

**This electronic collection of documents is provided  
for the convenience of the user  
and is Not a Certified Document –**

**The documents contained herein were originally issued  
and sealed by the individuals whose names and license  
numbers appear on each page, on the dates appearing  
with their signature on that page.**

**This file or an individual page  
shall not be considered a certified document.**

REFERENCE: I-4400

PROJECT: 34232

**CONTENTS**

| <u>SHEET NO.</u> | <u>DESCRIPTION</u> |
|------------------|--------------------|
| 1                | TITLE SHEET        |
| 2                | LEGEND (SOIL)      |
| 3                | SITE PLAN          |
| 4                | BORELOGS           |

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

**STRUCTURE**  
**SUBSURFACE INVESTIGATION**

COUNTY HENDERSON

PROJECT DESCRIPTION I-26 FROM US-64 (EXIT 49)  
TO US-25 BUS. (EXIT 44)

SITE DESCRIPTION EXTEND EXISTING CULVERT #0218  
CROSSING UNDER I-26 CONVEYING FEATHERSTONE CRK  
@ PROJECT STATION -L- 525+98.1

| STATE | STATE PROJECT REFERENCE NO. | SHEET NO. | TOTAL SHEETS |
|-------|-----------------------------|-----------|--------------|
| N.C.  | I-4400                      | 1         | 4            |

**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  
**F&R CONSULTANTS**

D. RACEY

M. DURWAY

S. WOODS

INVESTIGATED BY D. RACEY/DC ELLIOTT

DRAWN BY DC ELLIOTT

CHECKED BY JC KUHNE

SUBMITTED BY JC KUHNE

DATE \_\_\_\_\_



DocuSigned by:  
D. Clayton Elliott 2/26/2019  
 \_\_\_\_\_  
 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
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 D 1586, ASTM D 5958). 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, VERY STIFF, GRAY, SILTY CLAY, MOIST WITH INTERBEDDED FINE SAND LAYERS, HIGHLY PLASTIC, A-7-6

SOIL LEGEND AND AASHTO CLASSIFICATION
Table with columns for General Class, Group Class, Symbol, % Passing, Material Passing #10, #40, #200, LL, PI, Group Index, Usual Types of Major Materials, and General Rating as Subgrade.

CONSISTENCY OR DENSENESS
Table with columns for Primary Soil Type, Compactness or Consistency, Range of Standard Penetration Resistance (N-value), and Range of Unconfined Compressive Strength (tons/ft²).

TEXTURE OR GRAIN SIZE
Table with columns for U.S. Std. Sieve Size Opening (mm), Boulder (BLDR.), Cobble (COB.), Gravel (GR.), Coarse Sand (CS), Fine Sand (FS), Silt (SL), and Clay (CL).

SOIL MOISTURE - CORRELATION OF TERMS
Table with columns for Soil Moisture Scale (Atterberg Limits), Field Moisture Description, and Guide for Field Moisture Description.

PLASTICITY
Table with columns for Plasticity Index (PI) and Dry Strength.

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

GRADATION
WELL GRADED - INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM FINE TO COARSE.
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.

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 LL < 31
MODERATELY COMPRESSIBLE LL = 31 - 50
HIGHLY COMPRESSIBLE LL > 50

PERCENTAGE OF MATERIAL
ORGANIC MATERIAL: TRACE OF ORGANIC MATTER (2-3%), LITTLE ORGANIC MATTER (3-5%), MODERATELY ORGANIC (5-10%), HIGHLY ORGANIC (>10%)

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

MISCELLANEOUS SYMBOLS
ROADWAY EMBANKMENT (RE) WITH SOIL DESCRIPTION
ARTIFICIAL FILL (AF) OTHER THAN ROADWAY EMBANKMENT
INFERRED SOIL BOUNDARY
INFERRED ROCK LINE
ALLUVIAL SOIL BOUNDARY

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

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. 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.

COASTAL PLAIN SEDIMENTARY ROCK (CPS)
COASTAL PLAIN SEDIMENTS CEMENTED INTO ROCK, BUT MAY NOT YIELD SPT REFUSAL. ROCK TYPE INCLUDES LIMESTONE, SANDSTONE, CEMENTED SHELL BEDS, ETC.

WEATHERING
FRESH: ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING. ROCK RINGS UNDER HAMMER IF CRYSTALLINE.
VERY SLIGHT (V 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.

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.

MODERATE (MO): SIGNIFICANT PORTIONS OF ROCK SHOW DISCOLORATION AND WEATHERING EFFECTS. IN GRANITOID ROCKS, MOST FELDSPARS ARE DULL AND DISCOLORED. SOME SHOW CLAY. ROCK HAS DULL SOUND UNDER HAMMER BLOWS AND SHOWS SIGNIFICANT LOSS OF STRENGTH AS COMPARED WITH FRESH ROCK.

MODERATELY SEVERE (MO, 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.

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.

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.

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.

TERMS AND DEFINITIONS
ALLUVIUM (ALLUV): SOILS THAT HAVE BEEN TRANSPORTED BY WATER.
AQUIFER - A WATER BEARING FORMATION OR STRATA.

ARENACEOUS - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND.
ARGILLACEOUS - APPLIED TO ALL ROCKS OR SUBSTANCES COMPOSED OF CLAY MINERALS, OR HAVING A NOTABLE PROPORTION OF CLAY IN THEIR COMPOSITION, SUCH AS SHALE, SLATE, ETC.

ARTESIAN - GROUND WATER THAT IS UNDER SUFFICIENT PRESSURE TO RISE ABOVE THE LEVEL AT WHICH IT IS ENCOUNTERED, BUT WHICH DOES NOT NECESSARILY RISE TO OR ABOVE THE GROUND SURFACE.
CALCAREOUS (CALC) - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE.

COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM OF SLOPE.
CORE RECOVERY (REC.) - TOTAL LENGTH OF ALL MATERIAL RECOVERED IN THE CORE BARREL DIVIDED BY TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE.

DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT ROCKS OR CUTS MASSIVE ROCK.
DIP - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE HORIZONTAL.

DIP DIRECTION (DIP AZIMUTH) - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH.
FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE.

FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES.
FLOAT - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLOGGED FROM PARENT MATERIAL.
FLOOD PLAIN (FP) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM.

FORMATION (FM) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE FIELD.
JOINT - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED.
LEDGE - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO ITS LATERAL EXTENT.

LENS - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS.
MOTTLED (MOT.) - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS. MOTTLING IN SOILS USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE.
PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE OF AN INTERVENING IMPERVIOUS STRATUM.

RESIDUAL (RES.) SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK.
ROCK QUALITY DESIGNATION (ROD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE.

SAPROLITE (SAP.) - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT ROCK.
SILL - AN INTRUSIVE BODY OF IGNEOUS ROCK OF APPROXIMATELY UNIFORM THICKNESS AND RELATIVELY THIN COMPARED WITH ITS LATERAL EXTENT, THAT HAS BEEN EMPLACED PARALLEL TO THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS.

SLICKENSIDE - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE.
STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT) - NUMBER OF BLOWS (N OR BPF) OF A 140 LB. HAMMER FALLING 30 INCHES REQUIRED TO PRODUCE A PENETRATION OF 1 FOOT INTO SOIL WITH A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER. SPT REFUSAL IS PENETRATION EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS.

FRACTURE SPACING
Table with columns for Term and Spacing.

BEDDING
Table with columns for Term and Thickness.

INDURATION
FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.
FRIABLE: RUBBING WITH FINGER FREES NUMEROUS GRAINS; GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE.
MODERATELY INDURATED: GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE; BREAKS EASILY WHEN HIT WITH HAMMER.

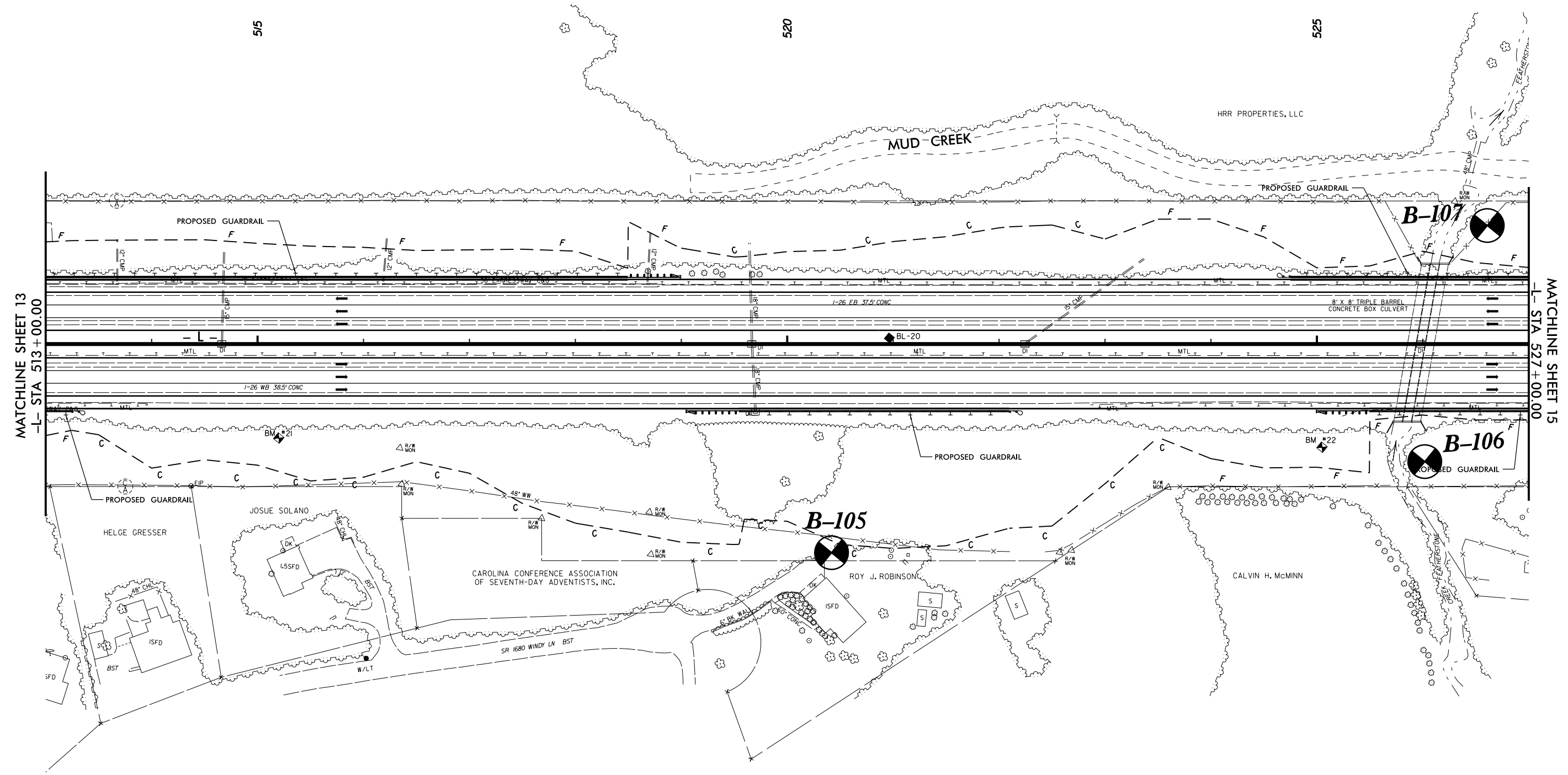
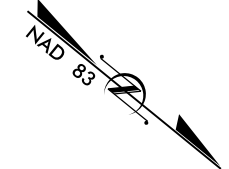
EQUIPMENT USED ON SUBJECT PROJECT
DRILL UNITS: CME-45C, CME-55, CME-55B, VANE SHEAR TEST, PORTABLE HOIST
ADVANCING TOOLS: CLAY BITS, 6" CONTINUOUS FLIGHT AUGER, 8" HOLLOW AUGERS, HARD FACED FINGER BITS, TUNG-CARBIDE INSERTS, CASING w/ ADVANCER, TRICONE STEEL TEETH, TRICONE TUNG-CARB., CORE BIT
HAMMER TYPE: AUTOMATIC, MANUAL
CORE SIZE: B, H, N
HAND TOOLS: POST HOLE DIGGER, HAND AUGER, SOUNDING ROD, VANE SHEAR TEST

BENCH MARK: NA; ELEVATIONS DERIVED FROM PROJECT DTM

ELEVATION: FEET

NOTES:

|   |                       |
|---|-----------------------|
| PROJECT REFERENCE NO.<br><b>I-400</b>                                   | SHEET NO.<br><b>3</b> |
| RW SHEET NO.  |                       |
| ROADWAY DESIGN ENGINEER   | HYDRAULICS ENGINEER   |
| <b>INCOMPLETE PLANS</b><br>DO NOT USE FOR R/W ACQUISITION               |                       |
| <b>DOCUMENT NOT CONSIDERED FINAL</b><br>UNLESS ALL SIGNATURES COMPLETED |                       |



MATCHLINE SHEET 13  
-L- STA 513+00.00

MATCHLINE SHEET 15  
-L- STA 527+00.00

REVISIONS

07\_Nov-2018 IJK  
 F:\pco\res\_656\656V-0174\_NCDOT-I-4400B\_Henderson\_Co\I-4400B\_GEO\RDWY\CADD\_GEO\TECH\Plan\I-4400BB\_RDY\_PSH\_14.dgn  
 TWalker AT 660261102  
 100.0000000000000000

FOR -L- PROFILE, SEE SHEET 58 & 59

# GEOTECHNICAL BORING REPORT

## BORE LOG

| WBS 34232.1.6  |                 | TIP I-4400          |                          | COUNTY HENDERSON    |       | GEOLOGIST S. Woods      |                 |    |    |     |           |     |                           |            |  |      |
|--|-----------------|---------------------|--------------------------|---------------------|-------|-------------------------|-----------------|----|----|-----|-----------|-----|---------------------------|------------|--|------|
| SITE DESCRIPTION I-26 from US 64 (Exit 49) to US 25 Business (Exit 44): Extend Culvert 0218 Featherstone Creek |                 |                     |                          |                     |       |                         | GROUND WTR (ft) |    |    |     |           |     |                           |            |  |      |
| BORING NO. B-106   |                 | STATION 526+01      |                          | OFFSET 111 ft RT    |       | ALIGNMENT -L-           |                 |    |    |     |           |     |                           |            |  |      |
| COLLAR ELEV. 2,065.2 ft  |                 | TOTAL DEPTH 15.0 ft |                          | NORTHING 608,720    |       | EASTING 965,129         |                 |    |    |     |           |     |                           |            |  |      |
| DRILL RIG/HAMMER EFF./DATE F&R2175 CME-55 88% 02/11/2017   |                 |                     | DRILL METHOD H.S. Augers |                     |       | HAMMER TYPE Automatic   |                 |    |    |     |           |     |                           |            |  |      |
| DRILLER S. Davis   |                 | START DATE 01/26/18 |                          | COMP. DATE 01/26/18 |       | SURFACE WATER DEPTH N/A |                 |    |    |     |           |     |                           |            |  |      |
| ELEV (ft)  | DRIVE ELEV (ft) | DEPTH (ft)          | BLOW COUNT               |                     |       | BLOWS PER FOOT          |                 |    |    |     | SAMP. NO. | LOG | SOIL AND ROCK DESCRIPTION | DEPTH (ft) |  |      |
|  |                 |                     | 0.5ft                    | 0.5ft               | 0.5ft | 0                       | 25              | 50 | 75 | 100 |           |     |                           |            |  |      |
| 2070   |                 |                     |                          |                     |       |                         |                 |    |    |     |           |     |                           |            |  |      |
| 2065   | 2,065.2         | 0.0                 |                          |                     |       |                         |                 |    |    |     |           |     |                           | 2,065.2    | GROUND SURFACE   | 0.0  |
| 2060   | 2,061.7         | 3.5                 | 1                        | 1                   | 1     |                         |                 |    |    |     |           |     | W                         | 2,063.2    | ROADWAY EMBANKMENT<br>Dark Brown, Fine Sandy Clayey SILT (A-5) with Trace Organics (Roots) | 2.0  |
|  | 2,056.7         | 8.5                 | 2                        | 2                   | 2     |                         |                 |    |    |     |           |     | W                         | 2,058.2    | ALLUVIAL<br>Dark Gray, Fine Sandy Clayey SILT (A-5) with Trace Organics (Roots)            | 7.0  |
| 2055   | 2,051.7         | 13.5                | 1                        | 1                   | 1     |                         |                 |    |    |     |           |     | Sat.                      | 2,056.3    | Tan, Fine to Coarse SAND (A-1-a) with Trace Organics (Roots) and Gravel                    | 8.9  |
|  |                 |                     | 7                        | 5                   | 6     |                         |                 |    |    |     |           |     | Sat.                      | 2,053.2    | Gray, Fine Sandy Silty CLAY (A-7) with Trace Organics (Roots)                              | 12.0 |
|  |                 |                     |                          |                     |       |                         |                 |    |    |     |           |     |                           | 2,050.2    | Orange-Brown, Silty Fine to Coarse SAND (A-2-4) with Little Gravel and Mica                | 15.0 |
| Boring Terminated at Elevation 2,050.2 ft in SAND (ALLUVIAL)   |                 |                     |                          |                     |       |                         |                 |    |    |     |           |     |                           |            |  |      |
| Note:<br>1) PROPOSED CULVERT INVERTS = 2058.3' UPSTREAM (WBL) & 2057.3' DOWNSTREAM (EBL)                       |                 |                     |                          |                     |       |                         |                 |    |    |     |           |     |                           |            |  |      |

| WBS 34232.1.6  |                 | TIP I-4400          |                          | COUNTY HENDERSON    |       | GEOLOGIST M. Durway     |                 |    |    |     |           |     |                           |            |  |      |
|--|-----------------|---------------------|--------------------------|---------------------|-------|-------------------------|-----------------|----|----|-----|-----------|-----|---------------------------|------------|--|------|
| SITE DESCRIPTION I-26 from US 64 (Exit 49) to US 25 Business (Exit 44): Extend Culvert 0218 Featherstone Creek                     |                 |                     |                          |                     |       |                         | GROUND WTR (ft) |    |    |     |           |     |                           |            |  |      |
| BORING NO. B-107   |                 | STATION 526+60      |                          | OFFSET 112 ft LT    |       | ALIGNMENT -L-           |                 |    |    |     |           |     |                           |            |  |      |
| COLLAR ELEV. 2,065.4 ft  |                 | TOTAL DEPTH 15.0 ft |                          | NORTHING 608,625    |       | EASTING 964,919         |                 |    |    |     |           |     |                           |            |  |      |
| DRILL RIG/HAMMER EFF./DATE F&R5785 CME-55 80% 02/11/2017   |                 |                     | DRILL METHOD H.S. Augers |                     |       | HAMMER TYPE Automatic   |                 |    |    |     |           |     |                           |            |  |      |
| DRILLER D. Aiello  |                 | START DATE 01/02/18 |                          | COMP. DATE 01/02/18 |       | SURFACE WATER DEPTH N/A |                 |    |    |     |           |     |                           |            |  |      |
| ELEV (ft)  | DRIVE ELEV (ft) | DEPTH (ft)          | BLOW COUNT               |                     |       | BLOWS PER FOOT          |                 |    |    |     | SAMP. NO. | LOG | SOIL AND ROCK DESCRIPTION | DEPTH (ft) |  |      |
|  |                 |                     | 0.5ft                    | 0.5ft               | 0.5ft | 0                       | 25              | 50 | 75 | 100 |           |     |                           |            |  |      |
| 2070   |                 |                     |                          |                     |       |                         |                 |    |    |     |           |     |                           |            |  |      |
| 2065   | 2,065.4         | 0.0                 |                          |                     |       |                         |                 |    |    |     |           |     |                           | 2,065.4    | GROUND SURFACE   | 0.0  |
| 2060   | 2,061.9         | 3.5                 | 1                        | 2                   | 4     |                         |                 |    |    |     |           |     | M                         | 2,063.4    | RESIDUAL<br>Brown-Tan, Silty Fine to Coarse SAND (A-2-4) with Trace Organics (Roots) | 2.0  |
|  | 2,056.9         | 8.5                 | 3                        | 2                   | 3     |                         |                 |    |    |     |           |     | SS-205 17%                | 2,058.4    | Brown-Orange, Silty Fine Sandy CLAY (A-6) with Trace Organics (Roots)                | 7.0  |
| 2055   | 2,051.9         | 13.5                | 3                        | 3                   | 4     |                         |                 |    |    |     |           |     | M                         | 2,053.4    | Gray-Tan, Fine Sandy Clayey SILT (A-5)   | 12.0 |
|  |                 |                     | 2                        | 3                   | 3     |                         |                 |    |    |     |           |     | W                         | 2,050.4    | Gray-White, Fine Sandy SILT (A-4) with Trace Mica and Little Coarse Sand             | 15.0 |
| Boring Terminated at Elevation 2,050.4 ft in SILT (Residual)   |                 |                     |                          |                     |       |                         |                 |    |    |     |           |     |                           |            |  |      |
| Note:<br>1) 0.0'-0.1' = SURFICIAL ORGANIC SOILS<br>2) PROPOSED CULVERT INVERTS = 2058.3' UPSTREAM (WBL) & 2057.3' DOWNSTREAM (EBL) |                 |                     |                          |                     |       |                         |                 |    |    |     |           |     |                           |            |  |      |

NCDOT BORE DOUBLE 14400B\_GEO\_BOREHOLES\_RDWY.GPJ\_NC\_DOT.GDT 2/22/19

REFERENCE: I-4400

PROJECT: 34232

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

| STATE | STATE PROJECT REFERENCE NO. | SHEET NO. | TOTAL SHEETS |
|-------|-----------------------------|-----------|--------------|
| N.C.  | 36030                       | 1         | 4            |

CONTENTS

| SHEET NO. | DESCRIPTION          |
|-----------|----------------------|
| 1         | TITLE SHEET          |
| 2         | LEGEND (SOIL & ROCK) |
| 3         | SITE PLAN            |
| 4         | BORE LOG             |

**STRUCTURE**  
**SUBSURFACE INVESTIGATION**

COUNTY HENDERSON  
PROJECT DESCRIPTION I-4400B I-26 FROM US 64 (EXIT 49) TO US 25 BUSINESS (EXIT 44)

SITE DESCRIPTION EXTEND I-26 CULVERT -L- STA 588+18.3 OVER BYERS CREEK

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 1919 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:
1. 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.
  2. 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

M. ARNOLD  
S. DAVIS

INVESTIGATED BY D. MULLEN  
DRAWN BY D. MULLEN  
CHECKED BY J. KUHNE  
SUBMITTED BY D. MULLEN  
DATE 2.25.2019



DocuSigned by:  
D Matt Mullen 2/26/2019  
18909BD3C05440C SIGNATURE DATE

DOCUMENT NOT CONSIDERED FINAL  
UNLESS ALL SIGNATURES COMPLETED

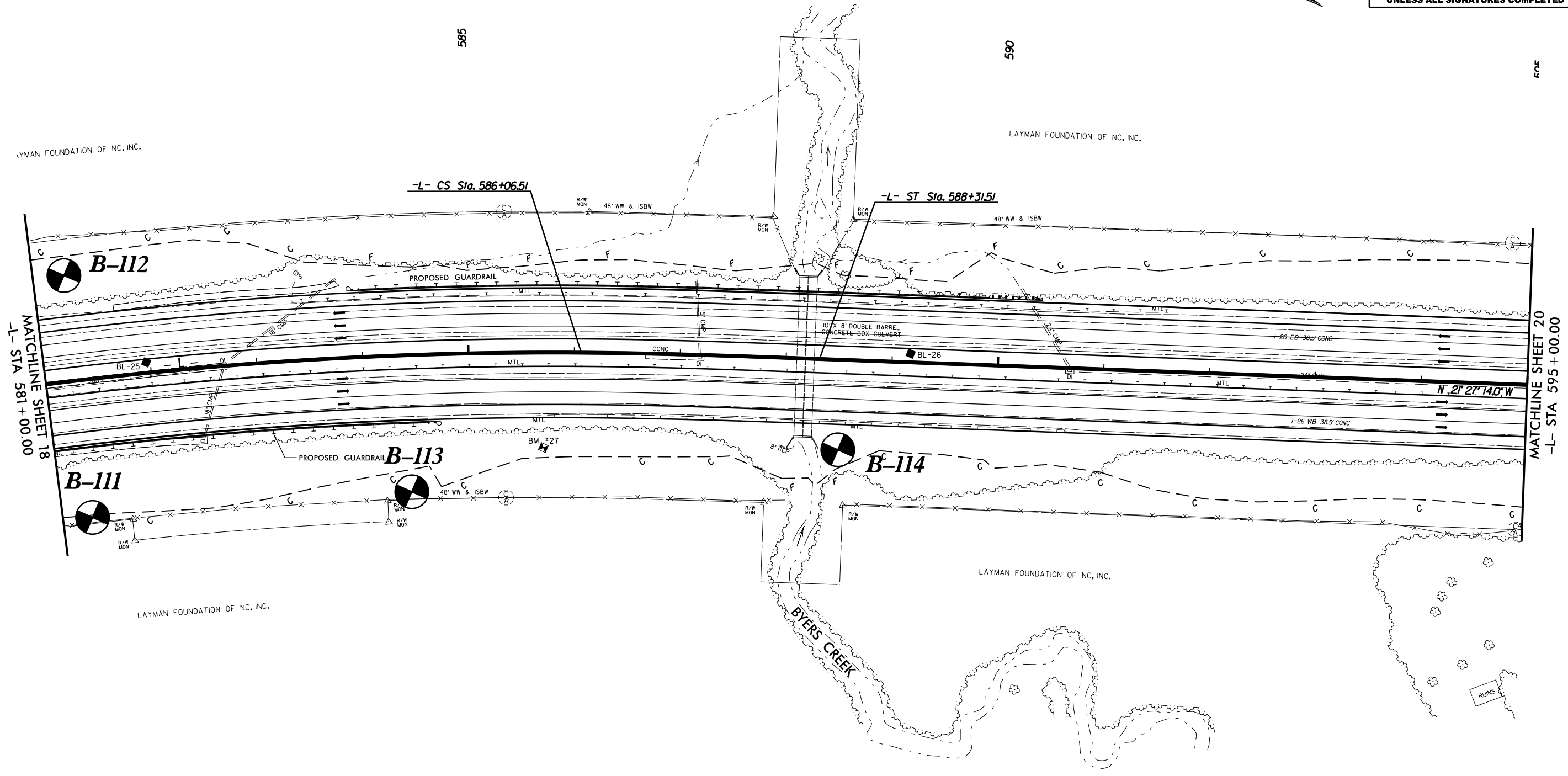
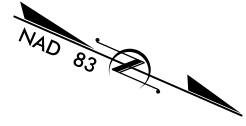


**NORTH CAROLINA DEPARTMENT OF TRANSPORTATION  
DIVISION OF HIGHWAYS  
GEOTECHNICAL ENGINEERING UNIT  
SUBSURFACE INVESTIGATION  
SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS**

