



Culvert Foundation Recommendation Letter
Box Culvert @ -Y33- Sta. 35+91 over Driving
Branch
Johnston County, North Carolina
TIP No. I-5986B
S&ME Project No. 6235-17-048

PREPARED FOR:

**Michael Baker International
8000 Regency Parkway, Suite 600
Cary, North Carolina 27518**

PREPARED BY:

**S&ME, Inc.
9751 Southern Pine Boulevard
Charlotte, North Carolina 28273**

March 10, 2020



March 10, 2020

Michael Baker International
8000 Regency Parkway, Suite 600
Cary, North Carolina 27518

Attention: Mr. Dwain Hathaway, P.E.

Reference: **Culvert Foundation Recommendation Letter**
Box Culvert @ -Y33- Sta. 35+91 over Driving Branch
Johnston County, North Carolina
NCDOT TIP No. I-5986B
S&ME Project No. 6235-17-048
NC PE Firm License No. F-0176

Dear Mr. Hathaway:

S&ME, Inc. (S&ME) has completed the authorized foundation recommendation report for the above-referenced project as part of the I-95 Widening project. Our services were performed in general accordance with the *Exhibit A - Task Order#6* of the Master Subcontract Agreement between Michael Baker International (MBI) and S&ME executed on March 24, 2017. Culvert design information was provided via the Culvert Survey & Hydraulic Design Report prepared by Sungate Design Group, P.A., dated January 13, 2020.

Project and Recommendations

We understand that the proposed culvert will consist of an approximately 62.5 feet long, 21 @ 6-foot x 9-foot RCBC with centerline bed elevation of 163.5 feet and slope of 0.3% at Station 35+91 -Y33- alignment. Based on our subsurface exploration, the box culvert is planned to bear in alluvial soils. The RCBC should be installed to bear on a minimum of 12 inches of foundation conditioning material in accordance with NCDOT Standard Specifications Section 414 due to the variability of alluvial soils. A total of 79 tons of foundation conditioning material is anticipated.

Total settlement along the proposed culvert alignment is anticipated to be less than 1 inch with differential settlement of approximately ½ inches, if constructed on suitable soils.



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

Sincerely,

S&ME, Inc.

DocuSigned by:

Stacie Mitchell

BBC611B64F19458...

Stacie E. Mitchell, P.E.
Project Manager

DocuSigned by:

Alyson Aarons

840D60E56C0C46C...

Alyson K. Aarons, P.E.
(née Yetman)
Project Engineer
NC Registration No. 046061



Senior Review By: Kristen H. Hill, P.E., P.G.

Attachments

Structure Subsurface Inventory Report
Culvert Survey & Hydraulic Design Report
FCM Quantity Calculations
Settlement Calculations

Attachments

REFERENCE: I-5986B

PROJECT: 47532

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

STRUCTURE
SUBSURFACE INVESTIGATION

COUNTY JOHNSTON
PROJECT DESCRIPTION I-95 WIDENING FROM SR 1811
(BUD HAWKINS RD.) (EXIT 70) TO I-40 (EXIT 81) -
WIDEN TO EIGHT LANES
SITE DESCRIPTION CULVERT ON -Y33- OVER DRIVING
BRANCH

CONTENTS

SHEET NO.	DESCRIPTION
1	TITLE SHEET
2	LEGEND (SOIL & ROCK)
3	SITE PLAN
4	PROFILE(S)
5	BORE LOG(S)

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	I-5986B	1	5

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:
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

H. CAMP

T. MILLER

INVESTIGATED BY S&ME, Inc.

DRAWN BY J. SWARTLEY

CHECKED BY S. MITCHELL

SUBMITTED BY S. MITCHELL

DATE MARCH 2020



9751 SOUTHERN PINE BLVD
CHARLOTTE, NC 28273
(704) 523-4726



DocuSigned by:

Stacie Mitchell

3/10/2020

BBC611B64E19458
SIGNATURE

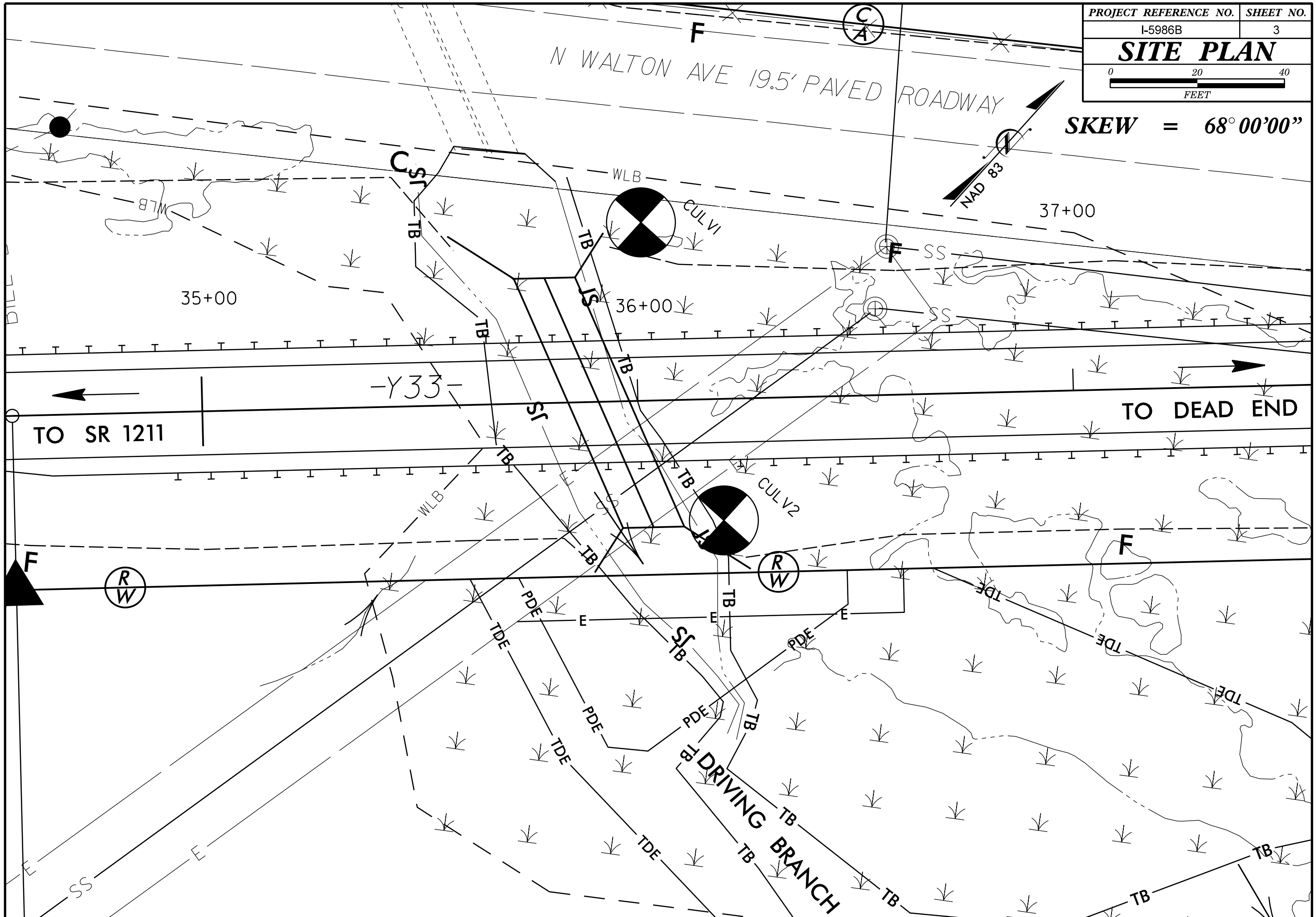
DATE

DOCUMENT NOT CONSIDERED FINAL
UNLESS ALL SIGNATURES COMPLETED

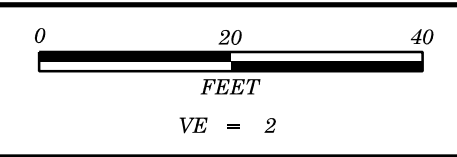
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL ENGINEERING UNIT
SUBSURFACE INVESTIGATION
SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

