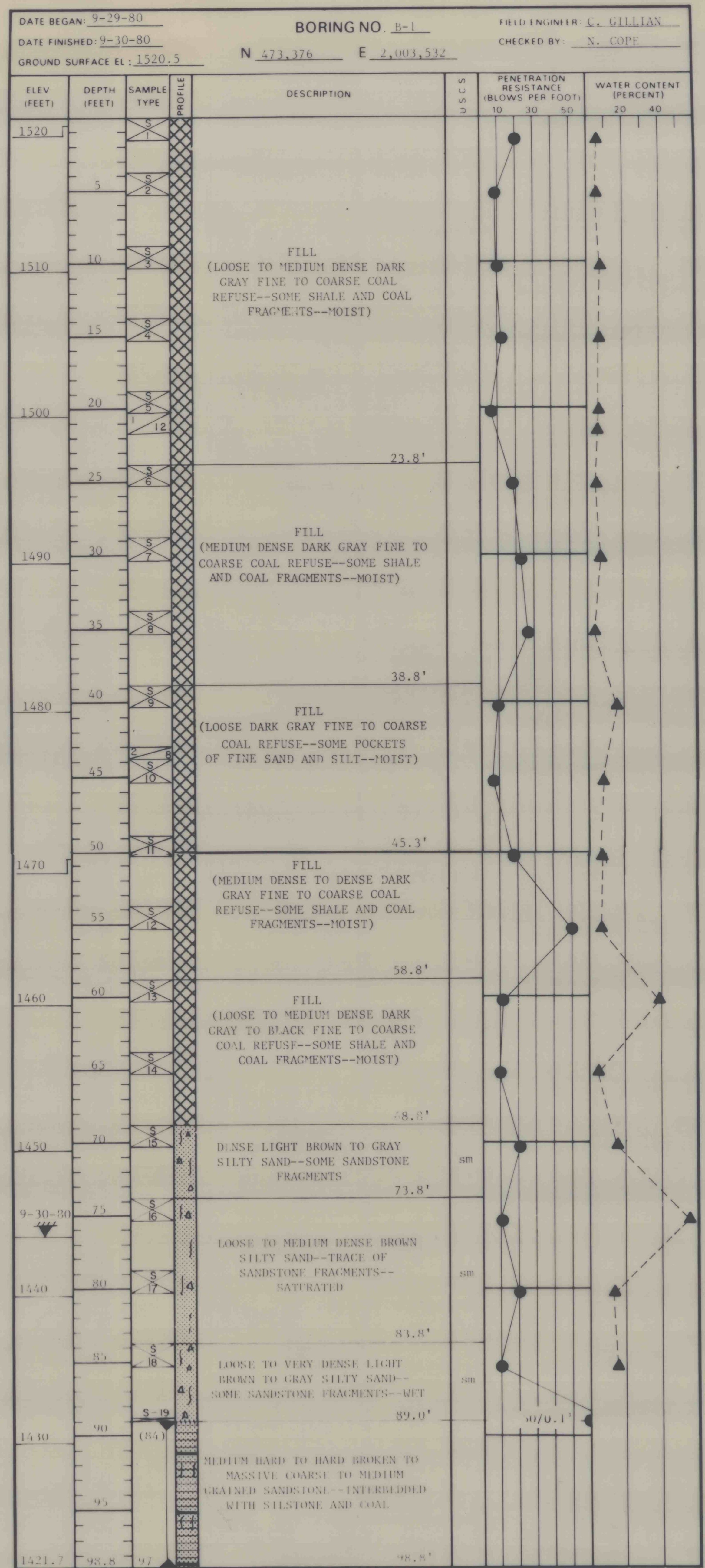
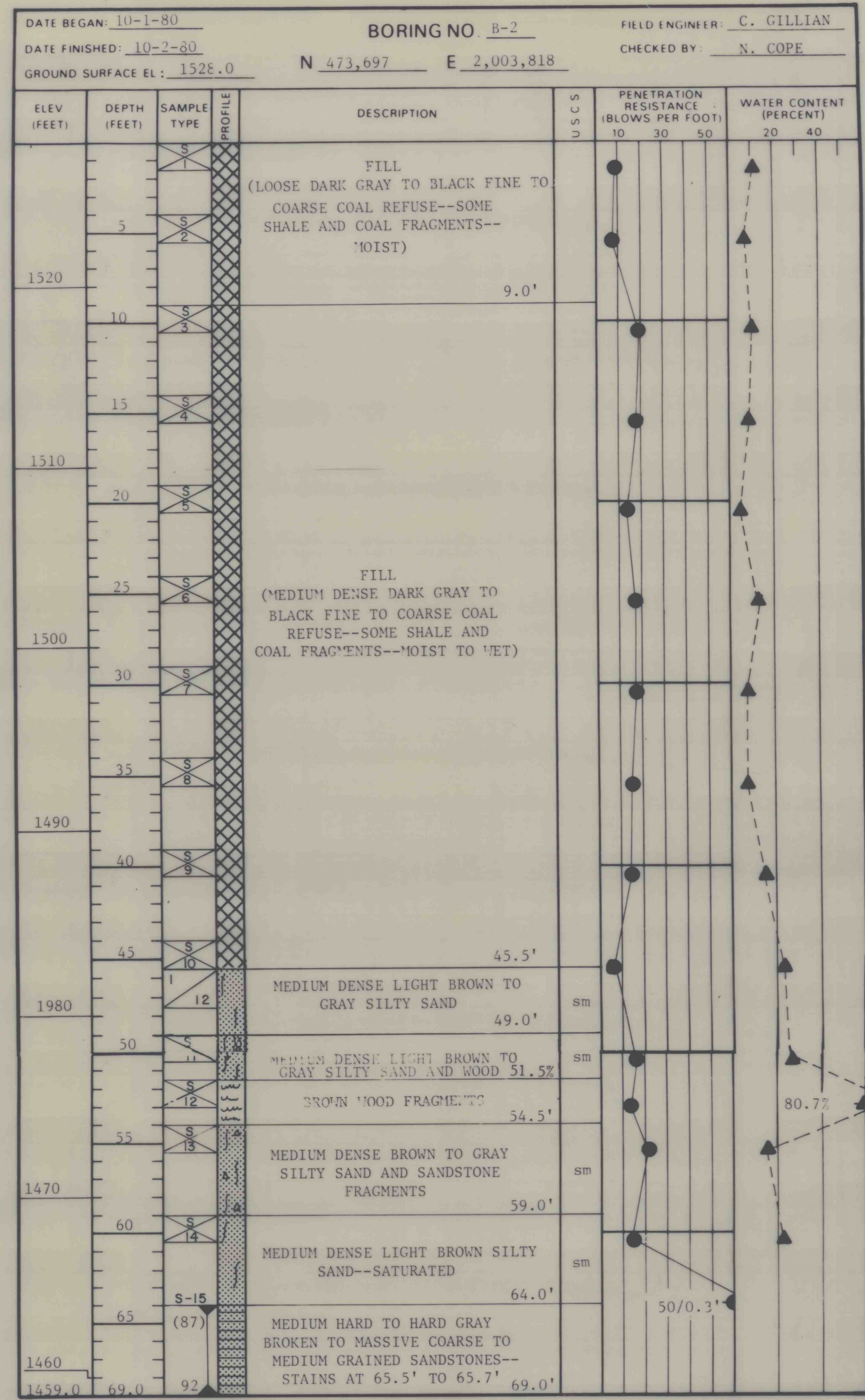
DRAWN BY M E L 3-9-81 | CHECKED BY Jco 2/March/81 | APPROVED BY RJA 3/2/81 | DRAWING NUMBER B77-801-E14