| SOIL DESCRIPTION   |   | GRADATION  |  | ROCK DESCRIPTION   |  | TERMS AND DEFINITIONS  |   |  |  |   |  |   |  |                                     |                     |   |   |         |  |                      |   |                                  |  |   |   |   |                  |                                  |  |   |  |   |              |   |   |   |                                |  |                                     |                          |   |                                       |                          |  |  |                          |                                   |          |                              |                       |            |                    |                      |  |              |          |  |            |  |  |  |  |  |  |                        |                   |                   |                  |                  |                  |                  |                  |                  |                  |                  |                  |                |                 |            |    |                            |   |   |                  |                |                                      |                   |                   |                   |                   |                   |                   |  |  |  |  |             |   |   |   |   |      |      |       |       |       |  |  |  |  |  |  |                                |                               |           |                                 |             |              |  |  |  |  |  |  |   |                      |  |  |                         |                   |  |  |  |              |  |  |  |              |      |             |  |  |  |  |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                   |                            |  |  |   |  |  |     |   |  |  |  |                                     |  |  |  |                                   |   |    |    |    |     |     |  |      |      |      |      |       |       |                 |  |  |  |  |  |  |               |  |  |  |  |  |  |              |  |  |  |  |  |  |                       |  |  |  |  |  |  |                   |  |  |  |  |  |  |            |  |  |  |  |  |  |            |  |  |  |  |  |  |            |     |    |     |      |      |       |    |  |  |  |  |  |  |     |    |   |  |  |  |  |                                      |  |  |  |  |                            |                                      |                   |                      |   |                    |             |   |                                       |               |                                    |                      |             |  |   |  |                    |               |                       |                        |                   |                  |            |                   |                  |                               |                  |                      |               |                |  |                        |                          |  |                                |                   |  |                |                   |  |          |                   |  |                       |                 |  |                              |                       |  |                    |                      |  |              |          |  |   |  |             |                       |              |  |     |          |  |      |        |  |       |        |  |            |      |   |  |              |                  |              |                                  |                                    |   |  |   |            |                                  |  |   |  |   |             |   |   |   |                          |  |                                     |                          |   |                                       |                          |  |  |                          |                                   |  |                          |  |  |   |  |  |  |      |         |           |                   |      |              |                  |             |       |                |            |                     |   |  |      |           |                     |        |                |              |               |                 |                    |                  |                   |                   |                  |              |   |  |         |  |                      |   |           |  |                     |   |  |  |                      |  |
|--|---|--|--|--|--|--|---|--|--|---|--|---|--|-------------------------------------|---------------------|---|---|---------|--|----------------------|---|----------------------------------|--|---|---|---|------------------|----------------------------------|--|---|--|---|--------------|---|---|---|--------------------------------|--|-------------------------------------|--------------------------|---|---------------------------------------|--------------------------|--|--|--------------------------|-----------------------------------|----------|------------------------------|-----------------------|------------|--------------------|----------------------|--|--------------|----------|--|------------|--|--|--|--|--|--|------------------------|-------------------|-------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|----------------|-----------------|------------|----|----------------------------|---|---|------------------|----------------|--------------------------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|--|--|--|--|-------------|---|---|---|---|------|------|-------|-------|-------|--|--|--|--|--|--|--------------------------------|-------------------------------|-----------|---------------------------------|-------------|--------------|--|--|--|--|--|--|---|----------------------|--|--|-------------------------|-------------------|--|--|--|--------------|--|--|--|--------------|------|-------------|--|--|--|--|---|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|-------------------|----------------------------|--|--|---|--|--|-----|---|--|--|--|-------------------------------------|--|--|--|-----------------------------------|---|----|----|----|-----|-----|--|------|------|------|------|-------|-------|-----------------|--|--|--|--|--|--|---------------|--|--|--|--|--|--|--------------|--|--|--|--|--|--|-----------------------|--|--|--|--|--|--|-------------------|--|--|--|--|--|--|------------|--|--|--|--|--|--|------------|--|--|--|--|--|--|------------|-----|----|-----|------|------|-------|----|--|--|--|--|--|--|-----|----|---|--|--|--|--|--------------------------------------|--|--|--|--|----------------------------|--------------------------------------|-------------------|----------------------|---|--------------------|-------------|---|---------------------------------------|---------------|------------------------------------|----------------------|-------------|--|---|--|--------------------|---------------|-----------------------|------------------------|-------------------|------------------|------------|-------------------|------------------|-------------------------------|------------------|----------------------|---------------|----------------|--|------------------------|--------------------------|--|--------------------------------|-------------------|--|----------------|-------------------|--|----------|-------------------|--|-----------------------|-----------------|--|------------------------------|-----------------------|--|--------------------|----------------------|--|--------------|----------|--|---|--|-------------|-----------------------|--------------|--|-----|----------|--|------|--------|--|-------|--------|--|------------|------|---|--|--------------|------------------|--------------|----------------------------------|------------------------------------|---|--|---|------------|----------------------------------|--|---|--|---|-------------|---|---|---|--------------------------|--|-------------------------------------|--------------------------|---|---------------------------------------|--------------------------|--|--|--------------------------|-----------------------------------|--|--------------------------|--|--|---|--|--|--|------|---------|-----------|-------------------|------|--------------|------------------|-------------|-------|----------------|------------|---------------------|---|--|------|-----------|---------------------|--------|----------------|--------------|---------------|-----------------|--------------------|------------------|-------------------|-------------------|------------------|--------------|---|--|---------|--|----------------------|---|-----------|--|---------------------|---|--|--|----------------------|--|
| <p>SOIL IS CONSIDERED UNCONSOLIDATED, SEMI-CONSOLIDATED, OR WEATHERED EARTH MATERIALS THAT CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER AND YIELD LESS THAN 100 BLOWS PER FOOT ACCORDING TO THE STANDARD PENETRATION TEST (AASHTO T 206, ASTM D1586). SOIL CLASSIFICATION IS BASED ON THE AASHTO SYSTEM. BASIC DESCRIPTIONS GENERALLY INCLUDE THE FOLLOWING: CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. FOR EXAMPLE, VERY STIFF, GRAY, SILTY CLAY, MOIST WITH INTERBEDDED FINE SAND LAYERS, HIGHLY PLASTIC, A-7-6</p>  |   | <p><b>WELL GRADED</b> - INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM FINE TO COARSE.<br/><b>UNIFORMLY GRADED</b> - INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE.<br/><b>GAP-GRADED</b> - INDICATES A MIXTURE OF UNIFORM PARTICLE SIZES OF TWO OR MORE SIZES.</p>  |  | <p>HARD ROCK IS NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT REFUSAL IF TESTED, AN INFERRED ROCK LINE INDICATES THE LEVEL AT WHICH NON-COASTAL PLAIN MATERIAL WOULD YIELD SPT REFUSAL. SPT REFUSAL IS PENETRATION BY A SPLIT SPOON SAMPLER EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS IN NON-COASTAL PLAIN MATERIAL. THE TRANSITION BETWEEN SOIL AND ROCK IS OFTEN REPRESENTED BY A ZONE OF WEATHERED ROCK. ROCK MATERIALS ARE TYPICALLY DIVIDED AS FOLLOWS:</p> |  | <p><b>ALLUVIUM (ALLUV.)</b> - SOILS THAT HAVE BEEN TRANSPORTED BY WATER.<br/><b>AQUIFER</b> - A WATER BEARING FORMATION OR STRATA.<br/><b>ARENACEOUS</b> - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND.<br/><b>ARGILLACEOUS</b> - 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.<br/><b>ARTESIAN</b> - 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.<br/><b>CALCAREOUS (CALC.)</b> - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE.<br/><b>COLLUVIUM</b> - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM OF SLOPE.<br/><b>CORE RECOVERY (REC.)</b> - TOTAL LENGTH OF ALL MATERIAL RECOVERED IN THE CORE BARREL DIVIDED BY TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE.<br/><b>DIKE</b> - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT ROCKS OR CUTS MASSIVE ROCK.<br/><b>DIP</b> - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE HORIZONTAL.<br/><b>DIP DIRECTION (DIP AZIMUTH)</b> - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH.<br/><b>FAULT</b> - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE.<br/><b>FISSILE</b> - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES.<br/><b>FLOAT</b> - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLOGGED FROM PARENT MATERIAL.<br/><b>FLOOD PLAIN (FP)</b> - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM.<br/><b>FORMATION (FM)</b> - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE FIELD.<br/><b>JOINT</b> - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED.<br/><b>LEDGE</b> - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO ITS LATERAL EXTENT.<br/><b>LENS</b> - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS.<br/><b>MOTTLED (MOT.)</b> - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS. MOTTLING IN SOILS USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE.<br/><b>PERCHED WATER</b> - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE OF AN INTERVENING IMPERVIOUS STRATUM.<br/><b>RESIDUAL (RES.) SOIL</b> - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK.<br/><b>ROCK QUALITY DESIGNATION (ROD)</b> - 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.<br/><b>SAPROLITE (SAP.)</b> - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT ROCK.<br/><b>SILL</b> - 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.<br/><b>SLICKENSIDE</b> - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE.<br/><b>STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT)</b> - NUMBER OF BLOWS (IN 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.<br/><b>STRATA CORE RECOVERY (SREC.)</b> - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE.<br/><b>STRATA ROCK QUALITY DESIGNATION (SROD)</b> - 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.<br/><b>TOPSOIL (TS.)</b> - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.</p> |   |  |  |   |  |   |  |                                     |                     |   |   |         |  |                      |   |                                  |  |   |   |   |                  |                                  |  |   |  |   |              |   |   |   |                                |  |                                     |                          |   |                                       |                          |  |  |                          |                                   |          |                              |                       |            |                    |                      |  |              |          |  |            |  |  |  |  |  |  |                        |                   |                   |                  |                  |                  |                  |                  |                  |                  |                  |                  |                |                 |            |    |                            |   |   |                  |                |                                      |                   |                   |                   |                   |                   |                   |  |  |  |  |             |   |   |   |   |      |      |       |       |       |  |  |  |  |  |  |                                |                               |           |                                 |             |              |  |  |  |  |  |  |   |                      |  |  |                         |                   |  |  |  |              |  |  |  |              |      |             |  |  |  |  |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                   |                            |  |  |   |  |  |     |   |  |  |  |                                     |  |  |  |                                   |   |    |    |    |     |     |  |      |      |      |      |       |       |                 |  |  |  |  |  |  |               |  |  |  |  |  |  |              |  |  |  |  |  |  |                       |  |  |  |  |  |  |                   |  |  |  |  |  |  |            |  |  |  |  |  |  |            |  |  |  |  |  |  |            |     |    |     |      |      |       |    |  |  |  |  |  |  |     |    |   |  |  |  |  |                                      |  |  |  |  |                            |                                      |                   |                      |   |                    |             |   |                                       |               |                                    |                      |             |  |   |  |                    |               |                       |                        |                   |                  |            |                   |                  |                               |                  |                      |               |                |  |                        |                          |  |                                |                   |  |                |                   |  |          |                   |  |                       |                 |  |                              |                       |  |                    |                      |  |              |          |  |   |  |             |                       |              |  |     |          |  |      |        |  |       |        |  |            |      |   |  |              |                  |              |                                  |                                    |   |  |   |            |                                  |  |   |  |   |             |   |   |   |                          |  |                                     |                          |   |                                       |                          |  |  |                          |                                   |  |                          |  |  |   |  |  |  |      |         |           |                   |      |              |                  |             |       |                |            |                     |   |  |      |           |                     |        |                |              |               |                 |                    |                  |                   |                   |                  |              |   |  |         |  |                      |   |           |  |                     |   |  |  |                      |  |
| <p><b>SOIL LEGEND AND AASHTO CLASSIFICATION</b></p> <table border="1"> <thead> <tr> <th rowspan="2">GENERAL CLASS.</th> <th colspan="6">GRANULAR MATERIALS (≤ 35% PASSING #200)</th> <th colspan="6">SILT-CLAY MATERIALS (&gt; 35% PASSING #200)</th> <th colspan="2">ORGANIC MATERIALS</th> </tr> <tr> <th>A-1</th><th>A-1-b</th><th>A-3</th><th>A-2</th><th>A-2-4</th><th>A-2-5</th><th>A-2-6</th><th>A-2-7</th><th>A-4</th><th>A-5</th><th>A-6</th><th>A-7</th><th>A-1, A-2</th><th>A-3</th><th>A-4, A-5</th><th>A-6, A-7</th> </tr> </thead> <tbody> <tr> <td>GROUP CLASS.</td> <td>A-1-a</td><td>A-1-b</td><td>A-3</td><td>A-2-4</td><td>A-2-5</td><td>A-2-6</td><td>A-2-7</td><td>A-4</td><td>A-5</td><td>A-6</td><td>A-7</td><td>A-1, A-2</td><td>A-3</td><td>A-4, A-5</td><td>A-6, A-7</td> </tr> <tr> <td>SYMBOL</td> <td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td> </tr> <tr> <td>% PASSING #10 #40 #200</td> <td>50 Mx 30 Mx 15 Mx</td><td>50 Mx 25 Mx 10 Mx</td><td>51 Mx 10 Mx 5 Mx</td><td>35 Mx 10 Mx 5 Mx</td><td>35 Mx 10 Mx 5 Mx</td><td>35 Mx 10 Mx 5 Mx</td><td>35 Mx 10 Mx 5 Mx</td><td>36 Mx 10 Mx 5 Mx</td><td>36 Mx 10 Mx 5 Mx</td><td>36 Mx 10 Mx 5 Mx</td><td>36 Mx 10 Mx 5 Mx</td><td>GRANULAR SOILS</td><td>SILT-CLAY SOILS</td><td>MUCK, PEAT</td><td></td> </tr> <tr> <td>MATERIAL PASSING #40 LL PI</td> <td>-</td><td>-</td><td>40 Mx 10 Mx 6 Mx</td><td>41 Mx 10 Mx NP</td><td>40 Mx 10 Mx 11 Mx</td><td>41 Mx 10 Mx 11 Mx</td><td>40 Mx 10 Mx 11 Mx</td><td>41 Mx 10 Mx 11 Mx</td><td>40 Mx 10 Mx 11 Mx</td><td>41 Mx 10 Mx 11 Mx</td><td>40 Mx 10 Mx 11 Mx</td><td></td><td></td><td></td><td></td> </tr> <tr> <td>GROUP INDEX</td> <td>0</td><td>0</td><td>0</td><td>0</td><td>4 Mx</td><td>8 Mx</td><td>12 Mx</td><td>16 Mx</td><td>NO Mx</td><td></td><td></td><td></td><td></td><td></td><td></td> </tr> <tr> <td>USUAL TYPES OF MAJOR MATERIALS</td> <td>STONE FRAGS. GRAVEL, AND SAND</td><td>FINE SAND</td><td>SILTY OR CLAYEY GRAVEL AND SAND</td><td>SILTY SOILS</td><td>CLAYEY SOILS</td><td></td><td></td><td></td><td></td><td></td><td></td><td>SOILS WITH LITTLE OR MODERATE AMOUNTS OF ORGANIC MATTER</td><td>HIGHLY ORGANIC SOILS</td><td></td><td></td> </tr> <tr> <td>GEN. RATING AS SUBGRADE</td> <td colspan="4">EXCELLENT TO GOOD</td><td colspan="4">FAIR TO POOR</td><td>FAIR TO POOR</td><td>POOR</td><td>UNSATURABLE</td><td></td><td></td><td></td><td></td> </tr> <tr> <td colspan="2">PI OF A-7-5 SUBGROUP IS ≤ LL - 30 ; PI OF A-7-6 SUBGROUP IS &gt; LL - 30</td> <td colspan="2"></td> <td colspan="2"></td> <td colspan="2"></td> <td colspan="2"></td> <td colspan="2"></td> <td colspan="2"></td> <td colspan="2"></td> </tr> <tr> <td colspan="2"> <p><b>CONSISTENCY OR DENSENESS</b></p> <table border="1"> <thead> <tr> <th>PRIMARY SOIL TYPE</th> <th>COMPACTNESS OR CONSISTENCY</th> <th>RANGE OF STANDARD PENETRATION RESISTANCE (N-VALUE)</th> <th>RANGE OF UNCONFINED COMPRESSIVE STRENGTH (TONS/FT<sup>2</sup>)</th> </tr> </thead> <tbody> <tr> <td>GENERALLY GRANULAR MATERIAL (NON-COHESSIVE)</td> <td>VERY LOOSE<br/>LOOSE<br/>MEDIUM DENSE<br/>DENSE<br/>VERY DENSE</td> <td>&lt; 4<br/>4 TO 10<br/>10 TO 30<br/>30 TO 50<br/>&gt; 50</td> <td>N/A</td> </tr> <tr> <td>GENERALLY SILT-CLAY MATERIAL (COHESIVE)</td> <td>VERY SOFT<br/>SOFT<br/>MEDIUM STIFF<br/>STIFF<br/>VERY STIFF<br/>HARD</td> <td>&lt; 2<br/>2 TO 4<br/>4 TO 8<br/>8 TO 15<br/>15 TO 30<br/>&gt; 30</td> <td>&lt; 0.25<br/>0.25 TO 0.5<br/>0.5 TO 1.0<br/>1 TO 2<br/>2 TO 4<br/>&gt; 4</td> </tr> </tbody> </table> </td> <td colspan="2"> <p><b>MISCELLANEOUS SYMBOLS</b></p> </td> </tr> <tr> <td colspan="2"> <p><b>TEXTURE OR GRAIN SIZE</b></p> <table border="1"> <thead> <tr> <th>U.S. STD. SIEVE SIZE OPENING (MM)</th> <th>4</th><th>10</th><th>40</th><th>60</th><th>200</th><th>270</th> </tr> <tr> <td></td> <td>4.76</td><td>2.00</td><td>0.42</td><td>0.25</td><td>0.075</td><td>0.053</td> </tr> </thead> <tbody> <tr> <td>BOULDER (BLDR.)</td> <td></td><td></td><td></td><td></td><td></td><td></td> </tr> <tr> <td>COBBLE (COB.)</td> <td></td><td></td><td></td><td></td><td></td><td></td> </tr> <tr> <td>GRAVEL (GR.)</td> <td></td><td></td><td></td><td></td><td></td><td></td> </tr> <tr> <td>COARSE SAND (CS, SD.)</td> <td></td><td></td><td></td><td></td><td></td><td></td> </tr> <tr> <td>FINE SAND (F SD.)</td> <td></td><td></td><td></td><td></td><td></td><td></td> </tr> <tr> <td>SILT (SL.)</td> <td></td><td></td><td></td><td></td><td></td><td></td> </tr> <tr> <td>CLAY (CL.)</td> <td></td><td></td><td></td><td></td><td></td><td></td> </tr> <tr> <td>GRAIN SIZE</td> <td>305</td><td>75</td><td>2.0</td><td>0.25</td><td>0.05</td><td>0.005</td> </tr> <tr> <td>MM</td> <td></td><td></td><td></td><td></td><td></td><td></td> </tr> <tr> <td>IN.</td> <td>12</td><td>3</td><td></td><td></td><td></td><td></td> </tr> </tbody> </table> </td> <td colspan="2"> <p><b>RECOMMENDATION SYMBOLS</b></p> </td> </tr> <tr> <td colspan="2"> <p><b>SOIL MOISTURE - CORRELATION OF TERMS</b></p> <table border="1"> <thead> <tr> <th>SOIL MOISTURE SCALE (ATTERBERG LIMITS)</th> <th>FIELD MOISTURE DESCRIPTION</th> <th>GUIDE FOR FIELD MOISTURE DESCRIPTION</th> </tr> </thead> <tbody> <tr> <td>LL - LIQUID LIMIT</td> <td>- SATURATED - (SAT.)</td> <td>USUALLY LIQUID; VERY WET, USUALLY FROM BELOW THE GROUND WATER TABLE</td> </tr> <tr> <td>PLASTIC RANGE (PI)</td> <td>- WET - (W)</td> <td>SEMISOLID; REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE</td> </tr> <tr> <td>OM - OPTIMUM MOISTURE SHRINKAGE LIMIT</td> <td>- MOIST - (M)</td> <td>SOLID; AT OR NEAR OPTIMUM MOISTURE</td> </tr> <tr> <td>SL - SHRINKAGE LIMIT</td> <td>- DRY - (D)</td> <td>REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE</td> </tr> </tbody> </table> </td> <td colspan="2"> <p><b>ABBREVIATIONS</b></p> <table border="1"> <tbody> <tr> <td>AR - AUGER REFUSAL</td> <td>MED. - MEDIUM</td> <td>VST - VANE SHEAR TEST</td> </tr> <tr> <td>BT - BORING TERMINATED</td> <td>MICA. - MICACEOUS</td> <td>WEA. - WEATHERED</td> </tr> <tr> <td>CL. - CLAY</td> <td>MOD. - MODERATELY</td> <td>UW - UNIT WEIGHT</td> </tr> <tr> <td>CPT - COARSE PENETRATION TEST</td> <td>NP - NON PLASTIC</td> <td>UW - DRY UNIT WEIGHT</td> </tr> <tr> <td>CSE. - COARSE</td> <td>ORG. - ORGANIC</td> <td></td> </tr> <tr> <td>DPT - DILATOMETER TEST</td> <td>PMT - PRESSUREMETER TEST</td> <td></td> </tr> <tr> <td>DPT - DYNAMIC PENETRATION TEST</td> <td>SAP. - SAPROLITIC</td> <td></td> </tr> <tr> <td>Ø - VOID RATIO</td> <td>SD. - SAND, SANDY</td> <td></td> </tr> <tr> <td>F - FINE</td> <td>SL. - SILT, SILTY</td> <td></td> </tr> <tr> <td>FOSS. - FOSSILIFEROUS</td> <td>SLI. - SLIGHTLY</td> <td></td> </tr> <tr> <td>FRAC. - FRACTURED, FRACTURES</td> <td>TCR - TRICONE REFUSAL</td> <td></td> </tr> <tr> <td>FRAGS. - FRAGMENTS</td> <td>w - MOISTURE CONTENT</td> <td></td> </tr> <tr> <td>HI. - HIGHLY</td> <td>V - VERY</td> <td></td> </tr> </tbody> </table> </td> </tr> <tr> <td colspan="2"> <p><b>PLASTICITY</b></p> <table border="1"> <thead> <tr> <th>NON PLASTIC</th> <th>PLASTICITY INDEX (PI)</th> <th>DRY STRENGTH</th> </tr> </thead> <tbody> <tr> <td></td> <td>0-5</td> <td>VERY LOW</td> </tr> <tr> <td></td> <td>6-15</td> <td>SLIGHT</td> </tr> <tr> <td></td> <td>16-25</td> <td>MEDIUM</td> </tr> <tr> <td></td> <td>26 OR MORE</td> <td>HIGH</td> </tr> </tbody> </table> </td> <td colspan="2"> <p><b>EQUIPMENT USED ON SUBJECT PROJECT</b></p> <table border="1"> <tbody> <tr> <td>DRILL UNITS:</td> <td>ADVANCING TOOLS:</td> <td>HAMMER TYPE:</td> </tr> <tr> <td><input type="checkbox"/> CME-45C</td> <td><input type="checkbox"/> CLAY BITS</td> <td><input checked="" type="checkbox"/> AUTOMATIC <input type="checkbox"/> MANUAL</td> </tr> <tr> <td><input checked="" type="checkbox"/> CME-55</td> <td><input type="checkbox"/> 6" CONTINUOUS FLIGHT AUGER</td> <td>CORE SIZE:</td> </tr> <tr> <td><input type="checkbox"/> CME-550</td> <td><input checked="" type="checkbox"/> 8" HOLLOW AUGERS</td> <td><input type="checkbox"/> -B <input type="checkbox"/> -H <input type="checkbox"/> -N</td> </tr> <tr> <td><input type="checkbox"/> VANE SHEAR TEST</td> <td><input type="checkbox"/> HARD FACED FINGER BITS</td> <td>HAND TOOLS:</td> </tr> <tr> <td><input type="checkbox"/> PORTABLE HOIST</td> <td><input type="checkbox"/> TUNG-CARBIDE INSERTS</td> <td><input type="checkbox"/> POST HOLE DIGGER</td> </tr> <tr> <td><input type="checkbox"/></td> <td><input type="checkbox"/> CASING <input type="checkbox"/> W/ ADVANCER</td> <td><input type="checkbox"/> HAND AUGER</td> </tr> <tr> <td><input type="checkbox"/></td> <td><input type="checkbox"/> TRICONE _____ *STEEL TEETH</td> <td><input type="checkbox"/> SOUNDING ROD</td> </tr> <tr> <td><input type="checkbox"/></td> <td><input type="checkbox"/> TRICONE _____ *TUNG-CARB.</td> <td><input type="checkbox"/> VANE SHEAR TEST</td> </tr> <tr> <td><input type="checkbox"/></td> <td><input type="checkbox"/> CORE BIT</td> <td></td> </tr> <tr> <td><input type="checkbox"/></td> <td></td> <td></td> </tr> </tbody> </table> </td> </tr> <tr> <td colspan="2"> <p><b>COLOR</b></p> <p>DESCRIPTIONS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YELLOW-BROWN, BLUE-GRAY). MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE.</p> </td> <td colspan="2"> <p><b>FRACTURE SPACING</b></p> <table border="1"> <thead> <tr> <th>TERM</th> <th>SPACING</th> </tr> </thead> <tbody> <tr> <td>VERY WIDE</td> <td>MORE THAN 10 FEET</td> </tr> <tr> <td>WIDE</td> <td>3 TO 10 FEET</td> </tr> <tr> <td>MODERATELY CLOSE</td> <td>1 TO 3 FEET</td> </tr> <tr> <td>CLOSE</td> <td>0.16 TO 1 FOOT</td> </tr> <tr> <td>VERY CLOSE</td> <td>LESS THAN 0.16 FEET</td> </tr> </tbody> </table> </td> </tr> <tr> <td colspan="2"> <p><b>BEDDING</b></p> <table border="1"> <thead> <tr> <th>TERM</th> <th>THICKNESS</th> </tr> </thead> <tbody> <tr> <td>VERY THICKLY BEDDED</td> <td>4 FEET</td> </tr> <tr> <td>THICKLY BEDDED</td> <td>1.5 - 4 FEET</td> </tr> <tr> <td>THINLY BEDDED</td> <td>0.16 - 1.5 FEET</td> </tr> <tr> <td>VERY THINLY BEDDED</td> <td>0.03 - 0.16 FEET</td> </tr> <tr> <td>THICKLY LAMINATED</td> <td>0.008 - 0.03 FEET</td> </tr> <tr> <td>THINLY LAMINATED</td> <td>&lt; 0.008 FEET</td> </tr> </tbody> </table> </td> <td colspan="2"> <p><b>INDURATION</b></p> <p>FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.</p> <table border="1"> <tbody> <tr> <td>FRIABLE</td> <td>RUBBING WITH FINGER FREES NUMEROUS GRAINS; GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE.</td> </tr> <tr> <td>MODERATELY INDURATED</td> <td>GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE; BREAKS EASILY WHEN HIT WITH HAMMER.</td> </tr> <tr> <td>INDURATED</td> <td>GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE; DIFFICULT TO BREAK WITH HAMMER.</td> </tr> <tr> <td>EXTREMELY INDURATED</td> <td>SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE; SAMPLE BREAKS ACROSS GRAINS.</td> </tr> </tbody> </table> </td> </tr> <tr> <td colspan="2"> <p><b>BENCH MARK: N/A ELEVATIONS DERIVED FROM PROJECT DTM</b></p> <p align="right">ELEVATION: FEET</p> </td> <td colspan="2"> <p><b>NOTES:</b></p> </td> </tr> </tbody> </table> |   | GENERAL CLASS.   | GRANULAR MATERIALS (≤ 35% PASSING #200)                          |  |  |  |   |  | SILT-CLAY MATERIALS (> 35% PASSING #200) |   |  |   |  |                                     | ORGANIC MATERIALS   |   | A-1   | A-1-b   | A-3  | A-2                  | A-2-4   | A-2-5                            | A-2-6  | A-2-7   | A-4   | A-5   | A-6              | A-7                              | A-1, A-2   | A-3   | A-4, A-5                                 | A-6, A-7  | GROUP CLASS. | A-1-a                                   | A-1-b   | A-3                                       | A-2-4                          | A-2-5  | A-2-6                               | A-2-7                    | A-4   | A-5                                   | A-6                      | A-7  | A-1, A-2                                 | A-3                      | A-4, A-5                          | A-6, A-7 | SYMBOL                       |                       |            |                    |                      |  |              |          |  |            |  |  |  |  |  |  | % PASSING #10 #40 #200 | 50 Mx 30 Mx 15 Mx | 50 Mx 25 Mx 10 Mx | 51 Mx 10 Mx 5 Mx | 35 Mx 10 Mx 5 Mx | 35 Mx 10 Mx 5 Mx | 35 Mx 10 Mx 5 Mx | 35 Mx 10 Mx 5 Mx | 36 Mx 10 Mx 5 Mx | 36 Mx 10 Mx 5 Mx | 36 Mx 10 Mx 5 Mx | 36 Mx 10 Mx 5 Mx | GRANULAR SOILS | SILT-CLAY SOILS | MUCK, PEAT |    | MATERIAL PASSING #40 LL PI | - | - | 40 Mx 10 Mx 6 Mx | 41 Mx 10 Mx NP | 40 Mx 10 Mx 11 Mx                    | 41 Mx 10 Mx 11 Mx | 40 Mx 10 Mx 11 Mx | 41 Mx 10 Mx 11 Mx | 40 Mx 10 Mx 11 Mx | 41 Mx 10 Mx 11 Mx | 40 Mx 10 Mx 11 Mx |  |  |  |  | GROUP INDEX | 0 | 0 | 0 | 0 | 4 Mx | 8 Mx | 12 Mx | 16 Mx | NO Mx |  |  |  |  |  |  | USUAL TYPES OF MAJOR MATERIALS | STONE FRAGS. GRAVEL, AND SAND | FINE SAND | SILTY OR CLAYEY GRAVEL AND SAND | SILTY SOILS | CLAYEY SOILS |  |  |  |  |  |  | SOILS WITH LITTLE OR MODERATE AMOUNTS OF ORGANIC MATTER | HIGHLY ORGANIC SOILS |  |  | GEN. RATING AS SUBGRADE | EXCELLENT TO GOOD |  |  |  | FAIR TO POOR |  |  |  | FAIR TO POOR | POOR | UNSATURABLE |  |  |  |  | PI OF A-7-5 SUBGROUP IS ≤ LL - 30 ; PI OF A-7-6 SUBGROUP IS > LL - 30 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | <p><b>CONSISTENCY OR DENSENESS</b></p> <table border="1"> <thead> <tr> <th>PRIMARY SOIL TYPE</th> <th>COMPACTNESS OR CONSISTENCY</th> <th>RANGE OF STANDARD PENETRATION RESISTANCE (N-VALUE)</th> <th>RANGE OF UNCONFINED COMPRESSIVE STRENGTH (TONS/FT<sup>2</sup>)</th> </tr> </thead> <tbody> <tr> <td>GENERALLY GRANULAR MATERIAL (NON-COHESSIVE)</td> <td>VERY LOOSE<br/>LOOSE<br/>MEDIUM DENSE<br/>DENSE<br/>VERY DENSE</td> <td>&lt; 4<br/>4 TO 10<br/>10 TO 30<br/>30 TO 50<br/>&gt; 50</td> <td>N/A</td> </tr> <tr> <td>GENERALLY SILT-CLAY MATERIAL (COHESIVE)</td> <td>VERY SOFT<br/>SOFT<br/>MEDIUM STIFF<br/>STIFF<br/>VERY STIFF<br/>HARD</td> <td>&lt; 2<br/>2 TO 4<br/>4 TO 8<br/>8 TO 15<br/>15 TO 30<br/>&gt; 30</td> <td>&lt; 0.25<br/>0.25 TO 0.5<br/>0.5 TO 1.0<br/>1 TO 2<br/>2 TO 4<br/>&gt; 4</td> </tr> </tbody> </table> |  | PRIMARY SOIL TYPE | COMPACTNESS OR CONSISTENCY | RANGE OF STANDARD PENETRATION RESISTANCE (N-VALUE) | RANGE OF UNCONFINED COMPRESSIVE STRENGTH (TONS/FT <sup>2</sup> ) | GENERALLY GRANULAR MATERIAL (NON-COHESSIVE) | VERY LOOSE<br>LOOSE<br>MEDIUM DENSE<br>DENSE<br>VERY DENSE | < 4<br>4 TO 10<br>10 TO 30<br>30 TO 50<br>> 50 | N/A | GENERALLY SILT-CLAY MATERIAL (COHESIVE) | VERY SOFT<br>SOFT<br>MEDIUM STIFF<br>STIFF<br>VERY STIFF<br>HARD | < 2<br>2 TO 4<br>4 TO 8<br>8 TO 15<br>15 TO 30<br>> 30 | < 0.25<br>0.25 TO 0.5<br>0.5 TO 1.0<br>1 TO 2<br>2 TO 4<br>> 4 | <p><b>MISCELLANEOUS SYMBOLS</b></p> |  | <p><b>TEXTURE OR GRAIN SIZE</b></p> <table border="1"> <thead> <tr> <th>U.S. STD. SIEVE SIZE OPENING (MM)</th> <th>4</th><th>10</th><th>40</th><th>60</th><th>200</th><th>270</th> </tr> <tr> <td></td> <td>4.76</td><td>2.00</td><td>0.42</td><td>0.25</td><td>0.075</td><td>0.053</td> </tr> </thead> <tbody> <tr> <td>BOULDER (BLDR.)</td> <td></td><td></td><td></td><td></td><td></td><td></td> </tr> <tr> <td>COBBLE (COB.)</td> <td></td><td></td><td></td><td></td><td></td><td></td> </tr> <tr> <td>GRAVEL (GR.)</td> <td></td><td></td><td></td><td></td><td></td><td></td> </tr> <tr> <td>COARSE SAND (CS, SD.)</td> <td></td><td></td><td></td><td></td><td></td><td></td> </tr> <tr> <td>FINE SAND (F SD.)</td> <td></td><td></td><td></td><td></td><td></td><td></td> </tr> <tr> <td>SILT (SL.)</td> <td></td><td></td><td></td><td></td><td></td><td></td> </tr> <tr> <td>CLAY (CL.)</td> <td></td><td></td><td></td><td></td><td></td><td></td> </tr> <tr> <td>GRAIN SIZE</td> <td>305</td><td>75</td><td>2.0</td><td>0.25</td><td>0.05</td><td>0.005</td> </tr> <tr> <td>MM</td> <td></td><td></td><td></td><td></td><td></td><td></td> </tr> <tr> <td>IN.</td> <td>12</td><td>3</td><td></td><td></td><td></td><td></td> </tr> </tbody> </table> |  | U.S. STD. SIEVE SIZE OPENING (MM) | 4 | 10 | 40 | 60 | 200 | 270 |  | 4.76 | 2.00 | 0.42 | 0.25 | 0.075 | 0.053 | BOULDER (BLDR.) |  |  |  |  |  |  | COBBLE (COB.) |  |  |  |  |  |  | GRAVEL (GR.) |  |  |  |  |  |  | COARSE SAND (CS, SD.) |  |  |  |  |  |  | FINE SAND (F SD.) |  |  |  |  |  |  | SILT (SL.) |  |  |  |  |  |  | CLAY (CL.) |  |  |  |  |  |  | GRAIN SIZE | 305 | 75 | 2.0 | 0.25 | 0.05 | 0.005 | MM |  |  |  |  |  |  | IN. | 12 | 3 |  |  |  |  | <p><b>RECOMMENDATION SYMBOLS</b></p> |  | <p><b>SOIL MOISTURE - CORRELATION OF TERMS</b></p> <table border="1"> <thead> <tr> <th>SOIL MOISTURE SCALE (ATTERBERG LIMITS)</th> <th>FIELD MOISTURE DESCRIPTION</th> <th>GUIDE FOR FIELD MOISTURE DESCRIPTION</th> </tr> </thead> <tbody> <tr> <td>LL - LIQUID LIMIT</td> <td>- SATURATED - (SAT.)</td> <td>USUALLY LIQUID; VERY WET, USUALLY FROM BELOW THE GROUND WATER TABLE</td> </tr> <tr> <td>PLASTIC RANGE (PI)</td> <td>- WET - (W)</td> <td>SEMISOLID; REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE</td> </tr> <tr> <td>OM - OPTIMUM MOISTURE SHRINKAGE LIMIT</td> <td>- MOIST - (M)</td> <td>SOLID; AT OR NEAR OPTIMUM MOISTURE</td> </tr> <tr> <td>SL - SHRINKAGE LIMIT</td> <td>- DRY - (D)</td> <td>REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE</td> </tr> </tbody> </table> |  | SOIL MOISTURE SCALE (ATTERBERG LIMITS) | FIELD MOISTURE DESCRIPTION | GUIDE FOR FIELD MOISTURE DESCRIPTION | LL - LIQUID LIMIT | - SATURATED - (SAT.) | USUALLY LIQUID; VERY WET, USUALLY FROM BELOW THE GROUND WATER TABLE | PLASTIC RANGE (PI) | - WET - (W) | SEMISOLID; REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE | OM - OPTIMUM MOISTURE SHRINKAGE LIMIT | - MOIST - (M) | SOLID; AT OR NEAR OPTIMUM MOISTURE | SL - SHRINKAGE LIMIT | - DRY - (D) | REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE | <p><b>ABBREVIATIONS</b></p> <table border="1"> <tbody> <tr> <td>AR - AUGER REFUSAL</td> <td>MED. - MEDIUM</td> <td>VST - VANE SHEAR TEST</td> </tr> <tr> <td>BT - BORING TERMINATED</td> <td>MICA. - MICACEOUS</td> <td>WEA. - WEATHERED</td> </tr> <tr> <td>CL. - CLAY</td> <td>MOD. - MODERATELY</td> <td>UW - UNIT WEIGHT</td> </tr> <tr> <td>CPT - COARSE PENETRATION TEST</td> <td>NP - NON PLASTIC</td> <td>UW - DRY UNIT WEIGHT</td> </tr> <tr> <td>CSE. - COARSE</td> <td>ORG. - ORGANIC</td> <td></td> </tr> <tr> <td>DPT - DILATOMETER TEST</td> <td>PMT - PRESSUREMETER TEST</td> <td></td> </tr> <tr> <td>DPT - DYNAMIC PENETRATION TEST</td> <td>SAP. - SAPROLITIC</td> <td></td> </tr> <tr> <td>Ø - VOID RATIO</td> <td>SD. - SAND, SANDY</td> <td></td> </tr> <tr> <td>F - FINE</td> <td>SL. - SILT, SILTY</td> <td></td> </tr> <tr> <td>FOSS. - FOSSILIFEROUS</td> <td>SLI. - SLIGHTLY</td> <td></td> </tr> <tr> <td>FRAC. - FRACTURED, FRACTURES</td> <td>TCR - TRICONE REFUSAL</td> <td></td> </tr> <tr> <td>FRAGS. - FRAGMENTS</td> <td>w - MOISTURE CONTENT</td> <td></td> </tr> <tr> <td>HI. - HIGHLY</td> <td>V - VERY</td> <td></td> </tr> </tbody> </table> |  | AR - AUGER REFUSAL | MED. - MEDIUM | VST - VANE SHEAR TEST | BT - BORING TERMINATED | MICA. - MICACEOUS | WEA. - WEATHERED | CL. - CLAY | MOD. - MODERATELY | UW - UNIT WEIGHT | CPT - COARSE PENETRATION TEST | NP - NON PLASTIC | UW - DRY UNIT WEIGHT | CSE. - COARSE | ORG. - ORGANIC |  | DPT - DILATOMETER TEST | PMT - PRESSUREMETER TEST |  | DPT - DYNAMIC PENETRATION TEST | SAP. - SAPROLITIC |  | Ø - VOID RATIO | SD. - SAND, SANDY |  | F - FINE | SL. - SILT, SILTY |  | FOSS. - FOSSILIFEROUS | SLI. - SLIGHTLY |  | FRAC. - FRACTURED, FRACTURES | TCR - TRICONE REFUSAL |  | FRAGS. - FRAGMENTS | w - MOISTURE CONTENT |  | HI. - HIGHLY | V - VERY |  | <p><b>PLASTICITY</b></p> <table border="1"> <thead> <tr> <th>NON PLASTIC</th> <th>PLASTICITY INDEX (PI)</th> <th>DRY STRENGTH</th> </tr> </thead> <tbody> <tr> <td></td> <td>0-5</td> <td>VERY LOW</td> </tr> <tr> <td></td> <td>6-15</td> <td>SLIGHT</td> </tr> <tr> <td></td> <td>16-25</td> <td>MEDIUM</td> </tr> <tr> <td></td> <td>26 OR MORE</td> <td>HIGH</td> </tr> </tbody> </table> |  | NON PLASTIC | PLASTICITY INDEX (PI) | DRY STRENGTH |  | 0-5 | VERY LOW |  | 6-15 | SLIGHT |  | 16-25 | MEDIUM |  | 26 OR MORE | HIGH | <p><b>EQUIPMENT USED ON SUBJECT PROJECT</b></p> <table border="1"> <tbody> <tr> <td>DRILL UNITS:</td> <td>ADVANCING TOOLS:</td> <td>HAMMER TYPE:</td> </tr> <tr> <td><input type="checkbox"/> CME-45C</td> <td><input type="checkbox"/> CLAY BITS</td> <td><input checked="" type="checkbox"/> AUTOMATIC <input type="checkbox"/> MANUAL</td> </tr> <tr> <td><input checked="" type="checkbox"/> CME-55</td> <td><input type="checkbox"/> 6" CONTINUOUS FLIGHT AUGER</td> <td>CORE SIZE:</td> </tr> <tr> <td><input type="checkbox"/> CME-550</td> <td><input checked="" type="checkbox"/> 8" HOLLOW AUGERS</td> <td><input type="checkbox"/> -B <input type="checkbox"/> -H <input type="checkbox"/> -N</td> </tr> <tr> <td><input type="checkbox"/> VANE SHEAR TEST</td> <td><input type="checkbox"/> HARD FACED FINGER BITS</td> <td>HAND TOOLS:</td> </tr> <tr> <td><input type="checkbox"/> PORTABLE HOIST</td> <td><input type="checkbox"/> TUNG-CARBIDE INSERTS</td> <td><input type="checkbox"/> POST HOLE DIGGER</td> </tr> <tr> <td><input type="checkbox"/></td> <td><input type="checkbox"/> CASING <input type="checkbox"/> W/ ADVANCER</td> <td><input type="checkbox"/> HAND AUGER</td> </tr> <tr> <td><input type="checkbox"/></td> <td><input type="checkbox"/> TRICONE _____ *STEEL TEETH</td> <td><input type="checkbox"/> SOUNDING ROD</td> </tr> <tr> <td><input type="checkbox"/></td> <td><input type="checkbox"/> TRICONE _____ *TUNG-CARB.</td> <td><input type="checkbox"/> VANE SHEAR TEST</td> </tr> <tr> <td><input type="checkbox"/></td> <td><input type="checkbox"/> CORE BIT</td> <td></td> </tr> <tr> <td><input type="checkbox"/></td> <td></td> <td></td> </tr> </tbody> </table> |  | DRILL UNITS: | ADVANCING TOOLS: | HAMMER TYPE: | <input type="checkbox"/> CME-45C | <input type="checkbox"/> CLAY BITS | <input checked="" type="checkbox"/> AUTOMATIC <input type="checkbox"/> MANUAL | <input checked="" type="checkbox"/> CME-55 | <input type="checkbox"/> 6" CONTINUOUS FLIGHT AUGER | CORE SIZE: | <input type="checkbox"/> CME-550 | <input checked="" type="checkbox"/> 8" HOLLOW AUGERS | <input type="checkbox"/> -B <input type="checkbox"/> -H <input type="checkbox"/> -N | <input type="checkbox"/> VANE SHEAR TEST | <input type="checkbox"/> HARD FACED FINGER BITS | HAND TOOLS: | <input type="checkbox"/> PORTABLE HOIST | <input type="checkbox"/> TUNG-CARBIDE INSERTS | <input type="checkbox"/> POST HOLE DIGGER | <input type="checkbox"/> | <input type="checkbox"/> CASING <input type="checkbox"/> W/ ADVANCER | <input type="checkbox"/> HAND AUGER | <input type="checkbox"/> | <input type="checkbox"/> TRICONE _____ *STEEL TEETH | <input type="checkbox"/> SOUNDING ROD | <input type="checkbox"/> | <input type="checkbox"/> TRICONE _____ *TUNG-CARB. | <input type="checkbox"/> VANE SHEAR TEST | <input type="checkbox"/> | <input type="checkbox"/> CORE BIT |  | <input type="checkbox"/> |  |  | <p><b>COLOR</b></p> <p>DESCRIPTIONS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YELLOW-BROWN, BLUE-GRAY). MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE.</p> |  | <p><b>FRACTURE SPACING</b></p> <table border="1"> <thead> <tr> <th>TERM</th> <th>SPACING</th> </tr> </thead> <tbody> <tr> <td>VERY WIDE</td> <td>MORE THAN 10 FEET</td> </tr> <tr> <td>WIDE</td> <td>3 TO 10 FEET</td> </tr> <tr> <td>MODERATELY CLOSE</td> <td>1 TO 3 FEET</td> </tr> <tr> <td>CLOSE</td> <td>0.16 TO 1 FOOT</td> </tr> <tr> <td>VERY CLOSE</td> <td>LESS THAN 0.16 FEET</td> </tr> </tbody> </table> |  | TERM | SPACING | VERY WIDE | MORE THAN 10 FEET | WIDE | 3 TO 10 FEET | MODERATELY CLOSE | 1 TO 3 FEET | CLOSE | 0.16 TO 1 FOOT | VERY CLOSE | LESS THAN 0.16 FEET | <p><b>BEDDING</b></p> <table border="1"> <thead> <tr> <th>TERM</th> <th>THICKNESS</th> </tr> </thead> <tbody> <tr> <td>VERY THICKLY BEDDED</td> <td>4 FEET</td> </tr> <tr> <td>THICKLY BEDDED</td> <td>1.5 - 4 FEET</td> </tr> <tr> <td>THINLY BEDDED</td> <td>0.16 - 1.5 FEET</td> </tr> <tr> <td>VERY THINLY BEDDED</td> <td>0.03 - 0.16 FEET</td> </tr> <tr> <td>THICKLY LAMINATED</td> <td>0.008 - 0.03 FEET</td> </tr> <tr> <td>THINLY LAMINATED</td> <td>&lt; 0.008 FEET</td> </tr> </tbody> </table> |  | TERM | THICKNESS | VERY THICKLY BEDDED | 4 FEET | THICKLY BEDDED | 1.5 - 4 FEET | THINLY BEDDED | 0.16 - 1.5 FEET | VERY THINLY BEDDED | 0.03 - 0.16 FEET | THICKLY LAMINATED | 0.008 - 0.03 FEET | THINLY LAMINATED | < 0.008 FEET | <p><b>INDURATION</b></p> <p>FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.</p> <table border="1"> <tbody> <tr> <td>FRIABLE</td> <td>RUBBING WITH FINGER FREES NUMEROUS GRAINS; GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE.</td> </tr> <tr> <td>MODERATELY INDURATED</td> <td>GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE; BREAKS EASILY WHEN HIT WITH HAMMER.</td> </tr> <tr> <td>INDURATED</td> <td>GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE; DIFFICULT TO BREAK WITH HAMMER.</td> </tr> <tr> <td>EXTREMELY INDURATED</td> <td>SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE; SAMPLE BREAKS ACROSS GRAINS.</td> </tr> </tbody> </table> |  | FRIABLE | RUBBING WITH FINGER FREES NUMEROUS GRAINS; GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE. | MODERATELY INDURATED | GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE; BREAKS EASILY WHEN HIT WITH HAMMER. | INDURATED | GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE; DIFFICULT TO BREAK WITH HAMMER. | EXTREMELY INDURATED | SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE; SAMPLE BREAKS ACROSS GRAINS. | <p><b>BENCH MARK: N/A ELEVATIONS DERIVED FROM PROJECT DTM</b></p> <p align="right">ELEVATION: FEET</p> |  | <p><b>NOTES:</b></p> |  |
| GENERAL CLASS.   | GRANULAR MATERIALS (≤ 35% PASSING #200)   |  |  |  |  |  | SILT-CLAY MATERIALS (> 35% PASSING #200)                            |  |  |   |  |   | ORGANIC MATERIALS  |                                     |                     |   |   |         |  |                      |   |                                  |  |   |   |   |                  |                                  |  |   |  |   |              |   |   |   |                                |  |                                     |                          |   |                                       |                          |  |  |                          |                                   |          |                              |                       |            |                    |                      |  |              |          |  |            |  |  |  |  |  |  |                        |                   |                   |                  |                  |                  |                  |                  |                  |                  |                  |                  |                |                 |            |    |                            |   |   |                  |                |                                      |                   |                   |                   |                   |                   |                   |  |  |  |  |             |   |   |   |   |      |      |       |       |       |  |  |  |  |  |  |                                |                               |           |                                 |             |              |  |  |  |  |  |  |   |                      |  |  |                         |                   |  |  |  |              |  |  |  |              |      |             |  |  |  |  |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                   |                            |  |  |   |  |  |     |   |  |  |  |                                     |  |  |  |                                   |   |    |    |    |     |     |  |      |      |      |      |       |       |                 |  |  |  |  |  |  |               |  |  |  |  |  |  |              |  |  |  |  |  |  |                       |  |  |  |  |  |  |                   |  |  |  |  |  |  |            |  |  |  |  |  |  |            |  |  |  |  |  |  |            |     |    |     |      |      |       |    |  |  |  |  |  |  |     |    |   |  |  |  |  |                                      |  |  |  |  |                            |                                      |                   |                      |   |                    |             |   |                                       |               |                                    |                      |             |  |   |  |                    |               |                       |                        |                   |                  |            |                   |                  |                               |                  |                      |               |                |  |                        |                          |  |                                |                   |  |                |                   |  |          |                   |  |                       |                 |  |                              |                       |  |                    |                      |  |              |          |  |   |  |             |                       |              |  |     |          |  |      |        |  |       |        |  |            |      |   |  |              |                  |              |                                  |                                    |   |  |   |            |                                  |  |   |  |   |             |   |   |   |                          |  |                                     |                          |   |                                       |                          |  |  |                          |                                   |  |                          |  |  |   |  |  |  |      |         |           |                   |      |              |                  |             |       |                |            |                     |   |  |      |           |                     |        |                |              |               |                 |                    |                  |                   |                   |                  |              |   |  |         |  |                      |   |           |  |                     |   |  |  |                      |  |
|  | A-1   | A-1-b  | A-3  | A-2  | A-2-4  | A-2-5  | A-2-6   | A-2-7  | A-4                                      | A-5   | A-6  | A-7   | A-1, A-2   | A-3                                 | A-4, A-5            | A-6, A-7  |   |         |  |                      |   |                                  |  |   |   |   |                  |                                  |  |   |  |   |              |   |   |   |                                |  |                                     |                          |   |                                       |                          |  |  |                          |                                   |          |                              |                       |            |                    |                      |  |              |          |  |            |  |  |  |  |  |  |                        |                   |                   |                  |                  |                  |                  |                  |                  |                  |                  |                  |                |                 |            |    |                            |   |   |                  |                |                                      |                   |                   |                   |                   |                   |                   |  |  |  |  |             |   |   |   |   |      |      |       |       |       |  |  |  |  |  |  |                                |                               |           |                                 |             |              |  |  |  |  |  |  |   |                      |  |  |                         |                   |  |  |  |              |  |  |  |              |      |             |  |  |  |  |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                   |                            |  |  |   |  |  |     |   |  |  |  |                                     |  |  |  |                                   |   |    |    |    |     |     |  |      |      |      |      |       |       |                 |  |  |  |  |  |  |               |  |  |  |  |  |  |              |  |  |  |  |  |  |                       |  |  |  |  |  |  |                   |  |  |  |  |  |  |            |  |  |  |  |  |  |            |  |  |  |  |  |  |            |     |    |     |      |      |       |    |  |  |  |  |  |  |     |    |   |  |  |  |  |                                      |  |  |  |  |                            |                                      |                   |                      |   |                    |             |   |                                       |               |                                    |                      |             |  |   |  |                    |               |                       |                        |                   |                  |            |                   |                  |                               |                  |                      |               |                |  |                        |                          |  |                                |                   |  |                |                   |  |          |                   |  |                       |                 |  |                              |                       |  |                    |                      |  |              |          |  |   |  |             |                       |              |  |     |          |  |      |        |  |       |        |  |            |      |   |  |              |                  |              |                                  |                                    |   |  |   |            |                                  |  |   |  |   |             |   |   |   |                          |  |                                     |                          |   |                                       |                          |  |  |                          |                                   |  |                          |  |  |   |  |  |  |      |         |           |                   |      |              |                  |             |       |                |            |                     |   |  |      |           |                     |        |                |              |               |                 |                    |                  |                   |                   |                  |              |   |  |         |  |                      |   |           |  |                     |   |  |  |                      |  |
| GROUP CLASS.   | A-1-a   | A-1-b  | A-3  | A-2-4  | A-2-5  | A-2-6  | A-2-7   | A-4  | A-5                                      | A-6   | A-7  | A-1, A-2  | A-3  | A-4, A-5                            | A-6, A-7            |   |   |         |  |                      |   |                                  |  |   |   |   |                  |                                  |  |   |  |   |              |   |   |   |                                |  |                                     |                          |   |                                       |                          |  |  |                          |                                   |          |                              |                       |            |                    |                      |  |              |          |  |            |  |  |  |  |  |  |                        |                   |                   |                  |                  |                  |                  |                  |                  |                  |                  |                  |                |                 |            |    |                            |   |   |                  |                |                                      |                   |                   |                   |                   |                   |                   |  |  |  |  |             |   |   |   |   |      |      |       |       |       |  |  |  |  |  |  |                                |                               |           |                                 |             |              |  |  |  |  |  |  |   |                      |  |  |                         |                   |  |  |  |              |  |  |  |              |      |             |  |  |  |  |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                   |                            |  |  |   |  |  |     |   |  |  |  |                                     |  |  |  |                                   |   |    |    |    |     |     |  |      |      |      |      |       |       |                 |  |  |  |  |  |  |               |  |  |  |  |  |  |              |  |  |  |  |  |  |                       |  |  |  |  |  |  |                   |  |  |  |  |  |  |            |  |  |  |  |  |  |            |  |  |  |  |  |  |            |     |    |     |      |      |       |    |  |  |  |  |  |  |     |    |   |  |  |  |  |                                      |  |  |  |  |                            |                                      |                   |                      |   |                    |             |   |                                       |               |                                    |                      |             |  |   |  |                    |               |                       |                        |                   |                  |            |                   |                  |                               |                  |                      |               |                |  |                        |                          |  |                                |                   |  |                |                   |  |          |                   |  |                       |                 |  |                              |                       |  |                    |                      |  |              |          |  |   |  |             |                       |              |  |     |          |  |      |        |  |       |        |  |            |      |   |  |              |                  |              |                                  |                                    |   |  |   |            |                                  |  |   |  |   |             |   |   |   |                          |  |                                     |                          |   |                                       |                          |  |  |                          |                                   |  |                          |  |  |   |  |  |  |      |         |           |                   |      |              |                  |             |       |                |            |                     |   |  |      |           |                     |        |                |              |               |                 |                    |                  |                   |                   |                  |              |   |  |         |  |                      |   |           |  |                     |   |  |  |                      |  |
| SYMBOL   |   |  |  |  |  |  |   |  |  |   |  |   |  |                                     |                     |   |   |         |  |                      |   |                                  |  |   |   |   |                  |                                  |  |   |  |   |              |   |   |   |                                |  |                                     |                          |   |                                       |                          |  |  |                          |                                   |          |                              |                       |            |                    |                      |  |              |          |  |            |  |  |  |  |  |  |                        |                   |                   |                  |                  |                  |                  |                  |                  |                  |                  |                  |                |                 |            |    |                            |   |   |                  |                |                                      |                   |                   |                   |                   |                   |                   |  |  |  |  |             |   |   |   |   |      |      |       |       |       |  |  |  |  |  |  |                                |                               |           |                                 |             |              |  |  |  |  |  |  |   |                      |  |  |                         |                   |  |  |  |              |  |  |  |              |      |             |  |  |  |  |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                   |                            |  |  |   |  |  |     |   |  |  |  |                                     |  |  |  |                                   |   |    |    |    |     |     |  |      |      |      |      |       |       |                 |  |  |  |  |  |  |               |  |  |  |  |  |  |              |  |  |  |  |  |  |                       |  |  |  |  |  |  |                   |  |  |  |  |  |  |            |  |  |  |  |  |  |            |  |  |  |  |  |  |            |     |    |     |      |      |       |    |  |  |  |  |  |  |     |    |   |  |  |  |  |                                      |  |  |  |  |                            |                                      |                   |                      |   |                    |             |   |                                       |               |                                    |                      |             |  |   |  |                    |               |                       |                        |                   |                  |            |                   |                  |                               |                  |                      |               |                |  |                        |                          |  |                                |                   |  |                |                   |  |          |                   |  |                       |                 |  |                              |                       |  |                    |                      |  |              |          |  |   |  |             |                       |              |  |     |          |  |      |        |  |       |        |  |            |      |   |  |              |                  |              |                                  |                                    |   |  |   |            |                                  |  |   |  |   |             |   |   |   |                          |  |                                     |                          |   |                                       |                          |  |  |                          |                                   |  |                          |  |  |   |  |  |  |      |         |           |                   |      |              |                  |             |       |                |            |                     |   |  |      |           |                     |        |                |              |               |                 |                    |                  |                   |                   |                  |              |   |  |         |  |                      |   |           |  |                     |   |  |  |                      |  |
| % PASSING #10 #40 #200   | 50 Mx 30 Mx 15 Mx   | 50 Mx 25 Mx 10 Mx  | 51 Mx 10 Mx 5 Mx   | 35 Mx 10 Mx 5 Mx   | 35 Mx 10 Mx 5 Mx   | 35 Mx 10 Mx 5 Mx   | 35 Mx 10 Mx 5 Mx  | 36 Mx 10 Mx 5 Mx                               | 36 Mx 10 Mx 5 Mx                         | 36 Mx 10 Mx 5 Mx                                      | 36 Mx 10 Mx 5 Mx   | GRANULAR SOILS  | SILT-CLAY SOILS  | MUCK, PEAT                          |                     |   |   |         |  |                      |   |                                  |  |   |   |   |                  |                                  |  |   |  |   |              |   |   |   |                                |  |                                     |                          |   |                                       |                          |  |  |                          |                                   |          |                              |                       |            |                    |                      |  |              |          |  |            |  |  |  |  |  |  |                        |                   |                   |                  |                  |                  |                  |                  |                  |                  |                  |                  |                |                 |            |    |                            |   |   |                  |                |                                      |                   |                   |                   |                   |                   |                   |  |  |  |  |             |   |   |   |   |      |      |       |       |       |  |  |  |  |  |  |                                |                               |           |                                 |             |              |  |  |  |  |  |  |   |                      |  |  |                         |                   |  |  |  |              |  |  |  |              |      |             |  |  |  |  |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                   |                            |  |  |   |  |  |     |   |  |  |  |                                     |  |  |  |                                   |   |    |    |    |     |     |  |      |      |      |      |       |       |                 |  |  |  |  |  |  |               |  |  |  |  |  |  |              |  |  |  |  |  |  |                       |  |  |  |  |  |  |                   |  |  |  |  |  |  |            |  |  |  |  |  |  |            |  |  |  |  |  |  |            |     |    |     |      |      |       |    |  |  |  |  |  |  |     |    |   |  |  |  |  |                                      |  |  |  |  |                            |                                      |                   |                      |   |                    |             |   |                                       |               |                                    |                      |             |  |   |  |                    |               |                       |                        |                   |                  |            |                   |                  |                               |                  |                      |               |                |  |                        |                          |  |                                |                   |  |                |                   |  |          |                   |  |                       |                 |  |                              |                       |  |                    |                      |  |              |          |  |   |  |             |                       |              |  |     |          |  |      |        |  |       |        |  |            |      |   |  |              |                  |              |                                  |                                    |   |  |   |            |                                  |  |   |  |   |             |   |   |   |                          |  |                                     |                          |   |                                       |                          |  |  |                          |                                   |  |                          |  |  |   |  |  |  |      |         |           |                   |      |              |                  |             |       |                |            |                     |   |  |      |           |                     |        |                |              |               |                 |                    |                  |                   |                   |                  |              |   |  |         |  |                      |   |           |  |                     |   |  |  |                      |  |
| MATERIAL PASSING #40 LL PI   | -   | -  | 40 Mx 10 Mx 6 Mx   | 41 Mx 10 Mx NP   | 40 Mx 10 Mx 11 Mx  | 41 Mx 10 Mx 11 Mx  | 40 Mx 10 Mx 11 Mx   | 41 Mx 10 Mx 11 Mx                              | 40 Mx 10 Mx 11 Mx                        | 41 Mx 10 Mx 11 Mx                                     | 40 Mx 10 Mx 11 Mx  |   |  |                                     |                     |   |   |         |  |                      |   |                                  |  |   |   |   |                  |                                  |  |   |  |   |              |   |   |   |                                |  |                                     |                          |   |                                       |                          |  |  |                          |                                   |          |                              |                       |            |                    |                      |  |              |          |  |            |  |  |  |  |  |  |                        |                   |                   |                  |                  |                  |                  |                  |                  |                  |                  |                  |                |                 |            |    |                            |   |   |                  |                |                                      |                   |                   |                   |                   |                   |                   |  |  |  |  |             |   |   |   |   |      |      |       |       |       |  |  |  |  |  |  |                                |                               |           |                                 |             |              |  |  |  |  |  |  |   |                      |  |  |                         |                   |  |  |  |              |  |  |  |              |      |             |  |  |  |  |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                   |                            |  |  |   |  |  |     |   |  |  |  |                                     |  |  |  |                                   |   |    |    |    |     |     |  |      |      |      |      |       |       |                 |  |  |  |  |  |  |               |  |  |  |  |  |  |              |  |  |  |  |  |  |                       |  |  |  |  |  |  |                   |  |  |  |  |  |  |            |  |  |  |  |  |  |            |  |  |  |  |  |  |            |     |    |     |      |      |       |    |  |  |  |  |  |  |     |    |   |  |  |  |  |                                      |  |  |  |  |                            |                                      |                   |                      |   |                    |             |   |                                       |               |                                    |                      |             |  |   |  |                    |               |                       |                        |                   |                  |            |                   |                  |                               |                  |                      |               |                |  |                        |                          |  |                                |                   |  |                |                   |  |          |                   |  |                       |                 |  |                              |                       |  |                    |                      |  |              |          |  |   |  |             |                       |              |  |     |          |  |      |        |  |       |        |  |            |      |   |  |              |                  |              |                                  |                                    |   |  |   |            |                                  |  |   |  |   |             |   |   |   |                          |  |                                     |                          |   |                                       |                          |  |  |                          |                                   |  |                          |  |  |   |  |  |  |      |         |           |                   |      |              |                  |             |       |                |            |                     |   |  |      |           |                     |        |                |              |               |                 |                    |                  |                   |                   |                  |              |   |  |         |  |                      |   |           |  |                     |   |  |  |                      |  |