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 208, ASTM D1586). SOIL CLASSIFICATION IS BASED ON THE AASHTO SYSTEM. BASIC DESCRIPTIONS GENERALLY INCLUDE THE FOLLOWING: CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. FOR EXAMPLE, <i>VERY STIFF, GRAY, SILTY CLAY, MOIST WITH INTERBEDDED FINE SAND LAYERS, HIGHLY PLASTIC, A-7-6</i></p>										<p>WELL GRADED - INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM FINE TO COARSE. UNIFORMLY GRADED - INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE. GAP-GRADED - INDICATES A MIXTURE OF UNIFORM PARTICLE SIZES OF TWO OR MORE SIZES.</p>										<p>HARD ROCK IS NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT REFUSAL IF TESTED, AN INFERRED ROCK LINE INDICATES THE LEVEL AT WHICH NON-COASTAL PLAIN MATERIAL WOULD YIELD SPT REFUSAL. SPT REFUSAL IS PENETRATION BY A SPLIT SPOON SAMPLER EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS IN NON-COASTAL PLAIN MATERIAL. THE TRANSITION BETWEEN SOIL AND ROCK IS OFTEN REPRESENTED BY A ZONE OF WEATHERED ROCK. ROCK MATERIALS ARE TYPICALLY DIVIDED AS FOLLOWS:</p>										<p>ALLUVIUM (ALLUV.) - SOILS THAT HAVE BEEN TRANSPORTED BY WATER. AQUIFER - A WATER BEARING FORMATION OR STRATA. ARENACEOUS - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND. ARGILLACEOUS - APPLIED TO ALL ROCKS OR SUBSTANCES COMPOSED OF CLAY MINERALS, OR HAVING A NOTABLE PROPORTION OF CLAY IN THEIR COMPOSITION, SUCH AS SHALE, SLATE, ETC. ARTESIAN - GROUND WATER THAT IS UNDER SUFFICIENT PRESSURE TO RISE ABOVE THE LEVEL AT WHICH IT IS ENCOUNTERED, BUT WHICH DOES NOT NECESSARILY RISE TO OR ABOVE THE GROUND SURFACE. CALCAREOUS (CALC.) - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE. COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM OF SLOPE. CORE RECOVERY (REC.) - TOTAL LENGTH OF ALL MATERIAL RECOVERED IN THE CORE BARREL DIVIDED BY TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE. DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT ROCKS OR CUTS MASSIVE ROCK. DIP - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE HORIZONTAL. DIP DIRECTION (DIP AZIMUTH) - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH. FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE. FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES. FLOAT - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLODGED FROM PARENT MATERIAL. FLOOD PLAIN (FP) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM. FORMATION (FM) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE FIELD. JOINT - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED. LEDGE - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO ITS LATERAL EXTENT. LENS - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS. MOTTLED (MOT.) - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS. MOTTLING IN SOILS USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE. PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE OF AN INTERVENING IMPERVIOUS STRATUM. RESIDUAL (RES.) SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK. ROCK QUALITY DESIGNATION (RQD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE. SAPROLITE (SAP.) - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT ROCK. SILL - AN INTRUSIVE BODY OF IGNEOUS ROCK OF APPROXIMATELY UNIFORM THICKNESS AND RELATIVELY THIN COMPARED WITH ITS LATERAL EXTENT, THAT HAS BEEN EMPLACED PARALLEL TO THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS. SLICKENSIDE - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE. STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT) - NUMBER OF BLOWS (N OR BPF) OF A 140 LB. HAMMER FALLING 30 INCHES REQUIRED TO PRODUCE A PENETRATION OF 1 FOOT INTO SOIL WITH A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER. SPT REFUSAL IS PENETRATION EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS. STRATA CORE RECOVERY (SCRC) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE. STRATA ROCK QUALITY DESIGNATION (SRQD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS WITHIN A STRATUM EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE. TOPSOIL (TS) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.</p>																																																																																																																																										
SOIL LEGEND AND AASHTO CLASSIFICATION										ANGULARITY OF GRAINS										WEATHERED ROCK (WR)										CRYSTALLINE ROCK (CR)																																																																																																																																										
<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th>GENERAL CLASS.</th> <th colspan="5">GRANULAR MATERIALS (≤ 35% PASSING #200)</th> <th colspan="5">SILT-CLAY MATERIALS (> 35% PASSING #200)</th> <th colspan="5">ORGANIC MATERIALS</th> </tr> <tr> <th>GROUP CLASS.</th> <th>A-1</th> <th>A-3</th> <th>A-2</th> <th>A-4</th> <th>A-5</th> <th>A-6</th> <th>A-7</th> <th>A-1, A-2</th> <th>A-3</th> <th>A-4, A-5</th> <th>A-6, A-7</th> <th colspan="5"></th> </tr> <tr> <th>SYMBOL</th> <td colspan="5">[Pattern]</td> <td colspan="5">[Pattern]</td> <td colspan="5">[Pattern]</td> </tr> <tr> <th>% PASSING #10 #40 #200</th> <td colspan="5">[Table]</td> <td colspan="5">[Table]</td> <td colspan="5">[Table]</td> </tr> <tr> <th>MATERIAL PASSING #40 LL PI</th> <td colspan="5">[Table]</td> <td colspan="5">[Table]</td> <td colspan="5">[Table]</td> </tr> <tr> <th>GROUP INDEX</th> <td colspan="5">[Table]</td> <td colspan="5">[Table]</td> <td colspan="5">[Table]</td> </tr> <tr> <th>USUAL TYPES OF MAJOR MATERIALS</th> <td colspan="5">[Table]</td> <td colspan="5">[Table]</td> <td colspan="5">[Table]</td> </tr> <tr> <th>GEN. RATING AS SUBGRADE</th> <td colspan="5">[Table]</td> <td colspan="5">[Table]</td> <td colspan="5">[Table]</td> </tr> </table>										GENERAL CLASS.	GRANULAR MATERIALS (≤ 35% PASSING #200)					SILT-CLAY MATERIALS (> 35% PASSING #200)					ORGANIC MATERIALS					GROUP CLASS.	A-1	A-3	A-2	A-4	A-5	A-6	A-7	A-1, A-2	A-3	A-4, A-5	A-6, A-7						SYMBOL	[Pattern]					[Pattern]					[Pattern]					% PASSING #10 #40 #200	[Table]					[Table]					[Table]					MATERIAL PASSING #40 LL PI	[Table]					[Table]					[Table]					GROUP INDEX	[Table]					[Table]					[Table]					USUAL TYPES OF MAJOR MATERIALS	[Table]					[Table]					[Table]					GEN. RATING AS SUBGRADE	[Table]					[Table]					[Table]					<p>THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS IS DESIGNATED BY THE TERMS: ANGULAR, SUBANGULAR, SUBROUNDED, OR ROUNDED.</p>										<p>NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT N VALUES > 100 BLOWS PER FOOT IF TESTED.</p>										<p>FINE TO COARSE GRAIN IGNEOUS AND METAMORPHIC ROCK THAT WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES GRANITE, GNEISS, GABBRO, SCHIST, ETC.</p>									
GENERAL CLASS.	GRANULAR MATERIALS (≤ 35% PASSING #200)					SILT-CLAY MATERIALS (> 35% PASSING #200)					ORGANIC MATERIALS																																																																																																																																																													
GROUP CLASS.	A-1	A-3	A-2	A-4	A-5	A-6	A-7	A-1, A-2	A-3	A-4, A-5	A-6, A-7																																																																																																																																																													
SYMBOL	[Pattern]					[Pattern]					[Pattern]																																																																																																																																																													
% PASSING #10 #40 #200	[Table]					[Table]					[Table]																																																																																																																																																													
MATERIAL PASSING #40 LL PI	[Table]					[Table]					[Table]																																																																																																																																																													
GROUP INDEX	[Table]					[Table]					[Table]																																																																																																																																																													
USUAL TYPES OF MAJOR MATERIALS	[Table]					[Table]					[Table]																																																																																																																																																													
GEN. RATING AS SUBGRADE	[Table]					[Table]					[Table]																																																																																																																																																													
MINERALOGICAL COMPOSITION										COMPRESSION										NON-CRYSTALLINE ROCK (NCR)										COASTAL PLAIN SEDIMENTARY ROCK (CP)																																																																																																																																										
<p>MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC. ARE USED IN DESCRIPTIONS WHEN THEY ARE CONSIDERED OF SIGNIFICANCE.</p>										<p>SLIGHTLY COMPRESSIBLE LL < 31 MODERATELY COMPRESSIBLE LL = 31 - 50 HIGHLY COMPRESSIBLE LL > 50</p>										<p>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.</p>										<p>COASTAL PLAIN SEDIMENTS CEMENTED INTO ROCK, BUT MAY NOT YIELD SPT REFUSAL. ROCK TYPE INCLUDES LIMESTONE, SANDSTONE, CEMENTED SHELL BEDS, ETC.</p>																																																																																																																																										
PERCENTAGE OF MATERIAL										GROUND WATER										WEATHERING										MISCELLANEOUS SYMBOLS																																																																																																																																										
<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th>ORGANIC MATERIAL</th> <th>GRANULAR SOILS</th> <th>SILT - CLAY SOILS</th> <th>OTHER MATERIAL</th> </tr> <tr> <td>TRACE OF ORGANIC MATTER</td> <td>2 - 3%</td> <td>3 - 5%</td> <td>TRACE 1 - 10%</td> </tr> <tr> <td>LITTLE ORGANIC MATTER</td> <td>3 - 5%</td> <td>5 - 12%</td> <td>LITTLE 10 - 20%</td> </tr> <tr> <td>MODERATELY ORGANIC</td> <td>5 - 10%</td> <td>12 - 20%</td> <td>SOME 20 - 35%</td> </tr> <tr> <td>HIGHLY ORGANIC</td> <td>> 10%</td> <td>> 20%</td> <td>HIGHLY 35% AND ABOVE</td> </tr> </table>										ORGANIC MATERIAL	GRANULAR SOILS	SILT - CLAY SOILS	OTHER MATERIAL	TRACE OF ORGANIC MATTER	2 - 3%	3 - 5%	TRACE 1 - 10%	LITTLE ORGANIC MATTER	3 - 5%	5 - 12%	LITTLE 10 - 20%	MODERATELY ORGANIC	5 - 10%	12 - 20%	SOME 20 - 35%	HIGHLY ORGANIC	> 10%	> 20%	HIGHLY 35% AND ABOVE	<p>▽ WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING ▽ STATIC WATER LEVEL AFTER 24 HOURS ▽PW PERCHED WATER, SATURATED ZONE, OR WATER BEARING STRATA ○ SPRING OR SEEP</p>										<p>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 (MOD) SIGNIFICANT PORTIONS OF ROCK SHOW DISCOLORATION AND WEATHERING EFFECTS. IN GRANITOID ROCKS, MOST FELDSPARS ARE DULL AND DISCOLORED, SOME SHOW CLAY. ROCK HAS DULL SOUND UNDER HAMMER BLOWS AND SHOWS SIGNIFICANT LOSS OF STRENGTH AS COMPARED WITH FRESH ROCK. MODERATELY SEVERE (MOD. SEV.) ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. IN GRANITOID ROCKS, ALL FELDSPARS DULL AND DISCOLORED AND A MAJORITY SHOW KAOLINIZATION. ROCK SHOWS SEVERE LOSS OF STRENGTH AND CAN BE EXCAVATED WITH A GEOLOGIST'S PICK. ROCK GIVES "CLUNK" SOUND WHEN STRUCK. <i>IF TESTED, WOULD YIELD SPT REFUSAL</i> 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. <i>IF TESTED, WOULD YIELD SPT N VALUES > 100 BPF</i> 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. <i>IF TESTED, WOULD YIELD SPT N VALUES < 100 BPF</i> 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.</p>										<p>ROADWAY EMBANKMENT (RE) WITH SOIL DESCRIPTION SOIL SYMBOL ARTIFICIAL FILL (AF) OTHER THAN ROADWAY EMBANKMENT INFERRED SOIL BOUNDARY INFERRED ROCK LINE ALLUVIAL SOIL BOUNDARY</p>																																																																																																																						
ORGANIC MATERIAL	GRANULAR SOILS	SILT - CLAY SOILS	OTHER MATERIAL																																																																																																																																																																					
TRACE OF ORGANIC MATTER	2 - 3%	3 - 5%	TRACE 1 - 10%																																																																																																																																																																					
LITTLE ORGANIC MATTER	3 - 5%	5 - 12%	LITTLE 10 - 20%																																																																																																																																																																					
MODERATELY ORGANIC	5 - 10%	12 - 20%	SOME 20 - 35%																																																																																																																																																																					
HIGHLY ORGANIC	> 10%	> 20%	HIGHLY 35% AND ABOVE																																																																																																																																																																					
TEXTURE OR GRAIN SIZE										RECOMMENDATION SYMBOLS										ROCK HARDNESS										ABBREVIATIONS																																																																																																																																										
<table border="1" style="width: 100%; border-collapse: collapse;"> <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> <tr> <th>BOULDER (BLDR.)</th> <th>COBBLE (COB.)</th> <th>GRAVEL (GR.)</th> <th>COARSE SAND (CSE. SD.)</th> <th>FINE SAND (F SD.)</th> <th>SILT (SL.)</th> <th>CLAY (CL.)</th> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <th>GRAIN SIZE</th> <th>MM</th> <th>305</th> <th>75</th> <th>2.0</th> <th>0.25</th> <th>0.05</th> <th>0.005</th> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </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 (CSE. SD.)	FINE SAND (F SD.)	SILT (SL.)	CLAY (CL.)								GRAIN SIZE	MM	305	75	2.0	0.25	0.05	0.005									<p>AR - AUGER REFUSAL BT - BORING TERMINATED CL - CLAY CPT - CONE PENETRATION TEST CSE - COARSE DMT - DILATOMETER TEST DPT - DYNAMIC PENETRATION TEST e - VOID RATIO F - FINE FOSS. - FOSSILIFEROUS FRAC. - FRACTURED, FRACTURES FRAGS. - FRAGMENTS HI. - HIGHLY</p>										<p>VERY HARD CANNOT BE SCRATCHED BY KNIFE OR SHARP PICK. BREAKING OF HAND SPECIMENS REQUIRES SEVERAL HARD BLOWS OF THE GEOLOGIST'S PICK. HARD CAN BE SCRATCHED BY KNIFE OR PICK ONLY WITH DIFFICULTY. HARD HAMMER BLOWS REQUIRED TO DETACH HAND SPECIMEN. MODERATELY HARD CAN BE SCRATCHED BY KNIFE OR PICK. GOUGES OR GROOVES TO 0.25 INCHES DEEP CAN BE EXCAVATED BY HARD BLOW OF A GEOLOGIST'S PICK. HAND SPECIMENS CAN BE DETACHED BY MODERATE BLOWS. MEDIUM HARD CAN BE GROOVED OR GOUGED 0.05 INCHES DEEP BY FIRM PRESSURE OF KNIFE OR PICK POINT. CAN BE EXCAVATED IN SMALL CHIPS TO PIECES 1 INCH MAXIMUM SIZE BY HARD BLOWS OF THE POINT OF A GEOLOGIST'S PICK. SOFT CAN BE GROOVED OR GOUGED READILY BY KNIFE OR PICK. CAN BE EXCAVATED IN FRAGMENTS FROM CHIPS TO SEVERAL INCHES IN SIZE BY MODERATE BLOWS OF A PICK POINT. SMALL, THIN PIECES CAN BE BROKEN BY FINGER PRESSURE. VERY SOFT CAN BE CARVED WITH KNIFE. CAN BE EXCAVATED READILY WITH POINT OF PICK. PIECES 1 INCH OR MORE IN THICKNESS CAN BE BROKEN BY FINGER PRESSURE. CAN BE SCRATCHED READILY BY FINGER NAIL.</p>										<p>UNCLASSIFIED EXCAVATION - UNSUITABLE WASTE UNCLASSIFIED EXCAVATION - ACCEPTABLE DEGRADABLE ROCK UNCLASSIFIED EXCAVATION - ACCEPTABLE DEGRADABLE ROCK</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 (CSE. SD.)	FINE SAND (F SD.)	SILT (SL.)	CLAY (CL.)																																																																																																																																																																		
GRAIN SIZE	MM	305	75	2.0	0.25	0.05	0.005																																																																																																																																																																	
SOIL MOISTURE - CORRELATION OF TERMS										EQUIPMENT USED ON SUBJECT PROJECT										FRACTURE SPACING										BEDDING																																																																																																																																										
<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th>SOIL MOISTURE SCALE (ATTERBERG LIMITS)</th> <th>FIELD MOISTURE DESCRIPTION</th> <th>GUIDE FOR FIELD MOISTURE DESCRIPTION</th> </tr> <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>PL - PLASTIC LIMIT</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> </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	PL - PLASTIC LIMIT	- 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>DRILL UNITS: <input type="checkbox"/> CME-45C <input type="checkbox"/> CME-55 <input type="checkbox"/> CME-550 <input type="checkbox"/> VANE SHEAR TEST <input type="checkbox"/> PORTABLE HOIST <input checked="" type="checkbox"/> D-50</p>										<p>TERM SPACING MORE THAN 10 FEET VERY WIDE 3 TO 10 FEET WIDE 1 TO 3 FEET MODERATELY CLOSE 0.16 TO 1 FOOT CLOSE 0.08 TO 0.16 FEET VERY CLOSE LESS THAN 0.08 FEET</p>										<p>TERM THICKNESS 4 FEET VERY THICKLY BEDDED 1.5 - 4 FEET THICKLY BEDDED 0.16 - 1.5 FEET THINLY BEDDED 0.03 - 0.16 FEET VERY THINLY BEDDED 0.008 - 0.03 FEET THICKLY LAMINATED < 0.008 FEET THINLY LAMINATED < 0.008 FEET</p>																																																																																																																											
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																																																																																																																																																																						
PL - PLASTIC LIMIT	- 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																																																																																																																																																																						
PLASTICITY										INDURATION										NOTES										BENCH MARK: *SEE NOTE																																																																																																																																										
<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th>NON PLASTIC</th> <th colspan="2">PLASTICITY INDEX (PI)</th> <th>DRY STRENGTH</th> </tr> <tr> <td></td> <td>0-5</td> <td>6-15</td> <td>VERY LOW</td> </tr> <tr> <td>SLIGHTLY PLASTIC</td> <td>6-15</td> <td>16-25</td> <td>SLIGHT</td> </tr> <tr> <td>MODERATELY PLASTIC</td> <td>16-25</td> <td>26 OR MORE</td> <td>MEDIUM</td> </tr> <tr> <td>HIGHLY PLASTIC</td> <td>26 OR MORE</td> <td></td> <td>HIGH</td> </tr> </table>										NON PLASTIC	PLASTICITY INDEX (PI)		DRY STRENGTH		0-5	6-15	VERY LOW	SLIGHTLY PLASTIC	6-15	16-25	SLIGHT	MODERATELY PLASTIC	16-25	26 OR MORE	MEDIUM	HIGHLY PLASTIC	26 OR MORE		HIGH	<p>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. 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>										<p>*ELEVATIONS DERIVED FROM GEOPAK AND .TIN FILE 'I5986b_2.ls+.tin.tin' DATED 10/9/18</p>										<p>ELEVATION: FEET</p>																																																																																																																						
NON PLASTIC	PLASTICITY INDEX (PI)		DRY STRENGTH																																																																																																																																																																					
	0-5	6-15	VERY LOW																																																																																																																																																																					
SLIGHTLY PLASTIC	6-15	16-25	SLIGHT																																																																																																																																																																					
MODERATELY PLASTIC	16-25	26 OR MORE	MEDIUM																																																																																																																																																																					
HIGHLY PLASTIC	26 OR MORE		HIGH																																																																																																																																																																					
COLOR										FRAC. SPACING										INDURATION										NOTES																																																																																																																																										
<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>DRILL UNITS: <input type="checkbox"/> CME-45C <input type="checkbox"/> CME-55 <input type="checkbox"/> CME-550 <input type="checkbox"/> VANE SHEAR TEST <input type="checkbox"/> PORTABLE HOIST <input checked="" type="checkbox"/> D-50</p>										<p>ADVANCING TOOLS: <input checked="" type="checkbox"/> CLAY BITS <input type="checkbox"/> 6" CONTINUOUS FLIGHT AUGER <input checked="" type="checkbox"/> 8" HOLLOW AUGERS <input type="checkbox"/> HARD FACED FINGER BITS <input type="checkbox"/> TUNG-CARBIDE INSERTS <input type="checkbox"/> CASING <input type="checkbox"/> W/ ADVANCER <input type="checkbox"/> TRICONE *STEEL TEETH <input type="checkbox"/> TRICONE *TUNG-CARB. <input type="checkbox"/> CORE BIT</p>										<p>HAMMER TYPE: <input checked="" type="checkbox"/> AUTOMATIC <input type="checkbox"/> MANUAL CORE SIZE: <input type="checkbox"/> -B <input type="checkbox"/> -H <input type="checkbox"/> -N HAND TOOLS: <input type="checkbox"/> POST HOLE DIGGER <input type="checkbox"/> HAND AUGER <input type="checkbox"/> SOUNDING ROD <input type="checkbox"/> VANE SHEAR TEST</p>										<p>FRAC. SPACING MORE THAN 10 FEET VERY WIDE 3 TO 10 FEET WIDE 1 TO 3 FEET MODERATELY CLOSE 0.16 TO 1 FOOT CLOSE 0.08 TO 0.16 FEET VERY CLOSE LESS THAN 0.08 FEET</p>										<p>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. 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>										<p>ELEVATION: FEET</p>																																																																																																												