DATE BEGAN: 9-29-80
DATE FINISHED: 9-30-80
GROUND SURFACE EL.: 1520.5
BORING NO. B-1
N 473,376 E 2,003,532
FIELD ENGINEER: C. GILLIAN
CHECKED BY: N. COPE
ELEV (FEET)
DEPTH (FEET)
SAMPLE TYPE
PROFILE
DESCRIPTION
USCS
PENETRATION RESISTANCE (BLOWS PER FOOT)
WATER CONTENT (PERCENT)
FILL (LOOSE TO MEDIUM DENSE DARK GRAY FINE TO COARSE COAL REFUSE--SOME SHALE AND COAL FRAGMENTS--MOIST)
23.8'
FILL (MEDIUM DENSE DARK GRAY FINE TO COARSE COAL REFUSE--SOME SHALE AND COAL FRAGMENTS--MOIST)
38.8'
FILL (LOOSE DARK GRAY FINE TO COARSE COAL REFUSE--SOME POCKETS OF FINE SAND AND SILT--MOIST)
45.3'
FILL (MEDIUM DENSE TO MEDIUM DENSE DARK GRAY FINE TO COARSE COAL REFUSE--SOME SHALE AND COAL FRAGMENTS--MOIST)
58.8'
FILL (LOOSE TO MEDIUM DENSE DARK GRAY TO BLACK FINE TO COARSE COAL REFUSE--SOME SHALE AND COAL FRAGMENTS--MOIST)
68.8'
DENSE LIGHT BROWN TO GRAY SILTY SAND--SOME SANDSTONE FRAGMENTS
73.8'
LOOSE TO MEDIUM DENSE BROWN SILTY SAND--TRACE OF SANDSTONE FRAGMENTS--SATURATED
81.8'
LOOSE TO VERY DENSE LIGHT BROWN TO GRAY SILTY SAND--SOME SANDSTONE FRAGMENTS--WET
89.0'
MEDIUM HARD TO HARD BROKEN TO MASSIVE COARSE TO MEDIUM GRAINED SANDSTONE--INTERBEDDED WITH SILTSTONE AND COAL
98.8'
9-30-80

BOTTOM OF BORING 98.8'