| GROUP INDEX  | 0   | 0  | 0  | 0  | 4 Mx   | 8 Mx   | 12 Mx   | 16 Mx  | NO Mx                                    |   |  |   |  |                                     |                     |   |   |         |  |                      |   |                                  |  |   |   |   |                  |                                  |  |   |  |   |              |   |   |   |                                |  |                                     |                          |   |                                       |                          |  |  |                          |                                   |          |                              |                       |            |                    |                      |  |              |          |  |            |  |  |  |  |  |  |                        |                   |                   |                  |                  |                  |                  |                  |                  |                  |                  |                  |                |                 |            |    |                            |   |   |                  |                |                                      |                   |                   |                   |                   |                   |                   |  |  |  |  |             |   |   |   |   |      |      |       |       |       |  |  |  |  |  |  |                                |                               |           |                                 |             |              |  |  |  |  |  |  |   |                      |  |  |                         |                   |  |  |  |              |  |  |  |              |      |             |  |  |  |  |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                   |                            |  |  |   |  |  |     |   |  |  |  |                                     |  |  |  |                                   |   |    |    |    |     |     |  |      |      |      |      |       |       |                 |  |  |  |  |  |  |               |  |  |  |  |  |  |              |  |  |  |  |  |  |                       |  |  |  |  |  |  |                   |  |  |  |  |  |  |            |  |  |  |  |  |  |            |  |  |  |  |  |  |            |     |    |     |      |      |       |    |  |  |  |  |  |  |     |    |   |  |  |  |  |                                      |  |  |  |  |                            |                                      |                   |                      |   |                    |             |   |                                       |               |                                    |                      |             |  |   |  |                    |               |                       |                        |                   |                  |            |                   |                  |                               |                  |                      |               |                |  |                        |                          |  |                                |                   |  |                |                   |  |          |                   |  |                       |                 |  |                              |                       |  |                    |                      |  |              |          |  |   |  |             |                       |              |  |     |          |  |      |        |  |       |        |  |            |      |   |  |              |                  |              |                                  |                                    |   |  |   |            |                                  |  |   |  |   |             |   |   |   |                          |  |                                     |                          |   |                                       |                          |  |  |                          |                                   |  |                          |  |  |   |  |  |  |      |         |           |                   |      |              |                  |             |       |                |            |                     |   |  |      |           |                     |        |                |              |               |                 |                    |                  |                   |                   |                  |              |   |  |         |  |                      |   |           |  |                     |   |  |  |                      |  |
| USUAL TYPES OF MAJOR MATERIALS   | STONE FRAGS. GRAVEL, AND SAND   | FINE SAND  | SILTY OR CLAYEY GRAVEL AND SAND                                  | SILTY SOILS  | CLAYEY SOILS   |  |   |  |  |   |  | SOILS WITH LITTLE OR MODERATE AMOUNTS OF ORGANIC MATTER | HIGHLY ORGANIC SOILS   |                                     |                     |   |   |         |  |                      |   |                                  |  |   |   |   |                  |                                  |  |   |  |   |              |   |   |   |                                |  |                                     |                          |   |                                       |                          |  |  |                          |                                   |          |                              |                       |            |                    |                      |  |              |          |  |            |  |  |  |  |  |  |                        |                   |                   |                  |                  |                  |                  |                  |                  |                  |                  |                  |                |                 |            |    |                            |   |   |                  |                |                                      |                   |                   |                   |                   |                   |                   |  |  |  |  |             |   |   |   |   |      |      |       |       |       |  |  |  |  |  |  |                                |                               |           |                                 |             |              |  |  |  |  |  |  |   |                      |  |  |                         |                   |  |  |  |              |  |  |  |              |      |             |  |  |  |  |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                   |                            |  |  |   |  |  |     |   |  |  |  |                                     |  |  |  |                                   |   |    |    |    |     |     |  |      |      |      |      |       |       |                 |  |  |  |  |  |  |               |  |  |  |  |  |  |              |  |  |  |  |  |  |                       |  |  |  |  |  |  |                   |  |  |  |  |  |  |            |  |  |  |  |  |  |            |  |  |  |  |  |  |            |     |    |     |      |      |       |    |  |  |  |  |  |  |     |    |   |  |  |  |  |                                      |  |  |  |  |                            |                                      |                   |                      |   |                    |             |   |                                       |               |                                    |                      |             |  |   |  |                    |               |                       |                        |                   |                  |            |                   |                  |                               |                  |                      |               |                |  |                        |                          |  |                                |                   |  |                |                   |  |          |                   |  |                       |                 |  |                              |                       |  |                    |                      |  |              |          |  |   |  |             |                       |              |  |     |          |  |      |        |  |       |        |  |            |      |   |  |              |                  |              |                                  |                                    |   |  |   |            |                                  |  |   |  |   |             |   |   |   |                          |  |                                     |                          |   |                                       |                          |  |  |                          |                                   |  |                          |  |  |   |  |  |  |      |         |           |                   |      |              |                  |             |       |                |            |                     |   |  |      |           |                     |        |                |              |               |                 |                    |                  |                   |                   |                  |              |   |  |         |  |                      |   |           |  |                     |   |  |  |                      |  |
| GEN. RATING AS SUBGRADE  | EXCELLENT TO GOOD   |  |  |  | FAIR TO POOR   |  |   |  | FAIR TO POOR                             | POOR  | UNSATURABLE  |   |  |                                     |                     |   |   |         |  |                      |   |                                  |  |   |   |   |                  |                                  |  |   |  |   |              |   |   |   |                                |  |                                     |                          |   |                                       |                          |  |  |                          |                                   |          |                              |                       |            |                    |                      |  |              |          |  |            |  |  |  |  |  |  |                        |                   |                   |                  |                  |                  |                  |                  |                  |                  |                  |                  |                |                 |            |    |                            |   |   |                  |                |                                      |                   |                   |                   |                   |                   |                   |  |  |  |  |             |   |   |   |   |      |      |       |       |       |  |  |  |  |  |  |                                |                               |           |                                 |             |              |  |  |  |  |  |  |   |                      |  |  |                         |                   |  |  |  |              |  |  |  |              |      |             |  |  |  |  |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                   |                            |  |  |   |  |  |     |   |  |  |  |                                     |  |  |  |                                   |   |    |    |    |     |     |  |      |      |      |      |       |       |                 |  |  |  |  |  |  |               |  |  |  |  |  |  |              |  |  |  |  |  |  |                       |  |  |  |  |  |  |                   |  |  |  |  |  |  |            |  |  |  |  |  |  |            |  |  |  |  |  |  |            |     |    |     |      |      |       |    |  |  |  |  |  |  |     |    |   |  |  |  |  |                                      |  |  |  |  |                            |                                      |                   |                      |   |                    |             |   |                                       |               |                                    |                      |             |  |   |  |                    |               |                       |                        |                   |                  |            |                   |                  |                               |                  |                      |               |                |  |                        |                          |  |                                |                   |  |                |                   |  |          |                   |  |                       |                 |  |                              |                       |  |                    |                      |  |              |          |  |   |  |             |                       |              |  |     |          |  |      |        |  |       |        |  |            |      |   |  |              |                  |              |                                  |                                    |   |  |   |            |                                  |  |   |  |   |             |   |   |   |                          |  |                                     |                          |   |                                       |                          |  |  |                          |                                   |  |                          |  |  |   |  |  |  |      |         |           |                   |      |              |                  |             |       |                |            |                     |   |  |      |           |                     |        |                |              |               |                 |                    |                  |                   |                   |                  |              |   |  |         |  |                      |   |           |  |                     |   |  |  |                      |  |
| PI OF A-7-5 SUBGROUP IS ≤ LL - 30 ; PI OF A-7-6 SUBGROUP IS > LL - 30  |   |  |  |  |  |  |   |  |  |   |  |   |  |                                     |                     |   |   |         |  |                      |   |                                  |  |   |   |   |                  |                                  |  |   |  |   |              |   |   |   |                                |  |                                     |                          |   |                                       |                          |  |  |                          |                                   |          |                              |                       |            |                    |                      |  |              |          |  |            |  |  |  |  |  |  |                        |                   |                   |                  |                  |                  |                  |                  |                  |                  |                  |                  |                |                 |            |    |                            |   |   |                  |                |                                      |                   |                   |                   |                   |                   |                   |  |  |  |  |             |   |   |   |   |      |      |       |       |       |  |  |  |  |  |  |                                |                               |           |                                 |             |              |  |  |  |  |  |  |   |                      |  |  |                         |                   |  |  |  |              |  |  |  |              |      |             |  |  |  |  |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                   |                            |  |  |   |  |  |     |   |  |  |  |                                     |  |  |  |                                   |   |    |    |    |     |     |  |      |      |      |      |       |       |                 |  |  |  |  |  |  |               |  |  |  |  |  |  |              |  |  |  |  |  |  |                       |  |  |  |  |  |  |                   |  |  |  |  |  |  |            |  |  |  |  |  |  |            |  |  |  |  |  |  |            |     |    |     |      |      |       |    |  |  |  |  |  |  |     |    |   |  |  |  |  |                                      |  |  |  |  |                            |                                      |                   |                      |   |                    |             |   |                                       |               |                                    |                      |             |  |   |  |                    |               |                       |                        |                   |                  |            |                   |                  |                               |                  |                      |               |                |  |                        |                          |  |                                |                   |  |                |                   |  |          |                   |  |                       |                 |  |                              |                       |  |                    |                      |  |              |          |  |   |  |             |                       |              |  |     |          |  |      |        |  |       |        |  |            |      |   |  |              |                  |              |                                  |                                    |   |  |   |            |                                  |  |   |  |   |             |   |   |   |                          |  |                                     |                          |   |                                       |                          |  |  |                          |                                   |  |                          |  |  |   |  |  |  |      |         |           |                   |      |              |                  |             |       |                |            |                     |   |  |      |           |                     |        |                |              |               |                 |                    |                  |                   |                   |                  |              |   |  |         |  |                      |   |           |  |                     |   |  |  |                      |  |
| <p><b>CONSISTENCY OR DENSENESS</b></p> <table border="1"> <thead> <tr> <th>PRIMARY SOIL TYPE</th> <th>COMPACTNESS OR CONSISTENCY</th> <th>RANGE OF STANDARD PENETRATION RESISTANCE (N-VALUE)</th> <th>RANGE OF UNCONFINED COMPRESSIVE STRENGTH (TONS/FT<sup>2</sup>)</th> </tr> </thead> <tbody> <tr> <td>GENERALLY GRANULAR MATERIAL (NON-COHESSIVE)</td> <td>VERY LOOSE<br/>LOOSE<br/>MEDIUM DENSE<br/>DENSE<br/>VERY DENSE</td> <td>&lt; 4<br/>4 TO 10<br/>10 TO 30<br/>30 TO 50<br/>&gt; 50</td> <td>N/A</td> </tr> <tr> <td>GENERALLY SILT-CLAY MATERIAL (COHESIVE)</td> <td>VERY SOFT<br/>SOFT<br/>MEDIUM STIFF<br/>STIFF<br/>VERY STIFF<br/>HARD</td> <td>&lt; 2<br/>2 TO 4<br/>4 TO 8<br/>8 TO 15<br/>15 TO 30<br/>&gt; 30</td> <td>&lt; 0.25<br/>0.25 TO 0.5<br/>0.5 TO 1.0<br/>1 TO 2<br/>2 TO 4<br/>&gt; 4</td> </tr> </tbody> </table>   |   | PRIMARY SOIL TYPE  | COMPACTNESS OR CONSISTENCY                                       | RANGE OF STANDARD PENETRATION RESISTANCE (N-VALUE)   | RANGE OF UNCONFINED COMPRESSIVE STRENGTH (TONS/FT <sup>2</sup> ) | GENERALLY GRANULAR MATERIAL (NON-COHESSIVE)  | VERY LOOSE<br>LOOSE<br>MEDIUM DENSE<br>DENSE<br>VERY DENSE          | < 4<br>4 TO 10<br>10 TO 30<br>30 TO 50<br>> 50 | N/A                                      | GENERALLY SILT-CLAY MATERIAL (COHESIVE)               | VERY SOFT<br>SOFT<br>MEDIUM STIFF<br>STIFF<br>VERY STIFF<br>HARD | < 2<br>2 TO 4<br>4 TO 8<br>8 TO 15<br>15 TO 30<br>> 30  | < 0.25<br>0.25 TO 0.5<br>0.5 TO 1.0<br>1 TO 2<br>2 TO 4<br>> 4 | <p><b>MISCELLANEOUS SYMBOLS</b></p> |                     |   |   |         |  |                      |   |                                  |  |   |   |   |                  |                                  |  |   |  |   |              |   |   |   |                                |  |                                     |                          |   |                                       |                          |  |  |                          |                                   |          |                              |                       |            |                    |                      |  |              |          |  |            |  |  |  |  |  |  |                        |                   |                   |                  |                  |                  |                  |                  |                  |                  |                  |                  |                |                 |            |    |                            |   |   |                  |                |                                      |                   |                   |                   |                   |                   |                   |  |  |  |  |             |   |   |   |   |      |      |       |       |       |  |  |  |  |  |  |                                |                               |           |                                 |             |              |  |  |  |  |  |  |   |                      |  |  |                         |                   |  |  |  |              |  |  |  |              |      |             |  |  |  |  |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                   |                            |  |  |   |  |  |     |   |  |  |  |                                     |  |  |  |                                   |   |    |    |    |     |     |  |      |      |      |      |       |       |                 |  |  |  |  |  |  |               |  |  |  |  |  |  |              |  |  |  |  |  |  |                       |  |  |  |  |  |  |                   |  |  |  |  |  |  |            |  |  |  |  |  |  |            |  |  |  |  |  |  |            |     |    |     |      |      |       |    |  |  |  |  |  |  |     |    |   |  |  |  |  |                                      |  |  |  |  |                            |                                      |                   |                      |   |                    |             |   |                                       |               |                                    |                      |             |  |   |  |                    |               |                       |                        |                   |                  |            |                   |                  |                               |                  |                      |               |                |  |                        |                          |  |                                |                   |  |                |                   |  |          |                   |  |                       |                 |  |                              |                       |  |                    |                      |  |              |          |  |   |  |             |                       |              |  |     |          |  |      |        |  |       |        |  |            |      |   |  |              |                  |              |                                  |                                    |   |  |   |            |                                  |  |   |  |   |             |   |   |   |                          |  |                                     |                          |   |                                       |                          |  |  |                          |                                   |  |                          |  |  |   |  |  |  |      |         |           |                   |      |              |                  |             |       |                |            |                     |   |  |      |           |                     |        |                |              |               |                 |                    |                  |                   |                   |                  |              |   |  |         |  |                      |   |           |  |                     |   |  |  |                      |  |
| PRIMARY SOIL TYPE  | COMPACTNESS OR CONSISTENCY  | RANGE OF STANDARD PENETRATION RESISTANCE (N-VALUE)   | RANGE OF UNCONFINED COMPRESSIVE STRENGTH (TONS/FT <sup>2</sup> ) |  |  |  |   |  |  |   |  |   |  |                                     |                     |   |   |         |  |                      |   |                                  |  |   |   |   |                  |                                  |  |   |  |   |              |   |   |   |                                |  |                                     |                          |   |                                       |                          |  |  |                          |                                   |          |                              |                       |            |                    |                      |  |              |          |  |            |  |  |  |  |  |  |                        |                   |                   |                  |                  |                  |                  |                  |                  |                  |                  |                  |                |                 |            |    |                            |   |   |                  |                |                                      |                   |                   |                   |                   |                   |                   |  |  |  |  |             |   |   |   |   |      |      |       |       |       |  |  |  |  |  |  |                                |                               |           |                                 |             |              |  |  |  |  |  |  |   |                      |  |  |                         |                   |  |  |  |              |  |  |  |              |      |             |  |  |  |  |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                   |                            |  |  |   |  |  |     |   |  |  |  |                                     |  |  |  |                                   |   |    |    |    |     |     |  |      |      |      |      |       |       |                 |  |  |  |  |  |  |               |  |  |  |  |  |  |              |  |  |  |  |  |  |                       |  |  |  |  |  |  |                   |  |  |  |  |  |  |            |  |  |  |  |  |  |            |  |  |  |  |  |  |            |     |    |     |      |      |       |    |  |  |  |  |  |  |     |    |   |  |  |  |  |                                      |  |  |  |  |                            |                                      |                   |                      |   |                    |             |   |                                       |               |                                    |                      |             |  |   |  |                    |               |                       |                        |                   |                  |            |                   |                  |                               |                  |                      |               |                |  |                        |                          |  |                                |                   |  |                |                   |  |          |                   |  |                       |                 |  |                              |                       |  |                    |                      |  |              |          |  |   |  |             |                       |              |  |     |          |  |      |        |  |       |        |  |            |      |   |  |              |                  |              |                                  |                                    |   |  |   |            |                                  |  |   |  |   |             |   |   |   |                          |  |                                     |                          |   |                                       |                          |  |  |                          |                                   |  |                          |  |  |   |  |  |  |      |         |           |                   |      |              |                  |             |       |                |            |                     |   |  |      |           |                     |        |                |              |               |                 |                    |                  |                   |                   |                  |              |   |  |         |  |                      |   |           |  |                     |   |  |  |                      |  |
| GENERALLY GRANULAR MATERIAL (NON-COHESSIVE)  | VERY LOOSE<br>LOOSE<br>MEDIUM DENSE<br>DENSE<br>VERY DENSE                                | < 4<br>4 TO 10<br>10 TO 30<br>30 TO 50<br>> 50   | N/A  |  |  |  |   |  |  |   |  |   |  |                                     |                     |   |   |         |  |                      |   |                                  |  |   |   |   |                  |                                  |  |   |  |   |              |   |   |   |                                |  |                                     |                          |   |                                       |                          |  |  |                          |                                   |          |                              |                       |            |                    |                      |  |              |          |  |            |  |  |  |  |  |  |                        |                   |                   |                  |                  |                  |                  |                  |                  |                  |                  |                  |                |                 |            |    |                            |   |   |                  |                |                                      |                   |                   |                   |                   |                   |                   |  |  |  |  |             |   |   |   |   |      |      |       |       |       |  |  |  |  |  |  |                                |                               |           |                                 |             |              |  |  |  |  |  |  |   |                      |  |  |                         |                   |  |  |  |              |  |  |  |              |      |             |  |  |  |  |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                   |                            |  |  |   |  |  |     |   |  |  |  |                                     |  |  |  |                                   |   |    |    |    |     |     |  |      |      |      |      |       |       |                 |  |  |  |  |  |  |               |  |  |  |  |  |  |              |  |  |  |  |  |  |                       |  |  |  |  |  |  |                   |  |  |  |  |  |  |            |  |  |  |  |  |  |            |  |  |  |  |  |  |            |     |    |     |      |      |       |    |  |  |  |  |  |  |     |    |   |  |  |  |  |                                      |  |  |  |  |                            |                                      |                   |                      |   |                    |             |   |                                       |               |                                    |                      |             |  |   |  |                    |               |                       |                        |                   |                  |            |                   |                  |                               |                  |                      |               |                |  |                        |                          |  |                                |                   |  |                |                   |  |          |                   |  |                       |                 |  |                              |                       |  |                    |                      |  |              |          |  |   |  |             |                       |              |  |     |          |  |      |        |  |       |        |  |            |      |   |  |              |                  |              |                                  |                                    |   |  |   |            |                                  |  |   |  |   |             |   |   |   |                          |  |                                     |                          |   |                                       |                          |  |  |                          |                                   |  |                          |  |  |   |  |  |  |      |         |           |                   |      |              |                  |             |       |                |            |                     |   |  |      |           |                     |        |                |              |               |                 |                    |                  |                   |                   |                  |              |   |  |         |  |                      |   |           |  |                     |   |  |  |                      |  |
| GENERALLY SILT-CLAY MATERIAL (COHESIVE)  | VERY SOFT<br>SOFT<br>MEDIUM STIFF<br>STIFF<br>VERY STIFF<br>HARD                          | < 2<br>2 TO 4<br>4 TO 8<br>8 TO 15<br>15 TO 30<br>> 30   | < 0.25<br>0.25 TO 0.5<br>0.5 TO 1.0<br>1 TO 2<br>2 TO 4<br>> 4   |  |  |  |   |  |  |   |  |   |  |                                     |                     |   |   |         |  |                      |   |                                  |  |   |   |   |                  |                                  |  |   |  |   |              |   |   |   |                                |  |                                     |                          |   |                                       |                          |  |  |                          |                                   |          |                              |                       |            |                    |                      |  |              |          |  |            |  |  |  |  |  |  |                        |                   |                   |                  |                  |                  |                  |                  |                  |                  |                  |                  |                |                 |            |    |                            |   |   |                  |                |                                      |                   |                   |                   |                   |                   |                   |  |  |  |  |             |   |   |   |   |      |      |       |       |       |  |  |  |  |  |  |                                |                               |           |                                 |             |              |  |  |  |  |  |  |   |                      |  |  |                         |                   |  |  |  |              |  |  |  |              |      |             |  |  |  |  |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                   |                            |  |  |   |  |  |     |   |  |  |  |                                     |  |  |  |                                   |   |    |    |    |     |     |  |      |      |      |      |       |       |                 |  |  |  |  |  |  |               |  |  |  |  |  |  |              |  |  |  |  |  |  |                       |  |  |  |  |  |  |                   |  |  |  |  |  |  |            |  |  |  |  |  |  |            |  |  |  |  |  |  |            |     |    |     |      |      |       |    |  |  |  |  |  |  |     |    |   |  |  |  |  |                                      |  |  |  |  |                            |                                      |                   |                      |   |                    |             |   |                                       |               |                                    |                      |             |  |   |  |                    |               |                       |                        |                   |                  |            |                   |                  |                               |                  |                      |               |                |  |                        |                          |  |                                |                   |  |                |                   |  |          |                   |  |                       |                 |  |                              |                       |  |                    |                      |  |              |          |  |   |  |             |                       |              |  |     |          |  |      |        |  |       |        |  |            |      |   |  |              |                  |              |                                  |                                    |   |  |   |            |                                  |  |   |  |   |             |   |   |   |                          |  |                                     |                          |   |                                       |                          |  |  |                          |                                   |  |                          |  |  |   |  |  |  |      |         |           |                   |      |              |                  |             |       |                |            |                     |   |  |      |           |                     |        |                |              |               |                 |                    |                  |                   |                   |                  |              |   |  |         |  |                      |   |           |  |                     |   |  |  |                      |  |
| <p><b>TEXTURE OR GRAIN SIZE</b></p> <table border="1"> <thead> <tr> <th>U.S. STD. SIEVE SIZE OPENING (MM)</th> <th>4</th><th>10</th><th>40</th><th>60</th><th>200</th><th>270</th> </tr> <tr> <td></td> <td>4.76</td><td>2.00</td><td>0.42</td><td>0.25</td><td>0.075</td><td>0.053</td> </tr> </thead> <tbody> <tr> <td>BOULDER (BLDR.)</td> <td></td><td></td><td></td><td></td><td></td><td></td> </tr> <tr> <td>COBBLE (COB.)</td> <td></td><td></td><td></td><td></td><td></td><td></td> </tr> <tr> <td>GRAVEL (GR.)</td> <td></td><td></td><td></td><td></td><td></td><td></td> </tr> <tr> <td>COARSE SAND (CS, SD.)</td> <td></td><td></td><td></td><td></td><td></td><td></td> </tr> <tr> <td>FINE SAND (F SD.)</td> <td></td><td></td><td></td><td></td><td></td><td></td> </tr> <tr> <td>SILT (SL.)</td> <td></td><td></td><td></td><td></td><td></td><td></td> </tr> <tr> <td>CLAY (CL.)</td> <td></td><td></td><td></td><td></td><td></td><td></td> </tr> <tr> <td>GRAIN SIZE</td> <td>305</td><td>75</td><td>2.0</td><td>0.25</td><td>0.05</td><td>0.005</td> </tr> <tr> <td>MM</td> <td></td><td></td><td></td><td></td><td></td><td></td> </tr> <tr> <td>IN.</td> <td>12</td><td>3</td><td></td><td></td><td></td><td></td> </tr> </tbody> </table>   |   | U.S. STD. SIEVE SIZE OPENING (MM)  | 4  | 10   | 40   | 60   | 200   | 270  |  | 4.76  | 2.00   | 0.42  | 0.25   | 0.075                               | 0.053               | BOULDER (BLDR.)   |   |         |  |                      |   |                                  | COBBLE (COB.)  |   |   |   |                  |                                  |  | GRAVEL (GR.)  |  |   |              |   |   |   | COARSE SAND (CS, SD.)          |  |                                     |                          |   |                                       |                          | FINE SAND (F SD.)                                  |  |                          |                                   |          |                              |                       | SILT (SL.) |                    |                      |  |              |          |  | CLAY (CL.) |  |  |  |  |  |  | GRAIN SIZE             | 305               | 75                | 2.0              | 0.25             | 0.05             | 0.005            | MM               |                  |                  |                  |                  |                |                 | IN.        | 12 | 3                          |   |   |                  |                | <p><b>RECOMMENDATION SYMBOLS</b></p> |                   |                   |                   |                   |                   |                   |  |  |  |  |             |   |   |   |   |      |      |       |       |       |  |  |  |  |  |  |                                |                               |           |                                 |             |              |  |  |  |  |  |  |   |                      |  |  |                         |                   |  |  |  |              |  |  |  |              |      |             |  |  |  |  |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                   |                            |  |  |   |  |  |     |   |  |  |  |                                     |  |  |  |                                   |   |    |    |    |     |     |  |      |      |      |      |       |       |                 |  |  |  |  |  |  |               |  |  |  |  |  |  |              |  |  |  |  |  |  |                       |  |  |  |  |  |  |                   |  |  |  |  |  |  |            |  |  |  |  |  |  |            |  |  |  |  |  |  |            |     |    |     |      |      |       |    |  |  |  |  |  |  |     |    |   |  |  |  |  |                                      |  |  |  |  |                            |                                      |                   |                      |   |                    |             |   |                                       |               |                                    |                      |             |  |   |  |                    |               |                       |                        |                   |                  |            |                   |                  |                               |                  |                      |               |                |  |                        |                          |  |                                |                   |  |                |                   |  |          |                   |  |                       |                 |  |                              |                       |  |                    |                      |  |              |          |  |   |  |             |                       |              |  |     |          |  |      |        |  |       |        |  |            |      |   |  |              |                  |              |                                  |                                    |   |  |   |            |                                  |  |   |  |   |             |   |   |   |                          |  |                                     |                          |   |                                       |                          |  |  |                          |                                   |  |                          |  |  |   |  |  |  |      |         |           |                   |      |              |                  |             |       |                |            |                     |   |  |      |           |                     |        |                |              |               |                 |                    |                  |                   |                   |                  |              |   |  |         |  |                      |   |           |  |                     |   |  |  |                      |  |
| U.S. STD. SIEVE SIZE OPENING (MM)  | 4   | 10   | 40   | 60   | 200  | 270  |   |  |  |   |  |   |  |                                     |                     |   |   |         |  |                      |   |                                  |  |   |   |   |                  |                                  |  |   |  |   |              |   |   |   |                                |  |                                     |                          |   |                                       |                          |  |  |                          |                                   |          |                              |                       |            |                    |                      |  |              |          |  |            |  |  |  |  |  |  |                        |                   |                   |                  |                  |                  |                  |                  |                  |                  |                  |                  |                |                 |            |    |                            |   |   |                  |                |                                      |                   |                   |                   |                   |                   |                   |  |  |  |  |             |   |   |   |   |      |      |       |       |       |  |  |  |  |  |  |                                |                               |           |                                 |             |              |  |  |  |  |  |  |   |                      |  |  |                         |                   |  |  |  |              |  |  |  |              |      |             |  |  |  |  |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                   |                            |  |  |   |  |  |     |   |  |  |  |                                     |  |  |  |                                   |   |    |    |    |     |     |  |      |      |      |      |       |       |                 |  |  |  |  |  |  |               |  |  |  |  |  |  |              |  |  |  |  |  |  |                       |  |  |  |  |  |  |                   |  |  |  |  |  |  |            |  |  |  |  |  |  |            |  |  |  |  |  |  |            |     |    |     |      |      |       |    |  |  |  |  |  |  |     |    |   |  |  |  |  |                                      |  |  |  |  |                            |                                      |                   |                      |   |                    |             |   |                                       |               |                                    |                      |             |  |   |  |                    |               |                       |                        |                   |                  |            |                   |                  |                               |                  |                      |               |                |  |                        |                          |  |                                |                   |  |                |                   |  |          |                   |  |                       |                 |  |                              |                       |  |                    |                      |  |              |          |  |   |  |             |                       |              |  |     |          |  |      |        |  |       |        |  |            |      |   |  |              |                  |              |                                  |                                    |   |  |   |            |                                  |  |   |  |   |             |   |   |   |                          |  |                                     |                          |   |                                       |                          |  |  |                          |                                   |  |                          |  |  |   |  |  |  |      |         |           |                   |      |              |                  |             |       |                |            |                     |   |  |      |           |                     |        |                |              |               |                 |                    |                  |                   |                   |                  |              |   |  |         |  |                      |   |           |  |                     |   |  |  |                      |  |
|  | 4.76  | 2.00   | 0.42   | 0.25   | 0.075  | 0.053  |   |  |  |   |  |   |  |                                     |                     |   |   |         |  |                      |   |                                  |  |   |   |   |                  |                                  |  |   |  |   |              |   |   |   |                                |  |                                     |                          |   |                                       |                          |  |  |                          |                                   |          |                              |                       |            |                    |                      |  |              |          |  |            |  |  |  |  |  |  |                        |                   |                   |                  |                  |                  |                  |                  |                  |                  |                  |                  |                |                 |            |    |                            |   |   |                  |                |                                      |                   |                   |                   |                   |                   |                   |  |  |  |  |             |   |   |   |   |      |      |       |       |       |  |  |  |  |  |  |                                |                               |           |                                 |             |              |  |  |  |  |  |  |   |                      |  |  |                         |                   |  |  |  |              |  |  |  |              |      |             |  |  |  |  |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                   |                            |  |  |   |  |  |     |   |  |  |  |                                     |  |  |  |                                   |   |    |    |    |     |     |  |      |      |      |      |       |       |                 |  |  |  |  |  |  |               |  |  |  |  |  |  |              |  |  |  |  |  |  |                       |  |  |  |  |  |  |                   |  |  |  |  |  |  |            |  |  |  |  |  |  |            |  |  |  |  |  |  |            |     |    |     |      |      |       |    |  |  |  |  |  |  |     |    |   |  |  |  |  |                                      |  |  |  |  |                            |                                      |                   |                      |   |                    |             |   |                                       |               |                                    |                      |             |  |   |  |                    |               |                       |                        |                   |                  |            |                   |                  |                               |                  |                      |               |                |  |                        |                          |  |                                |                   |  |                |                   |  |          |                   |  |                       |                 |  |                              |                       |  |                    |                      |  |              |          |  |   |  |             |                       |              |  |     |          |  |      |        |  |       |        |  |            |      |   |  |              |                  |              |                                  |                                    |   |  |   |            |                                  |  |   |  |   |             |   |   |   |                          |  |                                     |                          |   |                                       |                          |  |  |                          |                                   |  |                          |  |  |   |  |  |  |      |         |           |                   |      |              |                  |             |       |                |            |                     |   |  |      |           |                     |        |                |              |               |                 |                    |                  |                   |                   |                  |              |   |  |         |  |                      |   |           |  |                     |   |  |  |                      |  |
| BOULDER (BLDR.)  |   |  |  |  |  |  |   |  |  |   |  |   |  |                                     |                     |   |   |         |  |                      |   |                                  |  |   |   |   |                  |                                  |  |   |  |   |              |   |   |   |                                |  |                                     |                          |   |                                       |                          |  |  |                          |                                   |          |                              |                       |            |                    |                      |  |              |          |  |            |  |  |  |  |  |  |                        |                   |                   |                  |                  |                  |                  |                  |                  |                  |                  |                  |                |                 |            |    |                            |   |   |                  |                |                                      |                   |                   |                   |                   |                   |                   |  |  |  |  |             |   |   |   |   |      |      |       |       |       |  |  |  |  |  |  |                                |                               |           |                                 |             |              |  |  |  |  |  |  |   |                      |  |  |                         |                   |  |  |  |              |  |  |  |              |      |             |  |  |  |  |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                   |                            |  |  |   |  |  |     |   |  |  |  |                                     |  |  |  |                                   |   |    |    |    |     |     |  |      |      |      |      |       |       |                 |  |  |  |  |  |  |               |  |  |  |  |  |  |              |  |  |  |  |  |  |                       |  |  |  |  |  |  |                   |  |  |  |  |  |  |            |  |  |  |  |  |  |            |  |  |  |  |  |  |            |     |    |     |      |      |       |    |  |  |  |  |  |  |     |    |   |  |  |  |  |                                      |  |  |  |  |                            |                                      |                   |                      |   |                    |             |   |                                       |               |                                    |                      |             |  |   |  |                    |               |                       |                        |                   |                  |            |                   |                  |                               |                  |                      |               |                |  |                        |                          |  |                                |                   |  |                |                   |  |          |                   |  |                       |                 |  |                              |                       |  |                    |                      |  |              |          |  |   |  |             |                       |              |  |     |          |  |      |        |  |       |        |  |            |      |   |  |              |                  |              |                                  |                                    |   |  |   |            |                                  |  |   |  |   |             |   |   |   |                          |  |                                     |                          |   |                                       |                          |  |  |                          |                                   |  |                          |  |  |   |  |  |  |      |         |           |                   |      |              |                  |             |       |                |            |                     |   |  |      |           |                     |        |                |              |               |                 |                    |                  |                   |                   |                  |              |   |  |         |  |                      |   |           |  |                     |   |  |  |                      |  |
| COBBLE (COB.)  |   |  |  |  |  |  |   |  |  |   |  |   |  |                                     |                     |   |   |         |  |                      |   |                                  |  |   |   |   |                  |                                  |  |   |  |   |              |   |   |   |                                |  |                                     |                          |   |                                       |                          |  |  |                          |                                   |          |                              |                       |            |                    |                      |  |              |          |  |            |  |  |  |  |  |  |                        |                   |                   |                  |                  |                  |                  |                  |                  |                  |                  |                  |                |                 |            |    |                            |   |   |                  |                |                                      |                   |                   |                   |                   |                   |                   |  |  |  |  |             |   |   |   |   |      |      |       |       |       |  |  |  |  |  |  |                                |                               |           |                                 |             |              |  |  |  |  |  |  |   |                      |  |  |                         |                   |  |  |  |              |  |  |  |              |      |             |  |  |  |  |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                   |                            |  |  |   |  |  |     |   |  |  |  |                                     |  |  |  |                                   |   |    |    |    |     |     |  |      |      |      |      |       |       |                 |  |  |  |  |  |  |               |  |  |  |  |  |  |              |  |  |  |  |  |  |                       |  |  |  |  |  |  |                   |  |  |  |  |  |  |            |  |  |  |  |  |  |            |  |  |  |  |  |  |            |     |    |     |      |      |       |    |  |  |  |  |  |  |     |    |   |  |  |  |  |                                      |  |  |  |  |                            |                                      |                   |                      |   |                    |             |   |                                       |               |                                    |                      |             |  |   |  |                    |               |                       |                        |                   |                  |            |                   |                  |                               |                  |                      |               |                |  |                        |                          |  |                                |                   |  |                |                   |  |          |                   |  |                       |                 |  |                              |                       |  |                    |                      |  |              |          |  |   |  |             |                       |              |  |     |          |  |      |        |  |       |        |  |            |      |   |  |              |                  |              |                                  |                                    |   |  |   |            |                                  |  |   |  |   |             |   |   |   |                          |  |                                     |                          |   |                                       |                          |  |  |                          |                                   |  |                          |  |  |   |  |  |  |      |         |           |                   |      |              |                  |             |       |                |            |                     |   |  |      |           |                     |        |                |              |               |                 |                    |                  |                   |                   |                  |              |   |  |         |  |                      |   |           |  |                     |   |  |  |                      |  |
| GRAVEL (GR.)   |   |  |  |  |  |  |   |  |  |   |  |   |  |                                     |                     |   |   |         |  |                      |   |                                  |  |   |   |   |                  |                                  |  |   |  |   |              |   |   |   |                                |  |                                     |                          |   |                                       |                          |  |  |                          |                                   |          |                              |                       |            |                    |                      |  |              |          |  |            |  |  |  |  |  |  |                        |                   |                   |                  |                  |                  |                  |                  |                  |                  |                  |                  |                |                 |            |    |                            |   |   |                  |                |                                      |                   |                   |                   |                   |                   |                   |  |  |  |  |             |   |   |   |   |      |      |       |       |       |  |  |  |  |  |  |                                |                               |           |                                 |             |              |  |  |  |  |  |  |   |                      |  |  |                         |                   |  |  |  |              |  |  |  |              |      |             |  |  |  |  |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                   |                            |  |  |   |  |  |     |   |  |  |  |                                     |  |  |  |                                   |   |    |    |    |     |     |  |      |      |      |      |       |       |                 |  |  |  |  |  |  |               |  |  |  |  |  |  |              |  |  |  |  |  |  |                       |  |  |  |  |  |  |                   |  |  |  |  |  |  |            |  |  |  |  |  |  |            |  |  |  |  |  |  |            |     |    |     |      |      |       |    |  |  |  |  |  |  |     |    |   |  |  |  |  |                                      |  |  |  |  |                            |                                      |                   |                      |   |                    |             |   |                                       |               |                                    |                      |             |  |   |  |                    |               |                       |                        |                   |                  |            |                   |                  |                               |                  |                      |               |                |  |                        |                          |  |                                |                   |  |                |                   |  |          |                   |  |                       |                 |  |                              |                       |  |                    |                      |  |              |          |  |   |  |             |                       |              |  |     |          |  |      |        |  |       |        |  |            |      |   |  |              |                  |              |                                  |                                    |   |  |   |            |                                  |  |   |  |   |             |   |   |   |                          |  |                                     |                          |   |                                       |                          |  |  |                          |                                   |  |                          |  |  |   |  |  |  |      |         |           |                   |      |              |                  |             |       |                |            |                     |   |  |      |           |                     |        |                |              |               |                 |                    |                  |                   |                   |                  |              |   |  |         |  |                      |   |           |  |                     |   |  |  |                      |  |
| COARSE SAND (CS, SD.)  |   |  |  |  |  |  |   |  |  |   |  |   |  |                                     |                     |   |   |         |  |                      |   |                                  |  |   |   |   |                  |                                  |  |   |  |   |              |   |   |   |                                |  |                                     |                          |   |                                       |                          |  |  |                          |                                   |          |                              |                       |            |                    |                      |  |              |          |  |            |  |  |  |  |  |  |                        |                   |                   |                  |                  |                  |                  |                  |                  |                  |                  |                  |                |                 |            |    |                            |   |   |                  |                |                                      |                   |                   |                   |                   |                   |                   |  |  |  |  |             |   |   |   |   |      |      |       |       |       |  |  |  |  |  |  |                                |                               |           |                                 |             |              |  |  |  |  |  |  |   |                      |  |  |                         |                   |  |  |  |              |  |  |  |              |      |             |  |  |  |  |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                   |                            |  |  |   |  |  |     |   |  |  |  |                                     |  |  |  |                                   |   |    |    |    |     |     |  |      |      |      |      |       |       |                 |  |  |  |  |  |  |               |  |  |  |  |  |  |              |  |  |  |  |  |  |                       |  |  |  |  |  |  |                   |  |  |  |  |  |  |            |  |  |  |  |  |  |            |  |  |  |  |  |  |            |     |    |     |      |      |       |    |  |  |  |  |  |  |     |    |   |  |  |  |  |                                      |  |  |  |  |                            |                                      |                   |                      |   |                    |             |   |                                       |               |                                    |                      |             |  |   |  |                    |               |                       |                        |                   |                  |            |                   |                  |                               |                  |                      |               |                |  |                        |                          |  |                                |                   |  |                |                   |  |          |                   |  |                       |                 |  |                              |                       |  |                    |                      |  |              |          |  |   |  |             |                       |              |  |     |          |  |      |        |  |       |        |  |            |      |   |  |              |                  |              |                                  |                                    |   |  |   |            |                                  |  |   |  |   |             |   |   |   |                          |  |                                     |                          |   |                                       |                          |  |  |                          |                                   |  |                          |  |  |   |  |  |  |      |         |           |                   |      |              |                  |             |       |                |            |                     |   |  |      |           |                     |        |                |              |               |                 |                    |                  |                   |                   |                  |              |   |  |         |  |                      |   |           |  |                     |   |  |  |                      |  |