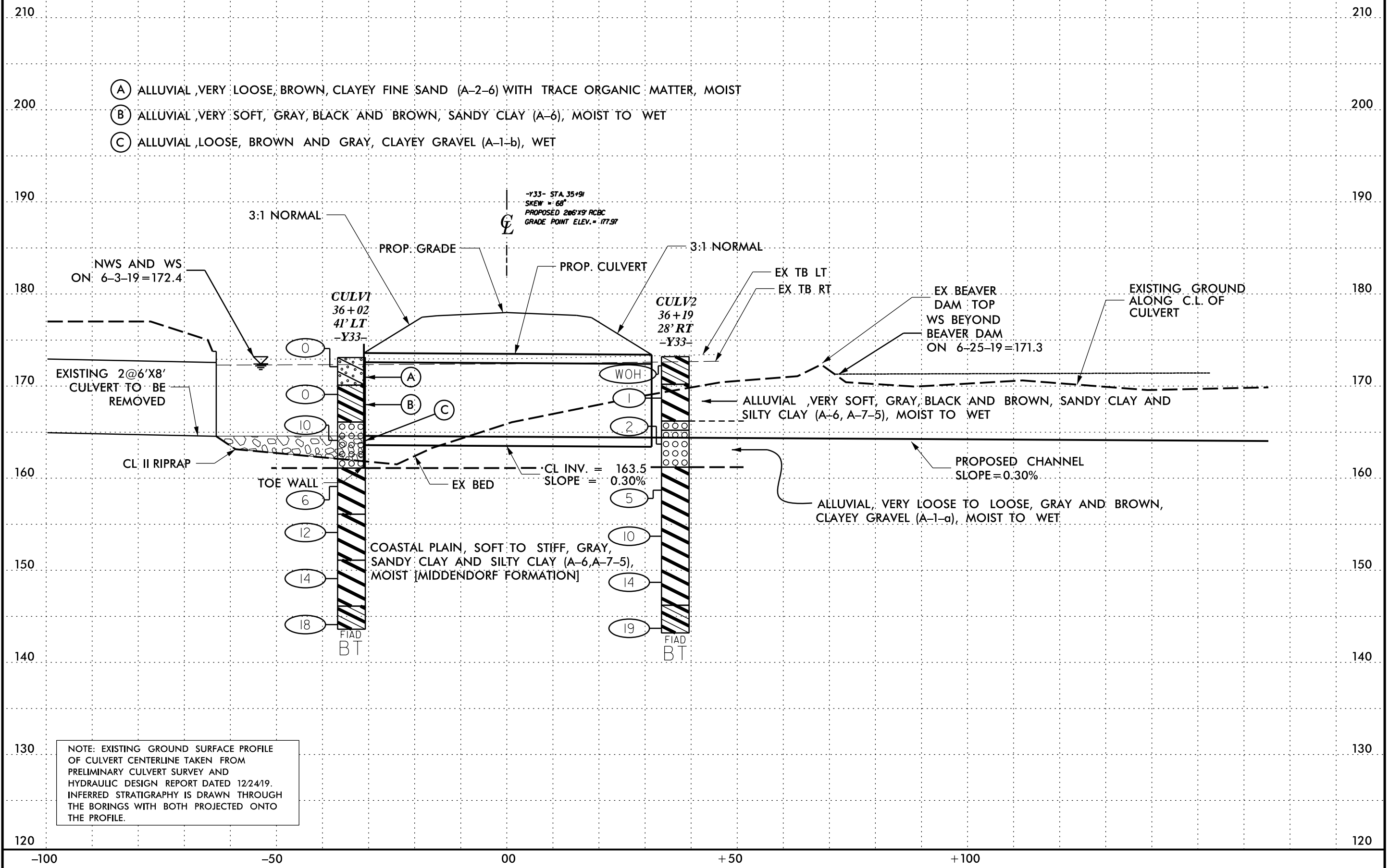
SKEW = 68° 00' 00"



5/14/99



PROJECT REFERENCE NO.	SHEET NO.
I-5986B	4
PROFILE PROJECTED ALONG C.L. OF CULVERT	



- (A) ALLUVIAL, VERY LOOSE, BROWN, CLAYEY FINE SAND (A-2-6) WITH TRACE ORGANIC MATTER, MOIST
- (B) ALLUVIAL, VERY SOFT, GRAY, BLACK AND BROWN, SANDY CLAY (A-6), MOIST TO WET
- (C) ALLUVIAL, LOOSE, BROWN AND GRAY, CLAYEY GRAVEL (A-1-b), WET

-Y33- STA. 35+91
 SKEW = 68°
 PROPOSED 266'X9' RCBC
 GRADE POINT ELEV. = 177.97

NWS AND WS
 ON 6-3-19 = 172.4

EXISTING 2@6'X8'
 CULVERT TO BE
 REMOVED

CL II RIPRAP

3:1 NORMAL

PROP. GRADE

PROP. CULVERT

3:1 NORMAL

EX TB LT
 EX TB RT

EX BEAVER
 DAM TOP
 WS BEYOND
 BEAVER DAM
 ON 6-25-19 = 171.3

EXISTING GROUND
 ALONG C.L. OF
 CULVERT

ALLUVIAL, VERY SOFT, GRAY, BLACK AND BROWN, SANDY CLAY AND
 SILTY CLAY (A-6, A-7-5), MOIST TO WET

CL INV. = 163.5
 SLOPE = 0.30%

PROPOSED CHANNEL
 SLOPE = 0.30%

ALLUVIAL, VERY LOOSE TO LOOSE, GRAY AND BROWN,
 CLAYEY GRAVEL (A-1-a), MOIST TO WET

COASTAL PLAIN, SOFT TO STIFF, GRAY,
 SANDY CLAY AND SILTY CLAY (A-6, A-7-5),
 MOIST [MIDDENDORF FORMATION]

NOTE: EXISTING GROUND SURFACE PROFILE
 OF CULVERT CENTERLINE TAKEN FROM
 PRELIMINARY CULVERT SURVEY AND
 HYDRAULIC DESIGN REPORT DATED 12/24/19.
 INFERRED STRATIGRAPHY IS DRAWN THROUGH
 THE BORINGS WITH BOTH PROJECTED ONTO
 THE PROFILE.

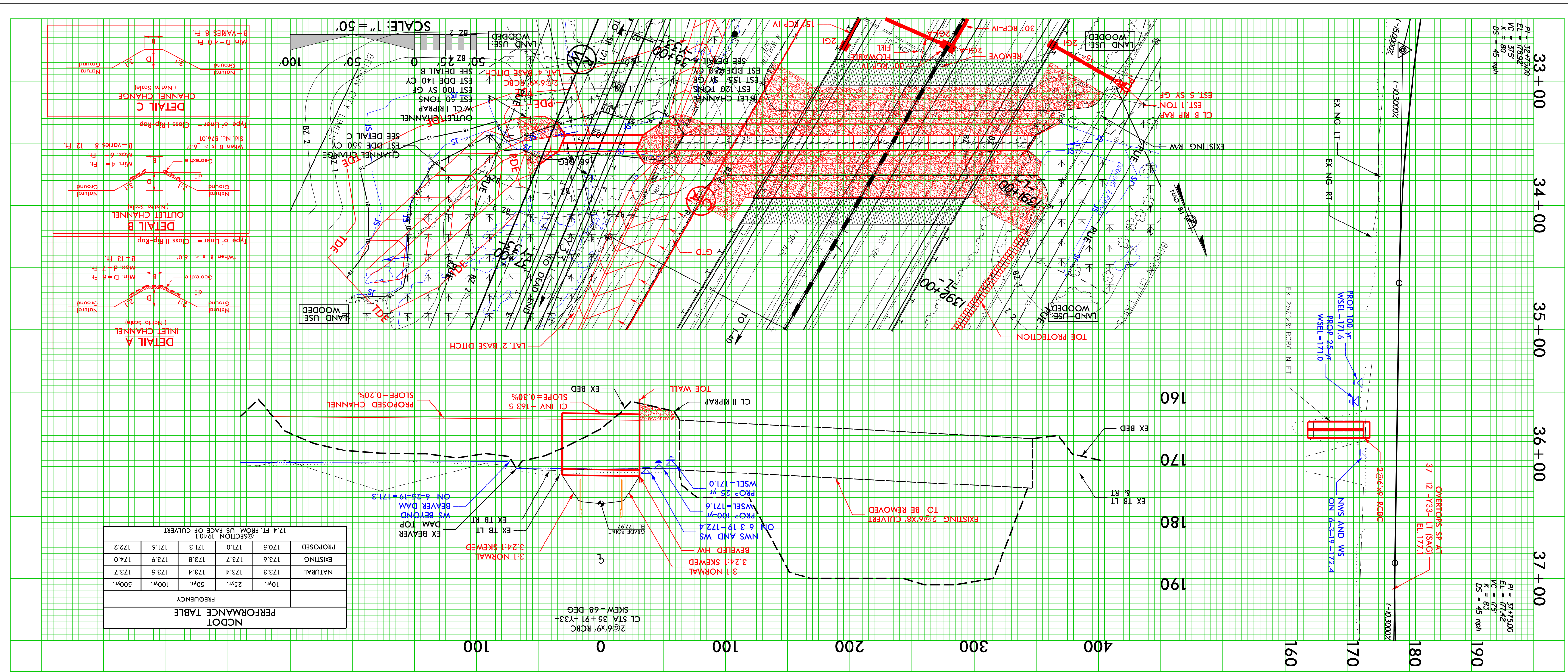
GEOTECHNICAL BORING REPORT

BORE LOG

WBS 47532.1.3		TIP I-5986B		COUNTY JOHNSTON		GEOLOGIST H. Camp										
SITE DESCRIPTION I-95 from SR 1811 Bud Hawkins Road to I-40 Widen to Eight Lanes							GROUND WTR (ft)									
BORING NO. CULV1		STATION 36+02		OFFSET 41 ft LT		ALIGNMENT -Y33-										
COLLAR ELEV. 173.1 ft		TOTAL DEPTH 29.5 ft		NORTHING 595,173		EASTING 2,141,172										
DRILL RIG/HAMMER EFF./DATE SME275 DIEDRICH D-50 90% 11/08/2018				DRILL METHOD Mud Rotary		HAMMER TYPE Automatic										
DRILLER T. Williams		START DATE 03/04/20		COMP. DATE 03/04/20		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						
175	173.1	0.0	1	0	0									173.1	GROUND SURFACE	0.0
170	170.1	3.0	1	0	0								M	170.1	ALLUVIAL VERY LOOSE, BROWN, CLAYEY FINE SAND (A-2-6), TRACE ORGANICS, TRACE GRAVEL	3.0
165	165.1	8.0	2	4	6								M	166.1	VERY SOFT, GRAY BROWN, SANDY CLAY (A-6), TRACE ORGANICS	7.0
160	160.1	13.0	4	3	3								W	166.1	LOOSE, GRAY BROWN, CLAYEY GRAVEL (A-1-B)	7.0
155	155.1	18.0	4	5	7								M	161.1	COASTAL PLAIN MEDIUM STIFF, GRAY, CLAY (A-7-5) [MIDDENDORF FORMATION]	12.0
150	150.1	23.0	3	6	8								M	156.1	NO RECOVERY (ASSUME A-7-5)	17.0
145	145.1	28.0	7	8	10								M	151.1	STIFF, GRAY, CLAY (A-7-5)	22.0
													M	146.1	VERY STIFF, GRAY, SANDY CLAY (A-6), TRACE MICA	27.0
													M	143.6	Boring Terminated at Elevation 143.6 ft IN VERY STIFF SANDY CLAY (COASTAL PLAIN)	29.5

WBS 47532.1.3		TIP I-5986B		COUNTY JOHNSTON		GEOLOGIST H. Camp										
SITE DESCRIPTION I-95 from SR 1811 Bud Hawkins Road to I-40 Widen to Eight Lanes							GROUND WTR (ft)									
BORING NO. CULV2		STATION 36+19		OFFSET 28 ft RT		ALIGNMENT -Y33-										
COLLAR ELEV. 173.2 ft		TOTAL DEPTH 30.0 ft		NORTHING 595,135		EASTING 2,141,232										
DRILL RIG/HAMMER EFF./DATE SME275 DIEDRICH D-50 90% 11/08/2018				DRILL METHOD Mud Rotary		HAMMER TYPE Automatic										
DRILLER T. Williams		START DATE 03/04/20		COMP. DATE 03/04/20		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						
175	173.2	0.0												173.2	GROUND SURFACE	0.0
170	169.7	3.5	WOH	WOH	1								W	170.2	ALLUVIAL VERY SOFT, GRAY, SANDY CLAY (A-6), TRACE ORGANICS	3.0
165	164.7	8.5	2	1	1								M	170.2	VERY SOFT, BLACK, CLAY (A-7-5)	3.0
160	159.7	13.5	2	2	3								M	166.2	VERY LOOSE, WHITE, GRAVEL (A-1-a)	7.0
155	154.7	18.5	4	4	6								M	165.2	NO RECOVERY (ASSUME A-1-a)	8.0
150	149.7	23.5	3	5	9								M	161.2	COASTAL PLAIN SOFT TO STIFF, GRAY, CLAY (A-7-5) [MIDDENDORF FORMATION]	12.0
145	144.7	28.5	7	8	11								M	156.1	NO RECOVERY (ASSUME A-7-5)	17.0
													M	151.1	STIFF, GRAY, CLAY (A-7-5)	22.0
													M	146.2	VERY STIFF, GRAY, SANDY CLAY (A-6), TRACE MICA	27.0
													M	143.2	Boring Terminated at Elevation 143.2 ft IN VERY STIFF SANDY CLAY (COASTAL PLAIN)	30.0

NCDOT BORE DOUBLE I5986B_CULVERT Y33_3591.GPJ_NC_DOT.GDT 3/6/20



ADDITIONAL INFORMATION AND COMPUTATIONS

DRAINAGE AREA = .811 ACRES (1.27 SQ. MI.)
 IMPERVIOUS AREA % = .34.8% (FROM FUTURE LAND USE MAPS)
 24-HR, 50-YR MAX. PRECIPITATION = 7.64 IN
 USGS SIR 2014-5030
 REGION 4, 0.10 SQ. MI < DA < 53.5 SQ. MI.

Q	Q ₁₀	Q ₂₅	Q ₅₀	Q ₁₀₀	Q ₅₀₀
434 CFS	430 CFS	492 CFS	529 CFS	570 CFS	638 CFS

USGS SIR 2014-5030 (REGION 4, 34.8% IMPERVIOUS AREA)
 Hydraulic Design Method HEC-RAS 5.0.6 (I-5986B DRIVING BRANCH I-95)
 Design Tailwater : Q₁₀ 5.0 ft.; Q₂₅ 5.4 ft.; Q₅₀ N/A ft.; Q₁₀₀ 5.8 ft.; Q₅₀₀ 6.1 ft.

INV. IN EL=163.6, INV. OUT EL=163.4, BURIED 1-FOOT
 SIZE & TYPE: 2@6' X 9' RCBC @ STATION 1940.1, APPROX. 17.4' UPSTREAM OF CULVERT.

FREQUENCY	Q (cfs)	Inlet Control		Outlet Control		Remarks	
		H.W.	WSEL	H.W.	WSEL		
10 YR	430	0.64	5.1	169.7	5.9	170.5	OUTLET CONTROL
25 YR	490	0.70	5.6	170.2	6.4	171.0	OUTLET CONTROL
100 YR	570	0.78	6.2	170.8	7.0	171.6	OUTLET CONTROL
500 YR	650	0.85	6.8	171.4	7.6	172.2	OUTLET CONTROL

Is a Floodway Revision Required? N/A Total Proposed Waterway Opening 96 s.f.
 Outlet Velocity (V_o) 7.1 f.p.s. Natural Channel Velocity (V_n) 5.0 f.p.s.
 Required Outlet Protection CLASS I RIPRAP (BANKS ONLY)

INFORMATION TO BE SHOWN ON PLANS
 Design: Discharge 490 c.f.s. Frequency 25 yr. Elev. 171.0 ft.
 Base Flood: Discharge 530 c.f.s. Frequency 100 yr. Elev. 171.6 ft.
 Overtopping: Discharge 1350 c.f.s. Frequency 500+ yr. Elev. 177.1 ft.
 *SP @ 37+12 -Y33- LT (SAG)

-BED MATERIALS: SAND, SILT, GRAVEL
 -NO UPSTREAM OR DOWNSTREAM STRUCTURES
 THAT WERE IN PLACE AT THE TIME THIS
 PROJECT WAS DESIGNED WILL BE ADVERSELY
 IMPACTED BY THIS CULVERT PROJECT

SITE DATA
 Drainage Area 1.27 SQ. MI. Source QL2 LIDAR
 River Basin NEUSE Character RESIDENTIAL; AGRICULTURAL
 Stream Classification (Such as Trout, High Quality Water, etc.) C; NSW
 Data on Existing Structure 2@6'X8' RCBC
 Total Waterway Opening 96 s.f. Waterway Opening Below 100yr. WS EL. 77 s.f.
 Debris Potential: Low Moderate High
 Data on Structures Up and Down Stream US: BRIDGE #449 ON SR 1173; 1@60' CORED SLAB; 10.2' BED TO CROWN
 DS: 2@6'X8' RCBC ON I-40
 Gage Station No. N/A Period of Records N/A
 Max. Discharge N/A c.f.s. Date N/A Frequency N/A

Historical Flood Information:
 DID NOT OT IN HURRICANE MATTHEW(10/2016)FLORENCE(09/2018) RAYMOND HONBARRIER DIV. 4 MAINT. ENGINEER Period of Knowledge .28 yr.
 DID NOT OT IN HURRICANE MATTHEW(10/2016)FLORENCE(09/2018) NEIL GODWIN - DIV. 4 BRIDGE MAINT. SUPERVISOR Knowledge .23 yr.