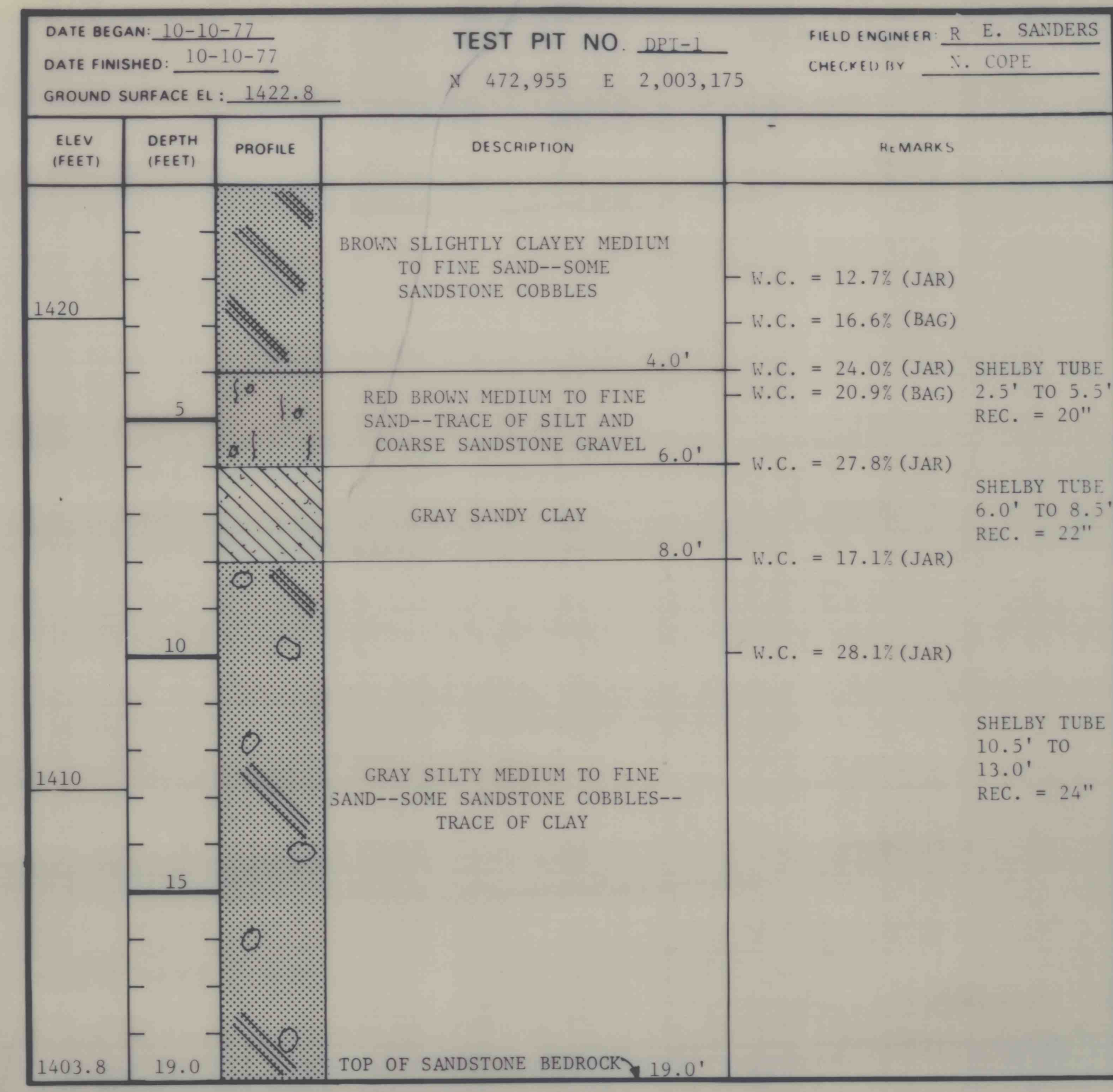
NOTE: TWO 3-1/4-INCH-DIAMETER PVC PIEZOMETERS INSTALLED WITH SLOTTED TIPS AT ELEVATIONS 1465.5 AND 1436.5.



DATE BEGAN: 10-1-80
DATE FINISHED: 10-2-80
GROUND SURFACE EL.: 1528.0
BORING NO. B-2
N 473,697 E 2,003,818
FIELD ENGINEER: C. GILLIAN
CHECKED BY: N. COPE
FILL (LOOSE DARK GRAY TO BLACK FINE TO COARSE COAL REFUSE--SOME SHALE AND COAL FRAGMENTS--MOIST)
9.0'
FILL (MEDIUM DENSE DARK GRAY TO BLACK FINE TO COARSE COAL REFUSE--SOME SHALE AND COAL FRAGMENTS--MOIST TO WET)
45.5'
MEDIUM DENSE LIGHT BROWN TO GRAY SILTY SAND
49.0'
MEDIUM DENSE LIGHT BROWN TO GRAY SILTY SAND AND WOOD 51.5'
BROWN WOOD FRAGMENTS
54.5'
MEDIUM DENSE BROWN TO GRAY SILTY SAND AND SANDSTONE FRAGMENTS
59.0'
MEDIUM DENSE LIGHT BROWN SILTY SAND--SATURATED
64.0'
MEDIUM HARD TO HARD GRAY BROKEN TO MASSIVE COARSE TO MEDIUM GRAINED SANDSTONES--STAINS AT 65.5' TO 65.7'
69.0'
80.7%
50/0.3"