| FINE SAND (F SD.)  |   |  |  |  |  |  |   |  |  |   |  |   |  |                                     |                     |   |   |         |  |                      |   |                                  |  |   |   |   |                  |                                  |  |   |  |   |              |   |   |   |                                |  |                                     |                          |   |                                       |                          |  |  |                          |                                   |          |                              |                       |            |                    |                      |  |              |          |  |            |  |  |  |  |  |  |                        |                   |                   |                  |                  |                  |                  |                  |                  |                  |                  |                  |                |                 |            |    |                            |   |   |                  |                |                                      |                   |                   |                   |                   |                   |                   |  |  |  |  |             |   |   |   |   |      |      |       |       |       |  |  |  |  |  |  |                                |                               |           |                                 |             |              |  |  |  |  |  |  |   |                      |  |  |                         |                   |  |  |  |              |  |  |  |              |      |             |  |  |  |  |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                   |                            |  |  |   |  |  |     |   |  |  |  |                                     |  |  |  |                                   |   |    |    |    |     |     |  |      |      |      |      |       |       |                 |  |  |  |  |  |  |               |  |  |  |  |  |  |              |  |  |  |  |  |  |                       |  |  |  |  |  |  |                   |  |  |  |  |  |  |            |  |  |  |  |  |  |            |  |  |  |  |  |  |            |     |    |     |      |      |       |    |  |  |  |  |  |  |     |    |   |  |  |  |  |                                      |  |  |  |  |                            |                                      |                   |                      |   |                    |             |   |                                       |               |                                    |                      |             |  |   |  |                    |               |                       |                        |                   |                  |            |                   |                  |                               |                  |                      |               |                |  |                        |                          |  |                                |                   |  |                |                   |  |          |                   |  |                       |                 |  |                              |                       |  |                    |                      |  |              |          |  |   |  |             |                       |              |  |     |          |  |      |        |  |       |        |  |            |      |   |  |              |                  |              |                                  |                                    |   |  |   |            |                                  |  |   |  |   |             |   |   |   |                          |  |                                     |                          |   |                                       |                          |  |  |                          |                                   |  |                          |  |  |   |  |  |  |      |         |           |                   |      |              |                  |             |       |                |            |                     |   |  |      |           |                     |        |                |              |               |                 |                    |                  |                   |                   |                  |              |   |  |         |  |                      |   |           |  |                     |   |  |  |                      |  |
| SILT (SL.)   |   |  |  |  |  |  |   |  |  |   |  |   |  |                                     |                     |   |   |         |  |                      |   |                                  |  |   |   |   |                  |                                  |  |   |  |   |              |   |   |   |                                |  |                                     |                          |   |                                       |                          |  |  |                          |                                   |          |                              |                       |            |                    |                      |  |              |          |  |            |  |  |  |  |  |  |                        |                   |                   |                  |                  |                  |                  |                  |                  |                  |                  |                  |                |                 |            |    |                            |   |   |                  |                |                                      |                   |                   |                   |                   |                   |                   |  |  |  |  |             |   |   |   |   |      |      |       |       |       |  |  |  |  |  |  |                                |                               |           |                                 |             |              |  |  |  |  |  |  |   |                      |  |  |                         |                   |  |  |  |              |  |  |  |              |      |             |  |  |  |  |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                   |                            |  |  |   |  |  |     |   |  |  |  |                                     |  |  |  |                                   |   |    |    |    |     |     |  |      |      |      |      |       |       |                 |  |  |  |  |  |  |               |  |  |  |  |  |  |              |  |  |  |  |  |  |                       |  |  |  |  |  |  |                   |  |  |  |  |  |  |            |  |  |  |  |  |  |            |  |  |  |  |  |  |            |     |    |     |      |      |       |    |  |  |  |  |  |  |     |    |   |  |  |  |  |                                      |  |  |  |  |                            |                                      |                   |                      |   |                    |             |   |                                       |               |                                    |                      |             |  |   |  |                    |               |                       |                        |                   |                  |            |                   |                  |                               |                  |                      |               |                |  |                        |                          |  |                                |                   |  |                |                   |  |          |                   |  |                       |                 |  |                              |                       |  |                    |                      |  |              |          |  |   |  |             |                       |              |  |     |          |  |      |        |  |       |        |  |            |      |   |  |              |                  |              |                                  |                                    |   |  |   |            |                                  |  |   |  |   |             |   |   |   |                          |  |                                     |                          |   |                                       |                          |  |  |                          |                                   |  |                          |  |  |   |  |  |  |      |         |           |                   |      |              |                  |             |       |                |            |                     |   |  |      |           |                     |        |                |              |               |                 |                    |                  |                   |                   |                  |              |   |  |         |  |                      |   |           |  |                     |   |  |  |                      |  |
| CLAY (CL.)   |   |  |  |  |  |  |   |  |  |   |  |   |  |                                     |                     |   |   |         |  |                      |   |                                  |  |   |   |   |                  |                                  |  |   |  |   |              |   |   |   |                                |  |                                     |                          |   |                                       |                          |  |  |                          |                                   |          |                              |                       |            |                    |                      |  |              |          |  |            |  |  |  |  |  |  |                        |                   |                   |                  |                  |                  |                  |                  |                  |                  |                  |                  |                |                 |            |    |                            |   |   |                  |                |                                      |                   |                   |                   |                   |                   |                   |  |  |  |  |             |   |   |   |   |      |      |       |       |       |  |  |  |  |  |  |                                |                               |           |                                 |             |              |  |  |  |  |  |  |   |                      |  |  |                         |                   |  |  |  |              |  |  |  |              |      |             |  |  |  |  |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                   |                            |  |  |   |  |  |     |   |  |  |  |                                     |  |  |  |                                   |   |    |    |    |     |     |  |      |      |      |      |       |       |                 |  |  |  |  |  |  |               |  |  |  |  |  |  |              |  |  |  |  |  |  |                       |  |  |  |  |  |  |                   |  |  |  |  |  |  |            |  |  |  |  |  |  |            |  |  |  |  |  |  |            |     |    |     |      |      |       |    |  |  |  |  |  |  |     |    |   |  |  |  |  |                                      |  |  |  |  |                            |                                      |                   |                      |   |                    |             |   |                                       |               |                                    |                      |             |  |   |  |                    |               |                       |                        |                   |                  |            |                   |                  |                               |                  |                      |               |                |  |                        |                          |  |                                |                   |  |                |                   |  |          |                   |  |                       |                 |  |                              |                       |  |                    |                      |  |              |          |  |   |  |             |                       |              |  |     |          |  |      |        |  |       |        |  |            |      |   |  |              |                  |              |                                  |                                    |   |  |   |            |                                  |  |   |  |   |             |   |   |   |                          |  |                                     |                          |   |                                       |                          |  |  |                          |                                   |  |                          |  |  |   |  |  |  |      |         |           |                   |      |              |                  |             |       |                |            |                     |   |  |      |           |                     |        |                |              |               |                 |                    |                  |                   |                   |                  |              |   |  |         |  |                      |   |           |  |                     |   |  |  |                      |  |
| GRAIN SIZE   | 305   | 75   | 2.0  | 0.25   | 0.05   | 0.005  |   |  |  |   |  |   |  |                                     |                     |   |   |         |  |                      |   |                                  |  |   |   |   |                  |                                  |  |   |  |   |              |   |   |   |                                |  |                                     |                          |   |                                       |                          |  |  |                          |                                   |          |                              |                       |            |                    |                      |  |              |          |  |            |  |  |  |  |  |  |                        |                   |                   |                  |                  |                  |                  |                  |                  |                  |                  |                  |                |                 |            |    |                            |   |   |                  |                |                                      |                   |                   |                   |                   |                   |                   |  |  |  |  |             |   |   |   |   |      |      |       |       |       |  |  |  |  |  |  |                                |                               |           |                                 |             |              |  |  |  |  |  |  |   |                      |  |  |                         |                   |  |  |  |              |  |  |  |              |      |             |  |  |  |  |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                   |                            |  |  |   |  |  |     |   |  |  |  |                                     |  |  |  |                                   |   |    |    |    |     |     |  |      |      |      |      |       |       |                 |  |  |  |  |  |  |               |  |  |  |  |  |  |              |  |  |  |  |  |  |                       |  |  |  |  |  |  |                   |  |  |  |  |  |  |            |  |  |  |  |  |  |            |  |  |  |  |  |  |            |     |    |     |      |      |       |    |  |  |  |  |  |  |     |    |   |  |  |  |  |                                      |  |  |  |  |                            |                                      |                   |                      |   |                    |             |   |                                       |               |                                    |                      |             |  |   |  |                    |               |                       |                        |                   |                  |            |                   |                  |                               |                  |                      |               |                |  |                        |                          |  |                                |                   |  |                |                   |  |          |                   |  |                       |                 |  |                              |                       |  |                    |                      |  |              |          |  |   |  |             |                       |              |  |     |          |  |      |        |  |       |        |  |            |      |   |  |              |                  |              |                                  |                                    |   |  |   |            |                                  |  |   |  |   |             |   |   |   |                          |  |                                     |                          |   |                                       |                          |  |  |                          |                                   |  |                          |  |  |   |  |  |  |      |         |           |                   |      |              |                  |             |       |                |            |                     |   |  |      |           |                     |        |                |              |               |                 |                    |                  |                   |                   |                  |              |   |  |         |  |                      |   |           |  |                     |   |  |  |                      |  |
| MM   |   |  |  |  |  |  |   |  |  |   |  |   |  |                                     |                     |   |   |         |  |                      |   |                                  |  |   |   |   |                  |                                  |  |   |  |   |              |   |   |   |                                |  |                                     |                          |   |                                       |                          |  |  |                          |                                   |          |                              |                       |            |                    |                      |  |              |          |  |            |  |  |  |  |  |  |                        |                   |                   |                  |                  |                  |                  |                  |                  |                  |                  |                  |                |                 |            |    |                            |   |   |                  |                |                                      |                   |                   |                   |                   |                   |                   |  |  |  |  |             |   |   |   |   |      |      |       |       |       |  |  |  |  |  |  |                                |                               |           |                                 |             |              |  |  |  |  |  |  |   |                      |  |  |                         |                   |  |  |  |              |  |  |  |              |      |             |  |  |  |  |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                   |                            |  |  |   |  |  |     |   |  |  |  |                                     |  |  |  |                                   |   |    |    |    |     |     |  |      |      |      |      |       |       |                 |  |  |  |  |  |  |               |  |  |  |  |  |  |              |  |  |  |  |  |  |                       |  |  |  |  |  |  |                   |  |  |  |  |  |  |            |  |  |  |  |  |  |            |  |  |  |  |  |  |            |     |    |     |      |      |       |    |  |  |  |  |  |  |     |    |   |  |  |  |  |                                      |  |  |  |  |                            |                                      |                   |                      |   |                    |             |   |                                       |               |                                    |                      |             |  |   |  |                    |               |                       |                        |                   |                  |            |                   |                  |                               |                  |                      |               |                |  |                        |                          |  |                                |                   |  |                |                   |  |          |                   |  |                       |                 |  |                              |                       |  |                    |                      |  |              |          |  |   |  |             |                       |              |  |     |          |  |      |        |  |       |        |  |            |      |   |  |              |                  |              |                                  |                                    |   |  |   |            |                                  |  |   |  |   |             |   |   |   |                          |  |                                     |                          |   |                                       |                          |  |  |                          |                                   |  |                          |  |  |   |  |  |  |      |         |           |                   |      |              |                  |             |       |                |            |                     |   |  |      |           |                     |        |                |              |               |                 |                    |                  |                   |                   |                  |              |   |  |         |  |                      |   |           |  |                     |   |  |  |                      |  |
| IN.  | 12  | 3  |  |  |  |  |   |  |  |   |  |   |  |                                     |                     |   |   |         |  |                      |   |                                  |  |   |   |   |                  |                                  |  |   |  |   |              |   |   |   |                                |  |                                     |                          |   |                                       |                          |  |  |                          |                                   |          |                              |                       |            |                    |                      |  |              |          |  |            |  |  |  |  |  |  |                        |                   |                   |                  |                  |                  |                  |                  |                  |                  |                  |                  |                |                 |            |    |                            |   |   |                  |                |                                      |                   |                   |                   |                   |                   |                   |  |  |  |  |             |   |   |   |   |      |      |       |       |       |  |  |  |  |  |  |                                |                               |           |                                 |             |              |  |  |  |  |  |  |   |                      |  |  |                         |                   |  |  |  |              |  |  |  |              |      |             |  |  |  |  |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                   |                            |  |  |   |  |  |     |   |  |  |  |                                     |  |  |  |                                   |   |    |    |    |     |     |  |      |      |      |      |       |       |                 |  |  |  |  |  |  |               |  |  |  |  |  |  |              |  |  |  |  |  |  |                       |  |  |  |  |  |  |                   |  |  |  |  |  |  |            |  |  |  |  |  |  |            |  |  |  |  |  |  |            |     |    |     |      |      |       |    |  |  |  |  |  |  |     |    |   |  |  |  |  |                                      |  |  |  |  |                            |                                      |                   |                      |   |                    |             |   |                                       |               |                                    |                      |             |  |   |  |                    |               |                       |                        |                   |                  |            |                   |                  |                               |                  |                      |               |                |  |                        |                          |  |                                |                   |  |                |                   |  |          |                   |  |                       |                 |  |                              |                       |  |                    |                      |  |              |          |  |   |  |             |                       |              |  |     |          |  |      |        |  |       |        |  |            |      |   |  |              |                  |              |                                  |                                    |   |  |   |            |                                  |  |   |  |   |             |   |   |   |                          |  |                                     |                          |   |                                       |                          |  |  |                          |                                   |  |                          |  |  |   |  |  |  |      |         |           |                   |      |              |                  |             |       |                |            |                     |   |  |      |           |                     |        |                |              |               |                 |                    |                  |                   |                   |                  |              |   |  |         |  |                      |   |           |  |                     |   |  |  |                      |  |
| <p><b>SOIL MOISTURE - CORRELATION OF TERMS</b></p> <table border="1"> <thead> <tr> <th>SOIL MOISTURE SCALE (ATTERBERG LIMITS)</th> <th>FIELD MOISTURE DESCRIPTION</th> <th>GUIDE FOR FIELD MOISTURE DESCRIPTION</th> </tr> </thead> <tbody> <tr> <td>LL - LIQUID LIMIT</td> <td>- SATURATED - (SAT.)</td> <td>USUALLY LIQUID; VERY WET, USUALLY FROM BELOW THE GROUND WATER TABLE</td> </tr> <tr> <td>PLASTIC RANGE (PI)</td> <td>- WET - (W)</td> <td>SEMISOLID; REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE</td> </tr> <tr> <td>OM - OPTIMUM MOISTURE SHRINKAGE LIMIT</td> <td>- MOIST - (M)</td> <td>SOLID; AT OR NEAR OPTIMUM MOISTURE</td> </tr> <tr> <td>SL - SHRINKAGE LIMIT</td> <td>- DRY - (D)</td> <td>REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE</td> </tr> </tbody> </table>   |   | SOIL MOISTURE SCALE (ATTERBERG LIMITS)   | FIELD MOISTURE DESCRIPTION                                       | GUIDE FOR FIELD MOISTURE DESCRIPTION   | LL - LIQUID LIMIT  | - SATURATED - (SAT.)   | USUALLY LIQUID; VERY WET, USUALLY FROM BELOW THE GROUND WATER TABLE | PLASTIC RANGE (PI)                             | - WET - (W)                              | SEMISOLID; REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE | OM - OPTIMUM MOISTURE SHRINKAGE LIMIT                            | - MOIST - (M)   | SOLID; AT OR NEAR OPTIMUM MOISTURE                             | SL - SHRINKAGE LIMIT                | - DRY - (D)         | REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE  | <p><b>ABBREVIATIONS</b></p> <table border="1"> <tbody> <tr> <td>AR - AUGER REFUSAL</td> <td>MED. - MEDIUM</td> <td>VST - VANE SHEAR TEST</td> </tr> <tr> <td>BT - BORING TERMINATED</td> <td>MICA. - MICACEOUS</td> <td>WEA. - WEATHERED</td> </tr> <tr> <td>CL. - CLAY</td> <td>MOD. - MODERATELY</td> <td>UW - UNIT WEIGHT</td> </tr> <tr> <td>CPT - COARSE PENETRATION TEST</td> <td>NP - NON PLASTIC</td> <td>UW - DRY UNIT WEIGHT</td> </tr> <tr> <td>CSE. - COARSE</td> <td>ORG. - ORGANIC</td> <td></td> </tr> <tr> <td>DPT - DILATOMETER TEST</td> <td>PMT - PRESSUREMETER TEST</td> <td></td> </tr> <tr> <td>DPT - DYNAMIC PENETRATION TEST</td> <td>SAP. - SAPROLITIC</td> <td></td> </tr> <tr> <td>Ø - VOID RATIO</td> <td>SD. - SAND, SANDY</td> <td></td> </tr> <tr> <td>F - FINE</td> <td>SL. - SILT, SILTY</td> <td></td> </tr> <tr> <td>FOSS. - FOSSILIFEROUS</td> <td>SLI. - SLIGHTLY</td> <td></td> </tr> <tr> <td>FRAC. - FRACTURED, FRACTURES</td> <td>TCR - TRICONE REFUSAL</td> <td></td> </tr> <tr> <td>FRAGS. - FRAGMENTS</td> <td>w - MOISTURE CONTENT</td> <td></td> </tr> <tr> <td>HI. - HIGHLY</td> <td>V - VERY</td> <td></td> </tr> </tbody> </table>   |         | AR - AUGER REFUSAL   | MED. - MEDIUM        | VST - VANE SHEAR TEST   | BT - BORING TERMINATED           | MICA. - MICACEOUS  | WEA. - WEATHERED  | CL. - CLAY  | MOD. - MODERATELY                                   | UW - UNIT WEIGHT | CPT - COARSE PENETRATION TEST    | NP - NON PLASTIC                                     | UW - DRY UNIT WEIGHT  | CSE. - COARSE                            | ORG. - ORGANIC                                  |              | DPT - DILATOMETER TEST                  | PMT - PRESSUREMETER TEST                      |   | DPT - DYNAMIC PENETRATION TEST | SAP. - SAPROLITIC  |                                     | Ø - VOID RATIO           | SD. - SAND, SANDY                                   |                                       | F - FINE                 | SL. - SILT, SILTY                                  |  | FOSS. - FOSSILIFEROUS    | SLI. - SLIGHTLY                   |          | FRAC. - FRACTURED, FRACTURES | TCR - TRICONE REFUSAL |            | FRAGS. - FRAGMENTS | w - MOISTURE CONTENT |  | HI. - HIGHLY | V - VERY |  |            |  |  |  |  |  |  |                        |                   |                   |                  |                  |                  |                  |                  |                  |                  |                  |                  |                |                 |            |    |                            |   |   |                  |                |                                      |                   |                   |                   |                   |                   |                   |  |  |  |  |             |   |   |   |   |      |      |       |       |       |  |  |  |  |  |  |                                |                               |           |                                 |             |              |  |  |  |  |  |  |   |                      |  |  |                         |                   |  |  |  |              |  |  |  |              |      |             |  |  |  |  |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                   |                            |  |  |   |  |  |     |   |  |  |  |                                     |  |  |  |                                   |   |    |    |    |     |     |  |      |      |      |      |       |       |                 |  |  |  |  |  |  |               |  |  |  |  |  |  |              |  |  |  |  |  |  |                       |  |  |  |  |  |  |                   |  |  |  |  |  |  |            |  |  |  |  |  |  |            |  |  |  |  |  |  |            |     |    |     |      |      |       |    |  |  |  |  |  |  |     |    |   |  |  |  |  |                                      |  |  |  |  |                            |                                      |                   |                      |   |                    |             |   |                                       |               |                                    |                      |             |  |   |  |                    |               |                       |                        |                   |                  |            |                   |                  |                               |                  |                      |               |                |  |                        |                          |  |                                |                   |  |                |                   |  |          |                   |  |                       |                 |  |                              |                       |  |                    |                      |  |              |          |  |   |  |             |                       |              |  |     |          |  |      |        |  |       |        |  |            |      |   |  |              |                  |              |                                  |                                    |   |  |   |            |                                  |  |   |  |   |             |   |   |   |                          |  |                                     |                          |   |                                       |                          |  |  |                          |                                   |  |                          |  |  |   |  |  |  |      |         |           |                   |      |              |                  |             |       |                |            |                     |   |  |      |           |                     |        |                |              |               |                 |                    |                  |                   |                   |                  |              |   |  |         |  |                      |   |           |  |                     |   |  |  |                      |  |
| SOIL MOISTURE SCALE (ATTERBERG LIMITS)   | FIELD MOISTURE DESCRIPTION  | GUIDE FOR FIELD MOISTURE DESCRIPTION   |  |  |  |  |   |  |  |   |  |   |  |                                     |                     |   |   |         |  |                      |   |                                  |  |   |   |   |                  |                                  |  |   |  |   |              |   |   |   |                                |  |                                     |                          |   |                                       |                          |  |  |                          |                                   |          |                              |                       |            |                    |                      |  |              |          |  |            |  |  |  |  |  |  |                        |                   |                   |                  |                  |                  |                  |                  |                  |                  |                  |                  |                |                 |            |    |                            |   |   |                  |                |                                      |                   |                   |                   |                   |                   |                   |  |  |  |  |             |   |   |   |   |      |      |       |       |       |  |  |  |  |  |  |                                |                               |           |                                 |             |              |  |  |  |  |  |  |   |                      |  |  |                         |                   |  |  |  |              |  |  |  |              |      |             |  |  |  |  |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                   |                            |  |  |   |  |  |     |   |  |  |  |                                     |  |  |  |                                   |   |    |    |    |     |     |  |      |      |      |      |       |       |                 |  |  |  |  |  |  |               |  |  |  |  |  |  |              |  |  |  |  |  |  |                       |  |  |  |  |  |  |                   |  |  |  |  |  |  |            |  |  |  |  |  |  |            |  |  |  |  |  |  |            |     |    |     |      |      |       |    |  |  |  |  |  |  |     |    |   |  |  |  |  |                                      |  |  |  |  |                            |                                      |                   |                      |   |                    |             |   |                                       |               |                                    |                      |             |  |   |  |                    |               |                       |                        |                   |                  |            |                   |                  |                               |                  |                      |               |                |  |                        |                          |  |                                |                   |  |                |                   |  |          |                   |  |                       |                 |  |                              |                       |  |                    |                      |  |              |          |  |   |  |             |                       |              |  |     |          |  |      |        |  |       |        |  |            |      |   |  |              |                  |              |                                  |                                    |   |  |   |            |                                  |  |   |  |   |             |   |   |   |                          |  |                                     |                          |   |                                       |                          |  |  |                          |                                   |  |                          |  |  |   |  |  |  |      |         |           |                   |      |              |                  |             |       |                |            |                     |   |  |      |           |                     |        |                |              |               |                 |                    |                  |                   |                   |                  |              |   |  |         |  |                      |   |           |  |                     |   |  |  |                      |  |
| LL - LIQUID LIMIT  | - SATURATED - (SAT.)  | USUALLY LIQUID; VERY WET, USUALLY FROM BELOW THE GROUND WATER TABLE  |  |  |  |  |   |  |  |   |  |   |  |                                     |                     |   |   |         |  |                      |   |                                  |  |   |   |   |                  |                                  |  |   |  |   |              |   |   |   |                                |  |                                     |                          |   |                                       |                          |  |  |                          |                                   |          |                              |                       |            |                    |                      |  |              |          |  |            |  |  |  |  |  |  |                        |                   |                   |                  |                  |                  |                  |                  |                  |                  |                  |                  |                |                 |            |    |                            |   |   |                  |                |                                      |                   |                   |                   |                   |                   |                   |  |  |  |  |             |   |   |   |   |      |      |       |       |       |  |  |  |  |  |  |                                |                               |           |                                 |             |              |  |  |  |  |  |  |   |                      |  |  |                         |                   |  |  |  |              |  |  |  |              |      |             |  |  |  |  |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                   |                            |  |  |   |  |  |     |   |  |  |  |                                     |  |  |  |                                   |   |    |    |    |     |     |  |      |      |      |      |       |       |                 |  |  |  |  |  |  |               |  |  |  |  |  |  |              |  |  |  |  |  |  |                       |  |  |  |  |  |  |                   |  |  |  |  |  |  |            |  |  |  |  |  |  |            |  |  |  |  |  |  |            |     |    |     |      |      |       |    |  |  |  |  |  |  |     |    |   |  |  |  |  |                                      |  |  |  |  |                            |                                      |                   |                      |   |                    |             |   |                                       |               |                                    |                      |             |  |   |  |                    |               |                       |                        |                   |                  |            |                   |                  |                               |                  |                      |               |                |  |                        |                          |  |                                |                   |  |                |                   |  |          |                   |  |                       |                 |  |                              |                       |  |                    |                      |  |              |          |  |   |  |             |                       |              |  |     |          |  |      |        |  |       |        |  |            |      |   |  |              |                  |              |                                  |                                    |   |  |   |            |                                  |  |   |  |   |             |   |   |   |                          |  |                                     |                          |   |                                       |                          |  |  |                          |                                   |  |                          |  |  |   |  |  |  |      |         |           |                   |      |              |                  |             |       |                |            |                     |   |  |      |           |                     |        |                |              |               |                 |                    |                  |                   |                   |                  |              |   |  |         |  |                      |   |           |  |                     |   |  |  |                      |  |
| PLASTIC RANGE (PI)   | - WET - (W)   | SEMISOLID; REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE  |  |  |  |  |   |  |  |   |  |   |  |                                     |                     |   |   |         |  |                      |   |                                  |  |   |   |   |                  |                                  |  |   |  |   |              |   |   |   |                                |  |                                     |                          |   |                                       |                          |  |  |                          |                                   |          |                              |                       |            |                    |                      |  |              |          |  |            |  |  |  |  |  |  |                        |                   |                   |                  |                  |                  |                  |                  |                  |                  |                  |                  |                |                 |            |    |                            |   |   |                  |                |                                      |                   |                   |                   |                   |                   |                   |  |  |  |  |             |   |   |   |   |      |      |       |       |       |  |  |  |  |  |  |                                |                               |           |                                 |             |              |  |  |  |  |  |  |   |                      |  |  |                         |                   |  |  |  |              |  |  |  |              |      |             |  |  |  |  |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                   |                            |  |  |   |  |  |     |   |  |  |  |                                     |  |  |  |                                   |   |    |    |    |     |     |  |      |      |      |      |       |       |                 |  |  |  |  |  |  |               |  |  |  |  |  |  |              |  |  |  |  |  |  |                       |  |  |  |  |  |  |                   |  |  |  |  |  |  |            |  |  |  |  |  |  |            |  |  |  |  |  |  |            |     |    |     |      |      |       |    |  |  |  |  |  |  |     |    |   |  |  |  |  |                                      |  |  |  |  |                            |                                      |                   |                      |   |                    |             |   |                                       |               |                                    |                      |             |  |   |  |                    |               |                       |                        |                   |                  |            |                   |                  |                               |                  |                      |               |                |  |                        |                          |  |                                |                   |  |                |                   |  |          |                   |  |                       |                 |  |                              |                       |  |                    |                      |  |              |          |  |   |  |             |                       |              |  |     |          |  |      |        |  |       |        |  |            |      |   |  |              |                  |              |                                  |                                    |   |  |   |            |                                  |  |   |  |   |             |   |   |   |                          |  |                                     |                          |   |                                       |                          |  |  |                          |                                   |  |                          |  |  |   |  |  |  |      |         |           |                   |      |              |                  |             |       |                |            |                     |   |  |      |           |                     |        |                |              |               |                 |                    |                  |                   |                   |                  |              |   |  |         |  |                      |   |           |  |                     |   |  |  |                      |  |
| OM - OPTIMUM MOISTURE SHRINKAGE LIMIT  | - MOIST - (M)   | SOLID; AT OR NEAR OPTIMUM MOISTURE   |  |  |  |  |   |  |  |   |  |   |  |                                     |                     |   |   |         |  |                      |   |                                  |  |   |   |   |                  |                                  |  |   |  |   |              |   |   |   |                                |  |                                     |                          |   |                                       |                          |  |  |                          |                                   |          |                              |                       |            |                    |                      |  |              |          |  |            |  |  |  |  |  |  |                        |                   |                   |                  |                  |                  |                  |                  |                  |                  |                  |                  |                |                 |            |    |                            |   |   |                  |                |                                      |                   |                   |                   |                   |                   |                   |  |  |  |  |             |   |   |   |   |      |      |       |       |       |  |  |  |  |  |  |                                |                               |           |                                 |             |              |  |  |  |  |  |  |   |                      |  |  |                         |                   |  |  |  |              |  |  |  |              |      |             |  |  |  |  |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                   |                            |  |  |   |  |  |     |   |  |  |  |                                     |  |  |  |                                   |   |    |    |    |     |     |  |      |      |      |      |       |       |                 |  |  |  |  |  |  |               |  |  |  |  |  |  |              |  |  |  |  |  |  |                       |  |  |  |  |  |  |                   |  |  |  |  |  |  |            |  |  |  |  |  |  |            |  |  |  |  |  |  |            |     |    |     |      |      |       |    |  |  |  |  |  |  |     |    |   |  |  |  |  |                                      |  |  |  |  |                            |                                      |                   |                      |   |                    |             |   |                                       |               |                                    |                      |             |  |   |  |                    |               |                       |                        |                   |                  |            |                   |                  |                               |                  |                      |               |                |  |                        |                          |  |                                |                   |  |                |                   |  |          |                   |  |                       |                 |  |                              |                       |  |                    |                      |  |              |          |  |   |  |             |                       |              |  |     |          |  |      |        |  |       |        |  |            |      |   |  |              |                  |              |                                  |                                    |   |  |   |            |                                  |  |   |  |   |             |   |   |   |                          |  |                                     |                          |   |                                       |                          |  |  |                          |                                   |  |                          |  |  |   |  |  |  |      |         |           |                   |      |              |                  |             |       |                |            |                     |   |  |      |           |                     |        |                |              |               |                 |                    |                  |                   |                   |                  |              |   |  |         |  |                      |   |           |  |                     |   |  |  |                      |  |
| SL - SHRINKAGE LIMIT   | - DRY - (D)   | REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE   |  |  |  |  |   |  |  |   |  |   |  |                                     |                     |   |   |         |  |                      |   |                                  |  |   |   |   |                  |                                  |  |   |  |   |              |   |   |   |                                |  |                                     |                          |   |                                       |                          |  |  |                          |                                   |          |                              |                       |            |                    |                      |  |              |          |  |            |  |  |  |  |  |  |                        |                   |                   |                  |                  |                  |                  |                  |                  |                  |                  |                  |                |                 |            |    |                            |   |   |                  |                |                                      |                   |                   |                   |                   |                   |                   |  |  |  |  |             |   |   |   |   |      |      |       |       |       |  |  |  |  |  |  |                                |                               |           |                                 |             |              |  |  |  |  |  |  |   |                      |  |  |                         |                   |  |  |  |              |  |  |  |              |      |             |  |  |  |  |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                   |                            |  |  |   |  |  |     |   |  |  |  |                                     |  |  |  |                                   |   |    |    |    |     |     |  |      |      |      |      |       |       |                 |  |  |  |  |  |  |               |  |  |  |  |  |  |              |  |  |  |  |  |  |                       |  |  |  |  |  |  |                   |  |  |  |  |  |  |            |  |  |  |  |  |  |            |  |  |  |  |  |  |            |     |    |     |      |      |       |    |  |  |  |  |  |  |     |    |   |  |  |  |  |                                      |  |  |  |  |                            |                                      |                   |                      |   |                    |             |   |                                       |               |                                    |                      |             |  |   |  |                    |               |                       |                        |                   |                  |            |                   |                  |                               |                  |                      |               |                |  |                        |                          |  |                                |                   |  |                |                   |  |          |                   |  |                       |                 |  |                              |                       |  |                    |                      |  |              |          |  |   |  |             |                       |              |  |     |          |  |      |        |  |       |        |  |            |      |   |  |              |                  |              |                                  |                                    |   |  |   |            |                                  |  |   |  |   |             |   |   |   |                          |  |                                     |                          |   |                                       |                          |  |  |                          |                                   |  |                          |  |  |   |  |  |  |      |         |           |                   |      |              |                  |             |       |                |            |                     |   |  |      |           |                     |        |                |              |               |                 |                    |                  |                   |                   |                  |              |   |  |         |  |                      |   |           |  |                     |   |  |  |                      |  |
| AR - AUGER REFUSAL   | MED. - MEDIUM   | VST - VANE SHEAR TEST  |  |  |  |  |   |  |  |   |  |   |  |                                     |                     |   |   |         |  |                      |   |                                  |  |   |   |   |                  |                                  |  |   |  |   |              |   |   |   |                                |  |                                     |                          |   |                                       |                          |  |  |                          |                                   |          |                              |                       |            |                    |                      |  |              |          |  |            |  |  |  |  |  |  |                        |                   |                   |                  |                  |                  |                  |                  |                  |                  |                  |                  |                |                 |            |    |                            |   |   |                  |                |                                      |                   |                   |                   |                   |                   |                   |  |  |  |  |             |   |   |   |   |      |      |       |       |       |  |  |  |  |  |  |                                |                               |           |                                 |             |              |  |  |  |  |  |  |   |                      |  |  |                         |                   |  |  |  |              |  |  |  |              |      |             |  |  |  |  |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                   |                            |  |  |   |  |  |     |   |  |  |  |                                     |  |  |  |                                   |   |    |    |    |     |     |  |      |      |      |      |       |       |                 |  |  |  |  |  |  |               |  |  |  |  |  |  |              |  |  |  |  |  |  |                       |  |  |  |  |  |  |                   |  |  |  |  |  |  |            |  |  |  |  |  |  |            |  |  |  |  |  |  |            |     |    |     |      |      |       |    |  |  |  |  |  |  |     |    |   |  |  |  |  |                                      |  |  |  |  |                            |                                      |                   |                      |   |                    |             |   |                                       |               |                                    |                      |             |  |   |  |                    |               |                       |                        |                   |                  |            |                   |                  |                               |                  |                      |               |                |  |                        |                          |  |                                |                   |  |                |                   |  |          |                   |  |                       |                 |  |                              |                       |  |                    |                      |  |              |          |  |   |  |             |                       |              |  |     |          |  |      |        |  |       |        |  |            |      |   |  |              |                  |              |                                  |                                    |   |  |   |            |                                  |  |   |  |   |             |   |   |   |                          |  |                                     |                          |   |                                       |                          |  |  |                          |                                   |  |                          |  |  |   |  |  |  |      |         |           |                   |      |              |                  |             |       |                |            |                     |   |  |      |           |                     |        |                |              |               |                 |                    |                  |                   |                   |                  |              |   |  |         |  |                      |   |           |  |                     |   |  |  |                      |  |
| BT - BORING TERMINATED   | MICA. - MICACEOUS   | WEA. - WEATHERED   |  |  |  |  |   |  |  |   |  |   |  |                                     |                     |   |   |         |  |                      |   |                                  |  |   |   |   |                  |                                  |  |   |  |   |              |   |   |   |                                |  |                                     |                          |   |                                       |                          |  |  |                          |                                   |          |                              |                       |            |                    |                      |  |              |          |  |            |  |  |  |  |  |  |                        |                   |                   |                  |                  |                  |                  |                  |                  |                  |                  |                  |                |                 |            |    |                            |   |   |                  |                |                                      |                   |                   |                   |                   |                   |                   |  |  |  |  |             |   |   |   |   |      |      |       |       |       |  |  |  |  |  |  |                                |                               |           |                                 |             |              |  |  |  |  |  |  |   |                      |  |  |                         |                   |  |  |  |              |  |  |  |              |      |             |  |  |  |  |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                   |                            |  |  |   |  |  |     |   |  |  |  |                                     |  |  |  |                                   |   |    |    |    |     |     |  |      |      |      |      |       |       |                 |  |  |  |  |  |  |               |  |  |  |  |  |  |              |  |  |  |  |  |  |                       |  |  |  |  |  |  |                   |  |  |  |  |  |  |            |  |  |  |  |  |  |            |  |  |  |  |  |  |            |     |    |     |      |      |       |    |  |  |  |  |  |  |     |    |   |  |  |  |  |                                      |  |  |  |  |                            |                                      |                   |                      |   |                    |             |   |                                       |               |                                    |                      |             |  |   |  |                    |               |                       |                        |                   |                  |            |                   |                  |                               |                  |                      |               |                |  |                        |                          |  |                                |                   |  |                |                   |  |          |                   |  |                       |                 |  |                              |                       |  |                    |                      |  |              |          |  |   |  |             |                       |              |  |     |          |  |      |        |  |       |        |  |            |      |   |  |              |                  |              |                                  |                                    |   |  |   |            |                                  |  |   |  |   |             |   |   |   |                          |  |                                     |                          |   |                                       |                          |  |  |                          |                                   |  |                          |  |  |   |  |  |  |      |         |           |                   |      |              |                  |             |       |                |            |                     |   |  |      |           |                     |        |                |              |               |                 |                    |                  |                   |                   |                  |              |   |  |         |  |                      |   |           |  |                     |   |  |  |                      |  |
| CL. - CLAY   | MOD. - MODERATELY   | UW - UNIT WEIGHT   |  |  |  |  |   |  |  |   |  |   |  |                                     |                     |   |   |         |  |                      |   |                                  |  |   |   |   |                  |                                  |  |   |  |   |              |   |   |   |                                |  |                                     |                          |   |                                       |                          |  |  |                          |                                   |          |                              |                       |            |                    |                      |  |              |          |  |            |  |  |  |  |  |  |                        |                   |                   |                  |                  |                  |                  |                  |                  |                  |                  |                  |                |                 |            |    |                            |   |   |                  |                |                                      |                   |                   |                   |                   |                   |                   |  |  |  |  |             |   |   |   |   |      |      |       |       |       |  |  |  |  |  |  |                                |                               |           |                                 |             |              |  |  |  |  |  |  |   |                      |  |  |                         |                   |  |  |  |              |  |  |  |              |      |             |  |  |  |  |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                   |                            |  |  |   |  |  |     |   |  |  |  |                                     |  |  |  |                                   |   |    |    |    |     |     |  |      |      |      |      |       |       |                 |  |  |  |  |  |  |               |  |  |  |  |  |  |              |  |  |  |  |  |  |                       |  |  |  |  |  |  |                   |  |  |  |  |  |  |            |  |  |  |  |  |  |            |  |  |  |  |  |  |            |     |    |     |      |      |       |    |  |  |  |  |  |  |     |    |   |  |  |  |  |                                      |  |  |  |  |                            |                                      |                   |                      |   |                    |             |   |                                       |               |                                    |                      |             |  |   |  |                    |               |                       |                        |                   |                  |            |                   |                  |                               |                  |                      |               |                |  |                        |                          |  |                                |                   |  |                |                   |  |          |                   |  |                       |                 |  |                              |                       |  |                    |                      |  |              |          |  |   |  |             |                       |              |  |     |          |  |      |        |  |       |        |  |            |      |   |  |              |                  |              |                                  |                                    |   |  |   |            |                                  |  |   |  |   |             |   |   |   |                          |  |                                     |                          |   |                                       |                          |  |  |                          |                                   |  |                          |  |  |   |  |  |  |      |         |           |                   |      |              |                  |             |       |                |            |                     |   |  |      |           |                     |        |                |              |               |                 |                    |                  |                   |                   |                  |              |   |  |         |  |                      |   |           |  |                     |   |  |  |                      |  |
| CPT - COARSE PENETRATION TEST  | NP - NON PLASTIC  | UW - DRY UNIT WEIGHT   |  |  |  |  |   |  |  |   |  |   |  |                                     |                     |   |   |         |  |                      |   |                                  |  |   |   |   |                  |                                  |  |   |  |   |              |   |   |   |                                |  |                                     |                          |   |                                       |                          |  |  |                          |                                   |          |                              |                       |            |                    |                      |  |              |          |  |            |  |  |  |  |  |  |                        |                   |                   |                  |                  |                  |                  |                  |                  |                  |                  |                  |                |                 |            |    |                            |   |   |                  |                |                                      |                   |                   |                   |                   |                   |                   |  |  |  |  |             |   |   |   |   |      |      |       |       |       |  |  |  |  |  |  |                                |                               |           |                                 |             |              |  |  |  |  |  |  |   |                      |  |  |                         |                   |  |  |  |              |  |  |  |              |      |             |  |  |  |  |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                   |                            |  |  |   |  |  |     |   |  |  |  |                                     |  |  |  |                                   |   |    |    |    |     |     |  |      |      |      |      |       |       |                 |  |  |  |  |  |  |               |  |  |  |  |  |  |              |  |  |  |  |  |  |                       |  |  |  |  |  |  |                   |  |  |  |  |  |  |            |  |  |  |  |  |  |            |  |  |  |  |  |  |            |     |    |     |      |      |       |    |  |  |  |  |  |  |     |    |   |  |  |  |  |                                      |  |  |  |  |                            |                                      |                   |                      |   |                    |             |   |                                       |               |                                    |                      |             |  |   |  |                    |               |                       |                        |                   |                  |            |                   |                  |                               |                  |                      |               |                |  |                        |                          |  |                                |                   |  |                |                   |  |          |                   |  |                       |                 |  |                              |                       |  |                    |                      |  |              |          |  |   |  |             |                       |              |  |     |          |  |      |        |  |       |        |  |            |      |   |  |              |                  |              |                                  |                                    |   |  |   |            |                                  |  |   |  |   |             |   |   |   |                          |  |                                     |                          |   |                                       |                          |  |  |                          |                                   |  |                          |  |  |   |  |  |  |      |         |           |                   |      |              |                  |             |       |                |            |                     |   |  |      |           |                     |        |                |              |               |                 |                    |                  |                   |                   |                  |              |   |  |         |  |                      |   |           |  |                     |   |  |  |                      |  |