Allowable HW Elev. 175.6 (1.5' BELOW SP*) ft. Normal Water Surface Elev. 172.4 ft.
 Manning's n : Left O.B. 0.12 Channel .045 Right O.B. 0.12 Obtained From FIELD RECON
 Flood Study/Status N/A Floodway Established? N/A
 Flood Study 100 yr. Discharge N/A c.f.s.; WS Elev.: Floodway N/A ft. Without Floodway N/A ft.

DESIGN DATA
 Hydrological Method USGS SIR 2014-5030 (REGION 4, 34.8% IMPERVIOUS AREA)
 Hydraulic Design Method HEC-RAS 5.0.6 (I-5986B DRIVING BRANCH I-95)
 Design Tailwater : Q₁₀ 5.0 ft.; Q₂₅ 5.4 ft.; Q₅₀ N/A ft.; Q₁₀₀ 5.8 ft.; Q₅₀₀ 6.1 ft.

CULVERT SURVEY & HYDRAULIC DESIGN REPORT
 N. C. DEPARTMENT OF TRANSPORTATION
 DIVISION OF HIGHWAYS
 HYDRAULICS UNIT
 RALEIGH, N. C.

I.D. No. I-5986B Project No. 47532.1.3 Proj. Station 35+91 -Y33-
 County JOHNSTON Stream DRIVING BRANCH Stru. No. C01
 On Highway SR1219 (N. WALTON AVE.) Between SR1211 and DEAD END
 Recommended Structure 2@6'X9' RCBC W/6" BEVELED HW (BURIED 1' BELOW STREAM BED)
 Recommended Width of Roadway 30' SP-SP (NORMAL) Skew 68 DEGREES
 Recommended Location is (Up, At, Down) Stream from Existing Crossing DOWN
 Latitude 35.38440 Longitude -078.52650
 Statewide Tier Regional Tier Sub-Regional Tier
 Bench Mark is BM#7: BENCH TIE IN 17" POPULAR TREE, STA 1391+89 -L-, 187' RT
 N 595120 E 2141144 Elev. 175.42 ft. Datum: NAVD 88
 Temporary Crossing N/A (PROPOSED BOX CULVERT IS DOWNSTREAM OF EXISTING CROSSING)

Designed by: WILL HINES, P.E. Date 1/23/2020
 Assisted by: D. TALBERT, J. HARVEY, M. EDWARDS, F. REESE
 Project Engineer: JOSHUA G. DALTON, P.E.
 Reviewed by: Matthew J. York, P.E.
 SUNGATE DESIGN GROUP, P.A.
 802 JONES FRANKLIN ROAD
 FLEETWOOD, NORTH CAROLINA 27841
 NC COA No. C-0880

Culvert Undercut Quantities
 Box Culvert over Driving Branch Creek



Portland Concrete Box Culvert (2 @ 6 ft x 9 ft)

Foundation Conditioning Material	
Beneath Culvert Footprint	
Single Culvert Inside Width	6
Number of Culverts	2
Number of Culvert Outside Walls	2
Number of Culvert Internal Divisions	1
Thickness of Walls & Divisions	2.00
Total Culvert(s) Outside Width	14.00
Culvert(s) Length (ft)	62.5
Per Structure Memo, UC to Outer + 4 feet	
UC Outside Width (ft)	18.00
UC depth (ft)	1
volume beneath culvert (ft ³)	1125
volume beneath culvert (cy)	41.67
Reqd. Foundation Conditioning Material for Culvert(s) (tons)	79.3
Reqd. Foundation Conditioning Material for Culvert(s) (tons)	79
Per Structure Memo, 1.904 tons/cy	1.904

Per Structure Memo, do not include FCM quantity for standard turned-back wings



Project: I-95 Widening (I-5986B)
Proj. #: 6235-17-048
Date: 3/6/2020

Embankment & Culvert Calculations for Settle3D

Embankment Inputs

Slope:	3.0 (H):1(V)	Skew:	68 deg
Angle:	17.15 deg.	Skewed Slope:	3.24 (H):1(V)
Height:	5 ft	(If culvert is not skewed, leave S8 blank & sheet will calculate as if it is perpendicular (90 deg skew))	
Top Length:	36.8 ft		
Base Length:	69.2 ft		

Equivalent Culvert & Embankment Load Inputs

Culvert

Unit Weight:	150 pcf	Full Outside Width:	14.0 ft
Number:	2		
Inside Width:	6 ft	Equivalent Volume:	2291.7 ft ³
Inside Height:	9 ft	Equivalent Weight:	343.8 kips
Length:	62.5 ft		
Assumed Wall Thickness:	0.67 ft	<i>Equiv. Pressure:</i>	<i>0.393 ksf</i>

Embankment

Unit Weight:	120 pcf	Equivalent Volume:	2780.4 ft ³
Top Length:	36.8 ft	Equivalent Weight:	333.6 kips
Bottom Length:	62.5 ft		
Avg. Height:	4 ft	<i>Equiv. Pressure:</i>	<i>0.381 ksf</i>

Total Equivalent Pressure: 0.774 ksf

Traffic Loading: 240 psf
0.240 ksf
Width: 30 ft

Parameters:








Parameters are based upon soil type, N-value, and lab testing correlations, where applicable. Where lab testings is not applicable, parameters are based on similar soils tested in the project and/or previous knowledge from the geology.

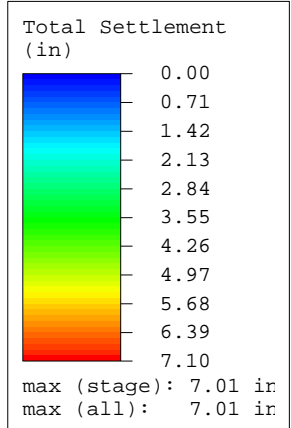
Cc/Cr - Terzaghi & Peck (1967); Cv/Cvr - NAVFAC DM 7.01 Ch. 3 Fig. 4

Es - AASHTO LRFD Table C10.4.6.3-1

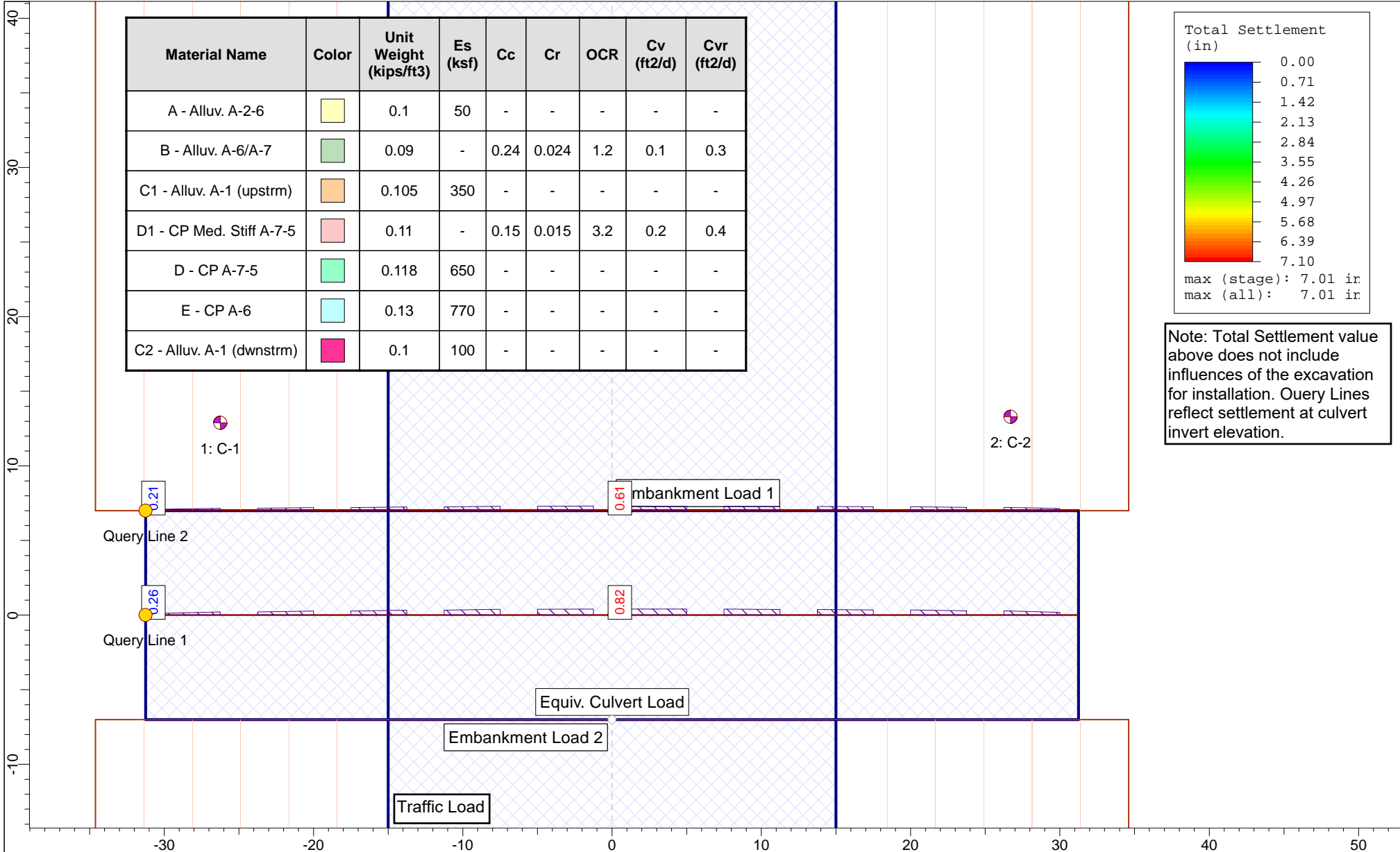
Blue Values are inputs

Black Values are calculations/references

Material Name	Color	Unit Weight (kips/ft3)	Es (ksf)	Cc	Cr	OCR	Cv (ft2/d)	Cvr (ft2/d)
A - Alluv. A-2-6		0.1	50	-	-	-	-	-
B - Alluv. A-6/A-7		0.09	-	0.24	0.024	1.2	0.1	0.3
C1 - Alluv. A-1 (upstrm)		0.105	350	-	-	-	-	-
D1 - CP Med. Stiff A-7-5		0.11	-	0.15	0.015	3.2	0.2	0.4
D - CP A-7-5		0.118	650	-	-	-	-	-
E - CP A-6		0.13	770	-	-	-	-	-
C2 - Alluv. A-1 (dwnstrm)		0.1	100	-	-	-	-	-

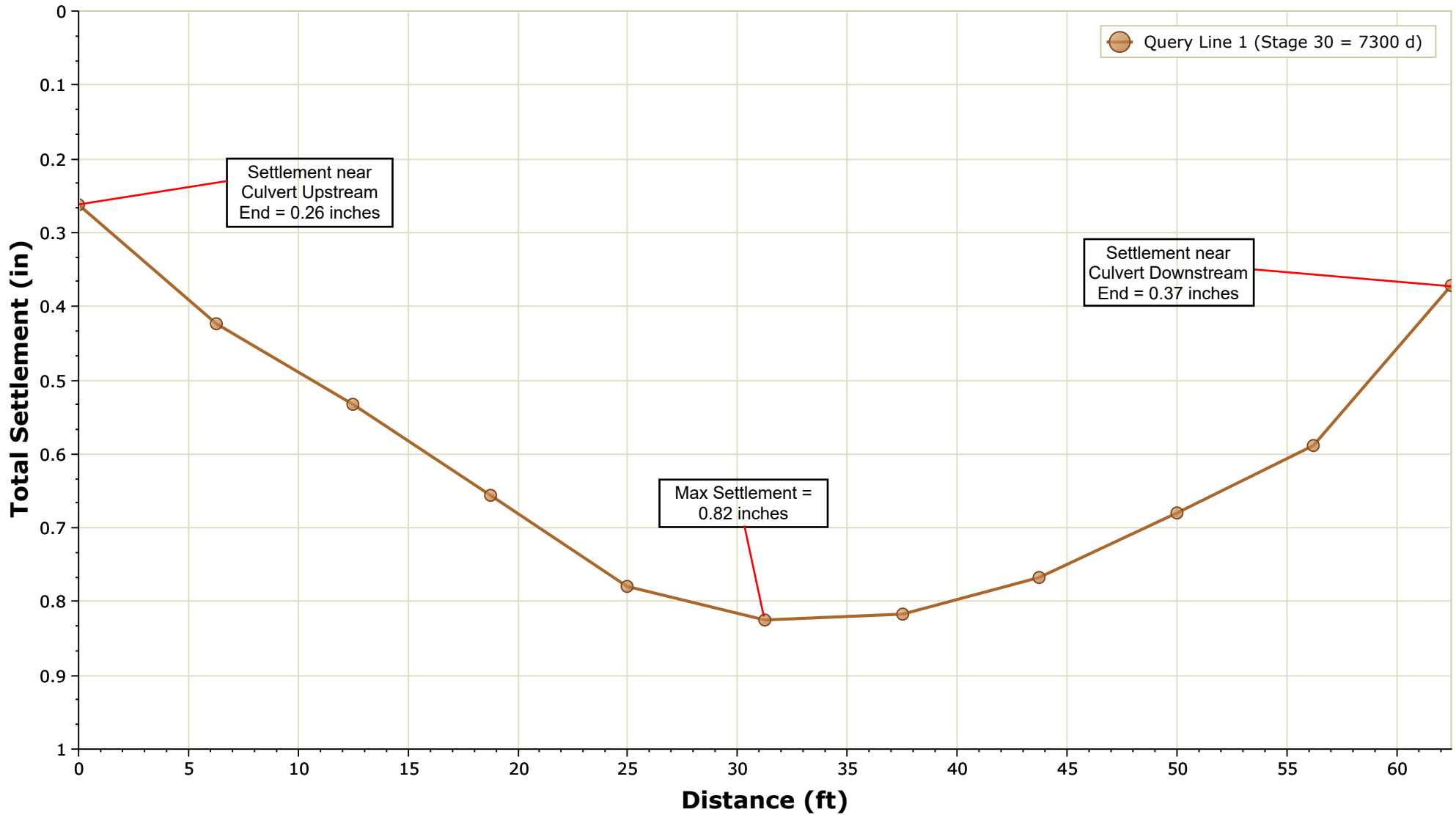


Note: Total Settlement value above does not include influences of the excavation for installation. Query Lines reflect settlement at culvert invert elevation.



Project		I-95					
Analysis		Settlement					
Drawn By	AKA	Project Number	6235-17-048	Company	S&ME	Figure	?
Location	-Y33- Sta 35+91	File Name	Y33_3591_Culv.s3z	Date	3/5/2020		

Distance vs. Total Settlement along Culvert Center Line



Total Settlement at Elevation = 162.5 ft

	Project		I-95		
	Analysis		Settlement		
	Drawn By	AKA	Project Number	6235-17-048	
	Company	S&ME	Figure	?	
Location	-Y33- Sta 35+91	File Name	Y33_3591_Culv.s3z	Date	3/5/2020

Settle3 Analysis Information

I-95

Project Settings

Document Name	Y33_3591_Culv.s3z
Project Title	I-95
Analysis	Settlement
Author	AKA
Company	S&ME
Date Created	3/6/2019, 3:30:56 PM

Comments

?

