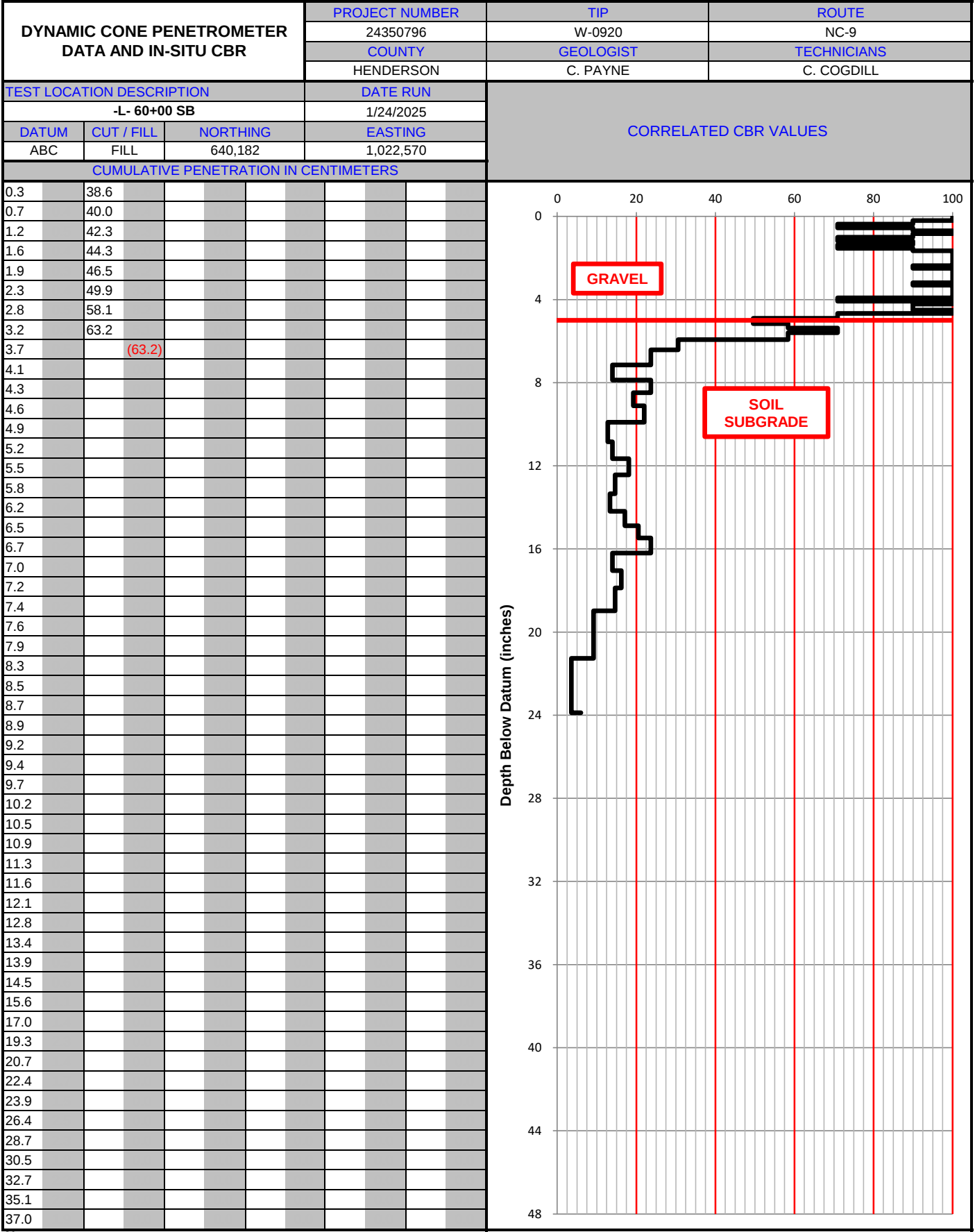
Notes:
 SG = Subgrade
 SS = Stabilized Soil
 CTBC = Cement-Treated Base Course
 ABC = Aggregate Base Course
 ESG = Estimated Subgrade (Approximately 1 foot below the existing ground surface)

[illegible]