| CSE. - COARSE  | ORG. - ORGANIC  |  |  |  |  |  |   |  |  |   |  |   |  |                                     |                     |   |   |         |  |                      |   |                                  |  |   |   |   |                  |                                  |  |   |  |   |              |   |   |   |                                |  |                                     |                          |   |                                       |                          |  |  |                          |                                   |          |                              |                       |            |                    |                      |  |              |          |  |            |  |  |  |  |  |  |                        |                   |                   |                  |                  |                  |                  |                  |                  |                  |                  |                  |                |                 |            |    |                            |   |   |                  |                |                                      |                   |                   |                   |                   |                   |                   |  |  |  |  |             |   |   |   |   |      |      |       |       |       |  |  |  |  |  |  |                                |                               |           |                                 |             |              |  |  |  |  |  |  |   |                      |  |  |                         |                   |  |  |  |              |  |  |  |              |      |             |  |  |  |  |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                   |                            |  |  |   |  |  |     |   |  |  |  |                                     |  |  |  |                                   |   |    |    |    |     |     |  |      |      |      |      |       |       |                 |  |  |  |  |  |  |               |  |  |  |  |  |  |              |  |  |  |  |  |  |                       |  |  |  |  |  |  |                   |  |  |  |  |  |  |            |  |  |  |  |  |  |            |  |  |  |  |  |  |            |     |    |     |      |      |       |    |  |  |  |  |  |  |     |    |   |  |  |  |  |                                      |  |  |  |  |                            |                                      |                   |                      |   |                    |             |   |                                       |               |                                    |                      |             |  |   |  |                    |               |                       |                        |                   |                  |            |                   |                  |                               |                  |                      |               |                |  |                        |                          |  |                                |                   |  |                |                   |  |          |                   |  |                       |                 |  |                              |                       |  |                    |                      |  |              |          |  |   |  |             |                       |              |  |     |          |  |      |        |  |       |        |  |            |      |   |  |              |                  |              |                                  |                                    |   |  |   |            |                                  |  |   |  |   |             |   |   |   |                          |  |                                     |                          |   |                                       |                          |  |  |                          |                                   |  |                          |  |  |   |  |  |  |      |         |           |                   |      |              |                  |             |       |                |            |                     |   |  |      |           |                     |        |                |              |               |                 |                    |                  |                   |                   |                  |              |   |  |         |  |                      |   |           |  |                     |   |  |  |                      |  |
| DPT - DILATOMETER TEST   | PMT - PRESSUREMETER TEST  |  |  |  |  |  |   |  |  |   |  |   |  |                                     |                     |   |   |         |  |                      |   |                                  |  |   |   |   |                  |                                  |  |   |  |   |              |   |   |   |                                |  |                                     |                          |   |                                       |                          |  |  |                          |                                   |          |                              |                       |            |                    |                      |  |              |          |  |            |  |  |  |  |  |  |                        |                   |                   |                  |                  |                  |                  |                  |                  |                  |                  |                  |                |                 |            |    |                            |   |   |                  |                |                                      |                   |                   |                   |                   |                   |                   |  |  |  |  |             |   |   |   |   |      |      |       |       |       |  |  |  |  |  |  |                                |                               |           |                                 |             |              |  |  |  |  |  |  |   |                      |  |  |                         |                   |  |  |  |              |  |  |  |              |      |             |  |  |  |  |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                   |                            |  |  |   |  |  |     |   |  |  |  |                                     |  |  |  |                                   |   |    |    |    |     |     |  |      |      |      |      |       |       |                 |  |  |  |  |  |  |               |  |  |  |  |  |  |              |  |  |  |  |  |  |                       |  |  |  |  |  |  |                   |  |  |  |  |  |  |            |  |  |  |  |  |  |            |  |  |  |  |  |  |            |     |    |     |      |      |       |    |  |  |  |  |  |  |     |    |   |  |  |  |  |                                      |  |  |  |  |                            |                                      |                   |                      |   |                    |             |   |                                       |               |                                    |                      |             |  |   |  |                    |               |                       |                        |                   |                  |            |                   |                  |                               |                  |                      |               |                |  |                        |                          |  |                                |                   |  |                |                   |  |          |                   |  |                       |                 |  |                              |                       |  |                    |                      |  |              |          |  |   |  |             |                       |              |  |     |          |  |      |        |  |       |        |  |            |      |   |  |              |                  |              |                                  |                                    |   |  |   |            |                                  |  |   |  |   |             |   |   |   |                          |  |                                     |                          |   |                                       |                          |  |  |                          |                                   |  |                          |  |  |   |  |  |  |      |         |           |                   |      |              |                  |             |       |                |            |                     |   |  |      |           |                     |        |                |              |               |                 |                    |                  |                   |                   |                  |              |   |  |         |  |                      |   |           |  |                     |   |  |  |                      |  |
| DPT - DYNAMIC PENETRATION TEST   | SAP. - SAPROLITIC   |  |  |  |  |  |   |  |  |   |  |   |  |                                     |                     |   |   |         |  |                      |   |                                  |  |   |   |   |                  |                                  |  |   |  |   |              |   |   |   |                                |  |                                     |                          |   |                                       |                          |  |  |                          |                                   |          |                              |                       |            |                    |                      |  |              |          |  |            |  |  |  |  |  |  |                        |                   |                   |                  |                  |                  |                  |                  |                  |                  |                  |                  |                |                 |            |    |                            |   |   |                  |                |                                      |                   |                   |                   |                   |                   |                   |  |  |  |  |             |   |   |   |   |      |      |       |       |       |  |  |  |  |  |  |                                |                               |           |                                 |             |              |  |  |  |  |  |  |   |                      |  |  |                         |                   |  |  |  |              |  |  |  |              |      |             |  |  |  |  |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                   |                            |  |  |   |  |  |     |   |  |  |  |                                     |  |  |  |                                   |   |    |    |    |     |     |  |      |      |      |      |       |       |                 |  |  |  |  |  |  |               |  |  |  |  |  |  |              |  |  |  |  |  |  |                       |  |  |  |  |  |  |                   |  |  |  |  |  |  |            |  |  |  |  |  |  |            |  |  |  |  |  |  |            |     |    |     |      |      |       |    |  |  |  |  |  |  |     |    |   |  |  |  |  |                                      |  |  |  |  |                            |                                      |                   |                      |   |                    |             |   |                                       |               |                                    |                      |             |  |   |  |                    |               |                       |                        |                   |                  |            |                   |                  |                               |                  |                      |               |                |  |                        |                          |  |                                |                   |  |                |                   |  |          |                   |  |                       |                 |  |                              |                       |  |                    |                      |  |              |          |  |   |  |             |                       |              |  |     |          |  |      |        |  |       |        |  |            |      |   |  |              |                  |              |                                  |                                    |   |  |   |            |                                  |  |   |  |   |             |   |   |   |                          |  |                                     |                          |   |                                       |                          |  |  |                          |                                   |  |                          |  |  |   |  |  |  |      |         |           |                   |      |              |                  |             |       |                |            |                     |   |  |      |           |                     |        |                |              |               |                 |                    |                  |                   |                   |                  |              |   |  |         |  |                      |   |           |  |                     |   |  |  |                      |  |
| Ø - VOID RATIO   | SD. - SAND, SANDY   |  |  |  |  |  |   |  |  |   |  |   |  |                                     |                     |   |   |         |  |                      |   |                                  |  |   |   |   |                  |                                  |  |   |  |   |              |   |   |   |                                |  |                                     |                          |   |                                       |                          |  |  |                          |                                   |          |                              |                       |            |                    |                      |  |              |          |  |            |  |  |  |  |  |  |                        |                   |                   |                  |                  |                  |                  |                  |                  |                  |                  |                  |                |                 |            |    |                            |   |   |                  |                |                                      |                   |                   |                   |                   |                   |                   |  |  |  |  |             |   |   |   |   |      |      |       |       |       |  |  |  |  |  |  |                                |                               |           |                                 |             |              |  |  |  |  |  |  |   |                      |  |  |                         |                   |  |  |  |              |  |  |  |              |      |             |  |  |  |  |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                   |                            |  |  |   |  |  |     |   |  |  |  |                                     |  |  |  |                                   |   |    |    |    |     |     |  |      |      |      |      |       |       |                 |  |  |  |  |  |  |               |  |  |  |  |  |  |              |  |  |  |  |  |  |                       |  |  |  |  |  |  |                   |  |  |  |  |  |  |            |  |  |  |  |  |  |            |  |  |  |  |  |  |            |     |    |     |      |      |       |    |  |  |  |  |  |  |     |    |   |  |  |  |  |                                      |  |  |  |  |                            |                                      |                   |                      |   |                    |             |   |                                       |               |                                    |                      |             |  |   |  |                    |               |                       |                        |                   |                  |            |                   |                  |                               |                  |                      |               |                |  |                        |                          |  |                                |                   |  |                |                   |  |          |                   |  |                       |                 |  |                              |                       |  |                    |                      |  |              |          |  |   |  |             |                       |              |  |     |          |  |      |        |  |       |        |  |            |      |   |  |              |                  |              |                                  |                                    |   |  |   |            |                                  |  |   |  |   |             |   |   |   |                          |  |                                     |                          |   |                                       |                          |  |  |                          |                                   |  |                          |  |  |   |  |  |  |      |         |           |                   |      |              |                  |             |       |                |            |                     |   |  |      |           |                     |        |                |              |               |                 |                    |                  |                   |                   |                  |              |   |  |         |  |                      |   |           |  |                     |   |  |  |                      |  |
| F - FINE   | SL. - SILT, SILTY   |  |  |  |  |  |   |  |  |   |  |   |  |                                     |                     |   |   |         |  |                      |   |                                  |  |   |   |   |                  |                                  |  |   |  |   |              |   |   |   |                                |  |                                     |                          |   |                                       |                          |  |  |                          |                                   |          |                              |                       |            |                    |                      |  |              |          |  |            |  |  |  |  |  |  |                        |                   |                   |                  |                  |                  |                  |                  |                  |                  |                  |                  |                |                 |            |    |                            |   |   |                  |                |                                      |                   |                   |                   |                   |                   |                   |  |  |  |  |             |   |   |   |   |      |      |       |       |       |  |  |  |  |  |  |                                |                               |           |                                 |             |              |  |  |  |  |  |  |   |                      |  |  |                         |                   |  |  |  |              |  |  |  |              |      |             |  |  |  |  |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                   |                            |  |  |   |  |  |     |   |  |  |  |                                     |  |  |  |                                   |   |    |    |    |     |     |  |      |      |      |      |       |       |                 |  |  |  |  |  |  |               |  |  |  |  |  |  |              |  |  |  |  |  |  |                       |  |  |  |  |  |  |                   |  |  |  |  |  |  |            |  |  |  |  |  |  |            |  |  |  |  |  |  |            |     |    |     |      |      |       |    |  |  |  |  |  |  |     |    |   |  |  |  |  |                                      |  |  |  |  |                            |                                      |                   |                      |   |                    |             |   |                                       |               |                                    |                      |             |  |   |  |                    |               |                       |                        |                   |                  |            |                   |                  |                               |                  |                      |               |                |  |                        |                          |  |                                |                   |  |                |                   |  |          |                   |  |                       |                 |  |                              |                       |  |                    |                      |  |              |          |  |   |  |             |                       |              |  |     |          |  |      |        |  |       |        |  |            |      |   |  |              |                  |              |                                  |                                    |   |  |   |            |                                  |  |   |  |   |             |   |   |   |                          |  |                                     |                          |   |                                       |                          |  |  |                          |                                   |  |                          |  |  |   |  |  |  |      |         |           |                   |      |              |                  |             |       |                |            |                     |   |  |      |           |                     |        |                |              |               |                 |                    |                  |                   |                   |                  |              |   |  |         |  |                      |   |           |  |                     |   |  |  |                      |  |
| FOSS. - FOSSILIFEROUS  | SLI. - SLIGHTLY   |  |  |  |  |  |   |  |  |   |  |   |  |                                     |                     |   |   |         |  |                      |   |                                  |  |   |   |   |                  |                                  |  |   |  |   |              |   |   |   |                                |  |                                     |                          |   |                                       |                          |  |  |                          |                                   |          |                              |                       |            |                    |                      |  |              |          |  |            |  |  |  |  |  |  |                        |                   |                   |                  |                  |                  |                  |                  |                  |                  |                  |                  |                |                 |            |    |                            |   |   |                  |                |                                      |                   |                   |                   |                   |                   |                   |  |  |  |  |             |   |   |   |   |      |      |       |       |       |  |  |  |  |  |  |                                |                               |           |                                 |             |              |  |  |  |  |  |  |   |                      |  |  |                         |                   |  |  |  |              |  |  |  |              |      |             |  |  |  |  |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                   |                            |  |  |   |  |  |     |   |  |  |  |                                     |  |  |  |                                   |   |    |    |    |     |     |  |      |      |      |      |       |       |                 |  |  |  |  |  |  |               |  |  |  |  |  |  |              |  |  |  |  |  |  |                       |  |  |  |  |  |  |                   |  |  |  |  |  |  |            |  |  |  |  |  |  |            |  |  |  |  |  |  |            |     |    |     |      |      |       |    |  |  |  |  |  |  |     |    |   |  |  |  |  |                                      |  |  |  |  |                            |                                      |                   |                      |   |                    |             |   |                                       |               |                                    |                      |             |  |   |  |                    |               |                       |                        |                   |                  |            |                   |                  |                               |                  |                      |               |                |  |                        |                          |  |                                |                   |  |                |                   |  |          |                   |  |                       |                 |  |                              |                       |  |                    |                      |  |              |          |  |   |  |             |                       |              |  |     |          |  |      |        |  |       |        |  |            |      |   |  |              |                  |              |                                  |                                    |   |  |   |            |                                  |  |   |  |   |             |   |   |   |                          |  |                                     |                          |   |                                       |                          |  |  |                          |                                   |  |                          |  |  |   |  |  |  |      |         |           |                   |      |              |                  |             |       |                |            |                     |   |  |      |           |                     |        |                |              |               |                 |                    |                  |                   |                   |                  |              |   |  |         |  |                      |   |           |  |                     |   |  |  |                      |  |
| FRAC. - FRACTURED, FRACTURES   | TCR - TRICONE REFUSAL   |  |  |  |  |  |   |  |  |   |  |   |  |                                     |                     |   |   |         |  |                      |   |                                  |  |   |   |   |                  |                                  |  |   |  |   |              |   |   |   |                                |  |                                     |                          |   |                                       |                          |  |  |                          |                                   |          |                              |                       |            |                    |                      |  |              |          |  |            |  |  |  |  |  |  |                        |                   |                   |                  |                  |                  |                  |                  |                  |                  |                  |                  |                |                 |            |    |                            |   |   |                  |                |                                      |                   |                   |                   |                   |                   |                   |  |  |  |  |             |   |   |   |   |      |      |       |       |       |  |  |  |  |  |  |                                |                               |           |                                 |             |              |  |  |  |  |  |  |   |                      |  |  |                         |                   |  |  |  |              |  |  |  |              |      |             |  |  |  |  |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                   |                            |  |  |   |  |  |     |   |  |  |  |                                     |  |  |  |                                   |   |    |    |    |     |     |  |      |      |      |      |       |       |                 |  |  |  |  |  |  |               |  |  |  |  |  |  |              |  |  |  |  |  |  |                       |  |  |  |  |  |  |                   |  |  |  |  |  |  |            |  |  |  |  |  |  |            |  |  |  |  |  |  |            |     |    |     |      |      |       |    |  |  |  |  |  |  |     |    |   |  |  |  |  |                                      |  |  |  |  |                            |                                      |                   |                      |   |                    |             |   |                                       |               |                                    |                      |             |  |   |  |                    |               |                       |                        |                   |                  |            |                   |                  |                               |                  |                      |               |                |  |                        |                          |  |                                |                   |  |                |                   |  |          |                   |  |                       |                 |  |                              |                       |  |                    |                      |  |              |          |  |   |  |             |                       |              |  |     |          |  |      |        |  |       |        |  |            |      |   |  |              |                  |              |                                  |                                    |   |  |   |            |                                  |  |   |  |   |             |   |   |   |                          |  |                                     |                          |   |                                       |                          |  |  |                          |                                   |  |                          |  |  |   |  |  |  |      |         |           |                   |      |              |                  |             |       |                |            |                     |   |  |      |           |                     |        |                |              |               |                 |                    |                  |                   |                   |                  |              |   |  |         |  |                      |   |           |  |                     |   |  |  |                      |  |
| FRAGS. - FRAGMENTS   | w - MOISTURE CONTENT  |  |  |  |  |  |   |  |  |   |  |   |  |                                     |                     |   |   |         |  |                      |   |                                  |  |   |   |   |                  |                                  |  |   |  |   |              |   |   |   |                                |  |                                     |                          |   |                                       |                          |  |  |                          |                                   |          |                              |                       |            |                    |                      |  |              |          |  |            |  |  |  |  |  |  |                        |                   |                   |                  |                  |                  |                  |                  |                  |                  |                  |                  |                |                 |            |    |                            |   |   |                  |                |                                      |                   |                   |                   |                   |                   |                   |  |  |  |  |             |   |   |   |   |      |      |       |       |       |  |  |  |  |  |  |                                |                               |           |                                 |             |              |  |  |  |  |  |  |   |                      |  |  |                         |                   |  |  |  |              |  |  |  |              |      |             |  |  |  |  |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                   |                            |  |  |   |  |  |     |   |  |  |  |                                     |  |  |  |                                   |   |    |    |    |     |     |  |      |      |      |      |       |       |                 |  |  |  |  |  |  |               |  |  |  |  |  |  |              |  |  |  |  |  |  |                       |  |  |  |  |  |  |                   |  |  |  |  |  |  |            |  |  |  |  |  |  |            |  |  |  |  |  |  |            |     |    |     |      |      |       |    |  |  |  |  |  |  |     |    |   |  |  |  |  |                                      |  |  |  |  |                            |                                      |                   |                      |   |                    |             |   |                                       |               |                                    |                      |             |  |   |  |                    |               |                       |                        |                   |                  |            |                   |                  |                               |                  |                      |               |                |  |                        |                          |  |                                |                   |  |                |                   |  |          |                   |  |                       |                 |  |                              |                       |  |                    |                      |  |              |          |  |   |  |             |                       |              |  |     |          |  |      |        |  |       |        |  |            |      |   |  |              |                  |              |                                  |                                    |   |  |   |            |                                  |  |   |  |   |             |   |   |   |                          |  |                                     |                          |   |                                       |                          |  |  |                          |                                   |  |                          |  |  |   |  |  |  |      |         |           |                   |      |              |                  |             |       |                |            |                     |   |  |      |           |                     |        |                |              |               |                 |                    |                  |                   |                   |                  |              |   |  |         |  |                      |   |           |  |                     |   |  |  |                      |  |
| HI. - HIGHLY   | V - VERY  |  |  |  |  |  |   |  |  |   |  |   |  |                                     |                     |   |   |         |  |                      |   |                                  |  |   |   |   |                  |                                  |  |   |  |   |              |   |   |   |                                |  |                                     |                          |   |                                       |                          |  |  |                          |                                   |          |                              |                       |            |                    |                      |  |              |          |  |            |  |  |  |  |  |  |                        |                   |                   |                  |                  |                  |                  |                  |                  |                  |                  |                  |                |                 |            |    |                            |   |   |                  |                |                                      |                   |                   |                   |                   |                   |                   |  |  |  |  |             |   |   |   |   |      |      |       |       |       |  |  |  |  |  |  |                                |                               |           |                                 |             |              |  |  |  |  |  |  |   |                      |  |  |                         |                   |  |  |  |              |  |  |  |              |      |             |  |  |  |  |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                   |                            |  |  |   |  |  |     |   |  |  |  |                                     |  |  |  |                                   |   |    |    |    |     |     |  |      |      |      |      |       |       |                 |  |  |  |  |  |  |               |  |  |  |  |  |  |              |  |  |  |  |  |  |                       |  |  |  |  |  |  |                   |  |  |  |  |  |  |            |  |  |  |  |  |  |            |  |  |  |  |  |  |            |     |    |     |      |      |       |    |  |  |  |  |  |  |     |    |   |  |  |  |  |                                      |  |  |  |  |                            |                                      |                   |                      |   |                    |             |   |                                       |               |                                    |                      |             |  |   |  |                    |               |                       |                        |                   |                  |            |                   |                  |                               |                  |                      |               |                |  |                        |                          |  |                                |                   |  |                |                   |  |          |                   |  |                       |                 |  |                              |                       |  |                    |                      |  |              |          |  |   |  |             |                       |              |  |     |          |  |      |        |  |       |        |  |            |      |   |  |              |                  |              |                                  |                                    |   |  |   |            |                                  |  |   |  |   |             |   |   |   |                          |  |                                     |                          |   |                                       |                          |  |  |                          |                                   |  |                          |  |  |   |  |  |  |      |         |           |                   |      |              |                  |             |       |                |            |                     |   |  |      |           |                     |        |                |              |               |                 |                    |                  |                   |                   |                  |              |   |  |         |  |                      |   |           |  |                     |   |  |  |                      |  |
| <p><b>PLASTICITY</b></p> <table border="1"> <thead> <tr> <th>NON PLASTIC</th> <th>PLASTICITY INDEX (PI)</th> <th>DRY STRENGTH</th> </tr> </thead> <tbody> <tr> <td></td> <td>0-5</td> <td>VERY LOW</td> </tr> <tr> <td></td> <td>6-15</td> <td>SLIGHT</td> </tr> <tr> <td></td> <td>16-25</td> <td>MEDIUM</td> </tr> <tr> <td></td> <td>26 OR MORE</td> <td>HIGH</td> </tr> </tbody> </table>  |   | NON PLASTIC  | PLASTICITY INDEX (PI)  | DRY STRENGTH   |  | 0-5  | VERY LOW  |  | 6-15                                     | SLIGHT  |  | 16-25   | MEDIUM   |                                     | 26 OR MORE          | HIGH  | <p><b>EQUIPMENT USED ON SUBJECT PROJECT</b></p> <table border="1"> <tbody> <tr> <td>DRILL UNITS:</td> <td>ADVANCING TOOLS:</td> <td>HAMMER TYPE:</td> </tr> <tr> <td><input type="checkbox"/> CME-45C</td> <td><input type="checkbox"/> CLAY BITS</td> <td><input checked="" type="checkbox"/> AUTOMATIC <input type="checkbox"/> MANUAL</td> </tr> <tr> <td><input checked="" type="checkbox"/> CME-55</td> <td><input type="checkbox"/> 6" CONTINUOUS FLIGHT AUGER</td> <td>CORE SIZE:</td> </tr> <tr> <td><input type="checkbox"/> CME-550</td> <td><input checked="" type="checkbox"/> 8" HOLLOW AUGERS</td> <td><input type="checkbox"/> -B <input type="checkbox"/> -H <input type="checkbox"/> -N</td> </tr> <tr> <td><input type="checkbox"/> VANE SHEAR TEST</td> <td><input type="checkbox"/> HARD FACED FINGER BITS</td> <td>HAND TOOLS:</td> </tr> <tr> <td><input type="checkbox"/> PORTABLE HOIST</td> <td><input type="checkbox"/> TUNG-CARBIDE INSERTS</td> <td><input type="checkbox"/> POST HOLE DIGGER</td> </tr> <tr> <td><input type="checkbox"/></td> <td><input type="checkbox"/> CASING <input type="checkbox"/> W/ ADVANCER</td> <td><input type="checkbox"/> HAND AUGER</td> </tr> <tr> <td><input type="checkbox"/></td> <td><input type="checkbox"/> TRICONE _____ *STEEL TEETH</td> <td><input type="checkbox"/> SOUNDING ROD</td> </tr> <tr> <td><input type="checkbox"/></td> <td><input type="checkbox"/> TRICONE _____ *TUNG-CARB.</td> <td><input type="checkbox"/> VANE SHEAR TEST</td> </tr> <tr> <td><input type="checkbox"/></td> <td><input type="checkbox"/> CORE BIT</td> <td></td> </tr> <tr> <td><input type="checkbox"/></td> <td></td> <td></td> </tr> </tbody> </table> |         | DRILL UNITS:   | ADVANCING TOOLS:     | HAMMER TYPE:  | <input type="checkbox"/> CME-45C | <input type="checkbox"/> CLAY BITS   | <input checked="" type="checkbox"/> AUTOMATIC <input type="checkbox"/> MANUAL | <input checked="" type="checkbox"/> CME-55                                | <input type="checkbox"/> 6" CONTINUOUS FLIGHT AUGER | CORE SIZE:       | <input type="checkbox"/> CME-550 | <input checked="" type="checkbox"/> 8" HOLLOW AUGERS | <input type="checkbox"/> -B <input type="checkbox"/> -H <input type="checkbox"/> -N | <input type="checkbox"/> VANE SHEAR TEST | <input type="checkbox"/> HARD FACED FINGER BITS | HAND TOOLS:  | <input type="checkbox"/> PORTABLE HOIST | <input type="checkbox"/> TUNG-CARBIDE INSERTS | <input type="checkbox"/> POST HOLE DIGGER | <input type="checkbox"/>       | <input type="checkbox"/> CASING <input type="checkbox"/> W/ ADVANCER | <input type="checkbox"/> HAND AUGER | <input type="checkbox"/> | <input type="checkbox"/> TRICONE _____ *STEEL TEETH | <input type="checkbox"/> SOUNDING ROD | <input type="checkbox"/> | <input type="checkbox"/> TRICONE _____ *TUNG-CARB. | <input type="checkbox"/> VANE SHEAR TEST | <input type="checkbox"/> | <input type="checkbox"/> CORE BIT |          | <input type="checkbox"/>     |                       |            |                    |                      |  |              |          |  |            |  |  |  |  |  |  |                        |                   |                   |                  |                  |                  |                  |                  |                  |                  |                  |                  |                |                 |            |    |                            |   |   |                  |                |                                      |                   |                   |                   |                   |                   |                   |  |  |  |  |             |   |   |   |   |      |      |       |       |       |  |  |  |  |  |  |                                |                               |           |                                 |             |              |  |  |  |  |  |  |   |                      |  |  |                         |                   |  |  |  |              |  |  |  |              |      |             |  |  |  |  |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                   |                            |  |  |   |  |  |     |   |  |  |  |                                     |  |  |  |                                   |   |    |    |    |     |     |  |      |      |      |      |       |       |                 |  |  |  |  |  |  |               |  |  |  |  |  |  |              |  |  |  |  |  |  |                       |  |  |  |  |  |  |                   |  |  |  |  |  |  |            |  |  |  |  |  |  |            |  |  |  |  |  |  |            |     |    |     |      |      |       |    |  |  |  |  |  |  |     |    |   |  |  |  |  |                                      |  |  |  |  |                            |                                      |                   |                      |   |                    |             |   |                                       |               |                                    |                      |             |  |   |  |                    |               |                       |                        |                   |                  |            |                   |                  |                               |                  |                      |               |                |  |                        |                          |  |                                |                   |  |                |                   |  |          |                   |  |                       |                 |  |                              |                       |  |                    |                      |  |              |          |  |   |  |             |                       |              |  |     |          |  |      |        |  |       |        |  |            |      |   |  |              |                  |              |                                  |                                    |   |  |   |            |                                  |  |   |  |   |             |   |   |   |                          |  |                                     |                          |   |                                       |                          |  |  |                          |                                   |  |                          |  |  |   |  |  |  |      |         |           |                   |      |              |                  |             |       |                |            |                     |   |  |      |           |                     |        |                |              |               |                 |                    |                  |                   |                   |                  |              |   |  |         |  |                      |   |           |  |                     |   |  |  |                      |  |
| NON PLASTIC  | PLASTICITY INDEX (PI)   | DRY STRENGTH   |  |  |  |  |   |  |  |   |  |   |  |                                     |                     |   |   |         |  |                      |   |                                  |  |   |   |   |                  |                                  |  |   |  |   |              |   |   |   |                                |  |                                     |                          |   |                                       |                          |  |  |                          |                                   |          |                              |                       |            |                    |                      |  |              |          |  |            |  |  |  |  |  |  |                        |                   |                   |                  |                  |                  |                  |                  |                  |                  |                  |                  |                |                 |            |    |                            |   |   |                  |                |                                      |                   |                   |                   |                   |                   |                   |  |  |  |  |             |   |   |   |   |      |      |       |       |       |  |  |  |  |  |  |                                |                               |           |                                 |             |              |  |  |  |  |  |  |   |                      |  |  |                         |                   |  |  |  |              |  |  |  |              |      |             |  |  |  |  |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                   |                            |  |  |   |  |  |     |   |  |  |  |                                     |  |  |  |                                   |   |    |    |    |     |     |  |      |      |      |      |       |       |                 |  |  |  |  |  |  |               |  |  |  |  |  |  |              |  |  |  |  |  |  |                       |  |  |  |  |  |  |                   |  |  |  |  |  |  |            |  |  |  |  |  |  |            |  |  |  |  |  |  |            |     |    |     |      |      |       |    |  |  |  |  |  |  |     |    |   |  |  |  |  |                                      |  |  |  |  |                            |                                      |                   |                      |   |                    |             |   |                                       |               |                                    |                      |             |  |   |  |                    |               |                       |                        |                   |                  |            |                   |                  |                               |                  |                      |               |                |  |                        |                          |  |                                |                   |  |                |                   |  |          |                   |  |                       |                 |  |                              |                       |  |                    |                      |  |              |          |  |   |  |             |                       |              |  |     |          |  |      |        |  |       |        |  |            |      |   |  |              |                  |              |                                  |                                    |   |  |   |            |                                  |  |   |  |   |             |   |   |   |                          |  |                                     |                          |   |                                       |                          |  |  |                          |                                   |  |                          |  |  |   |  |  |  |      |         |           |                   |      |              |                  |             |       |                |            |                     |   |  |      |           |                     |        |                |              |               |                 |                    |                  |                   |                   |                  |              |   |  |         |  |                      |   |           |  |                     |   |  |  |                      |  |
|  | 0-5   | VERY LOW   |  |  |  |  |   |  |  |   |  |   |  |                                     |                     |   |   |         |  |                      |   |                                  |  |   |   |   |                  |                                  |  |   |  |   |              |   |   |   |                                |  |                                     |                          |   |                                       |                          |  |  |                          |                                   |          |                              |                       |            |                    |                      |  |              |          |  |            |  |  |  |  |  |  |                        |                   |                   |                  |                  |                  |                  |                  |                  |                  |                  |                  |                |                 |            |    |                            |   |   |                  |                |                                      |                   |                   |                   |                   |                   |                   |  |  |  |  |             |   |   |   |   |      |      |       |       |       |  |  |  |  |  |  |                                |                               |           |                                 |             |              |  |  |  |  |  |  |   |                      |  |  |                         |                   |  |  |  |              |  |  |  |              |      |             |  |  |  |  |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                   |                            |  |  |   |  |  |     |   |  |  |  |                                     |  |  |  |                                   |   |    |    |    |     |     |  |      |      |      |      |       |       |                 |  |  |  |  |  |  |               |  |  |  |  |  |  |              |  |  |  |  |  |  |                       |  |  |  |  |  |  |                   |  |  |  |  |  |  |            |  |  |  |  |  |  |            |  |  |  |  |  |  |            |     |    |     |      |      |       |    |  |  |  |  |  |  |     |    |   |  |  |  |  |                                      |  |  |  |  |                            |                                      |                   |                      |   |                    |             |   |                                       |               |                                    |                      |             |  |   |  |                    |               |                       |                        |                   |                  |            |                   |                  |                               |                  |                      |               |                |  |                        |                          |  |                                |                   |  |                |                   |  |          |                   |  |                       |                 |  |                              |                       |  |                    |                      |  |              |          |  |   |  |             |                       |              |  |     |          |  |      |        |  |       |        |  |            |      |   |  |              |                  |              |                                  |                                    |   |  |   |            |                                  |  |   |  |   |             |   |   |   |                          |  |                                     |                          |   |                                       |                          |  |  |                          |                                   |  |                          |  |  |   |  |  |  |      |         |           |                   |      |              |                  |             |       |                |            |                     |   |  |      |           |                     |        |                |              |               |                 |                    |                  |                   |                   |                  |              |   |  |         |  |                      |   |           |  |                     |   |  |  |                      |  |
|  | 6-15  | SLIGHT   |  |  |  |  |   |  |  |   |  |   |  |                                     |                     |   |   |         |  |                      |   |                                  |  |   |   |   |                  |                                  |  |   |  |   |              |   |   |   |                                |  |                                     |                          |   |                                       |                          |  |  |                          |                                   |          |                              |                       |            |                    |                      |  |              |          |  |            |  |  |  |  |  |  |                        |                   |                   |                  |                  |                  |                  |                  |                  |                  |                  |                  |                |                 |            |    |                            |   |   |                  |                |                                      |                   |                   |                   |                   |                   |                   |  |  |  |  |             |   |   |   |   |      |      |       |       |       |  |  |  |  |  |  |                                |                               |           |                                 |             |              |  |  |  |  |  |  |   |                      |  |  |                         |                   |  |  |  |              |  |  |  |              |      |             |  |  |  |  |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                   |                            |  |  |   |  |  |     |   |  |  |  |                                     |  |  |  |                                   |   |    |    |    |     |     |  |      |      |      |      |       |       |                 |  |  |  |  |  |  |               |  |  |  |  |  |  |              |  |  |  |  |  |  |                       |  |  |  |  |  |  |                   |  |  |  |  |  |  |            |  |  |  |  |  |  |            |  |  |  |  |  |  |            |     |    |     |      |      |       |    |  |  |  |  |  |  |     |    |   |  |  |  |  |                                      |  |  |  |  |                            |                                      |                   |                      |   |                    |             |   |                                       |               |                                    |                      |             |  |   |  |                    |               |                       |                        |                   |                  |            |                   |                  |                               |                  |                      |               |                |  |                        |                          |  |                                |                   |  |                |                   |  |          |                   |  |                       |                 |  |                              |                       |  |                    |                      |  |              |          |  |   |  |             |                       |              |  |     |          |  |      |        |  |       |        |  |            |      |   |  |              |                  |              |                                  |                                    |   |  |   |            |                                  |  |   |  |   |             |   |   |   |                          |  |                                     |                          |   |                                       |                          |  |  |                          |                                   |  |                          |  |  |   |  |  |  |      |         |           |                   |      |              |                  |             |       |                |            |                     |   |  |      |           |                     |        |                |              |               |                 |                    |                  |                   |                   |                  |              |   |  |         |  |                      |   |           |  |                     |   |  |  |                      |  |
|  | 16-25   | MEDIUM   |  |  |  |  |   |  |  |   |  |   |  |                                     |                     |   |   |         |  |                      |   |                                  |  |   |   |   |                  |                                  |  |   |  |   |              |   |   |   |                                |  |                                     |                          |   |                                       |                          |  |  |                          |                                   |          |                              |                       |            |                    |                      |  |              |          |  |            |  |  |  |  |  |  |                        |                   |                   |                  |                  |                  |                  |                  |                  |                  |                  |                  |                |                 |            |    |                            |   |   |                  |                |                                      |                   |                   |                   |                   |                   |                   |  |  |  |  |             |   |   |   |   |      |      |       |       |       |  |  |  |  |  |  |                                |                               |           |                                 |             |              |  |  |  |  |  |  |   |                      |  |  |                         |                   |  |  |  |              |  |  |  |              |      |             |  |  |  |  |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                   |                            |  |  |   |  |  |     |   |  |  |  |                                     |  |  |  |                                   |   |    |    |    |     |     |  |      |      |      |      |       |       |                 |  |  |  |  |  |  |               |  |  |  |  |  |  |              |  |  |  |  |  |  |                       |  |  |  |  |  |  |                   |  |  |  |  |  |  |            |  |  |  |  |  |  |            |  |  |  |  |  |  |            |     |    |     |      |      |       |    |  |  |  |  |  |  |     |    |   |  |  |  |  |                                      |  |  |  |  |                            |                                      |                   |                      |   |                    |             |   |                                       |               |                                    |                      |             |  |   |  |                    |               |                       |                        |                   |                  |            |                   |                  |                               |                  |                      |               |                |  |                        |                          |  |                                |                   |  |                |                   |  |          |                   |  |                       |                 |  |                              |                       |  |                    |                      |  |              |          |  |   |  |             |                       |              |  |     |          |  |      |        |  |       |        |  |            |      |   |  |              |                  |              |                                  |                                    |   |  |   |            |                                  |  |   |  |   |             |   |   |   |                          |  |                                     |                          |   |                                       |                          |  |  |                          |                                   |  |                          |  |  |   |  |  |  |      |         |           |                   |      |              |                  |             |       |                |            |                     |   |  |      |           |                     |        |                |              |               |                 |                    |                  |                   |                   |                  |              |   |  |         |  |                      |   |           |  |                     |   |  |  |                      |  |
|  | 26 OR MORE  | HIGH   |  |  |  |  |   |  |  |   |  |   |  |                                     |                     |   |   |         |  |                      |   |                                  |  |   |   |   |                  |                                  |  |   |  |   |              |   |   |   |                                |  |                                     |                          |   |                                       |                          |  |  |                          |                                   |          |                              |                       |            |                    |                      |  |              |          |  |            |  |  |  |  |  |  |                        |                   |                   |                  |                  |                  |                  |                  |                  |                  |                  |                  |                |                 |            |    |                            |   |   |                  |                |                                      |                   |                   |                   |                   |                   |                   |  |  |  |  |             |   |   |   |   |      |      |       |       |       |  |  |  |  |  |  |                                |                               |           |                                 |             |              |  |  |  |  |  |  |   |                      |  |  |                         |                   |  |  |  |              |  |  |  |              |      |             |  |  |  |  |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                   |                            |  |  |   |  |  |     |   |  |  |  |                                     |  |  |  |                                   |   |    |    |    |     |     |  |      |      |      |      |       |       |                 |  |  |  |  |  |  |               |  |  |  |  |  |  |              |  |  |  |  |  |  |                       |  |  |  |  |  |  |                   |  |  |  |  |  |  |            |  |  |  |  |  |  |            |  |  |  |  |  |  |            |     |    |     |      |      |       |    |  |  |  |  |  |  |     |    |   |  |  |  |  |                                      |  |  |  |  |                            |                                      |                   |                      |   |                    |             |   |                                       |               |                                    |                      |             |  |   |  |                    |               |                       |                        |                   |                  |            |                   |                  |                               |                  |                      |               |                |  |                        |                          |  |                                |                   |  |                |                   |  |          |                   |  |                       |                 |  |                              |                       |  |                    |                      |  |              |          |  |   |  |             |                       |              |  |     |          |  |      |        |  |       |        |  |            |      |   |  |              |                  |              |                                  |                                    |   |  |   |            |                                  |  |   |  |   |             |   |   |   |                          |  |                                     |                          |   |                                       |                          |  |  |                          |                                   |  |                          |  |  |   |  |  |  |      |         |           |                   |      |              |                  |             |       |                |            |                     |   |  |      |           |                     |        |                |              |               |                 |                    |                  |                   |                   |                  |              |   |  |         |  |                      |   |           |  |                     |   |  |  |                      |  |