6235-17-048

-Y33- Sta 35+91

New Culvert

Stress Computation Method	Boussinesq
---------------------------	------------

Time-dependent Consolidation Analysis

Time Units	days
------------	------

Permeability Units	feet/day
--------------------	----------

Minimum settlement ratio for subgrade modulus	0.9
---	-----

Include buoyancy effect when material settles below water table

Use average properties to calculate layered stresses

Improve consolidation accuracy

Ignore negative effective stresses in settlement calculations

Stage Settings

Stage #	Name	Time [days]
1	Stage 1	0
2	Stage 2	1
3	Stage 3	2
4	Stage 4	3
5	Stage 5	4
6	Stage 6	5
7	Stage 7	6
8	Stage 8	7
9	Stage 9	14
10	Stage 10	21
11	Stage 11	30
12	Stage 12	60
13	Stage 13	90
14	Stage 14	120
15	Stage 15	150
16	Stage 16	180
17	Stage 17	210
18	Stage 18	240
19	Stage 19	270
20	Stage 20	300
21	Stage 21	330
22	Stage 22	365
23	Stage 23	730
24	Stage 24	1095
25	Stage 25	1460
26	Stage 26	1825
27	Stage 27	2920
28	Stage 28	3650
29	Stage 29	5475
30	Stage 30	7300

Results

Time taken to compute: 0 seconds

Stage: Stage 1 = 0 d

Data Type	Minimum	Maximum
Total Settlement [in]	0	0
Total Consolidation Settlement [in]	0	0
Virgin Consolidation Settlement [in]	0	0
Recompression Consolidation Settlement [in]	0	0
Immediate Settlement [in]	0	0
Secondary Settlement [in]	0	0
Loading Stress ZZ [ksf]	0	0
Loading Stress XX [ksf]	0	0
Loading Stress YY [ksf]	0	0
Effective Stress ZZ [ksf]	0	1.43788
Effective Stress XX [ksf]	0	1.43788
Effective Stress YY [ksf]	0	1.43788
Total Stress ZZ [ksf]	0	3.30364
Total Stress XX [ksf]	0	3.30364
Total Stress YY [ksf]	0	3.30364
Modulus of Subgrade Reaction (Total) [ksf/ft]	0	0
Modulus of Subgrade Reaction (Immediate) [ksf/ft]	0	0
Modulus of Subgrade Reaction (Consolidation) [ksf/ft]	0	0
Total Strain	0	0
Pore Water Pressure [ksf]	0	1.86576
Excess Pore Water Pressure [ksf]	0	0
Degree of Consolidation [%]	0	0
Pre-consolidation Stress [ksf]	0.00054	2.21208
Over-consolidation Ratio	1	3.8
Void Ratio	0	0.841
Permeability [ft/d]	0	0.235789
Coefficient of Consolidation [ft ² /d]	0	0.4
Hydroconsolidation Settlement [in]	0	0
Average Degree of Consolidation [%]	0	0
Undrained Shear Strength	0	0

Stage: Stage 2 = 1 d

Data Type	Minimum	Maximum
Total Settlement [in]	0	0.375895
Total Consolidation Settlement [in]	-0.0133037	0
Virgin Consolidation Settlement [in]	0	0
Recompression Consolidation Settlement [in]	-0.0133037	0
Immediate Settlement [in]	0	0.376109
Secondary Settlement [in]	0	0
Loading Stress ZZ [ksf]	0	0.774
Loading Stress XX [ksf]	-0.00381059	0.45236
Loading Stress YY [ksf]	0	0.708851
Effective Stress ZZ [ksf]	0	1.43788
Effective Stress XX [ksf]	0	1.45381
Effective Stress YY [ksf]	0	1.45452
Total Stress ZZ [ksf]	0	3.57494
Total Stress XX [ksf]	0	3.57268
Total Stress YY [ksf]	0	3.59666
Modulus of Subgrade Reaction (Total) [ksf/ft]	0	59.8087
Modulus of Subgrade Reaction (Immediate) [ksf/ft]	0	57.0329
Modulus of Subgrade Reaction (Consolidation) [ksf/ft]	0	0
Total Strain	-0.000911934	0.00774
Pore Water Pressure [ksf]	0	2.15895
Excess Pore Water Pressure [ksf]	0	0.774
Degree of Consolidation [%]	0	0
Pre-consolidation Stress [ksf]	0.00054	2.21208
Over-consolidation Ratio	1	3.83599
Void Ratio	0	0.842714
Permeability [ft/d]	0	0.235789
Coefficient of Consolidation [ft ² /d]	0	0.4
Hydroconsolidation Settlement [in]	0	0
Average Degree of Consolidation [%]	0	0
Undrained Shear Strength	0	0

Stage: Stage 3 = 2 d

Data Type	Minimum	Maximum
Total Settlement [in]	0	0.451371
Total Consolidation Settlement [in]	-0.00142163	0.199712
Virgin Consolidation Settlement [in]	0	0.190957
Recompression Consolidation Settlement [in]	-0.00142163	0.0439599
Immediate Settlement [in]	0	0.407825
Secondary Settlement [in]	0	0
Loading Stress ZZ [ksf]	0	0.809594
Loading Stress XX [ksf]	-0.052422	0.532211
Loading Stress YY [ksf]	0.0225721	0.824725
Effective Stress ZZ [ksf]	0	1.37804
Effective Stress XX [ksf]	-0.052422	1.61969
Effective Stress YY [ksf]	0.0225721	1.89891
Total Stress ZZ [ksf]	0	3.64433
Total Stress XX [ksf]	-0.052422	3.75445
Total Stress YY [ksf]	0.0225721	3.81494
Modulus of Subgrade Reaction (Total) [ksf/ft]	0	44.1258
Modulus of Subgrade Reaction (Immediate) [ksf/ft]	0	52.1269
Modulus of Subgrade Reaction (Consolidation) [ksf/ft]	0	330.087
Total Strain	-0.00111148	0.276194
Pore Water Pressure [ksf]	0	2.55654
Excess Pore Water Pressure [ksf]	0	0.7263
Degree of Consolidation [%]	0	23.102
Pre-consolidation Stress [ksf]	0.00054	2.21208
Over-consolidation Ratio	1	3.84331
Void Ratio	0	0.843089
Permeability [ft/d]	0	0.785962
Coefficient of Consolidation [ft ² /d]	0	0.4
Hydroconsolidation Settlement [in]	0	0
Average Degree of Consolidation [%]	0	0
Undrained Shear Strength	-1.30104e-018	0.0387355

Stage: Stage 4 = 3 d

Data Type	Minimum	Maximum
Total Settlement [in]	0	0.886579
Total Consolidation Settlement [in]	-0.00197142	0.708272
Virgin Consolidation Settlement [in]	0	0.666041
Recompression Consolidation Settlement [in]	-0.00197142	0.0698696
Immediate Settlement [in]	0	0.440664
Secondary Settlement [in]	0	0
Loading Stress ZZ [ksf]	5.58541e-005	0.852317
Loading Stress XX [ksf]	-0.0824862	0.609377
Loading Stress YY [ksf]	0.0469876	0.944868
Effective Stress ZZ [ksf]	5.58541e-005	1.38156
Effective Stress XX [ksf]	-0.0824862	1.72346
Effective Stress YY [ksf]	0.0469876	2.05043
Total Stress ZZ [ksf]	5.58541e-005	3.71055
Total Stress XX [ksf]	-0.0824862	3.93831
Total Stress YY [ksf]	0.0469876	4.02979
Modulus of Subgrade Reaction (Total) [ksf/ft]	0	38.8815
Modulus of Subgrade Reaction (Immediate) [ksf/ft]	0	48.3304
Modulus of Subgrade Reaction (Consolidation) [ksf/ft]	0	184.762
Total Strain	-0.0012438	0.281503
Pore Water Pressure [ksf]	0	2.62029
Excess Pore Water Pressure [ksf]	0	0.761446
Degree of Consolidation [%]	0	30.4928
Pre-consolidation Stress [ksf]	0.00054	2.21208
Over-consolidation Ratio	1	3.60659
Void Ratio	0	0.843338
Permeability [ft/d]	0	0.785962
Coefficient of Consolidation [ft ² /d]	0	0.4
Hydroconsolidation Settlement [in]	0	0
Average Degree of Consolidation [%]	0	0
Undrained Shear Strength	0	0.0400098

Stage: Stage 5 = 4 d

Data Type	Minimum	Maximum
Total Settlement [in]	0	1.24064
Total Consolidation Settlement [in]	-0.0014357	0.918477
Virgin Consolidation Settlement [in]	0	0.837593
Recompression Consolidation Settlement [in]	-0.0014357	0.0986428
Immediate Settlement [in]	0	0.473941
Secondary Settlement [in]	0	0
Loading Stress ZZ [ksf]	0.000273412	0.898506
Loading Stress XX [ksf]	-0.0906459	0.661412
Loading Stress YY [ksf]	0.058274	1.06792
Effective Stress ZZ [ksf]	0.000273412	1.38847
Effective Stress XX [ksf]	-0.0906459	1.80651
Effective Stress YY [ksf]	0.0608746	2.20964
Total Stress ZZ [ksf]	0.000273412	3.7727
Total Stress XX [ksf]	-0.0906459	4.12341
Total Stress YY [ksf]	0.0610746	4.23464
Modulus of Subgrade Reaction (Total) [ksf/ft]	0	34.4088
Modulus of Subgrade Reaction (Immediate) [ksf/ft]	0	45.4215
Modulus of Subgrade Reaction (Consolidation) [ksf/ft]	0	148.854
Total Strain	-0.00126446	0.282196
Pore Water Pressure [ksf]	0	2.67802
Excess Pore Water Pressure [ksf]	0	0.812898
Degree of Consolidation [%]	0	38.6631
Pre-consolidation Stress [ksf]	0.000725822	2.21208
Over-consolidation Ratio	1	3.4458
Void Ratio	0	0.843376
Permeability [ft/d]	0	0.785962
Coefficient of Consolidation [ft ² /d]	0	0.4
Hydroconsolidation Settlement [in]	0	0
Average Degree of Consolidation [%]	0	0
Undrained Shear Strength	0	0.0412628

Stage: Stage 6 = 5 d

Data Type	Minimum	Maximum
Total Settlement [in]	0	1.62874
Total Consolidation Settlement [in]	-0.00125618	1.28114
Virgin Consolidation Settlement [in]	0	1.17441
Recompression Consolidation Settlement [in]	-0.00125618	0.114063
Immediate Settlement [in]	0	0.50677
Secondary Settlement [in]	0	0
Loading Stress ZZ [ksf]	0.000626371	0.948061
Loading Stress XX [ksf]	-0.0796754	0.739658
Loading Stress YY [ksf]	0.0521195	1.19173
Effective Stress ZZ [ksf]	0.000626371	1.39861
Effective Stress XX [ksf]	-0.0790157	1.93747
Effective Stress YY [ksf]	0.0547692	2.37334
Total Stress ZZ [ksf]	0.000626371	3.83102
Total Stress XX [ksf]	-0.0790157	4.30925
Total Stress YY [ksf]	0.0549692	4.42558
Modulus of Subgrade Reaction (Total) [ksf/ft]	0	18.0238
Modulus of Subgrade Reaction (Immediate) [ksf/ft]	0	43.2099
Modulus of Subgrade Reaction (Consolidation) [ksf/ft]	0	114.448
Total Strain	-0.000948924	0.282339
Pore Water Pressure [ksf]	0	2.72777
Excess Pore Water Pressure [ksf]	0	0.863634
Degree of Consolidation [%]	0	47.7373
Pre-consolidation Stress [ksf]	0.00108046	2.21208
Over-consolidation Ratio	1	3.42145
Void Ratio	0	0.842782
Permeability [ft/d]	0	0.785962
Coefficient of Consolidation [ft ² /d]	0	0.4
Hydroconsolidation Settlement [in]	0	0
Average Degree of Consolidation [%]	0	0
Undrained Shear Strength	0	0.0565032

Stage: Stage 7 = 6 d

Data Type	Minimum	Maximum
Total Settlement [in]	0	1.928
Total Consolidation Settlement [in]	-0.000925932	1.56141
Virgin Consolidation Settlement [in]	0	1.43732
Recompression Consolidation Settlement [in]	-0.000925932	0.128303
Immediate Settlement [in]	0	0.540567
Secondary Settlement [in]	0	0
Loading Stress ZZ [ksf]	0.00106005	0.997669
Loading Stress XX [ksf]	-0.0933493	0.81937
Loading Stress YY [ksf]	0.0469083	1.31291
Effective Stress ZZ [ksf]	0.00106005	1.41123
Effective Stress XX [ksf]	-0.0926679	2.0905
Effective Stress YY [ksf]	0.0495852	2.53719
Total Stress ZZ [ksf]	0.00106005	3.88379
Total Stress XX [ksf]	-0.0926679	4.49553
Total Stress YY [ksf]	0.0497852	4.59807
Modulus of Subgrade Reaction (Total) [ksf/ft]	0	14.3725
Modulus of Subgrade Reaction (Immediate) [ksf/ft]	0	40.0077
Modulus of Subgrade Reaction (Consolidation) [ksf/ft]	0	0
Total Strain	-0.000691943	0.282335
Pore Water Pressure [ksf]	0	2.76858
Excess Pore Water Pressure [ksf]	0	0.905872
Degree of Consolidation [%]	0	53.9604
Pre-consolidation Stress [ksf]	0.00151567	2.21208
Over-consolidation Ratio	1	3.37271
Void Ratio	0	0.842274
Permeability [ft/d]	0	0.785962
Coefficient of Consolidation [ft ² /d]	0	0.4
Hydroconsolidation Settlement [in]	0	0
Average Degree of Consolidation [%]	0	0
Undrained Shear Strength	0	0.058917

Stage: Stage 8 = 7 d

Data Type	Minimum	Maximum
Total Settlement [in]	0	2.19735
Total Consolidation Settlement [in]	-0.000400691	1.78684
Virgin Consolidation Settlement [in]	0	1.64746
Recompression Consolidation Settlement [in]	-0.000400691	0.149148
Immediate Settlement [in]	0	0.714042
Secondary Settlement [in]	0	0
Loading Stress ZZ [ksf]	0.00232683	1.18714
Loading Stress XX [ksf]	-0.0768665	0.877028
Loading Stress YY [ksf]	0.0636749	1.35085
Effective Stress ZZ [ksf]	0.00232683	1.42543
Effective Stress XX [ksf]	-0.0762268	2.18101
Effective Stress YY [ksf]	0.0663101	2.61928
Total Stress ZZ [ksf]	0.00232683	4.00084
Total Stress XX [ksf]	-0.0762268	4.63068
Total Stress YY [ksf]	0.0665101	4.72433
Modulus of Subgrade Reaction (Total) [ksf/ft]	0	3.23238
Modulus of Subgrade Reaction (Immediate) [ksf/ft]	0	38.7603
Modulus of Subgrade Reaction (Consolidation) [ksf/ft]	0	10.6433
Total Strain	-0.000494192	0.282765
Pore Water Pressure [ksf]	0	2.87109
Excess Pore Water Pressure [ksf]	0	1.05099
Degree of Consolidation [%]	0	55.5245
Pre-consolidation Stress [ksf]	0.00278597	2.21208
Over-consolidation Ratio	1	3.29467
Void Ratio	0	0.84191
Permeability [ft/d]	0	0.785962
Coefficient of Consolidation [ft ² /d]	0	0.4
Hydroconsolidation Settlement [in]	0	0
Average Degree of Consolidation [%]	0	0
Undrained Shear Strength	0	0.0622389