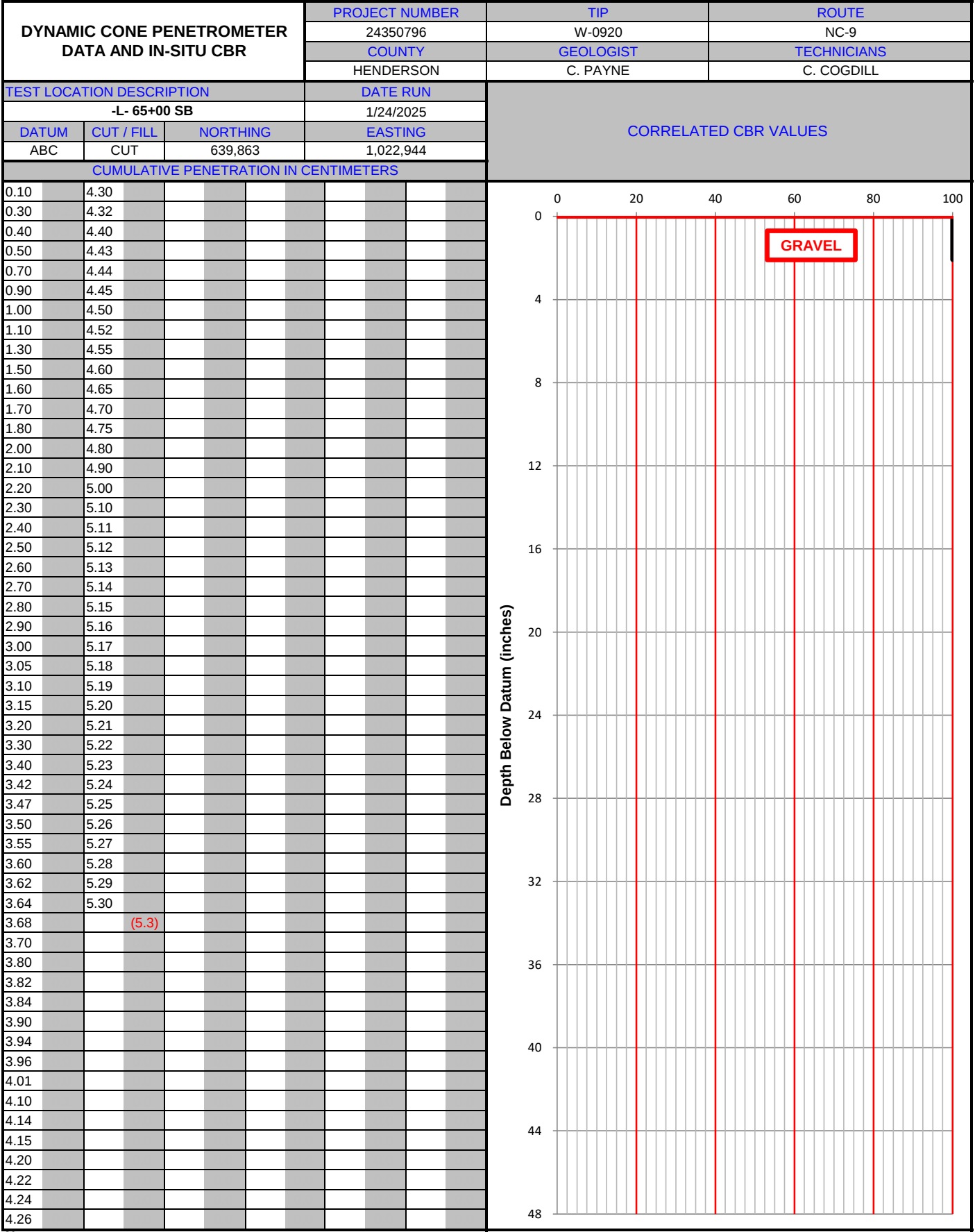
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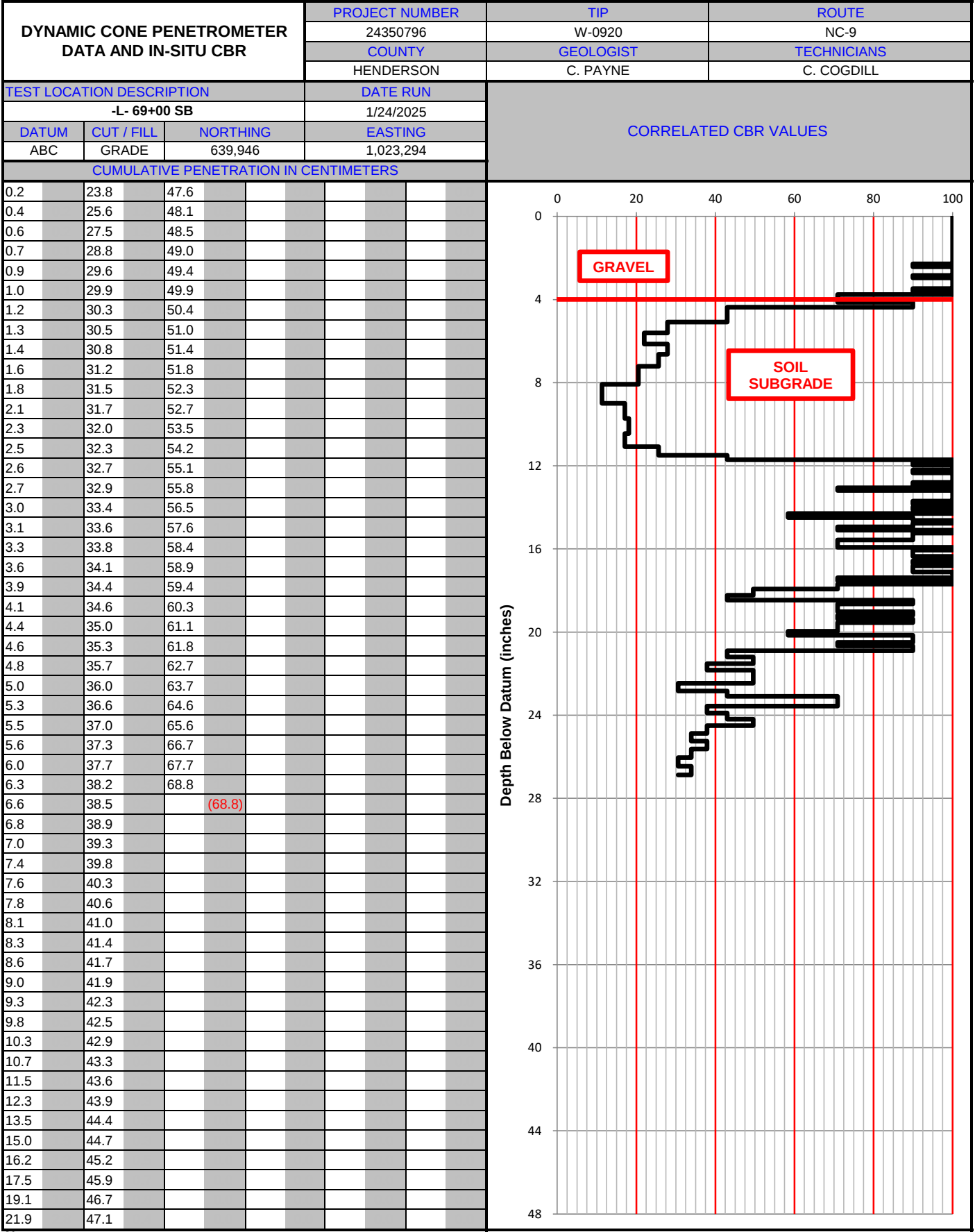
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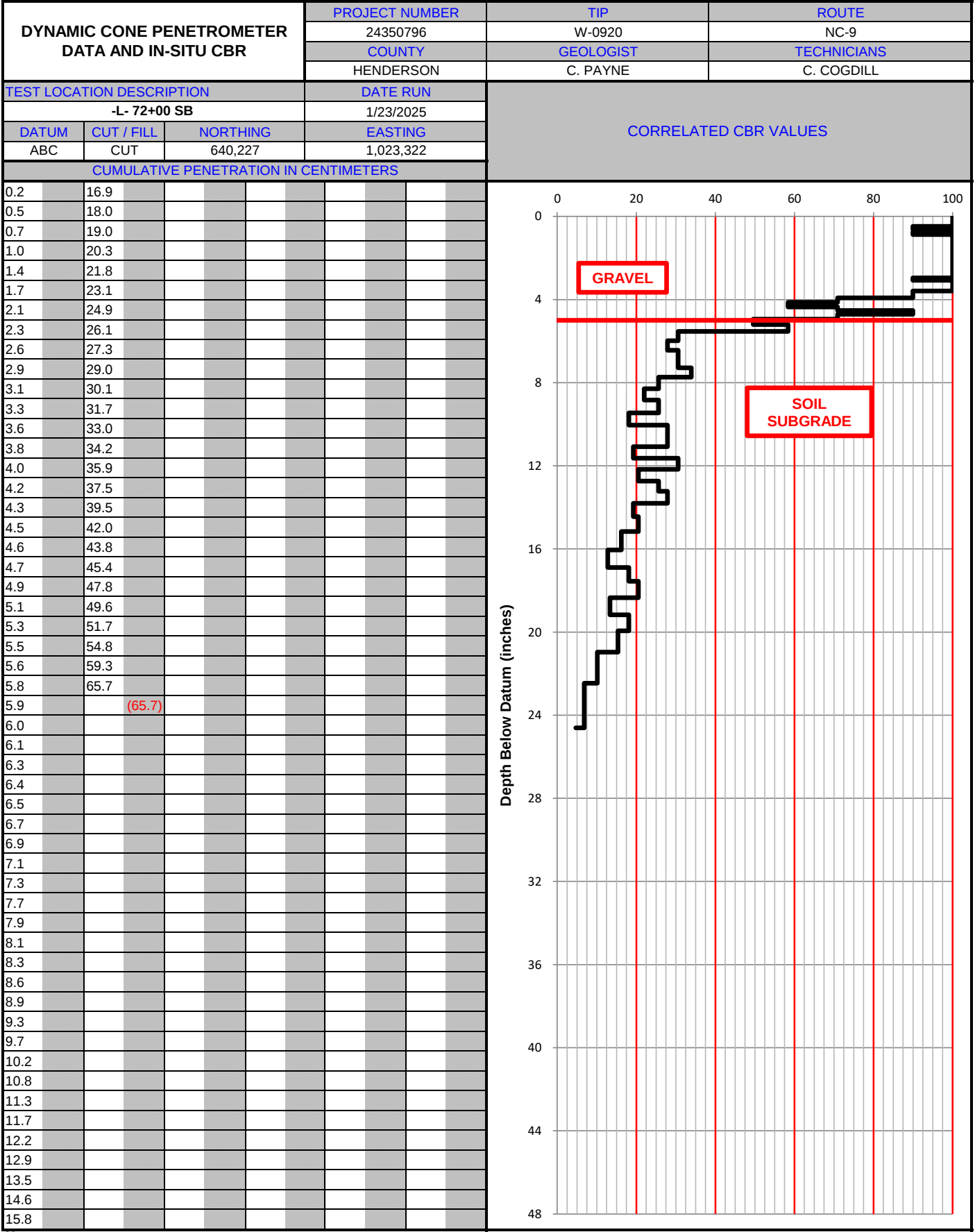
