PROJECT MANUAL
FOR
MUSKEGON COUNTY DRAIN COMMISSIONER

BLACK CREEK CONSOLIDATED DRAIN – DIVISION 7

JUNE 2020

ENGINEER:

Eng.
Engineering & Surveying
16930 Robbins Road Suite 105
Grand Haven, MI 49417

SECTION 00003

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INSTRUCTIONS TO BIDDERS

ARTICLE 1 - DEFINED TERMS

1.1. Terms used in these Instructions to Bidders and defined in Section 00700: General Conditions (Standard General Conditions of the Construction Contract, EJCDC, C-700, 2002 edition) and have the meanings assigned to them in Section 00700: General Conditions.

1.2. Other terms used in the Bidding Documents and not defined elsewhere have the following meanings, which are applicable to both the singular and plural thereof:

Bidder - One who submits a Bid directly to OWNER, as distinct from a sub-bidder, who submits a bid to a Bidder.

Successful Bidder - The lowest, responsive, responsible Bidder to whom OWNER (on the basis of OWNER's evaluation as hereinafter provided) makes an award.

ARTICLE 2 - COPIES OF BIDDING DOCUMENTS

2.1. Complete sets of the Bidding Documents in the number and for the fee, if any, stated in the Notice of Letting of Drain Contract, may be obtained from OWNER or ENGINEER.

2.2. Complete sets of Bidding Documents must be used in preparing Bids; neither OWNER nor ENGINEER assumes any responsibility for errors or misinterpretation resulting from the use of incomplete sets of Bidding Documents.

2.3. OWNER and ENGINEER, in making copies of Bidding Documents available on the above terms, do so only for the purpose of obtaining Bids on the Work and do not confer a license or grant for any other use.

ARTICLE 3 - QUALIFICATIONS OF BIDDERS

3.1. OWNER reserves the right to reject any Bid if the evidence submitted by, or investigation of, a Bidder fails to satisfy OWNER that the Bidder is properly qualified to carry out the obligations of the Contract and to complete the work contemplated therein.

ARTICLE 4 - EXAMINATION OF CONTRACT DOCUMENTS AND SITE

4.1. It is the responsibility of each Bidder before submitting a Bid:

4.1.1. To examine thoroughly the Contract Documents and other related data identified in the Bidding Documents including technical data referred to below, if any;

4.1.2. To visit the Site to become familiar with and satisfy Bidder as to the general, local and Site conditions that may affect cost, progress, performance or furnishing of the Work;

4.1.3. To consider federal, state and local Laws and Regulations that may affect cost, progress, performance or furnishing of the Work;

4.1.4. To study and carefully correlate Bidder’s knowledge and observations with the Contract Documents and such other related data; and

4.1.5. To promptly notify ENGINEER of all conflicts, errors, ambiguities or discrepancies which Bidder has discovered in or between the Contract Documents and such other related documents.

4.2. Refer to Section 00800: Supplementary Conditions for information on reference materials, if any, which ENGINEER has used in preparing the Contract Documents and a determination of the "technical data" therein upon which CONTRACTOR may rely.

4.3. Information and data shown or indicated in the Contract Documents with respect to existing Underground Facilities at or contiguous to the Site are based upon information and data furnished to OWNER and ENGINEER by owners of such Underground Facilities or others, and OWNER and ENGINEER do not assume responsibility for the accuracy or completeness thereof unless it is expressly provided otherwise in Section 00800: Supplementary Conditions.

4.4. Provisions concerning responsibilities for the adequacy of data, if any, furnished to prospective Bidders with respect to subsurface conditions, other physical conditions and Underground Facilities, and possible changes in the Contract Documents due to differing or unanticipated conditions appear in paragraphs 4.02 and 4.03 of Section 00700: General Conditions.

4.5. Before submitting a bid, each Bidder will be responsible to obtain such additional or supplementary examinations, investigations, explorations, tests, studies and data concerning conditions (surface, subsurface and Underground Facilities) at or contiguous to the Site or otherwise, which may affect cost, progress, performance or furnishing of the Work and which relate to any aspect of the means, methods, techniques, sequences or procedures of construction to be employed by Bidder and safety precautions and programs incident thereto or which Bidder deems necessary to determine its Bid for performing and furnishing the Work in accordance with the time, price and other terms and conditions of the Contract Documents.

4.6. On request, OWNER will provide each Bidder access to the Site to conduct such examinations, investigations, explorations, tests and studies as each Bidder deems necessary for submission of a Bid. Bidder shall fill all holes, clean up and restore the Site to its former condition upon completion of such examinations, investigations, explorations, tests and studies.

4.7. Reference is made to the Contract Documents and Section 01010: Summary of Work, for the identification of the general nature of work, if any, that is to be performed at the Site by OWNER or others (such as utilities and other prime contractors) that relates to the Work for which a Bid is to be submitted. On request, OWNER will provide to each Bidder for examination access to or copies of Contract Documents, if any, (other than portions thereof related to price) for such work.

4.8. The submission of a Bid will constitute an incontrovertible representation by Bidder that Bidder has complied with every requirement of this Article 4, that without exception the Bid is premised upon performing and furnishing the Work required by the Contract Documents and applying the specific means, methods, techniques, sequences or procedures of construction (if any) that may be shown or indicated or expressly required by the Contract Documents, that Bidder has given ENGINEER written notice of all conflicts, errors, ambiguities and discrepancies that Bidder has discovered in the Contract Documents and the written resolutions thereof by ENGINEER is acceptable to Bidder, and that the Contract Documents are generally sufficient to indicate and convey understanding of all terms and conditions for performing and furnishing the Work.

4.9. The provisions of 4.1 through 4.7, inclusive, do not apply to Asbestos, Polychlorinated biphenyls (PCBs), Petroleum, Hazardous Waste or Radioactive Material covered by Paragraph 4.06 of Section 00700: General Conditions, unless they are shown or indicated in the Documents and Specifications or identified in the Contract Document.

ARTICLE 5 - AVAILABILITY OF LANDS FOR WORK, ETC.

5.1. The lands upon which the Work is to be performed, rights-of-way and easements for access thereto and other lands designated for use by CONTRACTOR in performing the Work are identified in the Contract Documents. All additional lands and access thereto required for temporary construction facilities, construction equipment or storage of materials and equipment to be incorporated in the Work are to be obtained and paid for by CONTRACTOR. Easements for permanent structures or permanent changes in existing facilities are to be obtained and paid for by OWNER unless otherwise provided in the Contract Documents.

ARTICLE 6 - INTERPRETATIONS AND ADDENDA

6.1. All questions about the meaning or intent of the Bidding Documents are to be directed to ENGINEER. Interpretations or clarification considered necessary by ENGINEER in response to such questions will be issued by Addenda which will be mailed or delivered to all parties recorded by ENGINEER as having received the Bidding Documents. Questions received less than 2 days prior to the date for opening of Bids may not be answered. Only questions answered by formal written Addenda will be binding. Oral and other interpretations or clarification will be without legal effect.

6.2. Addenda may also be issued to modify the Bidding Documents as deemed advisable by OWNER or ENGINEER.

ARTICLE 7 - BID SECURITY

7.1. Each Bid must be accompanied by Bid security made payable to OWNER in the amount of 5% of the Bidders maximum Bid price and in the form of a certified or bank check or a Bid Bond (optional form attached) issued by a surety meeting the requirements of paragraph 5.01 of Section 00700: General Conditions.

7.2. The Bid security of Successful Bidder will be retained until such Bidder has executed the Agreement and furnished the required Contract security and met the other conditions of the Notice of Award, whereupon the Bid security will be returned. If successful Bidder fails to execute and deliver the Agreement and furnish the required Contract security within 15 days after the Notice of Award, OWNER may annul the Notice of Award and the Bid security of that Bidder will be forfeited. The Bid security of other Bidders whom OWNER believes to have a reasonable chance of receiving the award may be retained by OWNER until the earlier of the 7th day after the Effective Date of Agreement or the 121st day after the Bid opening, whereupon Bid security furnished by such Bidders will be returned. Bid security with Bids which are not competitive will be returned within 7 days after the Bid opening.

ARTICLE 8 - CONTRACT TIMES

8.1. The dates by which the Work is to be substantially completed and completed and ready for final payment (the Contract Times) are set forth in the Bid form and the Agreement.

ARTICLE 9 - LIQUIDATED DAMAGES

9.1. Provisions for liquidated damages, if any, are set forth in the Agreement.

ARTICLE 10 - SUBSTITUTE AND "OR EQUAL" ITEMS

10.1. The Contract, if awarded, will be on the basis of material and equipment described in the Drawings or specified in the Specifications without consideration of possible substitute or "or equal" items.

10.2. Whenever materials or equipment are indicated in the Drawings or specified in the Specifications by using the name of one or more Suppliers, the bid shall be based on providing the materials or equipment of one of the Suppliers name.

10.3. Whenever it is indicated in the Drawings or specified in the Specifications that a substitute or "or equal" item of material or equipment may be furnished or used by CONTRACTOR if acceptable to ENGINEER, application for such acceptance will not be considered by ENGINEER until after the Effective Date of Agreement. The procedure for submission of any such application by CONTRACTOR and consideration by ENGINEER is set forth in paragraph 6.05 of Section 00700: General Conditions, which may be supplemented in Division 1 – General Requirements.

ARTICLE 11 - SUBCONTRACTORS, SUPPLIERS AND OTHERS

11.1. If Section 00800: Supplementary Conditions requires or if OWNER requests the identity of certain Subcontractors, Suppliers, and other persons and organizations (including those who are to furnish principal items of material and equipment) to be submitted to OWNER in advance of the specified date prior to the Effective Date of Agreement, the apparent Successful Bidder, and any other Bidder so requested, shall within 7 days after the Bid opening submit to OWNER a list of all such Subcontractors, Suppliers, and other persons and organizations proposed for those portions of the Work for which such identification is required. Such list shall be accompanied by an experience statement with pertinent information regarding similar projects and other evidence of qualifications for each such Subcontractor, Supplier, person or organization if requested by OWNER. If OWNER or ENGINEER, after due investigation, has reasonable objection to any proposed Subcontractor, Supplier, or other person or organization, either may, before the Notice of Award is given request the apparent Successful Bidder to submit an acceptable substitute in which case the apparent Successful Bidder shall submit an acceptable substitute, that Bidders Bid price will be increased (decreased) by the difference in cost occasioned by such substitution and OWNER may consider such price adjustments in evaluating bids and making the Contract award. If apparent Successful Bidder declines to make any such substitution, OWNER may award the Contract to the next lowest bidder that proposed to use acceptable Subcontractors, Suppliers, and other persons and organizations. Declining to make requested substitutions will not constitute ground for forfeiting the Bid security of any Bidder. Any Subcontractor, Supplier, other person or organization listed and to whom OWNER or ENGINEER does not make written objection prior to the giving of the Notice of Award will be deemed acceptable to OWNER and ENGINEER subject to revocation of such acceptance after the Effective Date of the documents as provided in paragraph 6.06 of Section 00700: General Conditions.

11.2. CONTRACTOR shall not be required to employ any Subcontractor, Supplier, other person or organization against whom CONTRACTOR has reasonable objection except as identified in those Procurement Contracts, if any, which will be assigned to the CONTRACTOR and identified in the Contract Documents.

ARTICLE 12 - BID FORM

12.1. The Bid form is included with the Bidding Documents; additional copies may be obtained from ENGINEER.

12.2. All blanks of the Bid form must be completed legibly in ink or by typewriter.

12.3. Bids by corporations must be executed in the corporate name by the president or a vice president (or other corporate officer accompanied by evidence of authority to sign) and the corporate seal must be affixed, if required by state law, and attested by the secretary or an assistant secretary. The corporate address and state of incorporation shall be indicated below the signature.

12.4. Bids by partnerships must be executed in the partnership name and signed by a partner, whose title must appear under the signature and the official address of the partnership must be indicated below the signature.

12.5. All names must be typed or printed below the signature.

12.6. The Bid shall contain an acknowledgement of receipt of all Addenda (the numbers of which shall be filled in on the Bid form).

12.7. The address and telephone number for communications regarding the Bid must be indicated.

12.8. Evidence of authority to conduct business as an out-of-state corporation in the state where the Work is to be performed shall be provided in accordance with Article 3 above. State contractor license number, if any, must also be shown.

ARTICLE 13 - SUBMISSION OF BIDS

13.1. Bids shall be submitted to the Muskegon County Drain Commissioner's Office at 141 E. Apple Avenue, Muskegon, MI 49442 **by 2:00 p.m. Monday, July 20, 2020** and shall be enclosed in an opaque, sealed envelope, marked with the Project title and name and address of the Bidder and accompanied by the Bid security and other required documents. Bids will be readily accepted at the Drain Commissioner's Office at the address above on Friday, July 17th from 10:00 a.m. to 5:00 p.m. and Monday, July 20th from 10:00 a.m. until the submission deadlines noted below for each respective Division. If the Bid is sent through the mail or other delivery system, the sealed envelope shall be enclosed in a separate envelope with the notation "BID ENCLOSED" on the face of it.

Bids for Divisions 1 – 4 shall be submitted by 12:30 p.m.
Bids for Divisions 5 – 8 shall be submitted by 2:00 p.m.
Bids for Divisions 9 – 12 shall be submitted by 3:30 p.m.

13.2. Each prospective Bidder is furnished one copy of the Bidding Documents with one separate unbound copy each of the Bid form and the Bid Bond. The unbound copy of the Bid form is to be completed and submitted with the Bid security.

ARTICLE 14 - MODIFICATIONS WITH WITHDRAWAL OF BIDS

14.1. Bids may be modified or withdrawn by an appropriate document duly executed (in the manner that a Bid must be executed) and delivered to the place where Bids are to be submitted at any time prior to the opening of Bids.

14.2. If, within 24 hours after Bids are opened, any Bidder files a duly signed, written notice with OWNER and promptly thereafter demonstrates to the reasonable satisfaction of OWNER that there was a material and substantial mistake in the preparation of its Bid, that Bidder may withdraw its Bid and the Bid security will be returned. Thereafter, that Bidder will be disqualified from further bidding on the Work. No withdrawal of a Bid shall be permitted on account of mistake or any other reason after the expiration of this 24 hour period.

ARTICLE 15 - OPENING OF BIDS

15.1. Bids will be opened and, unless obviously nonresponsive, read aloud publicly via a digital Zoom meeting. The instructions for jointing the bid opening meeting are as follows:

Join Zoom Meeting **via computer**:
https://us02web.zoom.us/j/81104094147
Meeting ID: 811 0409 4147
By phone: 888 475 4499 US Toll-free
Meeting ID: 811 0409 4147

Bids will be opened and read in accordance with the following schedule:

Division 1: 1:00 p.m.
Division 2: 1:10 p.m.
Division 3: 1:20 p.m.
Division 4: 1:30 p.m.

Division 5: 2:30 p.m.
Division 6: 2:40 p.m.
Division 7: 2:50 p.m.
Division 8: 3:00 p.m.

Division 9: 4:00 p.m.
Division 10: 4:10 p.m.
Division 11: 4:20 p.m.
Division 12: 4:30 p.m.

An abstract of the amount of the Bids and alternatives will be made available to Bidders after the opening of Bids.

ARTICLE 16 - BIDS TO REMAIN SUBJECT TO ACCEPTANCE

16.1. All Bids will remain subject to acceptance for 120 days after the day of the Bid opening, but OWNER may, in its sole discretion, release any Bid and return the Bid security prior to that date.

ARTICLE 17 - AWARD OF CONTRACT

17.1. OWNER reserves the right to reject any or all bids, including without limitation the rights to reject any or all nonconforming, nonresponsive, unbalanced or conditional Bids and to reject the Bid of any Bidder if OWNER believes that it would not be in the best interest of the Project to make an award to that Bidder, whether because the Bid is not responsive or the Bidder is unqualified or of doubtful financial ability or fails to meet any other pertinent standard or criteria established by OWNER. OWNER also reserves the right to waive all informalities not involving price, time or changes in the Work and to negotiate Contract terms with the Successful Bidder. Discrepancies in the multiplication of units of Work and unit prices will be resolved in favor of the unit prices. Discrepancies between the indicated sum of any column of figures and the correct sum thereof will be resolved in favor of the correct sum. Discrepancies between words and figures will be resolved in favor of the words.

17.2. In evaluating Bids, OWNER will consider the qualifications of the Bidders, whether or not the Bids comply with the prescribed requirements, unit prices and other data, as may be requested in the Bid form or prior to the Notice of Award.

17.3. OWNER may consider the qualifications and experience of Subcontractors, Suppliers and other persons and organizations proposed for the Work. OWNER also may consider the operating costs, maintenance considerations, performance data and guarantees of materials and equipment proposed for incorporation in the Work when such data is required to be submitted prior to the Notice of Award.

17.4. OWNER may conduct such investigations as OWNER deems necessary to assist in the evaluation of any Bid and to establish the responsibility, qualifications and financial ability of the Bidders, proposed Subcontractors, Suppliers, other persons and organizations to do the Work in accordance with the Contract Documents to OWNER's satisfaction within the prescribed time.

17.5. If the Contract is to be awarded, it will be awarded on the basis of the Total Amount to the lowest Bidder whose evaluation by OWNER indicates to OWNER that the award will be in the best interest of the Project.

Alternatives will not be considered in the award of this Contract.

17.6. If the Contract is to be awarded, OWNER will give Successful Bidder Notice of Award within 120 days after the day of the Bid opening.

ARTICLE 18 - CONTRACT INSURANCE AND SECURITY

18.1. Paragraphs 5.03 through 5.10, of Section 00700: General Conditions and Section 00800: Supplementary Conditions set forth OWNER's requirements as to insurance. When Successful Bidder delivers the executed Agreement to OWNER, it shall be accompanied by the required certificates of insurance (and other evidence of insurance requested by OWNER).

18.2. Paragraph 5.01 of Section 00700: General Conditions and Section 00800: Supplementary Conditions set forth OWNER's requirements as to Performance and Payment Bonds. When Successful Bidder delivers the executed Agreement to OWNER, it shall be accompanied by the required Performance and Payment Bonds.

ARTICLE 19 - SIGNING OF AGREEMENT

19.1. When OWNER gives a Notice of Award to the Successful Bidder, it will be accompanied by the required number of unsigned counterparts of the Agreement with all other written Contract Documents attached. Within 15 days thereafter, CONTRACTOR shall sign and deliver the required number of counterparts of the Agreement to OWNER with the required Bonds and certificates of insurance. Within 10 days thereafter, OWNER will deliver one fully signed counterpart to CONTRACTOR.

ARTICLE 20 - PREBID CONFERENCE

20.1. A prebid conference will be held on Zoom on Thursday, July 9th at 1:00 p.m. The instructions for jointing the meeting are as follows:

Join Zoom Meeting **via computer**:
https://us02web.zoom.us/j/81104094147
Meeting ID: 811 0409 4147
By phone: 888 475 4499 US Toll-free
Meeting ID: 811 0409 4147

Representative of OWNER and ENGINEER will be present to discuss the Project. Bidders are encouraged to attend and participate in the conference. ENGINEER will transmit to all prospective Bidders of record such Addenda as ENGINEER considers necessary in response to questions arising at the conference. Oral statements may not be relied upon and will not be binding or legally effective.

ARTICLE 21 - RETAINAGE AND PROGRESS PAYMENTS

21.1. Provisions concerning retainage and progress payments are set forth in the Agreement.

21.2. Retainages and progress payments will be in accordance with State of Michigan Act 524 of the Public Acts of 1980.

ARTICLE 22 - WORK UNDER SEPARATE CONTRACT

22.1. Refer to Section 01010: Summary of Work for work under separate contract, if any.

END OF SECTION

SECTION 00220

GEOTECHNICAL DATA

The following Geotechnical Data have been used to design this project:

Report prepared by SME (SME Project No. 084059.00) dated May 2020.

END OF SECTION

882 40th Street SE
Grand Rapids, MI 49508
T (616) 406-1756

www.sme-usa.com

May 20, 2020

Mr. Daniel Fredricks, PE
Vice President
Land & Resource Engineering
2121 3 Mile Road NW
Walker, Michigan 49544

Via Email: fredricks@lremi.com

RE: Geotechnical Engineering Report
Muskegon County Drain Commission Culvert Replacements
Egelston and Moorland Townships, Mecosta County, Michigan
SME Project No. 084059.00

Dear Mr. Fredricks:

This report presents the results of our geotechnical engineering evaluation for the proposed culvert replacements in Egelston and Moorland Townships, Muskegon County, Michigan. SME performed our services for this project in accordance with the scope of services outlined in SME Proposal No. P01152.20 dated April 10, 2020. Land & Resource Engineering (LRE) authorized our services.

As input into this evaluation, LRE provided SME with preliminary plan sheets titled “Roadway Crossing Details” for the “Black Creek Consolidated Drain” project dated June 23, 2017 and prepared by LRE for the following crossings.

- Former Smith & Mulder Drain at Barnes Road
- Former Smith & Mulder Drain at Sullivan Road
- Former JTB&S Drain at Bailey Road
- Former Daley Drain at White Road
- Former Daley Drain at Bailey Road
- Former Bell Drain at Ravenna Road
- Former Little Drain at Hall Road
- Former Daley Drain at Bossett Road
- Former Bell Drain at White Road

LRE also provided drawings titled “Plan & Profile” for the “Black Creek Consolidated Drain” project with a latest revision date for the following drains.

- Former Little Drain (Sheet No. C34)
- Former Porter Drain (Sheet No. C35)
- Former Muskegon / Newaygo Branch 1 (Sheet No. C13)
- Former Smith & Mulder No. 2 Drain (Sheet No. C43)

SITE CONDITIONS AND PROJECT DESCRIPTION

The project site is located along tributaries to Black Creek in the above-referenced Townships. The crossing locations and the specific boring locations are depicted on the attached Boring Location Diagrams (Figure Nos. 1 through 3).

The project consists of culvert and bridge replacements at 14 road crossings. We understand final grades will remain approximately unchanged at the new culvert crossings and the existing roadways are not proposed to be widened.

LRE provided SME with the information regarding the existing culvert and estimated depths of new culverts in Table No. 1, below.

TABLE NO. 1: EXISTING CULVERT INFORMATION AND PROPOSED CULVERT DEPTHS

BRANCH	ROAD	MCRC ID	SIZE	MATERIAL / SHAPE	PROPOSED SIZE / MATERIAL	ESTIMATED DEPTH (FEET)	BORING
Muskegon-Newaygo	Barnes Rd	C11-019	26' x 4'	wood/box (5 spans)	Not Determined	No Survey	B1 & B2
Smith & Mulder	Barnes Rd	C11-027	dual 72"	CMP/circular	Not Determined	10 +/-	B3 & B4
Smith & Mulder	Sullivan Rd	C11-029	17' x 5.5'	concrete bridge	Not Determined	9 +/-	B5 & B6
JTB&S	Bossett Rd	7681	20' x 8'	concrete bridge	Not Determined	8 +/-	B7 & B8
JTB&S-Slater	Bailey Rd	C12-007	14' x 2.5'	CIP concrete/box	Not Determined	7 +/-	B13 & B14
Daley	White Rd	C12-025	54"	galv CMP/circular	Not Determined	6 +/-	B9 & B10
Daley	Bossett Rd	C12-022	6' x 2.5'	wood/box	Not Determined	5 +/-	B11 & B12
Daley	Bailey Rd	C12-008	36"	galv CMP/circular	Not Determined	4 +/-	B23 & B24
Bell	White Rd	C12-030	24"	RCP/circular	Not Determined	6 +/-	B27 & B28
Bell	Ravenna Rd	C12-028	24"	RCP/circular	Not Determined	6 +/-	B25 & B26
Musk / New Branch 1	Goebel Road	C12-041	71" x 47"	CMP Arch	72" CMP Circular	10 +/-	B21 & B22
Little	Hall Rd	C12-059	dual 36"	galv CMP/circular	57"x38" CMP Arch	8 +/-	B15 & B16
Porter	Moorland Road	C12-101	71" x 47"	CMP Arch	10'x5' Reinforced Concrete Box	8 +/-	B17 & B18
Smith & Mulder No. 2	Moorland Road	C12-116	66" x 51"	CMP Arch	10'x6' Reinforced Concrete Box	9 +/-	B19 & B20

The existing structures vary in type and size, and the bottom of the drainage structures are located between about 4 and 10 feet below the adjacent roadways. The proposed replacement structures at crossings have not yet been determined, but the referenced preliminary plans, and information summarized in Table No. 1 indicate the invert elevation of proposed structures will not substantially vary from the existing invert elevations. We understand the new structures could include reinforced concrete boxes, corrugate metal pipes and arches, and/or reinforced concrete arches.

EVALUATION PROCEDURES

FIELD EXPLORATION

SME drilled 28 borings between April 20 and April 27, 2020. Two borings were located near each subject crossing, and each boring extended 25 feet beneath the existing ground surface. The approximate locations of the borings are depicted on Figure Nos. 1 through 3.

Best Barricading, Inc. provided traffic control services for SME during drilling activities.

LRE determined the planned locations and depth of the borings. SME staked the borings in the field by referencing existing site features. The ground surface elevations at boring locations B3 through B28 were estimated to the nearest 1-foot using the pavement elevation at the centerline of road crossing depicted on the referenced plans. Ground surface elevations at borings B1 and B2 were not determined as a topographic survey at the crossing was not provided to SME.

The borings were drilled using a truck-mounted rotary drill rig, and advanced to the sampling depths using continuous-flight, hollow-stem augers. The borings included soil sampling based upon the Split-barrel Sampling Procedure. Recovered split-barrel samples were sealed in glass jars by the driller.

Groundwater measurements were recorded during drilling activities. Drilling slurry was added to the annulus of the augers to combat sand heave during drilling. Therefore, an accurate water level was unable to be obtained upon completion of drilling activities. After drilling, the boreholes were backfilled with auger cuttings. Borings located in existing pavement areas were topped with asphalt cold patch.

Soil samples recovered from the field exploration were returned to the SME laboratory for further observation and testing.

LABORATORY TESTING

The laboratory testing program consisted of performing visual soil classification on recovered samples in accordance with ASTM D-2488. Moisture content and hand penetrometer tests were performed on portions of a cohesive sample obtained. Also, moisture contents tests were performed on portions of organic soil samples obtained.

The Laboratory Testing Procedures attached to this report provides descriptions of the laboratory tests. Based on the visual engineering classifications and laboratory testing, we assigned a group symbol to the various soil strata encountered based on the Unified Soil Classification System (USCS).

Upon completion of the laboratory testing, boring logs were prepared and include the soil descriptions, penetration resistances, pertinent field observations, coordinates, offsets, and the results of the laboratory testing. Each log also includes the estimated existing ground surface elevation, where determined. The boring logs are attached to this report. Explanations of symbols and terms used on the boring logs are provided on the attached Boring Log Terminology sheet.

Soil samples retained over a long time, even in sealed jars or containers, are subject to moisture loss and are no longer representative of the conditions initially encountered in the field. Therefore, soil samples

are normally retained in our laboratory for 60 days after completion of SME's report, and are then disposed of, unless instructed otherwise.

SUBSURFACE CONDITIONS

Tabular generalized descriptions of the subsurface conditions encountered at each boring location are presented in Table No. 2 below. Please refer to the boring logs for detailed subsurface information at each boring location.

TABLE NO. 2: SUMMARY OF SUBSURFACE CONDITIONS

LOCATION & MCDC ID	ESTIMATED CULVERT INVERT ELEVATION +/- (FEET)	BORING	GROUNDWATER ELEVATION +/- (FEET) DURING DRILLING [1]	GENERAL SOIL CONDITIONS BENEATH PAVEMENT & AGGREGATE BASE [2,3]
B1 & B2 Barnes Road C11-019	Unknown	B1	Elevation was not estimated; however, groundwater was encountered about 3.5 feet below existing road centerline	Loose Sand Fill to 3.5' over Very Loose to Medium Dense Sand to 25'.
		B2		
B3&B4 Barnes Road C11-027	660	B3	661.5	Loose Sand Fill to 8.5' over Loose to Medium Dense Sand to 25'.
		B4	663	Loose Sand Fill to 6' over Loose to Medium Dense Sand to 25'.
B5&B6 Sullivan Road C11-029	663	B5	665	Loose to Medium Dense Sand Fill to 8.5' over Loose to Medium Dense Sand to 25'.
		B6	664.5	Medium Dense Sand Fill to 6' over Loose to Medium Dense Sand to 25'.
B7 & B8 Bossett Road 7681	688	B7	689	Very Loose to Medium Dense Sand Fill to 8.5' over Medium Dense to Dense Sand to 25'.
		B8	688	
B9& B10 White Road C12-025	697	B9	698	Loose Sand Fill to 5' over Loose to Dense Sand to 25'.
		B10		
B11 & B12 Bossett Road C12-022	691	B11	690	Very Loose to Loose Sand Fill to 6' over Very Loose to Medium Dense Sand to 23.5' over Clayey Silt to 25'.
		B12		Loose Sand Fill to 3.5' over Loose to Medium Dense Sand to 25'.
B13 & B14 Bailey Road C12-007	701	B13	702	Loose Sand Fill to 6' over Loose to Medium Dense Sand to 13.5' over Stiff Clayey Silt to 18.5' over Loose Sandy Silt to 24' over Loose Sand to 25'.

LOCATION & MCDC ID	ESTIMATED CULVERT INVERT ELEVATION +/- (FEET)	BORING	GROUNDWATER ELEVATION +/- (FEET) DURING DRILLING [1]	GENERAL SOIL CONDITIONS BENEATH PAVEMENT & AGGREGATE BASE [2,3]
		B14	703	Loose Sand fill to 5' over Loose to Medium Dense Sand to 13.5' over Very Stiff Silty Clay 23.5' over Medium Dense Sand to 25'.
B15 & B16 Hall Road C12-059	685	B15	687	Very Loose Sand Fill to 6' over Loose to Dense Sand to 23.5' over Hard Lean Clay to 25'
		B16	687.5	Loose Sand Fill to 3.5' over Loose to Medium Dense Sand to 25'.
B17 & B18 Moorland Road C12-101	680	B17	680	Medium Dense Sand Fill to 3.5' over Loose to Medium Dense Sand to 25'.
		B18	679.5	Loose Sand Fill to 3.5' over Loose to Medium Dense Sand to 25'.
B19 & B20 Moorland Road C12-116	680	B19	681.5	Loose Sand Fill to 6' over Medium Dense Sand to 25'.
		B20	682.5	Loose Sand Fill to 6' over Peat to 8.5' over Loose to Medium Dense Sand to 25'.
B21 & B22 Goebel Road C12-041	697	B21	698.5	Loose Sand Fill to 6' over Very Stiff Lean Clay to 8.5' over Loose to Medium Dense Sand to 18.5' over Stiff Lean Clay to 25'.
		B22		Very Loose to Loose Sand Fill to 6' over Very Stiff Lean Clay to 8.5' over Medium Dense Sand to 18.5' over Stiff Lean Clay to 25'.
B23 & B24 Bailey Road C12-008	703	B23	702	Loose Sand Fill to 5' over Loose to Medium Dense Sand to 25'.
		B24	702	
B25 & B26 Ravenna Road C12-028	696	B25	696	Loose Sand Fill to 6' over Loose to Medium Dense Sand to 25'.
		B26	695	Medium Dense Sand Fill to 8.5' over Loose to Medium Dense Sand to 25'.
B27 & B28 White Road C12-030	695	B27	695	Loose Sand Fill to 3.5' over Loose to Medium Dense Sand to 25'.
		B28	695.5	Very Loose Sand Fill to 3.5' over Loose to Medium Dense Sand to 25'.

NOTES:

1) Groundwater elevation as encountered during drilling activities and estimated within about 1-foot. Drilling mud was added to the annulus of the augers to combat sand heave. Therefore, an accurate water level was unable to be obtained upon completion of drilling activities. The groundwater observations indicated on the boring logs represent conditions at the time the readings were taken. The actual groundwater levels at the time of construction and afterward may vary from those conditions noted on the boring logs. Groundwater levels and the elevations and volumes of perched groundwater encountered in excavations, should be expected to fluctuate throughout the year, based on variations in precipitation, evaporation, run-off, and other factors.

2) It is sometimes difficult to distinguish between fill and natural soils based on samples and cuttings from small-diameter boreholes, especially when portions of the fill do not contain man-made materials, debris, topsoil, or organic layers, and when the fill appears similar in composition to the local natural soils. Therefore, the delineation of fill described above and presented on the boring logs should be considered approximate only.

3) The soil profiles described above and included on the attached boring logs are generalized descriptions of the conditions encountered at the boring locations. The stratification depths shown on the boring logs are intended to indicate a zone of

transition from one soil type to another. They are not intended to show exact depths of change from one soil type to another. The soil descriptions are based on visual classification of the soils encountered. Soil conditions may vary between or away from the boring locations from those conditions noted on the logs. Please refer to the boring logs for the soil conditions at the specific boring locations.

ANALYSIS AND RECOMMENDATIONS

SCOUR CONSIDERATIONS

The design of culverts at water crossings requires an understanding of potential watercourse scour (erosion) that could affect the structure. We anticipate LRE will design scour countermeasures to be constructed to protect the culverts from undermining during flood events. If gradation analyses are required for use in scour design, please contact SME within 30 days.

GLOBAL STABILITY

SME does not judge a slope stability analysis to be required for the road embankments since the existing roadways are not being widened, the final grades will match the existing grades, and assuming the crossing structures will be installed with embankment slopes not proposed to be steeper than 3H:1V. If design or conditions change please contact us.

DEWATERING CONSIDERATIONS

Based on the proposed invert depths and groundwater levels encountered during drilling, we anticipate excavations for new structures will extend near and/or below the site groundwater levels. Therefore, the water from the drains will need to be controlled during construction. We anticipate the drain will be diverted around the construction area using culverts, berms, and ditches.

Based on the borings and the proposed invert elevations of the culverts, the subgrade will generally consist of sand soils. For excavations that extend more than about 1-foot below the groundwater level in sands, the contractor should consider the use of a fully-enclosed, sheet pile type cofferdam to limit the size of the excavations and control groundwater seepage into the excavation during construction. At most crossings, a relatively impermeable stratum into which the bottom of the sheeting could be sealed to cut-off the flow of groundwater to the inside of the cofferdam was not encountered. Therefore, utilizing either tremie poured concrete seals or dewatering inside the cofferdam and constructing the foundations by conventional methods will be required for construction of the footings for new arch culvert and headwalls and wingwalls. The cofferdam would need to extend deep enough to prevent piping of the excavation during dewatering and rigorous dewatering may be required if the tremie concrete seal method is not used.

If sheet piles are used, we recommend all sheeting located within 10 feet of the culvert ends be left in place. Extraction of sheeting could adversely affect the end sections. We expect the internal culvert segments and joints should be less resistant to damage from removal of adjacent sheeting, but the end segments and headers may be more easily damaged from removal of sheeting. It may be feasible for sheeting that remains in-place to be used to counteract scour (if needed). A licensed Professional Engineer working in conjunction with the contractor should design cofferdams, if used.

The contractor and the sheeting designer should be provided with historical information for the sites, such as locations of previous and existing structures and utilities that may affect the construction and design of the sheeting or the installation of the new structure. If sheeting is used, care should be exercised during removal so as not to disturb the subsoil around and below the culvert. The contractor is responsible for the means and methods of construction according to the plans and MDOT Standard Specifications for Construction. Care should be taken during sheeting installation as vibrations could lead to settlement of nearby structures and roads.

We recommend lowering the groundwater level to a minimum of 2 feet below the anticipated excavation bottom to provide stable conditions for construction. The specific dewatering operations will depend on the rate and volume of groundwater flow and determined in the field by the dewatering contractor. The final design of the dewatering system is typically the responsibility of the contractor and their geotechnical engineer. We would be pleased to assist you in the development of a performance-based specification for this portion of the project.

Wet subgrades will be sensitive to disturbance. Therefore, the subgrade may need to be undercut or improved. We recommend an SME representative be on-site during construction and provide field recommendations to limit subgrade disturbance while establishing an adequate subgrade for culvert and wall foundation support.

BOX AND PIPE CULVERT SUBGRADE PREPARATION AND BEDDING

Soils that are suitable for support of box and pipe culverts were encountered at the approximate depths and elevations included in Table No. 3 below.

TABLE NO. 3: SUMMARY OF SUITABLE SOILS

LOCATION & MCDC ID	ESTIMATED CULVERT INVERT ELEVATION +/- (FEET)	BORING	DEPTH / ELEVATION (+/-) TO SUITABLE SOILS (FEET)
B1 & B2 Barnes Road C11-019	Unknown	B1	3.5 / Unknown
		B2	3.5 / Unknown
B3&B4 Barnes Road C11-027	660	B3	8.5 / 661.5
		B4	6 / 664
B5&B6 Sullivan Road C11-029	663	B5	8.5 / 663.5
		B6	6 / 666
B7 & B8 Bossett Road 7681	688	B7	8.5 / 687.5
		B8	8.5 / 687.5
B9& B10 White Road C12-025	697	B9	5 / 698
		B10	5 / 698
B11 & B12 Bossett Road C12-022	691	B11	6 / 690
		B12	3.5 / 692.5
B13 & B14 Bailey Road C12-007	701	B13	6 / 702
		B14	5 / 703
B15 & B16 Hall Road C12-059	685	B15	6 / 687
		B16	3.5 / 689.5
B17 & B18 Moorland Road C12-101	680	B17	3.5 / 684.5
		B18	3.5 / 684.5
B19 & B20	680	B19	6 / 683

LOCATION & MCDC ID	ESTIMATED CULVERT INVERT ELEVATION +/- (FEET)	BORING	DEPTH / ELEVATION (+/-) TO SUITABLE SOILS (FEET)
Moorland Road C12-116		B20	8.5 / 680.5
B21 & B22 Goebel Road C12-041	697	B21	6 / 701
		B22	6 / 701
B23 & B24 Bailey Road C12-008	703	B23	5 / 702
		B24	5 / 702
B25 & B26 Ravenna Road C12-028	696	B25	6 / 696
		B26	8.5 / 693.5
B27 & B28 White Road C12-030	695	B27	3.5 / 697.5
		B28	3.5 / 697.5

After dewatering the excavations as necessary, the upper exposed bearing soils will likely be disturbed. In accordance with the MDOT 2012 Standard Specifications for Construction 406.03.G.2, unstable/disturbed subsoils or obstructions other than bedrock should be undercut (removed) and replaced with, or stabilized using a layer of MDOT 6A coarse aggregate modified with 80 percent crushed coarse aggregate. We anticipated these soils can likely be stabilized by using a layer of MDOT 6A coarse aggregate modified with 80 percent crushed coarse aggregate. This layer should be placed with a minimum thickness of 12 inches, but may need to be thicker to stabilize and protect the soil depending on the field conditions. The modified MDOT 6A coarse aggregate should be used as backfill in deeper excavations or placed over the entire unstable area. Undercuts that extend beyond the outer edges of the culvert should be extended laterally based on a 1:1 slope descending from the outside bottom edge of the culvert to the base of the undercut. The MDOT 6A coarse aggregate should be placed in lifts not exceeding 12 inches and should be compacted or tamped/charged into the unstable subgrade with the backhoe bucket until the subgrade is sufficiently stable.

We have assumed that culvert Structure Backfill (MDOT Class II, Class III or Class IIIA sand) placed to typical dimensions will be used adjacent to the culverts per the 2012 MDOT Standard Specifications for Construction Section 206.03. Place and compact Structure Backfill on opposite sides of the culvert at the same time, so the backfill levels on opposite sides do not vary by more than 2 feet. Backfill should be hand compacted within 1-foot of the walls. For compacted Class II Structure backfill, we recommend Rankine Lateral Earth Pressure Coefficients for an effective angle of internal friction of 32 degrees be used for design.

The sands encountered at the borings are subject to sloughing and caving. Therefore, we anticipate relatively large temporary excavations will be required to install the new culverts if temporary earth retention (e.g. sheeting) is not used.

BOX CULVERT BEDDING

After stabilization of the bearing surfaces with the modified MDOT 6A aggregate, the final surface of the aggregate should be covered with 3 inches of MDOT 34R aggregate. However, if more than about 12 inches of modified MDOT 6A coarse aggregate is used to backfill undercuts, the top of the modified MDOT 6A should be covered by a suitable non-woven geotextile fabric to prevent migration of the MDOT 34R aggregate. The culvert bedding should extend at least 1 foot beyond the outside edges and ends of

the culvert. The depth of the excavation for the culvert should allow for the recommended bedding layer and stabilization layer.

CMP CULVERT BEDDING

After improving the subgrade, we recommend the upper culvert bedding (per MDOT 2012 Standard Specifications for Construction 401.03.A) consist of a minimum of 10 inches of MDOT Class IIIA sand. Layers of the MDOT Class IIIA sand should be no greater than 10 inches thick and compacted to at least 95 percent of the maximum unit weight. The culvert bedding should extend at least 1 foot beyond the outside edges and ends of the CMPA culverts.

ARCH CULVERT, HEADWALL, AND WINGWALL FOUNDATIONS

The exposed bearing soils will likely become disturbed due to the construction activities. Prior to placement of reinforcing steel and concrete or installing precast foundation elements, MDOT 6A coarse aggregate should be placed in lifts not exceeding 12 inches and should be tamped/charged into the unstable subgrade with the backhoe bucket until the subgrade is sufficiently stable. If more than about 12 inches of modified MDOT 6A coarse aggregate is used for stabilization, the top of the modified MDOT 6A should be choked with a dense graded MDOT 21AA aggregate or covered by a suitable non-woven geotextile fabric prior to the placement of concrete.

As previously mentioned, we recommend that the groundwater level be lowered a minimum of 2 feet below the planned subgrade depth to allow for adequate subgrade preparation. If the wall foundations extend deeper than the bottom of the culverts, it would be necessary to lower the groundwater even further.

Plans depicting the proposed structures were not provided. SME should review the culvert plans to verify are assumptions made in determining the maximum factored bearing resistances are valid. Based on the subsurface conditions, depth and elevation to suitable bearing soil and recommended factored bearing resistances are provided in Table No. 4 below.

TABLE NO. 4: SUMMARY OF SUITABLE SOILS AND FACTORED BEARING RESISTANCES

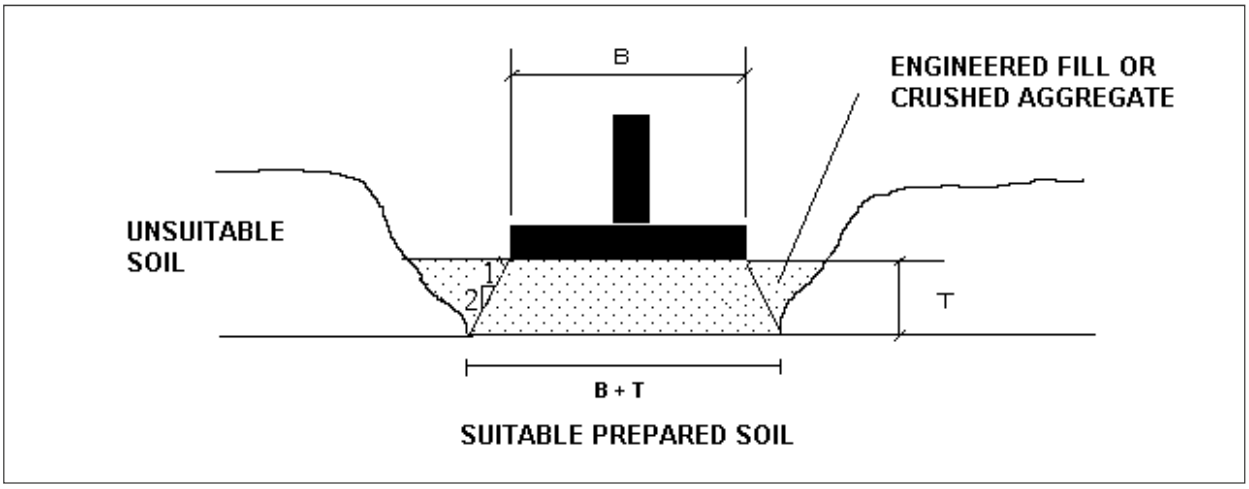
LOCATION & MCDC ID	ESTIMATED CULVERT INVERT ELEVATION +/- (FEET)	BORING	DEPTH / ELEVATION (+/-) TO SUITABLE BEARING SOILS (FEET)	RECOMMENDED MAXIMUM FACTORED BEARING RESISTANCE (PSF)
B1 & B2 Barnes Road C11-019	Unknown	B1	3.5 / Unknown	2,000
		B2	3.5 / Unknown	
B3&B4 Barnes Road C11-027	660	B3	8.5 / 661.5	3,000
		B4	6 / 664	
B5&B6 Sullivan Road C11-029	663	B5	8.5 / 663.5	2,000
		B6	6 / 666	
B7 & B8	688	B7	8.5 / 687.5	3,000

LOCATION & MCDC ID	ESTIMATED CULVERT INVERT ELEVATION +/- (FEET)	BORING	DEPTH / ELEVATION (+/-) TO SUITABLE BEARING SOILS (FEET)	RECOMMENDED MAXIMUM FACTORED BEARING RESISTANCE (PSF)
Bossett Road 7681		B8	8.5 / 687.5	
B9& B10 White Road C12-025	697	B9	5 / 698	2,000
		B10	5 / 698	
B11 & B12 Bossett Road C12-022	691	B11	6 / 690	2,000
		B12	3.5 / 692.5	
B13 & B14 Bailey Road C12-007	701	B13	6 / 702	3,000
		B14	5 / 703	
B15 & B16 Hall Road C12-059	685	B15	6 / 687	2,000
		B16	3.5 / 689.5	
B17 & B18 Moorland Road C12-101	680	B17	3.5 / 684.5	3,000
		B18	3.5 / 684.5	
B19 & B20 Moorland Road C12-116	680	B19	6 / 683	3,000
		B20	8.5 / 680.5	
B21 & B22 Goebel Road C12-041	697	B21	6 / 701	2,000
		B22	6 / 701	
B23 & B24 Bailey Road C12-008	703	B23	5 / 702	3,000
		B24	5 / 702	
B25 & B26 Ravenna Road C12-028	696	B25	6 / 696	3,000
		B26	8.5 / 693.5	
B27 & B28 White Road C12-030	695	B27	3.5 / 697.5	2,000
		B28	3.5 / 697.5	

The final footing design must consider the eccentricity caused by moments and lateral shear loads applied to the footings from the proposed wing walls and shear keys that transfer load from the structures to the footings. We recommend that the resultant eccentricity be kept within the middle third of the footing

width (i.e., a zero uplift condition for the footing edges). A bearing resistance factor (φ_b) of 0.45 was used to determine the factored bearing resistance allowed for the strength limit state.

We recommend SME evaluate foundation subgrades during construction to verify that the design soil bearing pressure is achieved. If the subsurface soils cannot be stabilized using MDOT 6A, then unstable/disturbed subsoils should be undercut (removed) and replaced with MDOT 6A coarse aggregate modified with 80 percent crushed coarse aggregate. Foundation undercuts should be oversized laterally and backfilled with the coarse crushed aggregate to reestablish the design bearing level. Please refer to the following Typical Foundation Undercutting Diagram.



Shallow foundations must be situated a minimum of 42 inches below final site grades for protection against frost action during normal winters. The foundations and proposed bearing soils should be protected from freezing during construction if work occurs in the winter months. The predominately sandy soils are prone to sloughing and caving. We recommend sloping back the foundation excavation sides prior to installing the precast foundations and wall elements or constructing cast-in-place foundations, and removing any caved soils from the design bearing surface.

WALLS AND DRAINAGE – LATERAL PRESSURES AND SLIDING

Head walls and wing walls are essentially retaining walls. The lateral earth pressure coefficients and sliding resistances should be established using the AASHTO & MDOT LRFD equations and procedures for bridge design. We have assumed that Structure Backfill (MDOT Class II) placed to typical dimensions will be used behind the walls per the 2012 MDOT Standard Specifications for Construction Section 206.03. Care should be exercised during compaction of the wall backfill to avoid overstressing the wall. Backfill should be hand compacted within 1 foot of the walls.

Lateral earth pressure coefficients can be calculated based on saturated (moist) unit weight of 120 pounds per cubic-foot (pcf) and an effective angle of internal friction of 32 degrees (assumed for typical MDOT Class II placed as Structure Backfill). Sliding resistances can be computed using a sliding resistance factor of 0.85 for concrete placed on sand or clay or MDOT 6A tamped into disturbed sand or clay.

Wall designs should incorporate anticipated surcharge loadings (such as traffic, construction equipment, and sloped ground conditions) and the design surcharge loading should not be exceeded during construction. The decision to use the active earth pressure or earth pressure at rest coefficient for wall designs will depend on the apparent flexibility of the proposed wall design. A rigid wall and footing with lateral resistance available should be designed using an at-rest coefficient, while a more flexible wall system that moves more significantly as a result of backfilling can use an active earth pressure coefficient. Regarding whether or not to include passive soil resistance provided by drained soils present

in front of the proposed walls in designs is typically the design engineer's choice. Typically, MDOT does not rely upon passive soil resistance even with the use of scour countermeasures for bridge structures.

To reduce the potential for the build-up of hydrostatic pressure behind the walls, we recommend permanent drains be installed on the heel side of the walls. The drains should consist of a minimum 6-inch-diameter perforated plastic drain pipe, wrapped with a filter fabric, and surrounded by 6 inches of a filter material, such as pea gravel (MDOT 34G or 34R). The drains should be discharged to a gravity drainage outlet. We recommend the design include provisions for access to the drains for cleaning and maintenance. It may be desirable to install the drains just above the drain water level and to design the lower portion of the wall to resist soil and hydrostatic groundwater pressures. Alternatively, the wing walls can be designed to resist both soil and hydrostatic groundwater pressures for the entire height.

In addition to checking sliding stability of the wing walls, the resistance factor for overturning, location of the resultant force at the base, mass stability, and contact pressure at the base should also be evaluated. If desired, SME can assist the project team in the design of the wing walls incorporating these considerations. However, such analyses go beyond the current scope of this evaluation.

CONSTRUCTION CONSIDERATIONS

We recommend the bid documents request prospective contractors include unit prices for removing unsuitable subgrade (e.g., debris-laden fill, buried organics and topsoil, overly loose soils, and disturbed soils) and replacing it with suitable engineered fill or stabilizing crushed aggregates. Also, we recommend establishing a contingency in the construction budget for this work. The actual quantity of unsuitable soils that may be encountered during construction could be estimated from the borings but may vary based on the actual conditions. The suitability of subgrades can be impacted by the contractor's means-and-methods (e.g., equipment and/or effort), time of year, groundwater levels, variable subsurface conditions, and other factors. Actual undercut quantities can be determined during construction by measuring excavation volumes, counting truckloads, or a combination of methods.

The contractor may encounter old foundations, and possibly boulders and cobbles during construction. Consider providing a contract pay item for removal of cobbles or obstructions. New foundations should not be placed where previous foundations will obstruct the construction, or adversely affect the long-term performance of the new substructures.

We recommend temporary construction slopes be graded in accordance with MI-OHSA requirements for the soil conditions encountered. Monitor the condition of any temporary slope utilized during construction for stability. In roadway widening areas (if any), depending on the specific conditions encountered during construction, require flatter slopes if needed. Since it is difficult to backfill on sloping ground, cut benches into the slope and place Structure Backfill in level horizontal lifts not exceeding 9 inches in loose thickness. Backfill soils and compaction requirements should meet the specifications for structure embankments provided by MDOT or Muskegon County Road Commission.

All excavations should be sloped, shored, or braced in accordance with MI-OSHA requirements. The contractor should provide an adequately constructed and braced shoring system for employees working in an excavation that may expose employees to the danger of moving ground. If material is stored or heavy equipment is operated near an excavation, stronger shoring must be used to resist the increased pressure due to the superimposed loads. The contractor should take precautions to protect adjacent utilities, roadways, and structures during construction.

Handling, transportation, and disposal of excavated materials and groundwater will need to be performed in accordance with applicable environmental regulations.

We appreciate the opportunity to be of service. If you have questions regarding this report or if you require additional information, please contact us.

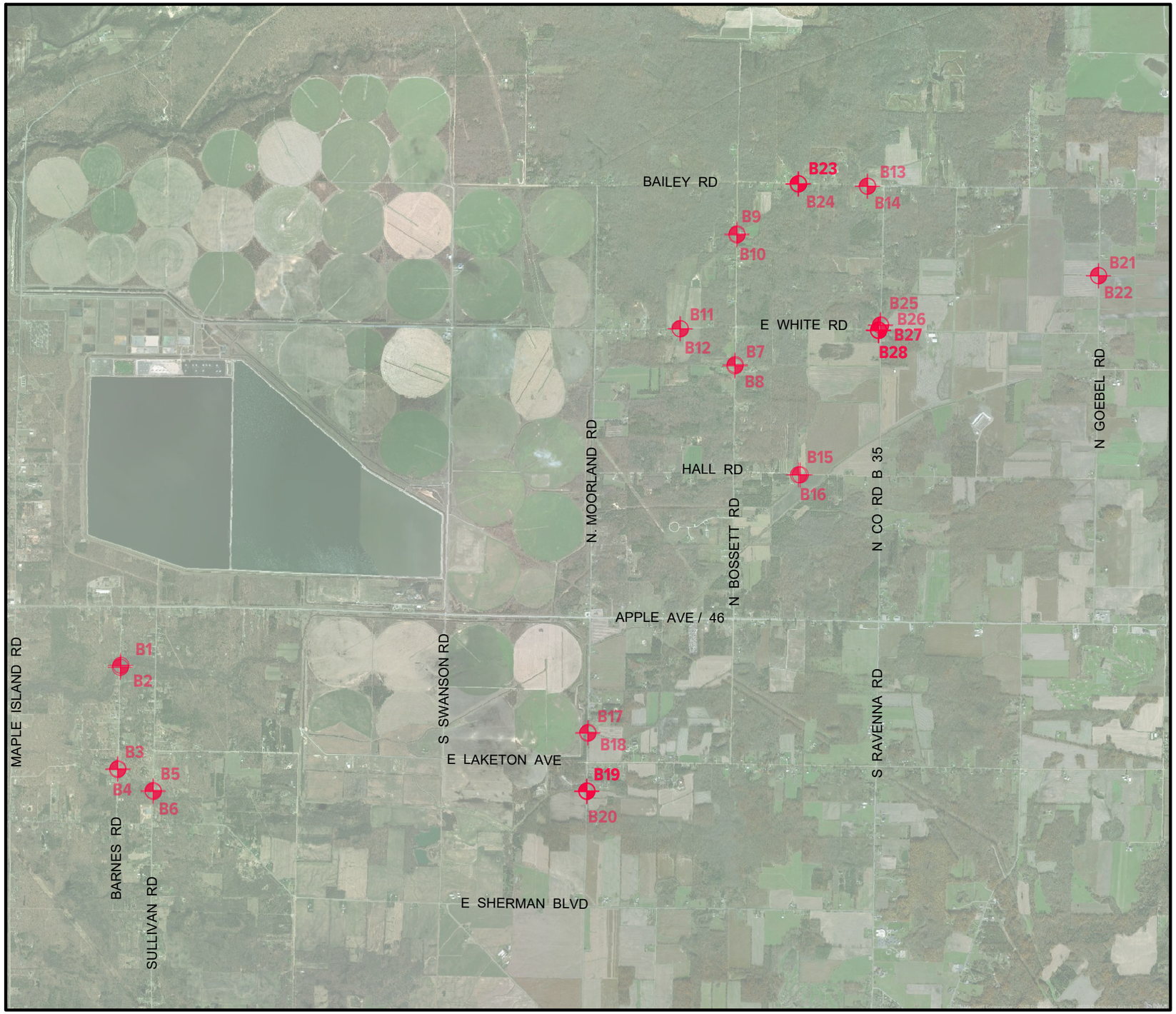
Sincerely,

SME

Paul E. Anderson, PE
Senior Project Engineer

Andrew T. Bolton, PE
Senior Consultant

Attachments: Boring Location Diagrams (Figures Nos. 1 through 3)
Boring Log Terminology
Boring Logs (B1 through B28)
Important Information about your Geotechnical Engineering Report
General Comments
Laboratory Testing Procedures



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W E

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0' 4000' 8000'

GRAPHIC SCALE: 1" = 4000'

LEGEND

APPROXIMATE BORING LOCATION

NOTE:
BASE DRAWING INFORMATION TAKEN FROM GOOGLE EARTH PRO AND BING ONLINE MAPS.

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Project

MCDC DRAIN CULVERT REPLACEMENTS

Project Location

EGELSTON AND MOORLAND TOWNSHIPS, MUSKEGON COUNTY, MICHIGAN

Sheet Name

BORING LOCATION DIAGRAM

No.	Revision Date

Date 5-13-2020

CADD JAB

Designer PEA

Scale AS NOTED

Project 084059.00

Figure No. 1

PLOT DATE: May 12, 2020 - 3:59pm - jblake \\Sme-inc\pz\WIP\084059.00\CAD\DWGS\BLD\rev0\084059.00-BLD.dwg

MUSKEGON-NEWAYGO DRAIN
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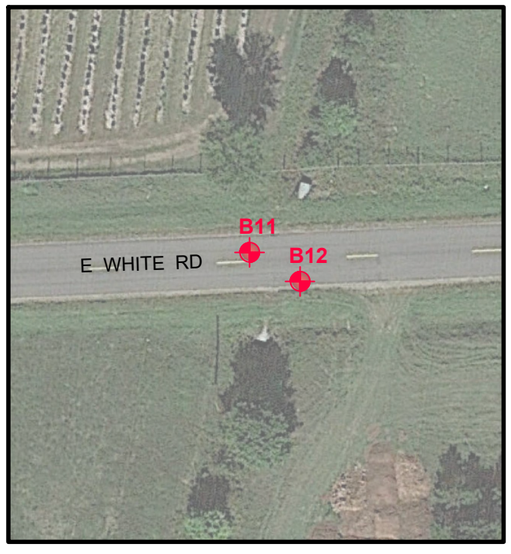
SMITH & MULDER DRAIN
MCRD ID: C11-027

SMITH & MULDER DRAIN
MCRD ID: C11-029

JTB&S DRAIN
MCRD ID: 7681

DALEY DRAIN
MCRD ID: C12-025



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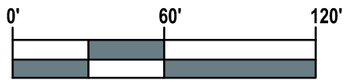

GRAPHIC SCALE: 1" = 60'

LEGEND

APPROXIMATE BORING LOCATION

NOTE:
BASE DRAWING INFORMATION TAKEN FROM GOOGLE EARTH PRO AND BING ONLINE MAPS.

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Project
MCDC DRAIN CULVERT REPLACEMENTS

Project Location
EGELSTON AND MOORLAND TOWNSHIPS, MUSKEGON COUNTY, MICHIGAN

Sheet Name
BORING LOCATION DIAGRAM -
BORINGS B1 THROUGH B12

No.	Revision Date

Date	5-13-2020
CADD	JAB
Designer	PEA
Scale	AS NOTED
Project	084059.00
Figure No.	2

PLOT DATE: May 12, 2020 - 3:56pm - jblake
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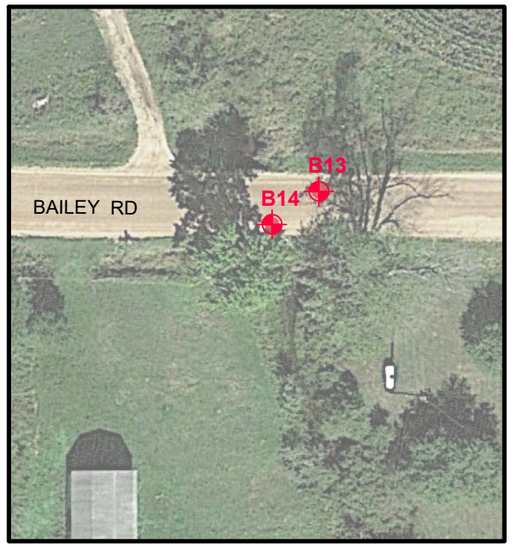

JTB&S - SLATER DRAIN
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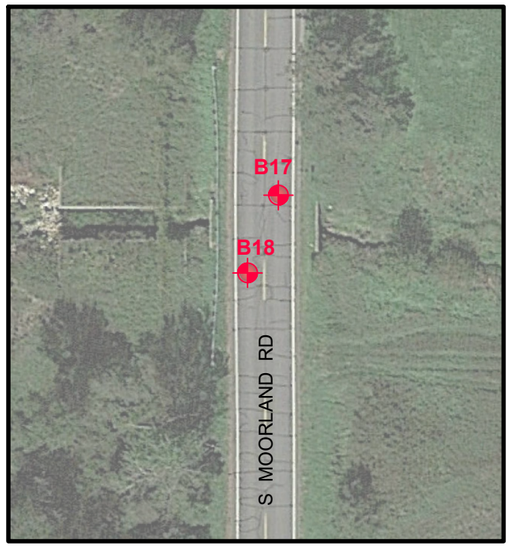
LITTLE DRAIN
MCRD ID: C12-059



PORTER DRAIN
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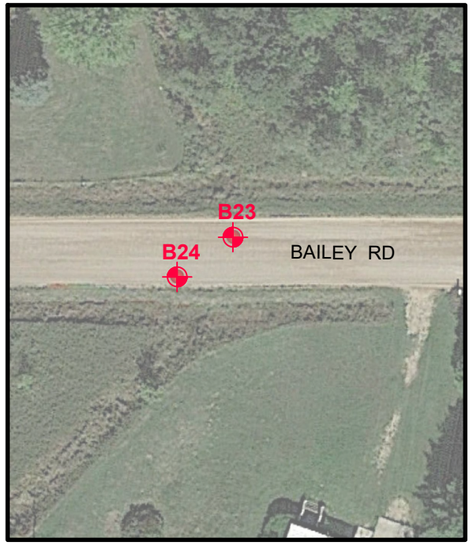
SMITH & MULDER NO. 2 DRAIN
MCRD ID: C12-116

MUSKEGON-NEWAYGO DRAIN
MCRD ID: C12-041



DALEY DRAIN
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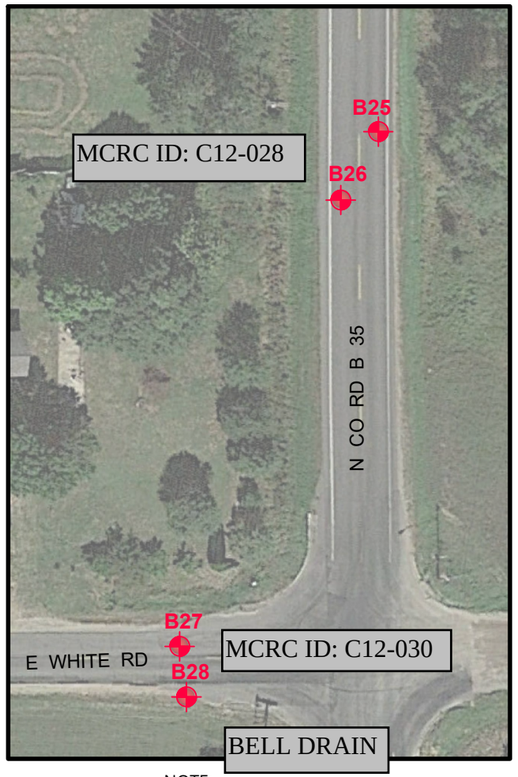

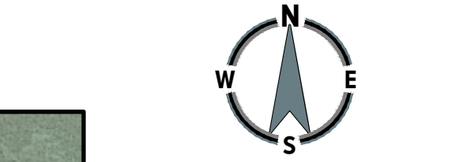

LEGEND

APPROXIMATE BORING LOCATION

NOTE:
BASE DRAWING INFORMATION TAKEN FROM GOOGLE EARTH PRO AND BING ONLINE MAPS.