| DRILL UNITS:   | ADVANCING TOOLS:  | HAMMER TYPE:   |  |  |  |  |   |  |  |   |  |   |  |                                     |                     |   |   |         |  |                      |   |                                  |  |   |   |   |                  |                                  |  |   |  |   |              |   |   |   |                                |  |                                     |                          |   |                                       |                          |  |  |                          |                                   |          |                              |                       |            |                    |                      |  |              |          |  |            |  |  |  |  |  |  |                        |                   |                   |                  |                  |                  |                  |                  |                  |                  |                  |                  |                |                 |            |    |                            |   |   |                  |                |                                      |                   |                   |                   |                   |                   |                   |  |  |  |  |             |   |   |   |   |      |      |       |       |       |  |  |  |  |  |  |                                |                               |           |                                 |             |              |  |  |  |  |  |  |   |                      |  |  |                         |                   |  |  |  |              |  |  |  |              |      |             |  |  |  |  |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                   |                            |  |  |   |  |  |     |   |  |  |  |                                     |  |  |  |                                   |   |    |    |    |     |     |  |      |      |      |      |       |       |                 |  |  |  |  |  |  |               |  |  |  |  |  |  |              |  |  |  |  |  |  |                       |  |  |  |  |  |  |                   |  |  |  |  |  |  |            |  |  |  |  |  |  |            |  |  |  |  |  |  |            |     |    |     |      |      |       |    |  |  |  |  |  |  |     |    |   |  |  |  |  |                                      |  |  |  |  |                            |                                      |                   |                      |   |                    |             |   |                                       |               |                                    |                      |             |  |   |  |                    |               |                       |                        |                   |                  |            |                   |                  |                               |                  |                      |               |                |  |                        |                          |  |                                |                   |  |                |                   |  |          |                   |  |                       |                 |  |                              |                       |  |                    |                      |  |              |          |  |   |  |             |                       |              |  |     |          |  |      |        |  |       |        |  |            |      |   |  |              |                  |              |                                  |                                    |   |  |   |            |                                  |  |   |  |   |             |   |   |   |                          |  |                                     |                          |   |                                       |                          |  |  |                          |                                   |  |                          |  |  |   |  |  |  |      |         |           |                   |      |              |                  |             |       |                |            |                     |   |  |      |           |                     |        |                |              |               |                 |                    |                  |                   |                   |                  |              |   |  |         |  |                      |   |           |  |                     |   |  |  |                      |  |
| <input type="checkbox"/> CME-45C   | <input type="checkbox"/> CLAY BITS  | <input checked="" type="checkbox"/> AUTOMATIC <input type="checkbox"/> MANUAL  |  |  |  |  |   |  |  |   |  |   |  |                                     |                     |   |   |         |  |                      |   |                                  |  |   |   |   |                  |                                  |  |   |  |   |              |   |   |   |                                |  |                                     |                          |   |                                       |                          |  |  |                          |                                   |          |                              |                       |            |                    |                      |  |              |          |  |            |  |  |  |  |  |  |                        |                   |                   |                  |                  |                  |                  |                  |                  |                  |                  |                  |                |                 |            |    |                            |   |   |                  |                |                                      |                   |                   |                   |                   |                   |                   |  |  |  |  |             |   |   |   |   |      |      |       |       |       |  |  |  |  |  |  |                                |                               |           |                                 |             |              |  |  |  |  |  |  |   |                      |  |  |                         |                   |  |  |  |              |  |  |  |              |      |             |  |  |  |  |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                   |                            |  |  |   |  |  |     |   |  |  |  |                                     |  |  |  |                                   |   |    |    |    |     |     |  |      |      |      |      |       |       |                 |  |  |  |  |  |  |               |  |  |  |  |  |  |              |  |  |  |  |  |  |                       |  |  |  |  |  |  |                   |  |  |  |  |  |  |            |  |  |  |  |  |  |            |  |  |  |  |  |  |            |     |    |     |      |      |       |    |  |  |  |  |  |  |     |    |   |  |  |  |  |                                      |  |  |  |  |                            |                                      |                   |                      |   |                    |             |   |                                       |               |                                    |                      |             |  |   |  |                    |               |                       |                        |                   |                  |            |                   |                  |                               |                  |                      |               |                |  |                        |                          |  |                                |                   |  |                |                   |  |          |                   |  |                       |                 |  |                              |                       |  |                    |                      |  |              |          |  |   |  |             |                       |              |  |     |          |  |      |        |  |       |        |  |            |      |   |  |              |                  |              |                                  |                                    |   |  |   |            |                                  |  |   |  |   |             |   |   |   |                          |  |                                     |                          |   |                                       |                          |  |  |                          |                                   |  |                          |  |  |   |  |  |  |      |         |           |                   |      |              |                  |             |       |                |            |                     |   |  |      |           |                     |        |                |              |               |                 |                    |                  |                   |                   |                  |              |   |  |         |  |                      |   |           |  |                     |   |  |  |                      |  |
| <input checked="" type="checkbox"/> CME-55   | <input type="checkbox"/> 6" CONTINUOUS FLIGHT AUGER                                       | CORE SIZE:   |  |  |  |  |   |  |  |   |  |   |  |                                     |                     |   |   |         |  |                      |   |                                  |  |   |   |   |                  |                                  |  |   |  |   |              |   |   |   |                                |  |                                     |                          |   |                                       |                          |  |  |                          |                                   |          |                              |                       |            |                    |                      |  |              |          |  |            |  |  |  |  |  |  |                        |                   |                   |                  |                  |                  |                  |                  |                  |                  |                  |                  |                |                 |            |    |                            |   |   |                  |                |                                      |                   |                   |                   |                   |                   |                   |  |  |  |  |             |   |   |   |   |      |      |       |       |       |  |  |  |  |  |  |                                |                               |           |                                 |             |              |  |  |  |  |  |  |   |                      |  |  |                         |                   |  |  |  |              |  |  |  |              |      |             |  |  |  |  |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                   |                            |  |  |   |  |  |     |   |  |  |  |                                     |  |  |  |                                   |   |    |    |    |     |     |  |      |      |      |      |       |       |                 |  |  |  |  |  |  |               |  |  |  |  |  |  |              |  |  |  |  |  |  |                       |  |  |  |  |  |  |                   |  |  |  |  |  |  |            |  |  |  |  |  |  |            |  |  |  |  |  |  |            |     |    |     |      |      |       |    |  |  |  |  |  |  |     |    |   |  |  |  |  |                                      |  |  |  |  |                            |                                      |                   |                      |   |                    |             |   |                                       |               |                                    |                      |             |  |   |  |                    |               |                       |                        |                   |                  |            |                   |                  |                               |                  |                      |               |                |  |                        |                          |  |                                |                   |  |                |                   |  |          |                   |  |                       |                 |  |                              |                       |  |                    |                      |  |              |          |  |   |  |             |                       |              |  |     |          |  |      |        |  |       |        |  |            |      |   |  |              |                  |              |                                  |                                    |   |  |   |            |                                  |  |   |  |   |             |   |   |   |                          |  |                                     |                          |   |                                       |                          |  |  |                          |                                   |  |                          |  |  |   |  |  |  |      |         |           |                   |      |              |                  |             |       |                |            |                     |   |  |      |           |                     |        |                |              |               |                 |                    |                  |                   |                   |                  |              |   |  |         |  |                      |   |           |  |                     |   |  |  |                      |  |
| <input type="checkbox"/> CME-550   | <input checked="" type="checkbox"/> 8" HOLLOW AUGERS                                      | <input type="checkbox"/> -B <input type="checkbox"/> -H <input type="checkbox"/> -N  |  |  |  |  |   |  |  |   |  |   |  |                                     |                     |   |   |         |  |                      |   |                                  |  |   |   |   |                  |                                  |  |   |  |   |              |   |   |   |                                |  |                                     |                          |   |                                       |                          |  |  |                          |                                   |          |                              |                       |            |                    |                      |  |              |          |  |            |  |  |  |  |  |  |                        |                   |                   |                  |                  |                  |                  |                  |                  |                  |                  |                  |                |                 |            |    |                            |   |   |                  |                |                                      |                   |                   |                   |                   |                   |                   |  |  |  |  |             |   |   |   |   |      |      |       |       |       |  |  |  |  |  |  |                                |                               |           |                                 |             |              |  |  |  |  |  |  |   |                      |  |  |                         |                   |  |  |  |              |  |  |  |              |      |             |  |  |  |  |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                   |                            |  |  |   |  |  |     |   |  |  |  |                                     |  |  |  |                                   |   |    |    |    |     |     |  |      |      |      |      |       |       |                 |  |  |  |  |  |  |               |  |  |  |  |  |  |              |  |  |  |  |  |  |                       |  |  |  |  |  |  |                   |  |  |  |  |  |  |            |  |  |  |  |  |  |            |  |  |  |  |  |  |            |     |    |     |      |      |       |    |  |  |  |  |  |  |     |    |   |  |  |  |  |                                      |  |  |  |  |                            |                                      |                   |                      |   |                    |             |   |                                       |               |                                    |                      |             |  |   |  |                    |               |                       |                        |                   |                  |            |                   |                  |                               |                  |                      |               |                |  |                        |                          |  |                                |                   |  |                |                   |  |          |                   |  |                       |                 |  |                              |                       |  |                    |                      |  |              |          |  |   |  |             |                       |              |  |     |          |  |      |        |  |       |        |  |            |      |   |  |              |                  |              |                                  |                                    |   |  |   |            |                                  |  |   |  |   |             |   |   |   |                          |  |                                     |                          |   |                                       |                          |  |  |                          |                                   |  |                          |  |  |   |  |  |  |      |         |           |                   |      |              |                  |             |       |                |            |                     |   |  |      |           |                     |        |                |              |               |                 |                    |                  |                   |                   |                  |              |   |  |         |  |                      |   |           |  |                     |   |  |  |                      |  |
| <input type="checkbox"/> VANE SHEAR TEST   | <input type="checkbox"/> HARD FACED FINGER BITS   | HAND TOOLS:  |  |  |  |  |   |  |  |   |  |   |  |                                     |                     |   |   |         |  |                      |   |                                  |  |   |   |   |                  |                                  |  |   |  |   |              |   |   |   |                                |  |                                     |                          |   |                                       |                          |  |  |                          |                                   |          |                              |                       |            |                    |                      |  |              |          |  |            |  |  |  |  |  |  |                        |                   |                   |                  |                  |                  |                  |                  |                  |                  |                  |                  |                |                 |            |    |                            |   |   |                  |                |                                      |                   |                   |                   |                   |                   |                   |  |  |  |  |             |   |   |   |   |      |      |       |       |       |  |  |  |  |  |  |                                |                               |           |                                 |             |              |  |  |  |  |  |  |   |                      |  |  |                         |                   |  |  |  |              |  |  |  |              |      |             |  |  |  |  |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                   |                            |  |  |   |  |  |     |   |  |  |  |                                     |  |  |  |                                   |   |    |    |    |     |     |  |      |      |      |      |       |       |                 |  |  |  |  |  |  |               |  |  |  |  |  |  |              |  |  |  |  |  |  |                       |  |  |  |  |  |  |                   |  |  |  |  |  |  |            |  |  |  |  |  |  |            |  |  |  |  |  |  |            |     |    |     |      |      |       |    |  |  |  |  |  |  |     |    |   |  |  |  |  |                                      |  |  |  |  |                            |                                      |                   |                      |   |                    |             |   |                                       |               |                                    |                      |             |  |   |  |                    |               |                       |                        |                   |                  |            |                   |                  |                               |                  |                      |               |                |  |                        |                          |  |                                |                   |  |                |                   |  |          |                   |  |                       |                 |  |                              |                       |  |                    |                      |  |              |          |  |   |  |             |                       |              |  |     |          |  |      |        |  |       |        |  |            |      |   |  |              |                  |              |                                  |                                    |   |  |   |            |                                  |  |   |  |   |             |   |   |   |                          |  |                                     |                          |   |                                       |                          |  |  |                          |                                   |  |                          |  |  |   |  |  |  |      |         |           |                   |      |              |                  |             |       |                |            |                     |   |  |      |           |                     |        |                |              |               |                 |                    |                  |                   |                   |                  |              |   |  |         |  |                      |   |           |  |                     |   |  |  |                      |  |
| <input type="checkbox"/> PORTABLE HOIST  | <input type="checkbox"/> TUNG-CARBIDE INSERTS   | <input type="checkbox"/> POST HOLE DIGGER  |  |  |  |  |   |  |  |   |  |   |  |                                     |                     |   |   |         |  |                      |   |                                  |  |   |   |   |                  |                                  |  |   |  |   |              |   |   |   |                                |  |                                     |                          |   |                                       |                          |  |  |                          |                                   |          |                              |                       |            |                    |                      |  |              |          |  |            |  |  |  |  |  |  |                        |                   |                   |                  |                  |                  |                  |                  |                  |                  |                  |                  |                |                 |            |    |                            |   |   |                  |                |                                      |                   |                   |                   |                   |                   |                   |  |  |  |  |             |   |   |   |   |      |      |       |       |       |  |  |  |  |  |  |                                |                               |           |                                 |             |              |  |  |  |  |  |  |   |                      |  |  |                         |                   |  |  |  |              |  |  |  |              |      |             |  |  |  |  |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                   |                            |  |  |   |  |  |     |   |  |  |  |                                     |  |  |  |                                   |   |    |    |    |     |     |  |      |      |      |      |       |       |                 |  |  |  |  |  |  |               |  |  |  |  |  |  |              |  |  |  |  |  |  |                       |  |  |  |  |  |  |                   |  |  |  |  |  |  |            |  |  |  |  |  |  |            |  |  |  |  |  |  |            |     |    |     |      |      |       |    |  |  |  |  |  |  |     |    |   |  |  |  |  |                                      |  |  |  |  |                            |                                      |                   |                      |   |                    |             |   |                                       |               |                                    |                      |             |  |   |  |                    |               |                       |                        |                   |                  |            |                   |                  |                               |                  |                      |               |                |  |                        |                          |  |                                |                   |  |                |                   |  |          |                   |  |                       |                 |  |                              |                       |  |                    |                      |  |              |          |  |   |  |             |                       |              |  |     |          |  |      |        |  |       |        |  |            |      |   |  |              |                  |              |                                  |                                    |   |  |   |            |                                  |  |   |  |   |             |   |   |   |                          |  |                                     |                          |   |                                       |                          |  |  |                          |                                   |  |                          |  |  |   |  |  |  |      |         |           |                   |      |              |                  |             |       |                |            |                     |   |  |      |           |                     |        |                |              |               |                 |                    |                  |                   |                   |                  |              |   |  |         |  |                      |   |           |  |                     |   |  |  |                      |  |
| <input type="checkbox"/>   | <input type="checkbox"/> CASING <input type="checkbox"/> W/ ADVANCER                      | <input type="checkbox"/> HAND AUGER  |  |  |  |  |   |  |  |   |  |   |  |                                     |                     |   |   |         |  |                      |   |                                  |  |   |   |   |                  |                                  |  |   |  |   |              |   |   |   |                                |  |                                     |                          |   |                                       |                          |  |  |                          |                                   |          |                              |                       |            |                    |                      |  |              |          |  |            |  |  |  |  |  |  |                        |                   |                   |                  |                  |                  |                  |                  |                  |                  |                  |                  |                |                 |            |    |                            |   |   |                  |                |                                      |                   |                   |                   |                   |                   |                   |  |  |  |  |             |   |   |   |   |      |      |       |       |       |  |  |  |  |  |  |                                |                               |           |                                 |             |              |  |  |  |  |  |  |   |                      |  |  |                         |                   |  |  |  |              |  |  |  |              |      |             |  |  |  |  |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                   |                            |  |  |   |  |  |     |   |  |  |  |                                     |  |  |  |                                   |   |    |    |    |     |     |  |      |      |      |      |       |       |                 |  |  |  |  |  |  |               |  |  |  |  |  |  |              |  |  |  |  |  |  |                       |  |  |  |  |  |  |                   |  |  |  |  |  |  |            |  |  |  |  |  |  |            |  |  |  |  |  |  |            |     |    |     |      |      |       |    |  |  |  |  |  |  |     |    |   |  |  |  |  |                                      |  |  |  |  |                            |                                      |                   |                      |   |                    |             |   |                                       |               |                                    |                      |             |  |   |  |                    |               |                       |                        |                   |                  |            |                   |                  |                               |                  |                      |               |                |  |                        |                          |  |                                |                   |  |                |                   |  |          |                   |  |                       |                 |  |                              |                       |  |                    |                      |  |              |          |  |   |  |             |                       |              |  |     |          |  |      |        |  |       |        |  |            |      |   |  |              |                  |              |                                  |                                    |   |  |   |            |                                  |  |   |  |   |             |   |   |   |                          |  |                                     |                          |   |                                       |                          |  |  |                          |                                   |  |                          |  |  |   |  |  |  |      |         |           |                   |      |              |                  |             |       |                |            |                     |   |  |      |           |                     |        |                |              |               |                 |                    |                  |                   |                   |                  |              |   |  |         |  |                      |   |           |  |                     |   |  |  |                      |  |
| <input type="checkbox"/>   | <input type="checkbox"/> TRICONE _____ *STEEL TEETH                                       | <input type="checkbox"/> SOUNDING ROD  |  |  |  |  |   |  |  |   |  |   |  |                                     |                     |   |   |         |  |                      |   |                                  |  |   |   |   |                  |                                  |  |   |  |   |              |   |   |   |                                |  |                                     |                          |   |                                       |                          |  |  |                          |                                   |          |                              |                       |            |                    |                      |  |              |          |  |            |  |  |  |  |  |  |                        |                   |                   |                  |                  |                  |                  |                  |                  |                  |                  |                  |                |                 |            |    |                            |   |   |                  |                |                                      |                   |                   |                   |                   |                   |                   |  |  |  |  |             |   |   |   |   |      |      |       |       |       |  |  |  |  |  |  |                                |                               |           |                                 |             |              |  |  |  |  |  |  |   |                      |  |  |                         |                   |  |  |  |              |  |  |  |              |      |             |  |  |  |  |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                   |                            |  |  |   |  |  |     |   |  |  |  |                                     |  |  |  |                                   |   |    |    |    |     |     |  |      |      |      |      |       |       |                 |  |  |  |  |  |  |               |  |  |  |  |  |  |              |  |  |  |  |  |  |                       |  |  |  |  |  |  |                   |  |  |  |  |  |  |            |  |  |  |  |  |  |            |  |  |  |  |  |  |            |     |    |     |      |      |       |    |  |  |  |  |  |  |     |    |   |  |  |  |  |                                      |  |  |  |  |                            |                                      |                   |                      |   |                    |             |   |                                       |               |                                    |                      |             |  |   |  |                    |               |                       |                        |                   |                  |            |                   |                  |                               |                  |                      |               |                |  |                        |                          |  |                                |                   |  |                |                   |  |          |                   |  |                       |                 |  |                              |                       |  |                    |                      |  |              |          |  |   |  |             |                       |              |  |     |          |  |      |        |  |       |        |  |            |      |   |  |              |                  |              |                                  |                                    |   |  |   |            |                                  |  |   |  |   |             |   |   |   |                          |  |                                     |                          |   |                                       |                          |  |  |                          |                                   |  |                          |  |  |   |  |  |  |      |         |           |                   |      |              |                  |             |       |                |            |                     |   |  |      |           |                     |        |                |              |               |                 |                    |                  |                   |                   |                  |              |   |  |         |  |                      |   |           |  |                     |   |  |  |                      |  |
| <input type="checkbox"/>   | <input type="checkbox"/> TRICONE _____ *TUNG-CARB.  | <input type="checkbox"/> VANE SHEAR TEST   |  |  |  |  |   |  |  |   |  |   |  |                                     |                     |   |   |         |  |                      |   |                                  |  |   |   |   |                  |                                  |  |   |  |   |              |   |   |   |                                |  |                                     |                          |   |                                       |                          |  |  |                          |                                   |          |                              |                       |            |                    |                      |  |              |          |  |            |  |  |  |  |  |  |                        |                   |                   |                  |                  |                  |                  |                  |                  |                  |                  |                  |                |                 |            |    |                            |   |   |                  |                |                                      |                   |                   |                   |                   |                   |                   |  |  |  |  |             |   |   |   |   |      |      |       |       |       |  |  |  |  |  |  |                                |                               |           |                                 |             |              |  |  |  |  |  |  |   |                      |  |  |                         |                   |  |  |  |              |  |  |  |              |      |             |  |  |  |  |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                   |                            |  |  |   |  |  |     |   |  |  |  |                                     |  |  |  |                                   |   |    |    |    |     |     |  |      |      |      |      |       |       |                 |  |  |  |  |  |  |               |  |  |  |  |  |  |              |  |  |  |  |  |  |                       |  |  |  |  |  |  |                   |  |  |  |  |  |  |            |  |  |  |  |  |  |            |  |  |  |  |  |  |            |     |    |     |      |      |       |    |  |  |  |  |  |  |     |    |   |  |  |  |  |                                      |  |  |  |  |                            |                                      |                   |                      |   |                    |             |   |                                       |               |                                    |                      |             |  |   |  |                    |               |                       |                        |                   |                  |            |                   |                  |                               |                  |                      |               |                |  |                        |                          |  |                                |                   |  |                |                   |  |          |                   |  |                       |                 |  |                              |                       |  |                    |                      |  |              |          |  |   |  |             |                       |              |  |     |          |  |      |        |  |       |        |  |            |      |   |  |              |                  |              |                                  |                                    |   |  |   |            |                                  |  |   |  |   |             |   |   |   |                          |  |                                     |                          |   |                                       |                          |  |  |                          |                                   |  |                          |  |  |   |  |  |  |      |         |           |                   |      |              |                  |             |       |                |            |                     |   |  |      |           |                     |        |                |              |               |                 |                    |                  |                   |                   |                  |              |   |  |         |  |                      |   |           |  |                     |   |  |  |                      |  |
| <input type="checkbox"/>   | <input type="checkbox"/> CORE BIT   |  |  |  |  |  |   |  |  |   |  |   |  |                                     |                     |   |   |         |  |                      |   |                                  |  |   |   |   |                  |                                  |  |   |  |   |              |   |   |   |                                |  |                                     |                          |   |                                       |                          |  |  |                          |                                   |          |                              |                       |            |                    |                      |  |              |          |  |            |  |  |  |  |  |  |                        |                   |                   |                  |                  |                  |                  |                  |                  |                  |                  |                  |                |                 |            |    |                            |   |   |                  |                |                                      |                   |                   |                   |                   |                   |                   |  |  |  |  |             |   |   |   |   |      |      |       |       |       |  |  |  |  |  |  |                                |                               |           |                                 |             |              |  |  |  |  |  |  |   |                      |  |  |                         |                   |  |  |  |              |  |  |  |              |      |             |  |  |  |  |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                   |                            |  |  |   |  |  |     |   |  |  |  |                                     |  |  |  |                                   |   |    |    |    |     |     |  |      |      |      |      |       |       |                 |  |  |  |  |  |  |               |  |  |  |  |  |  |              |  |  |  |  |  |  |                       |  |  |  |  |  |  |                   |  |  |  |  |  |  |            |  |  |  |  |  |  |            |  |  |  |  |  |  |            |     |    |     |      |      |       |    |  |  |  |  |  |  |     |    |   |  |  |  |  |                                      |  |  |  |  |                            |                                      |                   |                      |   |                    |             |   |                                       |               |                                    |                      |             |  |   |  |                    |               |                       |                        |                   |                  |            |                   |                  |                               |                  |                      |               |                |  |                        |                          |  |                                |                   |  |                |                   |  |          |                   |  |                       |                 |  |                              |                       |  |                    |                      |  |              |          |  |   |  |             |                       |              |  |     |          |  |      |        |  |       |        |  |            |      |   |  |              |                  |              |                                  |                                    |   |  |   |            |                                  |  |   |  |   |             |   |   |   |                          |  |                                     |                          |   |                                       |                          |  |  |                          |                                   |  |                          |  |  |   |  |  |  |      |         |           |                   |      |              |                  |             |       |                |            |                     |   |  |      |           |                     |        |                |              |               |                 |                    |                  |                   |                   |                  |              |   |  |         |  |                      |   |           |  |                     |   |  |  |                      |  |
| <input type="checkbox"/>   |   |  |  |  |  |  |   |  |  |   |  |   |  |                                     |                     |   |   |         |  |                      |   |                                  |  |   |   |   |                  |                                  |  |   |  |   |              |   |   |   |                                |  |                                     |                          |   |                                       |                          |  |  |                          |                                   |          |                              |                       |            |                    |                      |  |              |          |  |            |  |  |  |  |  |  |                        |                   |                   |                  |                  |                  |                  |                  |                  |                  |                  |                  |                |                 |            |    |                            |   |   |                  |                |                                      |                   |                   |                   |                   |                   |                   |  |  |  |  |             |   |   |   |   |      |      |       |       |       |  |  |  |  |  |  |                                |                               |           |                                 |             |              |  |  |  |  |  |  |   |                      |  |  |                         |                   |  |  |  |              |  |  |  |              |      |             |  |  |  |  |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                   |                            |  |  |   |  |  |     |   |  |  |  |                                     |  |  |  |                                   |   |    |    |    |     |     |  |      |      |      |      |       |       |                 |  |  |  |  |  |  |               |  |  |  |  |  |  |              |  |  |  |  |  |  |                       |  |  |  |  |  |  |                   |  |  |  |  |  |  |            |  |  |  |  |  |  |            |  |  |  |  |  |  |            |     |    |     |      |      |       |    |  |  |  |  |  |  |     |    |   |  |  |  |  |                                      |  |  |  |  |                            |                                      |                   |                      |   |                    |             |   |                                       |               |                                    |                      |             |  |   |  |                    |               |                       |                        |                   |                  |            |                   |                  |                               |                  |                      |               |                |  |                        |                          |  |                                |                   |  |                |                   |  |          |                   |  |                       |                 |  |                              |                       |  |                    |                      |  |              |          |  |   |  |             |                       |              |  |     |          |  |      |        |  |       |        |  |            |      |   |  |              |                  |              |                                  |                                    |   |  |   |            |                                  |  |   |  |   |             |   |   |   |                          |  |                                     |                          |   |                                       |                          |  |  |                          |                                   |  |                          |  |  |   |  |  |  |      |         |           |                   |      |              |                  |             |       |                |            |                     |   |  |      |           |                     |        |                |              |               |                 |                    |                  |                   |                   |                  |              |   |  |         |  |                      |   |           |  |                     |   |  |  |                      |  |
| <p><b>COLOR</b></p> <p>DESCRIPTIONS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YELLOW-BROWN, BLUE-GRAY). MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE.</p>  |   | <p><b>FRACTURE SPACING</b></p> <table border="1"> <thead> <tr> <th>TERM</th> <th>SPACING</th> </tr> </thead> <tbody> <tr> <td>VERY WIDE</td> <td>MORE THAN 10 FEET</td> </tr> <tr> <td>WIDE</td> <td>3 TO 10 FEET</td> </tr> <tr> <td>MODERATELY CLOSE</td> <td>1 TO 3 FEET</td> </tr> <tr> <td>CLOSE</td> <td>0.16 TO 1 FOOT</td> </tr> <tr> <td>VERY CLOSE</td> <td>LESS THAN 0.16 FEET</td> </tr> </tbody> </table> |  | TERM   | SPACING  | VERY WIDE  | MORE THAN 10 FEET   | WIDE   | 3 TO 10 FEET                             | MODERATELY CLOSE                                      | 1 TO 3 FEET  | CLOSE   | 0.16 TO 1 FOOT   | VERY CLOSE                          | LESS THAN 0.16 FEET |   |   |         |  |                      |   |                                  |  |   |   |   |                  |                                  |  |   |  |   |              |   |   |   |                                |  |                                     |                          |   |                                       |                          |  |  |                          |                                   |          |                              |                       |            |                    |                      |  |              |          |  |            |  |  |  |  |  |  |                        |                   |                   |                  |                  |                  |                  |                  |                  |                  |                  |                  |                |                 |            |    |                            |   |   |                  |                |                                      |                   |                   |                   |                   |                   |                   |  |  |  |  |             |   |   |   |   |      |      |       |       |       |  |  |  |  |  |  |                                |                               |           |                                 |             |              |  |  |  |  |  |  |   |                      |  |  |                         |                   |  |  |  |              |  |  |  |              |      |             |  |  |  |  |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                   |                            |  |  |   |  |  |     |   |  |  |  |                                     |  |  |  |                                   |   |    |    |    |     |     |  |      |      |      |      |       |       |                 |  |  |  |  |  |  |               |  |  |  |  |  |  |              |  |  |  |  |  |  |                       |  |  |  |  |  |  |                   |  |  |  |  |  |  |            |  |  |  |  |  |  |            |  |  |  |  |  |  |            |     |    |     |      |      |       |    |  |  |  |  |  |  |     |    |   |  |  |  |  |                                      |  |  |  |  |                            |                                      |                   |                      |   |                    |             |   |                                       |               |                                    |                      |             |  |   |  |                    |               |                       |                        |                   |                  |            |                   |                  |                               |                  |                      |               |                |  |                        |                          |  |                                |                   |  |                |                   |  |          |                   |  |                       |                 |  |                              |                       |  |                    |                      |  |              |          |  |   |  |             |                       |              |  |     |          |  |      |        |  |       |        |  |            |      |   |  |              |                  |              |                                  |                                    |   |  |   |            |                                  |  |   |  |   |             |   |   |   |                          |  |                                     |                          |   |                                       |                          |  |  |                          |                                   |  |                          |  |  |   |  |  |  |      |         |           |                   |      |              |                  |             |       |                |            |                     |   |  |      |           |                     |        |                |              |               |                 |                    |                  |                   |                   |                  |              |   |  |         |  |                      |   |           |  |                     |   |  |  |                      |  |
| TERM   | SPACING   |  |  |  |  |  |   |  |  |   |  |   |  |                                     |                     |   |   |         |  |                      |   |                                  |  |   |   |   |                  |                                  |  |   |  |   |              |   |   |   |                                |  |                                     |                          |   |                                       |                          |  |  |                          |                                   |          |                              |                       |            |                    |                      |  |              |          |  |            |  |  |  |  |  |  |                        |                   |                   |                  |                  |                  |                  |                  |                  |                  |                  |                  |                |                 |            |    |                            |   |   |                  |                |                                      |                   |                   |                   |                   |                   |                   |  |  |  |  |             |   |   |   |   |      |      |       |       |       |  |  |  |  |  |  |                                |                               |           |                                 |             |              |  |  |  |  |  |  |   |                      |  |  |                         |                   |  |  |  |              |  |  |  |              |      |             |  |  |  |  |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                   |                            |  |  |   |  |  |     |   |  |  |  |                                     |  |  |  |                                   |   |    |    |    |     |     |  |      |      |      |      |       |       |                 |  |  |  |  |  |  |               |  |  |  |  |  |  |              |  |  |  |  |  |  |                       |  |  |  |  |  |  |                   |  |  |  |  |  |  |            |  |  |  |  |  |  |            |  |  |  |  |  |  |            |     |    |     |      |      |       |    |  |  |  |  |  |  |     |    |   |  |  |  |  |                                      |  |  |  |  |                            |                                      |                   |                      |   |                    |             |   |                                       |               |                                    |                      |             |  |   |  |                    |               |                       |                        |                   |                  |            |                   |                  |                               |                  |                      |               |                |  |                        |                          |  |                                |                   |  |                |                   |  |          |                   |  |                       |                 |  |                              |                       |  |                    |                      |  |              |          |  |   |  |             |                       |              |  |     |          |  |      |        |  |       |        |  |            |      |   |  |              |                  |              |                                  |                                    |   |  |   |            |                                  |  |   |  |   |             |   |   |   |                          |  |                                     |                          |   |                                       |                          |  |  |                          |                                   |  |                          |  |  |   |  |  |  |      |         |           |                   |      |              |                  |             |       |                |            |                     |   |  |      |           |                     |        |                |              |               |                 |                    |                  |                   |                   |                  |              |   |  |         |  |                      |   |           |  |                     |   |  |  |                      |  |
| VERY WIDE  | MORE THAN 10 FEET   |  |  |  |  |  |   |  |  |   |  |   |  |                                     |                     |   |   |         |  |                      |   |                                  |  |   |   |   |                  |                                  |  |   |  |   |              |   |   |   |                                |  |                                     |                          |   |                                       |                          |  |  |                          |                                   |          |                              |                       |            |                    |                      |  |              |          |  |            |  |  |  |  |  |  |                        |                   |                   |                  |                  |                  |                  |                  |                  |                  |                  |                  |                |                 |            |    |                            |   |   |                  |                |                                      |                   |                   |                   |                   |                   |                   |  |  |  |  |             |   |   |   |   |      |      |       |       |       |  |  |  |  |  |  |                                |                               |           |                                 |             |              |  |  |  |  |  |  |   |                      |  |  |                         |                   |  |  |  |              |  |  |  |              |      |             |  |  |  |  |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                   |                            |  |  |   |  |  |     |   |  |  |  |                                     |  |  |  |                                   |   |    |    |    |     |     |  |      |      |      |      |       |       |                 |  |  |  |  |  |  |               |  |  |  |  |  |  |              |  |  |  |  |  |  |                       |  |  |  |  |  |  |                   |  |  |  |  |  |  |            |  |  |  |  |  |  |            |  |  |  |  |  |  |            |     |    |     |      |      |       |    |  |  |  |  |  |  |     |    |   |  |  |  |  |                                      |  |  |  |  |                            |                                      |                   |                      |   |                    |             |   |                                       |               |                                    |                      |             |  |   |  |                    |               |                       |                        |                   |                  |            |                   |                  |                               |                  |                      |               |                |  |                        |                          |  |                                |                   |  |                |                   |  |          |                   |  |                       |                 |  |                              |                       |  |                    |                      |  |              |          |  |   |  |             |                       |              |  |     |          |  |      |        |  |       |        |  |            |      |   |  |              |                  |              |                                  |                                    |   |  |   |            |                                  |  |   |  |   |             |   |   |   |                          |  |                                     |                          |   |                                       |                          |  |  |                          |                                   |  |                          |  |  |   |  |  |  |      |         |           |                   |      |              |                  |             |       |                |            |                     |   |  |      |           |                     |        |                |              |               |                 |                    |                  |                   |                   |                  |              |   |  |         |  |                      |   |           |  |                     |   |  |  |                      |  |
| WIDE   | 3 TO 10 FEET  |  |  |  |  |  |   |  |  |   |  |   |  |                                     |                     |   |   |         |  |                      |   |                                  |  |   |   |   |                  |                                  |  |   |  |   |              |   |   |   |                                |  |                                     |                          |   |                                       |                          |  |  |                          |                                   |          |                              |                       |            |                    |                      |  |              |          |  |            |  |  |  |  |  |  |                        |                   |                   |                  |                  |                  |                  |                  |                  |                  |                  |                  |                |                 |            |    |                            |   |   |                  |                |                                      |                   |                   |                   |                   |                   |                   |  |  |  |  |             |   |   |   |   |      |      |       |       |       |  |  |  |  |  |  |                                |                               |           |                                 |             |              |  |  |  |  |  |  |   |                      |  |  |                         |                   |  |  |  |              |  |  |  |              |      |             |  |  |  |  |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                   |                            |  |  |   |  |  |     |   |  |  |  |                                     |  |  |  |                                   |   |    |    |    |     |     |  |      |      |      |      |       |       |                 |  |  |  |  |  |  |               |  |  |  |  |  |  |              |  |  |  |  |  |  |                       |  |  |  |  |  |  |                   |  |  |  |  |  |  |            |  |  |  |  |  |  |            |  |  |  |  |  |  |            |     |    |     |      |      |       |    |  |  |  |  |  |  |     |    |   |  |  |  |  |                                      |  |  |  |  |                            |                                      |                   |                      |   |                    |             |   |                                       |               |                                    |                      |             |  |   |  |                    |               |                       |                        |                   |                  |            |                   |                  |                               |                  |                      |               |                |  |                        |                          |  |                                |                   |  |                |                   |  |          |                   |  |                       |                 |  |                              |                       |  |                    |                      |  |              |          |  |   |  |             |                       |              |  |     |          |  |      |        |  |       |        |  |            |      |   |  |              |                  |              |                                  |                                    |   |  |   |            |                                  |  |   |  |   |             |   |   |   |                          |  |                                     |                          |   |                                       |                          |  |  |                          |                                   |  |                          |  |  |   |  |  |  |      |         |           |                   |      |              |                  |             |       |                |            |                     |   |  |      |           |                     |        |                |              |               |                 |                    |                  |                   |                   |                  |              |   |  |         |  |                      |   |           |  |                     |   |  |  |                      |  |
| MODERATELY CLOSE   | 1 TO 3 FEET   |  |  |  |  |  |   |  |  |   |  |   |  |                                     |                     |   |   |         |  |                      |   |                                  |  |   |   |   |                  |                                  |  |   |  |   |              |   |   |   |                                |  |                                     |                          |   |                                       |                          |  |  |                          |                                   |          |                              |                       |            |                    |                      |  |              |          |  |            |  |  |  |  |  |  |                        |                   |                   |                  |                  |                  |                  |                  |                  |                  |                  |                  |                |                 |            |    |                            |   |   |                  |                |                                      |                   |                   |                   |                   |                   |                   |  |  |  |  |             |   |   |   |   |      |      |       |       |       |  |  |  |  |  |  |                                |                               |           |                                 |             |              |  |  |  |  |  |  |   |                      |  |  |                         |                   |  |  |  |              |  |  |  |              |      |             |  |  |  |  |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                   |                            |  |  |   |  |  |     |   |  |  |  |                                     |  |  |  |                                   |   |    |    |    |     |     |  |      |      |      |      |       |       |                 |  |  |  |  |  |  |               |  |  |  |  |  |  |              |  |  |  |  |  |  |                       |  |  |  |  |  |  |                   |  |  |  |  |  |  |            |  |  |  |  |  |  |            |  |  |  |  |  |  |            |     |    |     |      |      |       |    |  |  |  |  |  |  |     |    |   |  |  |  |  |                                      |  |  |  |  |                            |                                      |                   |                      |   |                    |             |   |                                       |               |                                    |                      |             |  |   |  |                    |               |                       |                        |                   |                  |            |                   |                  |                               |                  |                      |               |                |  |                        |                          |  |                                |                   |  |                |                   |  |          |                   |  |                       |                 |  |                              |                       |  |                    |                      |  |              |          |  |   |  |             |                       |              |  |     |          |  |      |        |  |       |        |  |            |      |   |  |              |                  |              |                                  |                                    |   |  |   |            |                                  |  |   |  |   |             |   |   |   |                          |  |                                     |                          |   |                                       |                          |  |  |                          |                                   |  |                          |  |  |   |  |  |  |      |         |           |                   |      |              |                  |             |       |                |            |                     |   |  |      |           |                     |        |                |              |               |                 |                    |                  |                   |                   |                  |              |   |  |         |  |                      |   |           |  |                     |   |  |  |                      |  |