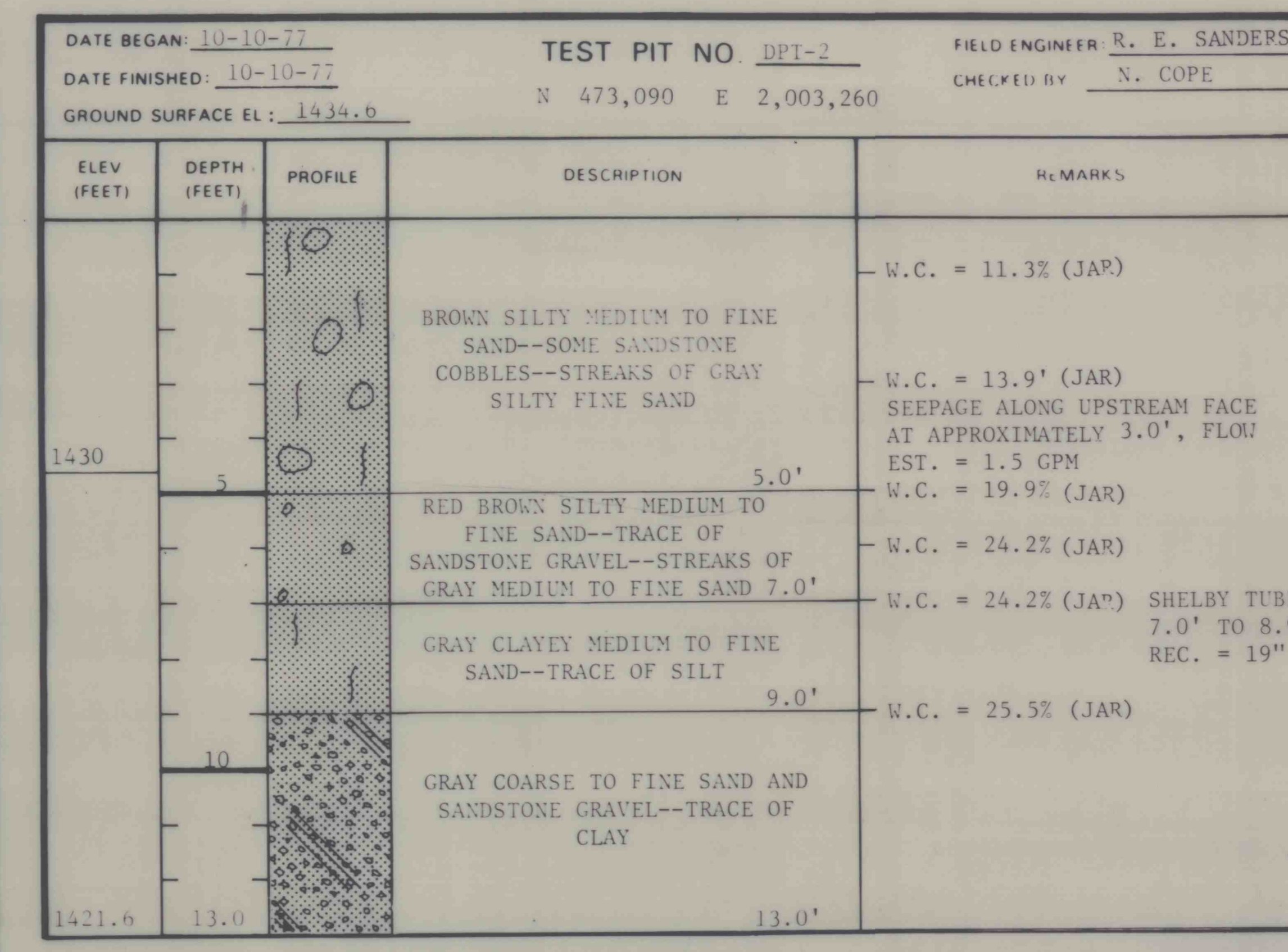
BOTTOM OF BORING 69.0'

NOTE: TWO 3-1/4-INCH-DIAMETER PVC PIEZOMETERS INSTALLED WITH SLOTTED TIPS AT ELEVATIONS 1492 AND 1468.