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Project
MCDC DRAIN CULVERT REPLACEMENTS

Project Location
EGELSTON AND MOORLAND TOWNSHIPS, MUSKEGON COUNTY, MICHIGAN

Sheet Name
BORING LOCATION DIAGRAM - BORINGS B13 THROUGH B28

No.	Revision Date

Date 5-13-2020
CADD JAB
Designer PEA
Scale AS NOTED
Project 084059.00
Figure No. 3

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BORING LOG TERMINOLOGY

UNIFIED SOIL CLASSIFICATION AND SYMBOL CHART

COARSE-GRAINED SOIL (more than 50% of material is larger than No. 200 sieve size.)			
GRAVEL More than 50% of coarse fraction larger than No. 4 sieve size	Clean Gravel (Less than 5% fines)	GW	Well-graded gravel; gravel-sand mixtures, little or no fines
		GP	Poorly-graded gravel; gravel-sand mixtures, little or no fines
	Gravel with fines (More than 12% fines)	GM	Silty gravel; gravel-sand-silt mixtures
		GC	Clayey gravel; gravel-sand-clay mixtures
SAND 50% or more of coarse fraction smaller than No. 4 sieve size	Clean Sand (Less than 5% fines)	SW	Well-graded sand; sand-gravel mixtures, little or no fines
		SP	Poorly graded sand; sand-gravel mixtures, little or no fines
	Sand with fines (More than 12% fines)	SM	Silty sand; sand-silt-gravel mixtures
		SC	Clayey sand; sand–clay-gravel mixtures
FINE-GRAINED SOIL (50% or more of material is smaller than No. 200 sieve size)			
SILT AND CLAY Liquid limit less than 50%		ML	Inorganic silt; sandy silt or gravelly silt with slight plasticity
		CL	Inorganic clay of low plasticity; lean clay, sandy clay, gravelly clay
		OL	Organic silt and organic clay of low plasticity
SILT AND CLAY Liquid limit 50% or greater		MH	Inorganic silt of high plasticity, elastic silt
		CH	Inorganic clay of high plasticity, fat clay
		OH	Organic silt and organic clay of high plasticity
HIGHLY ORGANIC SOIL		PT	Peat and other highly organic soil

OTHER MATERIAL SYMBOLS

Topsoil, Void, Sandstone, Asphalt, Glacial Till, Siltstone, Base, Coal, Limestone, Concrete, Shale, Fill

LABORATORY CLASSIFICATION CRITERIA

GW	$C_U = \frac{D_{60}}{D_{10}}$ greater than 4; $C_C = \frac{D_{30}^2}{D_{10} \times D_{60}}$ between 1 and 3	
GP	Not meeting all gradation requirements for GW	
GM	Atterberg limits below "A" line or PI less than 4	Above "A" line with PI between 4 and 7 are borderline cases requiring use of dual symbols
GC	Atterberg limits above "A" line with PI greater than 7	
SW	$C_U = \frac{D_{60}}{D_{10}}$ greater than 6; $C_C = \frac{D_{30}^2}{D_{10} \times D_{60}}$ between 1 and 3	
SP	Not meeting all gradation requirements for SW	
SM	Atterberg limits below "A" line or PI less than 4	Above "A" line with PI between 4 and 7 are borderline cases requiring use of dual symbols
SC	Atterberg limits above "A" line with PI greater than 7	

Determine percentages of sand and gravel from grain-size curve. Depending on percentage of fines (fraction smaller than No. 200 sieve size), coarse-grained soils are classified as follows:

Less than 5 percent……GW, GP, SW, SP
More than 12 percent……GM, GC, SM, SC
5 to 12 percent……Cases requiring dual symbols

- SP-SM or SW-SM (SAND with Silt or SAND with Silt and Gravel)
- SP-SC or SW-SC (SAND with Clay or SAND with Clay and Gravel)
- GP-GM or GW-GM (GRAVEL with Silt or GRAVEL with Silt and Sand)
- GP-GC or GW-GC (GRAVEL with Clay or GRAVEL with Clay and Sand)

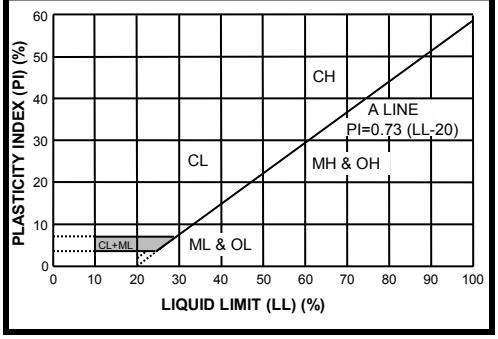
If the fines are CL-ML:

- SC-SM (SILTY CLAYEY SAND or SILTY CLAYEY SAND with Gravel)
- SM-SC (CLAYEY SILTY SAND or CLAYEY SILTY SAND with Gravel)
- GC-GM (SILTY CLAYEY GRAVEL or SILTY CLAYEY GRAVEL with Sand)
- GM-GC (CLAYEY SILTY GRAVEL or CLAYEY SILTY GRAVEL with Sand)

PARTICLE SIZES

Boulders	-	Greater than 12 inches
Cobbles	-	3 inches to 12 inches
Gravel- Coarse	-	3/4 inches to 3 inches
Fine	-	No. 4 to 3/4 inches
Sand- Coarse	-	No. 10 to No. 4
Medium	-	No. 40 to No. 10
Fine	-	No. 200 to No. 40
Silt and Clay	-	Less than (0.0074 mm)

PLASTICITY CHART



VISUAL MANUAL PROCEDURE

When laboratory tests are not performed to confirm the classification of soils exhibiting borderline classifications, the two possible classifications would be separated with a slash, as follows:

For soils where it is difficult to distinguish if it is a coarse or fine-grained soil:

- SC/CL (CLAYEY SAND to Sandy LEAN CLAY)
- SM/ML (SILTY SAND to SANDY SILT)
- GC/CL (CLAYEY GRAVEL to Gravelly LEAN CLAY)
- GM/ML (SILTY GRAVEL to Gravelly SILT)

For soils where it is difficult to distinguish if it is sand or gravel, poorly or well-graded sand or gravel; silt or clay; or plastic or non-plastic silt or clay:

- SP/GP or SW/GW (SAND with Gravel to GRAVEL with Sand)
- SC/GC (CLAYEY SAND with Gravel to CLAYEY GRAVEL with Sand)
- SM/GM (SILTY SAND with Gravel to SILTY GRAVEL with Sand)
- SW/SP (SAND or SAND with Gravel)
- GP/GW (GRAVEL or GRAVEL with Sand)
- SC/SM (CLAYEY to SILTY SAND)
- GM/GC (SILTY to CLAYEY GRAVEL)
- CL/ML (SILTY CLAY)
- ML/CL (CLAYEY SILT)
- CH/MH (FAT CLAY to ELASTIC SILT)
- CL/CH (LEAN to FAT CLAY)
- MH/ML (ELASTIC SILT to SILT)
- OL/OH (ORGANIC SILT or ORGANIC CLAY)

DRILLING AND SAMPLING ABBREVIATIONS

2ST	–	Shelby Tube – 2" O.D.
3ST	–	Shelby Tube – 3" O.D.
AS	–	Auger Sample
GS	–	Grab Sample
LS	–	Liner Sample
NR	–	No Recovery
PM	–	Pressure Meter
RC	–	Rock Core diamond bit. NX size, except where noted
SB	–	Split Barrel Sample 1-3/8" I.D., 2" O.D., except where noted
VS	–	Vane Shear
WS	–	Wash Sample

OTHER ABBREVIATIONS

WOH	–	Weight of Hammer
WOR	–	Weight of Rods
SP	–	Soil Probe
PID	–	Photo Ionization Device
FID	–	Flame Ionization Device

DEPOSITIONAL FEATURES

Parting	–	as much as 1/16 inch thick
Seam	–	1/16 inch to 1/2 inch thick
Layer	–	1/2 inch to 12 inches thick
Stratum	–	greater than 12 inches thick
Pocket	–	deposit of limited lateral extent
Lens	–	lenticular deposit
Hardpan/Till	–	an unstratified, consolidated or cemented mixture of clay, silt, sand and/or gravel, the size/shape of the constituents vary widely
Lacustrine	–	soil deposited by lake water
Mottled	–	soil irregularly marked with spots of different colors that vary in number and size
Varved	–	alternating partings or seams of silt and/or clay
Occasional	–	one or less per foot of thickness
Frequent	–	more than one per foot of thickness
Interbedded	–	strata of soil or beds of rock lying between or alternating with other strata of a different nature

CLASSIFICATION TERMINOLOGY AND CORRELATIONS

Cohesionless Soils

Relative Density	N-Value (Blows per foot)
Very Loose	0 to 4
Loose	4 to 10
Medium Dense	10 to 30
Dense	30 to 50
Very Dense	50 to 80
Extremely Dense	Over 80

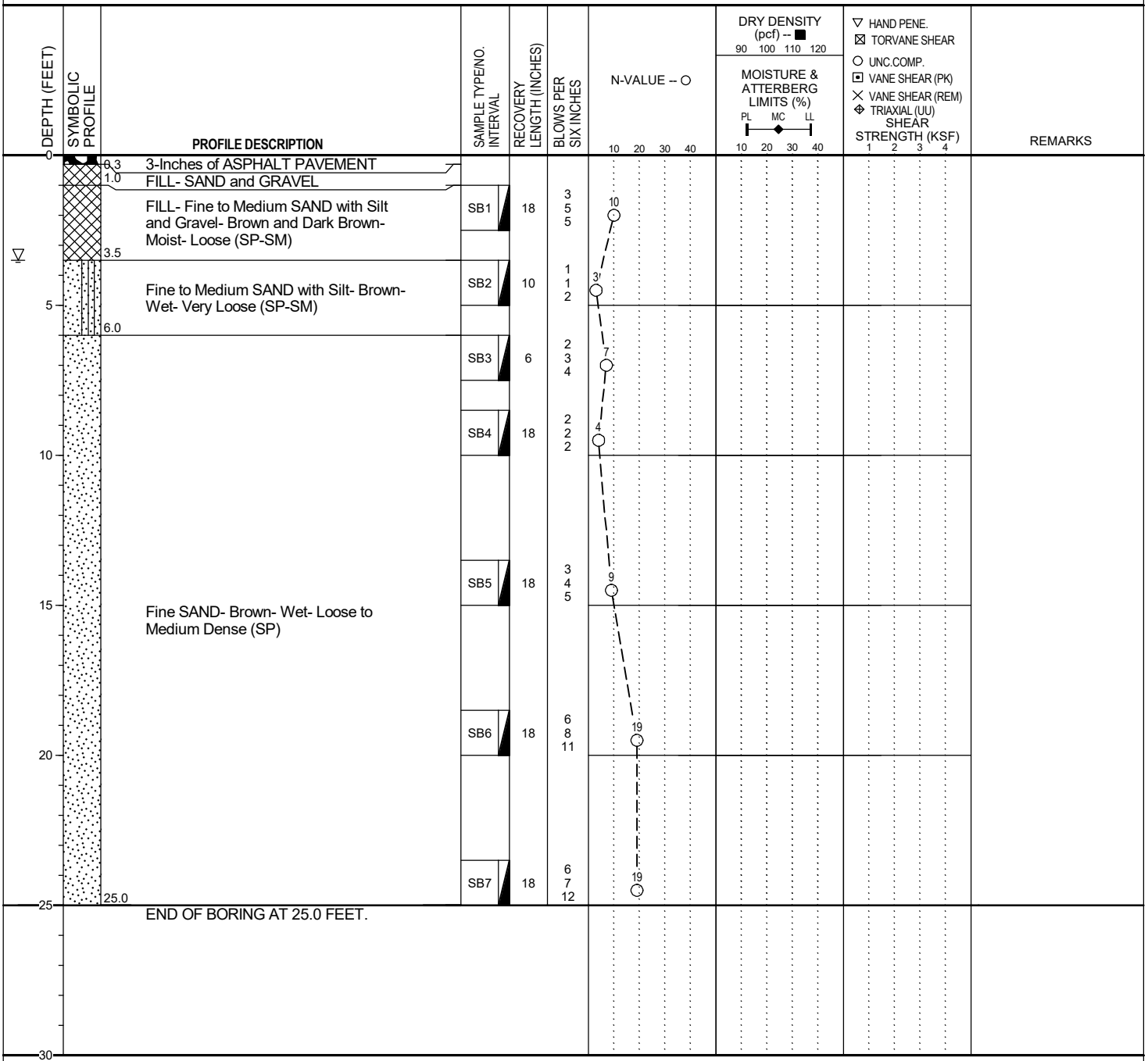
Cohesive Soils

Consistency	N-Value (Blows per foot)	Undrained Shear Strength (kips/ft^2)
Very Soft	0 - 2	0.25 or less
Soft	2 - 4	0.25 to 0.50
Medium	4 - 8	0.50 to 1.0
Stiff	8 - 15	1.0 to 2.0
Very Stiff	15 - 30	2.0 to 4.0
Hard	> 30	4.0 or greater

Standard Penetration 'N-Value' = Blows per foot of a 140-pound hammer falling 30 inches on a 2-inch O.D. split barrel sampler, except where noted.

BORING B 1

PROJECT NAME: MCDC Drain Culvert Replacements
PROJECT NUMBER: 084059.00
CLIENT: Land & Resource Engineering
PROJECT LOCATION: Muskegon County, Michigan
DATE STARTED: 4/21/20 **COMPLETED:** 4/21/20
BORING METHOD: Hollow-stem Augers
DRILLER: JN **RIG NO.:** Truck-CME 55
LOGGED BY: GBS **CHECKED BY:** ATB



GROUNDWATER & BACKFILL INFORMATION

	DEPTH (FT)
▽ DURING BORING:	3.5
▼ AT END OF BORING:	Note 2

CAVE-IN OF BOREHOLE AT: 5.0

BACKFILL METHOD: Auger Cuttings

NOTES:
1. The indicated stratification lines are approximate. In situ, the transition between materials may be gradual.
2. Drilling mud was added to annulus of augers 6 feet below the ground surface. Therefore, obtaining an accurate water level after completion of drilling was not possible.
3. Surface capped with cold patch after backfilling the borehole.

BORING B 2

PROJECT NAME: MCDC Drain Culvert Replacements
PROJECT NUMBER: 084059.00
CLIENT: Land & Resource Engineering
PROJECT LOCATION: Muskegon County, Michigan
DATE STARTED: 4/21/20 **COMPLETED:** 4/21/20
BORING METHOD: Hollow-stem Augers
DRILLER: JN **RIG NO.:** Truck-CME 55
LOGGED BY: GBS **CHECKED BY:** ATB

DEPTH (FEET)	PROFILE DESCRIPTION	SAMPLE TYPE/NO. INTERVAL	RECOVERY LENGTH (INCHES)	BLOWS PER SIX INCHES	N-VALUE -- ○ (10 20 30 40)	DRY DENSITY (pcf) -- ■ (90 100 110 120) / MOISTURE & ATTERBERG LIMITS (%) PL MC LL (10 20 30 40)	▽ HAND PENE. ⊠ TORVANE SHEAR ○ UNC.COMP. ⊡ VANE SHEAR (PK) × VANE SHEAR (REM) ◈ TRIAXIAL (UU) SHEAR STRENGTH (KSF) (1 2 3 4)	REMARKS
0	0.4 4 1/2-Inches of ASPHALT PAVEMENT							
	0.8 FILL- SAND and GRAVEL							
	FILL- Fine SAND with Silt- Few Gravel- Brown and Dark Brown- Moist- Loose (SP-SM)	SB1	18	6 5 5	10			
▽	3.5							
5	Fine to Medium SAND with Silt- Brown- Wet- Very Loose (SP-SM)	SB2	18	2 2 2	4			
	6.0							
	Fine to Medium SAND with Silt- Occasional Roots- Brown- Wet- Very Loose (SP-SM)	SB3	18	2 2 2	4			
	9.0	SB4	18	2 2 4	6			
10								
		SB5	18	2 3 4	7			
15	Fine SAND- Brown- Wet- Loose to Medium Dense (SP)							
		SB6	18	3 5 6	11			
20								
		SB7	18	5 5 6	11			
25	25.0							
	END OF BORING AT 25.0 FEET.							
30								

GROUNDWATER & BACKFILL INFORMATION

	DEPTH (FT)
▽ **DURING BORING:**	3.5
▼ **AT END OF BORING:**	Note 2

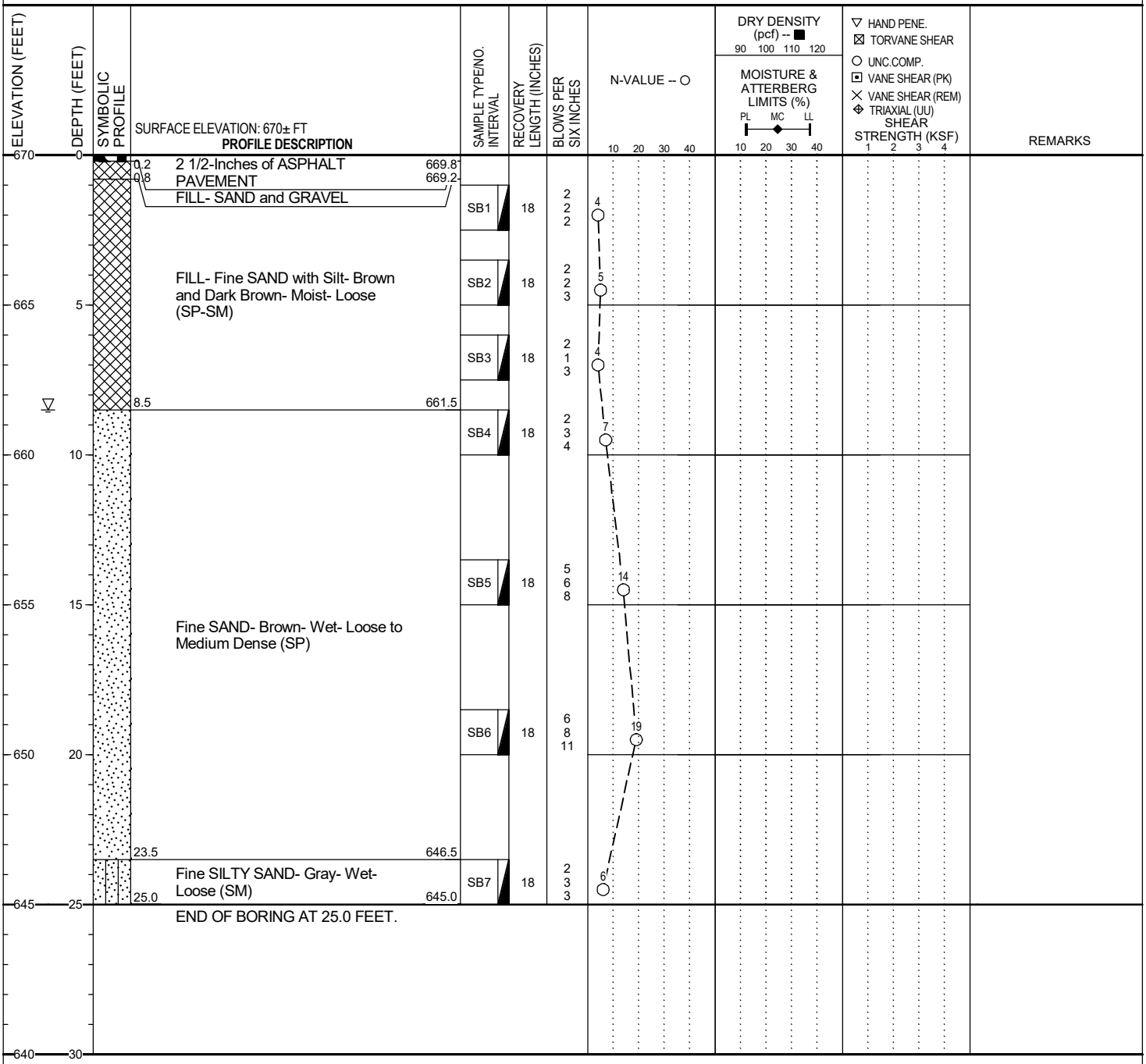
CAVE-IN OF BOREHOLE AT: 4.0

BACKFILL METHOD: Auger Cuttings

NOTES:
1. The indicated stratification lines are approximate. In situ, the transition between materials may be gradual.
2. Drilling mud was added to annulus of augers 6 feet below the ground surface. Therefore, obtaining an accurate water level after completion of drilling was not possible.
3. Surface capped with cold patch after backfilling the borehole.

BORING B 3

PROJECT NAME: MCDC Drain Culvert Replacements
PROJECT NUMBER: 084059.00
CLIENT: Land & Resource Engineering
PROJECT LOCATION: Muskegon County, Michigan
DATE STARTED: 4/21/20 **COMPLETED:** 4/21/20
BORING METHOD: Hollow-stem Augers
DRILLER: JN **RIG NO.:** Truck-CME 55
LOGGED BY: GBS **CHECKED BY:** ATB



GROUNDWATER & BACKFILL INFORMATION

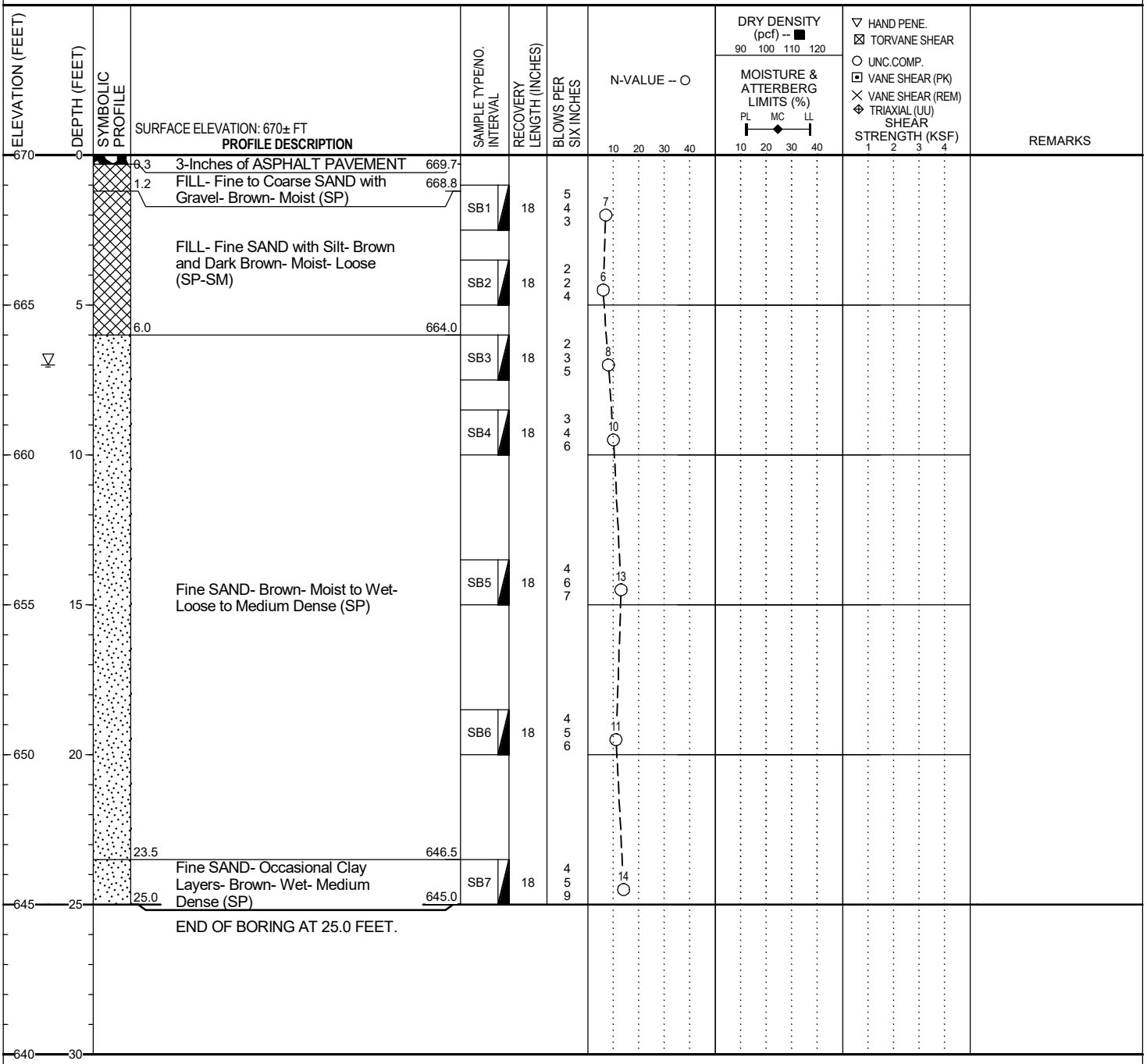
	DEPTH (FT)	ELEV (FT)
▽ **DURING BORING:**	8.5	661.5
▼ **AT END OF BORING:**	Note 2	
CAVE-IN OF BOREHOLE AT:	8.0	662.0

BACKFILL METHOD: Auger Cuttings

NOTES:
1. The indicated stratification lines are approximate. In situ, the transition between materials may be gradual.
2. Drilling mud was added to annulus of augers 10 feet below the ground surface. Therefore, obtaining an accurate water level after completion of drilling was not possible.
3. Surface capped with cold patch after backfilling the borehole.

BORING B 4

PROJECT NAME: MCDC Drain Culvert Replacements
PROJECT NUMBER: 084059.00
CLIENT: Land & Resource Engineering
PROJECT LOCATION: Muskegon County, Michigan
DATE STARTED: 4/21/20 **COMPLETED:** 4/21/20 **BORING METHOD:** Hollow-stem Augers
DRILLER: JN **RIG NO.:** Truck-CME 55 **LOGGED BY:** GBS **CHECKED BY:** ATB



GROUNDWATER & BACKFILL INFORMATION

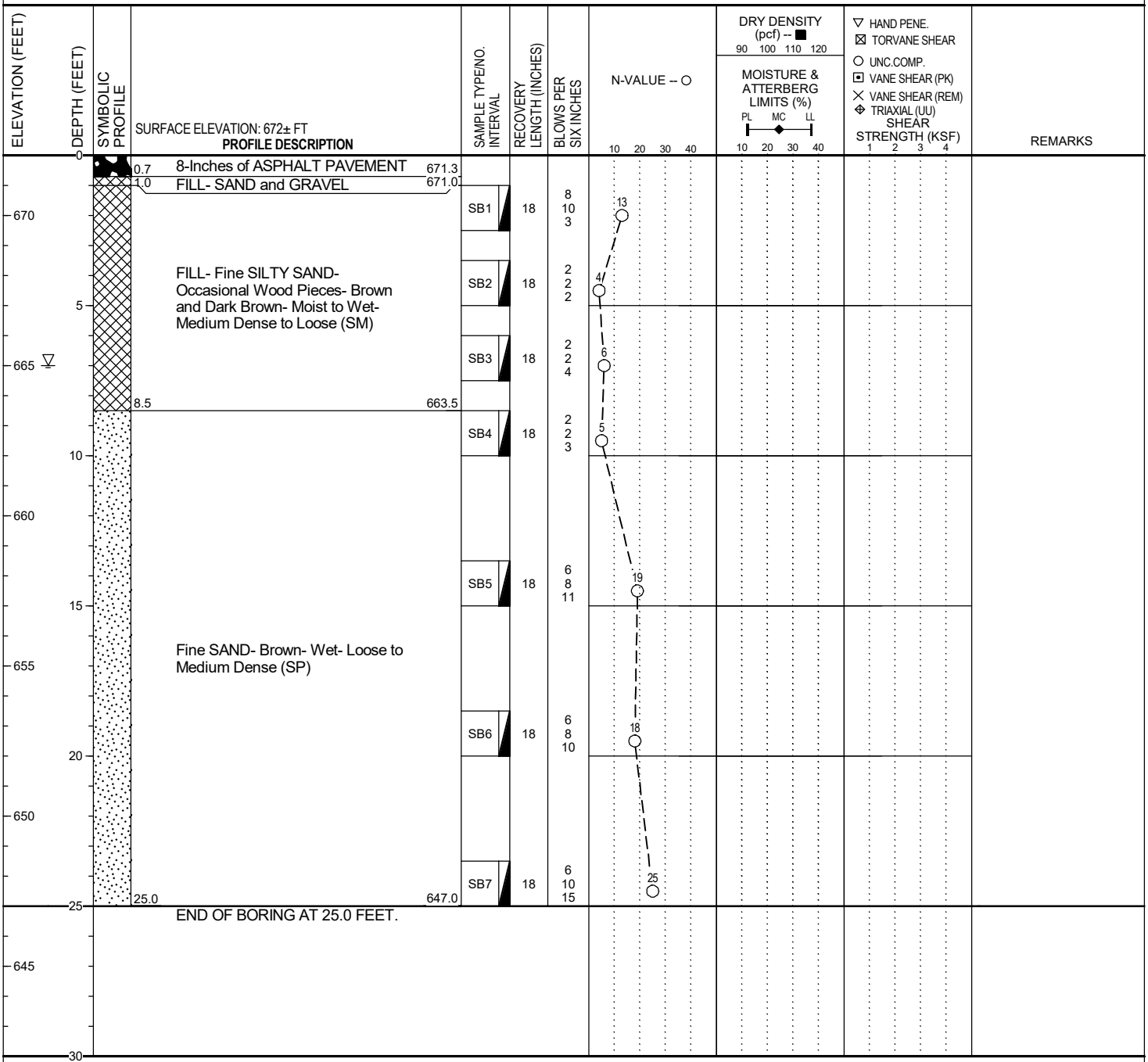
	DEPTH (FT)	ELEV (FT)
▽ **DURING BORING:**	7.0	663.0
▼ **AT END OF BORING:**	Note 2	
CAVE-IN OF BOREHOLE AT:	6.5	663.5

BACKFILL METHOD: Auger Cuttings

NOTES:
1. The indicated stratification lines are approximate. In situ, the transition between materials may be gradual.
2. Drilling mud was added to annulus of augers 10 feet below the ground surface. Therefore, obtaining an accurate water level after completion of drilling was not possible.
3. Surface capped with cold patch after backfilling the borehole.

BORING B 5

PROJECT NAME: MCDC Drain Culvert Replacements
PROJECT NUMBER: 084059.00
CLIENT: Land & Resource Engineering
PROJECT LOCATION: Muskegon County, Michigan
DATE STARTED: 4/21/20 **COMPLETED:** 4/21/20 **BORING METHOD:** Hollow-stem Augers
DRILLER: JN **RIG NO.:** Truck-CME 55 **LOGGED BY:** GBS **CHECKED BY:** ATB



GROUNDWATER & BACKFILL INFORMATION

	DEPTH (FT)	ELEV (FT)
▽ DURING BORING:	7.0	665.0
▼ AT END OF BORING:	Note 2	
CAVE-IN OF BOREHOLE AT:	6.0	666.0

BACKFILL METHOD: Auger Cuttings

NOTES:
1. The indicated stratification lines are approximate. In situ, the transition between materials may be gradual.
2. Drilling mud was added to annulus of augers 10 feet below the ground surface. Therefore, obtaining an accurate water level after completion of drilling was not possible.
3. Surface capped with cold patch after backfilling the borehole.

BORING B 6

PROJECT NAME: MCDC Drain Culvert Replacements
PROJECT NUMBER: 084059.00
CLIENT: Land & Resource Engineering
PROJECT LOCATION: Muskegon County, Michigan
DATE STARTED: 4/21/20 **COMPLETED:** 4/21/20
BORING METHOD: Hollow-stem Augers
DRILLER: JN **RIG NO.:** Truck-CME 55
LOGGED BY: GBS **CHECKED BY:** ATB

SURFACE ELEVATION: 672± FT

ELEVATION (FEET)	DEPTH (FEET)	PROFILE DESCRIPTION		SAMPLE TYPE/NO. INTERVAL	RECOVERY LENGTH (INCHES)	BLOWS PER SIX INCHES
	0					
	0.5	6-Inches of ASPHALT PAVEMENT	671.5			
	1.1	FILL- SAND and GRAVEL	670.9	SB1	18	9 6 5
670		FILL- Fine SAND with Silt- Occasional Wood Pieces and Topsoil Seams- Brown and Dark Brown- Moist- Medium Dense (SP-SM)		SB2	18	5 10 11
	5					
	6.0		666.0	SB3	16	5 6 6
665 ▽				SB4	18	3 3 6
	10	Fine to Medium SAND- Brown- Moist to Wet- Loose to Medium Dense (SP)				
660				SB5	18	4 5 6
	15					
655						
	18.5		653.5	SB6	18	5 6 10
	20					
650		Fine SAND- Brown- Wet- Medium Dense (SP)				
	25.0		647.0	SB7	18	6 9 10
	25	END OF BORING AT 25.0 FEET.				
645						
	30					

N-VALUE -- ○ (10 20 30 40)

DRY DENSITY (pcf) -- ■ (90 100 110 120)

MOISTURE & ATTERBERG LIMITS (%) PL MC LL (10 20 30 40)

▽ HAND PENE.
⊠ TORVANE SHEAR
○ UNC.COMP.
⊡ VANE SHEAR (PK)
× VANE SHEAR (REM)
◈ TRIAXIAL (UU)
SHEAR STRENGTH (KSF) (1 2 3 4)

REMARKS

GROUNDWATER & BACKFILL INFORMATION

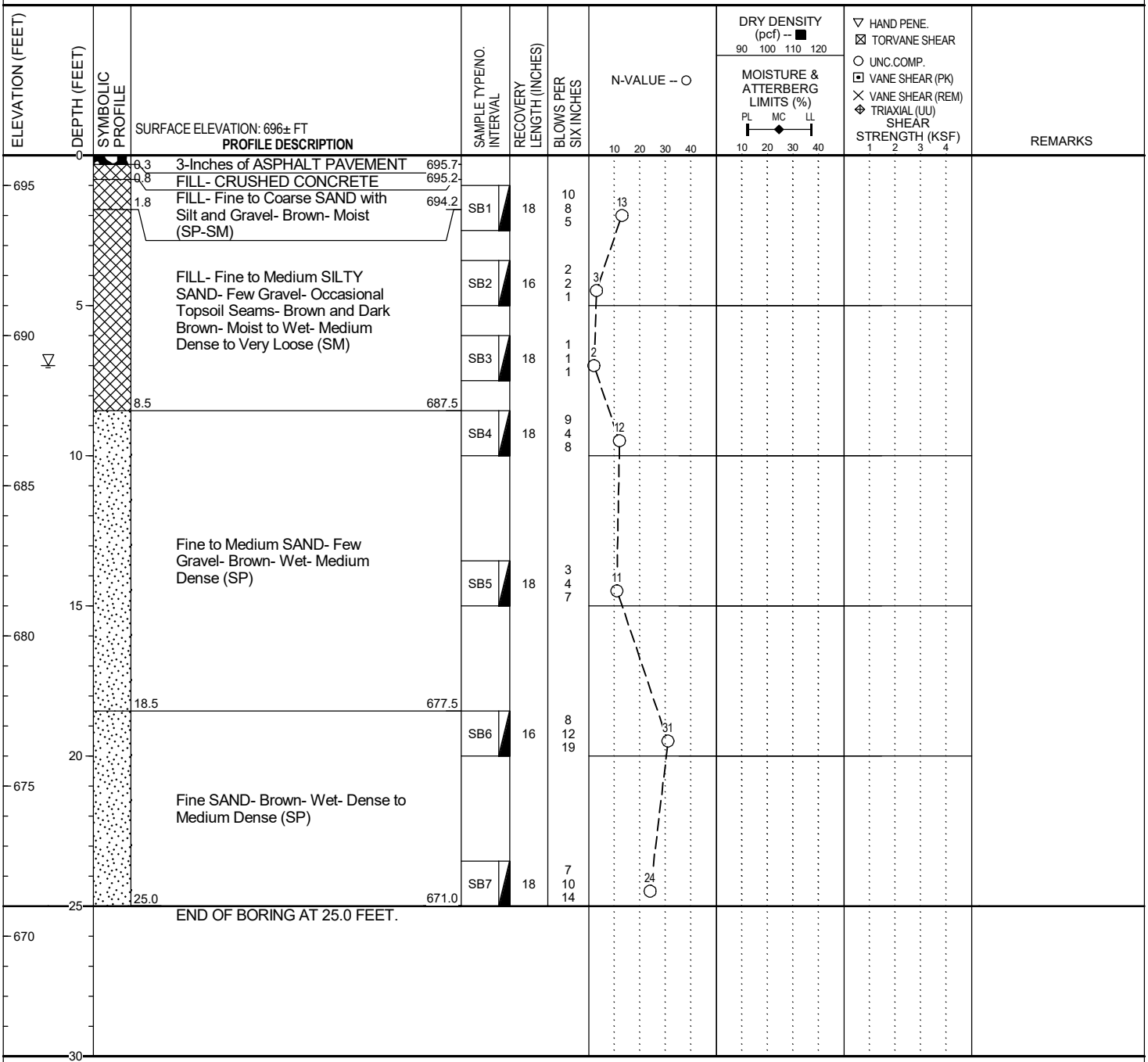
	DEPTH (FT)	ELEV (FT)
▽ **DURING BORING:**	7.5	664.5
▼ **AT END OF BORING:**	Note 2	
CAVE-IN OF BOREHOLE AT:	6.5	665.5

BACKFILL METHOD: Auger Cuttings

NOTES:
1. The indicated stratification lines are approximate. In situ, the transition between materials may be gradual.
2. Drilling mud was added to annulus of augers 10 feet below the ground surface. Therefore, obtaining an accurate water level after completion of drilling was not possible.
3. Surface capped with cold patch after backfilling the borehole.

BORING B 7

PROJECT NAME: MCDC Drain Culvert Replacements
PROJECT NUMBER: 084059.00
CLIENT: Land & Resource Engineering
PROJECT LOCATION: Muskegon County, Michigan
DATE STARTED: 4/23/20 **COMPLETED:** 4/23/20 **BORING METHOD:** Hollow-stem Augers
DRILLER: JN **RIG NO.:** Truck-CME 55 **LOGGED BY:** GBS **CHECKED BY:** ATB



GROUNDWATER & BACKFILL INFORMATION

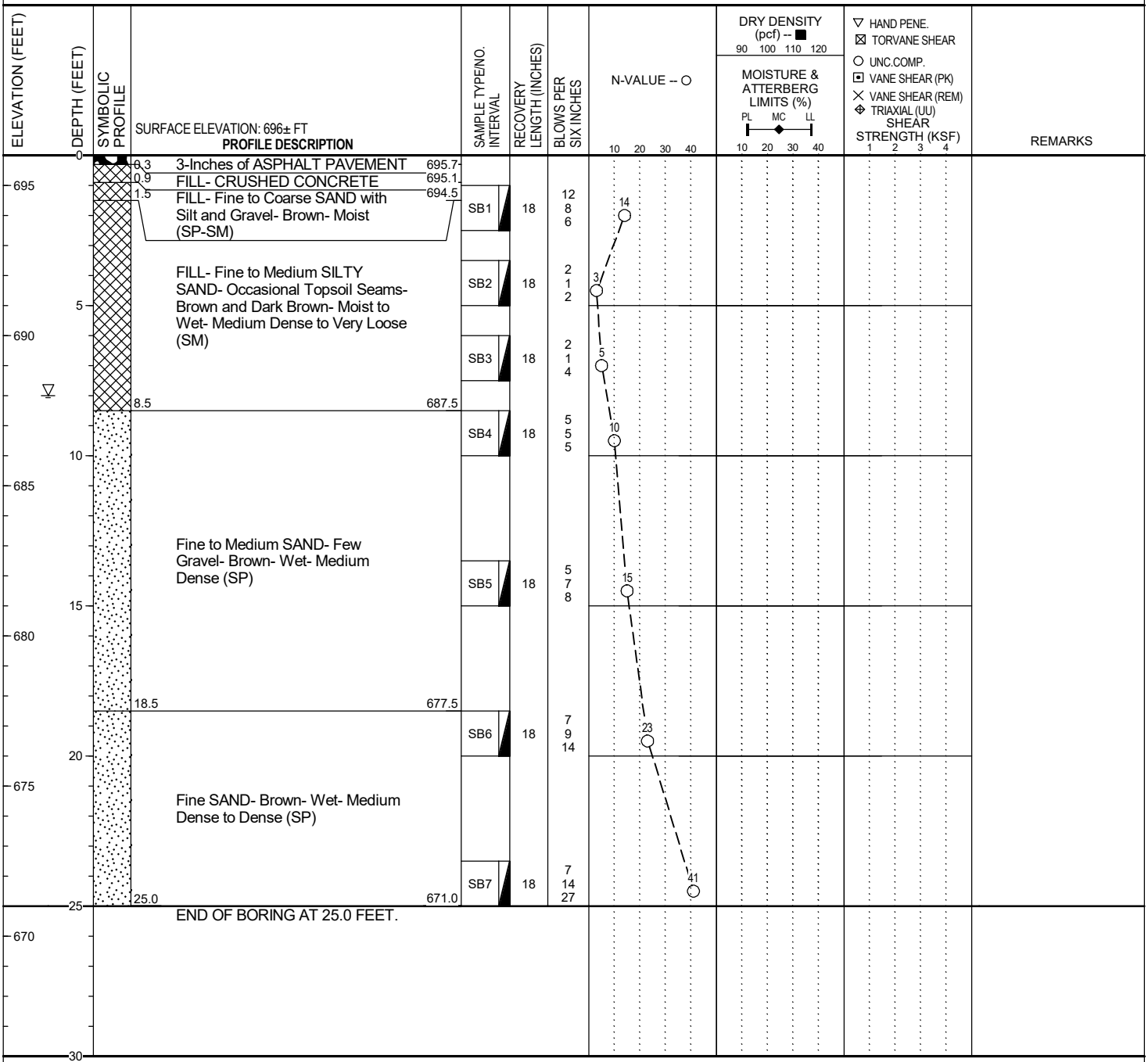
	DEPTH (FT)	ELEV (FT)
▽ **DURING BORING:**	7.0	689.0
▼ **AT END OF BORING:**	Note 2	
CAVE-IN OF BOREHOLE AT:	8.0	688.0

BACKFILL METHOD: Auger Cuttings

NOTES:
1. The indicated stratification lines are approximate. In situ, the transition between materials may be gradual.
2. Drilling mud was added to annulus of augers 10 feet below the ground surface. Therefore, obtaining an accurate water level after completion of drilling was not possible.
3. Surface capped with cold patch after backfilling the borehole.

BORING B 8

PROJECT NAME: MCDC Drain Culvert Replacements
PROJECT NUMBER: 084059.00
CLIENT: Land & Resource Engineering
PROJECT LOCATION: Muskegon County, Michigan
DATE STARTED: 4/23/20 **COMPLETED:** 4/23/20
BORING METHOD: Hollow-stem Augers
DRILLER: JN **RIG NO.:** Truck-CME 55
LOGGED BY: GBS **CHECKED BY:** ATB



GROUNDWATER & BACKFILL INFORMATION

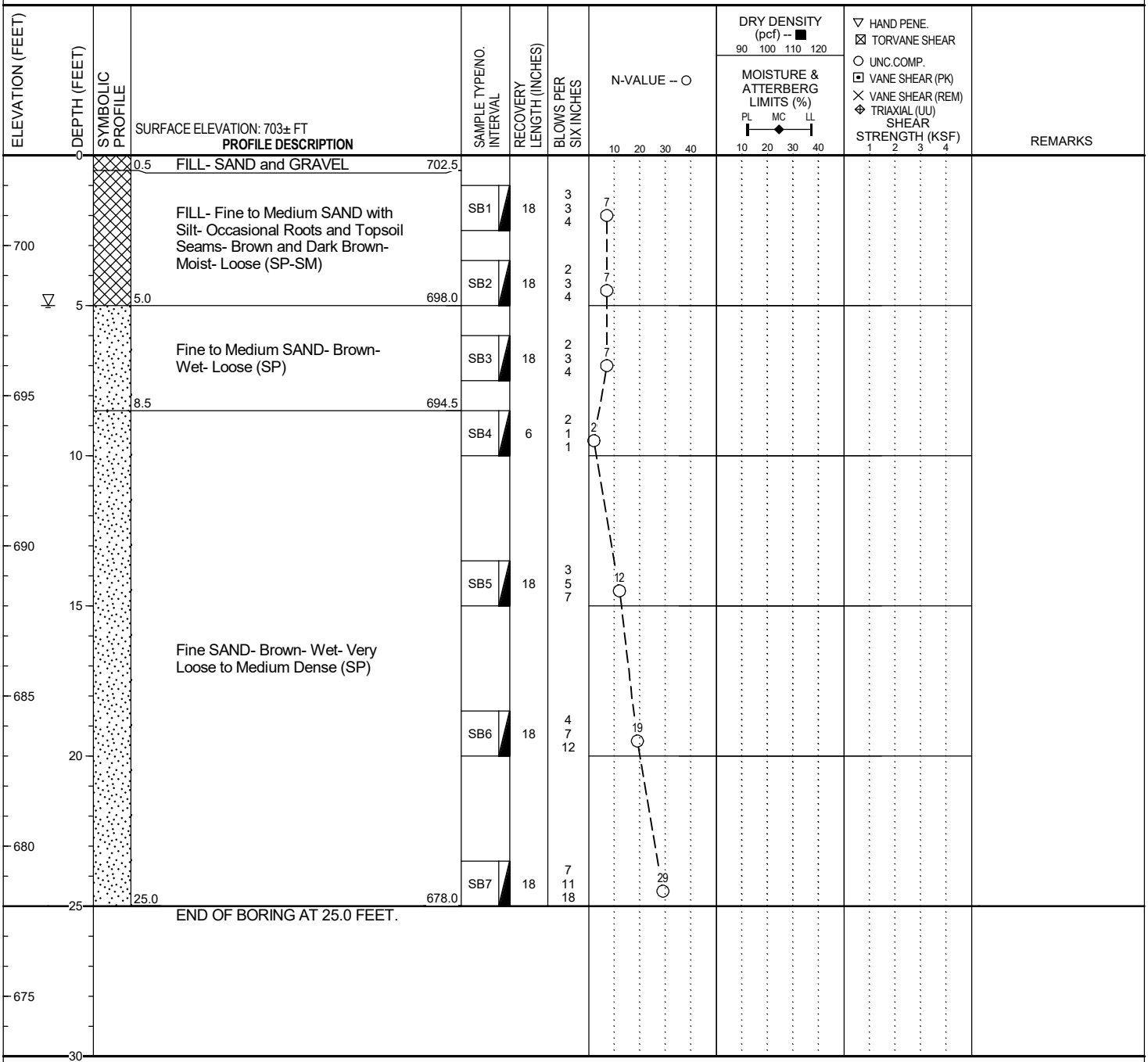
	DEPTH (FT)	ELEV (FT)
▽ **DURING BORING:**	8.0	688.0
▼ **AT END OF BORING:**	Note 2	

BACKFILL METHOD: Auger Cuttings

NOTES:
1. The indicated stratification lines are approximate. In situ, the transition between materials may be gradual.
2. Drilling mud was added to annulus of augers 10 feet below the ground surface. Therefore, obtaining an accurate water level after completion of drilling was not possible.
3. Surface capped with cold patch after backfilling the borehole.

BORING B 9

PROJECT NAME: MCDC Drain Culvert Replacements
PROJECT NUMBER: 084059.00
CLIENT: Land & Resource Engineering
PROJECT LOCATION: Muskegon County, Michigan
DATE STARTED: 4/23/20 **COMPLETED:** 4/23/20 **BORING METHOD:** Hollow-stem Augers
DRILLER: JN **RIG NO.:** Truck-CME 55 **LOGGED BY:** GBS **CHECKED BY:** ATB



GROUNDWATER & BACKFILL INFORMATION

	DEPTH (FT)	ELEV (FT)
▽ DURING BORING:	5.0	698.0
▼ AT END OF BORING:	Note 2	
CAVE-IN OF BOREHOLE AT:	5.0	698.0

BACKFILL METHOD: Auger Cuttings

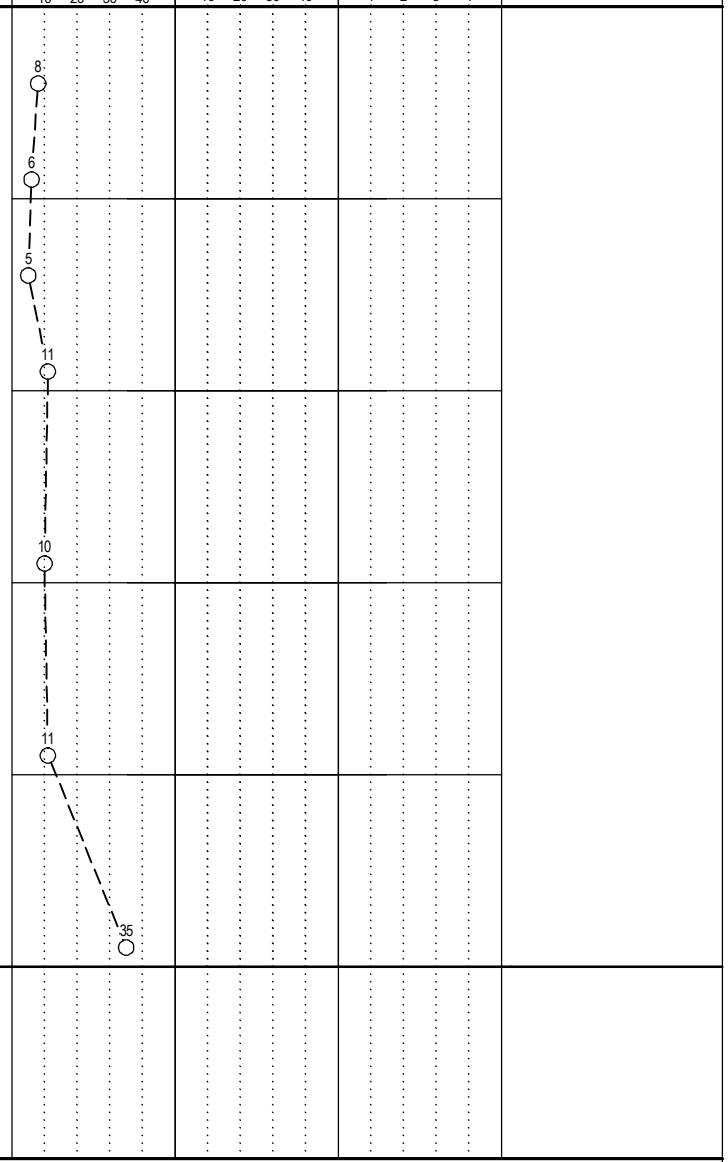
NOTES: 1. The indicated stratification lines are approximate. In situ, the transition between materials may be gradual.
2. Drilling mud was added to annulus of augers 8 feet below the ground surface. Therefore, obtaining an accurate water level after completion of drilling was not possible.

BORING B10

PROJECT NAME: MCDC Drain Culvert Replacements
PROJECT NUMBER: 084059.00
CLIENT: Land & Resource Engineering
PROJECT LOCATION: Muskegon County, Michigan
DATE STARTED: 4/23/20 **COMPLETED:** 4/23/20
BORING METHOD: Hollow-stem Augers
DRILLER: JN **RIG NO.:** Truck-CME 55
LOGGED BY: GBS **CHECKED BY:** ATB

SURFACE ELEVATION: 703± FT

ELEVATION (FEET)	DEPTH (FEET)	PROFILE DESCRIPTION	SAMPLE TYPE/NO. INTERVAL	RECOVERY LENGTH (INCHES)	BLOWS PER SIX INCHES
703	0				
	0.7	FILL- SAND and GRAVEL			
702.3			SB1	18	4 4 4
		FILL- Fine SAND with Silt- Occasional Roots and Topsoil Seams- Brown and Dark Brown- Moist- Loose (SP-SM)	SB2	18	2 2 4
700	5.0				
698.0			SB3	18	2 2 3
		Fine to Medium SAND- Brown- Wet- Loose (SP)			
695	8.5				
694.5			SB4	18	3 5 6
		Fine SAND- Brown- Wet- Medium Dense (SP)	SB5	18	3 4 6
690	18.5				
684.5			SB6	18	3 4 7
		Fine SILTY SAND- Brown- Wet- Medium Dense (SM)			
685	23.5				
679.5			SB7	18	7 15 20
		Fine SAND- Brown- Wet- Dense (SP)			
678.0	25.0				
675	25	END OF BORING AT 25.0 FEET.			
	30				



REMARKS

GROUNDWATER & BACKFILL INFORMATION

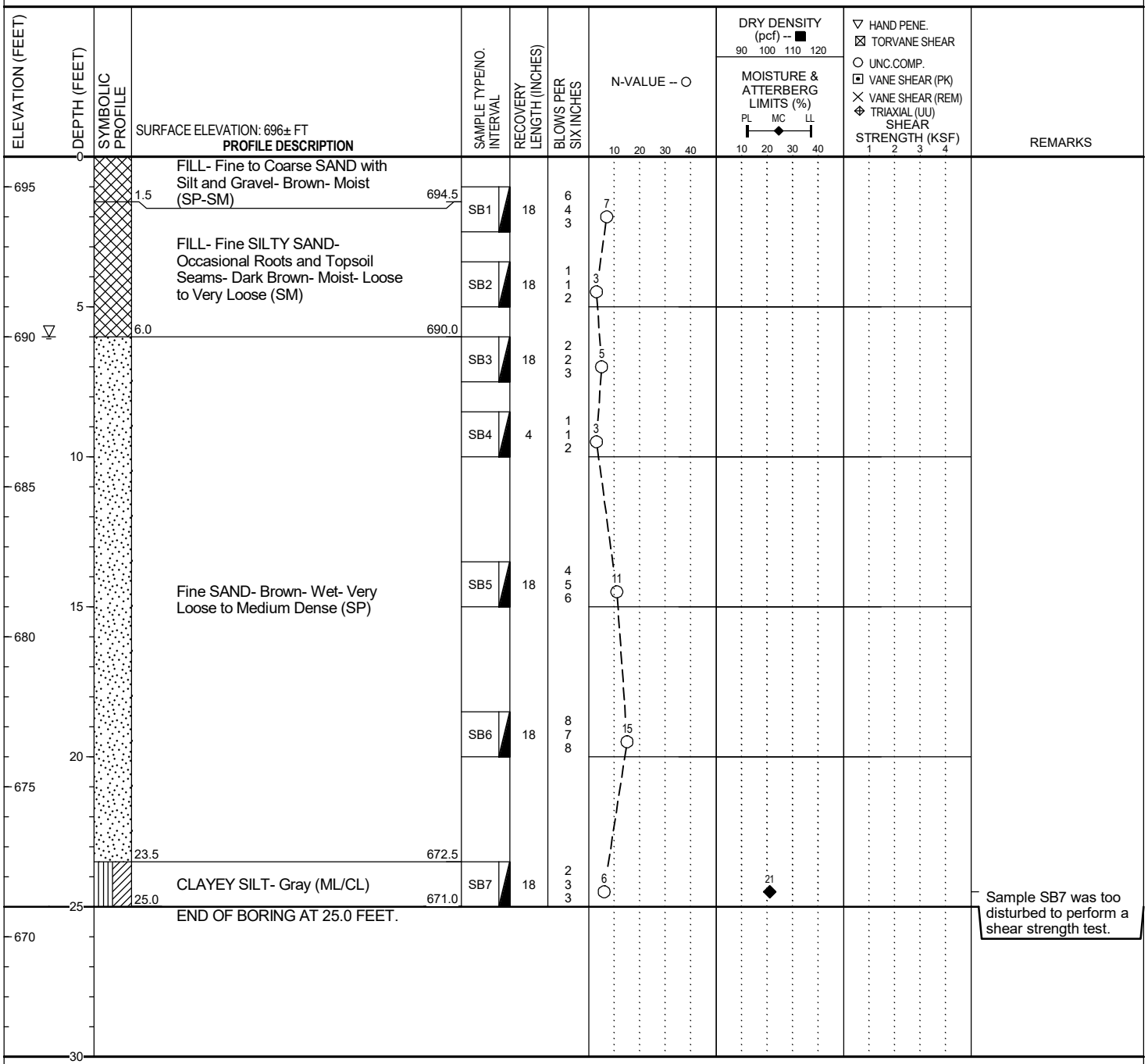
	DEPTH (FT)	ELEV (FT)
▽ **DURING BORING:**	5.0	698.0
▼ **AT END OF BORING:**	Note 2	
CAVE-IN OF BOREHOLE AT:	5.0	698.0

BACKFILL METHOD: Auger Cuttings

NOTES: 1. The indicated stratification lines are approximate. In situ, the transition between materials may be gradual.
2. Drilling mud was added to annulus of augers 6 feet below the ground surface. Therefore, obtaining an accurate water level after completion of drilling was not possible.

BORING B11

PROJECT NAME: MCDC Drain Culvert Replacements
PROJECT NUMBER: 084059.00
CLIENT: Land & Resource Engineering
PROJECT LOCATION: Muskegon County, Michigan
DATE STARTED: 4/24/20 **COMPLETED:** 4/24/20
BORING METHOD: Hollow-stem Augers
DRILLER: JN **RIG NO.:** Truck-CME 55
LOGGED BY: GBS **CHECKED BY:** ATB



GROUNDWATER & BACKFILL INFORMATION

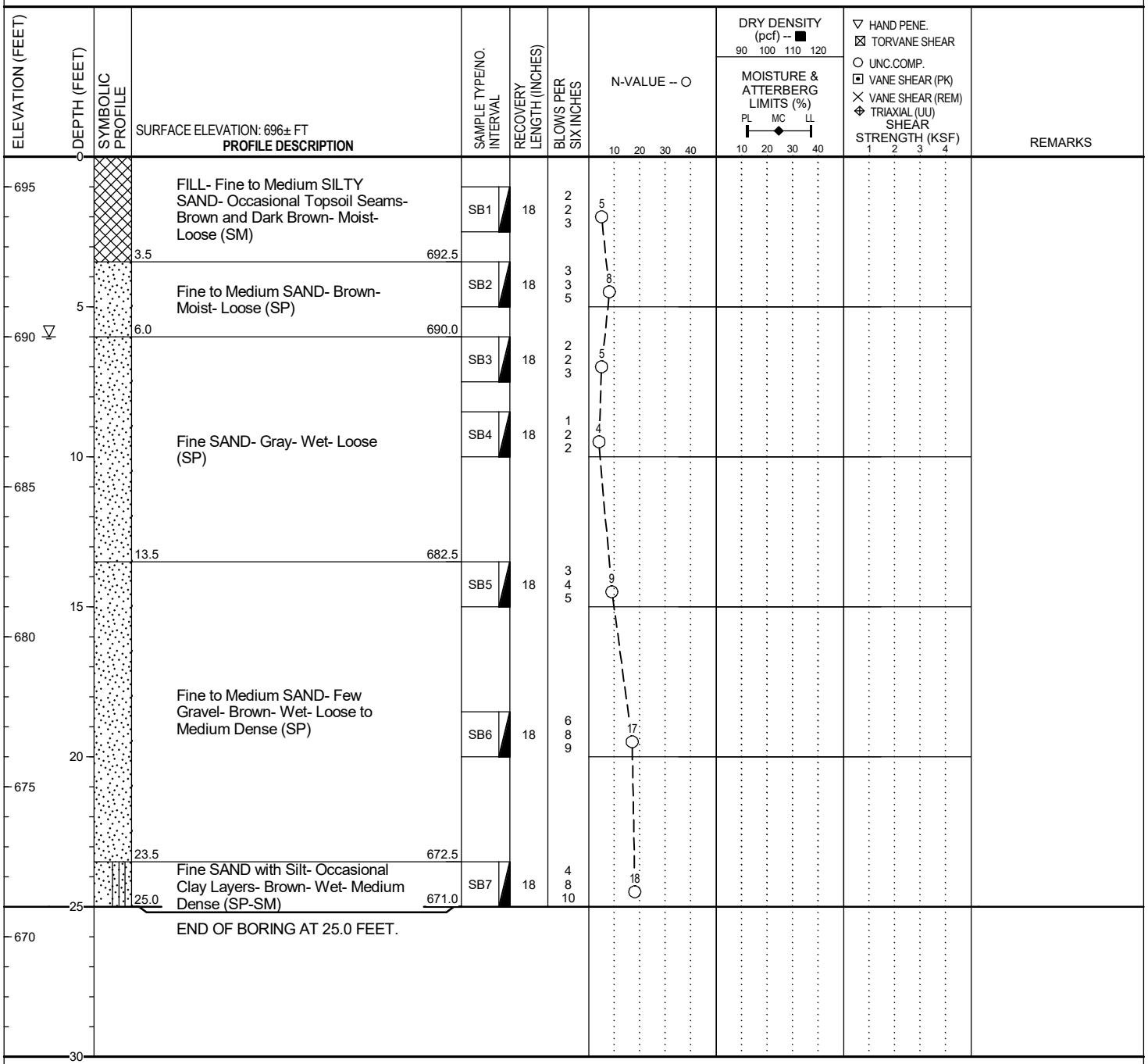
	DEPTH (FT)	ELEV (FT)
▽ **DURING BORING:**	6.0	690.0
▼ **AT END OF BORING:**	Note 2	
CAVE-IN OF BOREHOLE AT:	5.0	691.0

BACKFILL METHOD: Auger Cuttings

NOTES: 1. The indicated stratification lines are approximate. In situ, the transition between materials may be gradual.
2. Drilling mud was added to annulus of augers 6 feet below the ground surface. Therefore, obtaining an accurate water level after completion of drilling was not possible.

BORING B12

PROJECT NAME: MCDC Drain Culvert Replacements
PROJECT NUMBER: 084059.00
CLIENT: Land & Resource Engineering
PROJECT LOCATION: Muskegon County, Michigan
DATE STARTED: 4/24/20 **COMPLETED:** 4/24/20 **BORING METHOD:** Hollow-stem Augers
DRILLER: JN **RIG NO.:** Truck-CME 55 **LOGGED BY:** GBS **CHECKED BY:** ATB



GROUNDWATER & BACKFILL INFORMATION

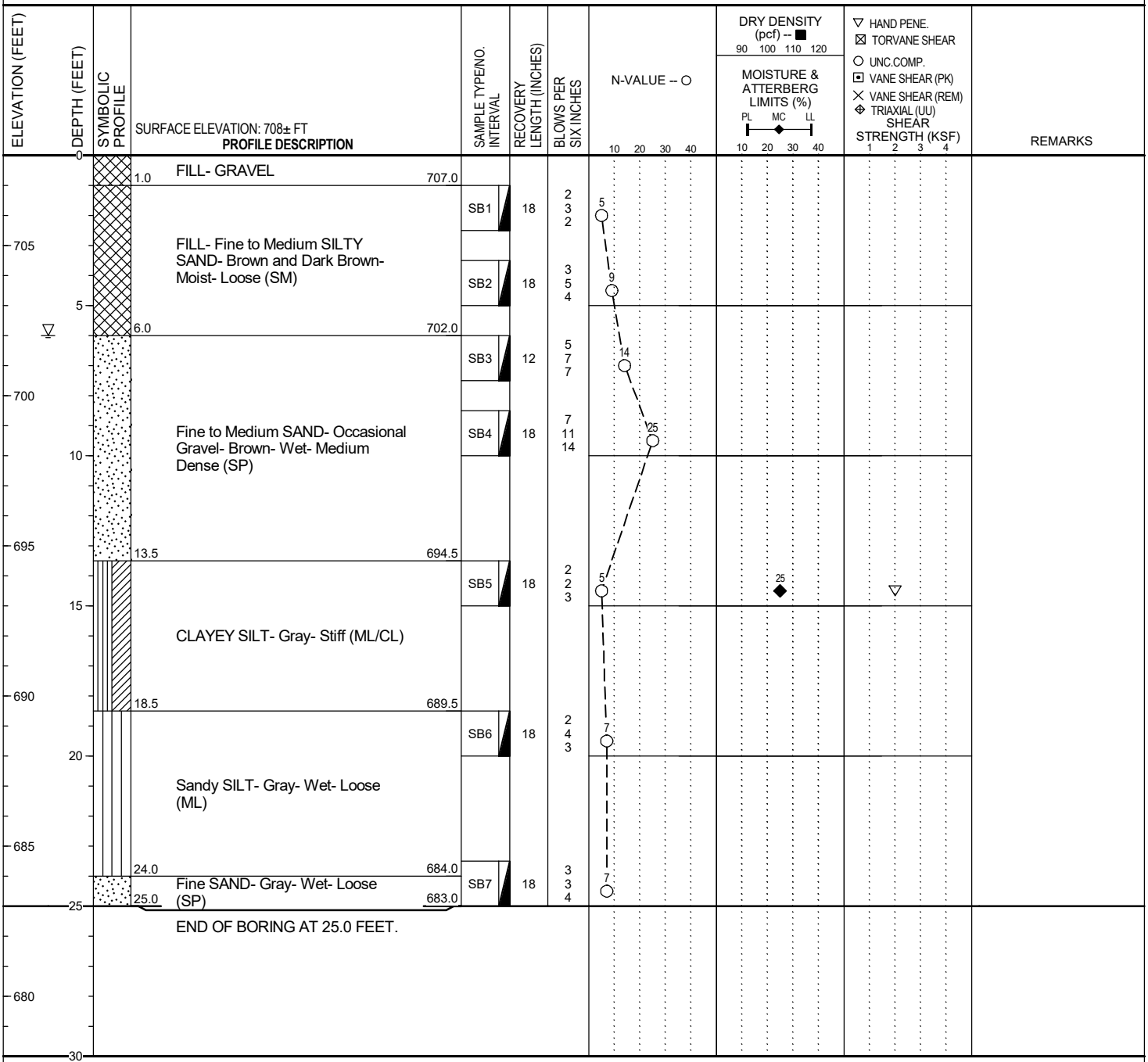
	DEPTH (FT)	ELEV (FT)
▽ DURING BORING:	6.0	690.0
▼ AT END OF BORING:	Note 2	
CAVE-IN OF BOREHOLE AT:	5.0	691.0

BACKFILL METHOD: Auger Cuttings

NOTES: 1. The indicated stratification lines are approximate. In situ, the transition between materials may be gradual.
2. Drilling mud was added to annulus of augers 6 feet below the ground surface. Therefore, obtaining an accurate water level after completion of drilling was not possible.