| CLOSE  | 0.16 TO 1 FOOT  |  |  |  |  |  |   |  |  |   |  |   |  |                                     |                     |   |   |         |  |                      |   |                                  |  |   |   |   |                  |                                  |  |   |  |   |              |   |   |   |                                |  |                                     |                          |   |                                       |                          |  |  |                          |                                   |          |                              |                       |            |                    |                      |  |              |          |  |            |  |  |  |  |  |  |                        |                   |                   |                  |                  |                  |                  |                  |                  |                  |                  |                  |                |                 |            |    |                            |   |   |                  |                |                                      |                   |                   |                   |                   |                   |                   |  |  |  |  |             |   |   |   |   |      |      |       |       |       |  |  |  |  |  |  |                                |                               |           |                                 |             |              |  |  |  |  |  |  |   |                      |  |  |                         |                   |  |  |  |              |  |  |  |              |      |             |  |  |  |  |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                   |                            |  |  |   |  |  |     |   |  |  |  |                                     |  |  |  |                                   |   |    |    |    |     |     |  |      |      |      |      |       |       |                 |  |  |  |  |  |  |               |  |  |  |  |  |  |              |  |  |  |  |  |  |                       |  |  |  |  |  |  |                   |  |  |  |  |  |  |            |  |  |  |  |  |  |            |  |  |  |  |  |  |            |     |    |     |      |      |       |    |  |  |  |  |  |  |     |    |   |  |  |  |  |                                      |  |  |  |  |                            |                                      |                   |                      |   |                    |             |   |                                       |               |                                    |                      |             |  |   |  |                    |               |                       |                        |                   |                  |            |                   |                  |                               |                  |                      |               |                |  |                        |                          |  |                                |                   |  |                |                   |  |          |                   |  |                       |                 |  |                              |                       |  |                    |                      |  |              |          |  |   |  |             |                       |              |  |     |          |  |      |        |  |       |        |  |            |      |   |  |              |                  |              |                                  |                                    |   |  |   |            |                                  |  |   |  |   |             |   |   |   |                          |  |                                     |                          |   |                                       |                          |  |  |                          |                                   |  |                          |  |  |   |  |  |  |      |         |           |                   |      |              |                  |             |       |                |            |                     |   |  |      |           |                     |        |                |              |               |                 |                    |                  |                   |                   |                  |              |   |  |         |  |                      |   |           |  |                     |   |  |  |                      |  |
| VERY CLOSE   | LESS THAN 0.16 FEET   |  |  |  |  |  |   |  |  |   |  |   |  |                                     |                     |   |   |         |  |                      |   |                                  |  |   |   |   |                  |                                  |  |   |  |   |              |   |   |   |                                |  |                                     |                          |   |                                       |                          |  |  |                          |                                   |          |                              |                       |            |                    |                      |  |              |          |  |            |  |  |  |  |  |  |                        |                   |                   |                  |                  |                  |                  |                  |                  |                  |                  |                  |                |                 |            |    |                            |   |   |                  |                |                                      |                   |                   |                   |                   |                   |                   |  |  |  |  |             |   |   |   |   |      |      |       |       |       |  |  |  |  |  |  |                                |                               |           |                                 |             |              |  |  |  |  |  |  |   |                      |  |  |                         |                   |  |  |  |              |  |  |  |              |      |             |  |  |  |  |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                   |                            |  |  |   |  |  |     |   |  |  |  |                                     |  |  |  |                                   |   |    |    |    |     |     |  |      |      |      |      |       |       |                 |  |  |  |  |  |  |               |  |  |  |  |  |  |              |  |  |  |  |  |  |                       |  |  |  |  |  |  |                   |  |  |  |  |  |  |            |  |  |  |  |  |  |            |  |  |  |  |  |  |            |     |    |     |      |      |       |    |  |  |  |  |  |  |     |    |   |  |  |  |  |                                      |  |  |  |  |                            |                                      |                   |                      |   |                    |             |   |                                       |               |                                    |                      |             |  |   |  |                    |               |                       |                        |                   |                  |            |                   |                  |                               |                  |                      |               |                |  |                        |                          |  |                                |                   |  |                |                   |  |          |                   |  |                       |                 |  |                              |                       |  |                    |                      |  |              |          |  |   |  |             |                       |              |  |     |          |  |      |        |  |       |        |  |            |      |   |  |              |                  |              |                                  |                                    |   |  |   |            |                                  |  |   |  |   |             |   |   |   |                          |  |                                     |                          |   |                                       |                          |  |  |                          |                                   |  |                          |  |  |   |  |  |  |      |         |           |                   |      |              |                  |             |       |                |            |                     |   |  |      |           |                     |        |                |              |               |                 |                    |                  |                   |                   |                  |              |   |  |         |  |                      |   |           |  |                     |   |  |  |                      |  |
| <p><b>BEDDING</b></p> <table border="1"> <thead> <tr> <th>TERM</th> <th>THICKNESS</th> </tr> </thead> <tbody> <tr> <td>VERY THICKLY BEDDED</td> <td>4 FEET</td> </tr> <tr> <td>THICKLY BEDDED</td> <td>1.5 - 4 FEET</td> </tr> <tr> <td>THINLY BEDDED</td> <td>0.16 - 1.5 FEET</td> </tr> <tr> <td>VERY THINLY BEDDED</td> <td>0.03 - 0.16 FEET</td> </tr> <tr> <td>THICKLY LAMINATED</td> <td>0.008 - 0.03 FEET</td> </tr> <tr> <td>THINLY LAMINATED</td> <td>&lt; 0.008 FEET</td> </tr> </tbody> </table>  |   | TERM   | THICKNESS  | VERY THICKLY BEDDED  | 4 FEET   | THICKLY BEDDED   | 1.5 - 4 FEET  | THINLY BEDDED                                  | 0.16 - 1.5 FEET                          | VERY THINLY BEDDED                                    | 0.03 - 0.16 FEET   | THICKLY LAMINATED                                       | 0.008 - 0.03 FEET  | THINLY LAMINATED                    | < 0.008 FEET        | <p><b>INDURATION</b></p> <p>FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.</p> <table border="1"> <tbody> <tr> <td>FRIABLE</td> <td>RUBBING WITH FINGER FREES NUMEROUS GRAINS; GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE.</td> </tr> <tr> <td>MODERATELY INDURATED</td> <td>GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE; BREAKS EASILY WHEN HIT WITH HAMMER.</td> </tr> <tr> <td>INDURATED</td> <td>GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE; DIFFICULT TO BREAK WITH HAMMER.</td> </tr> <tr> <td>EXTREMELY INDURATED</td> <td>SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE; SAMPLE BREAKS ACROSS GRAINS.</td> </tr> </tbody> </table> |   | FRIABLE | RUBBING WITH FINGER FREES NUMEROUS GRAINS; GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE. | MODERATELY INDURATED | GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE; BREAKS EASILY WHEN HIT WITH HAMMER. | INDURATED                        | GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE; DIFFICULT TO BREAK WITH HAMMER. | EXTREMELY INDURATED   | SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE; SAMPLE BREAKS ACROSS GRAINS. |   |                  |                                  |  |   |  |   |              |   |   |   |                                |  |                                     |                          |   |                                       |                          |  |  |                          |                                   |          |                              |                       |            |                    |                      |  |              |          |  |            |  |  |  |  |  |  |                        |                   |                   |                  |                  |                  |                  |                  |                  |                  |                  |                  |                |                 |            |    |                            |   |   |                  |                |                                      |                   |                   |                   |                   |                   |                   |  |  |  |  |             |   |   |   |   |      |      |       |       |       |  |  |  |  |  |  |                                |                               |           |                                 |             |              |  |  |  |  |  |  |   |                      |  |  |                         |                   |  |  |  |              |  |  |  |              |      |             |  |  |  |  |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                   |                            |  |  |   |  |  |     |   |  |  |  |                                     |  |  |  |                                   |   |    |    |    |     |     |  |      |      |      |      |       |       |                 |  |  |  |  |  |  |               |  |  |  |  |  |  |              |  |  |  |  |  |  |                       |  |  |  |  |  |  |                   |  |  |  |  |  |  |            |  |  |  |  |  |  |            |  |  |  |  |  |  |            |     |    |     |      |      |       |    |  |  |  |  |  |  |     |    |   |  |  |  |  |                                      |  |  |  |  |                            |                                      |                   |                      |   |                    |             |   |                                       |               |                                    |                      |             |  |   |  |                    |               |                       |                        |                   |                  |            |                   |                  |                               |                  |                      |               |                |  |                        |                          |  |                                |                   |  |                |                   |  |          |                   |  |                       |                 |  |                              |                       |  |                    |                      |  |              |          |  |   |  |             |                       |              |  |     |          |  |      |        |  |       |        |  |            |      |   |  |              |                  |              |                                  |                                    |   |  |   |            |                                  |  |   |  |   |             |   |   |   |                          |  |                                     |                          |   |                                       |                          |  |  |                          |                                   |  |                          |  |  |   |  |  |  |      |         |           |                   |      |              |                  |             |       |                |            |                     |   |  |      |           |                     |        |                |              |               |                 |                    |                  |                   |                   |                  |              |   |  |         |  |                      |   |           |  |                     |   |  |  |                      |  |
| TERM   | THICKNESS   |  |  |  |  |  |   |  |  |   |  |   |  |                                     |                     |   |   |         |  |                      |   |                                  |  |   |   |   |                  |                                  |  |   |  |   |              |   |   |   |                                |  |                                     |                          |   |                                       |                          |  |  |                          |                                   |          |                              |                       |            |                    |                      |  |              |          |  |            |  |  |  |  |  |  |                        |                   |                   |                  |                  |                  |                  |                  |                  |                  |                  |                  |                |                 |            |    |                            |   |   |                  |                |                                      |                   |                   |                   |                   |                   |                   |  |  |  |  |             |   |   |   |   |      |      |       |       |       |  |  |  |  |  |  |                                |                               |           |                                 |             |              |  |  |  |  |  |  |   |                      |  |  |                         |                   |  |  |  |              |  |  |  |              |      |             |  |  |  |  |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                   |                            |  |  |   |  |  |     |   |  |  |  |                                     |  |  |  |                                   |   |    |    |    |     |     |  |      |      |      |      |       |       |                 |  |  |  |  |  |  |               |  |  |  |  |  |  |              |  |  |  |  |  |  |                       |  |  |  |  |  |  |                   |  |  |  |  |  |  |            |  |  |  |  |  |  |            |  |  |  |  |  |  |            |     |    |     |      |      |       |    |  |  |  |  |  |  |     |    |   |  |  |  |  |                                      |  |  |  |  |                            |                                      |                   |                      |   |                    |             |   |                                       |               |                                    |                      |             |  |   |  |                    |               |                       |                        |                   |                  |            |                   |                  |                               |                  |                      |               |                |  |                        |                          |  |                                |                   |  |                |                   |  |          |                   |  |                       |                 |  |                              |                       |  |                    |                      |  |              |          |  |   |  |             |                       |              |  |     |          |  |      |        |  |       |        |  |            |      |   |  |              |                  |              |                                  |                                    |   |  |   |            |                                  |  |   |  |   |             |   |   |   |                          |  |                                     |                          |   |                                       |                          |  |  |                          |                                   |  |                          |  |  |   |  |  |  |      |         |           |                   |      |              |                  |             |       |                |            |                     |   |  |      |           |                     |        |                |              |               |                 |                    |                  |                   |                   |                  |              |   |  |         |  |                      |   |           |  |                     |   |  |  |                      |  |
| VERY THICKLY BEDDED  | 4 FEET  |  |  |  |  |  |   |  |  |   |  |   |  |                                     |                     |   |   |         |  |                      |   |                                  |  |   |   |   |                  |                                  |  |   |  |   |              |   |   |   |                                |  |                                     |                          |   |                                       |                          |  |  |                          |                                   |          |                              |                       |            |                    |                      |  |              |          |  |            |  |  |  |  |  |  |                        |                   |                   |                  |                  |                  |                  |                  |                  |                  |                  |                  |                |                 |            |    |                            |   |   |                  |                |                                      |                   |                   |                   |                   |                   |                   |  |  |  |  |             |   |   |   |   |      |      |       |       |       |  |  |  |  |  |  |                                |                               |           |                                 |             |              |  |  |  |  |  |  |   |                      |  |  |                         |                   |  |  |  |              |  |  |  |              |      |             |  |  |  |  |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                   |                            |  |  |   |  |  |     |   |  |  |  |                                     |  |  |  |                                   |   |    |    |    |     |     |  |      |      |      |      |       |       |                 |  |  |  |  |  |  |               |  |  |  |  |  |  |              |  |  |  |  |  |  |                       |  |  |  |  |  |  |                   |  |  |  |  |  |  |            |  |  |  |  |  |  |            |  |  |  |  |  |  |            |     |    |     |      |      |       |    |  |  |  |  |  |  |     |    |   |  |  |  |  |                                      |  |  |  |  |                            |                                      |                   |                      |   |                    |             |   |                                       |               |                                    |                      |             |  |   |  |                    |               |                       |                        |                   |                  |            |                   |                  |                               |                  |                      |               |                |  |                        |                          |  |                                |                   |  |                |                   |  |          |                   |  |                       |                 |  |                              |                       |  |                    |                      |  |              |          |  |   |  |             |                       |              |  |     |          |  |      |        |  |       |        |  |            |      |   |  |              |                  |              |                                  |                                    |   |  |   |            |                                  |  |   |  |   |             |   |   |   |                          |  |                                     |                          |   |                                       |                          |  |  |                          |                                   |  |                          |  |  |   |  |  |  |      |         |           |                   |      |              |                  |             |       |                |            |                     |   |  |      |           |                     |        |                |              |               |                 |                    |                  |                   |                   |                  |              |   |  |         |  |                      |   |           |  |                     |   |  |  |                      |  |
| THICKLY BEDDED   | 1.5 - 4 FEET  |  |  |  |  |  |   |  |  |   |  |   |  |                                     |                     |   |   |         |  |                      |   |                                  |  |   |   |   |                  |                                  |  |   |  |   |              |   |   |   |                                |  |                                     |                          |   |                                       |                          |  |  |                          |                                   |          |                              |                       |            |                    |                      |  |              |          |  |            |  |  |  |  |  |  |                        |                   |                   |                  |                  |                  |                  |                  |                  |                  |                  |                  |                |                 |            |    |                            |   |   |                  |                |                                      |                   |                   |                   |                   |                   |                   |  |  |  |  |             |   |   |   |   |      |      |       |       |       |  |  |  |  |  |  |                                |                               |           |                                 |             |              |  |  |  |  |  |  |   |                      |  |  |                         |                   |  |  |  |              |  |  |  |              |      |             |  |  |  |  |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                   |                            |  |  |   |  |  |     |   |  |  |  |                                     |  |  |  |                                   |   |    |    |    |     |     |  |      |      |      |      |       |       |                 |  |  |  |  |  |  |               |  |  |  |  |  |  |              |  |  |  |  |  |  |                       |  |  |  |  |  |  |                   |  |  |  |  |  |  |            |  |  |  |  |  |  |            |  |  |  |  |  |  |            |     |    |     |      |      |       |    |  |  |  |  |  |  |     |    |   |  |  |  |  |                                      |  |  |  |  |                            |                                      |                   |                      |   |                    |             |   |                                       |               |                                    |                      |             |  |   |  |                    |               |                       |                        |                   |                  |            |                   |                  |                               |                  |                      |               |                |  |                        |                          |  |                                |                   |  |                |                   |  |          |                   |  |                       |                 |  |                              |                       |  |                    |                      |  |              |          |  |   |  |             |                       |              |  |     |          |  |      |        |  |       |        |  |            |      |   |  |              |                  |              |                                  |                                    |   |  |   |            |                                  |  |   |  |   |             |   |   |   |                          |  |                                     |                          |   |                                       |                          |  |  |                          |                                   |  |                          |  |  |   |  |  |  |      |         |           |                   |      |              |                  |             |       |                |            |                     |   |  |      |           |                     |        |                |              |               |                 |                    |                  |                   |                   |                  |              |   |  |         |  |                      |   |           |  |                     |   |  |  |                      |  |
| THINLY BEDDED  | 0.16 - 1.5 FEET   |  |  |  |  |  |   |  |  |   |  |   |  |                                     |                     |   |   |         |  |                      |   |                                  |  |   |   |   |                  |                                  |  |   |  |   |              |   |   |   |                                |  |                                     |                          |   |                                       |                          |  |  |                          |                                   |          |                              |                       |            |                    |                      |  |              |          |  |            |  |  |  |  |  |  |                        |                   |                   |                  |                  |                  |                  |                  |                  |                  |                  |                  |                |                 |            |    |                            |   |   |                  |                |                                      |                   |                   |                   |                   |                   |                   |  |  |  |  |             |   |   |   |   |      |      |       |       |       |  |  |  |  |  |  |                                |                               |           |                                 |             |              |  |  |  |  |  |  |   |                      |  |  |                         |                   |  |  |  |              |  |  |  |              |      |             |  |  |  |  |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                   |                            |  |  |   |  |  |     |   |  |  |  |                                     |  |  |  |                                   |   |    |    |    |     |     |  |      |      |      |      |       |       |                 |  |  |  |  |  |  |               |  |  |  |  |  |  |              |  |  |  |  |  |  |                       |  |  |  |  |  |  |                   |  |  |  |  |  |  |            |  |  |  |  |  |  |            |  |  |  |  |  |  |            |     |    |     |      |      |       |    |  |  |  |  |  |  |     |    |   |  |  |  |  |                                      |  |  |  |  |                            |                                      |                   |                      |   |                    |             |   |                                       |               |                                    |                      |             |  |   |  |                    |               |                       |                        |                   |                  |            |                   |                  |                               |                  |                      |               |                |  |                        |                          |  |                                |                   |  |                |                   |  |          |                   |  |                       |                 |  |                              |                       |  |                    |                      |  |              |          |  |   |  |             |                       |              |  |     |          |  |      |        |  |       |        |  |            |      |   |  |              |                  |              |                                  |                                    |   |  |   |            |                                  |  |   |  |   |             |   |   |   |                          |  |                                     |                          |   |                                       |                          |  |  |                          |                                   |  |                          |  |  |   |  |  |  |      |         |           |                   |      |              |                  |             |       |                |            |                     |   |  |      |           |                     |        |                |              |               |                 |                    |                  |                   |                   |                  |              |   |  |         |  |                      |   |           |  |                     |   |  |  |                      |  |
| VERY THINLY BEDDED   | 0.03 - 0.16 FEET  |  |  |  |  |  |   |  |  |   |  |   |  |                                     |                     |   |   |         |  |                      |   |                                  |  |   |   |   |                  |                                  |  |   |  |   |              |   |   |   |                                |  |                                     |                          |   |                                       |                          |  |  |                          |                                   |          |                              |                       |            |                    |                      |  |              |          |  |            |  |  |  |  |  |  |                        |                   |                   |                  |                  |                  |                  |                  |                  |                  |                  |                  |                |                 |            |    |                            |   |   |                  |                |                                      |                   |                   |                   |                   |                   |                   |  |  |  |  |             |   |   |   |   |      |      |       |       |       |  |  |  |  |  |  |                                |                               |           |                                 |             |              |  |  |  |  |  |  |   |                      |  |  |                         |                   |  |  |  |              |  |  |  |              |      |             |  |  |  |  |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                   |                            |  |  |   |  |  |     |   |  |  |  |                                     |  |  |  |                                   |   |    |    |    |     |     |  |      |      |      |      |       |       |                 |  |  |  |  |  |  |               |  |  |  |  |  |  |              |  |  |  |  |  |  |                       |  |  |  |  |  |  |                   |  |  |  |  |  |  |            |  |  |  |  |  |  |            |  |  |  |  |  |  |            |     |    |     |      |      |       |    |  |  |  |  |  |  |     |    |   |  |  |  |  |                                      |  |  |  |  |                            |                                      |                   |                      |   |                    |             |   |                                       |               |                                    |                      |             |  |   |  |                    |               |                       |                        |                   |                  |            |                   |                  |                               |                  |                      |               |                |  |                        |                          |  |                                |                   |  |                |                   |  |          |                   |  |                       |                 |  |                              |                       |  |                    |                      |  |              |          |  |   |  |             |                       |              |  |     |          |  |      |        |  |       |        |  |            |      |   |  |              |                  |              |                                  |                                    |   |  |   |            |                                  |  |   |  |   |             |   |   |   |                          |  |                                     |                          |   |                                       |                          |  |  |                          |                                   |  |                          |  |  |   |  |  |  |      |         |           |                   |      |              |                  |             |       |                |            |                     |   |  |      |           |                     |        |                |              |               |                 |                    |                  |                   |                   |                  |              |   |  |         |  |                      |   |           |  |                     |   |  |  |                      |  |
| THICKLY LAMINATED  | 0.008 - 0.03 FEET   |  |  |  |  |  |   |  |  |   |  |   |  |                                     |                     |   |   |         |  |                      |   |                                  |  |   |   |   |                  |                                  |  |   |  |   |              |   |   |   |                                |  |                                     |                          |   |                                       |                          |  |  |                          |                                   |          |                              |                       |            |                    |                      |  |              |          |  |            |  |  |  |  |  |  |                        |                   |                   |                  |                  |                  |                  |                  |                  |                  |                  |                  |                |                 |            |    |                            |   |   |                  |                |                                      |                   |                   |                   |                   |                   |                   |  |  |  |  |             |   |   |   |   |      |      |       |       |       |  |  |  |  |  |  |                                |                               |           |                                 |             |              |  |  |  |  |  |  |   |                      |  |  |                         |                   |  |  |  |              |  |  |  |              |      |             |  |  |  |  |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                   |                            |  |  |   |  |  |     |   |  |  |  |                                     |  |  |  |                                   |   |    |    |    |     |     |  |      |      |      |      |       |       |                 |  |  |  |  |  |  |               |  |  |  |  |  |  |              |  |  |  |  |  |  |                       |  |  |  |  |  |  |                   |  |  |  |  |  |  |            |  |  |  |  |  |  |            |  |  |  |  |  |  |            |     |    |     |      |      |       |    |  |  |  |  |  |  |     |    |   |  |  |  |  |                                      |  |  |  |  |                            |                                      |                   |                      |   |                    |             |   |                                       |               |                                    |                      |             |  |   |  |                    |               |                       |                        |                   |                  |            |                   |                  |                               |                  |                      |               |                |  |                        |                          |  |                                |                   |  |                |                   |  |          |                   |  |                       |                 |  |                              |                       |  |                    |                      |  |              |          |  |   |  |             |                       |              |  |     |          |  |      |        |  |       |        |  |            |      |   |  |              |                  |              |                                  |                                    |   |  |   |            |                                  |  |   |  |   |             |   |   |   |                          |  |                                     |                          |   |                                       |                          |  |  |                          |                                   |  |                          |  |  |   |  |  |  |      |         |           |                   |      |              |                  |             |       |                |            |                     |   |  |      |           |                     |        |                |              |               |                 |                    |                  |                   |                   |                  |              |   |  |         |  |                      |   |           |  |                     |   |  |  |                      |  |
| THINLY LAMINATED   | < 0.008 FEET  |  |  |  |  |  |   |  |  |   |  |   |  |                                     |                     |   |   |         |  |                      |   |                                  |  |   |   |   |                  |                                  |  |   |  |   |              |   |   |   |                                |  |                                     |                          |   |                                       |                          |  |  |                          |                                   |          |                              |                       |            |                    |                      |  |              |          |  |            |  |  |  |  |  |  |                        |                   |                   |                  |                  |                  |                  |                  |                  |                  |                  |                  |                |                 |            |    |                            |   |   |                  |                |                                      |                   |                   |                   |                   |                   |                   |  |  |  |  |             |   |   |   |   |      |      |       |       |       |  |  |  |  |  |  |                                |                               |           |                                 |             |              |  |  |  |  |  |  |   |                      |  |  |                         |                   |  |  |  |              |  |  |  |              |      |             |  |  |  |  |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                   |                            |  |  |   |  |  |     |   |  |  |  |                                     |  |  |  |                                   |   |    |    |    |     |     |  |      |      |      |      |       |       |                 |  |  |  |  |  |  |               |  |  |  |  |  |  |              |  |  |  |  |  |  |                       |  |  |  |  |  |  |                   |  |  |  |  |  |  |            |  |  |  |  |  |  |            |  |  |  |  |  |  |            |     |    |     |      |      |       |    |  |  |  |  |  |  |     |    |   |  |  |  |  |                                      |  |  |  |  |                            |                                      |                   |                      |   |                    |             |   |                                       |               |                                    |                      |             |  |   |  |                    |               |                       |                        |                   |                  |            |                   |                  |                               |                  |                      |               |                |  |                        |                          |  |                                |                   |  |                |                   |  |          |                   |  |                       |                 |  |                              |                       |  |                    |                      |  |              |          |  |   |  |             |                       |              |  |     |          |  |      |        |  |       |        |  |            |      |   |  |              |                  |              |                                  |                                    |   |  |   |            |                                  |  |   |  |   |             |   |   |   |                          |  |                                     |                          |   |                                       |                          |  |  |                          |                                   |  |                          |  |  |   |  |  |  |      |         |           |                   |      |              |                  |             |       |                |            |                     |   |  |      |           |                     |        |                |              |               |                 |                    |                  |                   |                   |                  |              |   |  |         |  |                      |   |           |  |                     |   |  |  |                      |  |
| FRIABLE  | RUBBING WITH FINGER FREES NUMEROUS GRAINS; GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE.    |  |  |  |  |  |   |  |  |   |  |   |  |                                     |                     |   |   |         |  |                      |   |                                  |  |   |   |   |                  |                                  |  |   |  |   |              |   |   |   |                                |  |                                     |                          |   |                                       |                          |  |  |                          |                                   |          |                              |                       |            |                    |                      |  |              |          |  |            |  |  |  |  |  |  |                        |                   |                   |                  |                  |                  |                  |                  |                  |                  |                  |                  |                |                 |            |    |                            |   |   |                  |                |                                      |                   |                   |                   |                   |                   |                   |  |  |  |  |             |   |   |   |   |      |      |       |       |       |  |  |  |  |  |  |                                |                               |           |                                 |             |              |  |  |  |  |  |  |   |                      |  |  |                         |                   |  |  |  |              |  |  |  |              |      |             |  |  |  |  |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                   |                            |  |  |   |  |  |     |   |  |  |  |                                     |  |  |  |                                   |   |    |    |    |     |     |  |      |      |      |      |       |       |                 |  |  |  |  |  |  |               |  |  |  |  |  |  |              |  |  |  |  |  |  |                       |  |  |  |  |  |  |                   |  |  |  |  |  |  |            |  |  |  |  |  |  |            |  |  |  |  |  |  |            |     |    |     |      |      |       |    |  |  |  |  |  |  |     |    |   |  |  |  |  |                                      |  |  |  |  |                            |                                      |                   |                      |   |                    |             |   |                                       |               |                                    |                      |             |  |   |  |                    |               |                       |                        |                   |                  |            |                   |                  |                               |                  |                      |               |                |  |                        |                          |  |                                |                   |  |                |                   |  |          |                   |  |                       |                 |  |                              |                       |  |                    |                      |  |              |          |  |   |  |             |                       |              |  |     |          |  |      |        |  |       |        |  |            |      |   |  |              |                  |              |                                  |                                    |   |  |   |            |                                  |  |   |  |   |             |   |   |   |                          |  |                                     |                          |   |                                       |                          |  |  |                          |                                   |  |                          |  |  |   |  |  |  |      |         |           |                   |      |              |                  |             |       |                |            |                     |   |  |      |           |                     |        |                |              |               |                 |                    |                  |                   |                   |                  |              |   |  |         |  |                      |   |           |  |                     |   |  |  |                      |  |
| MODERATELY INDURATED   | GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE; BREAKS EASILY WHEN HIT WITH HAMMER. |  |  |  |  |  |   |  |  |   |  |   |  |                                     |                     |   |   |         |  |                      |   |                                  |  |   |   |   |                  |                                  |  |   |  |   |              |   |   |   |                                |  |                                     |                          |   |                                       |                          |  |  |                          |                                   |          |                              |                       |            |                    |                      |  |              |          |  |            |  |  |  |  |  |  |                        |                   |                   |                  |                  |                  |                  |                  |                  |                  |                  |                  |                |                 |            |    |                            |   |   |                  |                |                                      |                   |                   |                   |                   |                   |                   |  |  |  |  |             |   |   |   |   |      |      |       |       |       |  |  |  |  |  |  |                                |                               |           |                                 |             |              |  |  |  |  |  |  |   |                      |  |  |                         |                   |  |  |  |              |  |  |  |              |      |             |  |  |  |  |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                   |                            |  |  |   |  |  |     |   |  |  |  |                                     |  |  |  |                                   |   |    |    |    |     |     |  |      |      |      |      |       |       |                 |  |  |  |  |  |  |               |  |  |  |  |  |  |              |  |  |  |  |  |  |                       |  |  |  |  |  |  |                   |  |  |  |  |  |  |            |  |  |  |  |  |  |            |  |  |  |  |  |  |            |     |    |     |      |      |       |    |  |  |  |  |  |  |     |    |   |  |  |  |  |                                      |  |  |  |  |                            |                                      |                   |                      |   |                    |             |   |                                       |               |                                    |                      |             |  |   |  |                    |               |                       |                        |                   |                  |            |                   |                  |                               |                  |                      |               |                |  |                        |                          |  |                                |                   |  |                |                   |  |          |                   |  |                       |                 |  |                              |                       |  |                    |                      |  |              |          |  |   |  |             |                       |              |  |     |          |  |      |        |  |       |        |  |            |      |   |  |              |                  |              |                                  |                                    |   |  |   |            |                                  |  |   |  |   |             |   |   |   |                          |  |                                     |                          |   |                                       |                          |  |  |                          |                                   |  |                          |  |  |   |  |  |  |      |         |           |                   |      |              |                  |             |       |                |            |                     |   |  |      |           |                     |        |                |              |               |                 |                    |                  |                   |                   |                  |              |   |  |         |  |                      |   |           |  |                     |   |  |  |                      |  |
| INDURATED  | GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE; DIFFICULT TO BREAK WITH HAMMER.        |  |  |  |  |  |   |  |  |   |  |   |  |                                     |                     |   |   |         |  |                      |   |                                  |  |   |   |   |                  |                                  |  |   |  |   |              |   |   |   |                                |  |                                     |                          |   |                                       |                          |  |  |                          |                                   |          |                              |                       |            |                    |                      |  |              |          |  |            |  |  |  |  |  |  |                        |                   |                   |                  |                  |                  |                  |                  |                  |                  |                  |                  |                |                 |            |    |                            |   |   |                  |                |                                      |                   |                   |                   |                   |                   |                   |  |  |  |  |             |   |   |   |   |      |      |       |       |       |  |  |  |  |  |  |                                |                               |           |                                 |             |              |  |  |  |  |  |  |   |                      |  |  |                         |                   |  |  |  |              |  |  |  |              |      |             |  |  |  |  |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                   |                            |  |  |   |  |  |     |   |  |  |  |                                     |  |  |  |                                   |   |    |    |    |     |     |  |      |      |      |      |       |       |                 |  |  |  |  |  |  |               |  |  |  |  |  |  |              |  |  |  |  |  |  |                       |  |  |  |  |  |  |                   |  |  |  |  |  |  |            |  |  |  |  |  |  |            |  |  |  |  |  |  |            |     |    |     |      |      |       |    |  |  |  |  |  |  |     |    |   |  |  |  |  |                                      |  |  |  |  |                            |                                      |                   |                      |   |                    |             |   |                                       |               |                                    |                      |             |  |   |  |                    |               |                       |                        |                   |                  |            |                   |                  |                               |                  |                      |               |                |  |                        |                          |  |                                |                   |  |                |                   |  |          |                   |  |                       |                 |  |                              |                       |  |                    |                      |  |              |          |  |   |  |             |                       |              |  |     |          |  |      |        |  |       |        |  |            |      |   |  |              |                  |              |                                  |                                    |   |  |   |            |                                  |  |   |  |   |             |   |   |   |                          |  |                                     |                          |   |                                       |                          |  |  |                          |                                   |  |                          |  |  |   |  |  |  |      |         |           |                   |      |              |                  |             |       |                |            |                     |   |  |      |           |                     |        |                |              |               |                 |                    |                  |                   |                   |                  |              |   |  |         |  |                      |   |           |  |                     |   |  |  |                      |  |
| EXTREMELY INDURATED  | SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE; SAMPLE BREAKS ACROSS GRAINS.                 |  |  |  |  |  |   |  |  |   |  |   |  |                                     |                     |   |   |         |  |                      |   |                                  |  |   |   |   |                  |                                  |  |   |  |   |              |   |   |   |                                |  |                                     |                          |   |                                       |                          |  |  |                          |                                   |          |                              |                       |            |                    |                      |  |              |          |  |            |  |  |  |  |  |  |                        |                   |                   |                  |                  |                  |                  |                  |                  |                  |                  |                  |                |                 |            |    |                            |   |   |                  |                |                                      |                   |                   |                   |                   |                   |                   |  |  |  |  |             |   |   |   |   |      |      |       |       |       |  |  |  |  |  |  |                                |                               |           |                                 |             |              |  |  |  |  |  |  |   |                      |  |  |                         |                   |  |  |  |              |  |  |  |              |      |             |  |  |  |  |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                   |                            |  |  |   |  |  |     |   |  |  |  |                                     |  |  |  |                                   |   |    |    |    |     |     |  |      |      |      |      |       |       |                 |  |  |  |  |  |  |               |  |  |  |  |  |  |              |  |  |  |  |  |  |                       |  |  |  |  |  |  |                   |  |  |  |  |  |  |            |  |  |  |  |  |  |            |  |  |  |  |  |  |            |     |    |     |      |      |       |    |  |  |  |  |  |  |     |    |   |  |  |  |  |                                      |  |  |  |  |                            |                                      |                   |                      |   |                    |             |   |                                       |               |                                    |                      |             |  |   |  |                    |               |                       |                        |                   |                  |            |                   |                  |                               |                  |                      |               |                |  |                        |                          |  |                                |                   |  |                |                   |  |          |                   |  |                       |                 |  |                              |                       |  |                    |                      |  |              |          |  |   |  |             |                       |              |  |     |          |  |      |        |  |       |        |  |            |      |   |  |              |                  |              |                                  |                                    |   |  |   |            |                                  |  |   |  |   |             |   |   |   |                          |  |                                     |                          |   |                                       |                          |  |  |                          |                                   |  |                          |  |  |   |  |  |  |      |         |           |                   |      |              |                  |             |       |                |            |                     |   |  |      |           |                     |        |                |              |               |                 |                    |                  |                   |                   |                  |              |   |  |         |  |                      |   |           |  |                     |   |  |  |                      |  |
| <p><b>BENCH MARK: N/A ELEVATIONS DERIVED FROM PROJECT DTM</b></p> <p align="right">ELEVATION: FEET</p>   |   | <p><b>NOTES:</b></p>   |  |  |  |  |   |  |  |   |  |   |  |                                     |                     |   |   |         |  |                      |   |                                  |  |   |   |   |                  |                                  |  |   |  |   |              |   |   |   |                                |  |                                     |                          |   |                                       |                          |  |  |                          |                                   |          |                              |                       |            |                    |                      |  |              |          |  |            |  |  |  |  |  |  |                        |                   |                   |                  |                  |                  |                  |                  |                  |                  |                  |                  |                |                 |            |    |                            |   |   |                  |                |                                      |                   |                   |                   |                   |                   |                   |  |  |  |  |             |   |   |   |   |      |      |       |       |       |  |  |  |  |  |  |                                |                               |           |                                 |             |              |  |  |  |  |  |  |   |                      |  |  |                         |                   |  |  |  |              |  |  |  |              |      |             |  |  |  |  |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                   |                            |  |  |   |  |  |     |   |  |  |  |                                     |  |  |  |                                   |   |    |    |    |     |     |  |      |      |      |      |       |       |                 |  |  |  |  |  |  |               |  |  |  |  |  |  |              |  |  |  |  |  |  |                       |  |  |  |  |  |  |                   |  |  |  |  |  |  |            |  |  |  |  |  |  |            |  |  |  |  |  |  |            |     |    |     |      |      |       |    |  |  |  |  |  |  |     |    |   |  |  |  |  |                                      |  |  |  |  |                            |                                      |                   |                      |   |                    |             |   |                                       |               |                                    |                      |             |  |   |  |                    |               |                       |                        |                   |                  |            |                   |                  |                               |                  |                      |               |                |  |                        |                          |  |                                |                   |  |                |                   |  |          |                   |  |                       |                 |  |                              |                       |  |                    |                      |  |              |          |  |   |  |             |                       |              |  |     |          |  |      |        |  |       |        |  |            |      |   |  |              |                  |              |                                  |                                    |   |  |   |            |                                  |  |   |  |   |             |   |   |   |                          |  |                                     |                          |   |                                       |                          |  |  |                          |                                   |  |                          |  |  |   |  |  |  |      |         |           |                   |      |              |                  |             |       |                |            |                     |   |  |      |           |                     |        |                |              |               |                 |                    |                  |                   |                   |                  |              |   |  |         |  |                      |   |           |  |                     |   |  |  |                      |  |