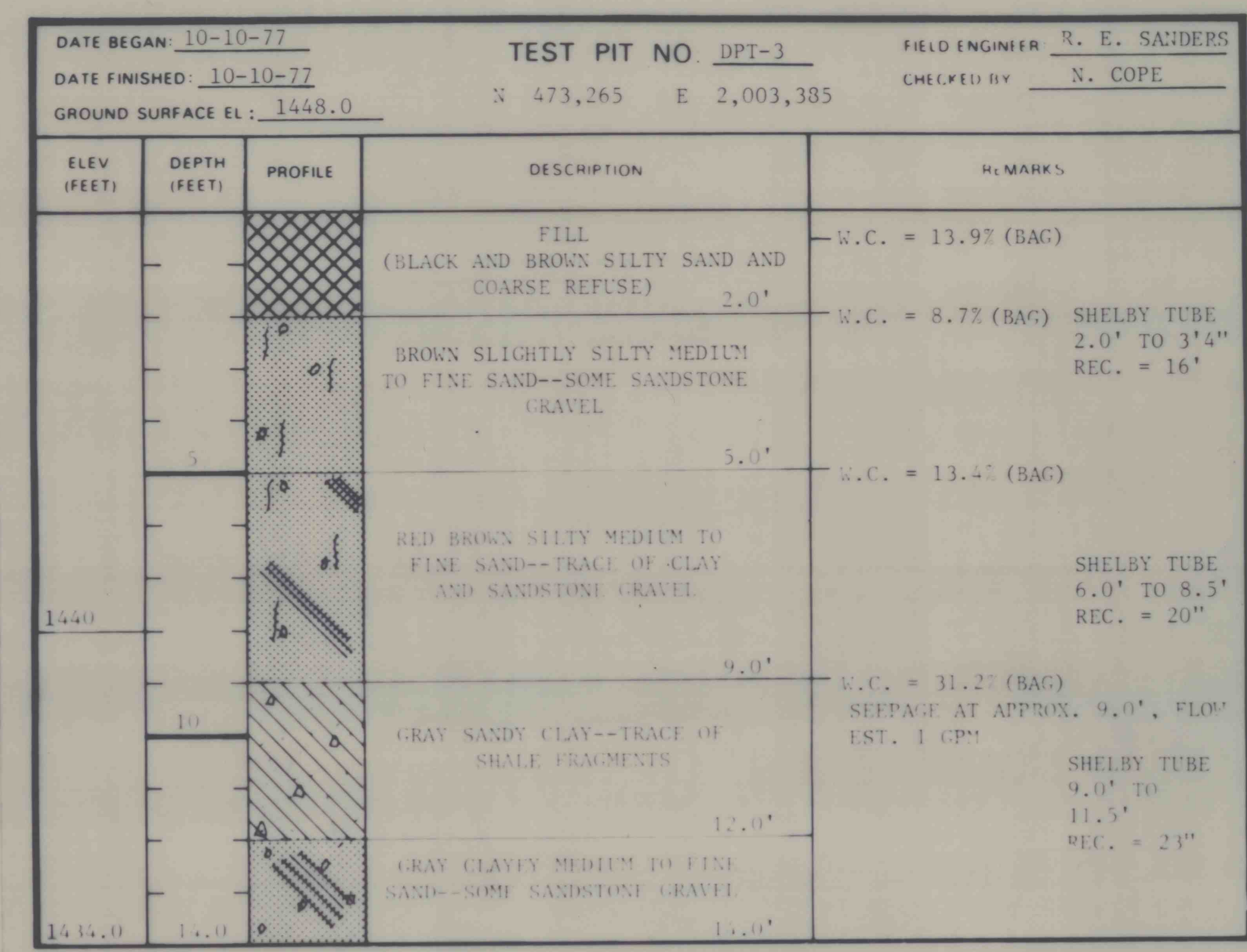
DATE BEGAN: 10-10-77
DATE FINISHED: 10-10-77
GROUND SURFACE EL.: 1422.8
TEST PIT NO. DPT-1
N 472,955 E 2,003,175
FIELD ENGINEER: R. E. SANDERS
CHECKED BY: N. COPE
ELEV (FEET)
DEPTH (FEET)
PROFILE
DESCRIPTION
REMARKS
BROWN SLIGHTLY CLAYEY MEDIUM TO FINE SAND--SOME SANDSTONE COBBLES
4.0'
RED BROWN MEDIUM TO FINE SAND--TRACE OF SILT AND COARSE SANDSTONE GRAVEL
6.0'
GRAY SANDY CLAY
8.0'
GRAY SILTY MEDIUM TO FINE SAND--SOME SANDSTONE COBBLES--TRACE OF CLAY
TOP OF SANDSTONE BEDROCK 19.0'
W.C. = 12.7% (JAR)
W.C. = 16.6% (BAG)
W.C. = 24.0% (JAR)
W.C. = 20.9% (BAG)
W.C. = 27.8% (JAR)
W.C. = 17.1% (JAR)
W.C. = 28.1% (JAR)
SHELBY TUBE 2.5' TO 5.5' REC. = 20"
SHELBY TUBE 6.0' TO 8.5' REC. = 22"
SHELBY TUBE 10.5' TO 13.0' REC. = 24"

BOTTOM OF TEST PIT 19.0'



DATE BEGAN: 10-10-77
DATE FINISHED: 10-10-77
GROUND SURFACE EL.: 1434.6
TEST PIT NO. DPT-2
N 473,090 E 2,003,260
FIELD ENGINEER: R. E. SANDERS
CHECKED BY: N. COPE
BROWN SILTY MEDIUM TO FINE SAND--SOME SANDSTONE COBBLES--STREAKS OF GRAY SILTY FINE SAND
5.0'
RED BROWN SILTY MEDIUM TO FINE SAND--TRACE OF SANDSTONE GRAVEL--STREAKS OF GRAY MEDIUM TO FINE SAND 7.0'
GRAY CLAYEY MEDIUM TO FINE SAND--TRACE OF SILT
9.0'
GRAY COARSE TO FINE SAND AND SANDSTONE GRAVEL--TRACE OF CLAY
13.0'
W.C. = 11.3% (JAR)
W.C. = 13.9% (JAR)
SEEPAGE ALONG UPSTREAM FACE AT APPROXIMATELY 3.0', FLOW EST. = 1.5 GPM
W.C. = 19.9% (JAR)
W.C. = 24.2% (JAR)
W.C. = 24.2% (JAR) SHELBY TUBE 7.0' TO 8.9' REC. = 19"
W.C. = 25.5% (JAR)