BORING B13

PROJECT NAME: MCDC Drain Culvert Replacements
PROJECT NUMBER: 084059.00
CLIENT: Land & Resource Engineering
PROJECT LOCATION: Muskegon County, Michigan
DATE STARTED: 4/27/20 **COMPLETED:** 4/27/20
BORING METHOD: Hollow-stem Augers
DRILLER: JN **RIG NO.:** Truck-CME 55
LOGGED BY: GBS **CHECKED BY:** ATB



GROUNDWATER & BACKFILL INFORMATION

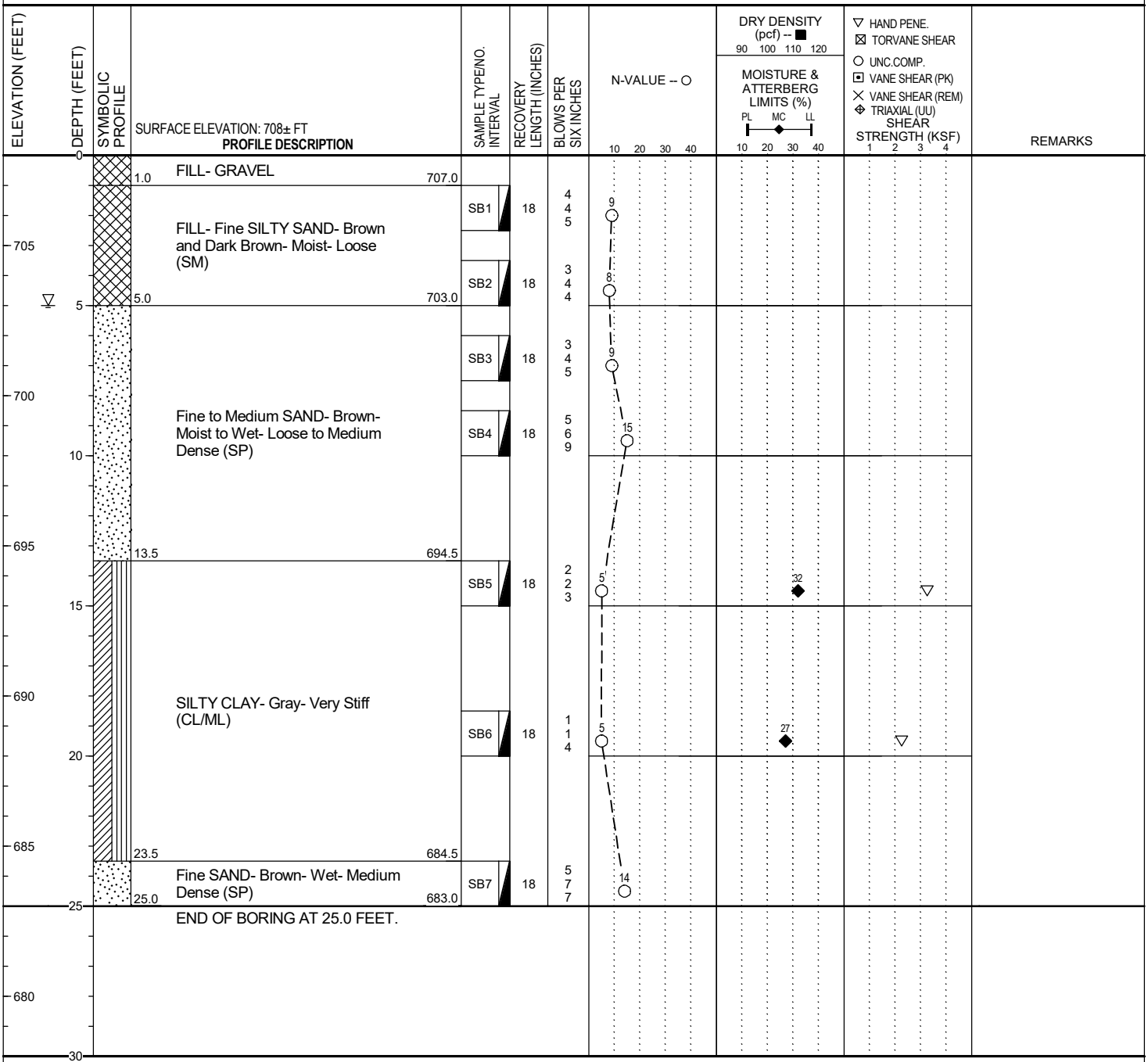
	DEPTH (FT)	ELEV (FT)
▽ **DURING BORING:**	6.0	702.0
▼ **AT END OF BORING:**	Note 2	
CAVE-IN OF BOREHOLE AT:	5.0	703.0

BACKFILL METHOD: Auger Cuttings

NOTES: 1. The indicated stratification lines are approximate. In situ, the transition between materials may be gradual.
2. Drilling mud was added to annulus of augers 6 feet below the ground surface. Therefore, obtaining an accurate water level after completion of drilling was not possible.

BORING B14

PROJECT NAME: MCDC Drain Culvert Replacements
PROJECT NUMBER: 084059.00
CLIENT: Land & Resource Engineering
PROJECT LOCATION: Muskegon County, Michigan
DATE STARTED: 4/27/20 **COMPLETED:** 4/27/20
BORING METHOD: Hollow-stem Augers
DRILLER: JN **RIG NO.:** Truck-CME 55
LOGGED BY: GBS **CHECKED BY:** ATB



GROUNDWATER & BACKFILL INFORMATION

	DEPTH (FT)	ELEV (FT)
▽ DURING BORING:	5.0	703.0
▼ AT END OF BORING:	Note 2	
CAVE-IN OF BOREHOLE AT:	5.0	703.0

BACKFILL METHOD: Auger Cuttings

NOTES: 1. The indicated stratification lines are approximate. In situ, the transition between materials may be gradual.
2. Drilling mud was added to annulus of augers 6 feet below the ground surface. Therefore, obtaining an accurate water level after completion of drilling was not possible.

BORING B15

PROJECT NAME: MCDC Drain Culvert Replacements
PROJECT NUMBER: 084059.00
CLIENT: Land & Resource Engineering
PROJECT LOCATION: Muskegon County, Michigan
DATE STARTED: 4/24/20 **COMPLETED:** 4/24/20
BORING METHOD: Hollow-stem Augers
DRILLER: JN **RIG NO.:** Truck-CME 55
LOGGED BY: GBS **CHECKED BY:** ATB

SURFACE ELEVATION: 693± FT

ELEVATION (FEET)	DEPTH (FEET)	PROFILE DESCRIPTION	SAMPLE TYPE/NO. INTERVAL	RECOVERY LENGTH (INCHES)	BLOWS PER SIX INCHES	N-VALUE -- ○
693	0					
		FILL- Fine to Medium SILTY SAND with Gravel- Occasional Topsoil Seams and Plastic Fragments- Dark Brown- Moist- Very Loose (SM)	SB1	10	1 1 3	4
690			SB2	3	2 2 2	4
	5		SB3	18	2 2 3	5
		6.0 / 687.0				
685			SB4	18	2 3 5	8
	10					
680		Fine to Medium SAND- Few Gravel- Brown- Wet- Loose to Dense (SP)	SB5	18	5 7 11	18
	15					
675			SB6	18	11 15 19	34
	20					
670		23.5 / 669.5				
		Sandy LEAN CLAY- Brown- Hard (CL)	SB7	18	3 4 7	11
	25	25.0 / 668.0				
		END OF BORING AT 25.0 FEET.				
665	30					

DRY DENSITY (pcf) -- ■ (90 100 110 120)
MOISTURE & ATTERBERG LIMITS (%) PL MC LL (10 20 30 40)
SHEAR STRENGTH (KSF) (1 2 3 4)
▽ HAND PENE. ⊠ TORVANE SHEAR ○ UNC.COMP. ⊡ VANE SHEAR (PK) × VANE SHEAR (REM) ◈ TRIAXIAL (UU)

REMARKS: 4.5+ ▽

GROUNDWATER & BACKFILL INFORMATION

	DEPTH (FT)	ELEV (FT)
▽ **DURING BORING:**	6.0	687.0
▼ **AT END OF BORING:**	Note 2	
CAVE-IN OF BOREHOLE AT:	6.0	687.0

BACKFILL METHOD: Auger Cuttings

NOTES: 1. The indicated stratification lines are approximate. In situ, the transition between materials may be gradual.
2. Drilling mud was added to annulus of augers 10 feet below the ground surface. Therefore, obtaining an accurate water level after completion of drilling was not possible.

BORING B16

PROJECT NAME: MCDC Drain Culvert Replacements
PROJECT NUMBER: 084059.00
CLIENT: Land & Resource Engineering
PROJECT LOCATION: Muskegon County, Michigan
DATE STARTED: 4/24/20 **COMPLETED:** 4/24/20
BORING METHOD: Hollow-stem Augers
DRILLER: JN **RIG NO.:** Truck-CME 55
LOGGED BY: GBS **CHECKED BY:** ATB

SURFACE ELEVATION: 693± FT

ELEVATION (FEET)	DEPTH (FEET)	PROFILE DESCRIPTION	SAMPLE TYPE/NO. INTERVAL	RECOVERY LENGTH (INCHES)	BLOWS PER SIX INCHES	REMARKS
692.5	0.5	FILL- SAND and GRAVEL				
		FILL- Fine SILTY SAND- Occasional Topsoil Seams- Brown and Dark Brown- Moist- Loose (SM)	SB1	15	2 3 4	
689.5	3.5		SB2	18	3 5 5	
			SB3	12	2 2 3	
			SB4	3	5 7 8	Driller reported driving a rock for Sample SB4.
		Fine SAND- Brown- Moist to Wet- Loose to Medium Dense (SP)	SB5	18	4 7 10	
674.5	18.5		SB6	18	4 5 6	
		Fine to Coarse SAND- Brown- Wet- Medium Dense (SP)	SB7	18	4 7 5	
668.0	25.0	END OF BORING AT 25.0 FEET.				

N-VALUE -- ○ (10 20 30 40)
DRY DENSITY (pcf) -- ■ (90 100 110 120)
MOISTURE & ATTERBERG LIMITS (%) PL MC LL (10 20 30 40)
▽ HAND PENE. ☒ TORVANE SHEAR ○ UNC.COMP. ⊡ VANE SHEAR (PK) × VANE SHEAR (REM) ◈ TRIAXIAL (UU)
SHEAR STRENGTH (KSF) (1 2 3 4)

GROUNDWATER & BACKFILL INFORMATION

	DEPTH (FT)	ELEV (FT)
▽ DURING BORING:	5.5	687.5
▼ AT END OF BORING:	Note 2	
CAVE-IN OF BOREHOLE AT:	5.0	688.0

BACKFILL METHOD: Auger Cuttings

NOTES: 1. The indicated stratification lines are approximate. In situ, the transition between materials may be gradual.
2. Drilling mud was added to annulus of augers 6 feet below the ground surface. Therefore, obtaining an accurate water level after completion of drilling was not possible.

BORING B17

PROJECT NAME: MCDC Drain Culvert Replacements
PROJECT NUMBER: 084059.00
CLIENT: Land & Resource Engineering
PROJECT LOCATION: Muskegon County, Michigan
DATE STARTED: 4/20/20 **COMPLETED:** 4/20/20 **BORING METHOD:** Hollow-stem Augers
DRILLER: JN **RIG NO.:** Truck-CME 55 **LOGGED BY:** GBS **CHECKED BY:** ATB

SURFACE ELEVATION: 688± FT

ELEV (FT)	DEPTH (FT)	PROFILE DESCRIPTION	SAMPLE TYPE/NO.	RECOVERY LENGTH (INCHES)	BLOWS PER SIX INCHES	N-VALUE
	0	0.4 5-Inches of ASPHALT PAVEMENT 687.6				
		0.9 FILL- SAND and GRAVEL 687.1				
		FILL- Fine SILTY SAND- Few Gravel- Occasional Topsoil Seams- Brown and Dark Brown- Moist- Medium Dense (SM)	SB1	18	9 5 6	11
685		3.5 684.5				
	5	Fine SAND- Brown- Moist- Loose (SP)	SB2	18	3 4 5	9
		6.0 682.0				
		Fine SAND- Occasional Clay Layers- Moist to Wet- Loose (SP)	SB3	18	3 3 4	7
680 ▽		8.5 679.5				
			SB4	18	3 5 6	11
	10					
675			SB5	18	3 5 7	12
	15	Fine SAND- Brown- Wet- Loose to Medium Dense (SP)				
670			SB6	16	3 4 4	8
	20					
665			SB7	18	7 9 9	18
	25	25.0 663.0				
		END OF BORING AT 25.0 FEET.				
660						
	30					

DRY DENSITY (pcf) -- ■ (90 100 110 120)
MOISTURE & ATTERBERG LIMITS (%) PL MC LL (10 20 30 40)
▽ HAND PENE. ⊠ TORVANE SHEAR ○ UNC.COMP. ⊡ VANE SHEAR (PK) × VANE SHEAR (REM) ◈ TRIAXIAL (UU)
SHEAR STRENGTH (KSF) (1 2 3 4)
REMARKS

GROUNDWATER & BACKFILL INFORMATION

	DEPTH (FT)	ELEV (FT)
▽ **DURING BORING:**	8.0	680.0
▼ **AT END OF BORING:**	Note 2	
CAVE-IN OF BOREHOLE AT:	7.0	681.0

BACKFILL METHOD: Auger Cuttings

NOTES:
1. The indicated stratification lines are approximate. In situ, the transition between materials may be gradual.
2. Drilling mud was added to annulus of augers 10 feet below the ground surface. Therefore, obtaining an accurate water level after completion of drilling was not possible.
3. Surface capped with cold patch after backfilling the borehole.

BORING B18

PROJECT NAME: MCDC Drain Culvert Replacements
PROJECT NUMBER: 084059.00
CLIENT: Land & Resource Engineering
PROJECT LOCATION: Muskegon County, Michigan
DATE STARTED: 4/20/20 **COMPLETED:** 4/20/20
BORING METHOD: Hollow-stem Augers
DRILLER: JN **RIG NO.:** Truck-CME 55
LOGGED BY: GBS **CHECKED BY:** ATB

SURFACE ELEVATION: 688± FT

ELEVATION (FEET)	DEPTH (FEET)	PROFILE DESCRIPTION	SAMPLE TYPE/NO. INTERVAL	RECOVERY LENGTH (INCHES)	BLOWS PER SIX INCHES
	0	0.5 6-Inches of ASPHALT PAVEMENT 687.5			
		0.8 FILL- SAND and GRAVEL 687.2			
		FILL- Fine SILTY SAND- Few Gravel- Occasional Topsoil Seams- Dark Brown- Moist- Loose (SM)	SB1	18	3 3 6
685		3.5 684.5			
	5		SB2	18	3 6 7
			SB3	18	3 5 6
680 ▽			SB4	18	4 5 7
	10				
675		Fine SAND- Brown- Moist to Wet- Loose to Medium Dense (SP)	SB5	9	3 4 5
	15				
670			SB6	18	3 5 6
	20				
665			SB7	18	6 12 17
	25	25.0 663.0			
		END OF BORING AT 25.0 FEET.			
660					
	30				

N-VALUE -- ○ (10 20 30 40)

DRY DENSITY (pcf) -- ■ (90 100 110 120)

MOISTURE & ATTERBERG LIMITS (%) PL MC LL (10 20 30 40)

▽ HAND PENE.
⊠ TORVANE SHEAR
○ UNC.COMP.
⊡ VANE SHEAR (PK)
× VANE SHEAR (REM)
◈ TRIAXIAL (UU)
SHEAR STRENGTH (KSF) (1 2 3 4)

REMARKS

GROUNDWATER & BACKFILL INFORMATION

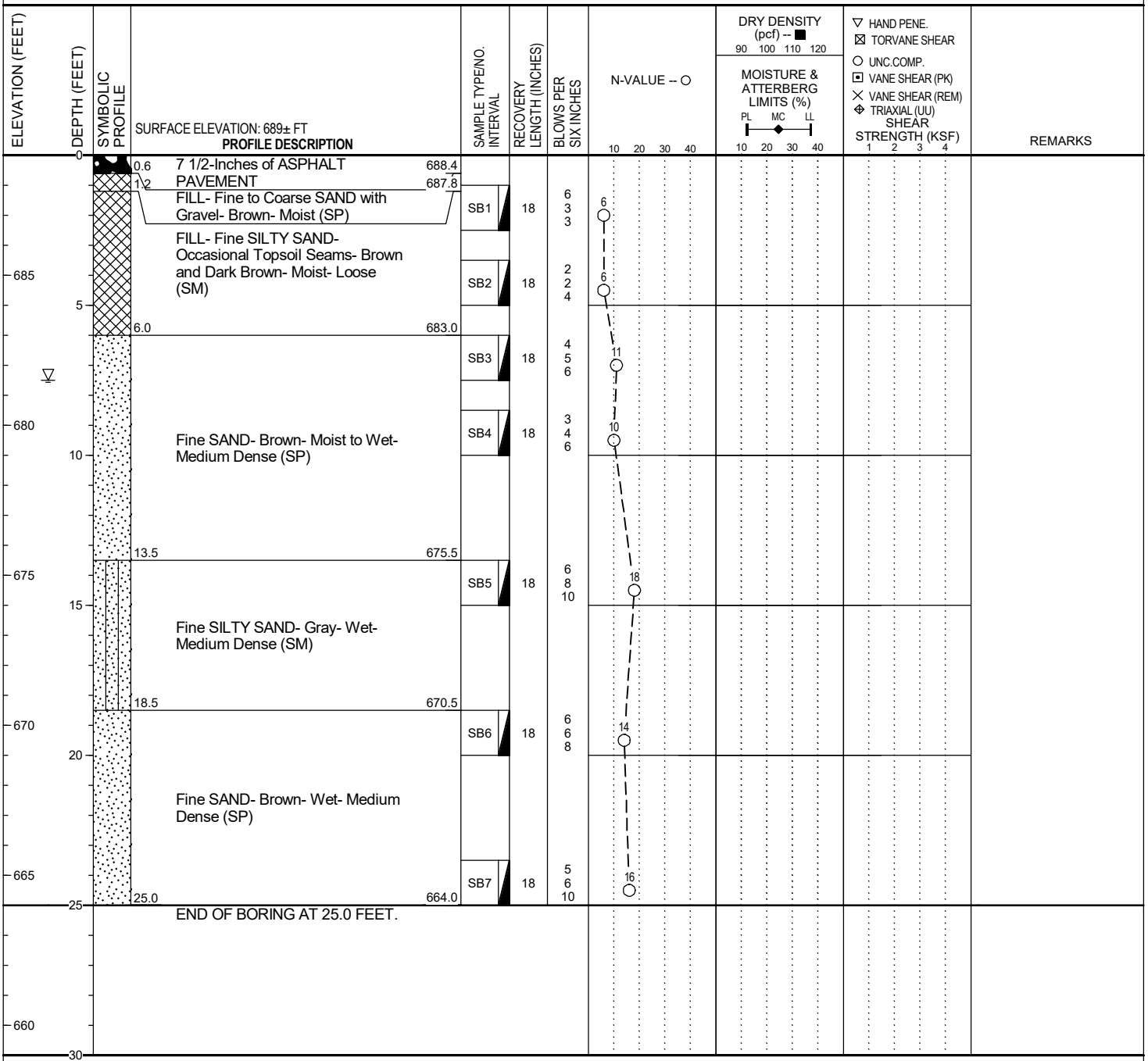
	DEPTH (FT)	ELEV (FT)
▽ **DURING BORING:**	8.5	679.5
▼ **AT END OF BORING:**	Note 2	
CAVE-IN OF BOREHOLE AT:	7.0	681.0

BACKFILL METHOD: Auger Cuttings

NOTES:
1. The indicated stratification lines are approximate. In situ, the transition between materials may be gradual.
2. Drilling mud was added to annulus of augers 10 feet below the ground surface. Therefore, obtaining an accurate water level after completion of drilling was not possible.
3. Surface capped with cold patch after backfilling the borehole.

BORING B19

PROJECT NAME: MCDC Drain Culvert Replacements
PROJECT NUMBER: 084059.00
CLIENT: Land & Resource Engineering
PROJECT LOCATION: Muskegon County, Michigan
DATE STARTED: 4/20/20 **COMPLETED:** 4/20/20 **BORING METHOD:** Hollow-stem Augers
DRILLER: JN **RIG NO.:** Truck-CME 55 **LOGGED BY:** GBS **CHECKED BY:** ATB



GROUNDWATER & BACKFILL INFORMATION

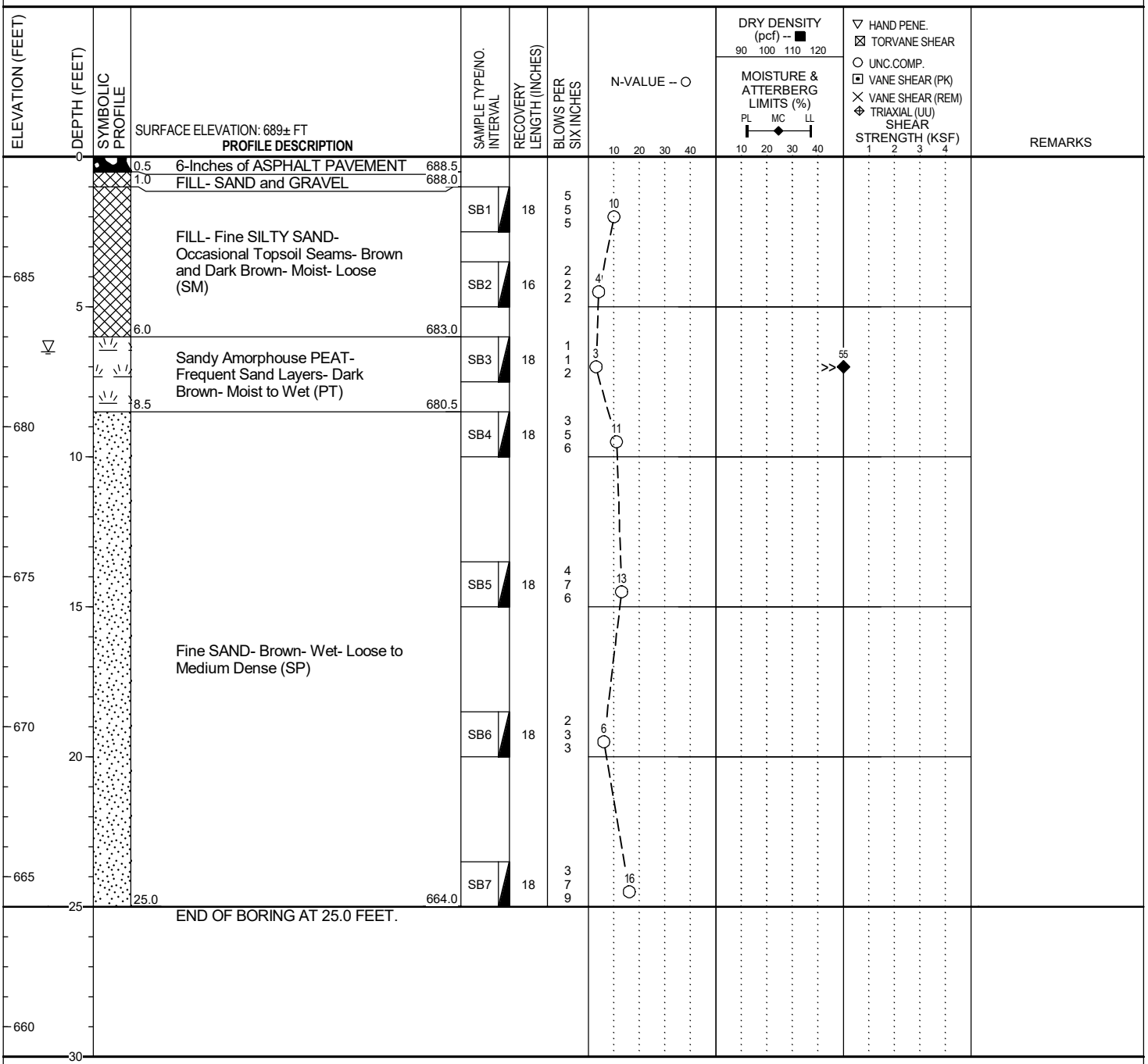
	DEPTH (FT)	ELEV (FT)
▽ DURING BORING:	7.5	681.5
▼ AT END OF BORING:	Note 2	
CAVE-IN OF BOREHOLE AT:	7.5	681.5

BACKFILL METHOD: Auger Cuttings

NOTES:
1. The indicated stratification lines are approximate. In situ, the transition between materials may be gradual.
2. Drilling mud was added to annulus of augers 10 feet below the ground surface. Therefore, obtaining an accurate water level after completion of drilling was not possible.
3. Surface capped with cold patch after backfilling the borehole.

BORING B20

PROJECT NAME: MCDC Drain Culvert Replacements
PROJECT NUMBER: 084059.00
CLIENT: Land & Resource Engineering
PROJECT LOCATION: Muskegon County, Michigan
DATE STARTED: 4/20/20 **COMPLETED:** 4/20/20
BORING METHOD: Hollow-stem Augers
DRILLER: JN **RIG NO.:** Truck-CME 55
LOGGED BY: GBS **CHECKED BY:** ATB



GROUNDWATER & BACKFILL INFORMATION

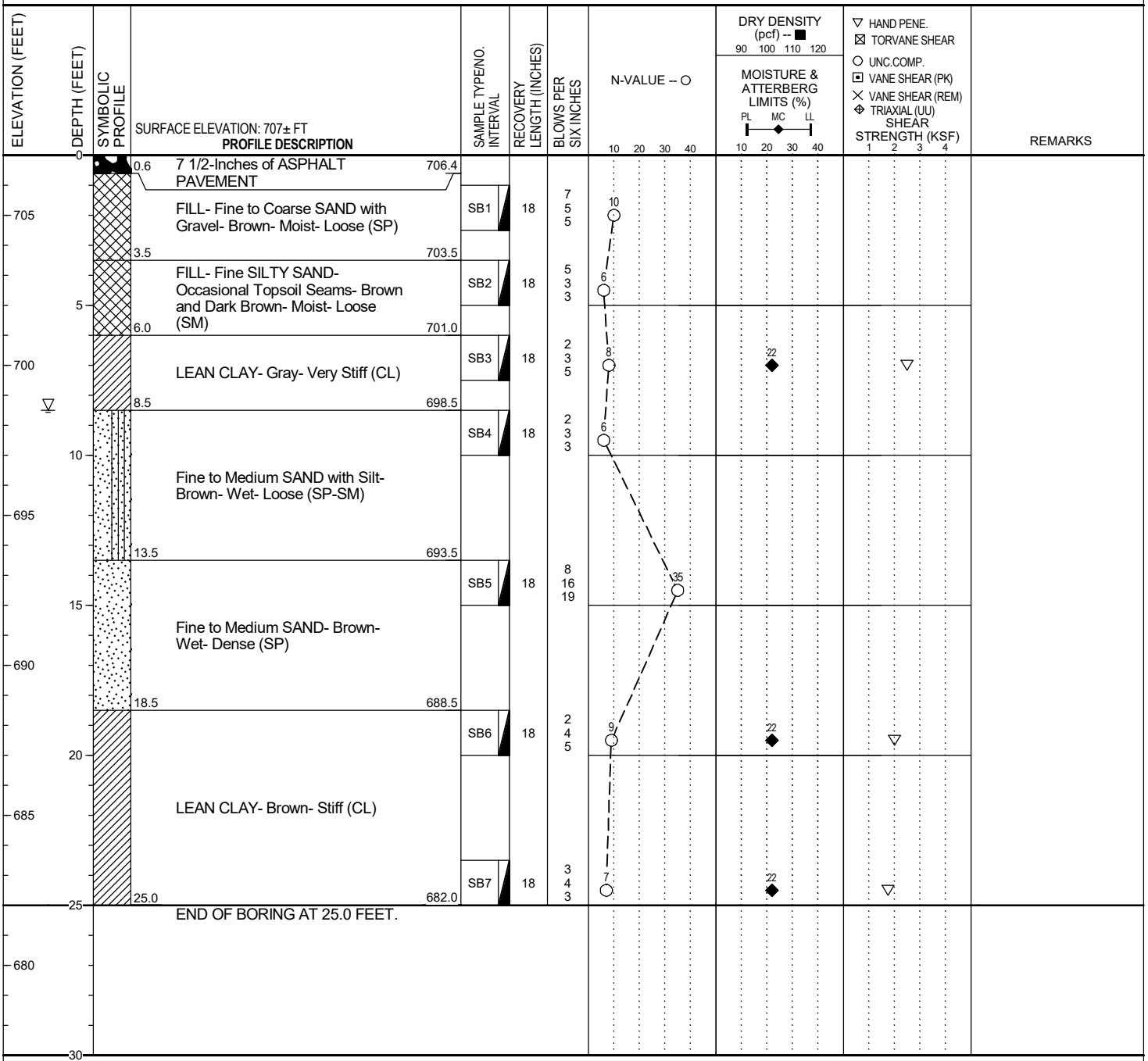
	DEPTH (FT)	ELEV (FT)
▽ **DURING BORING:**	6.5	682.5
▼ **AT END OF BORING:**	Note 2	
CAVE-IN OF BOREHOLE AT:	5.0	684.0

BACKFILL METHOD: Auger Cuttings

NOTES:
1. The indicated stratification lines are approximate. In situ, the transition between materials may be gradual.
2. Drilling mud was added to annulus of augers 10 feet below the ground surface. Therefore, obtaining an accurate water level after completion of drilling was not possible.
3. Surface capped with cold patch after backfilling the borehole.

BORING B21

PROJECT NAME: MCDC Drain Culvert Replacements
PROJECT NUMBER: 084059.00
CLIENT: Land & Resource Engineering
PROJECT LOCATION: Muskegon County, Michigan
DATE STARTED: 4/22/20 **COMPLETED:** 4/22/20
BORING METHOD: Hollow-stem Augers
DRILLER: JN **RIG NO.:** Truck-CME 55
LOGGED BY: GBS **CHECKED BY:** ATB



GROUNDWATER & BACKFILL INFORMATION

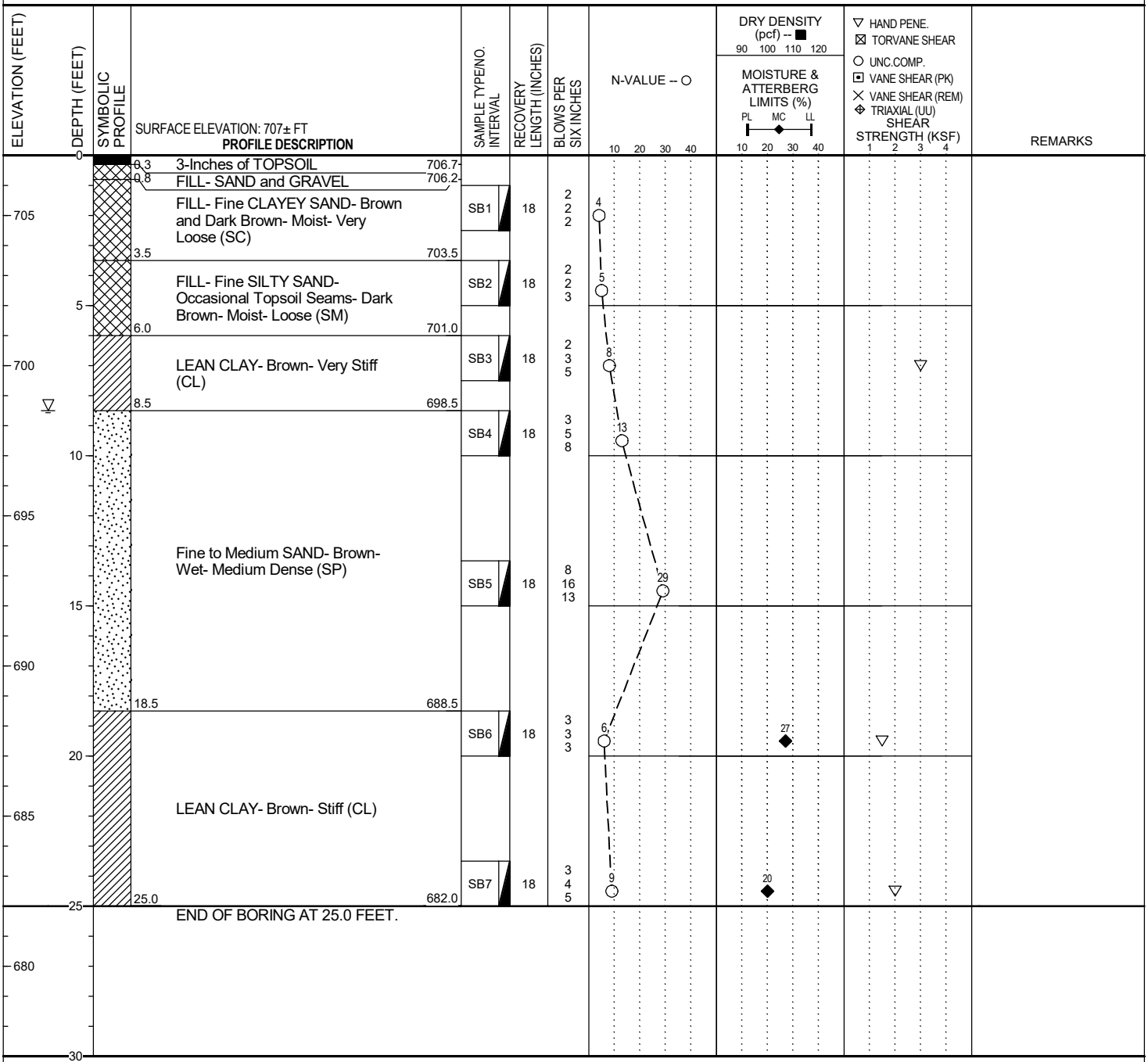
	DEPTH (FT)	ELEV (FT)
▽ **DURING BORING:**	8.5	698.5
▼ **AT END OF BORING:**	Note 2	
CAVE-IN OF BOREHOLE AT:	6.0	701.0

BACKFILL METHOD: Auger Cuttings

NOTES:
1. The indicated stratification lines are approximate. In situ, the transition between materials may be gradual.
2. Drilling mud was added to annulus of augers 10 feet below the ground surface. Therefore, obtaining an accurate water level after completion of drilling was not possible.
3. Surface capped with cold patch after backfilling the borehole.

BORING B22

PROJECT NAME: MCDC Drain Culvert Replacements
PROJECT NUMBER: 084059.00
CLIENT: Land & Resource Engineering
PROJECT LOCATION: Muskegon County, Michigan
DATE STARTED: 4/27/20 **COMPLETED:** 4/27/20
BORING METHOD: Hollow-stem Augers
DRILLER: JN **RIG NO.:** Truck-CME 55
LOGGED BY: GBS **CHECKED BY:** ATB



GROUNDWATER & BACKFILL INFORMATION

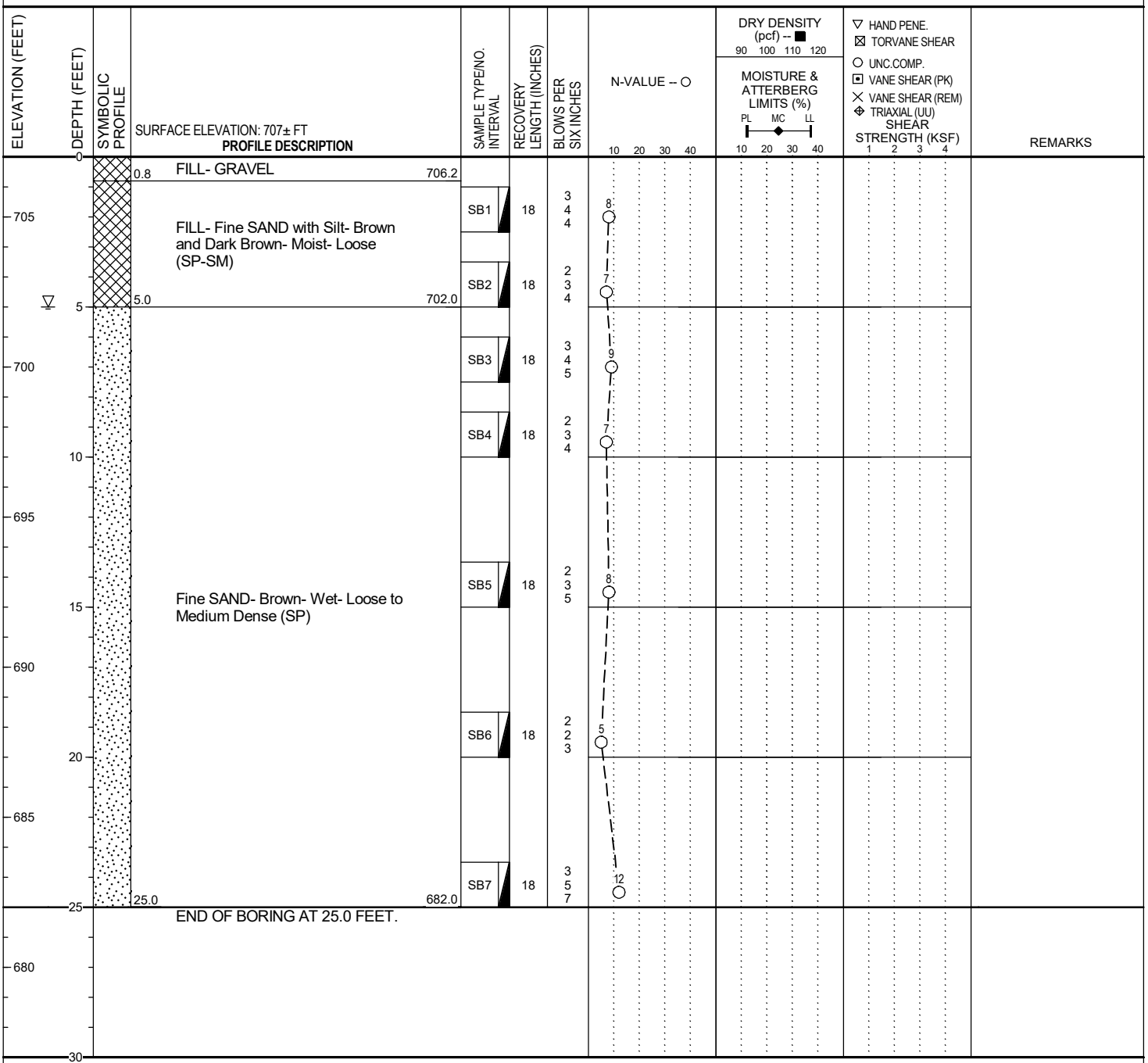
	DEPTH (FT)	ELEV (FT)
▽ DURING BORING:	8.5	698.5
▼ AT END OF BORING:	Note 2	
CAVE-IN OF BOREHOLE AT:	6.0	701.0

BACKFILL METHOD: Auger Cuttings

NOTES: 1. The indicated stratification lines are approximate. In situ, the transition between materials may be gradual.
2. Drilling mud was added to annulus of augers 10 feet below the ground surface. Therefore, obtaining an accurate water level after completion of drilling was not possible.

BORING B23

PROJECT NAME: MCDC Drain Culvert Replacements
PROJECT NUMBER: 084059.00
CLIENT: Land & Resource Engineering
PROJECT LOCATION: Muskegon County, Michigan
DATE STARTED: 4/27/20 **COMPLETED:** 4/27/20 **BORING METHOD:** Hollow-stem Augers
DRILLER: JN **RIG NO.:** Truck-CME 55 **LOGGED BY:** GBS **CHECKED BY:** ATB



GROUNDWATER & BACKFILL INFORMATION

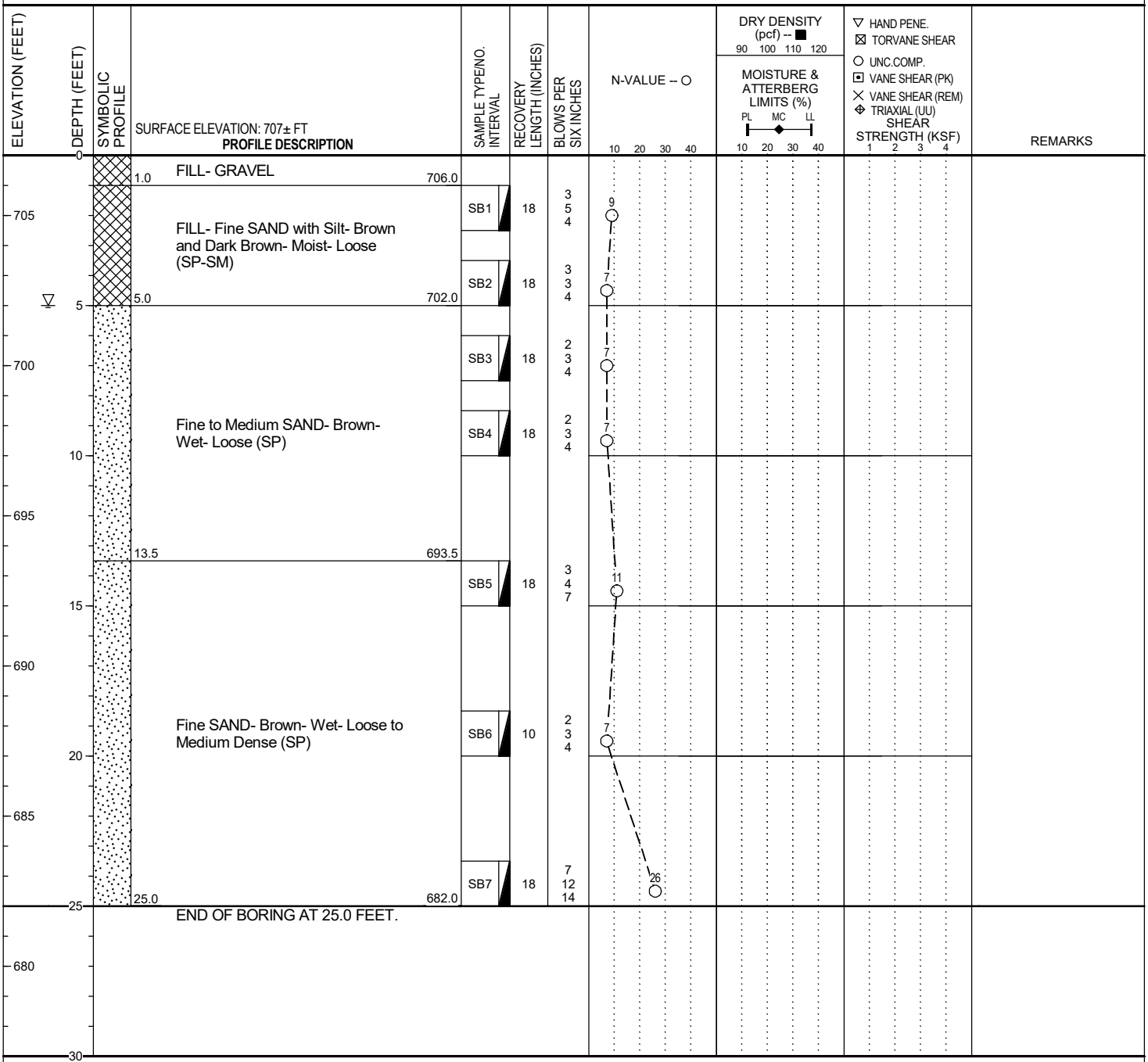
	DEPTH (FT)	ELEV (FT)
▽ **DURING BORING:**	5.0	702.0
▼ **AT END OF BORING:**	Note 2	
CAVE-IN OF BOREHOLE AT:	5.0	702.0

BACKFILL METHOD: Auger Cuttings

NOTES: 1. The indicated stratification lines are approximate. In situ, the transition between materials may be gradual.
2. Drilling mud was added to annulus of augers 6 feet below the ground surface. Therefore, obtaining an accurate water level after completion of drilling was not possible.

BORING B24

PROJECT NAME: MCDC Drain Culvert Replacements
PROJECT NUMBER: 084059.00
CLIENT: Land & Resource Engineering
PROJECT LOCATION: Muskegon County, Michigan
DATE STARTED: 4/27/20 **COMPLETED:** 4/27/20 **BORING METHOD:** Hollow-stem Augers
DRILLER: JN **RIG NO.:** Truck-CME 55 **LOGGED BY:** GBS **CHECKED BY:** ATB



GROUNDWATER & BACKFILL INFORMATION

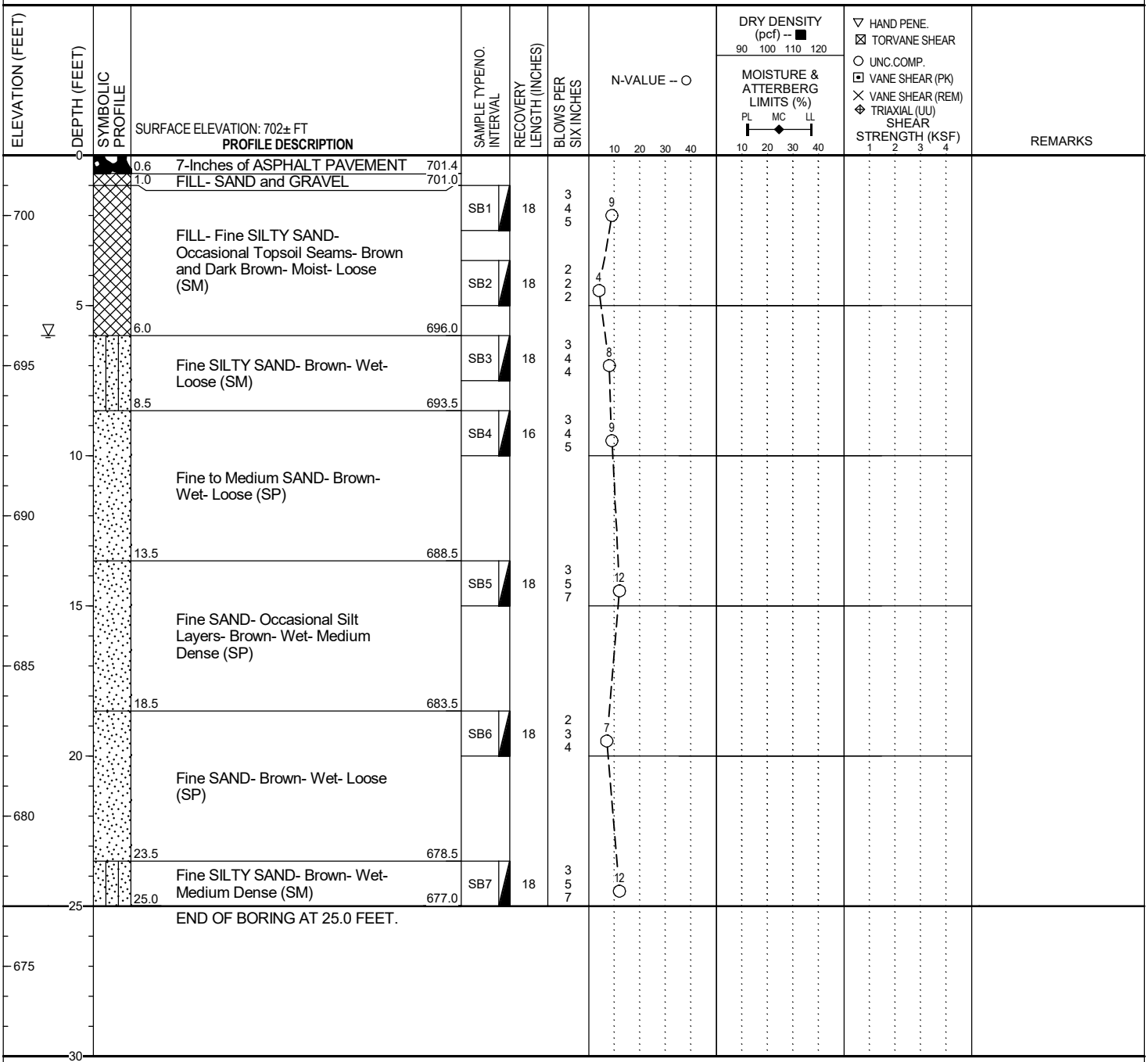
	DEPTH (FT)	ELEV (FT)
▽ **DURING BORING:**	5.0	702.0
▼ **AT END OF BORING:**	Note 2	
CAVE-IN OF BOREHOLE AT:	5.0	702.0

BACKFILL METHOD: Auger Cuttings

NOTES: 1. The indicated stratification lines are approximate. In situ, the transition between materials may be gradual.
2. Drilling mud was added to annulus of augers 6 feet below the ground surface. Therefore, obtaining an accurate water level after completion of drilling was not possible.

BORING B25

PROJECT NAME: MCDC Drain Culvert Replacements
PROJECT NUMBER: 084059.00
CLIENT: Land & Resource Engineering
PROJECT LOCATION: Muskegon County, Michigan
DATE STARTED: 4/22/20 **COMPLETED:** 4/22/20 **BORING METHOD:** Hollow-stem Augers
DRILLER: JN **RIG NO.:** Truck-CME 55 **LOGGED BY:** GBS **CHECKED BY:** ATB



GROUNDWATER & BACKFILL INFORMATION

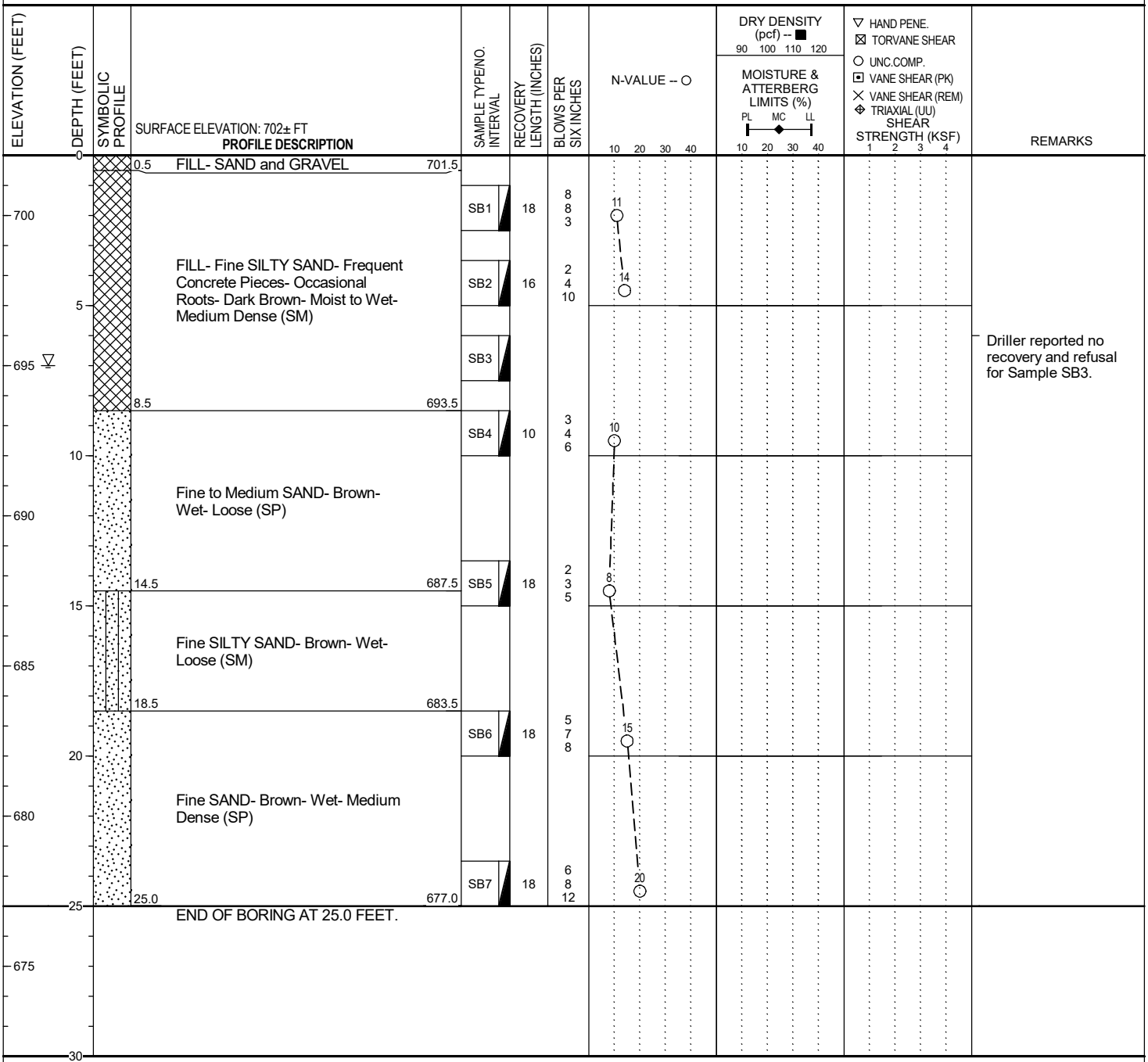
	DEPTH (FT)	ELEV (FT)
▽ **DURING BORING:**	6.0	696.0
▼ **AT END OF BORING:**	Note 2	
CAVE-IN OF BOREHOLE AT:	8.0	694.0

BACKFILL METHOD: Auger Cuttings

NOTES:
1. The indicated stratification lines are approximate. In situ, the transition between materials may be gradual.
2. Drilling mud was added to annulus of augers 10 feet below the ground surface. Therefore, obtaining an accurate water level after completion of drilling was not possible.
3. Surface capped with cold patch after backfilling the borehole.

BORING B26

PROJECT NAME: MCDC Drain Culvert Replacements
PROJECT NUMBER: 084059.00
CLIENT: Land & Resource Engineering
PROJECT LOCATION: Muskegon County, Michigan
DATE STARTED: 4/22/20 **COMPLETED:** 4/22/20
BORING METHOD: Hollow-stem Augers
DRILLER: JN **RIG NO.:** Truck-CME 55
LOGGED BY: GBS **CHECKED BY:** ATB



GROUNDWATER & BACKFILL INFORMATION

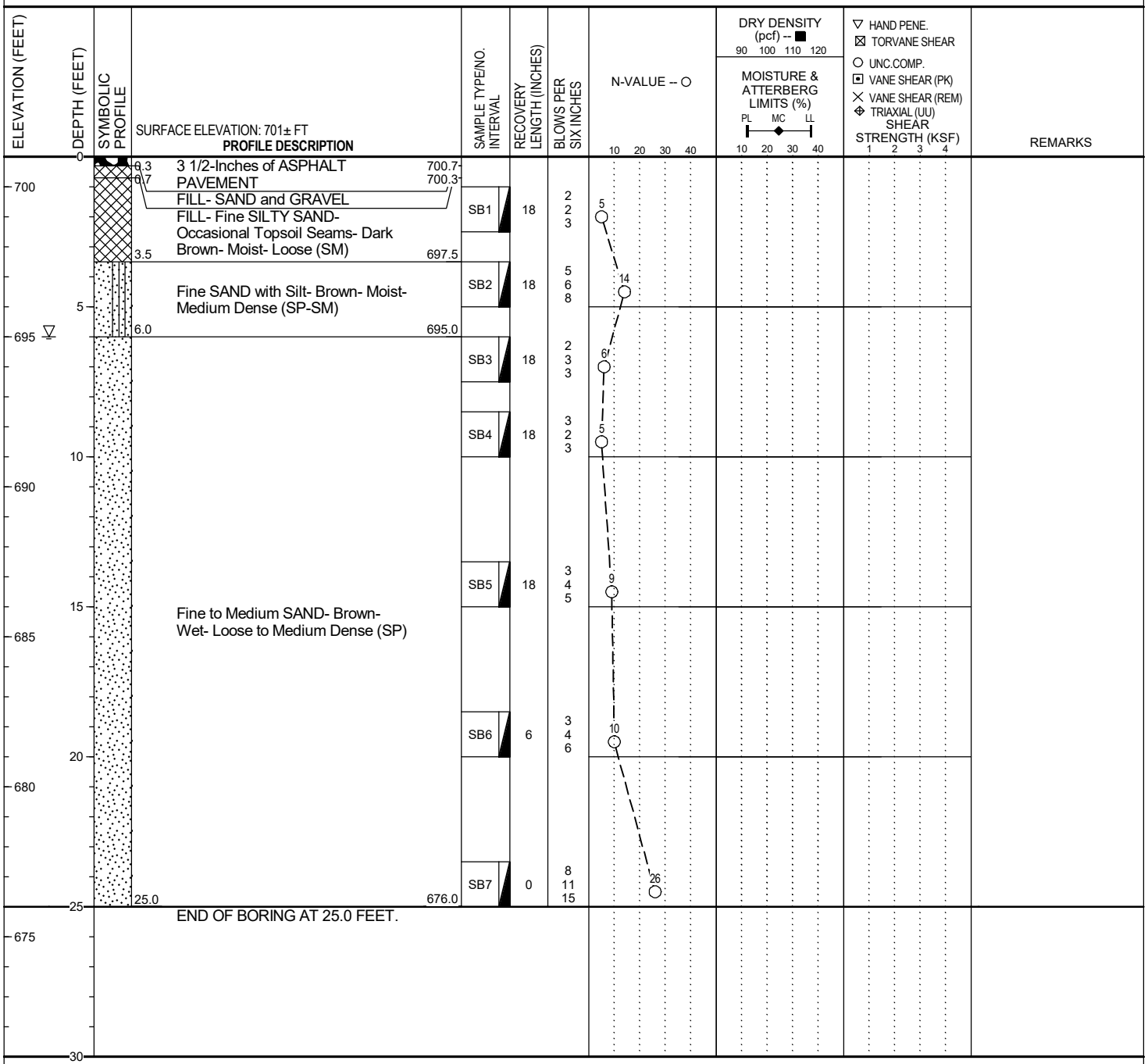
	DEPTH (FT)	ELEV (FT)
▽ **DURING BORING:**	7.0	695.0
▼ **AT END OF BORING:**	Note 2	
CAVE-IN OF BOREHOLE AT:	8.0	694.0

BACKFILL METHOD: Auger Cuttings

NOTES:
1. The indicated stratification lines are approximate. In situ, the transition between materials may be gradual.
2. Drilling mud was added to annulus of augers 10 feet below the ground surface. Therefore, obtaining an accurate water level after completion of drilling was not possible.
3. Driller reported encountering an obstruction about 6 feet below the ground surface. Boring was offset 3 feet west, blind drilled to 8.5 feet and drilled to the explored depth.

BORING B27

PROJECT NAME: MCDC Drain Culvert Replacements
PROJECT NUMBER: 084059.00
CLIENT: Land & Resource Engineering
PROJECT LOCATION: Muskegon County, Michigan
DATE STARTED: 4/22/20 **COMPLETED:** 4/22/20 **BORING METHOD:** Hollow-stem Augers
DRILLER: JN **RIG NO.:** Truck-CME 55 **LOGGED BY:** GBS **CHECKED BY:** ATB



GROUNDWATER & BACKFILL INFORMATION

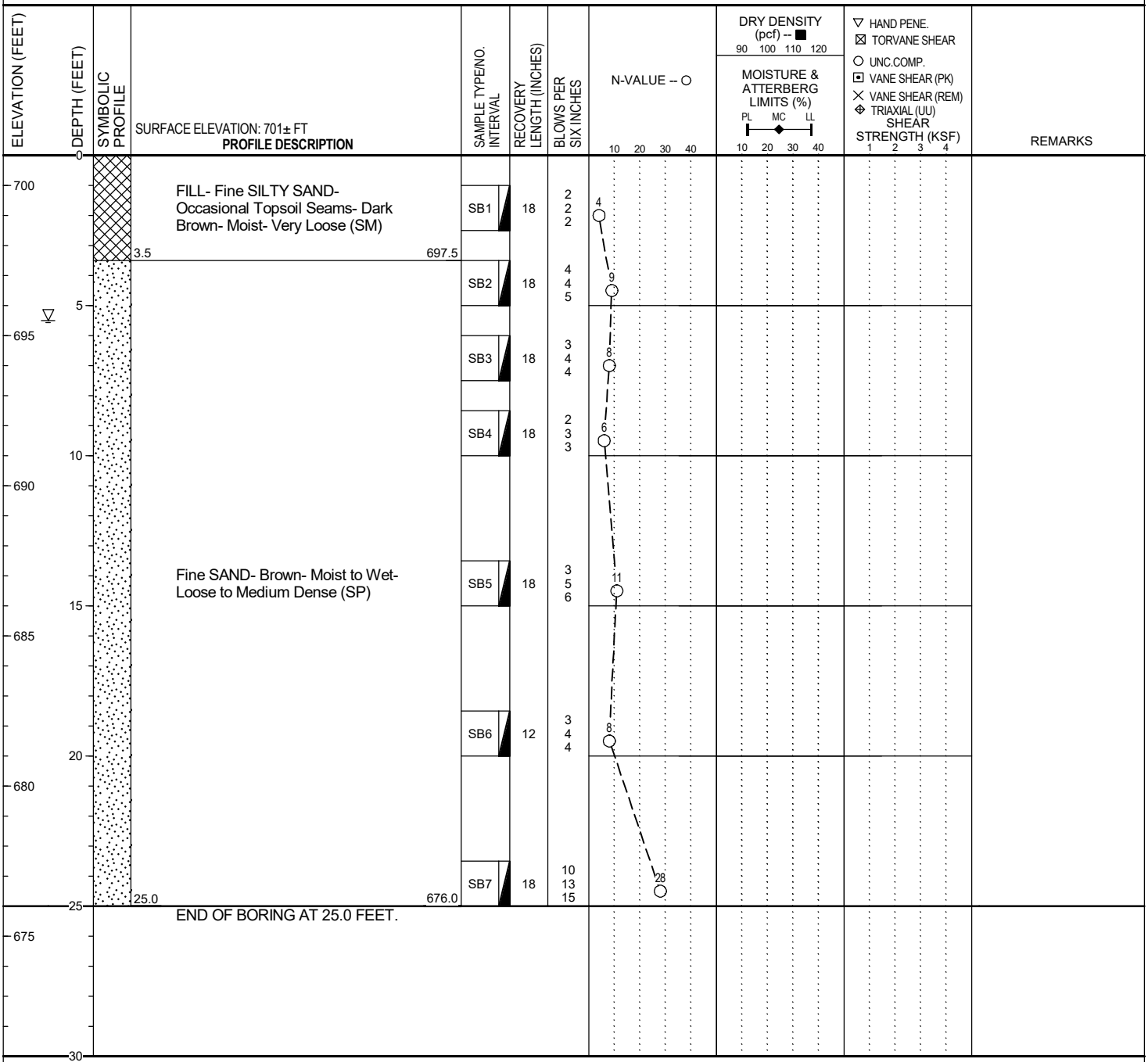
	DEPTH (FT)	ELEV (FT)
▽ DURING BORING:	6.0	695.0
▼ AT END OF BORING:	Note 2	
CAVE-IN OF BOREHOLE AT:	6.0	695.0

BACKFILL METHOD: Auger Cuttings

NOTES:
1. The indicated stratification lines are approximate. In situ, the transition between materials may be gradual.
2. Drilling mud was added to annulus of augers 10 feet below the ground surface. Therefore, obtaining an accurate water level after completion of drilling was not possible.
3. Surface capped with cold patch after backfilling the borehole.