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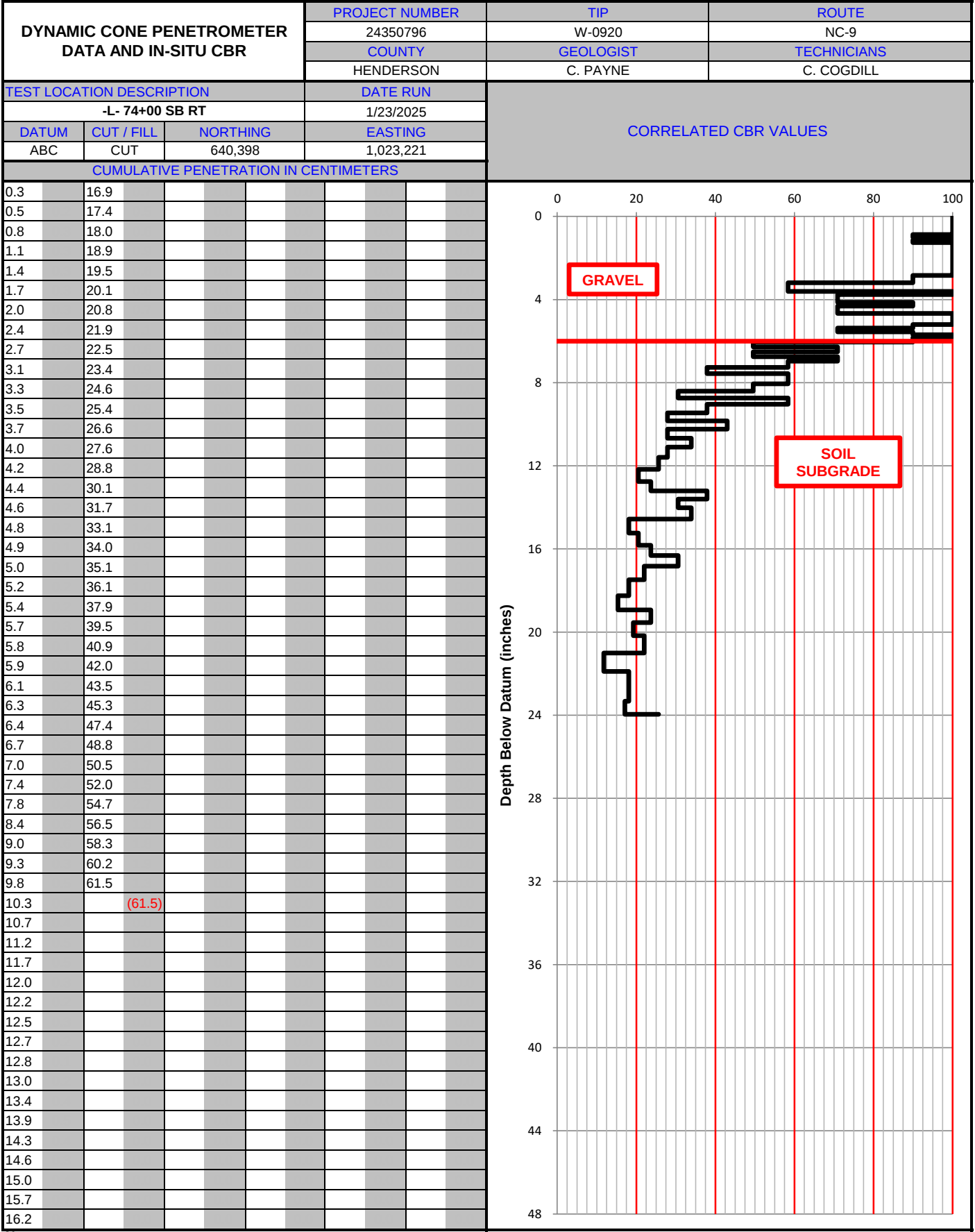
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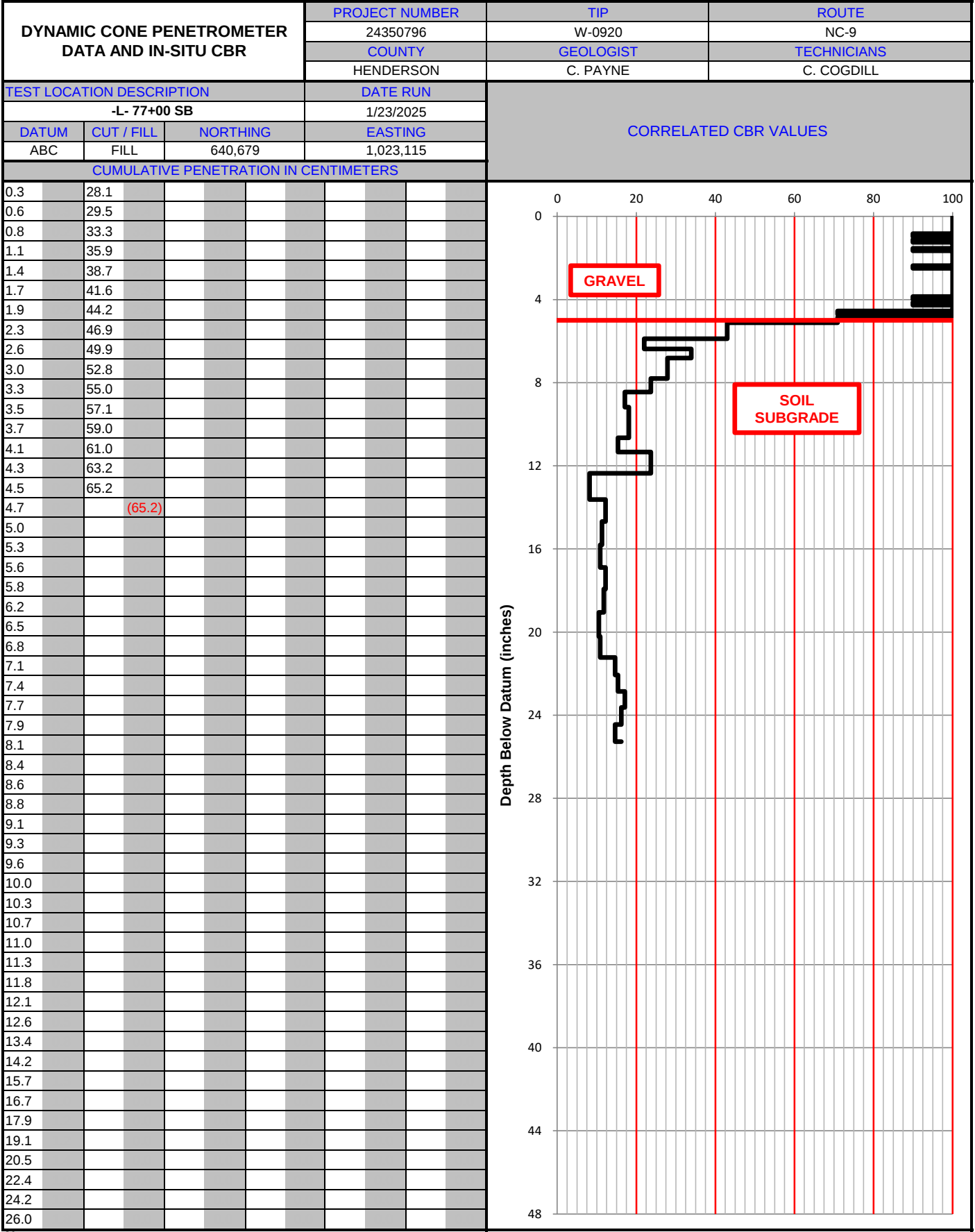
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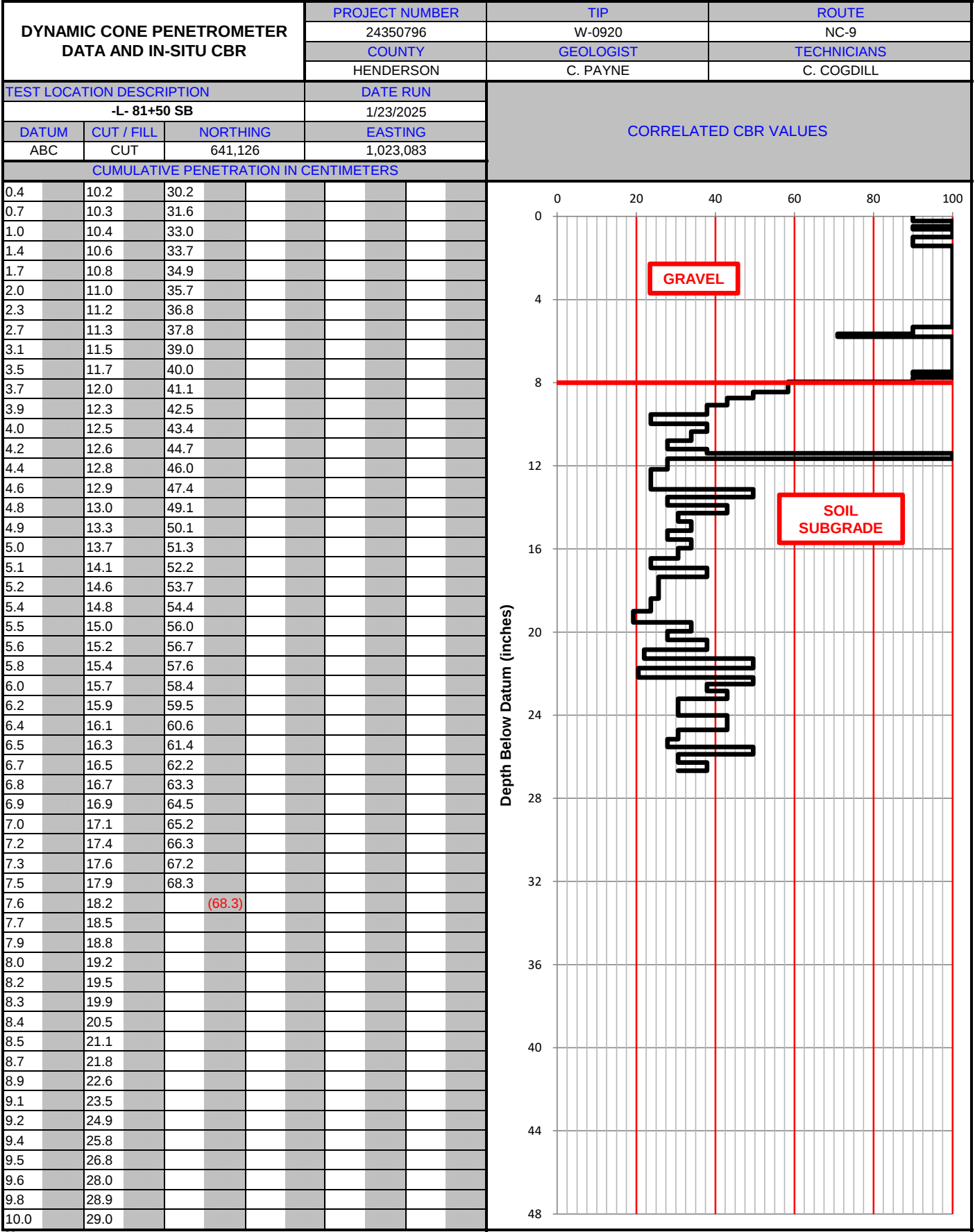