|   |                       |
|---|-----------------------|
| PROJECT REFERENCE NO.<br><b>1-4400BB</b>                                | SHEET NO.<br><b>3</b> |
| RW SHEET NO.  |                       |
| ROADWAY DESIGN ENGINEER   | HYDRAULICS ENGINEER   |
| <b>INCOMPLETE PLANS</b><br>DO NOT USE FOR R/W ACQUISITION               |                       |
| <b>DOCUMENT NOT CONSIDERED FINAL</b><br>UNLESS ALL SIGNATURES COMPLETED |                       |

# DRAFT



REVISIONS

07\_Nov-2018 11:11 F:\pco\pco\656566V-0174\_NCDOT-I-4400B\_Henderson\_Co\1-4400B\_GEO\_RDWY\CADD\_GEO\TECH\Plan\1-4400BB\_RDY\_PSH\_19.dgn T.Walker AT 660261102 100.000000000000000

FOR -L- PROFILE, SEE SHEET 63 & 64



# GEOTECHNICAL BORING REPORT

## BORE LOG

| WBS 34232  |                 | TIP I-4400B         |            | COUNTY HENDERSON         |       | GEOLOGIST M. Arnold     |                 |    |    |     |           |      |  |            |      |                |
|--|-----------------|---------------------|------------|--------------------------|-------|-------------------------|-----------------|----|----|-----|-----------|------|--|------------|------|----------------|
| SITE DESCRIPTION I-26 from US 64 (Exit 49) to US 25 Business (Exit 44) EXTEND BYERS CREEK CULVERT AT I26 STA 588                               |                 |                     |            |                          |       |                         | GROUND WTR (ft) |    |    |     |           |      |  |            |      |                |
| BORING NO. B-114   |                 | STATION 588+52      |            | OFFSET 85 ft RT          |       | ALIGNMENT -L-           |                 |    |    |     |           |      |  |            |      |                |
| COLLAR ELEV. 2,078.4 ft  |                 | TOTAL DEPTH 14.1 ft |            | NORTHING 613,155         |       | EASTING 960,881         |                 |    |    |     |           |      |  |            |      |                |
| DRILL RIG/HAMMER EFF./DATE F&R2175 CME-55 88% 02/11/2017   |                 |                     |            | DRILL METHOD H.S. Augers |       | HAMMER TYPE Automatic   |                 |    |    |     |           |      |  |            |      |                |
| DRILLER S. Davis   |                 | START DATE 01/09/18 |            | COMP. DATE 01/09/18      |       | SURFACE WATER DEPTH N/A |                 |    |    |     |           |      |  |            |      |                |
| ELEV (ft)  | DRIVE ELEV (ft) | DEPTH (ft)          | BLOW COUNT |                          |       | BLOWS PER FOOT          |                 |    |    |     | SAMP. NO. | LOG  | SOIL AND ROCK DESCRIPTION  |            |      |                |
|  |                 |                     | 0.5ft      | 0.5ft                    | 0.5ft | 0                       | 25              | 50 | 75 | 100 |           |      | ELEV. (ft)   | DEPTH (ft) |      |                |
| 2080   |                 |                     |            |                          |       |                         |                 |    |    |     |           |      |  | 2,078.4    | 0.0  | GROUND SURFACE |
| 2075   | 2,074.9         | 3.5                 | 1          | 3                        | 3     | 6                       |                 |    |    |     |           | M    | RESIDUAL<br>Red-Orange-Brown, Silty Fine to Coarse SAND (A-2-4) with Trace Organics (Roots) and Mica, Trace to Little Rock Fragments |            |      |                |
| 2070   | 2,069.9         | 8.5                 | 2          | 2                        | 2     | 4                       |                 |    |    |     |           | W    |  |            |      |                |
| 2065   | 2,064.9         | 13.5                | 5          | 15                       | 78    |                         |                 |    |    |     |           | Sat. | White-Gray, Fine Sandy SILT (A-4) with Trace Mica and Rock Fragments   | 2,069.3    | 9.1  |                |
|  |                 |                     | 60         | 40/0.1                   |       |                         |                 |    |    |     |           |      | WEATHERED ROCK<br>White-Gray (GNEISS)  | 2,066.4    | 12.0 |                |
|  |                 |                     |            |                          |       |                         |                 |    |    |     |           |      | White-Gray (GNEISS)  | 2,064.3    | 14.1 |                |
| <p>Boring Terminated at Elevation 2,064.3 ft in GNEISS (Weathered Rock)</p> <p>Note:<br/>1. 0.0'-0.1' = SURFICIAL ORGANIC SOILS</p>            |                 |                     |            |                          |       |                         |                 |    |    |     |           |      |  |            |      |                |
| <p>Invert elevation of proposed culvert extension inlet : 2067.50'</p> <p>Invert elevation of proposed culvert extension outlet : 2063.48'</p> |                 |                     |            |                          |       |                         |                 |    |    |     |           |      |  |            |      |                |

NCDOT BORE DOUBLE I4400B\_GEO\_BH\_RDWY\_DRAFT.GPJ NC\_DOT.GDT 2/25/19