BORING B28

PROJECT NAME: MCDC Drain Culvert Replacements
PROJECT NUMBER: 084059.00
CLIENT: Land & Resource Engineering
PROJECT LOCATION: Muskegon County, Michigan
DATE STARTED: 4/22/20 **COMPLETED:** 4/22/20 **BORING METHOD:** Hollow-stem Augers
DRILLER: JN **RIG NO.:** Truck-CME 55 **LOGGED BY:** GBS **CHECKED BY:** ATB



GROUNDWATER & BACKFILL INFORMATION

	DEPTH (FT)	ELEV (FT)
▽ **DURING BORING:**	5.5	695.5
▼ **AT END OF BORING:**	Note 2	
CAVE-IN OF BOREHOLE AT:	7.0	694.0

BACKFILL METHOD: Auger Cuttings

NOTES: 1. The indicated stratification lines are approximate. In situ, the transition between materials may be gradual.
2. Drilling mud was added to annulus of augers 10 feet below the ground surface. Therefore, obtaining an accurate water level after completion of drilling was not possible.

Important Information about This

Geotechnical-Engineering Report

Subsurface problems are a principal cause of construction delays, cost overruns, claims, and disputes.

While you cannot eliminate all such risks, you can manage them. The following information is provided to help.

The Geoprofessional Business Association (GBA) has prepared this advisory to help you – assumedly a client representative – interpret and apply this geotechnical-engineering report as effectively as possible. In that way, you can benefit from a lowered exposure to problems associated with subsurface conditions at project sites and development of them that, for decades, have been a principal cause of construction delays, cost overruns, claims, and disputes. If you have questions or want more information about any of the issues discussed herein, contact your GBA-member geotechnical engineer. Active engagement in GBA exposes geotechnical engineers to a wide array of risk-confrontation techniques that can be of genuine benefit for everyone involved with a construction project.

Understand the Geotechnical-Engineering Services Provided for this Report

Geotechnical-engineering services typically include the planning, collection, interpretation, and analysis of exploratory data from widely spaced borings and/or test pits. Field data are combined with results from laboratory tests of soil and rock samples obtained from field exploration (if applicable), observations made during site reconnaissance, and historical information to form one or more models of the expected subsurface conditions beneath the site. Local geology and alterations of the site surface and subsurface by previous and proposed construction are also important considerations. Geotechnical engineers apply their engineering training, experience, and judgment to adapt the requirements of the prospective project to the subsurface model(s). Estimates are made of the subsurface conditions that will likely be exposed during construction as well as the expected performance of foundations and other structures being planned and/or affected by construction activities.

The culmination of these geotechnical-engineering services is typically a geotechnical-engineering report providing the data obtained, a discussion of the subsurface model(s), the engineering and geologic engineering assessments and analyses made, and the recommendations developed to satisfy the given requirements of the project. These reports may be titled investigations, explorations, studies, assessments, or evaluations. Regardless of the title used, the geotechnical-engineering report is an engineering interpretation of the subsurface conditions within the context of the project and does not represent a close examination, systematic inquiry, or thorough investigation of all site and subsurface conditions.

Geotechnical-Engineering Services are Performed for Specific Purposes, Persons, and Projects, and At Specific Times

Geotechnical engineers structure their services to meet the specific needs, goals, and risk management preferences of their clients. A geotechnical-engineering study conducted for a given civil engineer will not likely meet the needs of a civil-works constructor or even a different civil engineer. Because each geotechnical-engineering study is unique, each geotechnical-engineering report is unique, prepared *solely* for the client.

Likewise, geotechnical-engineering services are performed for a specific project and purpose. For example, it is unlikely that a geotechnical-engineering study for a refrigerated warehouse will be the same as one prepared for a parking garage; and a few borings drilled during a preliminary study to evaluate site feasibility will not be adequate to develop geotechnical design recommendations for the project.

Do not rely on this report if your geotechnical engineer prepared it:

- for a different client;
- for a different project or purpose;
- for a different site (that may or may not include all or a portion of the original site); or
- before important events occurred at the site or adjacent to it; e.g., man-made events like construction or environmental remediation, or natural events like floods, droughts, earthquakes, or groundwater fluctuations.

Note, too, the reliability of a geotechnical-engineering report can be affected by the passage of time, because of factors like changed subsurface conditions; new or modified codes, standards, or regulations; or new techniques or tools. *If you are the least bit uncertain* about the continued reliability of this report, contact your geotechnical engineer before applying the recommendations in it. A minor amount of additional testing or analysis after the passage of time – if any is required at all – could prevent major problems.

Read this Report in Full

Costly problems have occurred because those relying on a geotechnical-engineering report did not read the report in its entirety. Do not rely on an executive summary. Do not read selective elements only. *Read and refer to the report in full.*

You Need to Inform Your Geotechnical Engineer About Change

Your geotechnical engineer considered unique, project-specific factors when developing the scope of study behind this report and developing the confirmation-dependent recommendations the report conveys. Typical changes that could erode the reliability of this report include those that affect:

- the site's size or shape;
- the elevation, configuration, location, orientation, function or weight of the proposed structure and the desired performance criteria;
- the composition of the design team; or
- project ownership.

As a general rule, *always* inform your geotechnical engineer of project or site changes – even minor ones – and request an assessment of their impact. *The geotechnical engineer who prepared this report cannot accept*

responsibility or liability for problems that arise because the geotechnical engineer was not informed about developments the engineer otherwise would have considered.

Most of the "Findings" Related in This Report Are Professional Opinions

Before construction begins, geotechnical engineers explore a site's subsurface using various sampling and testing procedures. *Geotechnical engineers can observe actual subsurface conditions only at those specific locations where sampling and testing is performed.* The data derived from that sampling and testing were reviewed by your geotechnical engineer, who then applied professional judgement to form opinions about subsurface conditions throughout the site. Actual sitewide-subsurface conditions may differ – maybe significantly – from those indicated in this report. Confront that risk by retaining your geotechnical engineer to serve on the design team through project completion to obtain informed guidance quickly, whenever needed.

This Report's Recommendations Are Confirmation-Dependent

The recommendations included in this report – including any options or alternatives – are confirmation-dependent. In other words, they are not final, because the geotechnical engineer who developed them relied heavily on judgement and opinion to do so. Your geotechnical engineer can finalize the recommendations *only after observing actual subsurface conditions* exposed during construction. If through observation your geotechnical engineer confirms that the conditions assumed to exist actually do exist, the recommendations can be relied upon, assuming no other changes have occurred. *The geotechnical engineer who prepared this report cannot assume responsibility or liability for confirmation-dependent recommendations if you fail to retain that engineer to perform construction observation.*

This Report Could Be Misinterpreted

Other design professionals' misinterpretation of geotechnical-engineering reports has resulted in costly problems. Confront that risk by having your geotechnical engineer serve as a continuing member of the design team, to:

- confer with other design-team members;
- help develop specifications;
- review pertinent elements of other design professionals' plans and specifications; and
- be available whenever geotechnical-engineering guidance is needed.

You should also confront the risk of constructors misinterpreting this report. Do so by retaining your geotechnical engineer to participate in prebid and preconstruction conferences and to perform construction-phase observations.

Give Constructors a Complete Report and Guidance

Some owners and design professionals mistakenly believe they can shift unanticipated-subsurface-conditions liability to constructors by limiting the information they provide for bid preparation. To help prevent the costly, contentious problems this practice has caused, include the complete geotechnical-engineering report, along with any attachments or appendices, with your contract documents, *but be certain to note conspicuously that you've included the material for information purposes only.* To avoid misunderstanding, you may also want to note that "informational purposes" means constructors have no right to rely on the interpretations, opinions, conclusions, or recommendations in the report. Be certain that constructors know they may learn about specific project requirements, including options selected from the report, *only* from the design drawings and specifications. Remind constructors that they may perform their own studies if they want to, and *be sure to allow enough time* to permit them to do so. Only then might you be in a position to give constructors the information available to you, while requiring them to at least share some of the financial responsibilities stemming from unanticipated conditions. Conducting prebid and preconstruction conferences can also be valuable in this respect.

Read Responsibility Provisions Closely

Some client representatives, design professionals, and constructors do not realize that geotechnical engineering is far less exact than other engineering disciplines. This happens in part because soil and rock on project sites are typically heterogeneous and not manufactured materials with well-defined engineering properties like steel and concrete. That lack of understanding has nurtured unrealistic expectations that have resulted in disappointments, delays, cost overruns, claims, and disputes. To confront that risk, geotechnical engineers commonly include explanatory provisions in their reports. Sometimes labeled "limitations," many of these provisions indicate where geotechnical engineers' responsibilities begin and end, to help others recognize their own responsibilities and risks. *Read these provisions closely.* Ask questions. Your geotechnical engineer should respond fully and frankly.

Geoenvironmental Concerns Are Not Covered

The personnel, equipment, and techniques used to perform an environmental study – e.g., a "phase-one" or "phase-two" environmental site assessment – differ significantly from those used to perform a geotechnical-engineering study. For that reason, a geotechnical-engineering report does not usually provide environmental findings, conclusions, or recommendations; e.g., about the likelihood of encountering underground storage tanks or regulated contaminants. *Unanticipated subsurface environmental problems have led to project failures.* If you have not obtained your own environmental information about the project site, ask your geotechnical consultant for a recommendation on how to find environmental risk-management guidance.

Obtain Professional Assistance to Deal with Moisture Infiltration and Mold

While your geotechnical engineer may have addressed groundwater, water infiltration, or similar issues in this report, the engineer's services were not designed, conducted, or intended to prevent migration of moisture – including water vapor – from the soil through building slabs and walls and into the building interior, where it can cause mold growth and material-performance deficiencies. Accordingly, ***proper implementation of the geotechnical engineer's recommendations will not of itself be sufficient to prevent moisture infiltration. Confront the risk of moisture infiltration*** by including building-envelope or mold specialists on the design team. ***Geotechnical engineers are not building-envelope or mold specialists.***

GEOPROFESSIONAL BUSINESS ASSOCIATION

Telephone: 301/565-2733
e-mail: info@geoprofessional.org www.geoprofessional.org

GENERAL COMMENTS

BASIS OF GEOTECHNICAL REPORT

This report has been prepared in accordance with generally accepted geotechnical engineering practices to assist in the design and/or evaluation of this project. If the project plans, design criteria, and other project information referenced in this report and utilized by SME to prepare our recommendations are changed, the conclusions and recommendations contained in this report are not considered valid unless the changes are reviewed, and the conclusions and recommendations of this report are modified or approved in writing by our office.

The discussions and recommendations submitted in this report are based on the available project information, described in this report, and the geotechnical data obtained from the field exploration at the locations indicated in the report. Variations in the soil and groundwater conditions commonly occur between or away from sampling locations. The nature and extent of the variations may not become evident until the time of construction. If significant variations are observed during construction, SME should be contacted to reevaluate the recommendations of this report. SME should be retained to continue our services through construction to observe and evaluate the actual subsurface conditions relative to the recommendations made in this report.

In the process of obtaining and testing samples and preparing this report, procedures are followed that represent reasonable and accepted practice in the field of soil and foundation engineering. Specifically, field logs are prepared during the field exploration that describe field occurrences, sampling locations, and other information. Samples obtained in the field are frequently subjected to additional testing and reclassification in the laboratory and differences may exist between the field logs and the report logs. The engineer preparing the report reviews the field logs, laboratory classifications, and test data and then prepares the report logs. Our recommendations are based on the contents of the report logs and the information contained therein.

REVIEW OF DESIGN DETAILS, PLANS, AND SPECIFICATIONS

SME should be retained to review the design details, project plans, and specifications to verify those documents are consistent with the recommendations contained in this report.

REVIEW OF REPORT INFORMATION WITH PROJECT TEAM

Implementation of our recommendations may affect the design, construction, and performance of the proposed improvements, along with the potential inherent risks involved with the proposed construction. The client and key members of the design team, including SME, should discuss the issues covered in this report so that the issues are understood and applied in a manner consistent with the owner's budget, tolerance of risk, and expectations for performance and maintenance.

FIELD VERIFICATION OF GEOTECHNICAL CONDITIONS

SME should be retained to verify the recommendations of this report are properly implemented during construction. This may avoid misinterpretation of our recommendations by other parties and will allow us to review and modify our recommendations if variations in the site subsurface conditions are encountered.

PROJECT INFORMATION FOR CONTRACTOR

This report and any future addenda or other reports regarding this site should be made available to prospective contractors prior to submitting their proposals for their information only and to supply them with facts relative to the subsurface evaluation and laboratory test results. If the selected contractor encounters subsurface conditions during construction, which differ from those presented in this report, the contractor should promptly describe the nature and extent of the differing conditions in writing and SME should be notified so that we can verify those conditions. The construction contract should include provisions for dealing with differing conditions and contingency funds should be reserved for potential problems during earthwork and foundation construction. We would be pleased to assist you in developing the contract provisions based on our experience.

The contractor should be prepared to handle environmental conditions encountered at this site, which may affect the excavation, removal, or disposal of soil; dewatering of excavations; and health and safety of workers. Any Environmental Assessment reports prepared for this site should be made available for review by bidders and the successful contractor.

THIRD PARTY RELIANCE/REUSE OF THIS REPORT

This report has been prepared solely for the use of our Client for the project specifically described in this report. This report cannot be relied upon by other parties not involved in the project, unless specifically allowed by SME in writing. SME also is not responsible for the interpretation by other parties of the geotechnical data and the recommendations provided herein.

LABORATORY TESTING PROCEDURES

VISUAL ENGINEERING CLASSIFICATION

Visual classification was performed on recovered samples. The appended General Notes and Unified Soil Classification System (USCS) sheets include a brief summary of the general method used visually classify the soil and assign an appropriate USCS group symbol. The estimated group symbol, according to the USCS, is shown in parentheses following the textural description of the various strata on the boring logs appended to this report. The soil descriptions developed from visual classifications are sometimes modified to reflect the results of laboratory testing.

MOISTURE CONTENT

Moisture content tests were performed by weighing samples from the field at their in-situ moisture condition. These samples were then dried at a constant temperature (approximately 110º C) overnight in an oven. After drying, the samples were weighed to determine the dry weight of the sample and the weight of the water that was expelled during drying. The moisture content of the specimen is expressed as a percent and is the weight of the water compared to the dry weight of the specimen.

HAND PENETROMETER TESTS

In the hand penetrometer test, the unconfined compressive strength of a cohesive soil sample is estimated by measuring the resistance of the sample to the penetration of a small calibrated, spring-loaded cylinder. The maximum capacity of the penetrometer is 4.5 tons per square-foot (tsf). Theoretically, the undrained shear strength of the cohesive sample is one-half the unconfined compressive strength. The undrained shear strength (based on the hand penetrometer test) presented on the boring logs is reported in units of kips per square-foot (ksf).

TORVANE SHEAR TESTS

In the Torvane test, the shear strength of a low strength, cohesive soil sample is estimated by measuring the resistance of the sample to a torque applied through vanes inserted into the sample. The undrained shear strength of the samples is measured from the maximum torque required to shear the sample and is reported in units of kips per square-foot (ksf).

LOSS-ON-IGNITION (ORGANIC CONTENT) TESTS

Loss-on-ignition (LOI) tests are conducted by first weighing the sample and then heating the sample to dry the moisture from the sample (in the same manner as determining the moisture content of the soil). The sample is then re-weighed to determine the dry weight and then heated for 4 hours in a muffle furnace at a high temperature (approximately 440º C). After cooling, the sample is re-weighed to calculate the amount of ash remaining, which in turn is used to determine the amount of organic matter burned from the original dry sample. The organic matter content of the specimen is expressed as a percent compared to the dry weight of the sample.

ATTERBERG LIMITS TESTS

Atterberg limits tests consist of two components. The plastic limit of a cohesive sample is determined by rolling the sample into a thread and the plastic limit is the moisture content where a 1/8-inch thread begins to crumble. The liquid limit is determined by placing a ½-inch thick soil pat into the liquid limits cup and using a grooving tool to divide the soil pat in half. The cup is then tapped on the base of the liquid limits device using a crank handle. The number of drops of the cup to close the gap formed by the grooving tool ½ inch is recorded along with the corresponding moisture content of the sample. This procedure is repeated several times at different moisture contents and a graph of moisture content and the corresponding number of blows is plotted. The liquid limit is defined as the moisture content at a nominal 25 drops of the cup. From this test, the plasticity index can be determined by subtracting the plastic limit from the liquid limit.

SECTION 00314

BID

Bid of _____ hereinafter called Bidder, organized and existing under the laws of or a resident of

the State of _____, doing business as _____.*
*Insert as applicable: "a corporation", "a partnership" or "an individual".

To Muskegon County Drain Commissioner, hereinafter called OWNER.

1. The undersigned Bidder proposes and agrees, if this Bid is accepted, to enter into an Agreement with OWNER in the form included in the Contract Documents to perform and furnish all Work for the Black Creek Consolidated Drain – Division No. 7 as specified or indicated in the Contract Documents for the Contract Price and within the Contract Times indicated in the Bid and in accordance with the other terms and conditions of the Contract Documents.

2. Bidder accepts all of the terms and conditions of the Notice of Letting of Drain Contract and Instructions to Bidders including, without limitation, those dealing with the disposition of Bid security. This Bid will remain subject to acceptance for 120 days after the day of bid opening. Bidder will sign and submit the Agreement and the Bonds and other documents required by the Bidding Documents within 15 days after the date of OWNER's Notice of Award.

3. In submitting this Bid, Bidder represents, as more fully set forth in the Agreement, that:

   A. Bidder has examined and carefully studied the Bidding Documents and the following Addenda receipt of all which is hereby acknowledged:

Date	Addendum Number
_____	_____
_____	_____

   B. Bidder has visited the Site and become familiar with and is satisfied as to the general, local and site conditions that may affect cost, progress, performance and furnishing of the Work.

   C. Bidder is familiar with and is satisfied as to all federal, state and local laws and regulations that may affect cost, progress, performance and furnishing of the Work.

   D. Bidder has carefully studied all reports of explorations and test of subsurface conditions at or contiguous to the Site and all drawings of physical conditions in or relating to existing surface or subsurface structures at or contiguous to the Site (except Underground Facilities) if identified in Section 00800: Supplementary Conditions as provided in paragraph 4.02 of Section 00700: General Conditions. Bidder accepts the determination set forth in paragraph SC-4.02 of Section 00800: Supplementary Conditions of the extent of the "technical data" contained in such reports and drawings upon which Bidder is entitled to rely as provided in paragraph 4.02.1 of Section 00700: General Conditions. Bidder acknowledges that such reports and drawings are not Contract Documents and may not be complete for Bidder's purposes. Bidder acknowledges that OWNER and ENGINEER do not assume responsibility for the accuracy or completeness of information and data shown or indicated in Bidding Documents with respect to Underground Facilities at or contiguous to the Site.

   E. Bidder has obtained and carefully studied (or assumes responsibility for having done so) all such additional or supplementary examinations, investigations, explorations, tests, studies and data concerning conditions (surface, subsurface and Underground Facilities) at or contiguous to the Site or otherwise which may affect cost, progress, performance or furnishing of the Work or which relates to any aspect of the means, methods, techniques, sequences and procedures of construction to be employed by Bidder and safety precautions and programs incident thereto. Bidder does not consider that any additional examinations, investigations, explorations, tests, studies or data are necessary for the determination of the Bid for performance and furnishing of the Work in accordance with the times, price and other terms and conditions of the Contract Documents.

   F. Bidder is aware of the general nature of Work to be performed by OWNER and others at the Site that relates to Work for which this Bid is submitted as indicated on the Contract Documents.

   G. Bidder has correlated the information known to Bidder, information and observations obtained from visits to the Site, reports and drawings if any are identified in the Contract Documents and all additional or supplementary examinations, investigations, explorations, tests, studies and data with the Contract Documents.

H. Bidder has given ENGINEER written notice of all conflicts, errors, ambiguities or discrepancies that Bidder has discovered in the Contract Documents and the written resolution thereof by ENGINEER is acceptable to Bidder, and the Contract Documents are generally sufficient to indicate and convey understanding of all terms and conditions for performing and furnishing the Work for which this Bid is submitted.

I. This Bid is genuine and not made in the interest of or on behalf of any undisclosed person, firm or corporation and is not submitted in conformity with any agreement or rules of any group, association, organization or corporation; Bidder has not directly or indirectly induced or solicited any other Bidder to submit a false or sham bid; Bidder has not solicited or induced any person, firm or corporation to refrain from bidding; and Bidder has not sought by collusion to obtain for itself any advantage over any other bidder or over OWNER.

4. Bidder will complete the Work for the following unit prices:

Unit Price Schedule

Item No.	Item Description	Unit	Estimated Quantity	Unit Price	Amount
1	Storm Sewer & Culvert Removal, Less than 36-inch Diameter	LF	694.0	$	$
2	Storm Sewer & Culvert Removal, 36-inch Diameter & Larger	LF	161.0	$	$
3	Open Drain Cleanout	LF	9,917.0	$	$
4	Open Drain Construction	LF	7,313.0	$	$
5	36" CSP Culvert	LF	40.0	$	$
6	48" CSP Culvert	LF	20.0	$	$
7	60" x 38" HE RCP CL IV Culvert	LF	160.0	$	$
8	66" x 51" CSP Aluminized Arch Culvert	LF	420.0	$	$
9	36" CSP Flared End Section	EA	4.0	$	$
10	48" CSP Flared End Section	EA	2.0	$	$
11	60" x 38" HE RCP CL IV End Section	EA	6.0	$	$
12	Plain Riprap over Geotextile Fabric	SYD	885.0	$	$
13	Selective Drain Bank Clearing	LF	1,000.0	$	$
14	Stream Restoration Detail Stream Bank Tapering	LF	659.0	$	$
15	Stream Restoration Detail 108 Riffle Zone	EA	3.0	$	$
16	Stream Restoration Detail 111 Cross Vane	EA	2.0	$	$
17	Stream Restoration Detail 7 Rock Cluster	EA	12.0	$	$
18	HMA Roadway Restoration	SYD	290.0	$	$
19	Gravel Driveway Restoration	SYD	35.0	$	$
20	Curb and Gutter, Removal	FT	100.0	$	$
21	Concrete Curb and Gutter	FT	100.0	$	$
22	Pavt Mrkg, Waterborne, 4 inch, White	FT	60.0	$	$

23	Pavt Mrkg, Waterborne, 4 inch, Yellow	FT	20.0	$	$
24	Mulch Blanket	SYD	5,200.0	$	$
25	Surface Restoration (Topsoil, Open Channel Seeding and Mulch)	SYD	31,700.0	$	$
26	Mobilization, Max (10%)	LS	1.0	$	$
27	Soil Erosion & Sedimentation Control Measures	LS	1.0	$	$
28	Traffic Control	LS	1.0	$	$

Total Amount (numbers) $_____

Total Amount (words) _____

_____ dollars.

5. Bidder agrees that the Work will be substantially complete on or before September 15, 2021 and completed and ready for final payment in accordance with paragraph 14.07 of Section 00700: General Conditions on or before October 15, 2021. Once work has been initiated at the site, work shall be substantially complete within 120 calendar days and completed and ready for final payment within 150 calendar days.

Bidder accepts the provisions of the Agreement as to liquidated damages in the event of failure to complete the Work on time.

6. The following documents are attached to and made a condition of this bid:

   A. Required bid security.

7. Communications to Bidder concerning this Bid shall be addressed to the address indicated below.

8. The terms used in this Bid which are defined in the General Conditions of the construction Contract, included as part of the Contract Documents, have the meanings assigned to them in Section 00700: General Conditions.

SUBMITTED on _____, 20 __ BY: _____
Date* Name of Bidder*

_____ _____
Street* Signature

_____ _____
City, State, and Zip* Name and Title of Signatory*

_____
Telephone Number*

*Typed or printed in ink.

END OF SECTION

SECTION 00410

BID BOND

OWNER:

Address:

City, State, Zip:

Bid Due Date:

Project:

IN WITNESS WHEREOF, Surety and Bidder, intending to be legally bound hereby, subject to the following terms hereof, do each cause this Bid Bond to be duly executed on its behalf by its authorized officer, agent, or representative.

Surety (Principal Place of Business):	Bidder:
_____ Name of Surety*	_____ Name of Bidder*
_____ Street*	_____ Street*
_____ City, State, Zip*	_____ City, State, Zip*
_____ (Seal) Surety's Corporate Seal	_____ (Seal) Bidder's Corporate Seal
By: _____ Signature and Title	By: _____ Signature and Title (Attach Power of Attorney)
Attest: _____ Signature and Title	Attest: _____ Signature and Title

*Typed or printed in ink.

Bond:

Bond Number: _____

Date (not later than Bid Due Date): _____

Penal Sum: _____

Note: (1) Above addresses are to be used for giving required notice.
(2) Any singular reference to Bidder, Surety, OWNER or other party shall be considered plural where applicable.

1. Bidder and Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors and assigns to pay to OWNER upon default of Bidder the penal sum set forth on the face of this Bond.

2. Default of Bidder shall occur upon the failure of Bidder to deliver within the time required by the Bidding Documents the executed Agreement required by the Bidding Documents and any performance and payment bonds required by the Bidding Documents and Contract Documents.

3. This obligation shall be null and void if:

OWNER accepts Bidder's Bid and Bidder delivers within the time required by the Bidding Documents (or any extensions thereof agreed to in writing by OWNER) the Agreement required by the Bidding Documents and any performance any payment bonds required by the Bidding Documents and Contract Documents, or

All Bids are rejected by OWNER, or

OWNER fails to issue a Notice of Award to Bidder within the time specified in the Bidding Documents (or any extension thereof agreed to in writing by Bidder and, if applicable, consented to by Surety when required by paragraph 5 hereof).

4. Payment under this Bond will be due and payable upon default of Bidder and within 30 calendar days after receipt by Bidder and Surety of written notice of default from OWNER, which notice will be given with reasonable promptness, identifying this Bond and the Project and including a statement of the amount due.

5. Surety waives notice of and any all defenses based on or arising out of any time extension to issue notice of award agreed to in writing by OWNER and Bidder, provided that the time for issuing notice of award including extension shall not in the aggregate exceed 120 days from Bid Due Date without Surety's written consent.

6. No suit or action shall be commenced under this Bond prior to 30 calendar days after the notice of default required in paragraph 4 above is received by Bidder and Surety, and in no case later than one year after Bid Due Date.

7. Any suit or action under this Bond shall be commenced only in a court of competent jurisdiction located in the states in which the Project is located.

8. Notice required hereunder shall be in writing and sent to Bidder and Surety at their respective addresses shown on the face of this Bond. Such notices may be sent by personal delivery, commercial courier or by United States Registered or Certified Mail, return receipt requested, postage pre-paid, and shall be deemed to be effective upon receipt by the party concerned.

9. Surety shall cause to attach to this Bond a current and effective Power of Attorney evidencing the authority of the officer, agent or representative who executed this Bond on behalf of Surety to execute, seal and deliver such Bond and bind the Surety thereby.

10. This Bond is intended to conform to all applicable statutory requirements. Any applicable requirement of any applicable statute that has been omitted from this Bond shall be deemed to be included herein as if set forth at length. If any provision of the Bond conflicts with any applicable provision of any applicable statute, then the provision of said statue shall govern and the remainder of this Bond that is not conflict therewith shall continue in full force and effect.

11. The term "Bid" as used herein includes a Bid, offer or proposal as applicable.

END OF SECTION

SECTION 00500

AGREEMENT

THIS AGREEMENT is dated as of the _____ day of _____ in the year 2020 by and between Muskegon County Drain Commissioner (hereinafter called OWNER) and _____(hereinafter called CONTRACTOR). OWNER and CONTRACTOR, in consideration of the mutual covenants hereinafter set forth, agree as follows:

ARTICLE 1 - WORK

CONTRACTOR shall complete all Work as specified or indicated in the Contract Documents. The Work is generally described as follows: Black Creek Consolidated Drain – Division 7.

ARTICLE 2 - ENGINEER

The Project has been designed by Eng., Inc., Grand Haven, Michigan, who is hereinafter called ENGINEER and who will act as OWNER's representative, assume all duties and responsibilities and have the rights and authority assigned to ENGINEER in the Contract Documents in connection with completion of the Work in accordance with the Contract Documents.

ARTICLE 3 - CONTRACT TIMES

3.1 The Work will be substantially complete by September 15, 2021. All the work will be completed and ready for final payment by October 15, 2021. Once work has been initiated at the site, work shall be substantially complete within 120 calendar days and completed and ready for final payment within 150 calendar days.

3.2 Liquidated Damages: OWNER and CONTRACTOR recognize that time is of the essence of this Agreement and that OWNER will suffer financial loss if the Work is not completed within the times specified in paragraph 3.1 above, plus any extensions thereof allowed in accordance with Article 12 of the General Conditions. They also recognize the delays, expense and difficulties involved in proving in a legal or arbitration proceeding the actual loss suffered by OWNER if the Work is not completed on time. Accordingly, instead of requiring any such proof, OWNER and CONTRACTOR agree that as liquidated damages for delay (but not as a penalty) CONTRACTOR shall pay OWNER Amount Dollars $500.00 for each day that expires after the time specified in paragraph 3.1 for Substantial Completion until the Work is substantially complete. After Substantial Completion if CONTRACTOR shall neglect, refuse or fail to complete the remaining work within the Contract Time, CONTRACTOR shall pay OWNER Amount Dollars $500.00 for each day that expires after the time specified in paragraph 3.1 for completion and readiness for final payment.

ARTICLE 4 - CONTRACT PRICE

OWNER shall pay CONTRACTOR for completion of the Work in accordance with the Contract Documents.

ARTICLE 5 - PAYMENT PROCEDURES

CONTRACTOR shall submit Applications for Payment in accordance with Article 14 of Section 00700: General Conditions. Applications for Payment will be processed by ENGINEER as provided in the General Conditions.

5.1 Progress Payments. OWNER shall make progress payments on account of the Contract Price on the basis of CONTRACTOR's Application for Payment as recommended by ENGINEER, monthly during construction as provided in paragraphs 5.1.1 and 5.1.2 below. All such payments will be on the basis of the progress of the Work based on unit prices and quantities of Work completed.

5.1.1 Prior to Substantial completion, progress payments will be made in an amount equal to: 100 percent of the Work completed and 100 percent of materials and equipment not incorporated in the Work but delivered, suitably stored and accompanied by documentation satisfactory to OWNER as provided in paragraph 14.02 of Section 00700: General Conditions less the aggregate of payments previously made and less such amounts as ENGINEER should determine or OWNER may withhold, in accordance with Article 14 of Section 00700: General Conditions, except that OWNER will retain a portion of each progress payment limited to:

5.1.1.1 Not more than 10 percent of the dollar value of the work completed until 50 percent of the Work has been completed as determined by ENGINEER.

5.1.1.2 After the Work has been 50 percent completed as determined by ENGINEER, additional retainage will not be withheld unless OWNER determines that CONTRACTOR is not making satisfactory progress, or for other specific cause relating to CONTRACTOR's performance under the Contract. If the OWNER so determines, the OWNER may retain not more than 10 percent of the dollar value of the Work more that 50 percent completed.

5.1.2 Upon Substantial Completion, OWNER shall pay an amount sufficient to increase total payments to CONTRACTOR to 95 percent of the Contract Price, less such amounts as ENGINEER shall determine, or OWNER may withhold, in accordance with Article 14 of the General Conditions.

5.1.3 OWNER may deduct from progress payments amounts which are due to OWNER from CONTRACTOR in accordance with the Contract Documents.

5.1.4 After Substantial Completion, OWNER may, at OWNER's sole discretion, pay an amount sufficient to increase total payments to CONTRACTOR to more than 95 percent of the Contract Price (if OWNER has received consent of surety in a form acceptable to OWNER).

5.1.5 Progress payment shall not be due until 15 days after OWNER has received the funds with which to make the progress payment form a department or agency of the federal or state government, if any funds are to come from either of these sources.

5.2 The retained funds will not be commingled with other funds of OWNER and will be deposited in an interest bearing account in a regulated financial institution in this state where in all such retained funds are kept by OWNER which will account for both retainage and interest on each construction contract separately.

5.3 OWNER is not required to deposit retained funds in an interest-bearing account if the retained funds are to be provided under a state or federal grant and the retained funds have not been paid to OWNER.

5.4 OWNER, at any time after 94 percent of Work under the Contract has been completed as determined by ENGINEER and at the request of CONTRACTOR, will release the retainage plus interest to the CONTRACTOR only if CONTRACTOR provides to OWNER an irrevocable letter of credit in the amount of the retainage plus interest, issued by a Bank authorized to do business in this state, containing terms mutually acceptable to CONTRACTOR and OWNER.

5.5 Unresolved disputes between OWNER and CONTRACTOR regarding retained funds and interest on retained funds shall be submitted to an agent in accordance with the dispute resolution process described in Section 4 of State of Michigan Act 524 of P.A. of 1980.

ARTICLE 6 - INTEREST

All moneys not paid when due as provided in Article 14 of Section 00700: General Conditions shall bear interest at the rate of 1 percent per month.

ARTICLE 7 - CONTRACTOR'S REPRESENTATIONS

In order to induce OWNER to enter into the Agreement CONTRACTOR makes the following representations:

7.1 CONTRACTOR has examined and carefully studied the Contract Documents (including the Addenda listed in paragraph 8) and the other related data identified in the Bidding Documents including technical data.

7.2 CONTRACTOR has visited the Site and become familiar with and is satisfied as to the general, local, and Site conditions that may affect cost, progress, and performance of the Work.

7.3 CONTRACTOR is familiar with and is satisfied as to all federal, state, and local Laws and Regulations that may affect cost, progress, and performance of the Work.

7.4 CONTRACTOR has carefully studied all reports of explorations and tests of subsurface conditions at or contiguous to the Site and all drawings of physical conditions in or relating to existing surface or subsurface structures at or contiguous to the Site (except Underground Facilities) if identified in Section 00800: Supplementary Conditions as provided in paragraph 4.02.1 of Section 00700: General Conditions. CONTRACTOR accepts the determination set forth in paragraph SC-4.02 of Section 00800: Supplementary Conditions of the extent of the "technical data" contained in such reports and drawings upon which CONTRACTOR is entitled to rely as provided in paragraph 4.02 of Section 00700: General Conditions. CONTRACTOR acknowledges that such reports and drawings are not Contract Documents and may not be complete for CONTRACTOR's purposes. CONTRACTOR acknowledges that OWNER and ENGINEER do not

assume responsibility for the accuracy or completeness of information and data shown or indicated in the Contract Documents with respect to Underground Facilities at or contiguous to the Site.

7.5 CONTRACTOR has obtained and carefully studied (or assumes responsibility for having done so) all such additional or supplementary examinations, investigations, explorations, tests, studies, and data concerning conditions (surface, subsurface, and Underground Facilities) at or contiguous to the Site which may affect cost, progress, or performance or furnishing of the Work or which relate to any aspect of the means, methods, techniques, sequences, and procedures of construction to be employed by CONTRACTOR and safety precautions and programs incident thereto. CONTRACTOR does not consider that any additional examinations, investigations, explorations, tests, studies or data are necessary for the performance and furnishing of the Work at the Contract Price, within the Contract Times and in accordance with the other terms and conditions of the Contract Documents.

7.6 CONTRACTOR is aware of the general nature of work to be performed by OWNER and others at the Site that relates to the Work as indicated in the Contract Documents.

7.7 CONTRACTOR has correlated the information known to CONTRACTOR, information and observations obtained from visits to the Site, reports and drawings identified in the Contract Documents, and all additional examinations, investigations, explorations, tests, studies, and data with the Contract Documents.

7.8 CONTRACTOR has given ENGINEER written notice of all conflicts, errors, ambiguities, or discrepancies that CONTRACTOR has discovered in the Contract Documents, and the written resolution thereof by ENGINEER is acceptable to CONTRACTOR, and the Contract Documents are generally sufficient to indicate and convey understanding of all terms and conditions for performance and furnishing of the Work.

ARTICLE 8 - CONTRACT DOCUMENTS

The Contract Documents which comprise the entire agreement between OWNER and CONTRACTOR concerning the Work consist of the following:

8.1. CONTRACTOR's Bid dated _____.

8.2. Addenda ____ to ____, inclusive.

8.3. This Agreement.

8.4. Construction Performance Bond.

8.5. Construction Payment Bond.

8.6. General Conditions.

8.7. Supplementary Conditions.

8.8. Michigan EGLE Permit.

8.9. Right of Way Permit Application from Muskegon County Road Commission and Provided in Section 01570.

8.10. Muskegon County Drain Commissioner SESC Permit.

8.11. Notice of Award.

8.12. Notice to Proceed.

8.13. Project Manual bearing the title: Black Creek Consolidated Drain – Division 7 and consisting of Sections and Divisions and Drawings as listed in the Table of Contents thereof and dated June 2020.

8.14. Drawings, consisting of sheets as listed on the cover sheet with each sheet bearing the following general title: Black Creek Consolidated Drain – Division 7 and dated June 2020.

8.15. The following which may be delivered or issued after the Effective Date of the Agreement and are not attached hereto:

a. Written Amendments.
b. Change Orders.

There are no Contract Documents other than those listed above in Article 8. The Contract Documents may only be amended, modified, or supplemented as provided in paragraph 3.04 of Section 00700: General Conditions.

ARTICLE 9 – MISCELLANEOUS

9.1. Terms used in the Agreement which are defined in Article 1 of the General Conditions will have the meanings indicated in Section 00700: General Conditions.

9.2. No assignment by a party hereto of any rights under or interests in the Contract Documents will be binding on another party hereto without the written consent of the party sought to be bound; and specifically but without limitation, moneys that may become due and moneys that are due may not be assigned without such consent (except to the extent that the effect of this restriction may be limited by law), and unless specifically stated to the contrary in any written consent to an assignment, no assignment will release or discharge the assignor from any duty or responsibility under the Contract Documents.

9.3. OWNER and CONTRACTOR each binds itself, its partners, successors, assigns and legal representatives to the other party hereto, its partners, successors, assigns and legal representatives in respect of all covenants, agreements and obligations contained in the Contract Documents.

9.4. Any provision or part of the Contract Documents held to be void or unenforceable under any Law or Regulation shall be deemed stricken, and all remaining provisions shall continue to be valid and binding upon OWNER and CONTRACTOR, who agree that the Contract Documents shall be reformed to replace such stricken provision or part thereof with a valid and enforceable provision that comes as close as possible to expressing the intention of the stricken provision.

IN WITNESS WHEREOF, OWNER and CONTRACTOR have signed this Agreement in triplicate. One counterpart each has been delivered to OWNER, CONTRACTOR and ENGINEER.

CONTRACTOR:	OWNER:
By: _____	_____
Name of CONTRACTOR	
_____	_____
Signature	Signature
_____	_____
Name and Title of Signatory*	Name and Title of Signatory*
Witness: _____	Witness: _____
Witness: _____	Witness: _____
Signed on _____, 20__	Signed on _____, 20___
Date*	Date*
_____	_____
Street*	Street*
_____	_____
City, State and Zip*	City, State and Zip*
_____	_____
Telephone Number*	Telephone Number*

* typed or printed in ink.

END OF SECTION

SECTION 00610

CONSTRUCTION PERFORMANCE BOND

Any singular reference to CONTRACTOR, Surety, OWNER or other party shall be considered plural where applicable.

CONTRACTOR (Name and Address):

SURETY (Name and Principal Place of Business):

OWNER (Name and Address):

CONSTRUCTION CONTRACT
Date:
Amount:
Description (Name and Location):

BOND
Date (Not earlier than Construction Contract Date):
Amount:
Modifications to this Bond Form:

CONTRACTOR AS PRINCIPAL		SURETY	
Company:	(Corp. Seal)	Company:	(Corp. Seal)
Signature:_____		Signature:_____	
Name and Title:		Name and Title:	

CONTRACTOR AS PRINCIPAL		SURETY	
Company:	(Corp. Seal)	Company:	(Corp. Seal)
Signature:_____		Signature:_____	
Name and Title:		Name and Title:	

1. The CONTRACTOR and the Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors and assigns to the OWNER for the performance of the Construction Contract, which is incorporated herein by reference.

2. If the CONTRACTOR performs the Construction Contract, the Surety and the CONTRACTOR shall have no obligation under this Bond, except to participate in conferences as provided in Subparagraph 3.1.

3. If there is no Owner Default, the Surety's obligation under this Bond shall arise after:

3.1 The OWNER has notified the CONTRACTOR and the Surety at its address described in Paragraph 10 below, that the OWNER is considering declaring a Contractor Default and has requested and attempted to arrange a conference with the CONTRACTOR and the Surety to be held not later than fifteen days after receipt of such notice to discuss methods of performing the Construction Contract. If the OWNER, the CONTRACTOR and the Surety agree, the CONTRACTOR shall be allowed a reasonable time to perform the Construction Contract, but such an agreement shall not waive the OWNER's right, if any, subsequently to declare a Contractor Default; and

3.2 The OWNER has declared a Contractor Default and formally terminated the CONTRACTOR's right to complete the contract. Such Contractor Default shall not be declared earlier than twenty days after the CONTRACTOR and the Surety have received notice as provided in Subparagraph 3.1; and

3.3 The OWNER has agreed to pay the Balance of the Contract Price to the Surety in accordance with the terms of the Construction Contract or to a contractor selected to perform the Construction Contract in accordance with the terms of the contract with the OWNER.

4. When the OWNER has satisfied the conditions of Paragraph 3, the Surety shall promptly and at the Surety's expense take one of the following actions:

4.1 Arrange for the contractor, with consent of the OWNER, to perform and complete the Construction Contract; or

4.2 Undertake to perform and complete the Construction Contract itself, through its agents or through independent contractors; or

4.3 Obtain bids or negotiated proposals from qualified contractors acceptable to the OWNER for a contract for performance and completion of the Construction Contract, arrange for a contract to be prepared for execution by the OWNER and the contractor selected with the OWNER's concurrence, to be secured with performance and payment bonds executed by a qualified surety equivalent to the bonds issued on the Construction Contract, and pay to the OWNER the amount of damages as described in Paragraph 6 in excess of the Balance of the Contract Price incurred by the OWNER resulting from the CONTRACTOR's default; or

4.4 Waive its right to perform and complete, arrange for completion, or obtain a new contractor and with reasonable promptness under the circumstances:

1. After investigation, determine the amount for which it may be liable to the OWNER and, as soon as practicable after the amount is determined, tender payment therefor to the OWNER; or

2. Deny liability in whole or in part and notify the OWNER citing reasons therefor.

5. If the Surety does not proceed as provided in Paragraph 4 with reasonable promptness, the Surety shall be deemed to be in default on this Bond fifteen days after receipt of an additional written notice from the OWNER to the Surety demanding that the Surety perform its obligations under this Bond, and the OWNER shall be entitled to enforce any remedy available to the OWNER. If the Surety proceeds as provided in Subparagraph 4.4 and the OWNER refuses the payment tendered or the Surety had denied liability, in whole or in part, without further notice the OWNER shall be entitled to enforce any remedy available to the OWNER.

6. After the OWNER has terminated the CONTRACTOR's right to complete the Construction Contract, and if the Surety elects to act under Subparagraph 4.1, 4.2, or 4.3 above, then the responsibilities of the Surety to the OWNER shall not be greater than those of the CONTRACTOR under the Construction Contract, and the responsibilities of the OWNER to the Surety shall not be greater than those of the OWNER under the Construction Contract. To the limit of the amount of this Bond, but subject to commitment by the OWNER of the Balance of the Contract Price to mitigation of costs and damages on the Construction Contract, the Surety is obligated without duplication for:

6.1 The responsibilities of the CONTRACTOR for correction of defective work and completion of the Construction Contract;

6.2 Additional legal, design professional and delay costs resulting from the Contractor's Default, and resulting from the actions or failure to act of the Surety under Paragraph 4; and

6.3 Liquidated damages, or if no liquidated damages are specified in the Construction Contract, actual damages caused by delayed performance or non-performance of the CONTRACTOR.

7. The Surety shall not be liable to the OWNER or others for obligations of the CONTRACTOR that are unrelated to the Construction Contract, and the Balance of the Contract Price shall not be reduced or set off on account of any such unrelated obligations. No right of action shall accrue on this Bond to any person or entity other than the OWNER or its heirs, executors, administrators, or successors.

8. The Surety hereby waives notice of any change, including changes of time, to the Construction Contract or to related subcontracts, purchase orders and other obligations.

9. Any proceeding, legal or equitable, under this Bond may be instituted in any court of competent jurisdiction in the location in which the work or part of the work is located and shall be instituted within two years after Contractor Default or within two years after the CONTRACTOR ceased working or within two years after the Surety refuses or fails to perform its obligations under this Bond, whichever occurs first. If the provisions of this Paragraph are void or prohibited by law, the minimum period of limitation available to sureties as a defense in the jurisdiction of the suit shall be applicable.

10. Notice to the Surety, the OWNER or the CONTRACTOR shall be mailed or delivered to the address shown on the signature page.

11. When this Bond has been furnished to comply with a statutory or other legal requirement in the location where the construction was to be performed, any provision in this Bond conflicting with said statutory or legal requirement shall be deemed deleted herefrom and provisions conforming to such statutory or other legal requirement shall be deemed incorporated herein. The intent is that this Bond shall be construed as a statutory bond and not as a common law bond.

12. Definitions.

12.1 Balance of the Contract Price: The total amount payable by the OWNER to the CONTRACTOR under the Construction Contract after all proper adjustments have been made, including allowance to the CONTRACTOR of any amount received or to be received by the OWNER in settlement of insurance or other claims for damages to which the CONTRACTOR is entitled, reduced by all valid and proper payments made to or on behalf of the CONTRACTOR under the Construction Contract.

12.2 Construction Contract: The agreement between the OWNER and the CONTRACTOR identified on the signature page, including all Contract Documents and changes thereto.

12.3 Contractor Default: Failure of the CONTRACTOR, which has neither been remedied nor waived, to perform or otherwise to comply with the terms of the Construction Contract.

12.4 Owner Default: Failure of the OWNER, which has neither been remedied nor waived, to pay the CONTRACTOR as required by the Construction Contract or to perform and complete or comply with the other terms thereof.

(FOR INFORMATION ONLY - Name, Address and Telephone)
AGENT or BROKER:

OWNER's REPRESENTATIVE (Architect, Professional or other party):

END OF SECTION

SECTION 00620

CONSTRUCTION PAYMENT BOND

Any singular reference to CONTRACTOR, Surety, OWNER, or other party shall be considered plural where applicable.

CONTRACTOR (Name and Address):

SURETY (Name and Address of Principal Place of Business):

OWNER (Name and Address):

CONTRACT
Date:
Amount:
Description (Name and Location):

BOND
Bond Number:
Date (Not earlier than Contract Date):
Amount:
Modifications to this Bond Form:

Surety and CONTRACTOR, intending to be legally bound hereby, subject to the terms printed on the reverse side hereof, do each cause this Payment Bond to be duly executed on its behalf by its authorized officer, agent, or representative.

CONTRACTOR AS PRINCIPAL
Company:

Signature: _____ (Seal)
Name and Title:

SURETY

_____ (Seal)
Surety's Name and Corporate Seal

By: _____
Signature and Title
(Attach Power of Attorney)

(Space is provided below for signatures of additional parties, if required.)

Attest: _____
Signature and Title

CONTRACTOR AS PRINCIPAL
Company:

Signature: _____ (Seal)
Name and Title:

SURETY

_____ (Seal)
Surety's Name and Corporate Seal

By: _____
Signature and Title
(Attach Power of Attorney)

Attest: _____
Signature and Title:

1. CONTRACTOR and Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors, and assigns to OWNER to pay for labor, materials, and equipment furnished by Claimants for use in the performance of the Contract, which is incorporated herein by reference.

2. With respect to OWNER, this obligation shall be null and void if CONTRACTOR:

2.1. Promptly makes payment, directly or indirectly, for all sums due Claimants, and

2.2. Defends, indemnifies, and holds harmless OWNER from all claims, demands, liens, or suits alleging non-payment by CONTRACTOR by any person or entity who furnished labor, materials, or equipment for use in the performance of the Contract, provided OWNER has promptly notified CONTRACTOR and Surety (at the addresses described in Paragraph 12) of any claims, demands, liens, or suits and tendered defense of such claims, demands, liens, or suits to CONTRACTOR and Surety, and provided there is no Owner Default.

3. With respect to Claimants, this obligation shall be null and void if CONTRACTOR promptly makes payment, directly or indirectly, for all sums due.

4. Surety shall have no obligation to Claimants under this Bond until:

4.1. Claimants who are employed by or have a direct contract with CONTRACTOR have given notice to Surety (at the addresses described in Paragraph 12) and sent a copy, or notice thereof, to OWNER, stating that a claim is being made under this Bond and, with substantial accuracy, the amount of the claim.

4.2. Claimants who do not have a direct contract with CONTRACTOR:

1. Have furnished written notice to CONTRACTOR and sent a copy, or notice thereof, to OWNER, within 90 days after having last performed labor or last furnished materials or equipment included in the claim stating, with substantial accuracy, the amount of the claim and the name of the party to whom the materials or equipment were furnished or supplied, or for whom the labor was done or performed; and

2. Have either received a rejection in whole or in part from CONTRACTOR, or not received within 30 days of furnishing the above notice any communication from CONTRACTOR by which CONTRACTOR had indicated the claim will be paid directly or indirectly; and

3. Not having been paid within the above 30 days, have sent a written notice to Surety and sent a copy, or notice thereof, to OWNER, stating that a claim is being made under this Bond and enclosing a copy of the previous written notice furnished to CONTRACTOR.

5. If a notice by a Claimant required by Paragraph 4 is provided by OWNER to CONTRACTOR or to Surety, that is sufficient compliance.

6. When a Claimant has satisfied the conditions of Paragraph 4, the Surety shall promptly and at Surety's expense take the following actions:

6.1. Send an answer to that Claimant, with a copy to OWNER, within 45 days after receipt of the claim, stating the amounts that are undisputed and the basis for challenging any amounts that are disputed.

6.2. Pay or arrange for payment of any undisputed amounts.

7. Surety's total obligation shall not exceed the amount of this Bond, and the amount of this Bond shall be credited for any payments made in good faith by Surety.

8. Amounts owed by OWNER to CONTRACTOR under the Contract shall be used for the performance of the Contract and to satisfy claims, if any, under any performance bond. By CONTRACTOR furnishing and OWNER accepting this Bond, they agree that all funds earned by CONTRACTOR in the performance of the Contract are dedicated to satisfy obligations of CONTRACTOR and Surety under this Bond, subject to OWNER's priority to use the funds for the completion of the Work.

9. Surety shall not be liable to OWNER, Claimants, or others for obligations of CONTRACTOR that are unrelated to the Contract. OWNER shall not be liable for payment of any costs or expenses of any Claimant under this Bond, and shall have under this Bond no obligations to make payments to, give notices on behalf of, or otherwise have obligations to Claimants under this Bond.

10. Surety hereby waives notice of any change, including changes of time, to the Contract or to related Subcontracts, purchase orders and other obligations.

11. No suit or action shall be commenced by a Claimant under this Bond other than in a court of competent jurisdiction in the location in which the Work or part of the Work is located or after the expiration of one year from the date (1) on which the Claimant gave the notice required by Paragraph 4.1 or Paragraph 4.2.3, or (2) on which the last labor or service was performed by anyone or the last materials or equipment were furnished by anyone under the Construction Contract, whichever of (1) or (2) first occurs. If the provisions of this paragraph are void or prohibited by law, the minimum period of limitation available to sureties as a defense in the jurisdiction of the suit shall be applicable.

12. Notice to Surety, OWNER, or CONTRACTOR shall be mailed or delivered to the addresses shown on the signature page. Actual receipt of notice by Surety, OWNER, or CONTRACTOR, however accomplished, shall be sufficient compliance as of the date received at the address shown on the signature page.

13. When this Bond has been furnished to comply with a statutory requirement in the location where the Contract was to be performed, any provision in this Bond conflicting with said statutory requirement shall be deemed deleted herefrom and provisions conforming to such statutory requirement shall be deemed incorporated herein. The intent is that this Bond shall be construed as a statutory Bond and not as a common law bond.

14. Upon request of any person or entity appearing to be a potential beneficiary of this Bond, CONTRACTOR shall promptly furnish a copy of this Bond or shall permit a copy to be made.

15. Definitions.

15.1. Claimant: An individual or entity having a direct contract with CONTRACTOR, or with a first-tier subcontractor of CONTRACTOR, to furnish labor, materials, or equipment for use in the performance of the Contract. The intent of this Bond shall be to include without limitation in the terms "labor, materials or equipment" that part of water, gas, power, light, heat, oil, gasoline, telephone service, or rental equipment used in the Contract, architectural and engineering services required for performance of the Work of CONTRACTOR and CONTRACTOR's subcontractors, and all other items for which a mechanic's lien may be asserted in the jurisdiction where the labor, materials, or equipment were furnished.

15.2. Contract: The agreement between OWNER and CONTRACTOR identified on the signature page, including all Contract Documents and changes thereto.

15.3. Owner Default: Failure of OWNER, which has neither been remedied nor waived, to pay CONTRACTOR as required by the Contract or to perform and complete or comply with the other terms thereof.

END OF SECTION

STANDARD
GENERAL CONDITIONS
OF THE
CONSTRUCTION CONTRACT

Prepared by

ENGINEERS JOINT CONTRACT DOCUMENTS COMMITTEE

and

Issued and Published Jointly By

ACEC
American Council of Engineering Companies

National Society of Professional Engineers
Professional Engineers in Private Practice

ASCE American Society of Civil Engineers

PROFESSIONAL ENGINEERS IN PRIVATE PRACTICE
a practice division of the
NATIONAL SOCIETY OF PROFESSIONAL ENGINEERS

AMERICAN COUNCIL OF ENGINEERING COMPANIES

AMERICAN SOCIETY OF CIVIL ENGINEERS

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Knowledge for Creating and Sustaining the Built Environment

Construction Specifications Institute

National Society of Professional Engineers
1420 King Street, Alexandria, VA 22314

American Council of Engineering Companies
1015 15th Street, N.W., Washington, DC 20005

American Society of Civil Engineers
1801 Alexander Bell Drive, Reston, VA 20191-4400

These General Conditions have been prepared for use with the Suggested Forms of Agreement Between Owner and Contractor Nos. C-520 or C-525 (2002 Editions). Their provisions are interrelated and a change in one may necessitate a change in the other. Comments concerning their usage are contained in the EJCDC Construction Documents, General and Instructions (No. C-001) (2002 Edition). For guidance in the preparation of Supplementary Conditions, see Guide to the Preparation of Supplementary Conditions (No. C-800) (2002 Edition).

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GENERAL CONDITIONS

ARTICLE 1 - DEFINITIONS AND TERMINOLOGY

1.01 *Defined Terms*

A. Wherever used in the Bidding Requirements or Contract Documents and printed with initial capital letters, the terms listed below will have the meanings indicated which are applicable to both the singular and plural thereof. In addition to terms specifically defined, terms with initial capital letters in the Contract Documents include references to identified articles and paragraphs, and the titles of other documents or forms.

1. *Addenda*--Written or graphic instruments issued prior to the opening of Bids which clarify, correct, or change the Bidding Requirements or the proposed Contract Documents.

2. *Agreement*--The written instrument which is evidence of the agreement between Owner and Contractor covering the Work.

3. *Application for Payment*--The form acceptable to Engineer which is to be used by Contractor during the course of the Work in requesting progress or final payments and which is to be accompanied by such supporting documentation as is required by the Contract Documents.

4. *Asbestos*--Any material that contains more than one percent asbestos and is friable or is releasing asbestos fibers into the air above current action levels established by the United States Occupational Safety and Health Administration.

5. *Bid*--The offer or proposal of a Bidder submitted on the prescribed form setting forth the prices for the Work to be performed.

6. *Bidder*--The individual or entity who submits a Bid directly to Owner.

7. *Bidding Documents*--The Bidding Requirements and the proposed Contract Documents (including all Addenda).

8. *Bidding Requirements*--The Advertisement or Invitation to Bid, Instructions to Bidders, bid security of acceptable form, if any, and the Bid Form with any supplements.

9. *Change Order*--A document recommended by Engineer which is signed by Contractor and Owner and authorizes an addition, deletion, or revision in the Work or an adjustment in the Contract Price or the Contract Times, issued on or after the Effective Date of the Agreement.

10. *Claim*--A demand or assertion by Owner or Contractor seeking an adjustment of Contract Price or Contract Times, or both, or other relief with respect to the terms of the Contract. A demand for money or services by a third party is not a Claim.

11. *Contract*--The entire and integrated written agreement between the Owner and Contractor concerning the Work. The Contract supersedes prior negotiations, representations, or agreements, whether written or oral.

12. *Contract Documents*-- Those items so designated in the Agreement. Only printed or hard copies of the items listed in the Agreement are Contract Documents. Approved Shop Drawings, other Contractor's submittals, and the reports and drawings of subsurface and physical conditions are not Contract Documents.

13. *Contract Price*--The moneys payable by Owner to Contractor for completion of the Work in accordance with the Contract Documents as stated in the Agreement (subject to the provisions of Paragraph 11.03 in the case of Unit Price Work).

14. *Contract Times*--The number of days or the dates stated in the Agreement to: (i) achieve Milestones, if any, (ii) achieve Substantial Completion; and (iii) complete the Work so that it is ready for final payment as evidenced by Engineer's written recommendation of final payment.

15. *Contractor*--The individual or entity with whom Owner has entered into the Agreement.

16. *Cost of the Work*--See Paragraph 11.01.A for definition.

17. *Drawings*--That part of the Contract Documents prepared or approved by Engineer which graphically shows the scope, extent, and character of the Work to be performed by Contractor. Shop Drawings and other Contractor submittals are not Drawings as so defined.

18. *Effective Date of the Agreement*--The date indicated in the Agreement on which it becomes effective, but if no such date is indicated, it means the date on which the Agreement is signed and delivered by the last of the two parties to sign and deliver.

19. *Engineer*--The individual or entity named as such in the Agreement.

20. *Field Order*--A written order issued by Engineer which requires minor changes in the Work but which does not involve a change in the Contract Price or the Contract Times.

21. *General Requirements*--Sections of Division 1 of the Specifications. The General Requirements pertain to all sections of the Specifications.

22. *Hazardous Environmental Condition*--The presence at the Site of Asbestos, PCBs, Petroleum, Hazardous Waste, or Radioactive Material in such quantities or circumstances that may present a substantial danger to persons or property exposed thereto in connection with the Work.

23. *Hazardous Waste*--The term Hazardous Waste shall have the meaning provided in Section 1004 of the Solid Waste Disposal Act (42 USC Section 6903) as amended from time to time.

24. *Laws and Regulations; Laws or Regulations*--Any and all applicable laws, rules, regulations, ordinances, codes, and orders of any and all governmental bodies, agencies, authorities, and courts having jurisdiction.

25. *Liens*--Charges, security interests, or encumbrances upon Project funds, real property, or personal property.

26. *Milestone*--A principal event specified in the Contract Documents relating to an intermediate completion date or time prior to Substantial Completion of all the Work.

27. *Notice of Award*--The written notice by Owner to the Successful Bidder stating that upon timely compliance by the Successful Bidder with the conditions precedent listed therein, Owner will sign and deliver the Agreement.

28. *Notice to Proceed*--A written notice given by Owner to Contractor fixing the date on which the Contract Times will commence to run and on which Contractor shall start to perform the Work under the Contract Documents.

29. *Owner*--The individual or entity with whom Contractor has entered into the Agreement and for whom the Work is to be performed.

30. *PCBs*--Polychlorinated biphenyls.

31. *Petroleum*--Petroleum, including crude oil or any fraction thereof which is liquid at standard conditions of temperature and pressure (60 degrees Fahrenheit and 14.7 pounds per square inch absolute), such as oil, petroleum, fuel oil, oil sludge, oil refuse, gasoline, kerosene, and oil mixed with other non-Hazardous Waste and crude oils.

32. *Progress Schedule*--A schedule, prepared and maintained by Contractor, describing the sequence and duration of the activities comprising the Contractor's plan to accomplish the Work within the Contract Times.

33. *Project*--The total construction of which the Work to be performed under the Contract Documents may be the whole, or a part.

34. *Project Manual*--The bound documentary information prepared for bidding and constructing the Work. A listing of the contents of the Project Manual, which may be bound in one or more volumes, is contained in the table(s) of contents.

35. *Radioactive Material*--Source, special nuclear, or byproduct material as defined by the Atomic Energy Act of 1954 (42 USC Section 2011 et seq.) as amended from time to time.

36. *Related Entity* -- An officer, director, partner, employee, agent, consultant, or subcontractor.

37. *Resident Project Representative*--The authorized representative of Engineer who may be assigned to the Site or any part thereof.

38. *Samples*--Physical examples of materials, equipment, or workmanship that are representative of some portion of the Work and which establish the standards by which such portion of the Work will be judged.

39. *Schedule of Submittals*--A schedule, prepared and maintained by Contractor, of required submittals and the time requirements to support scheduled performance of related construction activities.

40. *Schedule of Values*--A schedule, prepared and maintained by Contractor, allocating portions of the Contract Price to various portions of the Work and used as the basis for reviewing Contractor's Applications for Payment.

41. *Shop Drawings*--All drawings, diagrams, illustrations, schedules, and other data or information which are specifically prepared or assembled by or for Contractor and submitted by Contractor to illustrate some portion of the Work.

42. *Site*--Lands or areas indicated in the Contract Documents as being furnished by Owner upon which the Work is to be performed, including rights-of-way and easements for access thereto, and such other lands furnished by Owner which are designated for the use of Contractor.

43. *Specifications*--That part of the Contract Documents consisting of written requirements for materials, equipment, systems, standards and workmanship as applied to the Work, and certain

administrative requirements and procedural matters applicable thereto.

44. *Subcontractor*--An individual or entity having a direct contract with Contractor or with any other Subcontractor for the performance of a part of the Work at the Site.

45. *Substantial Completion*--The time at which the Work (or a specified part thereof) has progressed to the point where, in the opinion of Engineer, the Work (or a specified part thereof) is sufficiently complete, in accordance with the Contract Documents, so that the Work (or a specified part thereof) can be utilized for the purposes for which it is intended. The terms "substantially complete" and "substantially completed" as applied to all or part of the Work refer to Substantial Completion thereof.

46. *Successful Bidder*--The Bidder submitting a responsive Bid to whom Owner makes an award.

47. *Supplementary Conditions*--That part of the Contract Documents which amends or supplements these General Conditions.

48. *Supplier*--A manufacturer, fabricator, supplier, distributor, materialman, or vendor having a direct contract with Contractor or with any Subcontractor to furnish materials or equipment to be incorporated in the Work by Contractor or any Subcontractor.

49. *Underground Facilities*--All underground pipelines, conduits, ducts, cables, wires, manholes, vaults, tanks, tunnels, or other such facilities or attachments, and any encasements containing such facilities, including those that convey electricity, gases, steam, liquid petroleum products, telephone or other communications, cable television, water, wastewater, storm water, other liquids or chemicals, or traffic or other control systems.

50. *Unit Price Work*--Work to be paid for on the basis of unit prices.

51. *Work*--The entire construction or the various separately identifiable parts thereof required to be provided under the Contract Documents. Work includes and is the result of performing or providing all labor, services, and documentation necessary to produce such construction, and furnishing, installing, and incorporating all materials and equipment into such construction, all as required by the Contract Documents.