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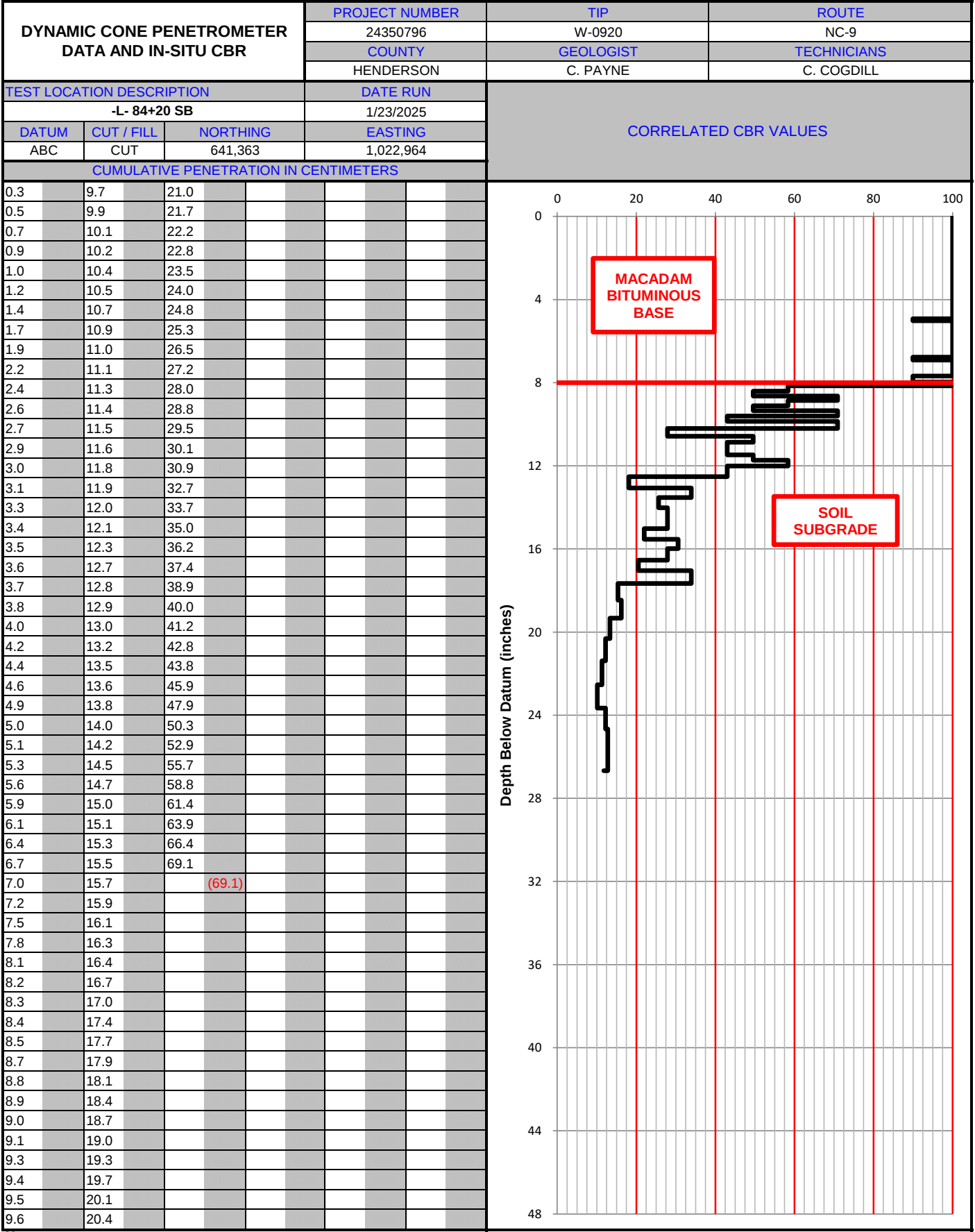
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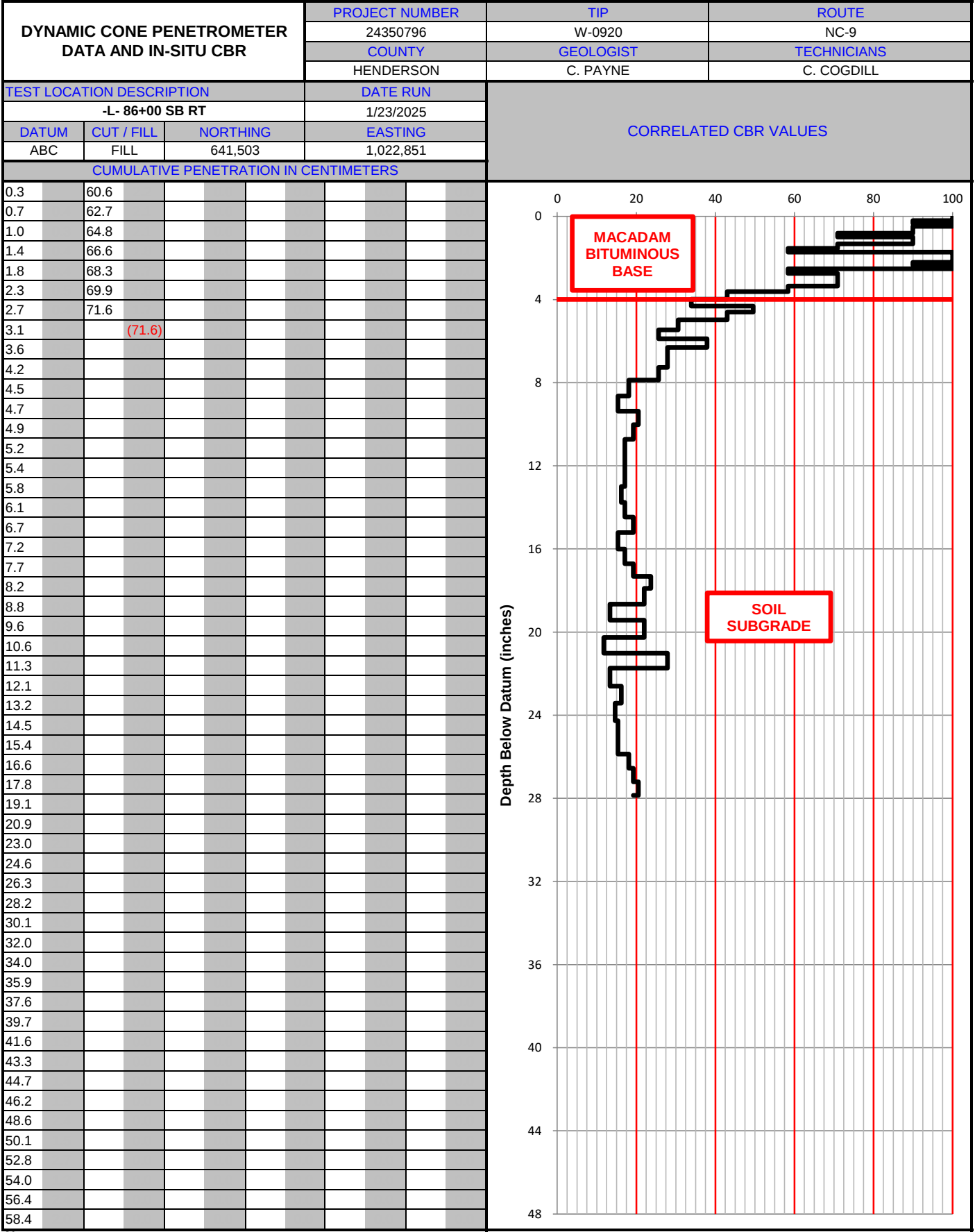