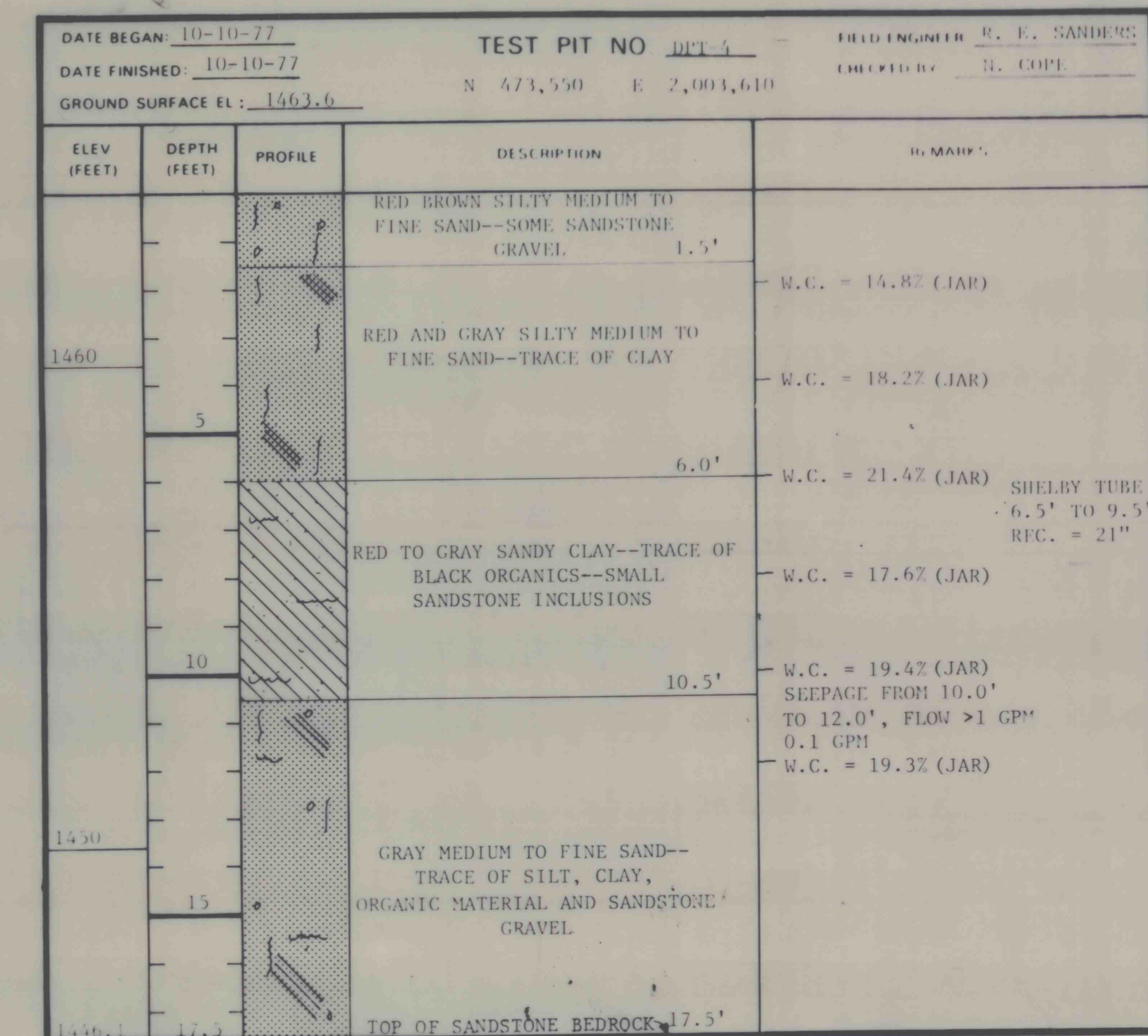
BOTTOM OF TEST PIT 13.0'