52. *Work Change Directive*--A written statement to Contractor issued on or after the Effective Date of the Agreement and signed by Owner and recommended by Engineer ordering an addition, deletion, or revision in the Work, or responding to differing or unforeseen subsurface or physical conditions under which the Work is to be performed or to emergencies. A Work Change Directive will not change the Contract Price or the Contract Times but is evidence that the parties expect that the change ordered or documented by a Work Change Directive will be incorporated in a subsequently issued Change Order following negotiations by the parties as to its effect, if any, on the Contract Price or Contract Times.

1.02 *Terminology*

A. The following words or terms are not defined but, when used in the Bidding Requirements or Contract Documents, have the following meaning.

B. *Intent of Certain Terms or Adjectives*

1. The Contract Documents include the terms "as allowed," "as approved," "as ordered", "as directed" or terms of like effect or import to authorize an exercise of professional judgment by Engineer. In addition, the adjectives "reasonable," "suitable," "acceptable," "proper," "satisfactory," or adjectives of like effect or import are used to describe an action or determination of Engineer as to the Work. It is intended that such exercise of professional judgment, action or determination will be solely to evaluate, in general, the Work for compliance with the requirements of and information in the Contract Documents and conformance with the design concept of the completed Project as a functioning whole as shown or indicated in the Contract Documents (unless there is a specific statement indicating otherwise). The use of any such term or adjective is not intended to and shall not be effective to assign to Engineer any duty or authority to supervise or direct the performance of the Work or any duty or authority to undertake responsibility contrary to the provisions of Paragraph 9.09 or any other provision of the Contract Documents.

C. *Day*

1. The word "day" means a calendar day of 24 hours measured from midnight to the next midnight.

D. *Defective*

1. The word "defective," when modifying the word "Work," refers to Work that is unsatisfactory, faulty, or deficient in that it:

a. does not conform to the Contract Documents, or

b. does not meet the requirements of any applicable inspection, reference standard, test, or approval referred to in the Contract Documents, or

c. has been damaged prior to Engineer's - recommendation of final payment (unless responsibility for the protection thereof has been assumed by Owner at Substantial Completion in accordance with Paragraph 14.04 or 14.05).

E. *Furnish, Install, Perform, Provide*

1. The word "furnish," when used in connection with services, materials, or equipment, shall mean to supply and deliver said services, materials, or equipment to the Site (or some other specified location) ready for use or installation and in usable or operable condition.

2. The word "install," when used in connection with services, materials, or equipment, shall mean to put into use or place in final position said services, materials, or equipment complete and ready for intended use.

3. The words "perform" or "provide," when used in connection with services, materials, or equipment, shall mean to furnish and install said services, materials, or equipment complete and ready for intended use.

4. When "furnish," "install," "perform," or "provide" is not used in connection with services, materials, or equipment in a context clearly requiring an obligation of Contractor, "provide" is implied.

F. Unless stated otherwise in the Contract Documents, words or phrases which have a well-known technical or construction industry or trade meaning are used in the Contract Documents in accordance with such recognized meaning.

ARTICLE 2 - PRELIMINARY MATTERS

2.01 *Delivery of Bonds and Evidence of Insurance*

A. When Contractor delivers the executed counterparts of the Agreement to Owner, Contractor shall also deliver to Owner such bonds as Contractor may be required to furnish.

B. *Evidence of Insurance:* Before any Work at the Site is started, Contractor and Owner shall each deliver to the other, with copies to each additional insured identified in the Supplementary Conditions, certificates of insurance (and other evidence of insurance which either of them or any additional insured may reasonably request) which Contractor and Owner respectively are required to purchase and maintain in accordance with Article 5.

2.02 *Copies of Documents*

A. Owner shall furnish to Contractor up to ten printed or hard copies of the Drawings and Project Manual. Additional copies will be furnished upon request at the cost of reproduction.

2.03 *Commencement of Contract Times; Notice to Proceed*

A. The Contract Times will commence to run on the thirtieth day after the Effective Date of the Agreement or, if a Notice to Proceed is given, on the day indicated in the Notice to Proceed. A Notice to Proceed may be given at any time within 30 days after the Effective Date of the Agreement. In no event will the Contract Times commence to run later than the sixtieth day after the day of Bid opening or the thirtieth day after the Effective Date of the Agreement, whichever date is earlier.

2.04 *Starting the Work*

A. Contractor shall start to perform the Work on the date when the Contract Times commence to run. No Work shall be done at the Site prior to the date on which the Contract Times commence to run.

2.05 *Before Starting Construction*

A. *Preliminary Schedules:* Within 10 days after the Effective Date of the Agreement (unless otherwise specified in the General Requirements), Contractor shall submit to Engineer for timely review**:**

1. a preliminary Progress Schedule; indicating the times (numbers of days or dates) for starting and completing the various stages of the Work, including any Milestones specified in the Contract Documents;

2. a preliminary Schedule of Submittals; and

3. a preliminary Schedule of Values for all of the Work which includes quantities and prices of items which when added together equal the Contract Price and subdivides the Work into component parts in sufficient detail to serve as the basis for progress payments during performance of the Work. Such prices will include an appropriate amount of overhead and profit applicable to each item of Work.

2.06 *Preconstruction Conference*

A. Before any Work at the Site is started, a conference attended by Owner, Contractor, Engineer, and others as appropriate will be held to establish a working understanding among the parties as to the Work and to discuss the schedules referred to in Paragraph 2.05.A, procedures for handling Shop Drawings and other submittals, processing Applications for Payment, and maintaining required records.

2.07 *Initial Acceptance of Schedules*

A. At least 10 days before submission of the first Application for Payment a conference attended by Contractor, Engineer, and others as appropriate will be held to review for acceptability to Engineer as provided below the schedules submitted in accordance with Paragraph 2.05.A. Contractor shall have an additional 10 days to make corrections and adjustments and to complete and resubmit the schedules. No progress payment shall be made to Contractor until acceptable schedules are submitted to Engineer.

1. The Progress Schedule will be acceptable to Engineer if it provides an orderly progression of the Work to completion within the Contract Times. Such acceptance will not impose on Engineer responsibility for the Progress Schedule, for sequencing, scheduling, or progress of the Work nor interfere with or relieve Contractor from Contractor's full responsibility therefor.

2. Contractor's Schedule of Submittals will be acceptable to Engineer if it provides a workable arrangement for reviewing and processing the required submittals.

3. Contractor's Schedule of Values will be acceptable to Engineer as to form and substance if it provides a reasonable allocation of the Contract Price to component parts of the Work.

ARTICLE 3 - CONTRACT DOCUMENTS: INTENT, AMENDING, REUSE

3.01 *Intent*

A. The Contract Documents are complementary; what is required by one is as binding as if required by all.

B. It is the intent of the Contract Documents to describe a functionally complete Project (or part thereof) to be constructed in accordance with the Contract Documents. Any labor, documentation, services, materials, or equipment that may reasonably be inferred from the Contract Documents or from prevailing custom or trade usage as being required to produce the intended result will be provided whether or not specifically called for at no additional cost to Owner.

C. Clarifications and interpretations of the Contract Documents shall be issued by Engineer as provided in Article 9.

3.02 *Reference Standards*

A. Standards, Specifications, Codes, Laws, and Regulations

1. Reference to standards, specifications, manuals, or codes of any technical society, organization, or association, or to Laws or Regulations, whether such reference be specific or by implication, shall mean the standard, specification, manual, code, or Laws or Regulations in effect at the time of opening of Bids (or on the Effective Date of the Agreement if there were no Bids), except as may be otherwise specifically stated in the Contract Documents.

2. No provision of any such standard, specification, manual or code, or any instruction of a Supplier shall be effective to change the duties or responsibilities of Owner, Contractor, or Engineer, or any of their subcontractors, consultants, agents, or employees from those set forth in the Contract Documents. No such provision or instruction shall be effective to assign to Owner, or Engineer, or any of, their Related Entities, any duty or authority to supervise or direct the performance of the Work or any duty or authority to undertake responsibility inconsistent with the provisions of the Contract Documents.

3.03 *Reporting and Resolving Discrepancies*

A. Reporting Discrepancies

1. *Contractor's Review of Contract Documents Before Starting Work*: Before undertaking each part of the Work, Contractor shall carefully study and compare the Contract Documents and check and verify pertinent figures therein and all applicable field measurements. Contractor shall promptly report in writing to Engineer any conflict, error, ambiguity, or discrepancy which Contractor may discover and shall obtain a written interpretation or clarification from Engineer before proceeding with any Work affected thereby.

2. *Contractor's Review of Contract Documents During Performance of Work*: If, during the performance of the Work, Contractor discovers any conflict, error, ambiguity, or discrepancy within the Contract Documents or between the Contract Documents and any provision of any Law or Regulation applicable to the performance of the Work or of any standard, specification, manual or code, or of any instruction of any Supplier, Contractor shall promptly report it to Engineer in writing. Contractor shall not proceed with the Work affected thereby (except in an emergency as required by Paragraph 6.16.A) until an amendment or supplement to the Contract Documents has been issued by one of the methods indicated in Paragraph 3.04.

3. Contractor shall not be liable to Owner or Engineer for failure to report any conflict, error, ambiguity, or discrepancy in the Contract Documents unless Contractor knew or reasonably should have known thereof.

B. Resolving Discrepancies

1. Except as may be otherwise specifically stated in the Contract Documents, the provisions of the Contract Documents shall take precedence in resolving any conflict, error, ambiguity, or discrepancy between the provisions of the Contract Documents and:

a. the provisions of any standard, specification, manual, code, or instruction (whether or not specifically incorporated by reference in the Contract Documents); or

b. the provisions of any Laws or Regulations applicable to the performance of the Work

(unless such an interpretation of the provisions of the Contract Documents would result in violation of such Law or Regulation).

3.04 *Amending and Supplementing Contract Documents*

A. The Contract Documents may be amended to provide for additions, deletions, and revisions in the Work or to modify the terms and conditions thereof by either a Change Order or a Work Change Directive.

B. The requirements of the Contract Documents may be supplemented, and minor variations and deviations in the Work may be authorized, by one or more of the following ways:

1. A Field Order;

2. Engineer's approval of a Shop Drawing or Sample; (Subject to the provisions of Paragraph 6.17.D.3); or

3. Engineer's written interpretation or clarification.

3.05 *Reuse of Documents*

A. Contractor and any Subcontractor or Supplier or other individual or entity performing or furnishing all of the Work under a direct or indirect contract with Contractor, shall not:

1. have or acquire any title to or ownership rights in any of the Drawings, Specifications, or other documents (or copies of any thereof) prepared by or bearing the seal of Engineer or Engineer's consultants, including electronic media editions; or

2. reuse any of such Drawings, Specifications, other documents, or copies thereof on extensions of the Project or any other project without written consent of Owner and Engineer and specific written verification or adaption by Engineer.

B. The prohibition of this Paragraph 3.05 will survive final payment, or termination of the Contract. Nothing herein shall preclude Contractor from retaining copies of the Contract Documents for record purposes.

3.06 *Electronic Data*

A. Copies of data furnished by Owner or Engineer to Contractor or Contractor to Owner or Engineer that may be relied upon are limited to the printed copies (also known as hard copies). Files in electronic media format of text, data, graphics, or other types are furnished only for the convenience of the receiving party. Any conclusion or information obtained or derived from such electronic files will be at the user's sole risk. If there is a discrepancy between the electronic files and the hard copies, the hard copies govern.

B. Because data stored in electronic media format can deteriorate or be modified inadvertently or otherwise without authorization of the data's creator, the party receiving electronic files agrees that it will perform acceptance tests or procedures within 60 days, after which the receiving party shall be deemed to have accepted the data thus transferred. Any errors detected within the 60-day acceptance period will be corrected by the transferring party..

C. When transferring documents in electronic media format, the transferring party makes no representations as to long term compatibility, usability, or readability of documents resulting from the use of software application packages, operating systems, or computer hardware differing from those used by the data's creator.

ARTICLE 4 - AVAILABILITY OF LANDS; SUBSURFACE AND PHYSICAL CONDITIONS; HAZARDOUS ENVIRONMENTAL CONDITIONS; REFERENCE POINTS

4.01 *Availability of Lands*

A. Owner shall furnish the Site. Owner shall notify Contractor of any encumbrances or restrictions not of general application but specifically related to use of the Site with which Contractor must comply in performing the Work. Owner will obtain in a timely manner and pay for easements for permanent structures or permanent changes in existing facilities. If Contractor and Owner are unable to agree on entitlement to or on the amount or extent, if any, of any adjustment in the Contract Price or Contract Times, or both, as a result of any delay in Owner's furnishing the Site or a part thereof, Contractor may make a Claim therefor as provided in Paragraph 10.05.

B. Upon reasonable written request, Owner shall furnish Contractor with a current statement of record legal title and legal description of the lands upon which the Work is to be performed and Owner's interest therein as necessary for giving notice of or filing a mechanic's or construction lien against such lands in accordance with applicable Laws and Regulations.

C. Contractor shall provide for all additional lands and access thereto that may be required for temporary construction facilities or storage of materials and equipment.

4.02 *Subsurface and Physical Conditions*

A. *Reports and Drawings:* The Supplementary Conditions identify:

1. those reports of explorations and tests of subsurface conditions at or contiguous to the Site that Engineer has used in preparing the Contract Documents; and

2. those drawings of physical conditions in or relating to existing surface or subsurface structures at or contiguous to the Site (except Underground Facilities) that Engineer has used in preparing the Contract Documents.

B. *Limited Reliance by Contractor on Technical Data Authorized:* Contractor may rely upon the general accuracy of the "technical data" contained in such reports and drawings, but such reports and drawings are not Contract Documents. Such "technical data" is identified in the Supplementary Conditions. Except for such reliance on such "technical data," Contractor may not rely upon or make any claim against Owner or Engineer, or any of their Related Entities with respect to:

1. the completeness of such reports and drawings for Contractor's purposes, including, but not limited to, any aspects of the means, methods, techniques, sequences, and procedures of construction to be employed by Contractor, and safety precautions and programs incident thereto; or

2. other data, interpretations, opinions, and information contained in such reports or shown or indicated in such drawings; or

3. any Contractor interpretation of or conclusion drawn from any "technical data" or any such other data, interpretations, opinions, or information.

4.03 *Differing Subsurface or Physical Conditions*

A. *Notice:* If Contractor believes that any subsurface or physical condition at or contiguous to the Site that is uncovered or revealed either:

1. is of such a nature as to establish that any "technical data" on which Contractor is entitled to rely as provided in Paragraph 4.02 is materially inaccurate; or

2. is of such a nature as to require a change in the Contract Documents; or

3. differs materially from that shown or indicated in the Contract Documents; or

4. is of an unusual nature, and differs materially from conditions ordinarily encountered and generally recognized as inherent in work of the character provided for in the Contract Documents;

then Contractor shall, promptly after becoming aware thereof and before further disturbing the subsurface or physical conditions or performing any Work in connection therewith (except in an emergency as required by Paragraph 6.16.A), notify Owner and Engineer in writing about such condition. Contractor shall not further disturb such condition or perform any Work in connection therewith (except as aforesaid) until receipt of written order to do so.

B. *Engineer's Review*: After receipt of written notice as required by Paragraph 4.03.A, Engineer will promptly review the pertinent condition, determine the necessity of Owner's obtaining additional exploration or tests with respect thereto, and advise Owner in writing (with a copy to Contractor) of Engineer's findings and conclusions.

C. Possible Price and Times Adjustments

1. The Contract Price or the Contract Times, or both, will be equitably adjusted to the extent that the existence of such differing subsurface or physical condition causes an increase or decrease in Contractor's cost of, or time required for, performance of the Work; subject, however, to the following:

a. such condition must meet any one or more of the categories described in Paragraph 4.03.A; and

b. with respect to Work that is paid for on a Unit Price Basis, any adjustment in Contract Price will be subject to the provisions of Paragraphs 9.07 and 11.03.

2. Contractor shall not be entitled to any adjustment in the Contract Price or Contract Times if:

a. Contractor knew of the existence of such conditions at the time Contractor made a final commitment to Owner with respect to Contract Price and Contract Times by the submission of a Bid or becoming bound under a negotiated contract; or

b. the existence of such condition could reasonably have been discovered or revealed as a result of any examination, investigation, exploration, test, or study of the Site and contiguous areas required by the Bidding Requirements or Contract Documents to be conducted by or for Contractor prior to Contractor's making such final commitment; or

c. Contractor failed to give the written notice as required by Paragraph 4.03.A.

3. If Owner and Contractor are unable to agree on entitlement to or on the amount or extent, if any, of any adjustment in the Contract Price or Contract Times, or both, a Claim may be made therefor as provided in Paragraph 10.05. However, Owner and Engineer, and any of their Related Entities shall not be liable to Contractor for any claims, costs, losses, or damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) sustained by Contractor on or in connection with any other project or anticipated project.

4.04 *Underground Facilities*

A. *Shown or Indicated:* The information and data shown or indicated in the Contract Documents with respect to existing Underground Facilities at or contiguous to the Site is based on information and data furnished to Owner or Engineer by the owners of such Underground Facilities, including Owner, or by others. Unless it is otherwise expressly provided in the Supplementary Conditions:

1. Owner and Engineer shall not be responsible for the accuracy or completeness of any such information or data; and

2. the cost of all of the following will be included in the Contract Price, and Contractor shall have full responsibility for:

a. reviewing and checking all such information and data,

b. locating all Underground Facilities shown or indicated in the Contract Documents,

c. coordination of the Work with the owners of such Underground Facilities, including Owner, during construction, and

d. the safety and protection of all such Underground Facilities and repairing any damage thereto resulting from the Work.

B. *Not Shown or Indicated*

1. If an Underground Facility is uncovered or revealed at or contiguous to the Site which was not shown or indicated, or not shown or indicated with reasonable accuracy in the Contract Documents, Contractor shall, promptly after becoming aware thereof and before further disturbing conditions affected thereby or performing any Work in connection therewith (except in an emergency as required by Paragraph 6.16.A), identify the owner of such Underground Facility and give written notice to that owner and to Owner and Engineer. Engineer will promptly review the Underground Facility and determine the extent, if any, to which a change is required in the Contract Documents to reflect and document the consequences of the existence or location of the Underground Facility. During such time, Contractor shall be responsible for the safety and protection of such Underground Facility.

2. If Engineer concludes that a change in the Contract Documents is required, a Work Change Directive or a Change Order will be issued to reflect and document such consequences. An equitable adjustment shall be made in the Contract Price or Contract Times, or both, to the extent that they are attributable to the existence or location of any Underground Facility that was not shown or indicated or not shown or indicated with reasonable accuracy in the Contract Documents and that Contractor did not know of and could not reasonably have been expected to be aware of or to have anticipated. If Owner and Contractor are unable to agree on entitlement to or on the amount or extent, if any, of any such adjustment in Contract Price or Contract Times, Owner or Contractor may make a Claim therefor as provided in Paragraph 10.05.

4.05 *Reference Points*

A. Owner shall provide engineering surveys to establish reference points for construction which in Engineer's judgment are necessary to enable Contractor to proceed with the Work. Contractor shall be responsible for laying out the Work, shall protect and preserve the established reference points and property monuments, and shall make no changes or relocations without the prior written approval of Owner. Contractor shall report to Engineer whenever any reference point or property monument is lost or destroyed or requires relocation because of necessary changes in grades or locations, and shall be responsible for the accurate replacement or relocation of such reference points or property monuments by professionally qualified personnel.

4.06 *Hazardous Environmental Condition at Site*

A. *Reports and Drawings:* Reference is made to the Supplementary Conditions for the identification of those reports and drawings relating to a Hazardous Environmental Condition identified at the Site, if any, that have been utilized by the Engineer in the preparation of the Contract Documents.

B. *Limited Reliance by Contractor on Technical Data Authorized:* Contractor may rely upon the general accuracy of the "technical data" contained in such reports and drawings, but such reports and drawings are not Contract Documents. Such "technical data" is identified in the Supplementary Conditions. Except for such reliance on such "technical data," Contractor may not rely upon or make any claim against Owner or Engineer, or any of their Related Entities with respect to:

1. the completeness of such reports and drawings for Contractor's purposes, including, but not limited to, any aspects of the means, methods, techniques, sequences and procedures of construction to be employed by Contractor and safety precautions and programs incident thereto; or

2. other data, interpretations, opinions and information contained in such reports or shown or indicated in such drawings; or

3. any Contractor interpretation of or conclusion drawn from any "technical data" or any such other data, interpretations, opinions or information.

C. Contractor shall not be responsible for any Hazardous Environmental Condition uncovered or revealed at the Site which was not shown or indicated in Drawings or Specifications or identified in the Contract Documents to be within the scope of the Work. Contractor shall be responsible for a Hazardous Environmental Condition created with any materials brought to the Site by Contractor, Subcontractors, Suppliers, or anyone else for whom Contractor is responsible.

D. If Contractor encounters a Hazardous Environmental Condition or if Contractor or anyone for whom Contractor is responsible creates a Hazardous Environmental Condition, Contractor shall immediately: (i) secure or otherwise isolate such condition; (ii) stop all Work in connection with such condition and in any area affected thereby (except in an emergency as required by Paragraph 6.16.A); and (iii) notify Owner and Engineer (and promptly thereafter confirm such notice in writing). Owner shall promptly consult with Engineer concerning the necessity for Owner to retain a qualified expert to evaluate such condition or take corrective action, if any.

E. Contractor shall not be required to resume Work in connection with such condition or in any affected area until after Owner has obtained any required permits related thereto and delivered to Contractor written notice: (i) specifying that such condition and any affected area is or has been rendered safe for the resumption of Work; or (ii) specifying any special conditions under which such Work may be resumed safely. If Owner and Contractor cannot agree as to entitlement to or on the amount or extent, if any, of any adjustment in Contract Price or Contract Times, or both, as a result of such Work stoppage or such special conditions under which Work is agreed to be resumed by Contractor, either party may make a Claim therefor as provided in Paragraph 10.05.

F. If after receipt of such written notice Contractor does not agree to resume such Work based on a reasonable belief it is unsafe, or does not agree to resume such Work under such special conditions, then Owner may order the portion of the Work that is in the area affected by such condition to be deleted from the Work. If Owner and Contractor cannot agree as to entitlement to or on the amount or extent, if any, of an adjustment in Contract Price or Contract Times as a result of deleting such portion of the Work, then either party may make a Claim therefor as provided in Paragraph 10.05. Owner may have such deleted portion of the Work performed by Owner's own forces or others in accordance with Article 7.

G. To the fullest extent permitted by Laws and Regulations, Owner shall indemnify and hold harmless Contractor, Subcontractors, and Engineer, and the officers, directors, partners, employees, agents, consultants, and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to a Hazardous Environmental Condition, provided that such Hazardous Environmental Condition: (i) was not shown or indicated in the Drawings or Specifications or identified in the Contract Documents to be included within the scope of the Work, and (ii) was not created by Contractor or by anyone for whom Contractor is responsible. Nothing in this Paragraph 4.06. G shall obligate Owner to indemnify any individual or entity from and against the consequences of that individual's or entity's own negligence.

H. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, partners, employees, agents, consultants, and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to a Hazardous Environmental Condition created by Contractor or by anyone for whom Contractor is responsible. Nothing in this Paragraph 4.06.H shall obligate Contractor to indemnify any individual or entity from and against the consequences of that individual's or entity's own negligence.

I. The provisions of Paragraphs 4.02, 4.03, and 4.04 do not apply to a Hazardous Environmental Condition uncovered or revealed at the Site.

ARTICLE 5 - BONDS AND INSURANCE

5.01 *Performance, Payment, and Other Bonds*

A. Contractor shall furnish performance and payment bonds, each in an amount at least equal to the Contract Price as security for the faithful performance and payment of all of Contractor's obligations under the Contract Documents. These bonds shall remain in effect until one year after the date when final payment becomes due or until completion of the correction period specified

in Paragraph 13.07, whichever is later, except as provided otherwise by Laws or Regulations or by the Contract Documents. Contractor shall also furnish such other bonds as are required by the Contract Documents.

B. All bonds shall be in the form prescribed by the Contract Documents except as provided otherwise by Laws or Regulations, and shall be executed by such sureties as are named in the current list of "Companies Holding Certificates of Authority as Acceptable Sureties on Federal Bonds and as Acceptable Reinsuring Companies" as published in Circular 570 (amended) by the Financial Management Service, Surety Bond Branch, U.S. Department of the Treasury. All bonds signed by an agent must be accompanied by a certified copy of the agent's authority to act.

C. If the surety on any bond furnished by Contractor is declared bankrupt or becomes insolvent or its right to do business is terminated in any state where any part of the Project is located or it ceases to meet the requirements of Paragraph 5.01.B, Contractor shall promptly notify Owner and Engineer and shall, within 20 days after the event giving rise to such notification, provide another bond and surety, both of which shall comply with the requirements of Paragraphs 5.01.B and 5.02.

5.02 *Licensed Sureties and Insurers*

A. All bonds and insurance required by the Contract Documents to be purchased and maintained by Owner or Contractor shall be obtained from surety or insurance companies that are duly licensed or authorized in the jurisdiction in which the Project is located to issue bonds or insurance policies for the limits and coverages so required. Such surety and insurance companies shall also meet such additional requirements and qualifications as may be provided in the Supplementary Conditions.

5.03 *Certificates of Insurance*

A. Contractor shall deliver to Owner, with copies to each additional insured identified in the Supplementary Conditions, certificates of insurance (and other evidence of insurance requested by Owner or any other additional insured) which Contractor is required to purchase and maintain.

B. Owner shall deliver to Contractor, with copies to each additional insured identified in the Supplementary Conditions, certificates of insurance (and other evidence of insurance requested by Contractor or any other additional insured) which Owner is required to purchase and maintain.

5.04 *Contractor's Liability Insurance*

A. Contractor shall purchase and maintain such liability and other insurance as is appropriate for the Work being performed and as will provide protection from claims set forth below which may arise out of or result from Contractor's performance of the Work and Contractor's other obligations under the Contract Documents, whether it is to be performed by Contractor, any Subcontractor or Supplier, or by anyone directly or indirectly employed by any of them to perform any of the Work, or by anyone for whose acts any of them may be liable:

1. claims under workers' compensation, disability benefits, and other similar employee benefit acts;

2. claims for damages because of bodily injury, occupational sickness or disease, or death of Contractor's employees;

3. claims for damages because of bodily injury, sickness or disease, or death of any person other than Contractor's employees;

4. claims for damages insured by reasonably available personal injury liability coverage which are sustained:

   a. by any person as a result of an offense directly or indirectly related to the employment of such person by Contractor, or

   b. by any other person for any other reason;

5. claims for damages, other than to the Work itself, because of injury to or destruction of tangible property wherever located, including loss of use resulting therefrom; and

6. claims for damages because of bodily injury or death of any person or property damage arising out of the ownership, maintenance or use of any motor vehicle.

B. The policies of insurance required by this Paragraph 5.04 shall:

1. with respect to insurance required by Paragraphs 5.04.A.3 through 5.04.A.6 inclusive, include as additional insured (subject to any customary exclusion regarding professional liability) Owner and Engineer, and any other individuals or entities identified in the Supplementary Conditions, all of whom shall be listed as additional insureds, and include coverage for the respective officers, directors, partners, employees, agents, consultants and subcontractors of each and any of all such additional insureds, and the insurance afforded to these additional insureds shall provide primary coverage for all claims covered thereby;

2. include at least the specific coverages and be written for not less than the limits of liability provided in the Supplementary Conditions or required by Laws or Regulations, whichever is greater;

3. include completed operations insurance;

4. include contractual liability insurance covering Contractor's indemnity obligations under Paragraphs 6.11 and 6.20;

5. contain a provision or endorsement that the coverage afforded will not be canceled, materially changed or renewal refused until at least 30 days prior written notice has been given to Owner and Contractor and to each other additional insured identified in the Supplementary Conditions to whom a certificate of insurance has been issued (and the certificates of insurance furnished by the Contractor pursuant to Paragraph 5.03 will so provide);

6. remain in effect at least until final payment and at all times thereafter when Contractor may be correcting, removing, or replacing defective Work in accordance with Paragraph 13.07; and

7. with respect to completed operations insurance, and any insurance coverage written on a claims-made basis, remain in effect for at least two years after final payment.

a. Contractor shall furnish Owner and each other additional insured identified in the Supplementary Conditions, to whom a certificate of insurance has been issued, evidence satisfactory to Owner and any such additional insured of continuation of such insurance at final payment and one year thereafter.

5.05 *Owner's Liability Insurance*

A. In addition to the insurance required to be provided by Contractor under Paragraph 5.04, Owner, at Owner's option, may purchase and maintain at Owner's expense Owner's own liability insurance as will protect Owner against claims which may arise from operations under the Contract Documents.

5.06 *Property Insurance*

A. Unless otherwise provided in the Supplementary Conditions, Owner shall purchase and maintain property insurance upon the Work at the Site in the amount of the full replacement cost thereof (subject to such deductible amounts as may be provided in the Supplementary Conditions or required by Laws and Regulations). This insurance shall:

1. include the interests of Owner, Contractor, Subcontractors, and Engineer, and any other individuals or entities identified in the Supplementary Conditions, and the officers, directors, partners, employees, agents, consultants and subcontractors of each and any of them, each of whom is deemed to have an insurable interest and shall be listed as an insured or additional insured;

2. be written on a Builder's Risk "all-risk" or open peril or special causes of loss policy form that shall at least include insurance for physical loss or damage to the Work, temporary buildings, false work, and materials and equipment in transit, and shall insure against at least the following perils or causes of loss: fire, lightning, extended coverage, theft, vandalism and malicious mischief, earthquake, collapse, debris removal, demolition occasioned by enforcement of Laws and Regulations, water damage, (other than caused by flood) and such other perils or causes of loss as may be specifically required by the Supplementary Conditions;

3. include expenses incurred in the repair or replacement of any insured property (including but not limited to fees and charges of engineers and architects);

4. cover materials and equipment stored at the Site or at another location that was agreed to in writing by Owner prior to being incorporated in the Work, provided that such materials and equipment have been included in an Application for Payment recommended by Engineer;

5. allow for partial utilization of the Work by Owner;

6. include testing and startup; and

7. be maintained in effect until final payment is made unless otherwise agreed to in writing by Owner, Contractor, and Engineer with 30 days written notice to each other additional insured to whom a certificate of insurance has been issued.

B. Owner shall purchase and maintain such boiler and machinery insurance or additional property insurance as may be required by the Supplementary Conditions or Laws and Regulations which will include the interests of Owner, Contractor, Subcontractors, and Engineer, and any other individuals or entities identified in the Supplementary Conditions, and the officers, directors, partners, employees, agents, consultants and subcontractors of each and any of them, each of whom is deemed to have an insurable interest and shall be listed as an insured or additional insured.

C. All the policies of insurance (and the certificates or other evidence thereof) required to be purchased and maintained in accordance with Paragraph 5.06 will contain a provision or endorsement that the coverage afforded will not be canceled or materially changed or renewal refused until at least 30 days prior written notice has been given to Owner and Contractor and to each other additional insured to whom a certificate of insurance has been issued and will contain waiver provisions in accordance with Paragraph 5.07.

D. Owner shall not be responsible for purchasing and maintaining any property insurance specified in this Paragraph 5.06 to protect the interests of Contractor, Subcontractors, or others in the Work to the extent of any

deductible amounts that are identified in the Supplementary Conditions. The risk of loss within such identified deductible amount will be borne by Contractor, Subcontractors, or others suffering any such loss, and if any of them wishes property insurance coverage within the limits of such amounts, each may purchase and maintain it at the purchaser's own expense.

E. If Contractor requests in writing that other special insurance be included in the property insurance policies provided under Paragraph 5.06, Owner shall, if possible, include such insurance, and the cost thereof will be charged to Contractor by appropriate Change Order. Prior to commencement of the Work at the Site, Owner shall in writing advise Contractor whether or not such other insurance has been procured by Owner.

5.07 *Waiver of Rights*

A. Owner and Contractor intend that all policies purchased in accordance with Paragraph 5.06 will protect Owner, Contractor, Subcontractors, and Engineer, and all other individuals or entities identified in the Supplementary Conditions to be listed as insureds or additional insureds (and the officers, directors, partners, employees, agents, consultants and subcontractors of each and any of them) in such policies and will provide primary coverage for all losses and damages caused by the perils or causes of loss covered thereby. All such policies shall contain provisions to the effect that in the event of payment of any loss or damage the insurers will have no rights of recovery against any of the insureds or additional insureds thereunder. Owner and Contractor waive all rights against each other and their respective officers, directors, partners, employees, agents, consultants and subcontractors of each and any of them for all losses and damages caused by, arising out of or resulting from any of the perils or causes of loss covered by such policies and any other property insurance applicable to the Work; and, in addition, waive all such rights against Subcontractors, and Engineer, and all other individuals or entities identified in the Supplementary Conditions to be listed as insured or additional insured (and the officers, directors, partners, employees, agents, consultants and subcontractors of each and any of them) under such policies for losses and damages so caused. None of the above waivers shall extend to the rights that any party making such waiver may have to the proceeds of insurance held by Owner as trustee or otherwise payable under any policy so issued.

B. Owner waives all rights against Contractor, Subcontractors, and Engineer, and the officers, directors, partners, employees, agents, consultants and subcontractors of each and any of them for:

1. loss due to business interruption, loss of use, or other consequential loss extending beyond direct physical loss or damage to Owner's property or the Work caused by, arising out of, or resulting from fire or other perils whether or not insured by Owner; and

2. loss or damage to the completed Project or part thereof caused by, arising out of, or resulting from fire or other insured peril or cause of loss covered by any property insurance maintained on the completed Project or part thereof by Owner during partial utilization pursuant to Paragraph 14.05, after Substantial Completion pursuant to Paragraph 14.04, or after final payment pursuant to Paragraph 14.07.

C. Any insurance policy maintained by Owner covering any loss, damage or consequential loss referred to in Paragraph 5.07.B shall contain provisions to the effect that in the event of payment of any such loss, damage, or consequential loss, the insurers will have no rights of recovery against Contractor, Subcontractors, or Engineer, and the officers, directors, partners, employees, agents, consultants and subcontractors of each and any of them.

5.08 *Receipt and Application of Insurance Proceeds*

A. Any insured loss under the policies of insurance required by Paragraph 5.06 will be adjusted with Owner and made payable to Owner as fiduciary for the insureds, as their interests may appear, subject to the requirements of any applicable mortgage clause and of Paragraph 5.08.B. Owner shall deposit in a separate account any money so received and shall distribute it in accordance with such agreement as the parties in interest may reach. If no other special agreement is reached, the damaged Work shall be repaired or replaced, the moneys so received applied on account thereof, and the Work and the cost thereof covered by an appropriate Change Order .

B. Owner as fiduciary shall have power to adjust and settle any loss with the insurers unless one of the parties in interest shall object in writing within 15 days after the occurrence of loss to Owner's exercise of this power. If such objection be made, Owner as fiduciary shall make settlement with the insurers in accordance with such agreement as the parties in interest may reach. If no such agreement among the parties in interest is reached, Owner as fiduciary shall adjust and settle the loss with the insurers and, if required in writing by any party in interest, Owner as fiduciary shall give bond for the proper performance of such duties.

5.09 *Acceptance of Bonds and Insurance; Option to Replace*

A. If either Owner or Contractor has any objection to the coverage afforded by or other provisions of the bonds or insurance required to be purchased and maintained by the other party in accordance with Article 5 on the basis of non-conformance with the Contract

Documents, the objecting party shall so notify the other party in writing within 10 days after receipt of the certificates (or other evidence requested) required by Paragraph 2.01.B. Owner and Contractor shall each provide to the other such additional information in respect of insurance provided as the other may reasonably request. If either party does not purchase or maintain all of the bonds and insurance required of such party by the Contract Documents, such party shall notify the other party in writing of such failure to purchase prior to the start of the Work, or of such failure to maintain prior to any change in the required coverage. Without prejudice to any other right or remedy, the other party may elect to obtain equivalent bonds or insurance to protect such other party's interests at the expense of the party who was required to provide such coverage, and a Change Order shall be issued to adjust the Contract Price accordingly.

5.10 *Partial Utilization, Acknowledgment of Property Insurer*

A. If Owner finds it necessary to occupy or use a portion or portions of the Work prior to Substantial Completion of all the Work as provided in Paragraph 14.05, no such use or occupancy shall commence before the insurers providing the property insurance pursuant to Paragraph 5.06 have acknowledged notice thereof and in writing effected any changes in coverage necessitated thereby. The insurers providing the property insurance shall consent by endorsement on the policy or policies, but the property insurance shall not be canceled or permitted to lapse on account of any such partial use or occupancy.

ARTICLE 6 - CONTRACTOR'S RESPONSIBILITIES

6.01 *Supervision and Superintendence*

A. Contractor shall supervise, inspect, and direct the Work competently and efficiently, devoting such attention thereto and applying such skills and expertise as may be necessary to perform the Work in accordance with the Contract Documents. Contractor shall be solely responsible for the means, methods, techniques, sequences, and procedures of construction. Contractor shall not be responsible for the negligence of Owner or Engineer in the design or specification of a specific means, method, technique, sequence, or procedure of construction which is shown or indicated in and expressly required by the Contract Documents.

B. At all times during the progress of the Work, Contractor shall assign a competent resident superintendent who shall not be replaced without written notice to Owner and Engineer except under extraordinary circumstances. The superintendent will be Contractor's representative at the Site and shall have authority to act on behalf of Contractor. All communications given to or received from the superintendent shall be binding on Contractor.

6.02 *Labor; Working Hours*

A. Contractor shall provide competent, suitably qualified personnel to survey and lay out the Work and perform construction as required by the Contract Documents. Contractor shall at all times maintain good discipline and order at the Site.

B. Except as otherwise required for the safety or protection of persons or the Work or property at the Site or adjacent thereto, and except as otherwise stated in the Contract Documents, all Work at the Site shall be performed during regular working hours. Contractor will not permit the performance of Work on a Saturday, Sunday, or any legal holiday without Owner's written consent (which will not be unreasonably withheld) given after prior written notice to Engineer.

6.03 *Services, Materials, and Equipment*

A. Unless otherwise specified in the Contract Documents, Contractor shall provide and assume full responsibility for all services, materials, equipment, labor, transportation, construction equipment and machinery, tools, appliances, fuel, power, light, heat, telephone, water, sanitary facilities, temporary facilities, and all other facilities and incidentals necessary for the performance, testing, start-up, and completion of the Work.

B. All materials and equipment incorporated into the Work shall be as specified or, if not specified, shall be of good quality and new, except as otherwise provided in the Contract Documents. All special warranties and guarantees required by the Specifications shall expressly run to the benefit of Owner. If required by Engineer, Contractor shall furnish satisfactory evidence (including reports of required tests) as to the source, kind, and quality of materials and equipment.

C. All materials and equipment shall be stored, applied, installed, connected, erected, protected, used, cleaned, and conditioned in accordance with instructions of the applicable Supplier, except as otherwise may be provided in the Contract Documents.

6.04 *Progress Schedule*

A. Contractor shall adhere to the Progress Schedule established in accordance with Paragraph 2.07 as it may be adjusted from time to time as provided below.

1. Contractor shall submit to Engineer for acceptance (to the extent indicated in Paragraph 2.07) proposed adjustments in the Progress Schedule that will not result in changing the Contract Times. Such adjustments will comply with any provisions of the General Requirements applicable thereto.

2. Proposed adjustments in the Progress Schedule that will change the Contract Times shall be submitted in accordance with the requirements of Article 12. Adjustments in Contract Times may only be made by a Change Order.

6.05 *Substitutes and "Or-Equals"*

A. Whenever an item of material or equipment is specified or described in the Contract Documents by using the name of a proprietary item or the name of a particular Supplier, the specification or description is intended to establish the type, function, appearance, and quality required. Unless the specification or description contains or is followed by words reading that no like, equivalent, or "or-equal" item or no substitution is permitted, other items of material or equipment or material or equipment of other Suppliers may be submitted to Engineer for review under the circumstances described below.

1. *"Or-Equal" Items:* If in Engineer's sole discretion an item of material or equipment proposed by Contractor is functionally equal to that named and sufficiently similar so that no change in related Work will be required, it may be considered by Engineer as an "or-equal" item, in which case review and approval of the proposed item may, in Engineer's sole discretion, be accomplished without compliance with some or all of the requirements for approval of proposed substitute items. For the purposes of this Paragraph 6.05.A.1, a proposed item of material or equipment will be considered functionally equal to an item so named if:

a. in the exercise of reasonable judgment Engineer determines that:

1) it is at least equal in materials of construction, quality, durability, appearance, strength, and design characteristics;

2) it will reliably perform at least equally well the function and achieve the results imposed by the design concept of the completed Project as a functioning whole,

3) it has a proven record of performance and availability of responsive service; and

b. Contractor certifies that, if approved and incorporated into the Work:

1) there will be no increase in cost to the Owner or increase in Contract Times, and

2) it will conform substantially to the detailed requirements of the item named in the Contract Documents.

2. Substitute Items

a. If in Engineer's sole discretion an item of material or equipment proposed by Contractor does not qualify as an "or-equal" item under Paragraph 6.05.A.1, it will be considered a proposed substitute item.

b. Contractor shall submit sufficient information as provided below to allow Engineer to determine that the item of material or equipment proposed is essentially equivalent to that named and an acceptable substitute therefor. Requests for review of proposed substitute items of material or equipment will not be accepted by Engineer from anyone other than Contractor.

c. The requirements for review by Engineer will be as set forth in Paragraph 6.05.A.2.d, as supplemented in the General Requirements and as Engineer may decide is appropriate under the circumstances.

d. Contractor shall make written application to Engineer for review of a proposed substitute item of material or equipment that Contractor seeks to furnish or use. The application:

1) shall certify that the proposed substitute item will:

a) perform adequately the functions and achieve the results called for by the general design,

b) be similar in substance to that specified, and

c) be suited to the same use as that specified;

2) will state:

a) the extent, if any, to which the use of the proposed substitute item will prejudice Contractor's achievement of Substantial Completion on time;

b) whether or not use of the proposed substitute item in the Work will require a change in any of the Contract Documents (or in the provisions of any other direct contract with Owner for other work on the Project) to adapt the design to the proposed substitute item; and

c) whether or not incorporation or use of the proposed substitute item in connection with the Work is subject to payment of any license fee or royalty;

3) will identify:

a) all variations of the proposed substitute item from that specified , and

b) available engineering, sales, maintenance, repair, and replacement services;

4) and shall contain an itemized estimate of all costs or credits that will result directly or indirectly from use of such substitute item, including costs of redesign and claims of other contractors affected by any resulting change,

B. *Substitute Construction Methods or Procedures:* If a specific means, method, technique, sequence, or procedure of construction is expressly required by the Contract Documents, Contractor may furnish or utilize a substitute means, method, technique, sequence, or procedure of construction approved by Engineer. Contractor shall submit sufficient information to allow Engineer, in Engineer's sole discretion, to determine that the substitute proposed is equivalent to that expressly called for by the Contract Documents. The requirements for review by Engineer will be similar to those provided in Paragraph 6.05.A.2.

C. *Engineer's Evaluation:* Engineer will be allowed a reasonable time within which to evaluate each proposal or submittal made pursuant to Paragraphs 6.05.A and 6.05.B. Engineer may require Contractor to furnish additional data about the proposed substitute item. Engineer will be the sole judge of acceptability. No "or equal" or substitute will be ordered, installed or utilized until Engineer's review is complete, which will be evidenced by either a Change Order for a substitute or an approved Shop Drawing for an "or equal." Engineer will advise Contractor in writing of any negative determination.

D. *Special Guarantee:* Owner may require Contractor to furnish at Contractor's expense a special performance guarantee or other surety with respect to any substitute.

E. *Engineer's Cost Reimbursement*: Engineer will record Engineer's costs in evaluating a substitute proposed or submitted by Contractor pursuant to Paragraphs 6.05.A.2 and 6.05.B Whether or not Engineer approves a substitute item so proposed or submitted by Contractor, Contractor shall reimburse Owner for the charges of Engineer for evaluating each such proposed substitute. Contractor shall also reimburse Owner for the charges of Engineer for making changes in the Contract Documents (or in the provisions of any other direct contract with Owner) resulting from the acceptance of each proposed substitute.

F. *Contractor's Expense*: Contractor shall provide all data in support of any proposed substitute or "or-equal" at Contractor's expense.

6.06 *Concerning Subcontractors, Suppliers, and Others*

A. Contractor shall not employ any Subcontractor, Supplier, or other individual or entity (including those acceptable to Owner as indicated in Paragraph 6.06.B), whether initially or as a replacement, against whom Owner may have reasonable objection. Contractor shall not be required to employ any Subcontractor, Supplier, or other individual or entity to furnish or perform any of the Work against whom Contractor has reasonable objection.

B. If the Supplementary Conditions require the identity of certain Subcontractors, Suppliers, or other individuals or entities to be submitted to Owner in advance for acceptance by Owner by a specified date prior to the Effective Date of the Agreement, and if Contractor has submitted a list thereof in accordance with the Supplementary Conditions, Owner's acceptance (either in writing or by failing to make written objection thereto by the date indicated for acceptance or objection in the Bidding Documents or the Contract Documents) of any such Subcontractor, Supplier, or other individual or entity so identified may be revoked on the basis of reasonable objection after due investigation. Contractor shall submit an acceptable replacement for the rejected Subcontractor, Supplier, or other individual or entity, and the Contract Price will be adjusted by the difference in the cost occasioned by such replacement, and an appropriate Change Order will be issued . No acceptance by Owner of any such Subcontractor, Supplier, or other individual or entity, whether initially or as a replacement, shall constitute a waiver of any right of Owner or Engineer to reject defective Work.

C. Contractor shall be fully responsible to Owner and Engineer for all acts and omissions of the Subcontractors, Suppliers, and other individuals or entities performing or furnishing any of the Work just as Contractor is responsible for Contractor's own acts and omissions. Nothing in the Contract Documents:

1. shall create for the benefit of any such Subcontractor, Supplier, or other individual or entity any contractual relationship between Owner or Engineer and any such Subcontractor, Supplier or other individual or entity, nor

2. shall anything in the Contract Documents create any obligation on the part of Owner or Engineer to pay or to see to the payment of any moneys due any such Subcontractor, Supplier, or other individual

or entity except as may otherwise be required by Laws and Regulations.

D. Contractor shall be solely responsible for scheduling and coordinating the Work of Subcontractors, Suppliers, and other individuals or entities performing or furnishing any of the Work under a direct or indirect contract with Contractor.

E. Contractor shall require all Subcontractors, Suppliers, and such other individuals or entities performing or furnishing any of the Work to communicate with Engineer through Contractor.

F. The divisions and sections of the Specifications and the identifications of any Drawings shall not control Contractor in dividing the Work among Subcontractors or Suppliers or delineating the Work to be performed by any specific trade.

G. All Work performed for Contractor by a Subcontractor or Supplier will be pursuant to an appropriate agreement between Contractor and the Subcontractor or Supplier which specifically binds the Subcontractor or Supplier to the applicable terms and conditions of the Contract Documents for the benefit of Owner and Engineer. Whenever any such agreement is with a Subcontractor or Supplier who is listed as an additional insured on the property insurance provided in Paragraph 5.06, the agreement between the Contractor and the Subcontractor or Supplier will contain provisions whereby the Subcontractor or Supplier waives all rights against Owner, Contractor, and Engineer,, and all other individuals or entities identified in the Supplementary Conditions to be listed as insureds or additional insureds (and the officers, directors, partners, employees, agents, consultants and subcontractors of each and any of them) for all losses and damages caused by, arising out of, relating to, or resulting from any of the perils or causes of loss covered by such policies and any other property insurance applicable to the Work. If the insurers on any such policies require separate waiver forms to be signed by any Subcontractor or Supplier, Contractor will obtain the same.

6.07 *Patent Fees and Royalties*

A. Contractor shall pay all license fees and royalties and assume all costs incident to the use in the performance of the Work or the incorporation in the Work of any invention, design, process, product, or device which is the subject of patent rights or copyrights held by others. If a particular invention, design, process, product, or device is specified in the Contract Documents for use in the performance of the Work and if to the actual knowledge of Owner or Engineer its use is subject to patent rights or copyrights calling for the payment of any license fee or royalty to others, the existence of such rights shall be disclosed by Owner in the Contract Documents.

B. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, partners, employees, agents, consultants and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to any infringement of patent rights or copyrights incident to the use in the performance of the Work or resulting from the incorporation in the Work of any invention, design, process, product, or device not specified in the Contract Documents.

6.08 *Permits*

A. Unless otherwise provided in the Supplementary Conditions, Contractor shall obtain and pay for all construction permits and licenses. Owner shall assist Contractor, when necessary, in obtaining such permits and licenses. Contractor shall pay all governmental charges and inspection fees necessary for the prosecution of the Work which are applicable at the time of opening of Bids, or, if there are no Bids, on the Effective Date of the Agreement. Owner shall pay all charges of utility owners for connections for providing permanent service to the Work.

6.09 *Laws and Regulations*

A. Contractor shall give all notices required by and shall comply with all Laws and Regulations applicable to the performance of the Work. Except where otherwise expressly required by applicable Laws and Regulations, neither Owner nor Engineer shall be responsible for monitoring Contractor's compliance with any Laws or Regulations.

B. If Contractor performs any Work knowing or having reason to know that it is contrary to Laws or Regulations, Contractor shall bear all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such Work. However, it shall not be Contractor's primary responsibility to make certain that the Specifications and Drawings are in accordance with Laws and Regulations, but this shall not relieve Contractor of Contractor's obligations under Paragraph 3.03.

C. Changes in Laws or Regulations not known at the time of opening of Bids (or, on the Effective Date of the Agreement if there were no Bids) having an effect on the cost or time of performance of the Work shall be the subject of an adjustment in Contract Price or Contract Times. If Owner and Contractor are unable to agree on entitlement to or on the amount or extent, if any, of any such adjustment, a Claim may be made therefor as provided in Paragraph 10.05.

6.10 *Taxes*

A. Contractor shall pay all sales, consumer, use, and other similar taxes required to be paid by Contractor in accordance with the Laws and Regulations of the place of the Project which are applicable during the performance of the Work.

6.11 *Use of Site and Other Areas*

A. Limitation on Use of Site and Other Areas

1. Contractor shall confine construction equipment, the storage of materials and equipment, and the operations of workers to the Site and other areas permitted by Laws and Regulations, and shall not unreasonably encumber the Site and other areas with construction equipment or other materials or equipment. Contractor shall assume full responsibility for any damage to any such land or area, or to the owner or occupant thereof, or of any adjacent land or areas resulting from the performance of the Work.

2. Should any claim be made by any such owner or occupant because of the performance of the Work, Contractor shall promptly settle with such other party by negotiation or otherwise resolve the claim by arbitration or other dispute resolution proceeding or at law.

3. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, partners, employees, agents, consultants and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to any claim or action, legal or equitable, brought by any such owner or occupant against Owner, Engineer, or any other party indemnified hereunder to the extent caused by or based upon Contractor's performance of the Work.

B. *Removal of Debris During Performance of the Work:* During the progress of the Work Contractor shall keep the Site and other areas free from accumulations of waste materials, rubbish, and other debris. Removal and disposal of such waste materials, rubbish, and other debris shall conform to applicable Laws and Regulations.

C. *Cleaning:* Prior to Substantial Completion of the Work Contractor shall clean the Site and the Work and make it ready for utilization by Owner. At the completion of the Work Contractor shall remove from the Site all tools, appliances, construction equipment and machinery, and surplus materials and shall restore to original condition all property not designated for alteration by the Contract Documents.

D. *Loading Structures:* Contractor shall not load nor permit any part of any structure to be loaded in any manner that will endanger the structure, nor shall Contractor subject any part of the Work or adjacent property to stresses or pressures that will endanger it.

6.12 *Record Documents*

A. Contractor shall maintain in a safe place at the Site one record copy of all Drawings, Specifications, Addenda, Change Orders, Work Change Directives, Field Orders, and written interpretations and clarifications in good order and annotated to show changes made during construction. These record documents together with all approved Samples and a counterpart of all approved Shop Drawings will be available to Engineer for reference. Upon completion of the Work, these record documents, Samples, and Shop Drawings will be delivered to Engineer for Owner.

6.13 *Safety and Protection*

A. Contractor shall be solely responsible for initiating, maintaining and supervising all safety precautions and programs in connection with the Work. Contractor shall take all necessary precautions for the safety of, and shall provide the necessary protection to prevent damage, injury or loss to:

1. all persons on the Site or who may be affected by the Work;

2. all the Work and materials and equipment to be incorporated therein, whether in storage on or off the Site; and

3. other property at the Site or adjacent thereto, including trees, shrubs, lawns, walks, pavements, roadways, structures, utilities, and Underground Facilities not designated for removal, relocation, or replacement in the course of construction.

B. Contractor shall comply with all applicable Laws and Regulations relating to the safety of persons or property, or to the protection of persons or property from damage, injury, or loss; and shall erect and maintain all necessary safeguards for such safety and protection. Contractor shall notify owners of adjacent property and of Underground Facilities and other utility owners when prosecution of the Work may affect them, and shall cooperate with them in the protection, removal, relocation, and replacement of their property.

C. All damage, injury, or loss to any property referred to in Paragraph 6.13.A.2 or 6.13.A.3 caused, directly or indirectly, in whole or in part, by Contractor, any Subcontractor, Supplier, or any other individual or entity directly or indirectly employed by any of them to perform any of the Work, or anyone for whose acts any of them may be liable, shall be remedied by Contractor (except damage or loss attributable to the fault of Draw-

ings or Specifications or to the acts or omissions of Owner or Engineer or , or anyone employed by any of them, or anyone for whose acts any of them may be liable, and not attributable, directly or indirectly, in whole or in part, to the fault or negligence of Contractor or any Subcontractor, Supplier, or other individual or entity directly or indirectly employed by any of them).

D. Contractor's duties and responsibilities for safety and for protection of the Work shall continue until such time as all the Work is completed and Engineer has issued a notice to Owner and Contractor in accordance with Paragraph 14.07.B that the Work is acceptable (except as otherwise expressly provided in connection with Substantial Completion).

6.14 *Safety Representative*

A. Contractor shall designate a qualified and experienced safety representative at the Site whose duties and responsibilities shall be the prevention of accidents and the maintaining and supervising of safety precautions and programs.

6.15 *Hazard Communication Programs*

A. Contractor shall be responsible for coordinating any exchange of material safety data sheets or other hazard communication information required to be made available to or exchanged between or among employers at the Site in accordance with Laws or Regulations.

6.16 *Emergencies*

A. In emergencies affecting the safety or protection of persons or the Work or property at the Site or adjacent thereto, Contractor is obligated to act to prevent threatened damage, injury, or loss. Contractor shall give Engineer prompt written notice if Contractor believes that any significant changes in the Work or variations from the Contract Documents have been caused thereby or are required as a result thereof. If Engineer determines that a change in the Contract Documents is required because of the action taken by Contractor in response to such an emergency, a Work Change Directive or Change Order will be issued.

6.17 *Shop Drawings and Samples*

A. Contractor shall submit Shop Drawings and Samples to Engineer for review and approval in accordance with the acceptable Schedule of Submittals (as required by Paragraph 2.07). Each submittal will be identified as Engineer may require.

1. Shop Drawings

a. Submit number of copies specified in the General Requirements.

b. Data shown on the Shop Drawings will be complete with respect to quantities, dimensions, specified performance and design criteria, materials, and similar data to show Engineer the services, materials, and equipment Contractor proposes to provide and to enable Engineer to review the information for the limited purposes required by Paragraph 6.17.D.

2. *Samples:* Contractor shall also submit Samples to Engineer for review and approval in accordance with the acceptable schedule of Shop Drawings and Sample submittals.

a. Submit number of Samples specified in the Specifications.

b. Clearly identify each Sample as to material, Supplier, pertinent data such as catalog numbers, the use for which intended and other data as Engineer may require to enable Engineer to review the submittal for the limited purposes required by Paragraph 6.17.D.

B. Where a Shop Drawing or Sample is required by the Contract Documents or the Schedule of Submittals , any related Work performed prior to Engineer's review and approval of the pertinent submittal will be at the sole expense and responsibility of Contractor.

C. Submittal Procedures

1. Before submitting each Shop Drawing or Sample, Contractor shall have determined and verified:

a. all field measurements, quantities, dimensions, specified performance and design criteria, installation requirements, materials, catalog numbers, and similar information with respect thereto;

b. the suitability of all materials with respect to intended use, fabrication, shipping, handling, storage, assembly, and installation pertaining to the performance of the Work;

c. all information relative to Contractor's responsibilities for means, methods, techniques, sequences, and procedures of construction, and safety precautions and programs incident thereto; and

d. shall also have reviewed and coordinated each Shop Drawing or Sample with other Shop Drawings and Samples and with the requirements of the Work and the Contract Documents.

2. Each submittal shall bear a stamp or specific written certification that Contractor has satisfied Contractor's obligations under the Contract Documents

with respect to Contractor's review and approval of that submittal.

3. With each submittal, Contractor shall give Engineer specific written notice of any variations, that the Shop Drawing or Sample may have from the requirements of the Contract Documents. This notice shall be both a written communication separate from the Shop Drawing's or Sample Submittal; and, in addition, by a specific notation made on each Shop Drawing or Sample submitted to Engineer for review and approval of each such variation.

D. *Engineer's Review*

1. Engineer will provide timely review of Shop Drawings and Samples in accordance with the Schedule of Submittals acceptable to Engineer. Engineer's review and approval will be only to determine if the items covered by the submittals will, after installation or incorporation in the Work, conform to the information given in the Contract Documents and be compatible with the design concept of the completed Project as a functioning whole as indicated by the Contract Documents.

2. Engineer's review and approval will not extend to means, methods, techniques, sequences, or procedures of construction (except where a particular means, method, technique, sequence, or procedure of construction is specifically and expressly called for by the Contract Documents) or to safety precautions or programs incident thereto. The review and approval of a separate item as such will not indicate approval of the assembly in which the item functions.

3. Engineer's review and approval shall not relieve Contractor from responsibility for any variation from the requirements of the Contract Documents unless Contractor has complied with the requirements of Paragraph 6.17.C.3 and Engineer has given written approval of each such variation by specific written notation thereof incorporated in or accompanying the Shop Drawing or Sample. Engineer's review and approval shall not relieve Contractor from responsibility for complying with the requirements of Paragraph 6.17.C.1.

E. *Resubmittal Procedures*

1. Contractor shall make corrections required by Engineer and shall return the required number of corrected copies of Shop Drawings and submit, as required, new Samples for review and approval. Contractor shall direct specific attention in writing to revisions other than the corrections called for by Engineer on previous submittals.

6.18 *Continuing the Work*

A. Contractor shall carry on the Work and adhere to the Progress Schedule during all disputes or disagreements with Owner. No Work shall be delayed or postponed pending resolution of any disputes or disagreements, except as permitted by Paragraph 15.04 or as Owner and Contractor may otherwise agree in writing.

6.19 *Contractor's General Warranty and Guarantee*

A. Contractor warrants and guarantees to Owner that all Work will be in accordance with the Contract Documents and will not be defective. Engineer and its Related Entities shall be entitled to rely on representation of Contractor's warranty and guarantee.

B. Contractor's warranty and guarantee hereunder excludes defects or damage caused by:

1. abuse, modification, or improper maintenance or operation by persons other than Contractor, Subcontractors, Suppliers, or any other individual or entity for whom Contractor is responsible; or

2. normal wear and tear under normal usage.

C. Contractor's obligation to perform and complete the Work in accordance with the Contract Documents shall be absolute. None of the following will constitute an acceptance of Work that is not in accordance with the Contract Documents or a release of Contractor's obligation to perform the Work in accordance with the Contract Documents:

1. observations by Engineer;

2. recommendation by Engineer or payment by Owner of any progress or final payment;

3. the issuance of a certificate of Substantial Completion by Engineer or any payment related thereto by Owner;

4. use or occupancy of the Work or any part thereof by Owner;

5. any review and approval of a Shop Drawing or Sample submittal or the issuance of a notice of acceptability by Engineer;

6. any inspection, test, or approval by others; or

7. any correction of defective Work by Owner.

6.20 *Indemnification*

A. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, partners, employees, agents, consultants and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or

arbitration or other dispute resolution costs) arising out of or relating to the performance of the Work, provided that any such claim, cost, loss, or damage is attributable to bodily injury, sickness, disease, or death, or to injury to or destruction of tangible property (other than the Work itself), including the loss of use resulting therefrom but only to the extent caused by any negligent act or omission of Contractor, any Subcontractor, any Supplier, or any individual or entity directly or indirectly employed by any of them to perform any of the Work or anyone for whose acts any of them may be liable .

B. In any and all claims against Owner or Engineer or any of their respective consultants, agents, officers, directors, partners, or employees by any employee (or the survivor or personal representative of such employee) of Contractor, any Subcontractor, any Supplier, or any individual or entity directly or indirectly employed by any of them to perform any of the Work, or anyone for whose acts any of them may be liable, the indemnification obligation under Paragraph 6.20.A shall not be limited in any way by any limitation on the amount or type of damages, compensation, or benefits payable by or for Contractor or any such Subcontractor, Supplier, or other individual or entity under workers' compensation acts, disability benefit acts, or other employee benefit acts.

C. The indemnification obligations of Contractor under Paragraph 6.20.A shall not extend to the liability of Engineer and Engineer's officers, directors, partners, employees, agents, consultants and subcontractors arising out of:

1. the preparation or approval of, or the failure to prepare or approve, maps, Drawings, opinions, reports, surveys, Change Orders, designs, or Specifications; or

2. giving directions or instructions, or failing to give them, if that is the primary cause of the injury or damage.

6.21 *Delegation of Professional Design Services*

A. Contractor will not be required to provide professional design services unless such services are specifically required by the Contract Documents for a portion of the Work or unless such services are required to carry out Contractor's responsibilities for construction means, methods, techniques, sequences and procedures. Contractor shall not be required to provide professional services in violation of applicable law.

B. If professional design services or certifications by a design professional related to systems, materials or equipment are specifically required of Contractor by the Contract Documents, Owner and Engineer will specify all performance and design criteria that such services must satisfy. Contractor shall cause such services or certifications to be provided by a properly licensed professional, whose signature and seal shall appear on all drawings, calculations, specifications, certifications, Shop Drawings and other submittals prepared by such professional. Shop Drawings and other submittals related to the Work designed or certified by such professional, if prepared by others, shall bear such professional's written approval when submitted to Engineer.

C. Owner and Engineer shall be entitled to rely upon the adequacy, accuracy and completeness of the services, certifications or approvals performed by such design professionals, provided Owner and Engineer have specified to Contractor all performance and design criteria that such services must satisfy.

D. Pursuant to this Paragraph 6.21, Engineer's review and approval of design calculations and design drawings will be only for the limited purpose of checking for conformance with performance and design criteria given and the design concept expressed in the Contract Documents. Engineer's review and approval of Shop Drawings and other submittals (except design calculations and design drawings) will be only for the purpose stated in Paragraph 6.17.D.1.

E. Contractor shall not be responsible for the adequacy of the performance or design criteria required by the Contract Documents.

ARTICLE 7 - OTHER WORK AT THE SITE

7.01 *Related Work at Site*

A. Owner may perform other work related to the Project at the Site with Owner's employees, or via other direct contracts therefor, or have other work performed by utility owners. If such other work is not noted in the Contract Documents, then:

1. written notice thereof will be given to Contractor prior to starting any such other work; and

2. if Owner and Contractor are unable to agree on entitlement to or on the amount or extent, if any, of any adjustment in the Contract Price or Contract Times that should be allowed as a result of such other work, a Claim may be made therefor as provided in Paragraph 10.05.