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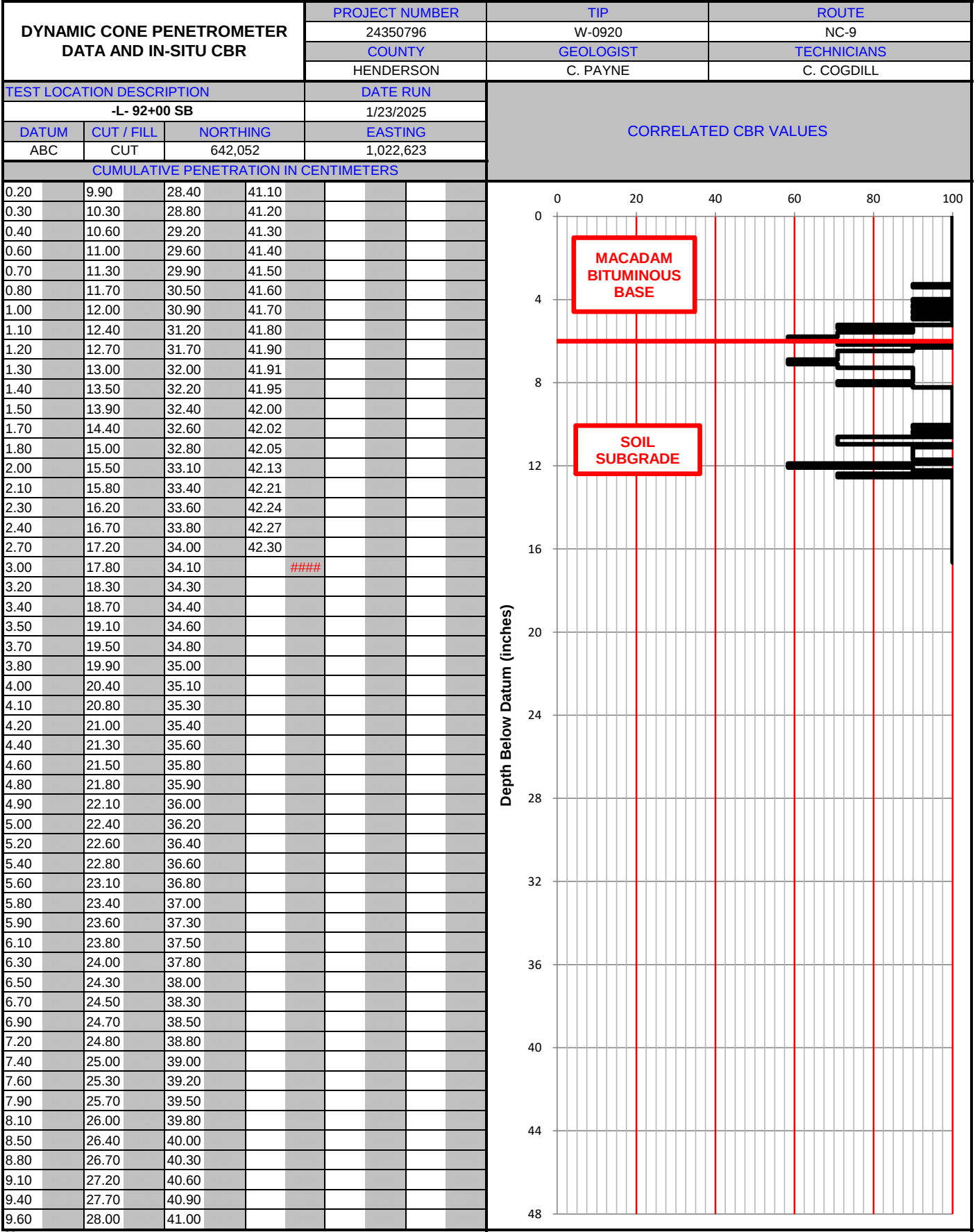
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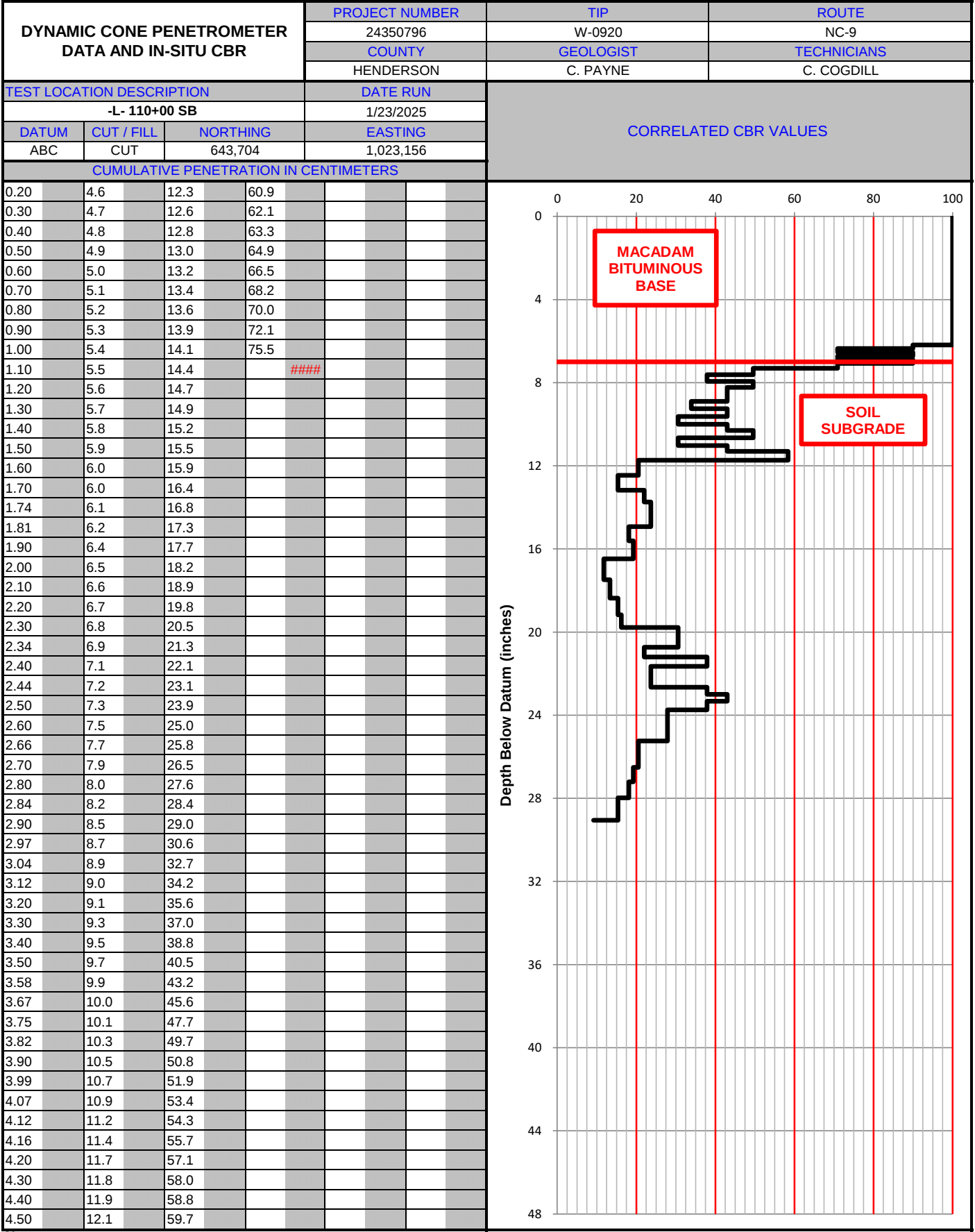
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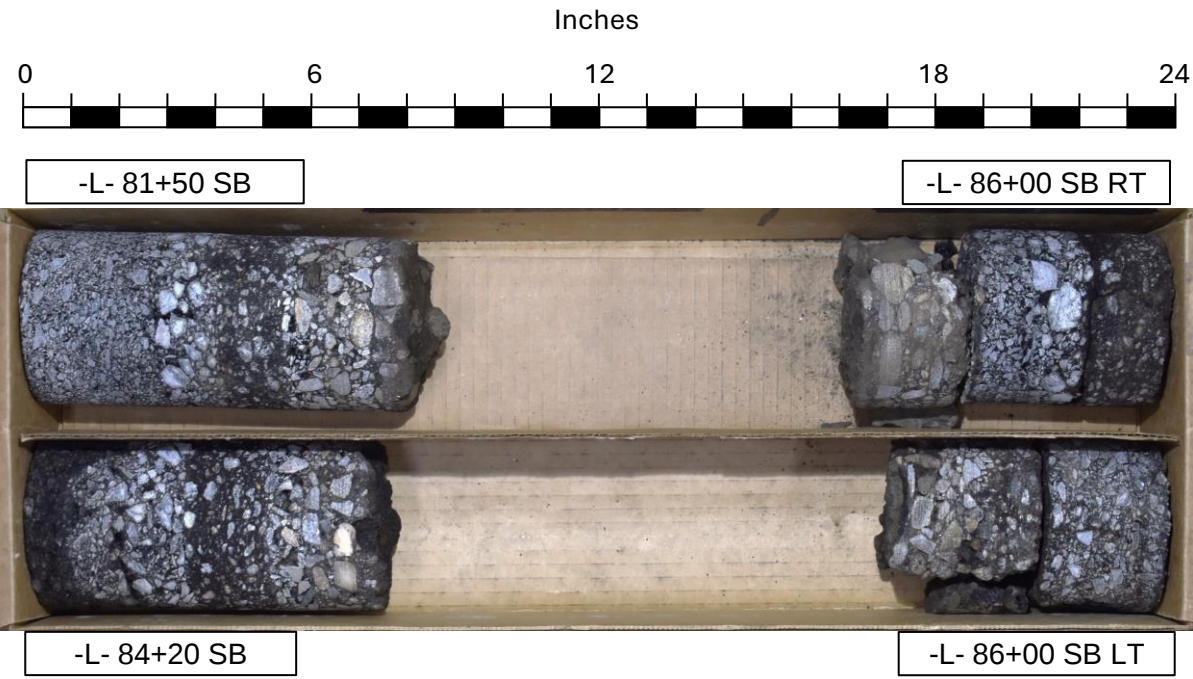