DATE BEGAN: 10-10-77
DATE FINISHED: 10-10-77
GROUND SURFACE EL.: 1448.0
TEST PIT NO. DPT-3
N 473,265 E 2,003,385
FIELD ENGINEER: R. E. SANDERS
CHECKED BY: N. COPE
FILL (BLACK AND BROWN SILTY SAND AND COARSE REFUSE)
2.0'
BROWN SLIGHTLY SILTY MEDIUM TO FINE SAND--SOME SANDSTONE GRAVEL
5.0'
RED BROWN SILTY MEDIUM TO FINE SAND--TRACE OF CLAY AND SANDSTONE GRAVEL
9.0'
GRAY SANDY CLAY--TRACE OF SHALE FRAGMENTS
12.0'
GRAY CLAYEY MEDIUM TO FINE SAND--SOME SANDSTONE GRAVEL
14.0'
W.C. = 13.9% (BAG)
W.C. = 8.7% (BAG) SHELBY TUBE 2.0' TO 3'4" REC. = 16"
W.C. = 13.4% (BAG)
SHELBY TUBE 6.0' TO 8.5' REC. = 20"
W.C. = 11.2% (BAG) SEEPAGE AT APPROX. 9.0', FLOW EST. 1 GPM
SHELBY TUBE 9.0' TO 11.5' REC. = 21"

BOTTOM OF TEST PIT 14.0'

NOTE: FILL EXISTED ON LEFT SIDE LOOKING UPSTREAM TO AN APPROXIMATE DEPTH OF 10' TO 12'



DATE BEGAN: 10-10-77
DATE FINISHED: 10-10-77
GROUND SURFACE EL.: 1463.6
TEST PIT NO. DPT-4
N 473,550 E 2,003,610
FIELD ENGINEER: R. E. SANDERS
CHECKED BY: N. COPE
RED BROWN SILTY MEDIUM TO FINE SAND--SOME SANDSTONE GRAVEL 1.5'
RED AND GRAY SILTY MEDIUM TO FINE SAND--TRACE OF CLAY
6.0'
RED TO GRAY SANDY CLAY--TRACE OF BLACK ORGANICS--SMALL SANDSTONE INCLUSIONS
10.5'
GRAY MEDIUM TO FINE SAND--TRACE OF SILT, CLAY, ORGANIC MATERIAL AND SANDSTONE GRAVEL
TOP OF SANDSTONE BEDROCK 17.5'
W.C. = 14.8% (JAR)
W.C. = 18.2% (JAR)
W.C. = 21.4% (JAR) SHELBY TUBE 6.5' TO 9.5' REC. = 21"
W.C. = 17.6% (JAR)
W.C. = 19.4% (JAR) SEEPAGE FROM 10.0' TO 12.0', FLOW >1 GPM 0.1 GPM
W.C. = 19.3% (JAR)

BOTTOM OF TEST PIT 17.5'

2" O.D. SPLIT BARREL SAMPLE

75/0.5" PENETRATION REFUSAL RESISTANCE AND FRACTIONAL INCREMENT DRIVEN IN FEET

(1-8-81) GROUND WATER LEVEL AND DATE

USCS UNIFIED SOIL CLASSIFICATION SYSTEM (CAPITAL LETTERS INDICATE LAB TEST CLASSIFICATION, LOWER CASE LETTERS INDICATE VISUAL FIELD CLASSIFICATION)

SAMPLE NUMBER
3" UNDISTURBED SAMPLE (SHELBY TUBE)
RECOVERY INCHES

(60) RQD (ROCK QUALITY DESIGNATION PERCENT) (LENGTH OF NUMBER OF PIECES GREATER THAN 4 INCHES DIVIDED BY THE LENGTH OF THE CORE RUN)

90 INDICATES PERCENT OF CORE RECOVERED (LENGTH OF CORE RECOVERED DIVIDED BY LENGTH OF CORE RUN)

TRACE — INDICATES PRESENT OF LESS THAN 10% OF SUBJECT MATERIAL BY WEIGHT
SOME — INDICATES PRESENT OF 10 TO 30% OF SUBJECT MATERIAL BY WEIGHT
AND — INDICATES PRESENT OF 30 TO 50% OF SUBJECT MATERIAL BY WEIGHT

Symbols to be used for designation of subsurface materials on all boring logs and subsurface sections

OVERBURDEN: GRAVEL, SAND, SILT, CLAY, ORGANIC MATTER, ROOTS

SEDIMENTARY ROCKS: SILTSTONE, SANDSTONE, SHALE, COAL

MISCELLANEOUS: FILL, APPROXIMATE EXISTING GROUND, APPROXIMATE TOP OF ROCK

CONSISTENCY OF COHESIVE SOILS

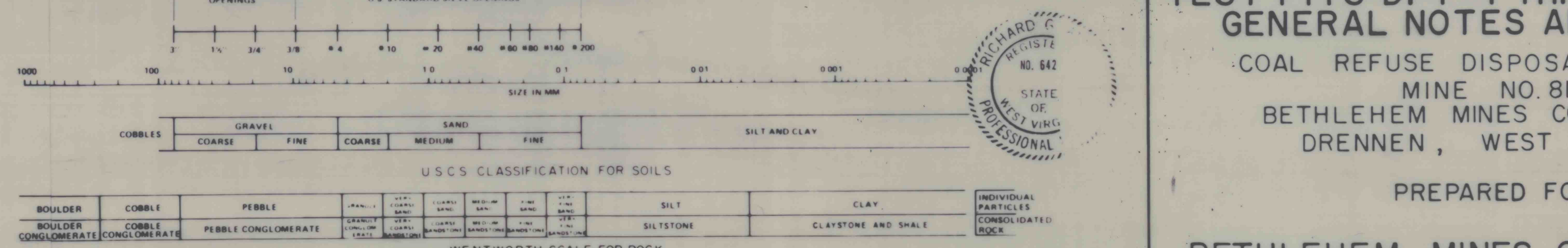
CONSISTENCY	UNCONFINED COMPRESSIVE STRENGTH TONS PER SQUARE FOOT
VERY SOFT	LESS THAN 0.25
SOFT	0.25 TO 0.50
MEDIUM STIFF	0.50 TO 1.0
STIFF	1.0 TO 2.0
VERY STIFF	2.0 TO 4.0
HARD	MORE THAN 4.0