Stage: Stage 9 = 14 d

Data Type	Minimum	Maximum
Total Settlement [in]	0	4.07088
Total Consolidation Settlement [in]	0	3.39003
Virgin Consolidation Settlement [in]	0	3.18481
Recompression Consolidation Settlement [in]	0	0.242987
Immediate Settlement [in]	0	0.714042
Secondary Settlement [in]	0	0
Loading Stress ZZ [ksf]	0.00232683	1.18714
Loading Stress XX [ksf]	-0.0768665	0.877028
Loading Stress YY [ksf]	0.0636749	1.35085
Effective Stress ZZ [ksf]	0.00232683	1.60463
Effective Stress XX [ksf]	-0.0762268	2.35523
Effective Stress YY [ksf]	0.0663101	2.82075
Total Stress ZZ [ksf]	0.00232683	4.00084
Total Stress XX [ksf]	-0.0762268	4.62194
Total Stress YY [ksf]	0.0665101	4.71811
Modulus of Subgrade Reaction (Total) [ksf/ft]	0	1.11568
Modulus of Subgrade Reaction (Immediate) [ksf/ft]	0	38.7603
Modulus of Subgrade Reaction (Consolidation) [ksf/ft]	0	1.44988
Total Strain	4.67194e-005	0.282606
Pore Water Pressure [ksf]	-2.31299e-005	2.68822
Excess Pore Water Pressure [ksf]	-0.000200629	0.831203
Degree of Consolidation [%]	0	78.3383
Pre-consolidation Stress [ksf]	0.00278597	2.21208
Over-consolidation Ratio	1	3.0556
Void Ratio	0	0.840873
Permeability [ft/d]	0	0.785962
Coefficient of Consolidation [ft ² /d]	0	0.4
Hydroconsolidation Settlement [in]	0	0
Average Degree of Consolidation [%]	0	0
Undrained Shear Strength	-5.44848e-005	0.0691228

Stage: Stage 10 = 21 d

Data Type	Minimum	Maximum
Total Settlement [in]	0	4.85416
Total Consolidation Settlement [in]	0	4.17332
Virgin Consolidation Settlement [in]	0	3.94092
Recompression Consolidation Settlement [in]	0	0.272425
Immediate Settlement [in]	0	0.714042
Secondary Settlement [in]	0	0
Loading Stress ZZ [ksf]	0.00232683	1.18714
Loading Stress XX [ksf]	-0.0768665	0.877028
Loading Stress YY [ksf]	0.0636749	1.35085
Effective Stress ZZ [ksf]	0.00232683	1.60766
Effective Stress XX [ksf]	-0.0762268	2.35523
Effective Stress YY [ksf]	0.0663101	2.82075
Total Stress ZZ [ksf]	0.00232683	4.00084
Total Stress XX [ksf]	-0.0762268	4.6187
Total Stress YY [ksf]	0.0665101	4.71811
Modulus of Subgrade Reaction (Total) [ksf/ft]	0	0.909318
Modulus of Subgrade Reaction (Immediate) [ksf/ft]	0	38.7603
Modulus of Subgrade Reaction (Consolidation) [ksf/ft]	0	1.16595
Total Strain	-3.62789e-005	0.282514
Pore Water Pressure [ksf]	-2.84238e-005	2.43337
Excess Pore Water Pressure [ksf]	-0.00118287	0.579586
Degree of Consolidation [%]	0	85.4925
Pre-consolidation Stress [ksf]	0.00278597	2.21208
Over-consolidation Ratio	1	3.05644
Void Ratio	0	0.841067
Permeability [ft/d]	0	0.785962
Coefficient of Consolidation [ft ² /d]	0	0.4
Hydroconsolidation Settlement [in]	0	0
Average Degree of Consolidation [%]	0	0
Undrained Shear Strength	0	0.0691228

Stage: Stage 11 = 30 d

Data Type	Minimum	Maximum
Total Settlement [in]	0	5.45219
Total Consolidation Settlement [in]	0	4.81728
Virgin Consolidation Settlement [in]	0	4.56568
Recompression Consolidation Settlement [in]	0	0.294969
Immediate Settlement [in]	0	0.714042
Secondary Settlement [in]	0	0
Loading Stress ZZ [ksf]	0.00232683	1.18714
Loading Stress XX [ksf]	-0.0768665	0.877028
Loading Stress YY [ksf]	0.0636749	1.35085
Effective Stress ZZ [ksf]	0.00232683	1.82825
Effective Stress XX [ksf]	-0.0762268	2.44357
Effective Stress YY [ksf]	0.0663101	2.82075
Total Stress ZZ [ksf]	0.00232683	4.00084
Total Stress XX [ksf]	-0.0762268	4.61616
Total Stress YY [ksf]	0.0665101	4.71811
Modulus of Subgrade Reaction (Total) [ksf/ft]	0	0.822339
Modulus of Subgrade Reaction (Immediate) [ksf/ft]	0	38.7603
Modulus of Subgrade Reaction (Consolidation) [ksf/ft]	0	0.982844
Total Strain	-0.000134145	0.282428
Pore Water Pressure [ksf]	-3.13943e-005	2.20373
Excess Pore Water Pressure [ksf]	0	0.337968
Degree of Consolidation [%]	0	90.8851
Pre-consolidation Stress [ksf]	0.00278597	2.21208
Over-consolidation Ratio	1	3.05713
Void Ratio	0	0.841247
Permeability [ft/d]	0	0.785962
Coefficient of Consolidation [ft ² /d]	0	0.4
Hydroconsolidation Settlement [in]	0	0
Average Degree of Consolidation [%]	0	0
Undrained Shear Strength	0	0.0691228

Stage: Stage 12 = 60 d

Data Type	Minimum	Maximum
Total Settlement [in]	0	6.38239
Total Consolidation Settlement [in]	0	5.77051
Virgin Consolidation Settlement [in]	0	5.49374
Recompression Consolidation Settlement [in]	0	0.314742
Immediate Settlement [in]	0	0.714042
Secondary Settlement [in]	0	0
Loading Stress ZZ [ksf]	0.00232683	1.18714
Loading Stress XX [ksf]	-0.0768665	0.877028
Loading Stress YY [ksf]	0.0636749	1.35085
Effective Stress ZZ [ksf]	0.00232683	2.12202
Effective Stress XX [ksf]	-0.0762268	2.73382
Effective Stress YY [ksf]	0.0663101	2.82747
Total Stress ZZ [ksf]	0.00232683	4.00084
Total Stress XX [ksf]	-0.0762268	4.61263
Total Stress YY [ksf]	0.0665101	4.71811
Modulus of Subgrade Reaction (Total) [ksf/ft]	0	0.699234
Modulus of Subgrade Reaction (Immediate) [ksf/ft]	0	38.7603
Modulus of Subgrade Reaction (Consolidation) [ksf/ft]	0	0.816282
Total Strain	-0.000263605	0.282272
Pore Water Pressure [ksf]	-3.43938e-005	1.94977
Excess Pore Water Pressure [ksf]	-0.00106	0.12163
Degree of Consolidation [%]	0	98.8333
Pre-consolidation Stress [ksf]	0.00278597	2.21208
Over-consolidation Ratio	1	3.05805
Void Ratio	0	0.841485
Permeability [ft/d]	0	0.785962
Coefficient of Consolidation [ft ² /d]	0	0.4
Hydroconsolidation Settlement [in]	0	0
Average Degree of Consolidation [%]	0	0
Undrained Shear Strength	0	0.0691228

Stage: Stage 13 = 90 d

Data Type	Minimum	Maximum
Total Settlement [in]	0	6.75415
Total Consolidation Settlement [in]	0	6.14226
Virgin Consolidation Settlement [in]	0	5.85955
Recompression Consolidation Settlement [in]	0	0.316787
Immediate Settlement [in]	0	0.714042
Secondary Settlement [in]	0	0
Loading Stress ZZ [ksf]	0.00232683	1.18714
Loading Stress XX [ksf]	-0.0768665	0.877028
Loading Stress YY [ksf]	0.0636749	1.35085
Effective Stress ZZ [ksf]	0.00232683	2.15017
Effective Stress XX [ksf]	-0.0762268	2.7609
Effective Stress YY [ksf]	0.0663101	2.85455
Total Stress ZZ [ksf]	0.00232683	4.00084
Total Stress XX [ksf]	-0.0762268	4.61157
Total Stress YY [ksf]	0.0665101	4.71811
Modulus of Subgrade Reaction (Total) [ksf/ft]	0	0.672658
Modulus of Subgrade Reaction (Immediate) [ksf/ft]	0	38.7603
Modulus of Subgrade Reaction (Consolidation) [ksf/ft]	0	0.786948
Total Strain	-0.000290392	0.282199
Pore Water Pressure [ksf]	-3.52083e-005	1.88664
Excess Pore Water Pressure [ksf]	-0.00251507	0.054006
Degree of Consolidation [%]	0	99.8677
Pre-consolidation Stress [ksf]	0.00278597	2.21208
Over-consolidation Ratio	1	3.05827
Void Ratio	0	0.841535
Permeability [ft/d]	0	0.785962
Coefficient of Consolidation [ft ² /d]	0	0.4
Hydroconsolidation Settlement [in]	0	0
Average Degree of Consolidation [%]	0	0
Undrained Shear Strength	0	0.0691228

Stage: Stage 14 = 120 d

Data Type	Minimum	Maximum
Total Settlement [in]	0	6.90273
Total Consolidation Settlement [in]	0	6.29084
Virgin Consolidation Settlement [in]	0	6.00675
Recompression Consolidation Settlement [in]	0	0.317028
Immediate Settlement [in]	0	0.714042
Secondary Settlement [in]	0	0
Loading Stress ZZ [ksf]	0.00232683	1.18714
Loading Stress XX [ksf]	-0.0768665	0.877028
Loading Stress YY [ksf]	0.0636749	1.35085
Effective Stress ZZ [ksf]	0.00232683	2.15398
Effective Stress XX [ksf]	-0.0762268	2.76436
Effective Stress YY [ksf]	0.0663101	2.858
Total Stress ZZ [ksf]	0.00232683	4.00084
Total Stress XX [ksf]	-0.0762268	4.61121
Total Stress YY [ksf]	0.0665101	4.71811
Modulus of Subgrade Reaction (Total) [ksf/ft]	0	0.665111
Modulus of Subgrade Reaction (Immediate) [ksf/ft]	0	38.7603
Modulus of Subgrade Reaction (Consolidation) [ksf/ft]	0	0.779868
Total Strain	-0.000299798	0.282165
Pore Water Pressure [ksf]	-3.55e-005	1.87095
Excess Pore Water Pressure [ksf]	-0.00562164	0.0231892
Degree of Consolidation [%]	0	99.9845
Pre-consolidation Stress [ksf]	0.00278597	2.21208
Over-consolidation Ratio	1	3.05833
Void Ratio	0	0.841552
Permeability [ft/d]	0	0.785962
Coefficient of Consolidation [ft ² /d]	0	0.4
Hydroconsolidation Settlement [in]	0	0
Average Degree of Consolidation [%]	0	0
Undrained Shear Strength	0	0.0691626

Stage: Stage 15 = 150 d

Data Type	Minimum	Maximum
Total Settlement [in]	0	6.96467
Total Consolidation Settlement [in]	0	6.35278
Virgin Consolidation Settlement [in]	0	6.06834
Recompression Consolidation Settlement [in]	0	0.317066
Immediate Settlement [in]	0	0.714042
Secondary Settlement [in]	0	0
Loading Stress ZZ [ksf]	0.00232683	1.18714
Loading Stress XX [ksf]	-0.0768665	0.877028
Loading Stress YY [ksf]	0.0636749	1.35085
Effective Stress ZZ [ksf]	0.00232683	2.15459
Effective Stress XX [ksf]	-0.0762268	2.76484
Effective Stress YY [ksf]	0.0663101	2.85849
Total Stress ZZ [ksf]	0.00232683	4.00084
Total Stress XX [ksf]	-0.0762268	4.61109
Total Stress YY [ksf]	0.0665101	4.71811
Modulus of Subgrade Reaction (Total) [ksf/ft]	0	0.662816
Modulus of Subgrade Reaction (Immediate) [ksf/ft]	0	38.7603
Modulus of Subgrade Reaction (Consolidation) [ksf/ft]	0	0.778034
Total Strain	-0.00030356	0.282149
Pore Water Pressure [ksf]	-3.56276e-005	1.86705
Excess Pore Water Pressure [ksf]	-0.00258401	0.00994969
Degree of Consolidation [%]	0	99.9982
Pre-consolidation Stress [ksf]	0.00278597	2.21208
Over-consolidation Ratio	1	3.05834
Void Ratio	0	0.841559
Permeability [ft/d]	0	0.785962
Coefficient of Consolidation [ft ² /d]	0	0.4
Hydroconsolidation Settlement [in]	0	0
Average Degree of Consolidation [%]	0	0
Undrained Shear Strength	0	0.0691735

Stage: Stage 16 = 180 d

Data Type	Minimum	Maximum
Total Settlement [in]	0	6.99108
Total Consolidation Settlement [in]	0	6.37919
Virgin Consolidation Settlement [in]	0	6.09466
Recompression Consolidation Settlement [in]	0	0.317076
Immediate Settlement [in]	0	0.714042
Secondary Settlement [in]	0	0
Loading Stress ZZ [ksf]	0.00232683	1.18714
Loading Stress XX [ksf]	-0.0768665	0.877028
Loading Stress YY [ksf]	0.0636749	1.35085
Effective Stress ZZ [ksf]	0.00232683	2.1547
Effective Stress XX [ksf]	-0.0762268	2.76491
Effective Stress YY [ksf]	0.0663101	2.85856
Total Stress ZZ [ksf]	0.00232683	4.00084
Total Stress XX [ksf]	-0.0762268	4.61104
Total Stress YY [ksf]	0.0665101	4.71811
Modulus of Subgrade Reaction (Total) [ksf/ft]	0	0.662105
Modulus of Subgrade Reaction (Immediate) [ksf/ft]	0	38.7603
Modulus of Subgrade Reaction (Consolidation) [ksf/ft]	0	0.77755
Total Strain	-0.00030519	0.28214
Pore Water Pressure [ksf]	-3.80176e-005	1.86608
Excess Pore Water Pressure [ksf]	-0.00561128	0.00421342
Degree of Consolidation [%]	0	99.9999
Pre-consolidation Stress [ksf]	0.00278597	2.21208
Over-consolidation Ratio	1	3.05834
Void Ratio	0	0.841562
Permeability [ft/d]	0	0.785962
Coefficient of Consolidation [ft ² /d]	0	0.4
Hydroconsolidation Settlement [in]	0	0
Average Degree of Consolidation [%]	0	0
Undrained Shear Strength	0	0.069175