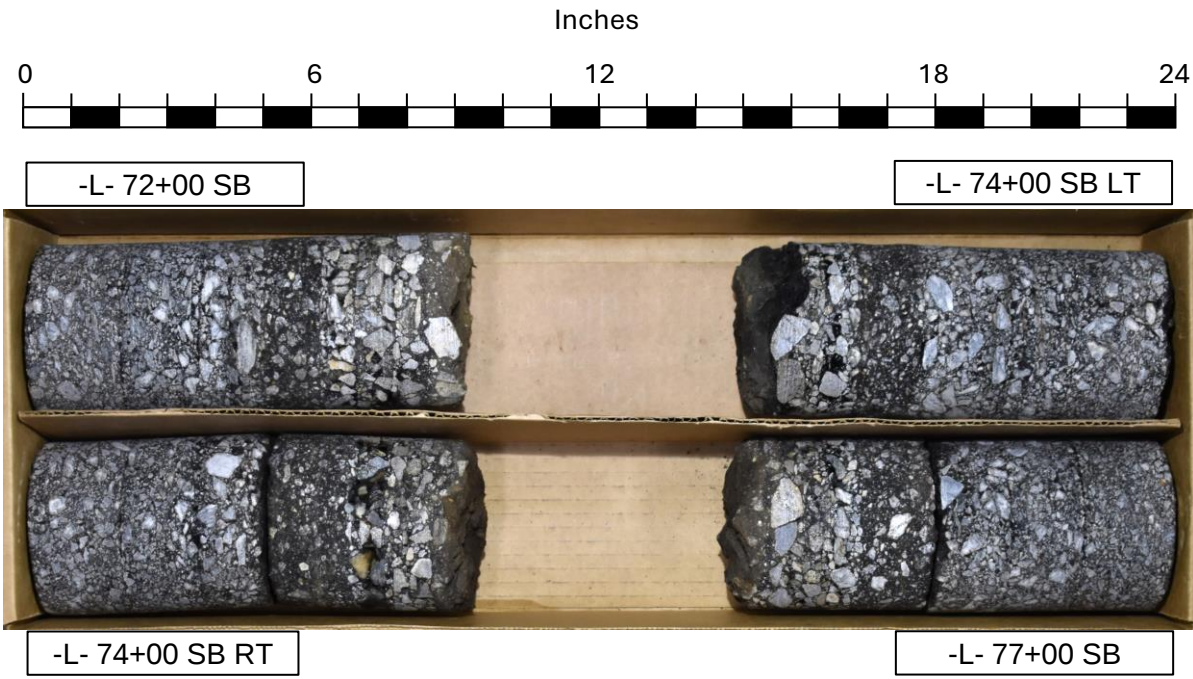
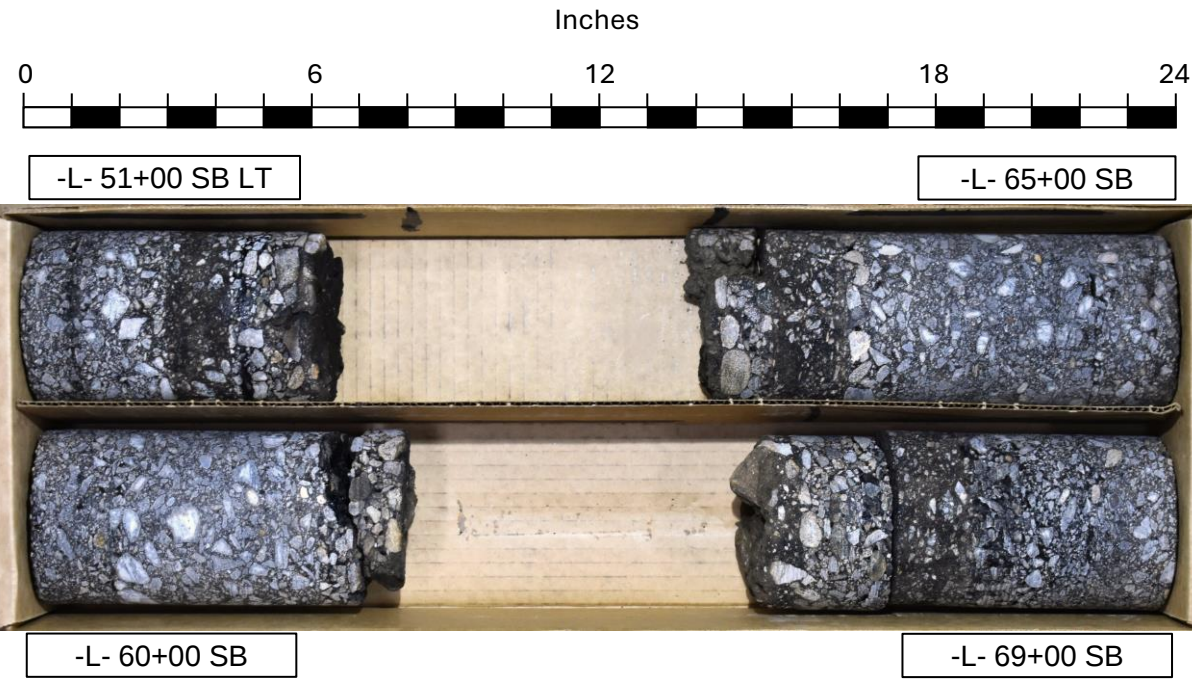
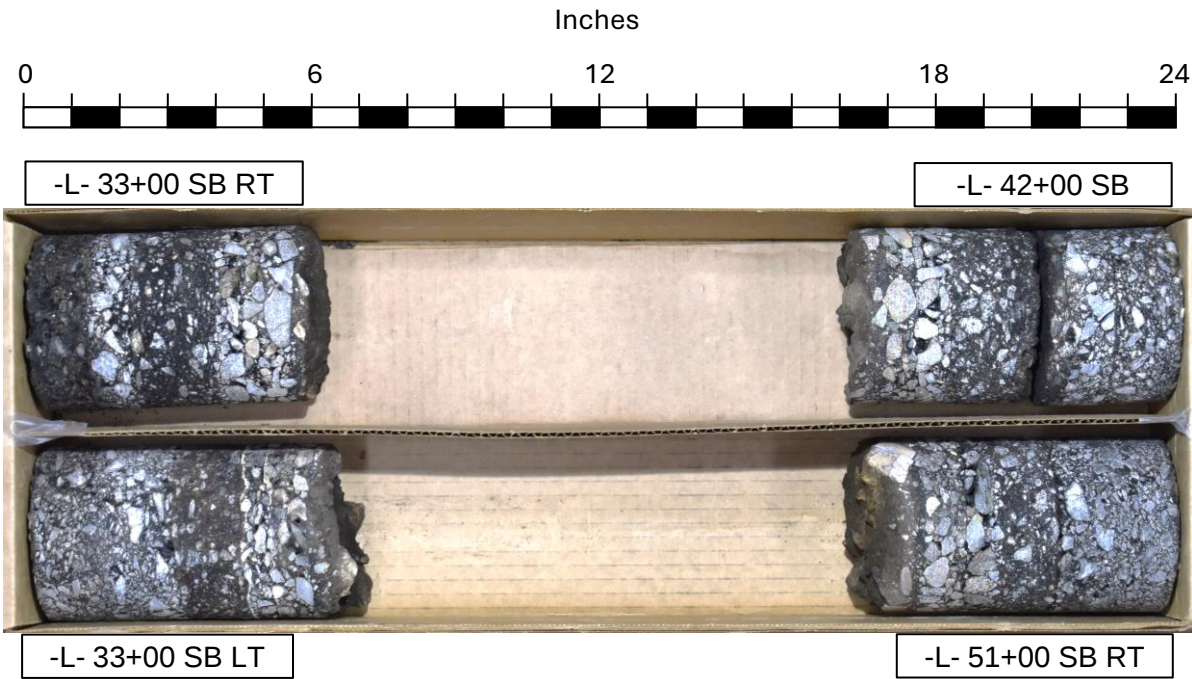
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PAVEMENT CORE PHOTOGRAPHS