B. Contractor shall afford each other contractor who is a party to such a direct contract, each utility owner and Owner, if Owner is performing other work with Owner's employees, proper and safe access to the Site, a reasonable opportunity for the introduction and storage of materials and equipment and the execution of such other work, and shall properly coordinate the Work with theirs. Contractor shall do all cutting, fitting, and patching of the Work that may be required to properly connect or otherwise make its several parts come together and

properly integrate with such other work. Contractor shall not endanger any work of others by cutting, excavating, or otherwise altering their work and will only cut or alter their work with the written consent of Engineer and the others whose work will be affected. The duties and responsibilities of Contractor under this Paragraph are for the benefit of such utility owners and other contractors to the extent that there are comparable provisions for the benefit of Contractor in said direct contracts between Owner and such utility owners and other contractors.

C. If the proper execution or results of any part of Contractor's Work depends upon work performed by others under this Article 7, Contractor shall inspect such other work and promptly report to Engineer in writing any delays, defects, or deficiencies in such other work that render it unavailable or unsuitable for the proper execution and results of Contractor's Work. Contractor's failure to so report will constitute an acceptance of such other work as fit and proper for integration with Contractor's Work except for latent defects and deficiencies in such other work.

7.02 *Coordination*

A. If Owner intends to contract with others for the performance of other work on the Project at the Site, the following will be set forth in Supplementary Conditions:

1. the individual or entity who will have authority and responsibility for coordination of the activities among the various contractors will be identified;

2. the specific matters to be covered by such authority and responsibility will be itemized; and

3. the extent of such authority and responsibilities will be provided.

B. Unless otherwise provided in the Supplementary Conditions, Owner shall have sole authority and responsibility for such coordination.

7.03 *Legal Relationships*

A. Paragraphs 7.01.A and 7.02 are not applicable for utilities not under the control of Owner.

B. Each other direct contract of Owner under Paragraph 7.01.A shall provide that the other contractor is liable to Owner and Contractor for the reasonable direct delay and disruption costs incurred by Contractor as a result of the other contractor's actions or inactions.

C. Contractor shall be liable to Owner and any other contractor for the reasonable direct delay and disruption costs incurred by such other contractor as a result of Contractor's action or inactions.

ARTICLE 8 - OWNER'S RESPONSIBILITIES

8.01 *Communications to Contractor*

A. Except as otherwise provided in these General Conditions, Owner shall issue all communications to Contractor through Engineer.

8.02 *Replacement of Engineer*

A. In case of termination of the employment of Engineer, Owner shall appoint an engineer to whom Contractor makes no reasonable objection, whose status under the Contract Documents shall be that of the former Engineer.

8.03 *Furnish Data*

A. Owner shall promptly furnish the data required of Owner under the Contract Documents.

8.04 *Pay When Due*

A. Owner shall make payments to Contractor when they are due as provided in Paragraphs 14.02.C and 14.07.C.

8.05 *Lands and Easements; Reports and Tests*

A. Owner's duties in respect of providing lands and easements and providing engineering surveys to establish reference points are set forth in Paragraphs 4.01 and 4.05. Paragraph 4.02 refers to Owner's identifying and making available to Contractor copies of reports of explorations and tests of subsurface conditions and drawings of physical conditions in or relating to existing surface or subsurface structures at or contiguous to the Site that have been utilized by Engineer in preparing the Contract Documents.

8.06 *Insurance*

A. Owner's responsibilities, if any, in respect to purchasing and maintaining liability and property insurance are set forth in Article 5.

8.07 *Change Orders*

A. Owner is obligated to execute Change Orders as indicated in Paragraph 10.03.

8.08 *Inspections, Tests, and Approvals*

A. Owner's responsibility in respect to certain inspections, tests, and approvals is set forth in Paragraph 13.03.B.

8.09 *Limitations on Owner's Responsibilities*

A. The Owner shall not supervise, direct, or have control or authority over, nor be responsible for, Contractor's means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of Contractor to comply with Laws and Regulations applicable to the performance of the Work. Owner will not be responsible for Contractor's failure to perform the Work in accordance with the Contract Documents.

8.10 *Undisclosed Hazardous Environmental Condition*

A. Owner's responsibility in respect to an undisclosed Hazardous Environmental Condition is set forth in Paragraph 4.06.

8.11 *Evidence of Financial Arrangements*

A. If and to the extent Owner has agreed to furnish Contractor reasonable evidence that financial arrangements have been made to satisfy Owner's obligations under the Contract Documents, Owner's responsibility in respect thereof will be as set forth in the Supplementary Conditions.

ARTICLE 9 - ENGINEER'S STATUS DURING CONSTRUCTION

9.01 *Owner's Representative*

A. Engineer will be Owner's representative during the construction period. The duties and responsibilities and the limitations of authority of Engineer as Owner's representative during construction are set forth in the Contract Documents and will not be changed without written consent of Owner and Engineer.

9.02 *Visits to Site*

A. Engineer will make visits to the Site at intervals appropriate to the various stages of construction as Engineer deems necessary in order to observe as an experienced and qualified design professional the progress that has been made and the quality of the various aspects of Contractor's executed Work. Based on information obtained during such visits and observations, Engineer, for the benefit of Owner, will determine, in general, if the Work is proceeding in accordance with the Contract Documents. Engineer will not be required to make exhaustive or continuous inspections on the Site to check the quality or quantity of the Work. Engineer's efforts will be directed toward providing for Owner a greater degree of confidence that the completed Work will conform generally to the Contract Documents. On the basis of such visits and observations, Engineer will keep Owner informed of the progress of the Work and will endeavor to guard Owner against defective Work.

B. Engineer's visits and observations are subject to all the limitations on Engineer's authority and responsibility set forth in Paragraph 9.09. Particularly, but without limitation, during or as a result of Engineer's visits or observations of Contractor's Work Engineer will not supervise, direct, control, or have authority over or be responsible for Contractor's means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of Contractor to comply with Laws and Regulations applicable to the performance of the Work.

9.03 *Project Representative*

A. If Owner and Engineer agree, Engineer will furnish a Resident Project Representative to assist Engineer in providing more extensive observation of the Work. The authority and responsibilities of any such Resident Project Representative and assistants will be as provided in the Supplementary Conditions, and limitations on the responsibilities thereof will be as provided in Paragraph 9.09. If Owner designates another representative or agent to represent Owner at the Site who is not Engineer's consultant, agent or employee, the responsibilities and authority and limitations thereon of such other individual or entity will be as provided in the Supplementary Conditions.

9.04 *Authorized Variations in Work*

A. Engineer may authorize minor variations in the Work from the requirements of the Contract Documents which do not involve an adjustment in the Contract Price or the Contract Times and are compatible with the design concept of the completed Project as a functioning whole as indicated by the Contract Documents. These may be accomplished by a Field Order and will be binding on Owner and also on Contractor, who shall perform the Work involved promptly. If Owner or Contractor believes that a Field Order justifies an adjustment in the Contract Price or Contract Times, or both, and the parties are unable to agree on entitlement to or on the amount or extent, if any, of any such adjustment , a Claim may be made therefor as provided in Paragraph 10.05.

9.05 *Rejecting Defective Work*

A. Engineer will have authority to reject Work which Engineer believes to be defective, or that Engineer believes will not produce a completed Project that conforms to the Contract Documents or that will prejudice the integrity of the design concept of the completed Project as a functioning whole as indicated by the Contract Documents. Engineer will also have authority to require special inspection or testing of the Work as provided in Paragraph 13.04, whether or not the Work is fabricated, installed, or completed.

9.06 *Shop Drawings, Change Orders and Payments*

A. In connection with Engineer's authority, and limitations thereof, as to Shop Drawings and Samples, see Paragraph 6.17.

B. In connection with Engineer's authority, and limitations thereof, as to design calculations and design drawings submitted in response to a delegation of professional design services, if any, see Paragraph 6.21.

C. In connection with Engineer's authority as to Change Orders, see Articles 10, 11, and 12.

D. In connection with Engineer's authority as to Applications for Payment, see Article 14.

9.07 *Determinations for Unit Price Work*

A. Engineer will determine the actual quantities and classifications of Unit Price Work performed by Contractor. Engineer will review with Contractor the Engineer's preliminary determinations on such matters before rendering a written decision thereon (by recommendation of an Application for Payment or otherwise). Engineer's written decision thereon will be final and binding (except as modified by Engineer to reflect changed factual conditions or more accurate data) upon Owner and Contractor, subject to the provisions of Paragraph 10.05.

9.08 *Decisions on Requirements of Contract Documents and Acceptability of Work*

A. Engineer will be the initial interpreter of the requirements of the Contract Documents and judge of the acceptability of the Work thereunder. All matters in question and other matters between Owner and Contractor arising prior to the date final payment is due relating to the acceptability of the Work, and the interpretation of the requirements of the Contract Documents pertaining to the performance of the Work, will be referred initially to Engineer in writing within 30 days of the event giving rise to the question

B. Engineer will, with reasonable promptness, render a written decision on the issue referred. If Owner or Contractor believe that any such decision entitles them to an adjustment in the Contract Price or Contract Times or both, a Claim may be made under Paragraph 10.05. The date of Engineer's decision shall be the date of the event giving rise to the issues referenced for the purposes of Paragraph 10.05.B.

C. Engineer's written decision on the issue referred will be final and binding on Owner and Contractor, subject to the provisions of Paragraph 10.05.

D. When functioning as interpreter and judge under this Paragraph 9.08, Engineer will not show partiality to Owner or Contractor and will not be liable in connection with any interpretation or decision rendered in good faith in such capacity.

9.09 *Limitations on Engineer's Authority and Responsibilities*

A. Neither Engineer's authority or responsibility under this Article 9 or under any other provision of the Contract Documents nor any decision made by Engineer in good faith either to exercise or not exercise such authority or responsibility or the undertaking, exercise, or performance of any authority or responsibility by Engineer shall create, impose, or give rise to any duty in contract, tort, or otherwise owed by Engineer to Contractor, any Subcontractor, any Supplier, any other individual or entity, or to any surety for or employee or agent of any of them.

B. Engineer will not supervise, direct, control, or have authority over or be responsible for Contractor's means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of Contractor to comply with Laws and Regulations applicable to the performance of the Work. Engineer will not be responsible for Contractor's failure to perform the Work in accordance with the Contract Documents.

C. Engineer will not be responsible for the acts or omissions of Contractor or of any Subcontractor, any Supplier, or of any other individual or entity performing any of the Work.

D. Engineer's review of the final Application for Payment and accompanying documentation and all maintenance and operating instructions, schedules, guarantees, bonds, certificates of inspection, tests and approvals, and other documentation required to be delivered by Paragraph 14.07.A will only be to determine generally that their content complies with the requirements of, and in the case of certificates of inspections, tests, and approvals that the results certified indicate compliance with the Contract Documents.

E. The limitations upon authority and responsibility set forth in this Paragraph 9.09 shall also apply to, the Resident Project Representative, if any, and assistants, if any.

ARTICLE 10 - CHANGES IN THE WORK; CLAIMS

10.01 *Authorized Changes in the Work*

A. Without invalidating the Contract and without notice to any surety, Owner may, at any time or from time to time, order additions, deletions, or revisions in the Work by a Change Order, or a Work Change Directive. Upon receipt of any such document, Contractor shall

promptly proceed with the Work involved which will be performed under the applicable conditions of the Contract Documents (except as otherwise specifically provided).

B. If Owner and Contractor are unable to agree on entitlement to, or on the amount or extent, if any, of an adjustment in the Contract Price or Contract Times, or both, that should be allowed as a result of a Work Change Directive, a Claim may be made therefor as provided in Paragraph 10.05.

10.02 *Unauthorized Changes in the Work*

A.Contractor shall not be entitled to an increase in the Contract Price or an extension of the Contract Times with respect to any work performed that is not required by the Contract Documents as amended, modified, or supplemented as provided in Paragraph 3.04, except in the case of an emergency as provided in Paragraph 6.16 or in the case of uncovering Work as provided in Paragraph 13.04.B.

10.03 *Execution of Change Orders*

A. Owner and Contractor shall execute appropriate Change Orders recommended by Engineer covering:

1. changes in the Work which are: (i) ordered by Owner pursuant to Paragraph 10.01.A, (ii) required because of acceptance of defective Work under Paragraph 13.08.A or Owner's correction of defective Work under Paragraph 13.09, or (iii) agreed to by the parties;

2. changes in the Contract Price or Contract Times which are agreed to by the parties, including any undisputed sum or amount of time for Work actually performed in accordance with a Work Change Directive; and

3. changes in the Contract Price or Contract Times which embody the substance of any written decision rendered by Engineer pursuant to Paragraph 10.05; provided that, in lieu of executing any such Change Order, an appeal may be taken from any such decision in accordance with the provisions of the Contract Documents and applicable Laws and Regulations, but during any such appeal, Contractor shall carry on the Work and adhere to the Progress Schedule as provided in Paragraph 6.18.A.

10.04 *Notification to Surety*

A. If notice of any change affecting the general scope of the Work or the provisions of the Contract Documents (including, but not limited to, Contract Price or Contract Times) is required by the provisions of any bond to be given to a surety, the giving of any such notice will be Contractor's responsibility. The amount of each applicable bond will be adjusted to reflect the effect of any such change.

10.05 *Claims*

A. *Engineer's Decision Required*: All Claims, except those waived pursuant to Paragraph 14.09, shall be referred to the Engineer for decision. A decision by Engineer shall be required as a condition precedent to any exercise by Owner or Contractor of any rights or remedies either may otherwise have under the Contract Documents or by Laws and Regulations in respect of such Claims.

B. *Notice:* Written notice stating the general nature of each Claim, shall be delivered by the claimant to Engineer and the other party to the Contract promptly (but in no event later than 30 days) after the start of the event giving rise thereto. The responsibility to substantiate a Claim shall rest with the party making the Claim. Notice of the amount or extent of the Claim, with supporting data shall be delivered to the Engineer and the other party to the Contract within 60 days after the start of such event (unless Engineer allows additional time for claimant to submit additional or more accurate data in support of such Claim). A Claim for an adjustment in Contract Price shall be prepared in accordance with the provisions of Paragraph 12.01.B. A Claim for an adjustment in Contract Time shall be prepared in accordance with the provisions of Paragraph 12.02.B. Each Claim shall be accompanied by claimant's written statement that the adjustment claimed is the entire adjustment to which the claimant believes it is entitled as a result of said event. The opposing party shall submit any response to Engineer and the claimant within 30 days after receipt of the claimant's last submittal (unless Engineer allows additional time).

C. *Engineer's Action*: Engineer will review each Claim and, within 30 days after receipt of the last submittal of the claimant or the last submittal of the opposing party, if any, take one of the following actions in writing:

1. deny the Claim in whole or in part,

2. approve the Claim, or

3. notify the parties that the Engineer is unable to resolve the Claim if, in the Engineer's sole discretion, it would be inappropriate for the Engineer to do so. For purposes of further resolution of the Claim, such notice shall be deemed a denial.

D. In the event that Engineer does not take action on a Claim within said 30 days, the Claim shall be deemed denied.

E. Engineer's written action under Paragraph 10.05.C or denial pursuant to Paragraphs 10.05.C.3 or 10.05.D will be final and binding upon Owner and Contractor, unless Owner or Contractor invoke the dispute resolution procedure set forth in Article 16 within 30 days of such action or denial.

F. No Claim for an adjustment in Contract Price or Contract Times will be valid if not submitted in accordance with this Paragraph 10.05.

ARTICLE 11 - COST OF THE WORK; ALLOWANCES; UNIT PRICE WORK

11.01 *Cost of the Work*

A. *Costs Included:* The term Cost of the Work means the sum of all costs, except those excluded in Paragraph 11.01.B, necessarily incurred and paid by Contractor in the proper performance of the Work. When the value of any Work covered by a Change Order or when a Claim for an adjustment in Contract Price is determined on the basis of Cost of the Work, the costs to be reimbursed to Contractor will be only those additional or incremental costs required because of the change in the Work or because of the event giving rise to the Claim. Except as otherwise may be agreed to in writing by Owner, such costs shall be in amounts no higher than those prevailing in the locality of the Project, shall include only the following items, and shall not include any of the costs itemized in Paragraph 11.01.B.

1. Payroll costs for employees in the direct employ of Contractor in the performance of the Work under schedules of job classifications agreed upon by Owner and Contractor. Such employees shall include, without limitation, superintendents, foremen, and other personnel employed full time at the Site. Payroll costs for employees not employed full time on the Work shall be apportioned on the basis of their time spent on the Work. Payroll costs shall include, but not be limited to, salaries and wages plus the cost of fringe benefits, which shall include social security contributions, unemployment, excise, and payroll taxes, workers' compensation, health and retirement benefits, bonuses, sick leave, vacation and holiday pay applicable thereto. The expenses of performing Work outside of regular working hours, on Saturday, Sunday, or legal holidays, shall be included in the above to the extent authorized by Owner.

2. Cost of all materials and equipment furnished and incorporated in the Work, including costs of transportation and storage thereof, and Suppliers' field services required in connection therewith. All cash discounts shall accrue to Contractor unless Owner deposits funds with Contractor with which to make payments, in which case the cash discounts shall accrue to Owner. All trade discounts, rebates and refunds and returns from sale of surplus materials and equipment shall accrue to Owner, and Contractor shall make provisions so that they may be obtained.

3. Payments made by Contractor to Subcontractors for Work performed by Subcontractors. If required by Owner, Contractor shall obtain competitive bids from subcontractors acceptable to Owner and Contractor and shall deliver such bids to Owner, who will then determine, with the advice of Engineer, which bids, if any, will be acceptable. If any subcontract provides that the Subcontractor is to be paid on the basis of Cost of the Work plus a fee, the Subcontractor's Cost of the Work and fee shall be determined in the same manner as Contractor's Cost of the Work and fee as provided in this Paragraph 11.01.

4. Costs of special consultants (including but not limited to Engineers, architects, testing laboratories, surveyors, attorneys, and accountants) employed for services specifically related to the Work.

5. Supplemental costs including the following:

a. The proportion of necessary transportation, travel, and subsistence expenses of Contractor's employees incurred in discharge of duties connected with the Work.

b. Cost, including transportation and maintenance, of all materials, supplies, equipment, machinery, appliances, office, and temporary facilities at the Site, and hand tools not owned by the workers, which are consumed in the performance of the Work, and cost, less market value, of such items used but not consumed which remain the property of Contractor.

c. Rentals of all construction equipment and machinery, and the parts thereof whether rented from Contractor or others in accordance with rental agreements approved by Owner with the advice of Engineer, and the costs of transportation, loading, unloading, assembly, dismantling, and removal thereof. All such costs shall be in accordance with the terms of said rental agreements. The rental of any such equipment, machinery, or parts shall cease when the use thereof is no longer necessary for the Work.

d. Sales, consumer, use, and other similar taxes related to the Work, and for which Contractor is liable, imposed by Laws and Regulations.

e. Deposits lost for causes other than negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable, and royalty payments and fees for permits and licenses.

f. Losses and damages (and related expenses) caused by damage to the Work, not compensated by insurance or otherwise, sustained by Contractor in connection with the performance of the Work (except losses and damages within the deductible amounts of property insurance established in accordance with Paragraph 5.06.D), provided such losses and damages have

resulted from causes other than the negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable. Such losses shall include settlements made with the written consent and approval of Owner. No such losses, damages, and expenses shall be included in the Cost of the Work for the purpose of determining Contractor's fee.

g. The cost of utilities, fuel, and sanitary facilities at the Site.

h. Minor expenses such as telegrams, long distance telephone calls, telephone service at the Site, expresses, and similar petty cash items in connection with the Work.

i. The costs of premiums for all bonds and insurance Contractor is required by the Contract Documents to purchase and maintain.

B. *Costs Excluded:* The term Cost of the Work shall not include any of the following items:

1. Payroll costs and other compensation of Contractor's officers, executives, principals (of partnerships and sole proprietorships), general managers, safety managers, engineers, architects, estimators, attorneys, auditors, accountants, purchasing and contracting agents, expediters, timekeepers, clerks, and other personnel employed by Contractor, whether at the Site or in Contractor's principal or branch office for general administration of the Work and not specifically included in the agreed upon schedule of job classifications referred to in Paragraph 11.01.A.1 or specifically covered by Paragraph 11.01.A.4, all of which are to be considered administrative costs covered by the Contractor's fee.

2. Expenses of Contractor's principal and branch offices other than Contractor's office at the Site.

3. Any part of Contractor's capital expenses, including interest on Contractor's capital employed for the Work and charges against Contractor for delinquent payments.

4. Costs due to the negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable, including but not limited to, the correction of defective Work, disposal of materials or equipment wrongly supplied, and making good any damage to property.

5. Other overhead or general expense costs of any kind and the costs of any item not specifically and expressly included in Paragraphs 11.01.A and 11.01.B.

C. *Contractor's Fee:* When all the Work is performed on the basis of cost-plus, Contractor's fee shall be determined as set forth in the Agreement. When the value of any Work covered by a Change Order or when a Claim for an adjustment in Contract Price is determined on the basis of Cost of the Work, Contractor's fee shall be determined as set forth in Paragraph 12.01.C.

D. *Documentation:* Whenever the Cost of the Work for any purpose is to be determined pursuant to Paragraphs 11.01.A and 11.01.B, Contractor will establish and maintain records thereof in accordance with generally accepted accounting practices and submit in a form acceptable to Engineer an itemized cost breakdown together with supporting data.

11.02 *Allowances*

A. It is understood that Contractor has included in the Contract Price all allowances so named in the Contract Documents and shall cause the Work so covered to be performed for such sums and by such persons or entities as may be acceptable to Owner and Engineer.

B. *Cash Allowances*

1. Contractor agrees that:

a. the cash allowances include the cost to Contractor (less any applicable trade discounts) of materials and equipment required by the allowances to be delivered at the Site, and all applicable taxes; and

b. Contractor's costs for unloading and handling on the Site, labor, installation , overhead, profit, and other expenses contemplated for the cash allowances have been included in the Contract Price and not in the allowances, and no demand for additional payment on account of any of the foregoing will be valid.

C. Contingency Allowance

1. Contractor agrees that a contingency allowance, if any, is for the sole use of Owner to cover unanticipated costs.

D. Prior to final payment, an appropriate Change Order will be issued as recommended by Engineer to reflect actual amounts due Contractor on account of Work covered by allowances, and the Contract Price shall be correspondingly adjusted.

11.03 *Unit Price Work*

A. Where the Contract Documents provide that all or part of the Work is to be Unit Price Work, initially the Contract Price will be deemed to include for all Unit Price Work an amount equal to the sum of the unit price for each separately identified item of Unit Price Work times the estimated quantity of each item as indicated in the Agreement.

B. The estimated quantities of items of Unit Price Work are not guaranteed and are solely for the purpose of comparison of Bids and determining an initial Contract Price. Determinations of the actual quantities and classifications of Unit Price Work performed by Contractor will be made by Engineer subject to the provisions of Paragraph 9.07.

C. Each unit price will be deemed to include an amount considered by Contractor to be adequate to cover Contractor's overhead and profit for each separately identified item.

D. Owner or Contractor may make a Claim for an adjustment in the Contract Price in accordance with Paragraph 10.05 if:

1. the quantity of any item of Unit Price Work performed by Contractor differs materially and significantly from the estimated quantity of such item indicated in the Agreement; and

2. there is no corresponding adjustment with respect any other item of Work; and

3. Contractor believes that Contractor is entitled to an increase in Contract Price as a result of having incurred additional expense or Owner believes that Owner is entitled to a decrease in Contract Price and the parties are unable to agree as to the amount of any such increase or decrease.

ARTICLE 12 - CHANGE OF CONTRACT PRICE; CHANGE OF CONTRACT TIMES

12.01 *Change of Contract Price*

A. The Contract Price may only be changed by a Change Order. Any Claim for an adjustment in the Contract Price shall be based on written notice submitted by the party making the Claim to the Engineer and the other party to the Contract in accordance with the provisions of Paragraph 10.05.

B. The value of any Work covered by a Change Order or of any Claim for an adjustment in the Contract Price will be determined as follows:

1. where the Work involved is covered by unit prices contained in the Contract Documents, by application of such unit prices to the quantities of the items involved (subject to the provisions of Paragraph 11.03); or

2. where the Work involved is not covered by unit prices contained in the Contract Documents, by a mutually agreed lump sum (which may include an allowance for overhead and profit not necessarily in accordance with Paragraph 12.01.C.2); or

3. where the Work involved is not covered by unit prices contained in the Contract Documents and agreement to a lump sum is not reached under Paragraph 12.01.B.2, on the basis of the Cost of the Work (determined as provided in Paragraph 11.01) plus a Contractor's fee for overhead and profit (determined as provided in Paragraph 12.01.C).

C. *Contractor's Fee:* The Contractor's fee for overhead and profit shall be determined as follows:

1. a mutually acceptable fixed fee; or

2. if a fixed fee is not agreed upon, then a fee based on the following percentages of the various portions of the Cost of the Work:

a. for costs incurred under Paragraphs 11.01.A.1 and 11.01.A.2, the Contractor's fee shall be 15 percent;

b. for costs incurred under Paragraph 11.01.A.3, the Contractor's fee shall be five percent;

c. where one or more tiers of subcontracts are on the basis of Cost of the Work plus a fee and no fixed fee is agreed upon, the intent of Paragraph 12.01.C.2.a is that the Subcontractor who actually performs the Work, at whatever tier, will be paid a fee of 15 percent of the costs incurred by such Subcontractor under Paragraphs 11.01.A.1 and 11.01.A.2 and that any higher tier Subcontractor and Contractor will each be paid a fee of five percent of the amount paid to the next lower tier Subcontractor;

d. no fee shall be payable on the basis of costs itemized under Paragraphs 11.01.A.4, 11.01.A.5, and 11.01.B;

e. the amount of credit to be allowed by Contractor to Owner for any change which results in a net decrease in cost will be the amount of the actual net decrease in cost plus a deduction in Contractor's fee by an amount equal to five percent of such net decrease; and

f. when both additions and credits are involved in any one change, the adjustment in Contractor's fee shall be computed on the basis of the net change in accordance with Paragraphs 12.01.C.2.a through 12.01.C.2.e, inclusive.

12.02 *Change of Contract Times*

A. The Contract Times may only be changed by a Change Order. Any Claim for an adjustment in the Contract Times shall be based on written notice submitted

by the party making the Claim to the Engineer and the other party to the Contract in accordance with the provisions of Paragraph 10.05.

B. Any adjustment of the Contract Times covered by a Change Order or any Claim for an adjustment in the Contract Times will be determined in accordance with the provisions of this Article 12.

12.03 *Delays*

A. Where Contractor is prevented from completing any part of the Work within the Contract Times due to delay beyond the control of Contractor, the Contract Times will be extended in an amount equal to the time lost due to such delay if a Claim is made therefor as provided in Paragraph 12.02.A. Delays beyond the control of Contractor shall include, but not be limited to, acts or neglect by Owner, acts or neglect of utility owners or other contractors performing other work as contemplated by Article 7, fires, floods, epidemics, abnormal weather conditions, or acts of God.

B. If Owner, Engineer, or other contractors or utility owners performing other work for Owner as contemplated by Article 7, or anyone for whom Owner is responsible, delays, disrupts, or interferes with the performance or progress of the Work, then Contractor shall be entitled to an equitable adjustment in the Contract Price or the Contract Times , or both. Contractor's entitlement to an adjustment of the Contract Times is conditioned on such adjustment being essential to Contractor's ability to complete the Work within the Contract Times.

C If Contractor is delayed in the performance or progress of the Work by fire, flood, epidemic, abnormal weather conditions, acts of God, acts or failures to act of utility owners not under the control of Owner, or other causes not the fault of and beyond control of Owner and Contractor, then Contractor shall be entitled to an equitable adjustment in Contract Times, if such adjustment is essential to Contractor's ability to complete the Work within the Contract Times. Such an adjustment shall be Contractor's sole and exclusive remedy for the delays described in this Paragraph 12.03.C.

D. Owner, Engineer and the Related Entities of each of them shall not be liable to Contractor for any claims, costs, losses, or damages (including but not limited to all fees and charges of Engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) sustained by Contractor on or in connection with any other project or anticipated project.

E. Contractor shall not be entitled to an adjustment in Contract Price or Contract Times for delays within the control of Contractor. Delays attributable to and within the control of a Subcontractor or Supplier shall be deemed to be delays within the control of Contractor.

ARTICLE 13 - TESTS AND INSPECTIONS; CORRECTION, REMOVAL OR ACCEPTANCE OF DEFECTIVE WORK

13.01 *Notice of Defects*

A. Prompt notice of all defective Work of which Owner or Engineer has actual knowledge will be given to Contractor. All defective Work may be rejected, corrected, or accepted as provided in this Article 13.

13.02 *Access to Work*

A. Owner, Engineer, their consultants and other representatives and personnel of Owner, independent testing laboratories, and governmental agencies with jurisdictional interests will have access to the Site and the Work at reasonable times for their observation, inspecting, and testing. Contractor shall provide them proper and safe conditions for such access and advise them of Contractor's Site safety procedures and programs so that they may comply therewith as applicable.

13.03 *Tests and Inspections*

A. Contractor shall give Engineer timely notice of readiness of the Work for all required inspections, tests, or approvals and shall cooperate with inspection and testing personnel to facilitate required inspections or tests.

B. Owner shall employ and pay for the services of an independent testing laboratory to perform all inspections, tests, or approvals required by the Contract Documents except:

1. for inspections, tests, or approvals covered by Paragraphs 13.03.C and 13.03.D below;

2. that costs incurred in connection with tests or inspections conducted pursuant to Paragraph 13.04.B shall be paid as provided in said Paragraph 13.04.C; and

3. as otherwise specifically provided in the Contract Documents.

C. If Laws or Regulations of any public body having jurisdiction require any Work (or part thereof) specifically to be inspected, tested, or approved by an employee or other representative of such public body, Contractor shall assume full responsibility for arranging and obtaining such inspections, tests, or approvals, pay all costs in connection therewith, and furnish Engineer the required certificates of inspection or approval.

D. Contractor shall be responsible for arranging and obtaining and shall pay all costs in connection with any inspections, tests, or approvals required for Owner's and Engineer's acceptance of materials or equipment to

be incorporated in the Work; or acceptance of materials, mix designs, or equipment submitted for approval prior to Contractor's purchase thereof for incorporation in the Work. Such inspections, tests, or approvals shall be performed by organizations acceptable to Owner and Engineer.

E. If any Work (or the work of others) that is to be inspected, tested, or approved is covered by Contractor without written concurrence of Engineer, it must, if requested by Engineer, be uncovered for observation.

F. Uncovering Work as provided in Paragraph 13.03.E shall be at Contractor's expense unless Contractor has given Engineer timely notice of Contractor's intention to cover the same and Engineer has not acted with reasonable promptness in response to such notice.

13.04 *Uncovering Work*

A. If any Work is covered contrary to the written request of Engineer, it must, if requested by Engineer, be uncovered for Engineer's observation and replaced at Contractor's expense.

B. If Engineer considers it necessary or advisable that covered Work be observed by Engineer or inspected or tested by others, Contractor, at Engineer's request, shall uncover, expose, or otherwise make available for observation, inspection, or testing as Engineer may require, that portion of the Work in question, furnishing all necessary labor, material, and equipment.

C. If it is found that the uncovered Work is defective, Contractor shall pay all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such uncovering, exposure, observation, inspection, and testing, and of satisfactory replacement or reconstruction (including but not limited to all costs of repair or replacement of work of others); and Owner shall be entitled to an appropriate decrease in the Contract Price. If the parties are unable to agree as to the amount thereof, Owner may make a Claim therefor as provided in Paragraph 10.05.

D. If, the uncovered Work is not found to be defective, Contractor shall be allowed an increase in the Contract Price or an extension of the Contract Times, or both, directly attributable to such uncovering, exposure, observation, inspection, testing, replacement, and reconstruction. If the parties are unable to agree as to the amount or extent thereof, Contractor may make a Claim therefor as provided in Paragraph 10.05.

13.05 *Owner May Stop the Work*

A. If the Work is defective, or Contractor fails to supply sufficient skilled workers or suitable materials or equipment, or fails to perform the Work in such a way that the completed Work will conform to the Contract Documents, Owner may order Contractor to stop the Work, or any portion thereof, until the cause for such order has been eliminated; however, this right of Owner to stop the Work shall not give rise to any duty on the part of Owner to exercise this right for the benefit of Contractor, any Subcontractor, any Supplier, any other individual or entity, or any surety for, or employee or agent of any of them.

13.06 *Correction or Removal of Defective Work*

A. Promptly after receipt of notice, Contractor shall correct all defective Work, whether or not fabricated, installed, or completed, or, if the Work has been rejected by Engineer, remove it from the Project and replace it with Work that is not defective. Contractor shall pay all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such correction or removal (including but not limited to all costs of repair or replacement of work of others).

B. When correcting defective Work under the terms of this Paragraph 13.06 or Paragraph 13.07, Contractor shall take no action that would void or otherwise impair Owner's special warranty and guarantee, if any, on said Work.

13.07 *Correction Period*

A. If within one year after the date of Substantial Completion (or such longer period of time as may be prescribed by the terms of any applicable special guarantee required by the Contract Documents) or by any specific provision of the Contract Documents, any Work is found to be defective, or if the repair of any damages to the land or areas made available for Contractor's use by Owner or permitted by Laws and Regulations as contemplated in Paragraph 6.11.A is found to be defective, Contractor shall promptly, without cost to Owner and in accordance with Owner's written instructions:

1. repair such defective land or areas; or

2. correct such defective Work; or

3. if the defective Work has been rejected by Owner, remove it from the Project and replace it with Work that is not defective, and

4. satisfactorily correct or repair or remove and replace any damage to other Work, to the work of others or other land or areas resulting therefrom.

B. If Contractor does not promptly comply with the terms of Owner's written instructions, or in an emergency where delay would cause serious risk of loss or damage, Owner may have the defective Work corrected or repaired or may have the rejected Work removed and replaced. All claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such correction or repair or such removal and replacement (including but not limited to all costs of repair or replacement of work of others) will be paid by Contractor.

C. In special circumstances where a particular item of equipment is placed in continuous service before Substantial Completion of all the Work, the correction period for that item may start to run from an earlier date if so provided in the Specifications .

D. Where defective Work (and damage to other Work resulting therefrom) has been corrected or removed and replaced under this Paragraph 13.07, the correction period hereunder with respect to such Work will be extended for an additional period of one year after such correction or removal and replacement has been satisfactorily completed.

E. Contractor's obligations under this Paragraph 13.07 are in addition to any other obligation or warranty. The provisions of this Paragraph 13.07 shall not be construed as a substitute for or a waiver of the provisions of any applicable statute of limitation or repose.

13.08 *Acceptance of Defective Work*

A. If, instead of requiring correction or removal and replacement of defective Work, Owner (and, prior to Engineer's recommendation of final payment, Engineer) prefers to accept it, Owner may do so. Contractor shall pay all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) attributable to Owner's evaluation of and determination to accept such defective Work (such costs to be approved by Engineer as to reasonableness) and the diminished value of the Work to the extent not otherwise paid by Contractor pursuant to this sentence. If any such acceptance occurs prior to Engineer's recommendation of final payment, a Change Order will be issued incorporating the necessary revisions in the Contract Documents with respect to the Work, and Owner shall be entitled to an appropriate decrease in the Contract Price, reflecting the diminished value of Work so accepted. If the parties are unable to agree as to the amount thereof, Owner may make a Claim therefor as provided in Paragraph 10.05. If the acceptance occurs after such recommendation, an appropriate amount will be paid by Contractor to Owner.

13.09 *Owner May Correct Defective Work*

A. If Contractor fails within a reasonable time after written notice from Engineer to correct defective Work or to remove and replace rejected Work as required by Engineer in accordance with Paragraph 13.06.A, or if Contractor fails to perform the Work in accordance with the Contract Documents, or if Contractor fails to comply with any other provision of the Contract Documents, Owner may, after seven days written notice to Contractor, correct or remedy any such deficiency.

B. In exercising the rights and remedies under this Paragraph 13.09, Owner shall proceed expeditiously. In connection with such corrective or remedial action, Owner may exclude Contractor from all or part of the Site, take possession of all or part of the Work and suspend Contractor's services related thereto, take possession of Contractor's tools, appliances, construction equipment and machinery at the Site, and incorporate in the Work all materials and equipment stored at the Site or for which Owner has paid Contractor but which are stored elsewhere. Contractor shall allow Owner, Owner's representatives, agents and employees, Owner's other contractors, and Engineer and Engineer's consultants access to the Site to enable Owner to exercise the rights and remedies under this Paragraph.

C. All claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) incurred or sustained by Owner in exercising the rights and remedies under this Paragraph 13.09 will be charged against Contractor, and a Change Order will be issued incorporating the necessary revisions in the Contract Documents with respect to the Work; and Owner shall be entitled to an appropriate decrease in the Contract Price. If the parties are unable to agree as to the amount of the adjustment, Owner may make a Claim therefor as provided in Paragraph 10.05. Such claims, costs, losses and damages will include but not be limited to all costs of repair, or replacement of work of others destroyed or damaged by correction, removal, or replacement of Contractor's defective Work.

D. Contractor shall not be allowed an extension of the Contract Times because of any delay in the performance of the Work attributable to the exercise by Owner of Owner's rights and remedies under this Paragraph 13.09.

ARTICLE 14 - PAYMENTS TO CONTRACTOR AND COMPLETION

14.01 *Schedule of Values*

A. The Schedule of Values established as provided in Paragraph 2.07.A will serve as the basis for progress

payments and will be incorporated into a form of Application for Payment acceptable to Engineer. Progress payments on account of Unit Price Work will be based on the number of units completed.

14.02 *Progress Payments*

A. Applications for Payments

1. At least 20 days before the date established in the Agreement for each progress payment (but not more often than once a month), Contractor shall submit to Engineer for review an Application for Payment filled out and signed by Contractor covering the Work completed as of the date of the Application and accompanied by such supporting documentation as is required by the Contract Documents. If payment is requested on the basis of materials and equipment not incorporated in the Work but delivered and suitably stored at the Site or at another location agreed to in writing, the Application for Payment shall also be accompanied by a bill of sale, invoice, or other documentation warranting that Owner has received the materials and equipment free and clear of all Liens and evidence that the materials and equipment are covered by appropriate property insurance or other arrangements to protect Owner's interest therein, all of which must be satisfactory to Owner.

2. Beginning with the second Application for Payment, each Application shall include an affidavit of Contractor stating that all previous progress payments received on account of the Work have been applied on account to discharge Contractor's legitimate obligations associated with prior Applications for Payment.

3. The amount of retainage with respect to progress payments will be as stipulated in the Agreement.

B. *Review of Applications*

1. Engineer will, within 10 days after receipt of each Application for Payment, either indicate in writing a recommendation of payment and present the Application to Owner or return the Application to Contractor indicating in writing Engineer's reasons for refusing to recommend payment. In the latter case, Contractor may make the necessary corrections and resubmit the Application.

2. Engineer's recommendation of any payment requested in an Application for Payment will constitute a representation by Engineer to Owner, based on Engineer's observations on the Site of the executed Work as an experienced and qualified design professional and on Engineer's review of the Application for Payment and the accompanying data and schedules, that to the best of Engineer's knowledge, information and belief:

a. the Work has progressed to the point indicated;

b. the quality of the Work is generally in accordance with the Contract Documents (subject to an evaluation of the Work as a functioning whole prior to or upon Substantial Completion, to the results of any subsequent tests called for in the Contract Documents, to a final determination of quantities and classifications for Unit Price Work under Paragraph 9.07, and to any other qualifications stated in the recommendation); and

c. the conditions precedent to Contractor's being entitled to such payment appear to have been fulfilled in so far as it is Engineer's responsibility to observe the Work.

3. By recommending any such payment Engineer will not thereby be deemed to have represented that:

a. inspections made to check the quality or the quantity of the Work as it has been performed have been exhaustive, extended to every aspect of the Work in progress, or involved detailed inspections of the Work beyond the responsibilities specifically assigned to Engineer in the Contract Documents; or

b. that there may not be other matters or issues between the parties that might entitle Contractor to be paid additionally by Owner or entitle Owner to withhold payment to Contractor.

4. Neither Engineer's review of Contractor's Work for the purposes of recommending payments nor Engineer's recommendation of any payment, including final payment, will impose responsibility on Engineer:

a. to supervise, direct, or control the Work, or

b. for the means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or

c. for Contractor's failure to comply with Laws and Regulations applicable to Contractor's performance of the Work, or

d. to make any examination to ascertain how or for what purposes Contractor has used the moneys paid on account of the Contract Price, or

e. to determine that title to any of the Work, materials, or equipment has passed to Owner free and clear of any Liens.

5. Engineer may refuse to recommend the whole or any part of any payment if, in Engineer's opinion, it would be incorrect to make the representations to Owner stated in Paragraph 14.02.B.2. Engineer may also refuse to recommend any such payment or, because of subsequently discovered evidence or the results of subsequent

inspections or tests, revise or revoke any such payment recommendation previously made, to such extent as may be necessary in Engineer's opinion to protect Owner from loss because:

a. the Work is defective, or completed Work has been damaged, requiring correction or replacement;

b. the Contract Price has been reduced by Change Orders;

c. Owner has been required to correct defective Work or complete Work in accordance with Paragraph 13.09; or

d. Engineer has actual knowledge of the occurrence of any of the events enumerated in Paragraph 15.02.A.

C. *Payment Becomes Due*

1. Ten days after presentation of the Application for Payment to Owner with Engineer's recommendation, the amount recommended will (subject to the provisions of Paragraph 14.02.D) become due, and when due will be paid by Owner to Contractor.

D. *Reduction in Payment*

1. Owner may refuse to make payment of the full amount recommended by Engineer because:

a. claims have been made against Owner on account of Contractor's performance or furnishing of the Work;

b. Liens have been filed in connection with the Work, except where Contractor has delivered a specific bond satisfactory to Owner to secure the satisfaction and discharge of such Liens;

c. there are other items entitling Owner to a set-off against the amount recommended; or

d. Owner has actual knowledge of the occurrence of any of the events enumerated in Paragraphs 14.02.B.5.a through 14.02.B.5.c or Paragraph 15.02.A.

2. If Owner refuses to make payment of the full amount recommended by Engineer, Owner will give Contractor immediate written notice (with a copy to Engineer) stating the reasons for such action and promptly pay Contractor any amount remaining after deduction of the amount so withheld. Owner shall promptly pay Contractor the amount so withheld, or any adjustment thereto agreed to by Owner and Contractor, when Contractor corrects to Owner's satisfaction the reasons for such action.

3. If it is subsequently determined that Owner's refusal of payment was not justified, the amount wrongfully withheld shall be treated as an amount due as determined by Paragraph 14.02.C.1.

14.03 *Contractor's Warranty of Title*

A. Contractor warrants and guarantees that title to all Work, materials, and equipment covered by any Application for Payment, whether incorporated in the Project or not, will pass to Owner no later than the time of payment free and clear of all Liens.

14.04 *Substantial Completion*

A. When Contractor considers the entire Work ready for its intended use Contractor shall notify Owner and Engineer in writing that the entire Work is substantially complete (except for items specifically listed by Contractor as incomplete) and request that Engineer issue a certificate of Substantial Completion.

B. Promptly after Contractor's notification, , Owner, Contractor, and Engineer shall make an inspection of the Work to determine the status of completion. If Engineer does not consider the Work substantially complete, Engineer will notify Contractor in writing giving the reasons therefor.

C. If Engineer considers the Work substantially complete, Engineer will deliver to Owner a tentative certificate of Substantial Completion which shall fix the date of Substantial Completion. There shall be attached to the certificate a tentative list of items to be completed or corrected before final payment. Owner shall have seven days after receipt of the tentative certificate during which to make written objection to Engineer as to any provisions of the certificate or attached list. If, after considering such objections, Engineer concludes that the Work is not substantially complete, Engineer will within 14 days after submission of the tentative certificate to Owner notify Contractor in writing, stating the reasons therefor. If, after consideration of Owner's objections, Engineer considers the Work substantially complete, Engineer will within said 14 days execute and deliver to Owner and Contractor a definitive certificate of Substantial Completion (with a revised tentative list of items to be completed or corrected) reflecting such changes from the tentative certificate as Engineer believes justified after consideration of any objections from Owner.

D. At the time of delivery of the tentative certificate of Substantial Completion, Engineer will deliver to Owner and Contractor a written recommendation as to division of responsibilities pending final payment between Owner and Contractor with respect to security, operation, safety, and protection of the Work, maintenance, heat, utilities, insurance, and warranties and guarantees. Unless Owner and Contractor agree otherwise in writing and so inform Engineer in writing prior to Engineer's issuing the definitive certificate of Substantial

Completion, Engineer's aforesaid recommendation will be binding on Owner and Contractor until final payment.

E. Owner shall have the right to exclude Contractor from the Site after the date of Substantial Completion subject to allowing Contractor reasonable access to complete or correct items on the tentative list.

14.05 *Partial Utilization*

A. Prior to Substantial Completion of all the Work, Owner may use or occupy any substantially completed part of the Work which has specifically been identified in the Contract Documents, or which Owner, Engineer, and Contractor agree constitutes a separately functioning and usable part of the Work that can be used by Owner for its intended purpose without significant interference with Contractor's performance of the remainder of the Work, subject to the following conditions.

1. Owner at any time may request Contractor in writing to permit Owner to use or occupy any such part of the Work which Owner believes to be ready for its intended use and substantially complete. If and when Contractor agrees that such part of the Work is substantially complete, Contractor will certify to Owner and Engineer that such part of the Work is substantially complete and request Engineer to issue a certificate of Substantial Completion for that part of the Work.

2. Contractor at any time may notify Owner and Engineer in writing that Contractor considers any such part of the Work ready for its intended use and substantially complete and request Engineer to issue a certificate of Substantial Completion for that part of the Work.

3. Within a reasonable time after either such request, Owner, Contractor, and Engineer shall make an inspection of that part of the Work to determine its status of completion. If Engineer does not consider that part of the Work to be substantially complete, Engineer will notify Owner and Contractor in writing giving the reasons therefor. If Engineer considers that part of the Work to be substantially complete, the provisions of Paragraph 14.04 will apply with respect to certification of Substantial Completion of that part of the Work and the division of responsibility in respect thereof and access thereto.

4. No use or occupancy or separate operation of part of the Work may occur prior to compliance with the requirements of Paragraph 5.10 regarding property insurance.

14.06 *Final Inspection*

A. Upon written notice from Contractor that the entire Work or an agreed portion thereof is complete, Engineer will promptly make a final inspection with Owner and Contractor and will notify Contractor in writing of all particulars in which this inspection reveals that the Work is incomplete or defective. Contractor shall immediately take such measures as are necessary to complete such Work or remedy such deficiencies.

14.07 *Final Payment*

A. Application for Payment

1. After Contractor has, in the opinion of Engineer, satisfactorily completed all corrections identified during the final inspection and has delivered, in accordance with the Contract Documents, all maintenance and operating instructions, schedules, guarantees, bonds, certificates or other evidence of insurance certificates of inspection, marked-up record documents (as provided in Paragraph 6.12), and other documents, Contractor may make application for final payment following the procedure for progress payments.

2. The final Application for Payment shall be accompanied (except as previously delivered) by:

a. all documentation called for in the Contract Documents, including but not limited to the evidence of insurance required by Paragraph 5.04.B.7;

b. consent of the surety, if any, to final payment;

c. a list of all Claims against Owner that Contractor believes are unsettled; and

d. complete and legally effective releases or waivers (satisfactory to Owner) of all Lien rights arising out of or Liens filed in connection with the Work.

3. In lieu of the releases or waivers of Liens specified in Paragraph 14.07.A.2 and as approved by Owner, Contractor may furnish receipts or releases in full and an affidavit of Contractor that: (i) the releases and receipts include all labor, services, material, and equipment for which a Lien could be filed; and (ii) all payrolls, material and equipment bills, and other indebtedness connected with the Work for which Owner or Owner's property might in any way be responsible have been paid or otherwise satisfied. If any Subcontractor or Supplier fails to furnish such a release or receipt in full, Contractor may furnish a bond or other collateral satisfactory to Owner to indemnify Owner against any Lien.

B. *Engineer's Review of Application and Acceptance*

1. If, on the basis of Engineer's observation of the Work during construction and final inspection, and Engineer's review of the final Application for Payment and accompanying documentation as required by the Contract Documents, Engineer is satisfied that the Work has been completed and Contractor's other obligations

under the Contract Documents have been fulfilled, Engineer will, within ten days after receipt of the final Application for Payment, indicate in writing Engineer's recommendation of payment and present the Application for Payment to Owner for payment. At the same time Engineer will also give written notice to Owner and Contractor that the Work is acceptable subject to the provisions of Paragraph 14.09. Otherwise, Engineer will return the Application for Payment to Contractor, indicating in writing the reasons for refusing to recommend final payment, in which case Contractor shall make the necessary corrections and resubmit the Application for Payment.

C. Payment Becomes Due

1. Thirty days after the presentation to Owner of the Application for Payment and accompanying documentation, the amount recommended by Engineer, less any sum Owner is entitled to set off against Engineer's recommendation, including but not limited to liquidated damages, will become due and , will be paid by Owner to Contractor.

14.08 *Final Completion Delayed*

A. If, through no fault of Contractor, final completion of the Work is significantly delayed, and if Engineer so confirms, Owner shall, upon receipt of Contractor's final Application for Payment (for Work fully completed and accepted) and recommendation of Engineer, and without terminating the Contract, make payment of the balance due for that portion of the Work fully completed and accepted. If the remaining balance to be held by Owner for Work not fully completed or corrected is less than the retainage stipulated in the Agreement, and if bonds have been furnished as required in Paragraph 5.01, the written consent of the surety to the payment of the balance due for that portion of the Work fully completed and accepted shall be submitted by Contractor to Engineer with the Application for such payment. Such payment shall be made under the terms and conditions governing final payment, except that it shall not constitute a waiver of Claims.

14.09 *Waiver of Claims*

A. The making and acceptance of final payment will constitute:

1. a waiver of all Claims by Owner against Contractor, except Claims arising from unsettled Liens, from defective Work appearing after final inspection pursuant to Paragraph 14.06, from failure to comply with the Contract Documents or the terms of any special guarantees specified therein, or from Contractor's continuing obligations under the Contract Documents; and

2. a waiver of all Claims by Contractor against Owner other than those previously made in accordance with the requirements herein and expressly acknowledged by Owner in writing as still unsettled.

ARTICLE 15 - SUSPENSION OF WORK AND TERMINATION

15.01 *Owner May Suspend Work*

A. At any time and without cause, Owner may suspend the Work or any portion thereof for a period of not more than 90 consecutive days by notice in writing to Contractor and Engineer which will fix the date on which Work will be resumed. Contractor shall resume the Work on the date so fixed. Contractor shall be granted an adjustment in the Contract Price or an extension of the Contract Times, or both, directly attributable to any such suspension if Contractor makes a Claim therefor as provided in Paragraph 10.05.

15.02 *Owner May Terminate for Cause*

A. The occurrence of any one or more of the following events will justify termination for cause:

1. Contractor's persistent failure to perform the Work in accordance with the Contract Documents (including, but not limited to, failure to supply sufficient skilled workers or suitable materials or equipment or failure to adhere to the Progress Schedule established under Paragraph 2.07 as adjusted from time to time pursuant to Paragraph 6.04);

2. Contractor's disregard of Laws or Regulations of any public body having jurisdiction;

3. Contractor's disregard of the authority of Engineer; or

4. Contractor's violation in any substantial way of any provisions of the Contract Documents.

B. If one or more of the events identified in Paragraph 15.02.A occur, Owner may, after giving Contractor (and surety) seven days written notice of its intent to terminate the services of Contractor:

1. exclude Contractor from the Site, and take possession of the Work and of all Contractor's tools, appliances, construction equipment, and machinery at the Site, and use the same to the full extent they could be used by Contractor (without liability to Contractor for trespass or conversion),

2. incorporate in the Work all materials and equipment stored at the Site or for which Owner has paid Contractor but which are stored elsewhere, and

3. complete the Work as Owner may deem expedient.

C. If Owner proceeds as provided in Paragraph 15.02.B, Contractor shall not be entitled to receive any further payment until the Work is completed. If the unpaid balance of the Contract Price exceeds all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) sustained by Owner arising out of or relating to completing the Work, such excess will be paid to Contractor. If such claims, costs, losses, and damages exceed such unpaid balance, Contractor shall pay the difference to Owner. Such claims, costs, losses, and damages incurred by Owner will be reviewed by Engineer as to their reasonableness and, when so approved by Engineer, incorporated in a Change Order. When exercising any rights or remedies under this Paragraph Owner shall not be required to obtain the lowest price for the Work performed.

D. Notwithstanding Paragraphs 15.02.B and 15.02.C, Contractor's services will not be terminated if Contractor begins within seven days of receipt of notice of intent to terminate to correct its failure to perform and proceeds diligently to cure such failure within no more than 30 days of receipt of said notice.

E. Where Contractor's services have been so terminated by Owner, the termination will not affect any rights or remedies of Owner against Contractor then existing or which may thereafter accrue. Any retention or payment of moneys due Contractor by Owner will not release Contractor from liability.

F. If and to the extent that Contractor has provided a performance bond under the provisions of Paragraph 5.01.A, the termination procedures of that bond shall supersede the provisions of Paragraphs 15.02.B, and 15.02.C.

15.03 *Owner May Terminate For Convenience*

A. Upon seven days written notice to Contractor and Engineer, Owner may, without cause and without prejudice to any other right or remedy of Owner, terminate the Contract. In such case, Contractor shall be paid for (without duplication of any items):

1. completed and acceptable Work executed in accordance with the Contract Documents prior to the effective date of termination, including fair and reasonable sums for overhead and profit on such Work;

2. expenses sustained prior to the effective date of termination in performing services and furnishing labor, materials, or equipment as required by the Contract Documents in connection with uncompleted Work, plus fair and reasonable sums for overhead and profit on such expenses;

3. all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) incurred in settlement of terminated contracts with Subcontractors, Suppliers, and others; and

4. reasonable expenses directly attributable to termination.

B. Contractor shall not be paid on account of loss of anticipated profits or revenue or other economic loss arising out of or resulting from such termination.

15.04 *Contractor May Stop Work or Terminate*

A. If, through no act or fault of Contractor, (i) the Work is suspended for more than 90 consecutive days by Owner or under an order of court or other public authority, or (ii) Engineer fails to act on any Application for Payment within 30 days after it is submitted, or (iii) Owner fails for 30 days to pay Contractor any sum finally determined to be due, then Contractor may, upon seven days written notice to Owner and Engineer, and provided Owner or Engineer do not remedy such suspension or failure within that time, terminate the Contract and recover from Owner payment on the same terms as provided in Paragraph 15.03.

B. In lieu of terminating the Contract and without prejudice to any other right or remedy, if Engineer has failed to act on an Application for Payment within 30 days after it is submitted, or Owner has failed for 30 days to pay Contractor any sum finally determined to be due, Contractor may, seven days after written notice to Owner and Engineer, stop the Work until payment is made of all such amounts due Contractor, including interest thereon. The provisions of this Paragraph 15.04 are not intended to preclude Contractor from making a Claim under Paragraph 10.05 for an adjustment in Contract Price or Contract Times or otherwise for expenses or damage directly attributable to Contractor's stopping the Work as permitted by this Paragraph.

ARTICLE 16 - DISPUTE RESOLUTION

16.01 *Methods and Procedures*

A. Either Owner or Contractor may request mediation of any Claim submitted to Engineer for a decision under Paragraph 10.05 before such decision becomes final and binding. The mediation will be

governed by the Construction Industry Mediation Rules of the American Arbitration Association in effect as of the Effective Date of the Agreement. The request for mediation shall be submitted in writing to the American Arbitration Association and the other party to the Contract. Timely submission of the request shall stay the effect of Paragraph 10.05.E.

B. Owner and Contractor shall participate in the mediation process in good faith. The process shall be concluded within 60 days of filing of the request. The date of termination of the mediation shall be determined by application of the mediation rules referenced above.

C. If the Claim is not resolved by mediation, Engineer's action under Paragraph 10.05.C or a denial pursuant to Paragraphs 10.05.C.3 or 10.05.D shall become final and binding 30 days after termination of the mediation unless, within that time period, Owner or Contractor:

1. elects in writing to invoke any dispute resolution process provided for in the Supplementary Conditions, or

2. agrees with the other party to submit the Claim to another dispute resolution process, or

3. gives written notice to the other party of their intent to submit the Claim to a court of competent jurisdiction.

ARTICLE 17 - MISCELLANEOUS

17.01 *Giving Notice*

A. Whenever any provision of the Contract Documents requires the giving of written notice, it will be deemed to have been validly given if:

1. delivered in person to the individual or to a member of the firm or to an officer of the corporation for whom it is intended, or

2. delivered at or sent by registered or certified mail, postage prepaid, to the last business address known to the giver of the notice.

17.02 *Computation of Times*

A. When any period of time is referred to in the Contract Documents by days, it will be computed to exclude the first and include the last day of such period. If the last day of any such period falls on a Saturday or Sunday or on a day made a legal holiday by the law of the applicable jurisdiction, such day will be omitted from the computation.

17.03 *Cumulative Remedies*

A. The duties and obligations imposed by these General Conditions and the rights and remedies available hereunder to the parties hereto are in addition to, and are not to be construed in any way as a limitation of, any rights and remedies available to any or all of them which are otherwise imposed or available by Laws or Regulations, by special warranty or guarantee, or by other provisions of the Contract Documents. The provisions of this Paragraph will be as effective as if repeated specifically in the Contract Documents in connection with each particular duty, obligation, right, and remedy to which they apply.

17.04 *Survival of Obligations*

A. All representations, indemnifications, warranties, and guarantees made in, required by, or given in accordance with the Contract Documents, as well as all continuing obligations indicated in the Contract Documents, will survive final payment, completion, and acceptance of the Work or termination or completion of the Contract or termination of the services of Contractor.

17.05 *Controlling Law*

A. This Contract is to be governed by the law of the state in which the Project is located.

17.06 *Headings*

A. Article and paragraph headings are inserted for convenience only and do not constitute parts of these General Conditions.

SECTION 00800

SUPPLEMENTARY CONDITIONS

These Supplementary Conditions amend or supplement Section 00700: General Conditions (Standard General Conditions of the Construction Contract) and other provisions of the Contract Documents as indicated below. All provisions, which are not so amended or supplemented, remain in full force and effect.

The provisions of these Sections shall be complied with in addition to the provisions of Section 00700: General Conditions and Section 00800: Supplementary Conditions. If conflicts exist among these Sections, the stricter requirements, as determined by ENGINEER, shall govern.

ARTICLE 1 – DEFINITIONS

SC-1.01 Defined Terms

Add new paragraphs immediately after Paragraph 1.52 which are to read as follows:

1.55 Manufacturer – An individual, firm or corporation that manufactures, assembles, or fabricates products.

1.56 Products – Systems, materials, manufactured units, equipment, components, and accessories used in the Work.

ARTICLE 2 – PRELIMINARY MATTERS

SC-2.01 Delivery of Bonds and Evidence of Insurance

Delete Paragraph 2.01 and insert the following in its place:

2.01.1 When CONTRACTOR delivers the executed Agreements to OWNER, CONTRACTOR shall also deliver to OWNER, with copies to each additional insured identified herein, certificates of insurance endorsements to CONTRACTOR's insurance policies, insurance policies (and other evidence of insurance which OWNER or any additional insured may reasonably request) which CONTRACTOR is required to purchase and maintain in accordance with Article 5.

ARTICLE 3 – CONTRACT DOCUMENTS: INTENT, AMENDING, REUSE

SC-3.01 Intent

Add a new paragraph immediately after Paragraph 3.01 which is to read as follows:

3.01.D Sections of Division 1 – General Requirements govern all Sections of the Specifications.

SC-3.02 Reference Standards

Add a new paragraph immediately after Paragraph 3.02.1.2 which is to read as follows:

3. The CONTRACTOR is responsible for compliance to Part 91, Soil Erosion and Sedimentation Control of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended and is responsible for compliance in accordance with the Michigan Association of County Drain Commissioners (MACDC) Soil Erosion and Sedimentation Control (SESC) Authorized Public Agency (APA) procedures manual. If for any reason, the OWNER is found to be in violation of Part 91 due to the CONTRACTOR found in non-compliance, the CONTRACTOR will be fully responsible for any fines and costs incurred by the OWNER, including legal defense and any and all costs associated with a violation.

   The CONTRACTOR acknowledges that the procedures manual is available at macdc.net and has reviewed and understands the manual.

   The CONTRACTOR acknowledges the OWNER's right to enter on to the project and install or repair any soil erosion control measures at CONTRACTOR's expense after notice to CONTRACTOR, allowing time for the repair or installation to be made by CONTRACTOR. Such repair or installation may be made by OWNER or by a third-party Contractor or Owner.

ARTICLE 5 – BONDS AND INSURANCE

SC-5.01D

Add new paragraph immediately after Paragraph 5.01C which is to read as follows:

All Bonds and insurance required by the Contract Documents to be purchased and maintained by CONTRACTOR shall be obtained from surety or insurance companies that are authorized to transact business in Michigan and are classified at not lower than each of the following:

5.01.D.1 Best's Key Rating Guide, current edition:

(1)	Rating Classification:	A.
(2)	Financial Size Category:	Class V.

5.01.D.2 Standard and Poor's:

(1) Claims-Paying Ability Rating:	AA.

SC-5.04 Contractor's Liability Insurance

Add the following after Paragraph 5.04:

The limits of liability for the insurance required by Paragraph 5.04 shall provide the following coverages for not less than the following amounts or greater where required by Laws and Regulations:

5.04.A.1 and 5.04.A.2. Workers' Compensation, etc.:

(1)	State:	Statutory
(2)	Applicable Federal (e.g., Longshoreman's)	Statutory
(3)	Employer's Liability:	$ 500,000.00

5.04.A.3, 5.04.A.4., and 5.04.A.5. CONTRACTOR's Liability Insurance under Paragraph 5.04.A.3 through 5.04.A.5 which shall also include completed operations and product liability coverages and eliminate the exclusion with respect to property under the care, custody, and control of CONTRACTOR:

(1)	General Aggregate (Except Products-Completed Operations):	$ 2,000,000.00
(2)	Products-Completed Operations Aggregate	$ 2,000,000.00
(3)	Personal and Advertising Injury (Per Person/ Organization)	$ 1,000,000.00
(4)	Each Occurrence (Bodily Injury and Property Damage)	$ 1,000,000.00

(5) Property Damage liability insurance will provide Explosion, Collapse and Underground coverages where applicable.

5.04.A.6 Automobile Liability (including hired and non-owned vehicles):

(1) Combined Single Limit (Bodily Injury and Property Damage):

$ 1,000,000.00 Each Accident

(2) MCS 90 Endorsement on Vehicle Insurance: Statutory

SC-5.04.B.1

Add the following at the end of Paragraph 5.04.B.1:

OWNER, ENGINEER, and the following ENGINEER's Consultants and other persons or entities shall be listed as additional insureds under the policies required by Article 5:

5.04.B.a	Muskegon County Drain Commissioner
5.04.B.b	Eng., Inc.
5.04.B.c	Soils and Structures
5.04.B.d	County of Muskegon
5.04.B.e	Egelston Township
5.04.B.f	Moorland Township
5.04.B.g	Ravenna Township
5.04.B.h	Casnovia Township
5.04.B.i	Muskegon County Road Commission
5.04.B.j	People of the State of Michigan
5.04.B.k	Black Creek Consolidated Drain Drainage District
5.04.B.l	Land & Resource Engineers

SC-5.04.B.2

Add a new paragraph immediately after Paragraph 5.04.B.2 which is to read as follows:

5.04.B.2.a Umbrella Liability:

(1) The carrier shall agree to the underlying policies.
(2) Coverage shall be at least as broad as that in the covered policies.
(3) Shall cover CONTRACTOR's Liability Insurance and Automobile Liability Insurance.
(4) Coverage Limit: $ 2,000,000.00 General Aggregate
$ 1,000,000.00 Each Occurrence

SC-5.04.B.4 Contractual Endorsement

Add the following to Paragraph 5.04.B.4:

The Contractual Liability coverage required by Paragraph 5.04.B.4 shall provide coverage for not less than the following amounts:

(1)	General Aggregate	$ 2,000,000.00
(2)	Each Occurrence (Bodily Injury & Property Damage)	$ 1,000,000.00

SC-5.04.B.6

Delete Paragraph 5.04.B.6 and insert the following in its place:

6. remain in effect at least until the end of the correction period and at all times thereafter when CONTRACTOR may be correcting, removing, or replacing defective Work in accordance with Paragraph 13.07; and

SC-5.04.B.7

Amend Paragraph 5.04.B.7 by striking out the following words: "and any insurance coverage written on a claims-made basis". As so amended Paragraph 5.04.B.7 remains in effect.