Stage: Stage 17 = 210 d

Data Type	Minimum	Maximum
Total Settlement [in]	0	7.00199
Total Consolidation Settlement [in]	0	6.3901
Virgin Consolidation Settlement [in]	0	6.10554
Recompression Consolidation Settlement [in]	0	0.317079
Immediate Settlement [in]	0	0.714042
Secondary Settlement [in]	0	0
Loading Stress ZZ [ksf]	0.00232683	1.18714
Loading Stress XX [ksf]	-0.0768665	0.877028
Loading Stress YY [ksf]	0.0636749	1.35085
Effective Stress ZZ [ksf]	0.00232683	2.15473
Effective Stress XX [ksf]	-0.0762268	2.76492
Effective Stress YY [ksf]	0.0663101	2.85857
Total Stress ZZ [ksf]	0.00232683	4.00084
Total Stress XX [ksf]	-0.0762268	4.61103
Total Stress YY [ksf]	0.0665101	4.71811
Modulus of Subgrade Reaction (Total) [ksf/ft]	0	0.661883
Modulus of Subgrade Reaction (Immediate) [ksf/ft]	0	38.7603
Modulus of Subgrade Reaction (Consolidation) [ksf/ft]	0	0.777422
Total Strain	-0.000306001	0.282136
Pore Water Pressure [ksf]	-3.91476e-005	1.86584
Excess Pore Water Pressure [ksf]	-0.00269724	0.00556153
Degree of Consolidation [%]	0	100
Pre-consolidation Stress [ksf]	0.00278597	2.21208
Over-consolidation Ratio	1	3.05834
Void Ratio	0	0.841563
Permeability [ft/d]	0	0.785962
Coefficient of Consolidation [ft ² /d]	0	0.4
Hydroconsolidation Settlement [in]	0	0
Average Degree of Consolidation [%]	0	0
Undrained Shear Strength	0	0.0691753

Stage: Stage 18 = 240 d

Data Type	Minimum	Maximum
Total Settlement [in]	0	7.00653
Total Consolidation Settlement [in]	0	6.39464
Virgin Consolidation Settlement [in]	0	6.11009
Recompression Consolidation Settlement [in]	0	0.31708
Immediate Settlement [in]	0	0.714042
Secondary Settlement [in]	0	0
Loading Stress ZZ [ksf]	0.00232683	1.18714
Loading Stress XX [ksf]	-0.0768665	0.877028
Loading Stress YY [ksf]	0.0636749	1.35085
Effective Stress ZZ [ksf]	0.00232683	2.15474
Effective Stress XX [ksf]	-0.0762268	2.76492
Effective Stress YY [ksf]	0.0663101	2.85857
Total Stress ZZ [ksf]	0.00232683	4.00084
Total Stress XX [ksf]	-0.0762268	4.61102
Total Stress YY [ksf]	0.0665101	4.71811
Modulus of Subgrade Reaction (Total) [ksf/ft]	0	0.661814
Modulus of Subgrade Reaction (Immediate) [ksf/ft]	0	38.7603
Modulus of Subgrade Reaction (Consolidation) [ksf/ft]	0	0.777388
Total Strain	-0.000306697	0.282134
Pore Water Pressure [ksf]	-3.96047e-005	1.86578
Excess Pore Water Pressure [ksf]	-0.00538007	0.00270954
Degree of Consolidation [%]	0	100
Pre-consolidation Stress [ksf]	0.00278597	2.21208
Over-consolidation Ratio	1	3.05834
Void Ratio	0	0.841565
Permeability [ft/d]	0	0.785962
Coefficient of Consolidation [ft ² /d]	0	0.4
Hydroconsolidation Settlement [in]	0	0
Average Degree of Consolidation [%]	0	0
Undrained Shear Strength	0	0.0691753

Stage: Stage 19 = 270 d

Data Type	Minimum	Maximum
Total Settlement [in]	0	7.0085
Total Consolidation Settlement [in]	0	6.39661
Virgin Consolidation Settlement [in]	0	6.11205
Recompression Consolidation Settlement [in]	0	0.317081
Immediate Settlement [in]	0	0.714042
Secondary Settlement [in]	0	0
Loading Stress ZZ [ksf]	0.00232683	1.18714
Loading Stress XX [ksf]	-0.0768665	0.877028
Loading Stress YY [ksf]	0.0636749	1.35085
Effective Stress ZZ [ksf]	0.00232683	2.15474
Effective Stress XX [ksf]	-0.0762268	2.76492
Effective Stress YY [ksf]	0.0663101	2.85857
Total Stress ZZ [ksf]	0.00232683	4.00084
Total Stress XX [ksf]	-0.0762268	4.61102
Total Stress YY [ksf]	0.0665101	4.71811
Modulus of Subgrade Reaction (Total) [ksf/ft]	0	0.661792
Modulus of Subgrade Reaction (Immediate) [ksf/ft]	0	38.7603
Modulus of Subgrade Reaction (Consolidation) [ksf/ft]	0	0.777379
Total Strain	-0.000307032	0.282133
Pore Water Pressure [ksf]	-3.97897e-005	1.86576
Excess Pore Water Pressure [ksf]	-0.00267732	0.00525408
Degree of Consolidation [%]	0	100
Pre-consolidation Stress [ksf]	0.00278597	2.21208
Over-consolidation Ratio	1	3.05834
Void Ratio	0	0.841565
Permeability [ft/d]	0	0.785962
Coefficient of Consolidation [ft ² /d]	0	0.4
Hydroconsolidation Settlement [in]	0	0
Average Degree of Consolidation [%]	0	0
Undrained Shear Strength	0	0.0691753

Stage: Stage 20 = 300 d

Data Type	Minimum	Maximum
Total Settlement [in]	0	7.00934
Total Consolidation Settlement [in]	0	6.39745
Virgin Consolidation Settlement [in]	0	6.11289
Recompression Consolidation Settlement [in]	0	0.317081
Immediate Settlement [in]	0	0.714042
Secondary Settlement [in]	0	0
Loading Stress ZZ [ksf]	0.00232683	1.18714
Loading Stress XX [ksf]	-0.0768665	0.877028
Loading Stress YY [ksf]	0.0636749	1.35085
Effective Stress ZZ [ksf]	0.00232683	2.15474
Effective Stress XX [ksf]	-0.0762268	2.76492
Effective Stress YY [ksf]	0.0663101	2.85857
Total Stress ZZ [ksf]	0.00232683	4.00084
Total Stress XX [ksf]	-0.0762268	4.61102
Total Stress YY [ksf]	0.0665101	4.71811
Modulus of Subgrade Reaction (Total) [ksf/ft]	0	0.661786
Modulus of Subgrade Reaction (Immediate) [ksf/ft]	0	38.7603
Modulus of Subgrade Reaction (Consolidation) [ksf/ft]	0	0.777376
Total Strain	-0.000307194	0.282133
Pore Water Pressure [ksf]	-3.98646e-005	1.86576
Excess Pore Water Pressure [ksf]	-0.00510218	0.00236932
Degree of Consolidation [%]	0	100
Pre-consolidation Stress [ksf]	0.00278597	2.21208
Over-consolidation Ratio	1	3.05834
Void Ratio	0	0.841566
Permeability [ft/d]	0	0.785962
Coefficient of Consolidation [ft ² /d]	0	0.4
Hydroconsolidation Settlement [in]	0	0
Average Degree of Consolidation [%]	0	0
Undrained Shear Strength	0	0.0691753

Stage: Stage 21 = 330 d

Data Type	Minimum	Maximum
Total Settlement [in]	0	7.0097
Total Consolidation Settlement [in]	0	6.39782
Virgin Consolidation Settlement [in]	0	6.11325
Recompression Consolidation Settlement [in]	0	0.317081
Immediate Settlement [in]	0	0.714042
Secondary Settlement [in]	0	0
Loading Stress ZZ [ksf]	0.00232683	1.18714
Loading Stress XX [ksf]	-0.0768665	0.877028
Loading Stress YY [ksf]	0.0636749	1.35085
Effective Stress ZZ [ksf]	0.00232683	2.15474
Effective Stress XX [ksf]	-0.0762268	2.76492
Effective Stress YY [ksf]	0.0663101	2.85857
Total Stress ZZ [ksf]	0.00232683	4.00084
Total Stress XX [ksf]	-0.0762268	4.61102
Total Stress YY [ksf]	0.0665101	4.71811
Modulus of Subgrade Reaction (Total) [ksf/ft]	0	0.661783
Modulus of Subgrade Reaction (Immediate) [ksf/ft]	0	38.7603
Modulus of Subgrade Reaction (Consolidation) [ksf/ft]	0	0.777376
Total Strain	-0.000307272	0.282133
Pore Water Pressure [ksf]	-3.98949e-005	1.86576
Excess Pore Water Pressure [ksf]	-0.00264463	0.00496218
Degree of Consolidation [%]	0	100
Pre-consolidation Stress [ksf]	0.00278597	2.21208
Over-consolidation Ratio	1	3.05834
Void Ratio	0	0.841566
Permeability [ft/d]	0	0.785962
Coefficient of Consolidation [ft ² /d]	0	0.4
Hydroconsolidation Settlement [in]	0	0
Average Degree of Consolidation [%]	0	0
Undrained Shear Strength	0	0.0691753

Stage: Stage 22 = 365 d

Data Type	Minimum	Maximum
Total Settlement [in]	0	7.00988
Total Consolidation Settlement [in]	0	6.39799
Virgin Consolidation Settlement [in]	0	6.11342
Recompression Consolidation Settlement [in]	0	0.317081
Immediate Settlement [in]	0	0.714042
Secondary Settlement [in]	0	0
Loading Stress ZZ [ksf]	0.00232683	1.18714
Loading Stress XX [ksf]	-0.0768665	0.877028
Loading Stress YY [ksf]	0.0636749	1.35085
Effective Stress ZZ [ksf]	0.00232683	2.15474
Effective Stress XX [ksf]	-0.0762268	2.76492
Effective Stress YY [ksf]	0.0663101	2.85857
Total Stress ZZ [ksf]	0.00232683	4.00084
Total Stress XX [ksf]	-0.0762268	4.61102
Total Stress YY [ksf]	0.0665101	4.71811
Modulus of Subgrade Reaction (Total) [ksf/ft]	0	0.661783
Modulus of Subgrade Reaction (Immediate) [ksf/ft]	0	38.7603
Modulus of Subgrade Reaction (Consolidation) [ksf/ft]	0	0.777375
Total Strain	-0.000307314	0.282133
Pore Water Pressure [ksf]	-3.99081e-005	1.86576
Excess Pore Water Pressure [ksf]	-0.0048043	0.00227044
Degree of Consolidation [%]	0	100
Pre-consolidation Stress [ksf]	0.00278597	2.21208
Over-consolidation Ratio	1	3.05834
Void Ratio	0	0.841566
Permeability [ft/d]	0	0.785962
Coefficient of Consolidation [ft ² /d]	0	0.4
Hydroconsolidation Settlement [in]	0	0
Average Degree of Consolidation [%]	0	0
Undrained Shear Strength	0	0.0691753

Stage: Stage 23 = 730 d

Data Type	Minimum	Maximum
Total Settlement [in]	0	7.00998
Total Consolidation Settlement [in]	0	6.39809
Virgin Consolidation Settlement [in]	0	6.11352
Recompression Consolidation Settlement [in]	0	0.317081
Immediate Settlement [in]	0	0.714042
Secondary Settlement [in]	0	0
Loading Stress ZZ [ksf]	0.00232683	1.18714
Loading Stress XX [ksf]	-0.0768665	0.877028
Loading Stress YY [ksf]	0.0636749	1.35085
Effective Stress ZZ [ksf]	0.00232683	2.15474
Effective Stress XX [ksf]	-0.0762268	2.76492
Effective Stress YY [ksf]	0.0663101	2.85857
Total Stress ZZ [ksf]	0.00232683	4.00084
Total Stress XX [ksf]	-0.0762268	4.61102
Total Stress YY [ksf]	0.0665101	4.71811
Modulus of Subgrade Reaction (Total) [ksf/ft]	0	0.661782
Modulus of Subgrade Reaction (Immediate) [ksf/ft]	0	38.7603
Modulus of Subgrade Reaction (Consolidation) [ksf/ft]	0	0.777375
Total Strain	-0.000307346	0.282133
Pore Water Pressure [ksf]	-3.99155e-005	1.86576
Excess Pore Water Pressure [ksf]	-0.00436792	0.00212855
Degree of Consolidation [%]	0	100
Pre-consolidation Stress [ksf]	0.00278597	2.21208
Over-consolidation Ratio	1	3.05834
Void Ratio	0	0.841566
Permeability [ft/d]	0	0.785962
Coefficient of Consolidation [ft ² /d]	0	0.4
Hydroconsolidation Settlement [in]	0	0
Average Degree of Consolidation [%]	0	0
Undrained Shear Strength	0	0.0691753

Stage: Stage 24 = 1095 d

Data Type	Minimum	Maximum
Total Settlement [in]	0	7.00998
Total Consolidation Settlement [in]	0	6.39809
Virgin Consolidation Settlement [in]	0	6.11352
Recompression Consolidation Settlement [in]	0	0.317081
Immediate Settlement [in]	0	0.714042
Secondary Settlement [in]	0	0
Loading Stress ZZ [ksf]	0.00232683	1.18714
Loading Stress XX [ksf]	-0.0768665	0.877028
Loading Stress YY [ksf]	0.0636749	1.35085
Effective Stress ZZ [ksf]	0.00232683	2.15474
Effective Stress XX [ksf]	-0.0762268	2.76492
Effective Stress YY [ksf]	0.0663101	2.85857
Total Stress ZZ [ksf]	0.00232683	4.00084
Total Stress XX [ksf]	-0.0762268	4.61102
Total Stress YY [ksf]	0.0665101	4.71811
Modulus of Subgrade Reaction (Total) [ksf/ft]	0	0.661782
Modulus of Subgrade Reaction (Immediate) [ksf/ft]	0	38.7603
Modulus of Subgrade Reaction (Consolidation) [ksf/ft]	0	0.777375
Total Strain	-0.000307346	0.282133
Pore Water Pressure [ksf]	-3.99155e-005	1.86576
Excess Pore Water Pressure [ksf]	-0.00257931	0.00428378
Degree of Consolidation [%]	0	100
Pre-consolidation Stress [ksf]	0.00278597	2.21208
Over-consolidation Ratio	1	3.05834
Void Ratio	0	0.841566
Permeability [ft/d]	0	0.785962
Coefficient of Consolidation [ft ² /d]	0	0.4
Hydroconsolidation Settlement [in]	0	0
Average Degree of Consolidation [%]	0	0
Undrained Shear Strength	0	0.0691753

Stage: Stage 25 = 1460 d

Data Type	Minimum	Maximum
Total Settlement [in]	0	7.00998
Total Consolidation Settlement [in]	0	6.39809
Virgin Consolidation Settlement [in]	0	6.11352
Recompression Consolidation Settlement [in]	0	0.317081
Immediate Settlement [in]	0	0.714042
Secondary Settlement [in]	0	0
Loading Stress ZZ [ksf]	0.00232683	1.18714
Loading Stress XX [ksf]	-0.0768665	0.877028
Loading Stress YY [ksf]	0.0636749	1.35085
Effective Stress ZZ [ksf]	0.00232683	2.15474
Effective Stress XX [ksf]	-0.0762268	2.76492
Effective Stress YY [ksf]	0.0663101	2.85857
Total Stress ZZ [ksf]	0.00232683	4.00084
Total Stress XX [ksf]	-0.0762268	4.61102
Total Stress YY [ksf]	0.0665101	4.71811
Modulus of Subgrade Reaction (Total) [ksf/ft]	0	0.661782
Modulus of Subgrade Reaction (Immediate) [ksf/ft]	0	38.7603
Modulus of Subgrade Reaction (Consolidation) [ksf/ft]	0	0.777375
Total Strain	-0.000307346	0.282133
Pore Water Pressure [ksf]	-3.99155e-005	1.86576
Excess Pore Water Pressure [ksf]	-0.00424207	0.00211264
Degree of Consolidation [%]	0	100
Pre-consolidation Stress [ksf]	0.00278597	2.21208
Over-consolidation Ratio	1	3.05834
Void Ratio	0	0.841566
Permeability [ft/d]	0	0.785962
Coefficient of Consolidation [ft ² /d]	0	0.4
Hydroconsolidation Settlement [in]	0	0
Average Degree of Consolidation [%]	0	0
Undrained Shear Strength	0	0.0691753