DENSITY OF GRANULAR SOILS

DESIGNATION	BLOWS PER FOOT
VERY LOOSE	0-4
LOOSE	5-10
MEDIUM DENSE	11-30
DENSE	31-50
VERY DENSE	OVER 50

THE TEST PIT LOGS AND RELATED INFORMATION DEPICT SUBSURFACE CONDITIONS ONLY AT THE SPECIFIC LOCATIONS AND DATES INDICATED. SOIL CONDITIONS AND WATER LEVELS AT OTHER LOCATIONS MAY DIFFER FROM CONDITIONS OCCURRING AT THESE TEST PIT LOCATIONS. ALSO THE PASSAGE OF TIME MAY RESULT IN A CHANGE IN THE CONDITIONS AT THESE TEST PIT LOCATIONS.

STANDARD PENETRATION RESISTANCE IS THE NUMBER OF BLOWS REQUIRED TO DRIVE A 2 INCH O.D. SPLIT BARREL SAMPLER 12 INCHES USING A 140 POUND HAMMER FALLING FREELY THROUGH 30 INCHES. THE SAMPLER WAS DRIVEN 18 INCHES AND THE NUMBER OF BLOWS RECORDED FOR EACH 6 INCH INTERVAL. THE RESISTANCE TO PENETRATION IS INDICATED ON THE DRAWING AS BLOWS PER FOOT.



CLEAR SIEVE OPENINGS
U.S. STANDARD SIEVE OPENINGS
3" 1½" 3/4" 3/8" #4 #10 #20 #40 #60 #80 #140 #200
1000 100 10 1.0 0.1 0.01 0.001 0.0001
SIZE IN MM
COBBLES
GRAVEL COARSE FINE
SAND COARSE MEDIUM FINE
SILT AND CLAY
USCS CLASSIFICATION FOR SOILS
BOULDER COBBLE PEBBLE GRANULE VERY COARSE SAND COARSE SAND MEDIUM SAND FINE SAND VERY FINE SAND SILT CLAY INDIVIDUAL PARTICLES
BOULDER CONGLOMERATE COBBLE CONGLOMERATE PEBBLE CONGLOMERATE GRANULE CONGLOMERATE VERY COARSE SANDSTONE COARSE SANDSTONE MEDIUM SANDSTONE FINE SANDSTONE VERY FINE SANDSTONE SILTSTONE CLAYSTONE AND SHALE CONSOLIDATED ROCK
WENTWORTH SCALE FOR ROCK
RICHARD G. REGISTERED NO. 642 STATE OF WEST VIRGINIA PROFESSIONAL

TERMS USED TO DESCRIBE THE RELATIVE DEGREES OF ROCK CORE HARDNESS

DESCRIPTIVE TERMS	DEFINING CHARACTERISTICS
VERY SOFT	CRUSHES UNDER PRESSURE OF FINGERS AND/OR THUMB
SOFT	CRUSHES UNDER PRESSURE OF PRESSED HAMMER
MEDIUM HARD	BREAKS EASILY UNDER SINGLE HAMMER BLOW BUT WITH CRUMBLY EDGES
HARD	BREAKS UNDER ONE OR TWO STRONG HAMMER BLOWS BUT WITH RESISTANT SHARP EDGES
VERY HARD	BREAKS UNDER SEVERAL STRONG HAMMER BLOWS BUT WITH VERY RESISTANT SHARP EDGES AND MAY SPALL LEAVING CONCHOIDAL FRACTURES

THE SPACING OF THE DISCONTINUITIES IN THE ROCK MAY BE DESCRIBED BY ONE OF THE FOLLOWING TERMS

DESCRIPTIVE TERMS	SPACING
VERY BROKEN	LESS THAN 1 IN
BROKEN	1 IN TO 3 IN
SLIGHTLY BROKEN	3 IN TO 6 IN
MASSIVE	6 IN AND GREATER

DRAWING NO	SHEET NO	FIGURE NO
B77-801-E14	11 OF 12	4

BORING LOGS B-1 AND B-2 TEST PITS DPT-1 THROUGH DPT-4 AND GENERAL NOTES AND LEGEND

COAL REFUSE DISPOSAL FACILITY
MINE NO. 81
BETHLEHEM MINES CORPORATION
DRENNEN, WEST VIRGINIA

PREPARED FOR

BETHLEHEM MINES CORPORATION
NICHOLAS DIVISION
CHARLESTON, WEST VIRGINIA

D'APPOLONIA

12-4-11