SC-5.04.B.8

Add new paragraph immediately after Paragraph 5.04.B.7 that is to read as follows:

8. Not to be written on a claims-made basis; and

SC-5.05 Owner's Liability Insurance

Delete Paragraph 5.05 and insert the following in its place:

CONTRACTOR shall purchase and maintain Owner's and Contractor's Protective Liability Insurance which shall:

(1) Be written by the same insurance carrier as CONTRACTOR's Liability Insurance.
(2) Be a separate policy to protect OWNER, ENGINEER, their consultants, agents, employees, and such public corporations in whose jurisdiction the Work is located for their liability for work performed by CONTRACTOR or Subcontractors under this Contract.
(3) Name OWNER as the insured.
(4) Name the following as additional insured:
    a. Eng., Inc.
    b. Soils and Structures
    c. County of Muskegon
    d. Egelston Township
    e. Moorland Township
    f. Ravenna Township
    g. Casnovia Township
    h. Muskegon County Road Commission
    i. People of the State of Michigan
    j. Black Creek Consolidated Drain Drainage District
    k. Land & Resource Engineers
(5) Provide coverage for not less than the following amounts:
    a. Separate:
    Bodily Injury
    $ 1,000,000.00 Each Occurrence
    and Property Damage
    $ 1,000,000.00 Each Occurrence
    $ 2,000,000.00 Annual Aggregate

SC-5.06 Property Insurance

Delete the first sentence of Paragraph 5.06 and insert the following in its place:

CONTRACTOR shall purchase and maintain property insurance, with OWNER as loss payee, upon the Work at the site in the amount of the full replacement cost thereof.

SC-5.06.1

Add the following at the end of Paragraph 5.06.A.1.

ENGINEER, and the following ENGINEER's Consultants and other persons or entities shall be listed as additional insureds under the policy:

a. Soils and Structures
b. County of Muskegon
c. Egelston Township
d. Moorland Township
e. Ravenna Township
f. Casnovia Township
g. Muskegon County Road Commission
h. People of the State of Michigan
i. Black Creek Consolidated Drain Drainage District
j. Land & Resource Engineers

SC-5.06.A.2

Add the following Paragraph 5.06.A.2:

Property insurance coverage shall also include flood, start-up and testing, offsite storage, boiler, and machinery insurance.
SC-5.08 Amend the first sentence of Paragraph 5.08 by striking out the word "OWNER" where it first occurs and inserting the word "CONTRACTOR" in its place. As so amended, Paragraph 5.08 remains in effect.

ARTICLE 6 – CONTRACTOR'S RESPONSIBILITIES

SC-6.06 Concerning Subcontractors, Suppliers and Others

Add new Paragraph 6.06.H which is to read as follows:

OWNER or ENGINEER may furnish to any Subcontractor, Supplier or other person or organization, to the extent practicable, evidence of amounts paid to CONTRACTOR in accordance with CONTRACTOR's Application for Payment.

SC-6.08 Permits

Add the following at the end of Paragraph 6.08:

Within 5 days of signing the Agreement, the CONTRACTOR must complete, execute, and submit an application to the OWNER for work within the rights of way. The OWNER will then sign and deliver a completed copy to the Muskegon County Road Commission. The CONTRACTOR will also follow all requirements of the Muskegon County Road Commission for work within the rights of way and any insurance requirements listed in the Permit, including listing them as an additional insured. There is a fee of $200 for said Permit, which is noted in the Application for Permit in Section 01570: Traffic Regulation. Said Permit fee must be delivered to the OWNER with the completed Application to the Muskegon County Road Commission. A copy of the Permit can be found in Section 01570: Traffic Regulation.

The CONTRACTOR also acknowledges that the Muskegon County Drain Commissioner is the Authorized Public Agency (APA) for review and inspection of the CONTRACTOR's compliance to Part 91, Soil Erosion and Sedimentation Control of the Natural Resources and Environmental Protection Act, 1994 PA 451. The OWNER will complete a Permit for the CONTRACTOR once the Notice of Award is delivered. There will be no cost for this Permit.

ARTICLE 7- OTHER WORK AT THE SITE

SC-7.02 Coordination

Add the following to the end of Article 7.02.A:

4. CONTRACTOR shall communicate with, schedule, and coordinate the work performed by others.

ARTICLE 14- PAYMENTS TO CONTRACTOR AND COMPLETION

SC-14.02 Progress Payment

Add a new paragraph immediately after Paragraph 14.02.A.3 which is to read as follows:

4. CONTRACTOR shall indicate on the Application for Payment the amounts that are due to OWNER from CONTRACTOR in accordance with the Contract Documents and which amounts OWNER may deduct from the progress payment.

SC-14.02.B.5 Refusal to Recommend Payment

Add the following new paragraphs immediately after Paragraph 14.02.B.5.d which are to read as follows:

e. CONTRACTOR has incurred liability for other costs in accordance with Contract Documents.

f. Liability for liquidated damages has been incurred by CONTRACTOR.

g. CONTRACTOR's failure to maintain record documents in accordance with Paragraph 6.19.

ARTICLE 15 – SUSPENSION OF WORK AND TERMINATION

Add a new paragraph immediately after Paragraph 15.02.A.4 that is to read as follows:

5. If CONTRACTOR has filed a bankruptcy petition and if neither CONTRACTOR nor trustee has either assumed or rejected this Contract within 30 days after the filing of the bankruptcy petition;

ARTICLE 16 – DISPUTE RESOLUTION

SC-16 Dispute Resolution

Add a new paragraph immediately after Paragraph 16 which is to read as follows:

Exhibit GC-A is deleted in its entirety.

END OF SECTION

SECTION 00900

FORMS

The following forms are to be used during the project if needed:

00900.1 Notice of Award

00900.2 Work Change Directive

00900.3 Change Order

00900.4 Application for Payment

00900.5 Certificate of Substantial Completion

00900.6 Bulletin

END OF SECTION

SECTION 00900.1

NOTICE OF AWARD

Dated _____, 20____

TO: _____
(Successful Bidder)

ADDRESS: _____

_____

_____

CONTRACT FOR [ ].

You are notified that your Bid dated _____, 20___, for the above Contract has been considered. You are the apparent Successful Bidder and have been awarded a Contract for the [ ].

(Indicate total Work, alternatives or section of Work awarded.)

The Contract Price of your Contract is

_____

_____Dollars ($_____)

Three copies of the proposed Project Manual accompany this Notice of Award.

You must comply with the following conditions precedent within 15 days of the date of this Notice of Award; that is, by _____, 20___.

1. You must deliver to the OWNER three fully executed counterparts of the Agreement included in the Project Manual. Each of the Agreements must bear your signature at the designated location.

2. You must deliver with the executed Agreement the contract Security (Bonds) as specified in the Instructions to Bidders and Section 00700: General Conditions (paragraph 5.1) and Section 00800: Supplementary Conditions (paragraph SC-5.1.).

3. You must also deliver with the executed Agreement the insurance documents specified in Article 5 of Section 00700: General Conditions and Article 5 of Section 00800: Supplementary Conditions.

4. (List other conditions precedent).

_____

_____

_____

_____

_____

_____

Failure to comply with these conditions within the time specified will entitle OWNER to consider your bid abandoned, to annul this Notice of Award and to declare your Bid Security forfeited.

Within 10 days after you comply with those conditions, OWNER will return to you one fully signed counterpart of the Agreement included in the Project Manual.

[Name of Organization]

By _____
(Authorized Signature)

*Typed or Printed in ink

Copy to ENGINEER

_____
(*Name and Title)

ACCEPTANCE OF AWARD:

By:_____
Contractor

_____ _____
Signature Printed Name

_____ _____
Date Title

END OF SECTION

SECTION 00900.2

WORK CHANGE DIRECTIVE

No. _____

DATE OF ISSUANCE _____ EFFECTIVE DATE _____

OWNER _____

CONTRACTOR _____

Contract: _____

Project: _____

OWNER's Contract No. _____ ENGINEER's Project No. _____

You are directed to proceed promptly with the following change(s):

Description:

Purpose of Work Change Directive:

Attachments: (List documents supporting change)

If OWNER or CONTRACTOR believes that the above change has affected Contract Price, any Claim for a Change Order based thereon will involve one or more of the following methods as defined in the Contract Documents.

Method(s) of determining change in Contract Price:

_____ Unit Prices
_____ Lump Sum
_____ Cost of the Work

Estimated increase (decrease) in Contract Price:

$ _____

If the change involves an increase, the estimated amount is not to be exceeded without further authorization.

Estimated increase (decrease) in Contract Times:

Substantial Completion: _____ days.

Ready for final payment: _____ days.

RECOMMENDED:

_____
ENGINEER

By: _____

AUTHORIZED:

_____
OWNER

By: _____

END OF SECTION

SECTION 00900.3

CHANGE ORDER

No. 1

DATE OF ISSUANCE _____ EFFECTIVE DATE _____

OWNER _____
CONTRACTOR _____
Contract: _____
Project: _____
OWNER's Contract No. _____ ENGINEER's Contract No. _____
ENGINEER _____

You are directed to make the following changes in the Contract Documents:
Description:

Reason for Change Order:

Attachments: (List documents supporting change)

CHANGE IN CONTRACT PRICE:
Original Contract Price $ _____
Net Increase (Decrease) from previous Change Orders No. _____ To: _____ $ _____
Contract Price prior to this Change Order: $ _____
Net increase (decrease) of this Change Order: $ _____
Contract Price with all approved Change Orders: $ _____

CHANGE IN CONTRACT TIMES:
Original Contract Times: Substantial Completion: Ready for final payment _____ (days or dates)
Net change from previous Change Orders No._____ To No:_____ Substantial Completion: _____ Ready for final payment: _____ (days)
Contract Times prior to this Change Order: Substantial Completion: _____ Ready for final payment: _____ (days or dates)
Net increase (decrease) this Change Order: Substantial Completion: _____ Ready for final payment: _____ (days)
Contract Times with all approved Change Orders: Substantial Completion: _____ Ready for final payment: _____ (days or dates)

RECOMMENDED:

By: _____
ENGINEER (Authorized Signature)

Date: _____

APPROVED:

By: _____
OWNER (Authorized Signature)

Date: _____

ACCEPTED:

By: _____
CONTRACTOR (Authorized Signature)

Date: _____

END OF SECTION

SECTION 00900.4

APPLICATION FOR PAYMENT NO.

To:	(OWNER)
From:	(CONTRACTOR)
Contract:	
Project:	
OWNER's Contract No.	ENGINEER's Project No.
For Work accomplished through the date of :	

1. Original Contract Price:	
2. Net change by Change Orders and Written Amendments (+ or -):	
3. Current Contract Price (1plus 2)	$0.00
4. Total completed and stored to date:	
5. Retainage (per Agreement):	
___% of completed Work:	
___% of stored material:	
Total Retainage: $0.00	
6. Total completed and stored to date less retainage (4 minus 5):	$0.00
7. Less previous Application for Payments:	
8. **DUE THIS APPLICATION (6 MINUS 7):**	$0.00

Accompanying documentation:

CONTRACTOR'S Certification:
The undersigned CONTRACTOR certifies that (1) all previous progress payments received from OWNER on account of Work done under the Contract referred to above have been applied on account to discharge CONTRACTOR's legitimate obligations incurred in connection with Work covered by prior Applications for Payment numbered 1 through ___ inclusive; (2) title of all Work, materials and equipment incorporated in said Work or otherwise listed in or covered by this Application for Payment will pass to OWNER at time of payment free and clear of all Liens, security interests and encumbrances (except such as are covered by a Bond acceptable to OWNER indemnifying OWNER against any such Lien, security interest or encumbrance); and (3) all Work covered by this Application for payment is in accordance with the Contract Documents and not defective.

Dated _____ _____
CONTRACTOR

State of _____

County of _____

Subscribed and sworn to before me this _____ Day of _____

_____
Notary Public

My Commission expires: _____

Payment of the above AMOUNT DUE THIS APPLICATION is recommended.

Dated _____ _____
ENGINEER

By: _____

END OF SECTION

SECTION 00900.5

CERTIFICATE OF SUBSTANTIAL COMPLETION

The responsibilities between OWNER and CONTRACTOR for security, operation, safety, maintenance, heat, utilities, insurance, warranties and guarantees shall be as follows:

OWNER: _____

CONTRACTOR: _____

The following documents are attached to and made a part of this Certificate:

For items to be attached, see definition of Substantial Completion as supplemented and other specifically noted conditions precedent to achieving Substantial Completion as required by Contract Documents.

This certificate does not constitute an acceptance of Work not in accordance with the Contract Documents nor is it a release on CONTRACTOR's obligation to complete the work in accordance with the Contract Documents.

Executed by the ENGINEER on: _____
Date

_____
ENGINEER

By: _____
(Authorized Signature)

CONTRACTOR accepts this Certificate of Substantial Completion on: _____
Date

_____
CONTRACTOR

By: _____
(Authorized Signature)

OWNER accepts this Certificate of Substantial Completion on: _____
Date

_____
OWNER

By: _____
(Authorized Signature)

END OF SECTION

SECTION 00900.6

BULLETIN

No._____

PROJECT: _____ DATE OF ISSUANCE: _____

OWNER:
_____ _____
(Name, Address)

CONTRACTOR: _____ OWNER's Project No. _____ __

ENGINEER: _____

CONTRACT FOR: _____ ENGINEER's Project No. _____ _

This is not a Change Order to the Contract. We are requesting a quotation for possible work to be performed.

Description:

Purpose of Bulletin:

Attachments: (list documents supporting possible change)

_____

CHANGE IN CONTRACT PRICE:

Net Increase (decrease) of this Bulletin:

$_____

_____

CHANGE IN CONTRACT TIME:

Net Increase (decrease) of this Bulletin:

Day_____

_____

PROPOSED:

By_____
CONTRACTOR

END OF SECTION

SECTION 00920

ADDENDUM

[Project OWNER]
[OWNER Address]

ADDENDUM NO. _____

DATE: _____

ENGINEER: Eng., Inc.
4063 Grand Oak Drive, Suite A109
Lansing, MI 48911

Drawing Revision No: _____

Drawing Sheets Issued Herewith: _____

Bids Due: _____Issued to all Plan Holders

This Addendum is part of the Contract Documents and modifies the previously issued Bidding Documents. Acknowledge receipt of this Addendum in the space provided on the Bid Form. Failure to do so may result in rejection of the Bid.

ITEM NO. 1

SECTION: _____ [TITLE] _____

[PARAGRAPH] _____

[PARAGRAPH]_____

END OF SECTION

SECTION 00954

NOTICE TO PROCEED

DATED: _____, 20____

TO: _____
(Bidder)

ADDRESS: _____

_____

_____

CONTRACT for **[Name of Contract]**

You are notified that the Contract Time under the above Contract will commence to run on _____, 20__. By that date you are to start performing your obligations under the Contract Documents. In accordance with Article 3 of the Agreement the dates of Substantial Completion and Final Completion are _____, 20__ and _____, 20__ respectively.

Also before you may start any work at the Site, you must

(Add other requirements)

_____

_____

_____

[Owner]

By: _____
(Authorized Signature)

_____
(*Name and Title)

*Typed or printed in ink
Copy to ENGINEER

END OF SECTION

SECTION 00958

AFFIDAVIT AND CONSENT OF SURETY

STATE OF MICHIGAN

COUNTY OF _____.

The undersigned CONTRACTOR, being duly sworn, deposes and says that he entered into an Agreement (Contract) with [Owner] (OWNER) on the _____day of _____20___ for the performance of certain work generally described as follows: [Project Name].

CONTRACTOR further says that the Work under the terms of the Contract has been completed and all sums due to Contractors, Subcontractors, Suppliers and laborers with whom CONTRACTOR has contracted for performance under the Contract have been paid in full.

Furthermore, in consideration of final payment under the Contract, CONTRACTOR hereby waives and releases any and all claims or rights which CONTRACTOR may have in connection with the Contract against OWNER or the premises upon which the Contract Work was performed and agrees to indemnify OWNER against any and all such claims or rights which may above asserted by Contractors, Subcontractors, Suppliers or laborers with whom CONTRACTOR has contracted for performance under the Contract.

DATE: _____, 20____
Signed in the presence of:

_____

_____

_____
CONTRACTOR Signature

_____
Name*

_____
Title*

Subscribed and sworn to before me
this _____day of _____, 20____

Notary Public Signature_____

Notary Public Name:* _____

My commission expires: _____

County: _____

CONSENT OF SURETY

The undersigned as Surety on the Contract hereby consents to the making of final payment to the CONTRACTOR under the Contract.

Date_____, 20____

_____
Surety Company*

_____
Attorney-in-Fact (Signature)

_____
Name and Title*

*Typed or printed in ink.
(Attach copy of power of attorney certified to date of consent.)

END OF SECTION

SECTION 01010

SUMMARY OF WORK

PART 1 - GENERAL

1.01 WORK COVERED BY CONTRACT DOCUMENTS:

A. The Work covered by Contract Documents furnishing and installation of Black Creek Consolidated Drain Division 7 for the Muskegon County Drain Commissioner, OWNER.

B. The Work includes, but is not limited to, the major items listed in Section 00314: Bid.

1.02 TYPE OF CONTRACT:

A. Construct the Work of this Contract under a single unit price contract.

1.03 GENERAL:

A. Imperative language:
1. These Specifications (Divisions 1 through 16) are written in the imperative and abbreviated form. This imperative language of the technical specifications is directed at CONTRACTOR unless specifically noted otherwise. Incomplete sentences shall be completed by inserting “shall”, “shall be” and similar mandatory phrases by inference in the same manner as they are applied to notes on Drawings. The words “shall”, “shall be” and similar mandatory phrases shall be supplied by inference where a colon (:) is used within sentences or phrases. Except as worded to the contrary, fulfill (perform) all indicated requirements whether stated in the imperative or otherwise.

B. Related Sections:
1. Some Sections of these Specifications (Divisions 1 through 16) may include a paragraph titled “Related Sections”. This paragraph is an aid to the project Manual user and is not intended to include all Sections which may be related. It is CONTRACTOR’s obligation to coordinate all Sections whether indicated under “Related Sections” or not.

C. Reference to Section 00700: General Conditions:
1. In Divisions 1 through 16, a reference to Section 00700: General Conditions includes by inference all amendments or supplements in Section 00800: Supplementary Conditions.

1.04 WORK UNDER OTHER CONTRACTS:

A. OWNER will award Contracts for furnishing and installation of the following work:
1. Black Creek Consolidated Drain – Division 1.
2. Black Creek Consolidated Drain – Division 2.
3. Black Creek Consolidated Drain – Division 3.
4. Black Creek Consolidated Drain – Division 4.
5. Black Creek Consolidated Drain – Division 5.
6. Black Creek Consolidated Drain – Division 6.
7. Black Creek Consolidated Drain – Division 8.
8. Black Creek Consolidated Drain – Division 9.
9. Black Creek Consolidated Drain – Division 10.
10. Black Creek Consolidated Drain – Division 11.
11. Black Creek Consolidated Drain – Division 12.

B. Coordinate the schedule of Work under other contracts with OWNER and other contractors.

C. Cooperate with all contractors performing Work on the Site.

D. Copies of Contract Documents for Work under separate contracts are available for review at ENGINEER’s office.

1.05 CONTRACTOR USE OF PREMISES:

A. Limit use of premises to allow for OWNER occupancy, Work by other contractors, and public access.

B. Limit construction traffic access to Site from public right-of-way and recorded easements.

C. Coordinate use of premises under direction of ENGINEER.

D. Except in connection with the safety or protection of persons or the Work or property at the Site or adjacent thereto, all Work at the Site shall be restricted to the following hours.
   1. Monday through Friday (except legal holidays): 7:00 a.m. to 7:00 p.m.
   2. Saturday, Sundays or legal holidays with written approval of OWNER.

E. Work within highway rights-of-way:
   1. In accordance with Section 01570: Traffic Regulation.

F. Private easements:
   1. OWNER will arrange for the necessary easements required for construction across privately owned land. CONTRACTOR shall carry on the construction in such a manner as to cause a minimum of inconvenience to the occupants of the properties.
   2. OWNER has obtained restricted easement agreements in some locations. CONTRACTOR shall conduct CONTRACTOR's operations on easements in such a manner as to comply with the conditions set forth in said easement agreements, which are on file with the OWNER. All easement conditions noted shall be accomplished by CONTRACTOR and shall be included in the Contract Price. CONTRACTOR shall limit CONTRACTOR's operations to the time of year or time of week required on certain easements, as noted in the easement agreements.
   3. Any agreement made by CONTRACTOR with any property owner that extends the rights as granted under an easement obtained by OWNER or that provides for an additional easement shall be obtained by CONTRACTOR at CONTRACTOR's expense and shall in no way be binding upon OWNER. CONTRACTOR shall defend and hold OWNER and ENGINEER harmless against any action that may arise from activities conducted pursuant to such additional agreements or easements. Unless relieved of responsibility for surface restoration in writing by property owner, CONTRACTOR shall restore areas covered by separate agreements substantially the same as similar areas within the Project.
   4. CONTRACTOR may obtain copies of any of the recorded easements from the ENGINEER.

1.06 OCCUPANCY REQUIREMENTS:

A. OWNER occupancy during construction:
   1. OWNER will occupy or utilize premises during entire period of construction. Cooperate with ENGINEER to minimize conflict and to facilitate OWNER's operations.
   2. Access to abutting properties: Provide at all times.
   3. Access for emergency vehicles:
      a. Provide at all times.
      b. Provide at least one clear lane during nonwork periods.
   4. Fire hydrants: Provide access to at all times.
   5. Do not block fire access routes.
   6. Detours and street closure: When provided for in the Contract Documents or approved by ENGINEER. Routes and barricades as indicated or as approved by road authority.
   7. Limit parking for construction vehicles to an area designated by OWNER

1.07 MILESTONES:

A. Milestone:
   1. Comply with the following schedule of Milestones:
      a. Tree Cutting: After August 15 and prior to April 15.
      b. Work affecting public roadways: Road closures limited to 21-day window of uninterrupted work through top course paving for each affected roadway.

1.08 WORK SEQUENCE:

A. Coordinate construction schedule and operations with ENGINEER.

B. Sequence submittal:
   1. Submit a proposed sequence with appropriate times of starting and completion of tasks to ENGINEER for review.

C. The following sequence and intermediate dates of key work items are required in accordance with the project milestones set forth in Section 1.07 above.

1.09 ROAD PERMITS:

A. Within 10 days of signing the Agreement, the CONTRACTOR must complete, execute and submit a Right of Way Permit Application to the OWNER for work within the County rights of way. The OWNER will then sign and deliver a completed copy to the Muskegon County Road Commission. The CONTRACTOR will also follow all requirements of the Muskegon County Road Commission for work within the rights of way and any insurance requirements listed in the Permit. There is no fee for said Permit, which is noted in Section 01570: Traffic Regulation. Said Permit fee must be paid by CONTRACTOR and be delivered to the OWNER with the completed Application to the Muskegon County Road Commission. A copy of the Permit can be found in Section 01570: Traffic Regulation.

B. The CONTRACTOR must provide all necessary bonds and insurances as required for work performed in MDOT right of way. The CONTRACTOR will also follow all requirements and restrictions as outlined in the permit.

C. CONTRACTOR must complete all paving operations in any public right of way immediately after culvert installation and/or storm sewer work.

D. See Muskegon County Road Commission Permit, insurance requirements through the OWNER's project and the procedures and standards following Section 01570: Traffic Regulation.

1.10 SOIL EROSION AND SEDIMENTATION CONTROL:

A. The CONTRACTOR also acknowledges that the Muskegon County Drain Commissioner is the Authorized Public Agency (APA) for review and inspection of the CONTRACTOR's compliance to Part 91, Soil Erosion and Sedimentation Control of the Natural Resources and Environmental Protection Act, 1994 PA 451. The OWNER will complete a Permit for the CONTRACTOR once the Notice of Award is delivered. There will be no cost for this Permit.

1.11 STATE OF MICHIGAN - EGLE PERMIT:

A. CONTRACTOR acknowledges that a Permit has been obtained from the Michigan Department of Environment, Great Lakes and Energy (EGLE) for some aspects of work on this project and will comply with all provisions of said Permit.

PART 2 - PRODUCTS

2.01 OTHER MATERIALS:

A. General:
1. All other materials which are not specified herein and are not indicated on the Drawings, but are required for proper and complete performance of the Work.

B. Procedure:
1. Select new, first quality materials.
2. Obtain ENGINEER's review.
3. Provide and install.

PART 3 - EXECUTION

Not used.

END OF SECTION

SECTION 01012

STAKING AND INSPECTION SERVICES

PART 1 - GENERAL

1.01 SUMMARY:

A. Section includes:
1. This Section includes, but is not necessarily limited to, staking and inspection services to be provided by ENGINEER and others as indicated on the Drawings, as specified herein, and as necessary for the proper and complete performance of the Work.
2. Related Sections:
a. Documents affecting work of this Section include but are not necessarily limited to:
i. General Conditions, Supplementary Conditions and Sections in Division 1 of these Specifications.

1.02 PROJECT LAYOUT:

A. Responsibilities:
1. ENGINEER will furnish stakes as follows:
a. For wastewater and storm sewers, line and grade stakes:
i. At manhole.
ii. At 50, 100, 200 and 300 feet upstream from manholes.
iii. At mid-point between manholes.
b. For water mains and pumping mains, line stakes:
i. At intervals of approximately 300 feet.
ii. At other locations generally required to aid the construction.
iii. Grades will be established at critical locations only.
c. For street, line and grade stakes:
i. At intervals of 50 feet.
ii. At all P.I., P.C. and side street centerlines.
iii. As needed at critical locations.
2. Provide ENGINEER 2 working days' notice to schedule staking.

B. Expense:
1. Staking described above will be authorized by and paid for by OWNER.
2. Restaking or staking in excess of that described above will be at the expense of CONTRACTOR.

1.03 CONSTRUCTION INSPECTION:

A. By Eng., Inc.:
1. Resident Project Representatives: In accordance with Section 00700: General Conditions.
2. Expense:
a. Paid by OWNER with amounts for additional inspection costs deducted from payment or payments to CONTRACTOR in accordance with Section 01700: Contract Closeout.

B. By OWNER:
1. Periodic site visits.
2. Expense: Paid by OWNER.

C. By Muskegon County Road Commission:
1. Periodic site visits.
2. Expense: Paid by Muskegon County Road Commission.

D. By other governmental agencies:
1. Periodic site visits, inspection of public utilities.
2. Expense: Paid by the Township.

E. By Michigan Department of Environment, Great Lakes and Energy Quality (EGLE):
1. Periodic site visits.
2. Expense: Paid by EGLE.

PART 2 - PRODUCTS

Not used.

PART 3 - EXECUTION

Not used.

END OF SECTION

SECTION 01028

MEASUREMENT AND PAYMENT - UNIT PRICE WORK

PART 1 - GENERAL

1.01 SUMMARY:

A. Section includes:
1. This Section includes, but is not necessarily limited to, descriptions of the method of measurement and the basis of payment for Unit Price Work under this Contract as indicated on the Drawings, as specified herein, and as necessary for the proper and complete performance of the Work.

B. Related Sections:
1. Documents affecting work of this Section include, but are not necessarily limited to:
a. General Conditions, Supplementary Conditions and Sections in Division I of these Specifications.

C. Basis of Contract payments:
1. Final Contract Price shall be determined by actual quantities installed at unit prices stated in CONTRACTOR's Bid.
2. ENGINEER shall determine actual as-built quantities.
3. All work not included as a Bid item shall be considered incidental to construction.
4. Unit price payments for individual items shall include everything necessary for such item to function as intended in the system.
5. OWNER reserves the right to increase, decrease or eliminate any quantities for items listed in CONTRACTOR's Bid or which become a part of the Contract Documents.

D. Items included as incidental to unit prices for systems and appurtenances:
1. The unit price payment for all underground systems and appurtenance items shall include, but not be limited to:
a. Clearing, excavating, trenching, bedding, trench backfill, disposal of items for clearing and unsuitable or excess excavated materials.
b. Drainage and dewatering of excavation.
c. Temporary sheeting, bracing and shoring of excavations.
d. Support, relocation, replacement, connection or reconnection of existing pipelines and utilities.
e. Cleaning flushing, chlorinating and testing.
f. Cleanup and surface restoration.
g. Appurtenances except such items which are included as Bid items.
h. Jacking pits, casing pipes, tunnel liners or similar protective methods.

1.02 REMOVALS AND ADJUSTMENTS:

A. Items No. 1 & 2 – Storm Sewer & Culvert Removal.
1. Includes: All excavation, removal, disposal off-site of existing storm sewer piping and/or culverts indicated for removal on the Drawings or encountered during construction. Existing storm sewer removed within the same trench as new storm sewer (if 12-inches or smaller) is considered incidental to that particular pay item. Item also includes backfilling and compaction of the area required for the removal of the storm sewer in accordance with Section 02222: Excavating, Backfilling and Compacting for Utilities.
2. Unit of measure: Linear foot.

1.03 STORM SEWER SYSTEM INSTALLED BY OPEN CUT:

A. Item No. 3 – Open Drain Cleanout.
1. Includes: Excavation, removal and disposal of sediment, debris, brush, incidental log jams, and trash (all trash must be removed off-site), all tree removals to perform work and provide access, regardless of diameter and necessary for construction and shaping of existing open ditch. Also includes the leveling of spoils and grading (where allowed) and shaping of ditch bottom to specified detail on the Drawings or grading as indicated on the Drawings within the road right-of-way and/or easement area. Cleanout greater than 1.5 feet of depth requires one row of coconut logs to be placed at the toe of slope.
2. Unit of measure: Linear foot.

B. Item No. 4 – Open Drain Construction.
   1. Includes: All excavation, spoil removal and disposal, debris and brush removal, clearing, all tree removals to perform work and provide access, regardless of diameter and necessary for construction and shaping of existing open ditch. Also includes soil preparation, topsoil, seeding, mulch and mulch blanket, one row of coconut logs each side of drain and in accordance with the cross section and detail on the Drawings and Section 02270: Slope Protection and Stream Restoration and Section 02210: Site Grading.
   2. Unit of measure: Linear foot, measured along the centerline of the Drain.

C. Items No. 5 and 6 – 36-inch and 48-inch CSP Culvert.
   1. Includes: All excavation, spoil removal and disposal, dewatering, clearing, incidental tree removal, removal of any existing size and type storm sewer within same trench, grading as indicated on the Drawings, specific trenching details or requirements, exposing any existing utilities and all utility investigation, backfilling and CSP storm sewer culvert in accordance with Section 02720: Storm Sewer System .
   2. Unit of measure: Linear foot of storm sewer as measured from end of pipe to end of pipe.

D. Item No. 7 – 60-inch x 38-inch HE RCP Cl IV Culvert.
   1. Includes: All excavation, spoil removal and disposal, clearing, dewatering, restoration, backfilling to specific trench detail, utility investigation, and 68-inch by 43-inch HE RCP storm sewer in accordance with Section 02720: Storm Sewer System and per the appropriate detail shown on the Drawings. Also includes removing all temporary plugs, holes, structures or connections for any bypass work and maintaining stream flow during culvert construction.
   2. Unit of measure: Linear foot of HE RCP culvert, as measured from end of pipe to end of pipe.

E. Item No. 8 – 66-inch by 51-inch CSP Aluminized Type II Arch Culvert.
   1. Includes: All excavation, spoil removal and disposal, clearing, dewatering, restoration, backfilling to specific trench detail, utility investigation, and 66-inch by 51-inch culvert in accordance with Section 02720: Storm Sewer System and per the appropriate detail shown on the Drawings. Also includes removing all temporary plugs, holes, structures or connections for any bypass work and maintaining stream flow during culvert construction.
   2. Unit of measure: Linear foot of arch culvert, as measured from end of pipe to end of pipe.

1.04 STORM SEWER SYSTEM APPURTENANCES:

A. Items No. 9 and 10 – 36-inch and 48-inch CSP End Section.
   1. Includes: All excavation, spoil removal and disposal, clearing, backfill, dewatering, removal of any existing storm sewer or structure, grading as indicated on the plans, specific trenching detail or requirements, backfilling and CSP flared end section in accordance with Section 02720: Storm Sewer System and per the appropriate detail shown on the Drawings. Also includes toe walls, fill and grading around flared end section after installation.
   2. Unit of measure: Each.

B. Item No. 11 – 60-inch by 38-inch HE RCP Cl IV End Section.
   1. Includes: All excavation, spoil removal and disposal, clearing, backfill, dewatering, removal of any existing storm sewer or structure, grading as indicated on the plans, specific trenching detail or requirements, backfilling, and flared end section in accordance with Section 02720: Storm Sewer System and per the appropriate detail shown on the Drawings. Also includes toe walls, fill and grading around flared end section after installation.
   2. Unit of measure: Each.

A. Item No. 12 – Plain Riprap over Geotextile Fabric.
   1. Includes: Installation of specific material type and size as indicated on the plans as well as nonwoven geotextile fabric underneath all areas of applied riprap in accordance with Section 02271: Riprap and per the Drawings. Includes all specific excavation, grading and shaping required for the area and per the appropriate detail or location as indicated on the Drawings.
   2. Unit of measure: Square yard.

1.05 STREAM RESTORATION ITEMS:

A. Item No. 13 – Selective Drain Bank Clearing.
1. Includes: Clearing and cutting of trees (all diameters) and vegetation along the banks of the drain and extending 10 feet beyond the top of bank as shown on the Drawings or in areas as directed by the ENGINEER. Also includes the flush cutting of all stumps, brush removal and disposal of material off-site and in accordance with Section 02110: Clearing, Grubbing and Snagging. Item will only be paid when done as a standalone item at the direction of the Engineer and not in conjunction with open drain cleanout, construction or stream restoration items.
2. Unit of measure: Linear foot, measured along the centerline of the Drain, includes both sides of the Drain.

B. Item No. 14 – Stream Restoration Detail Stream Bank Tapering.
1. Includes all excavation, spoil removal and disposal, clearing and cutting of trees (all diameters) and vegetation along the drain banks, erosion control blanket, topsoil, seeding, coconut logs, and grading in accordance with the detail on the Drawings and Section 02270: Slope Protection and Stream Restoration.
2. Unit of measure: Linear foot, measured along the centerline of the Drain and including one side of the drain only.

C. Item No. 15 – Stream Restoration Detail 108 Riffle Zone.
1. Includes all excavation, spoil removal and disposal, clearing and cutting of trees (all diameters) and vegetation within the Drain channel and banks, geotextile filter fabric, riprap, cobbles and gravel, coconut logs, topsoil, seeding and grading in accordance with the detail on the Drawings and Section 02270: Slope Protection and Stream Restoration.
2. Unit of measure: Each.

D. Item No. 16 – Stream Restoration Detail 111 Cross Vane.
1. Includes all excavation, spoil removal and disposal, clearing and cutting of trees (all diameters) and vegetation within the Drain channel and banks, geotextile filter fabric, riprap, cobbles and gravel, fill and grading in accordance with the detail on the Drawings and Section 02270: Slope Protection and Stream Restoration.
2. Unit of measure: Each.

E. Item No. 17 – Stream Restoration Detail 7 Rock Cluster.
1. Includes all excavation, spoil removal and disposal, clearing and cutting of trees (all diameters) and vegetation within the Drain channel and banks, geotextile filter fabric, cobblestones, coconut logs, topsoil, seeding and grading in accordance with the detail on the Drawings and Section 02270: Slope Protection and Stream Restoration.
2. Unit of measure: Each.

1.06 SURFACE RESTORATION:

A. Item No. 18 – HMA Roadway Restoration.
1. Includes the following in accordance with Section 02510: Asphalt Paving and Section 02230: Base Courses:
   a. Saw-cutting at limits of removal.
   b. All material excavation and removal.
   c. 8-inch MDOT 21AA or 22A aggregate base.
   d. 12-inch MDOT CL II sand subbase.
   e. 2-inch MDOT HMA, 13A base course.
   f. 2-inch MDOT HMA, 13A leveling course.
   g. Bond coat.
   h. Sweeping.
2. Unit of measure: Square yard.

B. Item No. 19 – Gravel Driveway Restoration.
   1. Includes the following in accordance with Section 02210: Site Grading and Section 02230: Base Courses:
      a. All material excavation and removal.
      b. Preparation of subgrade.
      c. 8-inch MDOT 23A aggregate surface course.
      d. Compaction
      e. Maintaining gravel driveway in a smooth and firm condition until acceptance.
   2. Unit of measure: Square yard.

C. Item No. 20 – Curb and Gutter, Removal.
   1. Includes: Removal of curb and gutter in accordance with Section 204 of the MDOT 2012 Standards Specifications for Construction.
   2. Unit of measure: Linear foot.

D. Item No. 21 – Concrete Curb and Gutter.
   1. Includes: Placement of concrete curb and gutter in accordance with MDOT Standard Plan R-30-G and Section 802 of the MDOT 2012 Standard Specifications for Construction.
   2. Unit of measure: Linear foot.

E. Item No. 22 – Pavt Mrkg, Waterborne, 4 inch, White.
   1. Includes: Placement of waterborne pavement marking in accordance with the MDOT 2012 Standard Specifications for Construction.
   2. Unit of measure: Linear foot.

F. Item No. 23 – Pavt Mrkg, Waterborne, 4 inch, Yellow.
   1. Includes: Placement of waterborne pavement marking in accordance with the MDOT 2012 Standard Specifications for Construction.
   2. Unit of measure: Linear foot.

G. Item No. 24 – Mulch Blanket.
   1. Includes: Supply and installation of mulch blanket in accordance with Section 02272: Soil Erosion and Sedimentation Control, as noted on the Drawings or as indicated for placement by the ENGINEER.
   2. Unit of measure: Square yard. Overlap of blanket will not be considered in measurement.

H. Item No. 25 – Surface Restoration (Topsoil, Open Channel Seeding and Mulch).
   1. Includes the following at the top of bank in accordance with Section 02941: Open Channel Seeding, or as indicated for placement by ENGINEER.
      a. Furnishing, placing and grading 3 inches of topsoil. Existing topsoil can be used if approved by ENGINEER and consistent with new topsoil as indicated in Section 02930.
      b. Furnishing and placing specific seed, fertilizer and all loose mulch. Alternates to seed mix specified will be reviewed and approved by ENGINEER prior.
      c. Maintenance until final completion, including repair of washouts and re-prepping or re-seeding bare areas.
      d. Watering as necessary to sustain the viability of the seed and as necessary for full growth and coverage.
   2. Unit of measure: Square yard.

1.07 MISCELLANEOUS AND CONTINGENCY ITEMS:

A. Item No. 26 – Mobilization, Max (10%).
   1. Includes: All preparatory work and operations in accordance with Section 150 of the MDOT 2012 Specifications for Construction.
   2. Unit of measure: Lump sum.

B. Item No. 27 – Soil Erosion and Sedimentation Control Measures.
   1. Includes: Soil erosion control maintenance and items in accordance with Section 02272: Soil Erosion and Sedimentation Control and per the appropriate detail(s) and notes shown on the Drawings. Includes all inlet protection measures in new or existing catch basins or structures and maintenance of those inlet protection items. Includes all necessary dust control and SESC maintenance and care on all erosion control items listed until all final measures are installed. Also includes removal of all temporary SESC measures and all SESC compliance.
   2. Unit of measure: Lump sum paid as a percentage as work progresses.

C. Item No. 28 – Traffic Control.
   1. Includes: Furnishing, installation, relocation and removal of all traffic barrels, signage and other traffic devices necessary for proper functioning of traffic as determined by ENGINEER and in accordance with maintaining traffic plans, Section 812 of the MDOT 2012 Standard Specifications for Construction, Muskegon County Road Commission and MDOT standards. Includes all signage, barrels, barricades and flag control necessary for proper functioning of traffic and completion of work in accordance with the Contract Documents and enclosed Detour and Maintaining Traffic Plan. Also includes installation of 1 Porta-John to be maintained and placed on-site throughout construction. Also includes 50 barrels and 6 Type II Barricades, furnished and operated. Item includes all CONTRACTOR bonds and insurance necessary for securing of Road Commission permit.
   2. Unit of measure: Lump sum, paid as a percentage based on performance of the work.

PART 2 - PRODUCTS

Not used.

PART 3 - EXECUTION

Not used.

END OF SECTION

SECTION 01035

MODIFICATION PROCEDURES

PART 1 - GENERAL

1.01 SUMMARY:

A. Section includes:

1. This Section includes, but is not necessarily limited to, procedures for modifying the Contract Documents, as herein specified and as necessary for the proper and complete performance of the Work.
2. Procedures for the following documents are included:
   a. Bulletin.
3. Procedures for the following documents shall be in accordance with Section 00700: General Conditions:
   a. Field Order.
   b. Work Change Directive.
   c. Change Order.

B. Related Sections:
1. Documents affecting work of this Section include, but are not necessarily limited to:
   a. General Conditions, Supplementary Conditions and Sections in Division 1 of these Specifications.

1.02 DEFINITIONS:

A. Bulletin:
1. A document regarding possible changes to the Contract Documents which is issued by ENGINEER for OWNER and requests add or deduct costs from CONTRACTOR.

1.03 BULLETIN:

A. Changes in cost:
1. Indicate add or deduct lump sum or unit price for each item.
2. Include:
   a. Labor.
   b. Material.
   c. Overhead and profit.
   d. All related work.
   e. All trades and Subcontractors.
3. Provide a complete cost breakdown with supporting documentation.

B. Notification to ENGINEER:
1. Notify ENGINEER in writing if any of the listed items will cause a change in the Work for which a cost item is not provided in the Bulletin.

C. Submit:
1. Under provisions of Section 01300: Submittals.
2. Three copies.
3. To ENGINEER.
4. On or before due date noted.

D. OWNER: May issue one or more Change Orders for some or all items listed.

PART 2 - PRODUCTS

Not used.

PART 3 - EXECUTION

3.01 SCHEDULES:

A. Refer to Section 00900: Forms for the following forms:
1. Bulletin.
2. Work Change Directive.
3. Change Order.

END OF SECTION

SECTION 01200

MEETINGS

PART 1 - GENERAL

1.01 SUMMARY:

A. Section includes:
1. This Section includes all scheduling and administering of preconstruction and progress meetings as herein specified and as necessary for the proper and complete performance of the Work.

B. Related Sections:
1. Documents affecting work of this Section include, but are not necessarily limited to:
a. General Conditions, Supplementary Conditions and Sections in Division 1 of these Specifications.

C. Scheduling and administration of meetings:
1. Responsibility:
a. Preconstruction meeting: ENGINEER.
b. Progress meetings: ENGINEER.

2. Procedures:
a. Prepare agenda.
b. Distribute written notice and agendas of meetings 4 days in advance of the meeting date.
c. Make physical arrangements for the meetings.
d. Preside at meetings.
e. Record minutes and include significant proceedings and decisions.
f. Distribute copies of the minutes within 4 days after meetings to:
i. Participants.
ii. Others affected by proceedings.

1.02 PRECONSTRUCTION MEETING:

A. Schedule:
1. Preconstruction meeting will be scheduled by ENGINEER:
a. Within 20 days after the Effective Date of Agreement.
b. Before starting the Work at the Site.

B. Attendance:
1. Representatives of the following parties are to be in attendance at the meeting:
a. OWNER.
b. ENGINEER.
c. CONTRACTOR.
d. Major subcontractors.
e. Governmental or regulatory agencies when appropriate.
f. Utility companies.

1.03 PROGRESS MEETINGS:

A. Types of progress meetings:
1. Called.
2. Preinstallation for the following:
a. Precast box culvert.

B. Schedule meetings as follows unless otherwise approved by ENGINEER:
1. Called: As the progress of the Work dictates.
2. Preinstallation: At least 5 working days prior to start of installation.

C. Location:
1. Hold meetings as indicated in the notice.

D. Attendance:
1. Representatives of the following parties are to be in attendance at the meeting:
a. ENGINEER.
b. CONTRACTOR.
c. Major subcontractors as pertinent to the agenda.
d. OWNER's representative as appropriate.
e. Governmental or other regulatory agencies as appropriate.

E. Minimum agenda:
1. The minimum agenda for progress meetings shall consist of the following:
a. Review and approve minutes of previous meetings.
b. Review progress of the Work since the previous meeting.
c. Note field observations, problems and decisions.
d. Identify problems which impede planned progress.
e. Review off-site fabrication problems.
f. Develop corrective measures and procedures to regain plan schedule.
g. Revise construction schedule as indicated.
h. Review submittal schedules; expedite as required to maintain schedule.
i. Maintenance of quality and work standards.
j. Review changes proposed by OWNER for their effect on the construction schedule and completion date.
k. Identify all claims and potential claims.
l. Pending changes and substitutions.
m. Complete other current business.

PART 2 - PRODUCTS

Not used.

PART 3 - EXECUTION

Not used.

END OF SECTION

SECTION 01300

SUBMITTALS

PART 1 - GENERAL

1.01 SUMMARY:

A. Section includes: This Section includes, but not necessarily limited to, the submittal of Shop Drawings. Samples and other information as indicated on the Drawings, as specified herein, and as necessary for the proper and complete performance of the Work.

B. Related Sections:
1. Documents affecting work of this Section include, but are not necessarily limited to:
a. General Conditions, Supplementary Conditions and Sections in Division 1 of these Specifications.
b. Individual submittals required: Pertinent Sections of these Specifications.

PART 2 - PRODUCTS

2.01 SUBMITTALS REQUIRING ENGINEER'S REVIEW AND RETURN:

A. Drawings:
1. Scale required: Unless otherwise specifically directed by ENGINEER, make all drawings accurately to a scale sufficiently large to indicate all pertinent features of the item and its method of connection to the Work.
2. Type and number of prints required:
a. Submit the number of copies which are required to be returned plus 4.

B. Manufacturer's literature and product data:
1. General: Where content of submitted literature from Manufacturers includes data not pertinent to this submittal, clearly indicate which portion of the contents is being submitted for ENGINEER's review.
2. Number of copies required: Submit the number of copies which are required to be returned plus 4.

C. Calculations:
1. Performance type design calculations: Shall be prepared and sealed by a Professional Engineer licensed in the state where the project is being constructed.
2. Number of copies required: Submit the number of copies which are required to be returned plus 4.

D. Samples:
1. General:
a. Samples:
i. Illustrate materials, equipment and workmanship.
ii. Establish standards by which completed work is judged.
2. Accuracy of Sample: Unless otherwise specifically directed by ENGINEER, all Samples shall be of the precise articles proposed to be furnished.
3. Number of Samples required: Submit all Samples in the quantity which is required to be returned plus 1.

E. Colors and patterns: Unless the precise color and pattern is specifically described in the Contract Documents, whenever a choice of color or pattern is available in a specified Product, submit accurate color charts and pattern charts to ENGINEER for review and selection.

F. Manuals:
1. General:
a. Where manuals are required to be submitted covering items included in this Work, prepare all such manuals in durable plastic binders approximately 8 ½ inches x 11 inches in size and with at least the following:
i. Identification on, or readable through, the front cover stating general nature of the manual.

ii. Neatly typewritten index near the front of the manual.
iii. Complete instructions regarding operation and maintenance of all equipment involved.
iv. Complete nomenclature of all replaceable parts, their part numbers, current costs and name and address of nearest vendor of parts.
v. Copies of all guarantees and warranties issued.
vi. Copies of the reviewed drawings.
vii. Copies of all data concerning all changes made during construction.

2. Extraneous Data: Where contents of the manuals include Manufacturer's catalog pages. Clearly indicate the precise items included in this installation and delete or otherwise clearly indicate all Manufacturer's data with which this installation is not concerned.
3. Number of copies required: Unless otherwise specifically directed by ENGINEER or stipulated in the pertinent Section of these Specifications. Deliver 4 copies of the manual to ENGINEER.

2.02 SUBMITTALS NOT REQUIRING ENGINEER'S RETURN:

A. General:
1. Including, but not necessarily limited to:
a. Test Reports.
b. Certifications and affidavits.
c. Installation instructions.
2. Number required: Submit 4 copies.

PART 3 - EXECUTION

3.01 SCHEDULE OF SUBMITTALS:

A. Preparation and submittal of a schedule of submittals:
1. Prepare and submit a schedule of submittals as required by Section 00700: General Conditions.
2. The schedule of submittals shall include the following:
a. Shop Drawings.
b. Manufacturer's literature and product data.
c. Samples.
d. Colors and patterns.
e. Manuals.
f. Other submittals required by the Contract Documents.
3. Allow at least 15 full working days for ENGINEER's review following ENGINEER's receipt of the submittal unless ENGINEER has agreed to a shorter period for specific submittals.
4. Schedule submittals, except operation and maintenance manuals, far enough in advance of scheduled dates for installation to provide all required time for reviews for securing necessary approvals for possible revision and resubmittal, and for placing orders and securing delivery.
5. Schedule submittal of operation and maintenance manuals at least 60 days prior to system Substantial Completion unless otherwise specified.

B. Make all submittals in accordance with the schedule of submittals.

C. Be responsible for costs of delays caused by tardiness of submittals.

3.02 COORDINATION OF SUBMITTALS:

A. General:
1. Prior to submittals for ENGINEER's review. Use all means necessary to fully coordinate all material including the following procedures.
a. Determine and verify all field dimensions and conditions, catalog numbers and similar data.
b. Coordinate as required with all trades and all public involved.
c. Secure all necessary approvals from public agencies and others; signify by stamp or other means that all required approvals have been obtained.
d. Clearly indicate all deviations from the Contract Documents.

B. Grouping of submittals:
   1. Unless otherwise specifically permitted by ENGINEER, make all submittals in groups containing all associated items.
   2. ENGINEER may reject partial submittals as not complying with the provisions of the Contract Documents.

3.03 IDENTIFICATION OF SUBMITTALS:

A. General:
   1. Consecutively number all submittals.
   2. Accompany each submittal with a letter of transmittal showing the following:
      a. Project title and number.
      b. OWNER.
      c. Subcontractor.
      d. Date of submittal.
      e. Specification Section or Drawing number to which the submittal pertains.
      f. Brief description of the material submitted.
      g. Submittal identification number.
   3. Mark each submittal with:
      a. Company name of the originator of the submittal.
      b. Deviations from Contract Documents.
      c. CONTRACTOR's approval of the submittal.
      d. Submittal identification number adjacent to CONTRACTOR's approval.

B. Resubmittal:
   1. When material is resubmitted for any reason, transmit under a new letter of transmittal with a suffix added to the original submittal identification number.
   2. Indicate that this is a resubmittal and refer to the previous submittal.

C. Submittal Log:
   1. Maintain an accurate submittal log for the duration of the construction period showing the status of all submittals of all types.
   2. Make the log available to ENGINEER for review upon request.

3.04 RETURN OF SUBMITTALS:

A. Submittals requiring ENGINEER review and return:
   1. With status. "Rejected. Resubmit":
      a. Drawings: ENGINEER will retain 1 copy and return the rejected copies to CONTRACTOR.
      b. Manufacturer's literature and product data: ENGINEER will retain 1 copy and return remaining copies to CONTACTOR.
      c. Other submittals: ENGINEER will notify CONTRACTOR of rejection.
   2. With status: "Reviewed. No Exceptions Taken" and "Reviewed w/Corrections Noted":
      a. Drawings: ENGINEER will retain 4 copies and return the remaining copies to CONTRACTOR.
      b. Manufacturer's literature and product data: ENGINEER will retain 4 copies and return the remaining copies to CONTRACTOR.
      c. Samples: ENGINEER will retain 1 Sample and return the remaining Samples to CONTRACTOR.
      d. Colors: ENGINEER will retain color charts and pattern charts and will indicate color and pattern choices to CONTRACTOR.

B. Submittals not requiring ENGINEER return: No copies will be returned.

3.05 RESUBMISSION REQUIREMENTS:

A. Drawings:
   1. Revise initial drawings as required and resubmit as specified for initial submittal.
   2. Indicate on drawings all changes which have been made other than those requested by ENGINEER.
   3. If the same drawings are submitted with additional data and revisions, clearly identify the added data and revisions on the drawings.

B. Other submittals: Submit as required for initial submittal.

3.06 RE-REVIEW COST:

A. Should ENGINEER be required to review a submittal more than twice because of failure of the submittal to meet the requirements of the Contract Documents, ENGINEER will record ENGINEER's expenses for performing all additional reviews. The OWNER will compensate ENGINEER for these additional services and deduct the amount paid from payments to CONTRACTOR.

END OF SECTION

SECTION 01310

CONSTRUCTION PROGRESS SCHEDULES

PART 1 - GENERAL

1.01 SUMMARY:

A. Section includes:
1. This Section includes, but is not necessarily limited to, the preparation, furnishing, distribution and periodic revision of construction progress schedules as herein specified and as necessary for the proper and complete performance of the Work.

B. Related Sections:
1. Documents affecting work of this Section include, but are not necessarily limited to:
a. General Conditions, Supplementary Conditions and Sections in Division 1 of these Specifications.

PART 2 - PRODUCTS

2.01 FORM OF SCHEDULE:

A. Preparation:
1. Prepare in the form of a horizontal bar chart, CPM network, or other form as previously approved by the ENGINEER.
2. Provide a separate horizontal bar column or part for each trade or operation.
3. Prepare the schedule in the chronological order of the beginning of each item of work.
4. Identify each column or path by:
a. Major Specification Section number.
b. Distinct graphic delineation.
5. Use a horizontal time scale and identify the first work day of each week.
6. Allow space for updating.

B. Size:
1. The schedule sheets shall be 11 inches x 17 inches unless otherwise approved by ENGINEER.

2.02 CONTENT OF SCHEDULES:

A. Construction sequence:
1. Provide a complete sequence of construction by activity (identifying work of separate stages) and (milestones).
2. For Shop Drawing, project data and Samples indicate the following:
a. Submittal dates.
b. Dates review copies will be required.
3. Show decision dates for selection of finishes.
4. Show Product procurement and delivery dates (including those furnished by OWNER or under Allowances).
5. Show dates for beginning and completion of each element of construction.

B. Percentage completion:
1. Show the projected percentage of completion for each item of work as of the first day of each month.

C. Subschedules:
1. Provide separate subschedules showing submittals, review times, procurement schedules and delivery days.
2. Provide subschedules to define critical porportions of the entire schedule.

PART 3 - EXECUTION

3.01 SUBMITTALS:

A. Preliminary schedule:
1. Submit the preliminary schedule within 10 days after the Effective Date of Agreement.
2. ENGINEER will review schedules and will return the reviewed copy within 15 days after receipt.
3. If required, resubmit within 7 days after receipt of a returned review copy.
4. Meet with ENGINEER at least 10 days prior to the submission of the first Application for Payment to review the Schedule.

B. Periodic adjustment:
1. Monthly, submit a revised schedule accurately depicting adjustments and progress to the first day of each month.

C. Number of copies:
1. Submit the number of copies required by the CONTRACTOR, plus 4 copies to be retained by ENGINEER.

3.02 DISTRIBUTION:

A. Reviewed schedules:
1. Distribute copies of the reviewed schedules to:
a. Job Site file.
b. Subcontractors.
c. Other concerned parties.

B. Instructions to recipients:
1. Instruct recipients to report inability to comply with the schedule, and provide detailed explanations with suggested remedies.

3.03 ADJUSTMENT OF PROGRESS SCHEDULE:

A. Changes:
1. Show all changes occurring since previous submission of the schedule.

B. Progress:
1. Indicate progress of each activity and show completion dates.

C. Other items:
1. Include major changes in scope.
2. Include activities modified since previous updating.
3. Include revised projections due to changes.
4. Include other identifiable changes.

D. Narrative report:
1. Provide a narrative report including:
a. A discussion of problem areas including current and anticipated delay factors and their impact.
b. Direct action taken, or proposed, and its effect.
c. A description of revisions including:
i. Their effect on the schedule due to change of scope.
ii. Revisions in duration of activities.
iii. Other changes that may affect the schedule.
d. The status of completion of Milestones.

END OF SECTION

SECTION 01410

TESTING SERVICES

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:
1. This section includes, but is not necessarily limited to, testing services, as indicated in the Drawings, as specified herein and as necessary for the proper and complete performance of the Work.
2. General requirements:
a. Testing services and certifications which are to be included in CONTRACTOR's unit prices:
i. Inspections and tests required by codes or ordinances or by a plan approval authority and made by a legally constituted authority.
ii. Inspections, testing services and certifications including, but not limited to, the following items shall be furnished by CONTRACTOR:
a) Pipe leakage tests.
b) Pipe material yield strength tests at ENGINEER's request.
c) Cement Manufacturers' certification tests at ENGINEER's request.
d) Fine and coarse aggregate certification tests by Supplier at ENGINEER's request
e) Bedding material certification tests by Supplier at ENGINEER's request.
f) Testing in connection with ENGINEER's review of materials and equipment proposed to be incorporated into the Work.
g) Testing performed for CONTRACTOR's convenience.
3. OWNER paid items:
a. OWNER may elect to test or to employ either ENGINEER or an independent testing agency to test any materials or systems on the Project. The cost of this testing will be paid for by OWNER.

B. Related Sections:
1. Documents affecting work of this Section include, but are not necessarily limited to:
a. General Conditions, Supplementary Conditions and Sections in Division 1 of these Specifications.
2. Additional requirements for testing of materials and systems mentioned in this Section may be described in other Sections of these Specifications.

1.02 REFERENCES:

A. Except as herein specified or as indicated on the Drawings, the work of this Section shall comply with the following:
1. ASTM Standard Specifications:
a. C 31 – Making and Curing Concrete Test Specimens in the Field.
b. C 39 – Test for Compressive Strength of Cylindrical Concrete Specimens.
c. C 138 – Test for Unit Weight, Yield and Air Content of Concrete.
d. C 143 – Test for Slump of Hydraulic Cement Concrete.
e. C 172 – Sampling Fresh Concrete.
f. C 173 – Test for Air Content of Freshly Mixed Concrete by the Volumetric Method.
g. C 192 – Making and Curing Concrete Test Specimens in the Laboratory.
h. C 231- Test for Air Content of Freshly Mixed Concrete by the Pressure Method.
i. D 1556 – Density of Soil In Place by the Sand-Cone Method.
j. D 1557 – Moisture-Density Relations of Soils and Soils Aggregate Mixture Using 10 Pound Hammer and 18 Inch Drop.
k. D 1586 – Penetration Test and Split Barrel Sampling of Soils.
l. D 2166 – Unconfined Compressive Strength of Cohesive Soil.
m. D 2922 – Density of Soil and Soil Aggregates by Nuclear Methods.
n. D 2937 – Density of Soil in Place by Drive Cylinder Method.
2. AWS – American Welding Society:
a. D1.1 – Structural Welding Code.

3. ACI – American Concrete Institute:
   a. 211.1 – Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete.
   b. 301 – Specification for Structural Concrete for Buildings.
   c. 318 – Building Code Requirements for Reinforced Concrete.
   d. 506R – Guide to Shotcrete.
4. BOCA Building Code.

1.03 TEST REQUIREMENTS:

A. In accordance with:
1. Laws and Regulations.
2. Sections of these Specifications.
3. Reference procedures and requirements.
4. Pertinent standards for testing.
5. BOCA Building Code.

1.04 COLLECTING AND TRANSPORTING SAMPLES:

A. Samples:
1. Collected by CONTRACTOR and transported by CONTRACTOR to a location determined by ENGINEER.

1.05 RETESTING COSTS:

A. Retesting:
1. When initial tests of all items except soil compaction indicate noncompliance with the Contract Documents, all subsequent testing occasioned by the noncompliance shall be performed by the same testing laboratory, and the costs thereof will be deducted by OWNER from the Contract Sum.
2. The first retesting of soil compaction shall be paid for by OWNER. The second and subsequent retesting costs for soil compaction due to noncompliance with the Contract Documents shall be performed by the same laboratory, and the costs thereof will be deducted by OWNER from the Contract Sum.

B. Costs:
1. Uncovering costs shall be paid for as described in Article 13 of Section 00700: General Conditions.

1.06 REPORTS:

A. Provide typed copies of all laboratory reports, inspections, and certifications:
1. ENGINEER’s office: Two copies.
2. CONTRACTOR’s office: One copy.

1.07 SCHEDULES FOR TESTING:

A. Establishing schedule:
1. By advance discussion with the independent testing laboratory, determine the time required to perform tests and issue findings.

B. Revising schedule:
1. When changes of construction schedule are necessary during construction, coordinate all such changes of schedule with the independent testing laboratory as required.

C. Adherence to schedule:
1. When the independent testing laboratory is ready to test according to the determined work schedule, but is prevented from testing or taking specimens due to incompleteness of Work, all extra costs for testing attributable to the delay may be charged to CONTRACTOR and shall not be borne by OWNER.

1.08 CONTRACTOR’S DUTIES:

A. Coordinate and schedule the work of the independent testing laboratory:
1. Notify ENGINEER and the independent testing laboratory 24 hours prior to expected time when testing services will be required.
2. Provide the following as necessary for laboratory to properly perform its functions:
   a. Access to the Work.
   b. Facilities for access to the Work.

c. Tools.
d. Samples of materials.
e. Storage.
f. Assistance as requested.

PART 2 - PRODUCTS

Not used.

PART 3 - EXECUTION

3.01 TESTING REQUIREMENTS:

A. Fine and coarse aggregate and bedding material:
1. Test to ensure compliance with the materials specifications, at the request of ENGINEER.

B. Fill material from on-site and off-site:
1. Test to ensure compliance with the materials specifications.

C. Soil Compaction:
1. Perform all necessary laboratory and field testing required to verify compaction of fill, trench backfill, and structure of backfill to 95 percent Modified Proctor in accordance with ASTM D 1557.
2. Verify the compaction of the first 12 inches of the existing subgrade below all structures, paved areas and areas to be filled to 95 percent Modified Proctor in accordance with ASTM D 1557.
3. Independent testing laboratory shall inform ENGINEER's Resident Project Representative and CONTRACTOR's on-site supervisor immediately of all on-site test results.
4. Place no additional fill in areas where compaction results do not meet Specification requirements.

D. Concrete testing:
1. Point of sampling and the method of securing the Samples:
a. Determined by the independent testing laboratory.
b. In accordance with ASTM C 172.
2. Slump tests:
a. Perform slump tests in accordance with ASTM C 143.
b. Perform one slump test on the job for each 10 cubic yards of concrete.
c. At ENGINEER's request, also perform slump tests at batch plant.
d. Perform more slump tests if deemed necessary by ENGINEER.
3. Perform 1 air-entraining test in accordance with ASTM C 231 or C 173 for each truckload or every 10 yards of concrete placed, whichever is more frequent.
4. Test the concrete unit weight in accordance with ASTM C 138.
5. Test the air content of each set of concrete cylinders.
6. Concrete cylinder testing:
a. In accordance with ASTM C 31 and C 39.
b. Take concrete cylinder Samples as follows:
i. Once each day a given class of concrete is placed, nor less than
ii. Once for each 150 cubic yards (or fraction therof) of each class of concrete placed on each day, nor less than
iii. Once for each 5000 square feet of slab or wall surface area placed each day.
c. Concrete cylinder Sample shall consist of 4 standard 6-inch cylinders.
d. Handle cylinders carefully.
e. On-site storage:
i. 12 hours, minimum, 48 hours maximum.
ii. At a temperature range of 60 to 80 degrees F and in a moist environment.
iii. Shielded from direct sunlight and radiant heat.
iv. CONTRACTOR shall construct heated enclosure if conditions require.
f. Laboratory curing: For duration of curing after on-site storage.
g. Test 1 of the cylinders at 7 days and 2 cylinders at 28 days. Save 1 cylinder as a spare.
h. Acceptance and evaluation of the concrete shall be based on ACI 301.

E. Miscellaneous tests:
   1. OWNER or ENGINEER may elect to order testing of other materials by Independent Testing Laboratory.