Stage: Stage 26 = 1825 d

Data Type	Minimum	Maximum
Total Settlement [in]	0	7.00997
Total Consolidation Settlement [in]	0	6.39808
Virgin Consolidation Settlement [in]	0	6.11352
Recompression Consolidation Settlement [in]	0	0.317081
Immediate Settlement [in]	0	0.714042
Secondary Settlement [in]	0	0
Loading Stress ZZ [ksf]	0.00232683	1.18714
Loading Stress XX [ksf]	-0.0768665	0.877028
Loading Stress YY [ksf]	0.0636749	1.35085
Effective Stress ZZ [ksf]	0.00232683	2.15474
Effective Stress XX [ksf]	-0.0762268	2.76492
Effective Stress YY [ksf]	0.0663101	2.85857
Total Stress ZZ [ksf]	0.00232683	4.00084
Total Stress XX [ksf]	-0.0762268	4.61102
Total Stress YY [ksf]	0.0665101	4.71811
Modulus of Subgrade Reaction (Total) [ksf/ft]	0	0.661782
Modulus of Subgrade Reaction (Immediate) [ksf/ft]	0	38.7603
Modulus of Subgrade Reaction (Consolidation) [ksf/ft]	0	0.777375
Total Strain	-0.000307346	0.282133
Pore Water Pressure [ksf]	-3.99155e-005	1.86576
Excess Pore Water Pressure [ksf]	-0.00210818	0.00422129
Degree of Consolidation [%]	0	100
Pre-consolidation Stress [ksf]	0.00278597	2.21208
Over-consolidation Ratio	1	3.05834
Void Ratio	0	0.841566
Permeability [ft/d]	0	0.785962
Coefficient of Consolidation [ft ² /d]	0	0.4
Hydroconsolidation Settlement [in]	0	0
Average Degree of Consolidation [%]	0	0
Undrained Shear Strength	0	0.0691753

Stage: Stage 27 = 2920 d

Data Type	Minimum	Maximum
Total Settlement [in]	0	7.00997
Total Consolidation Settlement [in]	0	6.39808
Virgin Consolidation Settlement [in]	0	6.11352
Recompression Consolidation Settlement [in]	0	0.317081
Immediate Settlement [in]	0	0.714042
Secondary Settlement [in]	0	0
Loading Stress ZZ [ksf]	0.00232683	1.18714
Loading Stress XX [ksf]	-0.0768665	0.877028
Loading Stress YY [ksf]	0.0636749	1.35085
Effective Stress ZZ [ksf]	0.00232683	2.15474
Effective Stress XX [ksf]	-0.0762268	2.76492
Effective Stress YY [ksf]	0.0663101	2.85857
Total Stress ZZ [ksf]	0.00232683	4.00084
Total Stress XX [ksf]	-0.0762268	4.61102
Total Stress YY [ksf]	0.0665101	4.71811
Modulus of Subgrade Reaction (Total) [ksf/ft]	0	0.661782
Modulus of Subgrade Reaction (Immediate) [ksf/ft]	0	38.7603
Modulus of Subgrade Reaction (Consolidation) [ksf/ft]	0	0.777375
Total Strain	-0.000307346	0.282133
Pore Water Pressure [ksf]	-3.99155e-005	1.86576
Excess Pore Water Pressure [ksf]	-0.0041866	0.0025737
Degree of Consolidation [%]	0	100
Pre-consolidation Stress [ksf]	0.00278597	2.21208
Over-consolidation Ratio	1	3.05834
Void Ratio	0	0.841566
Permeability [ft/d]	0	0.785962
Coefficient of Consolidation [ft ² /d]	0	0.4
Hydroconsolidation Settlement [in]	0	0
Average Degree of Consolidation [%]	0	0
Undrained Shear Strength	0	0.0691753

Stage: Stage 28 = 3650 d

Data Type	Minimum	Maximum
Total Settlement [in]	0	7.00998
Total Consolidation Settlement [in]	0	6.39809
Virgin Consolidation Settlement [in]	0	6.11352
Recompression Consolidation Settlement [in]	0	0.317081
Immediate Settlement [in]	0	0.714042
Secondary Settlement [in]	0	0
Loading Stress ZZ [ksf]	0.00232683	1.18714
Loading Stress XX [ksf]	-0.0768665	0.877028
Loading Stress YY [ksf]	0.0636749	1.35085
Effective Stress ZZ [ksf]	0.00232683	2.15474
Effective Stress XX [ksf]	-0.0762268	2.76492
Effective Stress YY [ksf]	0.0663101	2.85857
Total Stress ZZ [ksf]	0.00232683	4.00084
Total Stress XX [ksf]	-0.0762268	4.61102
Total Stress YY [ksf]	0.0665101	4.71811
Modulus of Subgrade Reaction (Total) [ksf/ft]	0	0.661782
Modulus of Subgrade Reaction (Immediate) [ksf/ft]	0	38.7603
Modulus of Subgrade Reaction (Consolidation) [ksf/ft]	0	0.777375
Total Strain	-0.000307346	0.282133
Pore Water Pressure [ksf]	-3.99155e-005	1.86576
Excess Pore Water Pressure [ksf]	-0.00418063	0.00209615
Degree of Consolidation [%]	0	100
Pre-consolidation Stress [ksf]	0.00278597	2.21208
Over-consolidation Ratio	1	3.05834
Void Ratio	0	0.841566
Permeability [ft/d]	0	0.785962
Coefficient of Consolidation [ft ² /d]	0	0.4
Hydroconsolidation Settlement [in]	0	0
Average Degree of Consolidation [%]	0	0
Undrained Shear Strength	0	0.0691753

Stage: Stage 29 = 5475 d

Data Type	Minimum	Maximum
Total Settlement [in]	0	7.00997
Total Consolidation Settlement [in]	0	6.39808
Virgin Consolidation Settlement [in]	0	6.11352
Recompression Consolidation Settlement [in]	0	0.317081
Immediate Settlement [in]	0	0.714042
Secondary Settlement [in]	0	0
Loading Stress ZZ [ksf]	0.00232683	1.18714
Loading Stress XX [ksf]	-0.0768665	0.877028
Loading Stress YY [ksf]	0.0636749	1.35085
Effective Stress ZZ [ksf]	0.00232683	2.15474
Effective Stress XX [ksf]	-0.0762268	2.76492
Effective Stress YY [ksf]	0.0663101	2.85857
Total Stress ZZ [ksf]	0.00232683	4.00084
Total Stress XX [ksf]	-0.0762268	4.61102
Total Stress YY [ksf]	0.0665101	4.71811
Modulus of Subgrade Reaction (Total) [ksf/ft]	0	0.661782
Modulus of Subgrade Reaction (Immediate) [ksf/ft]	0	38.7603
Modulus of Subgrade Reaction (Consolidation) [ksf/ft]	0	0.777375
Total Strain	-0.000307346	0.282133
Pore Water Pressure [ksf]	-3.99155e-005	1.86576
Excess Pore Water Pressure [ksf]	-0.00209073	0.00417003
Degree of Consolidation [%]	0	100
Pre-consolidation Stress [ksf]	0.00278597	2.21208
Over-consolidation Ratio	1	3.05834
Void Ratio	0	0.841566
Permeability [ft/d]	0	0.785962
Coefficient of Consolidation [ft ² /d]	0	0.4
Hydroconsolidation Settlement [in]	0	0
Average Degree of Consolidation [%]	0	0
Undrained Shear Strength	0	0.0691753

Stage: Stage 30 = 7300 d

Data Type	Minimum	Maximum
Total Settlement [in]	0	7.00998
Total Consolidation Settlement [in]	0	6.39809
Virgin Consolidation Settlement [in]	0	6.11352
Recompression Consolidation Settlement [in]	0	0.317081
Immediate Settlement [in]	0	0.714042
Secondary Settlement [in]	0	0
Loading Stress ZZ [ksf]	0.00232683	1.18714
Loading Stress XX [ksf]	-0.0768665	0.877028
Loading Stress YY [ksf]	0.0636749	1.35085
Effective Stress ZZ [ksf]	0.00232683	2.15474
Effective Stress XX [ksf]	-0.0762268	2.76492
Effective Stress YY [ksf]	0.0663101	2.85857
Total Stress ZZ [ksf]	0.00232683	4.00084
Total Stress XX [ksf]	-0.0762268	4.61102
Total Stress YY [ksf]	0.0665101	4.71811
Modulus of Subgrade Reaction (Total) [ksf/ft]	0	0.661782
Modulus of Subgrade Reaction (Immediate) [ksf/ft]	0	38.7603
Modulus of Subgrade Reaction (Consolidation) [ksf/ft]	0	0.777375
Total Strain	-0.000307346	0.282133
Pore Water Pressure [ksf]	-3.99155e-005	1.86576
Excess Pore Water Pressure [ksf]	-0.00257012	0.00416455
Degree of Consolidation [%]	0	100
Pre-consolidation Stress [ksf]	0.00278597	2.21208
Over-consolidation Ratio	1	3.05834
Void Ratio	0	0.841566
Permeability [ft/d]	0	0.785962
Coefficient of Consolidation [ft ² /d]	0	0.4
Hydroconsolidation Settlement [in]	0	0
Average Degree of Consolidation [%]	0	0
Undrained Shear Strength	0	0.0691753

Loads**1. Rectangular Load: "Traffic Load"**

Length	30 ft
Width	300 ft
Rotation angle	0 degrees
Load Type	Flexible
Area of Load	9000 ft ²
Load	0.24 ksf
Depth	-177.5 ft
Installation Stage	Stage 8 = 7 d

Coordinates

X [ft]	Y [ft]
-15	-150
15	-150
15	150
-15	150

2. Rectangular Load: "Equiv. Culvert Load"

Length 62.5 ft
 Width 14 ft
 Rotation angle 0 degrees
 Load Type Flexible
 Area of Load 875 ft²
 Load 0.774 ksf
 Depth -163.5 ft
 Installation Stage Stage 2 = 1 d

Coordinates

X [ft]	Y [ft]
-31.25	-7
31.25	-7
31.25	7
-31.25	7

Embankments**1. Embankment: "Embankment Load 1"**

Label Embankment Load 1
 Center Line (0, 7) to (0, 149)
 Near End Angle 90 degrees
 Far End Angle 90 degrees
 Number of Layers 5
 Base Width 69.2

Layer	Stage	Left Bench Width (ft)	Left Angle (deg)	Height (ft)	Unit Weight (kips/ft ³)	Right Angle (deg)	Right Bench Width (ft)
1	Stage 3 = 2 d	0	17.17	1	0.12	17.17	0
2	Stage 4 = 3 d	0	17.17	1	0.12	17.17	0
3	Stage 5 = 4 d	0	17.17	1	0.12	17.17	0
4	Stage 6 = 5 d	0	17.17	1	0.12	17.17	0
5	Stage 7 = 6 d	0	17.17	1	0.12	17.17	0

2. Embankment: "Embankment Load 2"

Label Embankment Load 2
 Center Line (0, -7) to (0, -149)
 Near End Angle 90 degrees
 Far End Angle 90 degrees
 Number of Layers 5
 Base Width 69.2

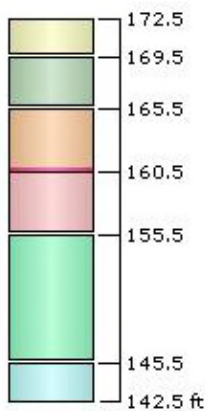
Layer	Stage	Left Bench Width (ft)	Left Angle (deg)	Height (ft)	Unit Weight (kips/ft ³)	Right Angle (deg)	Right Bench Width (ft)
1	Stage 3 = 2 d	0	17.17	1	0.12	17.17	0
2	Stage 4 = 3 d	0	17.17	1	0.12	17.17	0
3	Stage 5 = 4 d	0	17.17	1	0.12	17.17	0
4	Stage 6 = 5 d	0	17.17	1	0.12	17.17	0
5	Stage 7 = 6 d	0	17.17	1	0.12	17.17	0

Soil Layers

Ground Surface Drained: Yes

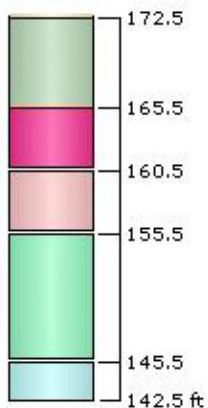
C-1: (-26.235, 12.88)

Layer #	Type	Thickness [ft]	Depth [ft]	Drained at Bottom
1	A - Alluv. A-2-6	3	-172.5	No
2	B - Alluv. A-6/A-7	4	-169.5	Yes
3	C1 - Alluv. A-1 (upstrm)	5	-165.5	No
4	C2 - Alluv. A-1 (dwnstrm)	0	-160.5	No
5	D1 - CP Med. Stiff A-7-5	5	-160.5	No
6	D - CP A-7-5	10	-155.5	No
7	E - CP A-6	3	-145.5	No










C-2: (26.711, 13.27)

Layer #	Type	Thickness [ft]	Depth [ft]	Drained at Bottom
1	A - Alluv. A-2-6	0	-172.5	No
2	B - Alluv. A-6/A-7	7	-172.5	Yes
3	C1 - Alluv. A-1 (upstrm)	0	-165.5	No
4	C2 - Alluv. A-1 (dwnstrm)	5	-165.5	No
5	D1 - CP Med. Stiff A-7-5	5	-160.5	No
6	D - CP A-7-5	10	-155.5	No
7	E - CP A-6	3	-145.5	No



Soil Properties

Property	A - Alluv. A-2-6	B - Alluv. A-6/A-7	C1 - Alluv. A-1 (upstrm)	D1 - CP Med. Stiff A-7-5
Color				
Unit Weight [kips/ft ³]	0.1	0.09	0.105	0.11
Saturated Unit Weight [kips/ft ³]	0.1	0.09	0.105	0.11
K0	1	1	1	1
Immediate Settlement	Enabled	Disabled	Enabled	Disabled
Es [ksf]	50	-	350	-
Esur [ksf]	50	-	350	-
Primary Consolidation	Disabled	Enabled	Disabled	Enabled
Material Type		Non-Linear		Non-Linear
Cc	-	0.24	-	0.15
Cr	-	0.024	-	0.015
e0	-	0.841	-	0.7805
OCR	-	1.2	-	3.2
Cv [ft ² /d]	-	0.1	-	0.2
Cvr [ft ² /d]	-	0.3	-	0.4
B-bar	-	1	-	1
Undrained Su A [kips/ft ²]	0	0	0	0
Undrained Su S	0.2	0.2	0.2	0.2
Undrained Su m	0.8	0.8	0.8	0.8
Piezo Line ID	1	1	1	1

Property	D - CP A-7-5	E - CP A-6	C2 - Alluv. A-1 (dwnstrm)
Color			
Unit Weight [kips/ft ³]	0.118	0.13	0.1
Saturated Unit Weight [kips/ft ³]	0.118	0.13	0.1
K0	1	1	1
Immediate Settlement	Enabled	Enabled	Enabled
Es [ksf]	650	770	100
Esur [ksf]	650	770	100
B-bar	-	-	-
Undrained Su A [kips/ft ²]	0	0	0
Undrained Su S	0.2	0.2	0.2
Undrained Su m	0.8	0.8	0.8
Piezo Line ID	1	1	1

Groundwater

Groundwater method Piezometric Lines
Water Unit Weight 0.0624 kips/ft³

Piezometric Line Entities

ID	Depth (ft)
1	-172.4 ft

Query Lines

Line #	Query Line Name	Start Location	End Location	Horizontal Divisions	Vertical Divisions
1	Query Line 1	-31.25, 0	31.25, 0	10	Auto: 77
2	Query Line 2	-31.25, 7	31.25, 7	10	Auto: 77