WBS: 18314.1045035 TIP: W-0920 Route: NC-9 from US 74A to Buncombe County Line in Bat Cave County: Henderson



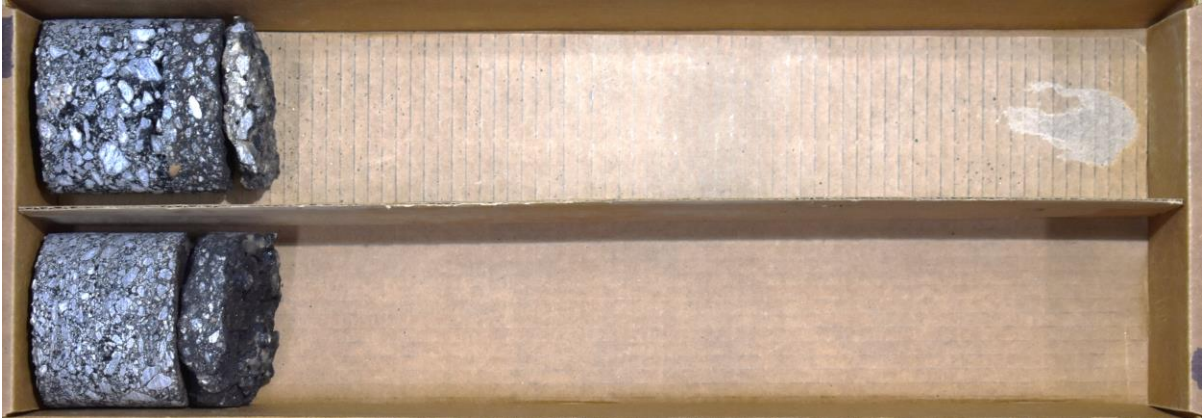
Notes:
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RT = Right Side of Lane
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PAVEMENT CORE PHOTOGRAPHS

WBS: 18314.1045035 TIP: W-0920 Route: NC-9 from US 74A to Buncombe County Line in Bat Cave County: Henderson



-L- 92+00 SB



-L- 110+00 SB

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