END OF SECTION

SECTION 01570

TRAFFIC REGULATION

PART 1 - GENERAL

1.01 SECTION INCLUDES:

A. Traffic control.

B. Construction parking control.

C. Flag person.

D. Flares and lights.

E. Haul routes.

F. Traffic signs and signals – placement and operation.

G. Removal.

1.02 RELATED SECTIONS:

A. Section 01010: Summary of Work.

1.03 TRAFFIC CONTROL:

A. Comply with the rules and regulations of the County, City, Township, Village, or MDOT having jurisdiction over the road.

B. Provide, install and maintain traffic control devices.

C. Control devices shall conform to the Michigan Manual of Uniform Traffic Control Devices and the MDOT Standard Specifications for Highway Construction latest edition.

D. Maintain through traffic unless written permission to do otherwise is obtained from the authority having jurisdiction over the road.

E. Maintain traffic to all businesses, residences and dwellings at all times.

F. Provide and maintain an adequate number of barrels at all times. No work shall be performed or lane closures allowed during holiday weekends, as defined by ENGINEER.

G. Provide barricades for advanced warning and partial road closures.

1.04 CONSTRUCTION PARKING CONTROL:

A. Control vehicular parking to prevent interference with public traffic and parking, access by emergency vehicles, access to businesses, access to dwellings, and OWNER's operations.

B. Monitor parking of construction personnel's vehicles in existing facilities. Maintain vehicular access to and through parking areas.

C. Prevent parking on or adjacent to access roads or in non-designated areas.

1.05 FLAG PERSON:

A. Provide trained and equipped flag person to regulate traffic when construction operations or traffic encroach on public traffic lanes.

1.06 FLARES AND LIGHTS:

A. Use flares and lights during hours of low visibility to delineate traffic lanes and to guide traffic.

B. Verify light operation weekly by after-dark site visit.

1.07 HAUL ROUTES:

A. Consult with authority having jurisdiction in establishing public thoroughfares to be used for haul routes and site access.

B. Confine construction traffic to designated haul routes.

C. Provide traffic control at critical areas of haul routes to regulate traffic, to minimize interference with public traffic.

1.08 TRAFFIC SIGNS AND SIGNALS – PLACEMENT AND OPERATION:

A. At approaches to site and on-site, install at crossroads, detours, parking areas, and elsewhere as needed to direct construction and affected public traffic.

B. Install and operate traffic control signals to direct and maintain orderly flow of traffic in areas under CONTRACTOR's control, and areas affected by CONTRACTOR's operations.

C. Relocate as Work progresses, to maintain effective traffic control.

D. Provide traffic control equipment and labor to meet the requirements of authority having jurisdiction.

1.09 REMOVAL:

A. Remove equipment and devices when no longer required.

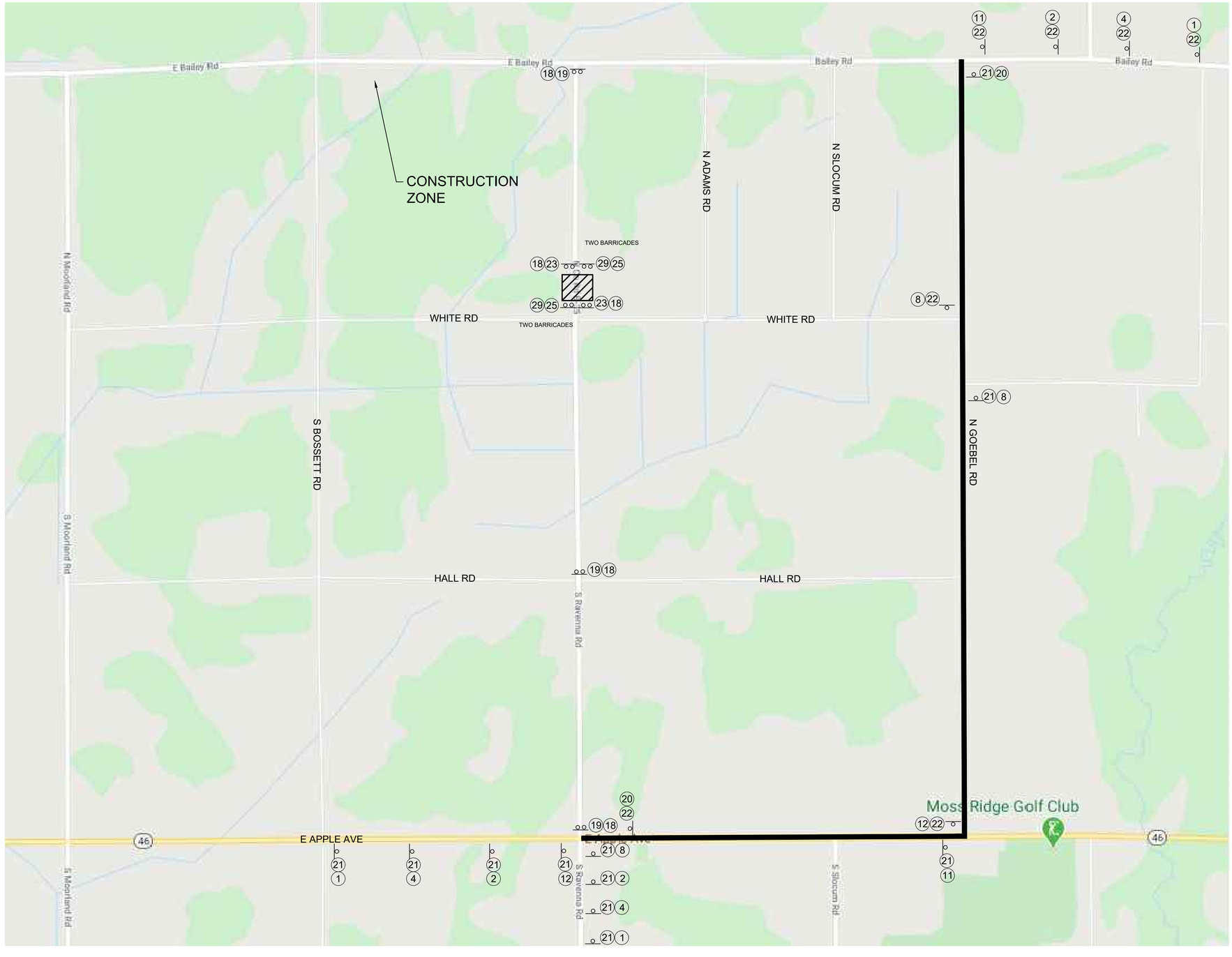
B. Repair damage caused by installation.

END OF SECTION

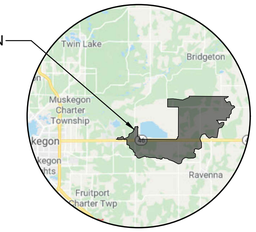
BRENDA M. MOORE
MUSKEGON COUNTY DRAIN COMMISSIONER
STEPHANIE BARRETT, DEPUTY DRAIN COMMISSIONER

BLACK CREEK DRAIN DRAINAGE DISTRICT

PART OF EGELSTON, MOORLAND, RAVENNA & CASNOVIA TOWNSHIPS
MUSKEGON COUNTY, MICHIGAN



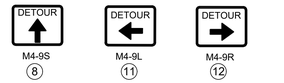
SITE LOCATION

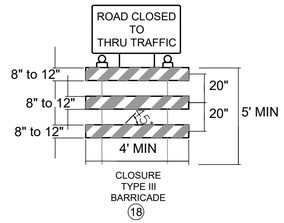


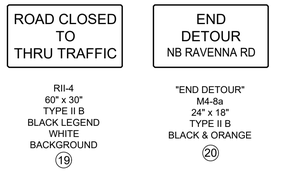
LOCATION MAP
NO SCALE

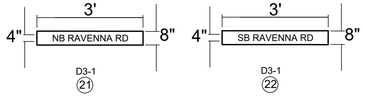
LEGEND

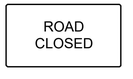
= DETOUR ROUTE

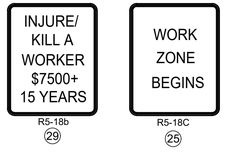












RAVENNA RD TRAFFIC DETOUR

NO	REVISIONS	BY	DATE

Drawn By JAJ
Date 6/22/20
Approved By
Date

4063 Grand Oak Drive Suite A109
Lansing, MI 48911
517.887.1100

16930 Robbins Road Suite 105
Grand Haven, MI 49417
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Engineering & Surveying

BRENDA M. MOORE
MUSKEGON COUNTY DRAIN COMMISSIONER
STEPHANIE BARRETT, DEPUTY DRAIN COMMISSIONER

BLACK CREEK DRAIN DRAINAGE DISTRICT
PART OF EGELSTON, MOORLAND, RAVENNA & CASNOVIA TOWNSHIPS
MUSKEGON COUNTY, MICHIGAN

PROJECT NO.
16041

SHEET NO.
DIVISION 7
RAVENNA ROAD DETOUR PLAN

SECTION 01600

MATERIAL AND EQUIPMENT

PART 1 - GENERAL

1.01 SECTION INCLUDES:

A. Products.

B. Transportation and handling.

C. Storage and protection.

D. Product options.

E. Substitutions.

1.02 PRODUCTS:

A. Products: Means new material, components, equipment, fixtures, and systems forming the Work. Does not include machinery and equipment used for preparation, fabrication, conveying and erection of the Work. Products may also include existing materials or components required for reuse.

B. All products used in the Contract shall be manufactured in the United States.

1.03 TRANSPORTATION AND HANDLING:

A. Transport and handle products in accordance with Manufacturer's instructions.

B. Promptly inspect shipments to assure that products comply with requirements, quantities are correct, and products are undamaged.

C. Provide equipment and personnel to handle products by methods to prevent soiling, disfigurement, or damage.

1.04 STORAGE AND PROTECTION:

A. Store and protect products in accordance with Manufacturer's instructions, with seals and labels intact and legible. Store sensitive products in weather-tight, climate controlled enclosures.

B. For exterior storage of fabricated products, place on sloped supports, above ground.

C. Provide off-site storage and protection when site does not permit on-site storage or protection.

D. Cover products subject to deterioration with impervious sheet covering. Provide ventilation to avoid condensation.

E. Store loose granular materials on solid flat surfaces in a well-drained area. Avoid mixing with foreign matter.

F. Provide equipment and personnel to store products by methods to prevent soiling, disfigurement, or damage.

G. Arrange storage of products to permit access for inspection. Periodically inspect to assure products are undamaged and are maintained under specified conditions.

1.05 PRODUCT OPTIONS:

A. Products Specified by Naming One or More Manufacturers with a Provision for Substitutions: Submit a request for substitution for any Manufacturer not named.

1.06 SUBSTITUTIONS:

A. Substitutions may be considered when a product becomes unavailable through no fault of the CONTRACTOR.

B. Document each request with complete data substantiating compliance of proposed Substitution with Contract Documents.

C. A request constitutes a representation that the CONTRACTOR:
   1. Has investigated proposed product and determined that it meets or exceeds the quality level of the specified product.
   2. Will provide the same warranty for the Substitution as for the specified product.
   3. Will coordinate installation and make changes to other Work which may be required for the Work to be complete with no additional cost to OWNER.
   4. Waives claims for additional costs or time extension which may subsequently become apparent.
   5. Will reimburse OWNER for review or redesign services associated with re-approval by authorities.

D. Substitutions will not be considered when they are indicated or implied on Shop Drawing or product data submittals, without separate written request, or when acceptance will require revision to the Contract Documents.

E. Substitution Submittal Procedure:
   1. Submit three copies of request for Substitution for consideration. Limit each request to one proposed Substitution.
   2. Submit Shop Drawings, product data, and certified test results attesting to the proposed product equivalence.

END OF SECTION

SECTION 01700

CONTRACT CLOSEOUT

PART 1 - GENERAL

1.01 SUMMARY:

A. Section includes:
1. This Section includes, but is not necessarily limited to, the instructions for and the responsibilities of each party in contract closeout as indicated on the Drawings, as specified herein, and as necessary for the proper and complete performance of the Work.

B. Related Sections:
1. Documents affecting work of this Section include, but are not necessarily limited to:
a. General Conditions, Supplementary Conditions and Sections in Division 1 of these Specifications.

1.02 SUBSTANTIAL COMPLETION:

A. When CONTRACTOR considers that Work or any portion of the Work is ready for its intended use, CONTRACTOR shall submit:
1. Written certification to ENGINEER and OWNER that the Work, or designated portion of the Work, is substantially complete.
2. A list of major items to be completed or corrected.
3. Request that ENGINEER issue a certificate of Substantial Completion.

B. ENGINEER's inspection:
1. ENGINEER will make an inspection:
a. Within 10 days after receipt of certification.
b. Together with OWNER and CONTRACTOR.

C. ENGINEER's determination of Substantial Completion in response to CONTRACTOR's request:
1. Should ENGINEER consider the Work or designated portion of the Work substantially complete, the following steps shall be taken:
a. CONTRACTOR shall prepare and submit to ENGINEER, a list of items to be completed or corrected as determined by the inspection.
b. ENGINEER will prepare and deliver to OWNER:
i. A tentative certificate of Substantial Completion.
ii. A tentative list of items to be completed or corrected before final payment.
c. OWNER shall have 7 days after receipt of the tentative certificate during which to make written objection to ENGINEER as to any provisions of the certificate or attached list.
d. ENGINEER will, within 14 days after delivery of tentative certificate to OWNER, decide:
i. Not substantially complete: ENGINEER will issue written notice to CONTRACTOR stating reasons.
ii. Substantially complete: ENGINEER will issue definitive certificate of Substantial Completion and a final list of items to be corrected or completed.
2. Should ENGINEER consider that the Work or designated portion of the Work is not substantially complete, the following steps shall be taken:
a. ENGINEER shall notify CONTRACTOR in writing stating ENGINEER's reasons.
b. CONTRACTOR shall complete the work and send a second written notice to ENGINEER certifying that the Project, or designated portion of the Project, is substantially complete.
c. ENGINEER and OWNER will reinspect the work.

D. Division of responsibilities:
1. ENGINEER:
a. At the time of delivery of tentative certificate of Substantial Completion.
b. Deliver to OWNER and CONTRACTOR a written recommendation as to division of responsibilities pending final payment with respect to:
i. Security.

ii. Operation.
iii. Safety.
iv. Maintenance.
v. Heat.
vi. Utilities.
vii. Insurance.
viii. Warranties.

2. ENGINEER's written recommendation on division of responsibilities shall be binding on OWNER and CONTRACTOR until final payment unless OWNER and CONTRACTOR agree otherwise in writing and so notify ENGINEER prior to ENGINEER's issuance of a definitive certificate of Substantial Completion.

1.03 FINAL INSPECTION:

A. CONTRACTOR certification:
1. Prior to final inspection, CONTRACTOR shall submit written certification that:
a. The Contract Documents have been reviewed.
b. The Project has been inspected in compliance with the Contract Documents.
c. Work has been completed in accordance with the Contract Documents.
d. Equipment and systems have been tested in the presence of the OWNER's representative and are optional.
e. The Project is complete and ready for final inspection.

B. ENGINEER's inspection:
1. The ENGINEER will make final inspection:
a. Within 10 days after receipt of certification.
b. Together with OWNER and CONTRACTOR.

C. ENGINEER's determination of final completion:
1. Should ENGINEER consider the Work finally complete in accordance with the requirements of the contract documents, ENGINEER shall request CONTRACTOR to make Project closeout submittals.
2. Should ENGINEER consider the Work not finally complete:
a. ENGINEER shall notify CONTRACTOR in writing stating the reasons.
b. CONTRACTOR:
i. Take immediate steps to remedy the stated deficiencies.
ii. Send a second written notice to ENGINEER certifying that the Work is complete.
c. ENGINEER and OWNER will reinspect the Work.

1.04 REINSPECTION COSTS:

A. Should ENGINEER be required to perform second inspections because of failure of the Work to comply with the original certifications of CONTRACTOR, OWNER will compensate ENGINEER for additional services and deduct the amount paid from payment or payments to CONTRACTOR.

1.05 ADDITIONAL INSPECTION COSTS:

A. Substantial Completion:
1. OWNER will compensate ENGINEER for inspection services rendered between the scheduled date of Substantial Completion and the actual date of Substantial Completion and deduct the amounts paid from payment or payments to CONTRACTOR.

B. Final Completion:
1. OWNER will compensate ENGINEER for inspection services rendered between the scheduled date of final completion and the actual date of final completion and deduct the amounts paid from payment or payments to CONTRACTOR.

1.06 CLOSEOUT SUBMITTALS:

A. CONTRACTOR:
1. Provide closeout submittals as required in the Contract Documents.
2. These submittals shall include, but not necessarily be limited to:
a. Project record documents.
b. Operation and maintenance manuals.

c. Guarantees.
d. Spare parts and maintenance materials.
e. Instruction in operation of all systems.

1.07 EVIDENCE OF PAYMENTS AND RELEASE OF LIENS:

A. Affidavits:
1. Submit with final Application for Payment an affidavit of payment of debts and release of claims.
2. Affidavit shall include:
a. CONTRACTOR's release or waiver of lien.
b. Consent of surety of final payment.
c. Separate releases or waivers of liens for Subcontractors, Suppliers and others with lien rights against property of OWNER together with a list of those parties.

B. Execution:
1. All submittals shall be duly executed before delivery to ENGINEER.

1.08 FINAL ADJUSTMENT OF ACCOUNTS:

A. Final statement:
1. Submit a final statement of accounting, which reflects all adjustment, to ENGINEER. This statement shall contain the following:
a. Original Contract Price.
b. Additions and deductions.
c. Total Contract Price as adjusted.
d. Previous payments.
e. Sum remaining due.

B. Final Change Order:
1. ENGINEER will prepare a final Change Order reflecting approved adjustments to the Contract Price not previously made by Change Orders and based on final field measurements of quantities installed.

1.09 FINAL APPLICATION FOR PAYMENT:

A. CONTRACTOR shall submit a final Application for Payment in accordance with the requirements of the Contract Documents.

B. Disposition of final Application for Payment:
1. ENGINEER will, within 10 days after receipt of the Application for Payment:
a. Submit to OWNER a written recommendation for payment.
b. Submit to OWNER and CONTRACTOR a written notice that the Work is acceptable subject to the provisions of GC 14.07 of Section 00700: General Conditions.
2. OWNER will, within 30 days after receipt of the Application for Payment and ENGINEER's recommendations in accordance with the Contract Documents, pay to CONTRACTOR the amount recommended.

C. If the Application for Payment, the Work or both are unacceptable:
1. ENGINEER will return the Application for Payment to CONTRACTOR, indicating in writing the reasons for refusing to recommend final payment.
2. CONTRACTOR shall make the necessary corrections and resubmit the Application for Payment.

D. OWNER shall make payment of the balance due for that portion of the Work fully completed and accepted:
1. If ENGINEER confirms that final completion of the Work is significantly delayed through no fault of CONTRACTOR.
2. Payment shall be made under the terms and conditions governing final payment, except that it shall not constitute a waiver of claims.

E. If CONTRACTOR submits written consent of surety for reduction of retainage to less than the amount stipulated in the Agreement.

PART 2 - PRODUCTS

Not used.

PART 3 - EXECUTION

Not used.

END OF SECTION

SECTION 01720

PROJECT RECORD DOCUMENTS

PART 1 - GENERAL:

1.01 SUMMARY:

A. Section includes: This Section includes, but is not necessarily limited to, procedures for the maintenance, recording and submittal of Project record documents as herein specified indicated on the Drawings, as specified herein, and as necessary for the proper and complete performance of the Work.

B. Related Sections: Documents affecting work of this Section include, but are not necessarily limited to General Conditions, Supplementary Conditions and Sections in Division 1 of these Specifications.

1.02 MAINTENANCE OF DOCUMENTS AND SAMPLES:

A. Storage:
1. Store documents and Samples in CONTRACTOR's field office apart from documents used for construction.
2. Provide files and racks for storage documents.
3. Provide locked cabinet or secure storage space for storage Samples.
a. Filing: File record documents in accordance with CSI Master format.

B. Maintenance:
1. Maintain documents in a clean, dry, legible condition and in good order.
2. Do not use record documents for construction purposes.

C. Availability: Make documents and Samples available at all times for inspection by ENGINEER.

1.03 RECORDING:

A. Labeling: Label each document "PROJECT RECORD" in neat large printed letters.
Recording:
1. Record actual revisions to the Work.
2. Record information concurrently with construction progress.
3. Do not conceal any work until required information is recorded.

B. Drawings:
1. Legibly mark, with notes or graphic representations, to record actual construction:
a. Depths of various elements of foundation in relation to approved datum.
b. Horizontal and vertical locations of Underground Facilities and appurtenances, referenced to permanent surface improvements.
c. Location of internal utilities and appurtenances concealed in the construction, referenced to visible and accessible features of the structure.
d. Field changes of dimension and detail.
e. Changes made by Field Order, Work Change Directive or Change Order.
f. Details not on original Contract Drawings.
2. At ENGINEER's option, after ENGINEER's review of the record drawings, transfer all marks to a set of Mylars provided by ENGINEER.

1.04 SUBMITTAL:

A. Delivery: At Contract closeout, deliver record documents to ENGINEER for the OWNER.

B. Transmittal letter:
1. Accompany submittal with transmittal letter in duplicate, containing:
a. Date.
b. Project title and number.
c. CONTRACTOR's name and address.
d. Title and number of each record document.
e. Signature of CONTRACTOR or his authorized representative.

PART 2 - PRODUCTS

Not used.

PART 3 - EXECUTION

Not used.

END OF SECTION

SECTION 02110

CLEARING, GRUBBING AND SNAGGING

PART 1 - GENERAL

1.01 SUMMARY:

A. Section includes:
1. This Section includes, but is not necessarily limited to, the major items listed below, as indicated on the Drawings, as specified herein, and as necessary for the proper and complete performance of the Work.
2. Major items:
a. Clearing.
b. Grubbing.
c. Snagging.
d. Disposal.
e. Salvaging.
f. Relocating.
g. Bank protection.

B. Related Sections:
1. Documents affecting work of this Section include, but are not necessarily limited to:
a. General Conditions, Supplementary Conditions and Sections in Division I of these Specifications.
b. Section 02210: Site Grading.

1.02 REFERENCES:

A. Except as herein specified or as indicated on the Drawings, the work of this Section shall comply with the following:
1. MDOT:
a. 2012 Standard Specifications for Construction.
b. Standard Plans.

1.03 DEFINITIONS:

A. Terms:
1. Clearing: Cutting and removal of trees, brush and shrubs.
2. Grubbing: Removal of tree stumps and roots from below ground.
3. Snagging: Removal of loose and fallen trees, limbs, logs, debris and stumps.
4. Disposal: Burning, burial or removal from site of all debris and woody material that is removed during the clearing, grubbing and snagging operations.
5. Salvaging: Saving of mercantile timber resulting from the clearing and snagging operation for use by OWNER.
6. Relocating: Removal and replanting of live trees and shrubs.
7. Bank protection: Securing trees and brush to prevent erosion of channel banks and encourage the deposit of sediment in the area in which bank protection is secured. It is also the intent of this work to deflect the current into midstream and/or the opposite bank.
8. Trees: 1. Vegetation with trunks or stalks with diameters exceeding 4 inches as measured at breast height (DBH). 2. A stump with numerous branches, trunks or sprouts shall be considered one tree.
9. Brush: Vegetation with trunks or stalks with diameters less than or equal to 4 inches as measured at breast height (DBH).
10. Mercantile timber: Trees having a stump diameter of 6 inches or more.

PART 2 - PRODUCTS

2.01 MATERIALS:

A. Bank protection material:
1. Upper tree top material from hardwood trees such as oak and ash. Maple tree branches may be used only when adequate hardwood material is not available.

2. Material from dead (or diseased) trees shall not be used for bank protection and must be removed from the Site.

B. Cable:
1. Woven wire cable with a minimum 3/16-inch diameter.
2. Woven wire cables shall be 6 x 19 Fiber Core or 6 x 19 IWRC and shall be rated at a minimum of 3,000 lbs. breaking strength.
3. Wire rope ends shall be connected using U-bolt wire rope clips. Each connection shall use a minimum of 2 clips.
4. Clips shall be malleable iron saddle with steel U-bolt and nuts, meeting Federal Specification FF-C-450, Type 1, Class 2.

PART 3 - EXECUTION

3.01 GENERAL:

A. Limits of work:
1. Clear within drain right-of-way for access lane on one side only. Remove only those trees that interfere with execution of the Work.
2. Clear and snag both sides of channel to top of bank. Trees are to remain if they do not interfere with the flow or the construction process and are not in danger of falling into the drain.
3. Grubbing is omitted except where tree roots interfere with construction.

B. Precautions:
1. Avoid damage to stable, vegetated channel banks, or trees and shrubs that are not designated for excavation or removal during completion of the clearing, grubbing and snagging operation.

C. Selective clearing and grubbing:
1. In areas where called for on the Drawings. Remove only those trees as designated by ENGINEER.

D. Ownership:
1. The property owner shall have the option of retaining ownership of any trees that are removed on his property.
2. CONTRACTOR shall notify the property owner of CONTRACTOR's schedule for clearing, grubbing and snagging in order to allow a reasonable amount of time for removal of material by the property owner.
3. Any trees, stumps, etc., that are not removed by the property owner after a reasonable amount of time shall become the property of CONTRACTOR and shall be removed or disposed of in accordance with the Specifications.
4. All trees, debris and vegetation which are removed shall be the property of CONTRACTOR. Everything not used by CONTRACTOR for bank protection or placed in designated debris piles shall be removed from the Project Site.

3.02 CLEARING:

A. Cutting:
1. Cut trees and brush a maximum of 18 inches above the ground.
2. Remove tree tops and limbs prior to cutting the entire tree if necessary to avoid damage to adjacent structures or trees that are not designated for removal.
3. The final cut shall be an even cut, parallel with the ground.
4. Identification for channel restoration: The trees that are specified for cutting will be marked by ENGINEER. Only marked trees shall be cut.
5. Fruit trees: Clear only when authorized by ENGINEER.

3.03 GRUBBING:

Not included with this contract.

3.04 SNAGGING:

A. Identification:
1. Trees and log jams specified for pulling will be marked by ENGINEER. Only marked trees shall be pulled.

B. Access:
   1. Restrict equipment access for snagging operations to areas indicated on the Drawings as designated by ENGINEER.
   2. Equipment shall remain outside of the channel limits unless authorized by ENGINEER.

3.05 BANK PROTECTION:

A. Locations: Locations as indicated on the Drawings or as directed by ENGINEER.

B. Procedures:
   1. Bank protection shall consist of dense piles of tree tops and brush material placed against the bank with the cut ends facing upstream against the bank.
   2. The approximate size of the bank protection shall be 20 feet along the bank and 5 to 10 feet wide.
   3. The tree tops and brush material shall be secured with wire or cable to stakes or trees on the adjacent bank.
   4. Final channel width shall not be less than 2/3 of the existing channel width, unless authorized by ENGINEER.

3.06 DISPOSAL:

A. General:
   1. Trash and other nonwoody material that are removed during the snagging operation: Sort out and dispose of in a licensed landfill.

B. Burial:
   1. Trees, brush, stumps and other woody material may be disposed of by burial where authorized by ENGINEER and in areas that do not conflict with present land use.
   2. Bury material in compacted trenches with a minimum of 2 feet of compacted earth cover.
   3. Locate buried trenches a minimum of 10 feet (horizontal) beyond the top edge of the proposed channel.

C. Debris piles:
   1. Woody material may be placed in debris piles as authorized by ENGINEER and in locations that do not conflict with present land use.
   2. Neatly windrow debris piles beyond the spoil piles or place in debris piles at intervals of not less than 100 feet.
   3. Maintain a minimum clearance of 200 feet (horizontal) between debris piles and overhead public utilities.
   4. Floodplains: Secure debris piles to prevent movement of debris during flooding events.

D. Removal:
   1. Material that is required to be removed from the Site shall become the property of the CONTRACTOR.

3.07 SALVAGING:

A. Cut mercantile timber that is designated for salvaging into 8-foot lengths or lengths as designated by ENGINEER. Mercantile timber shall become the property of OWNER.

B. Avoid damage to materials designated for salvaging during clearing, grubbing and snagging operations.

C. Replace all damaged materials that were designated for salvaging at no expense to OWNER.

D. Deliver all salvaged materials to locations designated by OWNER.

END OF SECTION

SECTION 02210

SITE GRADING

PART 1 - GENERAL

1.01 GENERAL:

A. The CONTRACTOR's attention is directed to the CONDITIONS OF THE CONTRACT, as well as DIVISION 1 - GENERAL REQUIREMENTS. They shall apply to all work of this section the same as if herein repeated in full.

1.02 DESCRIPTION:

A. Related Work specified elsewhere:
1. Section 02110: Clearing, Grubbing & Snagging.
2. Section 02222: Excavating, Backfilling & Compacting for Utilities.
3. Section 02271: Riprap.
4. Section 02510: Asphalt Paving.
5. Section 02930: Lawns and Grass.
6. Section 02941: Open Channel Seeding.

1.03 REGULATIONS AND STANDARDS:

A. All work shall comply with the rules and regulations of the Division of Industrial Safety and all other local and State agencies having jurisdiction. Nothing contained herein shall be construed as permitting work that is contrary to such rules, regulations and codes.

B. All work where applicable shall conform to State of Michigan Soil Erosion and Sedimentation Part 91, Act 451 of the Public Acts of 1994, as amended and related Ordinance.

C. Grades and Elevations: A licensed Professional Surveyor shall be required to establish all vertical and horizontal layout of Site construction.

D. Compaction: A registered soils engineer shall verify that the required densities have been achieved.

1.04 EXISTING CONDITIONS:

A. A topographic survey of the property has been included in the Drawings for reference only. Bidders shall be expected to have inspected the Site and satisfy themselves as to actual grades and levels and the true conditions under which the Work is to be performed. The bench mark shall be preserved. Any removal or necessary replacement shall be at CONTRACTOR's expense.

PART 2 - PRODUCTS

Not used.

PART 3 - EXECUTION

3.01 TOPSOIL STRIPPING:

A. Prior to mass earthwork, excavation, all topsoil must be removed from the construction Site. All topsoil shall be stripped from the areas to be occupied by the building and from areas within the Contract Limits which will receive walks, or other impervious surfacing. Remove topsoil to a maximum depth of 6 inches over the remainder of the Site within the Contract Limits where grading is required or areas to be occupied by storage areas. Topsoil may be required to be stored off-site due to soil conditions, existing trees to remain, or space limitations. Topsoil not required for replacement shall be disposed by the CONTRACTOR. See SOIL EROSION CONTROL PLAN for topsoil storage recommendations.

3.02 ROUGH GRADING:

A. Perform all exterior cut, fill, backfill and grading as required to conform to the contours and elevations shown on the Drawings. Rough grading to be held below finish grades as follows: 6 inches minimum for topsoil at lawn areas; 11 inches below areas to receive concrete platforms; 8 inches below areas to receive sidewalks; and as specified to receive surfacing in Section 02513.

1. Staking and Checking: A licensed Professional Surveyor shall set all grading stakes required and shall be responsible for checking and verifying their correctness. Any additional work required to bring rough grades to their proper levels shall be at the expense of the CONTRACTOR, including rechecking. CONTRACTOR shall certify in writing that subgrades are as shown on the drawings prior to spreading topsoil, paving or installation of utilities.
2. Cut: Excavate all materials as required to establish rough grades. Excavated material in excess of that needed for fill shall be disposed of at OWNER's direction.
3. Fill: Except as noted below, fill material shall be ordinary soil as excavated on the Site, free from debris, roots, stones larger than 2 inches, silt, muck or peat. Fill under paving, sidewalks and similar areas shall be coarse sand or bank run gravel, capable of being compacted to the specified densities. Additional fill material required shall be furnished by the CONTRACTOR, equivalent to that obtained on the Site. Fill material shall be installed in layers not exceeding 9 inches and shall be moistened only as required to obtain the specified degree of compaction.
4. Compaction: Upon completion of "cut" operations and prior to installation of fill over existing grades, the soil shall be proof rolled and inspected for suitability. If, in the opinion of the CONTRACTOR, the specified degrees of compaction cannot be obtained for this Contract, a test area of approximately 50 square feet shall be scarified, treated by the introduction of approved additives and/or water and compaction attempted. If the specified degree of compaction cannot be obtained, the ENGINEER, upon consultation with the soils engineer, may direct in writing the removal and replacement of the unsuitable area. Upon completion of removal of surface soils and inspection of specified areas, the construction for the general building area may proceed. Subgrades and each layer of fill material shall be compacted uniformly to a minimum density of 95 percent and a maximum of 98 percent dry density as determined by ASTM D 1557. Sub-bases for paving and sidewalks shall be compacted to a minimum density of 95 percent as determined by ASTM D 2049. All other areas shall be compacted to a minimum of 90 percent by ASTM D 1557.
5. CONTRACTOR shall provide written verification from a registered soils engineer that described densities are being achieved.

3.03 SHAPING:

A. After rough grading is completed and prior to applying topsoil, the surface shall be dragged and floated to remove ridges, depressions and other irregularities. Remove all roots, debris, and stones larger than 2 inches in diameter.

3.04 DEWATERING:

A. CONTRACTOR shall be responsible for the drained condition of the Site and shall employ such means as well-pointing, ditching, pumping or bailing to prevent the impoundment of water which in any way hinders construction.

END OF SECTION

SECTION 02222

EXCAVATING, BACKFILLING AND COMPACTING FOR UTILITIES

PART 1 - GENERAL

1.01 SUMMARY:

A. Section includes:
1. This Section includes, but is not necessarily limited to, the furnishing and installation of the major items listed below, as indicated on the Drawings, as specified herein, and as necessary for the proper and complete performance of the Work.
2. Major items:
a. Excavation and trenching in earth and in rock.
b. Disposal of items from clearing and unsuitable or excess excavated materials.
c. Complete drainage of excavations.
d. Temporary or permanent sheeting, bracing and shoring of excavations.
e. Installation of normal and special foundations, bedding and backfill materials.

B. Related Sections:
1. Documents affecting work of this Section include, but are not necessarily limited to:
a. General Conditions, Supplementary Conditions and Sections in Division 1 of these Specifications.
b. Section 02210: Site Grading.
c. Section 02272: Soil Erosion and Sedimentation Control.
d. Section 02510: Asphalt Paving.
e. Section 02720: Storm Sewer System.
f. Section 02930: Lawns and Grass.
g. Section 02941: Open Channel Seeding.

1.02 REFERENCES:

A. Except as herein specified or as indicated on the Drawings, the work of this Section shall comply with the following:
1. ASTM Standard Specifications:
a. D 1557 - Test Methods for Moisture-Density Relations of Soils and Soil Aggregate Mixtures using 10 lb. Hammer and 18-inch Drop.
2. MDOT:
a. 2012 Standard Specifications for Construction.
b. Standard Plans.

1.03 DEFINITIONS:

A. Terms:
1. Bedding: The material placed around a utility between 4 inches below to 12 inches above the utility the full width of the trench.
2. Driving surface: A pavement, curb, or sidewalk.
3. Excavation:
a. Removing the following materials from their present location:
i. Native below-grade material such as soil, rocks, boulders less than 1/2-cubic yard in volume, and buried trees.
ii. Man-made items such as, but not necessarily limited to:
1) Hot mix asphalt and concrete paving.
2) Curbs.
3) Riprap.
4) Head walls.
5) Underground utilities.
6) Manholes and catch basins.
7) Foundation.
8) Sidewalks.
4. Extra earth excavation: Excavation of native material from below the normal trench bottom.
5. Foundation materials: The material placed in a trench undercut to replace extra earth excavation.

6. Hardpan:
   a. Cemented soil layers.
   b. Is not hard clay layers that are not cemented.
7. Imported material: Soil material which is hauled onto the Site by CONTRACTOR.
8. Native material: Soil and other natural earth materials, except rock, which are existing on the Site prior to the start of Work.
9. Normal trench bottom: The surface of the undisturbed native material at an elevation 4 inches below the bottom of the utility.
10. Pavement: Any combination of subbase, base course and concrete, hot mix asphalt or aggregate surface course, including shoulders, placed on a subgrade. Includes roadways, parking areas, driveways, and hot mix asphalt seal coat.
11. Rock excavation:
    a. Excavation of igneous, metamorphic or sedimentary rock or hardpan which cannot be excavated without continuous drilling and blasting or continuous use of a ripper or other special equipment.
    b. Excavation of all boulders of ½ cubic yard or more in volume.
12. Special foundations:
    a. Specially constructed systems for support of underground utilities such as timber piling, concrete foundations and surcharge techniques.
    b. Extra earth excavation and placing imported or native materials is not a special foundation.
13. Structure: A building, retaining wall, tank, footing, slab, or other similar construction.
14. Suitable material:
    a. Native material excavated from the trench and approved as backfill by ENGINEER.
    b. Not used under or within 1 on 1 slope of surface improvements or structures.
15. Trench backfill:
    a. The material placed between the top of bedding and the bottom of suitable material, the surface restoration or surface improvement.
    b. Used under and within 1 on 1 slope of surface improvements or structures.
16. Utility structure: A manhole, catch basin, valve chamber, junction chamber, water main valve, or other similar utility appurtenance.
17. Other definitions: Other earthwork terms not defined herein shall be as defined in MDOT Standard Specifications.

1.04 DESIGN AND PERFORMANCE REQUIREMENTS:

A. Trench bottom suitability:
   1. Notify ENGINEER and await ENGINEER’s decision if a possible unsuitable condition exists.
   2. Poor dewatering techniques or lack of excess water control shall not be a reason for additional payment for corrective measures.
   3. Poor dewatering techniques or lack of excess water control shall not be a reason for additional payment for remedial measures.

B. Trench wall stability:
   1. Be responsible for the trench configuration, including all sheeting, shoring and bracing necessary to support trench side walls from collapsing.
   2. Be responsible for the structural design and stability of a pipe-laying box if necessary to prevent trench walls from collapsing.

1.05 QUALITY ASSURANCE:

A. Testing: Testing will be performed in accordance with Section 01410: Testing Services.

B. Compaction:
   1. Determine density by the modified Proctor method, ASTM D 1557.
   2. Compact trench backfill and bedding to at least 95 percent maximum density.
   3. Compact suitable material to at least 90 percent maximum density.
   4. The first 12 inches of native material at the bottom of utility trenches:
      a. Test for density.
      b. Compact to at least 95 percent maximum density if the existing density is below 95 percent.

1.06 PROJECT CONDITIONS:

A. Dust control:
1. Control dust on and near the Work and on and near all off-site borrow areas if such dust is caused by CONTRACTOR's operations.
2. Moisten or otherwise treat haul roads, delivery roads, temporary site access roads and other surfaces as required to prevent dust from being a nuisance to the public.
3. Scrape, broom, or vacuum adjacent streets to remove tracked dirt as necessary if directed by ENGINEER.

B. Existing structures, utility structures, and utilities:
1. Call Miss Dig to locate all existing underground utilities prior to starting excavation.
2. Where utilities, utility structures or structures are encountered which are in active use:
   a. Provide adequate protection for them.
   b. Be responsible for damage to them.
3. Provide stand-by utility service if temporary removal is necessary for a period exceeding 2 hours.
4. Where utility service connections to occupied buildings must be temporarily disconnected, give 48 hours notice to the affected occupants of the time and duration of the anticipated shutoff.
5. Notify Fire Department 48 hours in advance if water main or fire supply line shutoff is required.
6. Raise, lower, or move underground utilities, utility structures or structures which interfere with the utility or utility structure being constructed as part of this Work.

PART 2 - PRODUCTS

2.01 MATERIALS:

A. General:
1. Approval required: All material shall be subject to the approval of ENGINEER.
2. Notification: For approval of imported material, notify ENGINEER at least 1 week in advance of intention to import material, designate the proposed borrow area, and permit ENGINEER to sample as necessary from the borrow area for the purpose of making acceptance test to prove the quality of the material.

B. Material sources and uses:
1. Imported material:
   a. Foundation material.
   b. Bedding.
   c. Pea stone.
   d. Trench backfill.
2. Native material unless quantity is not sufficient; then shall be imported material: Suitable material.

C. Foundation material:
1. Crushed stone: 1½ inch maximum size.

D. Bedding:
1. For pipes less than 36 inches:
   a. MDOT Granular Material Class II modified to 100 percent passing a ½-inch sieve, or:
   b. MDOT Coarse Aggregate 17A.
2. For pipes 36 inches and larger:
   a. Pea stone bedding to spring line.
   b. Geotextile filter fabric over a pea stone.
   c. MDOT Class II Granular material to 1 foot above pipe.
3. For utility structures:
   a. Sand gravel fill of such gradation that 100 percent will pass a ½-inch sieve and not more than 10 percent by weight is lost by washing.
   b. MDOT Granular Material Class II modified to 100 percent passing a ½-inch sieve.
4. For box culverts and arch culverts:
   a. As detailed on the Drawings.

E. Pea Stone: clean stone with 100 percent passing 3/8-inch sieve and 100 percent being retained on a No. 8 sieve.

F. Trench backfill: MDOT Granular Material Class II.

G. Suitable material:
1. Native material which is used as backfill:
a. Exclusive of gray or blue clay, peat, organic matter, or frozen lumps.
b. Containing no rocks or lumps over 3 inches in greatest dimension.
c. Having a moisture content such that material is capable of being compacted to 90 percent maximum density.
2. MDOT Granular Class II if native material is not adequate in opinion of ENGINEER.

H. Special backfilling requirements: All backfill within the railroad right-of-way shall meet Class II regulations.

I. Special foundations:
1. Only if approved by ENGINEER.
2. MDOT Grade P2 concrete.
3. MDOT 912.06 timber piles.

J. Concrete encasement of utilities:
1. Only as indicated on the Drawings.
2. MDOT Grade M.

2.02 OTHER MATERIALS:

A. All other materials, not specifically described but required for proper completion of the work of this Section, shall be as selected by CONTRACTOR subject to the approval of ENGINEER.

PART 3 - EXECUTION

3.01 GENERAL:

A. Excavating, backfilling and compacting:
1. For utility structures: In accordance with this Section.

B. Obstructions:
1. Remove and dispose of buried trees, rocks, boulders, driving surfaces, pipes and the like, as required for the performance of the Work.
2. Exercise care in excavating around catch basins, inlets and manholes.
3. Avoid removing or loosening castings.
4. Repair and replace damaged or displaced castings; remove dirt entering utility structures during the performance of the Work at no additional cost to OWNER.

C. Cutting paved surfaces and similar improvements:
1. Cut pavement prior to excavating.
2. All cuts shall be a minimum of 1 foot wider than trench on each side. When the remaining width of paved surface is less than 4 feet, remove the entire paved surface.
3. Before removing pavement, mark the pavement neatly, paralleling pipelines and existing street lines. Space the marks the width of the trench.
4. Concrete:
a. Pavements: Saw cut if over 3 feet from expansion or construction joint, otherwise remove to joint.
b. Sidewalks: Remove to joints.
c. Curb and gutter: Remove to joints.
5. Final surface course hot mix asphalt: Saw cut joints unless otherwise approved by ENGINEER.
6. Do not disturb or damage the adjacent pavement. If the adjacent pavement is disturbed or damaged, remove and replace the damaged pavement.
7. CONTRACTOR may tunnel under curbs that are encountered. Replace curb disturbed by construction.
8. Dispose of materials removed.

D. Utilities to be abandoned:
1. When pipes, conduits, sewers or utility structures are removed from the trench leaving dead ends in the ground, fully plug such ends with brick and mortar.

2. Entirely remove abandoned utility structures unless otherwise specified or indicated on the Drawings.
3. Remove from the excavation all materials which can be readily salvaged and store on the Site.
4. All salvageable materials will remain the property of OWNER unless otherwise indicated by OWNER.

E. Extra earth excavation:
1. If soft material, which in the opinion of ENGINEER is not suitable, is encountered below the normal trench bottom or below a utility structure, ENGINEER may order the removal of this soft material and its replacement with specified material in order to make a suitable foundation for the construction of the utility or utility structure.
2. All extra earth excavation made at the order of ENGINEER will be paid for on the basis of the actual quantity of material excavated.
3. No extra payment will be made if removal is required as a result of poor dewatering techniques.
4. Special foundations shall be determined on an individual basis by ENGINEER in cooperation with CONTRACTOR, unless otherwise provided in the Contract Documents.

3.02 EXCAVATION AND TRENCHING:

A. General:
1. By open cut from surface unless designated otherwise.
2. Slope sides of trench adequately for protection of the Work and safety of workers.

B. Maximum length of open trench: 200 feet.

C. Width:
1. Minimum clearance on each side of utility: 6 inches.
2. Maximum width of trench at top of bedding:
   a. Up through 30-inch diameter utility: 16 inches plus utility diameter.
   b. Greater than 30-inch diameter utility: 24 inches plus utility diameter.
3. Maximum width of trench at ground surface:
   a. Not outside of the property line or easement.
   b. As required for protection of the Work and safety of workers.
   c. Use sheeting, bracing and shoring if required.
   d. Provide sufficient space in the trench to permit the joint to be properly made.

D. Depth:
1. Excavate to provide the elevations, grades, and depths of cover indicated on the Drawings and herein specified.
2. The 4 inches of required bedding material below the utility may be omitted if:
   a. Approved by ENGINEER.
   b. CONTRACTOR arranges and pays for testing of the native material.
   c. The native material complies with MDOT Granular Material Class II material, modified so that 100 percent passes a ½-inch sieve.
   d. The material is compacted as specified herein.
3. Excavate to the normal trench bottom elevation with an accuracy of ± 0.10 feet.

E. Rock excavation:
1. Where rock excavation is encountered within the excavation, expose the surface of the rock sufficient to permit adequate measurements to be taken before the rock excavation is started.
2. Notify ENGINEER prior to removal if rock is encountered.
3. No utility shall be within 6 inches of rock.
4. Blasting:
   a. Only with permission of ENGINEER and in accordance with laws and regulations applying thereto.
   b. Secure permit if required.
   c. Notify utility and public agencies.
   d. Explosives shall be used with extreme care by experienced workers only.
   e. Hours shall be fixed by ENGINEER.
   f. CONTRACTOR solely responsible for safety, damage and control of blasting operations.

F. Bedding:
1. Place the bedding material up to 1/8 the height of the utility. Compact as herein specified.

2. Accurately shape the bedding material to fit the pipe shape. Recess the bedding to relieve the pressure on the bell or other projecting utility joint.
3. After laying out the utility, tamp additional bedding in place up to the midpoint of the utility. Use hand-operated compactors to achieve the required compaction.
4. Place additional bedding up to 12 inches above the top of the utility. Use hand operated compactors to achieve required compaction.
5. Place all bedding in maximum lifts of 10 inches.
6. No payment shall be made for aggregate or stone bedding when used for CONTRACTOR's convenience.
7. Provide concrete encasement at utilities so indicated on Drawings.

G. Trench backfill:
1. Use backfill material as each Drawing detail indicates and as the material is defined herein.
2. Place all backfill in 12-inch lifts and compact as herein specified. ENGINEER will consider greater lifts if testing indicates that the required compaction is being achieved.

H. Utility structures:
1. Place and compact specified bedding below all utility structures.
2. Backfill around utility structures shall be of the same type backfill as that required for the trench in accordance with these Contract Documents.
3. Place all backfill in 12-inch lifts and compact as herein specified.

3.03 DISPOSAL OF EXCESS EXCAVATED MATERIAL:

A. General: CONTRACTOR responsibility and expense.

B. Disposal sites:
1. Material desired by OWNER shall be disposed of by CONTRACTOR in the following priority order:
a. At locations designated by the Contract Documents.
b. At locations on or within 10 miles of the Project Site designated by OWNER after construction starts.
c. At locations on the Project Site by written arrangement with individual property owners.
d. OWNER may choose not to accept certain materials, including but not necessarily limited to, items from clearing, muck, peat, marl and whole or broken man-made items removed by construction.
2. Material not desired by OWNER shall be disposed of in a location determined by CONTRACTOR.
3. Disposal of all materials shall not violate laws, rules, regulations and the like regarding the filling of flood plains, wetlands and other environmentally sensitive areas.
4. Provide adequate controls to maintain disposal sites in a neat and safe condition by periodic leveling of material, and such other practices as are necessary.
5. Provide all soil erosion control measures necessary to prevent soil erosion and sedimentation of wetlands, rivers, ditches, or similar low lying areas.

3.04 EXCESS WATER CONTROL:

A. All work where applicable shall conform to the State of Michigan Soil Erosion and Sedimentation Part 91, Act 451 of the Public Acts of 1994, as amended and related Ordinance.

B. Unfavorable weather:
1. Do not place, spread or roll any fill material during unfavorable weather conditions.
2. Do not resume operations until moisture content and fill density are satisfactory to ENGINEER.

C. Pumping and drainage:
1. Provide, maintain and use at all times during construction adequate means and devices to promptly remove and dispose of all water from every source entering the excavations or other parts of the Work.
2. Dewater by means which will ensure dry excavations, preserve final lines and grades, and will not disturb or displace adjacent soil. Use wells, portable pumps, temporary underdrains, or other methods as necessary.
3. Perform pumping and drainage:
a. In such a manner to cause no damage to property or structures and without interference to the rights of the public, owners of private property, pedestrians, vehicular traffic, or the work of other contractors.

b. In accordance with all pertinent laws, rules, ordinances, and regulations.

D. General:
1. Keep excavations dry during construction.
2. Remove water by use of wells, well points, portable pumps, bailing, drains, underdrains or other acceptable methods.
3. Provide crushed stone or gravel as required to aid dewatering operations.
4. Divert or temporarily reroute existing sewers and drainage of discharge lines to adequate and acceptable outlets during construction. CONTRACTOR responsible to ascertain availability of outlets.
5. Divert surface water from entering excavations by construction and maintenance of channels or berms.
6. Sediment traps and other soil erosion control measures shall prevent soil particles from entering any sewer, watercourse or similar conveyance.
7. Protect all utilities, utility structures, and structures, existing and new, from hydrostatic uplift.

3.05 SHEETING, SHORING AND BRACING EXCAVATIONS:

A. General:
1. Furnish, put in place and maintain all sheeting, bracing and shoring as may be required to properly support the sides of all excavations and to prevent all movement of earth which could in any way injure the Work or adjacent property.
2. Exercise care in the removal of sheeting, shoring, bracing and timbering to prevent collapse or caving of the excavation faces being supported and damage to the Work and adjacent property.
3. A pipe-laying box may be used in lieu of sheeting.

B. Sheeting:
1. Do not install by jetting.
2. Remove as backfilling proceeds, unless ordered left in place by ENGINEER. Use care to fill and compact voids created by removal, especially below mid-height of utility.

C. Sheeting left in place:
1. Requires written approval of ENGINEER.
2. Cut off minimum of 2 feet below finished grade.

3.06 CLEANUP:

A. Upon completion of the work of this Section, remove all excess excavated material, trash, and debris resulting from construction operations. Remove equipment and tools. Leave the Site in a neat and orderly condition acceptable to ENGINEER.

END OF SECTION

SECTION 02230

BASE COURSES

PART 1 - GENERAL

1.01 SUMMARY:

A. Section includes:
1. This Section includes, but is not necessarily limited to, the furnishing and installation of the major items listed below, as indicated on the Drawings, as specified herein, and as necessary for the proper and complete performance of the Work.
2. Major items:
a. Base course.
b. Subbase.

B. Related Sections:
1. Documents affecting work of this Section include, but are not necessarily limited to:
a. General Conditions, Supplementary Conditions and Sections in Division 1 of these Specifications.
b. Section 02210: Site Grading.
c. Section 02510: Asphalt Paving.

1.02 REFERENCES:

A. Except as herein specified or as indicated on the Drawings, the work of this Section shall comply with the following:
1. ASTM Standards: D 1557 - Test Methods for Moisture-Density Relations of Soils and Soil Aggregate Mixtures using 10 lb. Hammer and 18-inch Drop.
2. MDOT:
a. 2012 Standard Specifications for Construction.
b. Standard Plans.

1.03 DEFINITIONS:

A. Terms:
1. Base course: The layer of specified material of designed thickness placed on a subbase or a subgrade to support a surface course.
2. Pavement structure: Any combination of subbase, base course, and surface course, including shoulder, placed on a subgrade.
3. Plan grade: Vertical control grade indicated on the Drawings.
4. Roadbed: That portion of the roadway between the outside edges of finished shoulders, or the outside edges of berms back of curbs gutters, when constructed.
5. Roadside: That portion of the right-of-way outside of the roadway.
6. Roadway: That portion of the right-of-way required for construction, limited by the outside edges of slopes and including ditches, channels, and all structures pertaining to the work.
7. Shoulder: The portion of the roadway contiguous with the traveled way for accommodation of stopped vehicles, for emergency use, and for lateral support of base and surface courses.
8. Subbase: The layer of specified material of designed thickness placed on the subgrade as a part of the pavement structure.
9. Subgrade: That portion of the earth grade upon which the pavement is to be placed.

1.04 SUBMITTALS:

A. Submit in accordance with Section 01300: Submittals.

B. Quality control submittals:
1. Aggregate:
a. Source.
b. MDOT classification.
c. Gradation.

1.05 QUALITY ASSURANCE:

A. Testing:
1. Testing of aggregate materials: In accordance with Section 01410: Testing Services.

B. Compaction:
1. Determine density by the modified Proctor method, ASTM D 1557.
2. Compact subbase and base course to at least 98 percent maximum density.

1.06 PROJECT CONDITIONS:

A. Dust control:
1. Use all legal means necessary to control dust on and near the Work and on and near all off-site borrow areas if such dust is caused by CONTRACTOR's operations during performance of the Work or if resulting from the condition of the Site when earthwork operations are suspended.
2. Moisten or otherwise treat haul roads, delivery roads, temporary site access roads and other surfaces as required to prevent dust from being a nuisance to the public, neighbors, and concurrent performance of other work on the Site.

B. Existing utility structures:
1. Where utility structures are encountered which are in active use:
a. Provide adequate protection.
b. Be responsible for damage.
2. Adjust utility structures to meet plan grade.

PART 2 - PRODUCTS

2.01 MATERIALS:

A. General:
1. Approval required: All material shall be subject to the approval of ENGINEER.
2. Notification: For approval of all materials, notify ENGINEER at least 1 week in advance of intention to import material, designate the proposed stockpile area, and permit ENGINEER to sample as necessary from the stockpile area for the purpose of making acceptance tests to prove the quality of the material.

B. Subgrade: In accordance with Section 02210: Site Grading.

C. Material source:
1. Imported material:
a. Subbase.
b. Base course.

D. Subbase:
1. MDOT Granular Material Class II.
2. Thickness compacted in place: 12 inches.

E. Aggregate base course:
1. Aggregate MDOT 21AA or 22A.
2. Thickness compacted in place: 6 or 8 inches where noted.

F. Aggregate surface course:
1. Aggregate MDOT 23A.
2. Thickness compacted in place: 6 or 8 inches where noted.

PART 3 - EXECUTION

3.01 PREPARATION:

A. Subgrade:
1. Prepared in accordance with Section 02210: Site Grading.
2. Maintain in a smooth and compacted condition until the subbase or base course has been placed.
3. Proof roll subgrade prior to placing subbase or base course.
4. No base course shall be placed on the subgrade until it has been approved by ENGINEER.

3.02 INSTALLATION:

A. Subbase:

1. Smooth, spread and compact.
2. Placed in one layer, provided that the depth of the compacted layer does not exceed 15 inches.
3. Constructed to the grade and cross section as indicated on the Drawings.
4. Should the subgrade at any time prior to or during the placing of subbase become soft or unstable to the extent that rutting occurs in the subgrade or to the extent that subgrade material is forced up into the subbase materials the operation of hauling and placing subbase shall be immediately discontinued. Where subgrade material has become mixed with the subbase material, the mixed material shall be removed and disposed of. After the subgrade has been corrected as directed by ENGINEER, new subbase material shall be placed and compacted as specified above.
5. Shape to specified crown and grade and maintain in smooth condition.
6. Do not place on a frozen subgrade.
7. Proof roll subbase prior to installation of base course.

B. Base course:

1. Place in uniform layers to such a depth that when compacted, the course will have the thickness indicated on the Drawings.
2. The compacted depth of any layer shall be no more than 6 inches nor less than 3 inches.
3. Compact each layer of aggregate.
4. Place aggregate shoulder material in conjunction with the top layer of aggregate base material.
5. Shape to the crown and grade within a tolerance of $\pm$ 0.05 feet unless otherwise specified. The surface of each spreading operation shall be continuously maintained in a smooth condition.
6. Roll the shaped surface, when required, to provide thorough compaction.
7. Where the existing surface is very irregular, the use of a scarifier may be required. Wetting may be required to facilitate shaping the surface and to assist in providing compaction.
8. Final shaping and compacting shall be accomplished by use of subgrade machine operation on crawler tracks, or by the use of a maintainer or surface planer, with a rigid frame.

END OF SECTION

SECTION 02261

OPEN CHANNEL EXCAVATION

PART 1 - GENERAL

1.01 SUMMARY:

A. Section includes:
1. This Section includes, but is not necessarily limited to, the excavation of open channel drains as indicated on the Drawings, as specified herein, and as necessary for the proper and complete performance of the Work.

B. Related Sections:
1. Documents affecting work of this Section include, but are not necessarily limited to:
a. General Conditions, Supplementary Conditions and Sections in Division 1 of these Specifications.
b. Section 02110: Clearing, Grubbing and Snagging.

1.02 DEFINITIONS:

A. Excavated materials:
1. Earth:
a. All materials which can be excavated with equal facility by equipment used for normal earth excavation. Examples include, but are not limited to:
i. Common materials such as sand, clay, loam, gravel, silt and stones less than ½ cubic yard in volume.
ii. Organic materials such as muck, peat and marl.
iii. Rock-like material that is fragile, friable or fragmented.

B. Rock:
1. Igneous, metamorphic and sedimentary rock and hardpan requiring continuous drilling, blasting or use of ripper:
a. Solid ledge rock.
b. Solid boulders more than ½ cubic yard in volume.
c. Hardpan consists of cemented soil layers but does not include uncemented clay layers.

C. Other:
1. Natural items, such as trees, stumps, logs, brush, shrubs and other vegetation.
2. Man-made items, including but not limited to:
a. Surface items, such as hot mix asphalt and concrete paving, curb, headwalls and the like.
b. Underground items, such as pipes, culverts, manholes, catch basins, foundations, walls, chambers, refuse and the like.

PART 2 - PRODUCTS

Not used.

PART 3 - EXECUTION

3.01 OPEN CHANNEL EXCAVATION:

A. Location:
1. Excavate existing channels from one side only with the intent to incur minimal disturbance to the opposite bank.

B. Tolerance:
1. Excavation of the open channel drain shall conform to the cross-sections and horizontal and vertical alignment indicated on the Drawings.
2. The completed cross-section shall not be more than 0.2 foot above or 1.0 foot below the plan elevation without the prior approval of ENGINEER.

3. The finished bottom grade shall not be greater than 0.5 foot below the plan elevation within 300 feet upstream or downstream of structures or enclosures.

C. Rock excavation:
1. CONTRACTOR shall notify ENGINEER immediately when rock is encountered during excavation.
2. Rock excavation and removal methods shall be approved by ENGINEER prior to initiating the work.
3. Rock excavation shall be paid under separate change order unless a specific item appears in the bid schedule.

D. Unstable soils:
1. CONTRACTOR shall notify ENGINEER immediately when a significant amount of unstable soils are encountered during excavation.
2. Additional excavation that is deemed necessary by ENGINEER to compensate for unstable soil conditions will be compensated for in a separate change order.

E. Spoil banks:
1. Spoil material shall be placed and graded in the location and to the slopes indicated on the Drawings.
2. Location:
   a. On one side of channel only unless indicated otherwise on the Drawings.
   b. Away from existing tributary water courses or drains.
   c. Away from landscaped areas.
   d. Away from the trunks of trees.
   e. Maintain a 12-foot buffer strip between the top of the channel bank and the edge of the spoil pile.
3. Grading:
   a. Grade spoil banks to a minimum 5 on 1 side slopes away from the drain in open areas and a minimum 2 on 1 side slopes in wooded areas unless indicated otherwise on the Drawings.
   b. Level spoil piles to a maximum of 1 foot above existing grade unless indicated otherwise on the Drawings.
   c. Level spoil to allow broad, flat drainage ways to enter the drain without the ponding of surface water behind the spoil banks.

F. Side inlets:
1. Required where concentrated surface runoff enters the drain.
2. Type and location as indicated on the Drawings.

G. Pilot channel:
1. Location:
   a. Where indicated on the Drawings.
   b. In areas with wet or unstable soils.
2. Schedule:
   a. Construct pilot channel at least 30 days prior to final drain excavation.
   b. Following completion of replacement of structures located immediately downstream.
3. Design:
   a. Bottom elevation at or below the proposed final drain bottom elevation.
   b. Bottom width equal to half the proposed finished bottom width.
   c. Side slopes at 1 on 1 minimum.

H. Tributaries:
1. Grade tributaries at a constant slope away from the drain excavation throughout the limit of the available right-of-way or 75 feet, whichever is less.
2. Begin tributary grading at the proposed drain elevation and meet the existing grade at the limit of the regrading.
3. Regrade the tributary to a bottom width equal to the existing bottom width. Regraded channel side slopes shall be a minimum of 2 on 1.

I. Channels parallel to roads:
1. Excavate from field side of drain.

2. Comply with requests of highway authority having jurisdiction within road right-of-way.
3. Preserve and maintain existing driveways.

END OF SECTION

SECTION 02270

SLOPE PROTECTION AND STREAM RESTORATION

PART 1 - GENERAL

1.01 SECTION INCLUDES:

A. Cobblestone and riprap, grade and bank protection.

B. Riffle zones.

C. Meanders.

D. Cross-vanes.

E. Rock cluster.

1.02 RELATED SECTIONS:

A. Section 02210: Site Grading.

B. Section 02222: Excavating, Backfilling & Compacting for Utilities.

C. Section 02272: Soil Erosion and Sedimentation Control.

D. Section 02271: Riprap.

E. Section 02941: Open Channel Seeding.

1.03 REFERENCES:

A. ASTM A-641 Standard Specification for Galvanized Carbon Steel Wire.

B. ASTM D-4595: Test Method for geo-grid tensile strength.

C. Part 91 of Act No. 451, of 1994, relative to Soil Erosion and Sedimentation Control.

D. National Crushed Stone Association (N.C.S.A.).

E. MDOT 2012 Standard Specifications for Construction.

1.04 SUBMITTALS:

A. Submit product data.

B. Submit shop drawings under provisions of Section 01300.

C. Submit product data under provisions of Section 01300.

PART 2 - PRODUCTS

2.01 MATERIALS:

A. Note that all rock materials shall be crushed limestone except that cobblestone maybe used on the base of the riffle zone and that MDOT 6A is required for the gravel fill at the meander.

B. Cobblestone: Sound, tough, durable rock or crushed limestone free from structural defects. Material to be uniform in size and not less than 8 inches in the least dimension. MDOT 916.01.

C. Plain riprap: Sound, tough, durable crushed limestone free from structural defects. Material to be uniform in size and not less than 8 inches in the least dimension. MDOT 916.01.

D. Heavy riprap: Sound, tough, durable crushed limestone free from structural defects. Material to be uniform in size and not less than 16 inches in the least dimension, with an average of 18 inches to 24 inches in diameter. MDOT 916.01.

E. Riffle zone riprap: Riffle zone riprap is to consist of 70-80 percent cobblestone, 10-15 percent plain riprap and 5-10 percent heavy riprap. Placement of the riprap shall be random. All material is to be natural rocks, boulders or crushed limestone.

F. Erosion control blanket: Type SC150BN from North American Green or its approved equivalent. The blanket must be biodegradable lasting 18 to 24 months. The blanket must be composed on agricultural straw and coconut matrix. The matrix must consist of no less than 25 percent coconut and no greater than 75 percent straw.

G. Filter fabric: In accordance with Section 02271: Riprap.

H. Bedding stone: National Crushed Stone Association (N.C.S.A.) #FS-2 having a maximum size of No. 100, average size of No. 4 and a minimum size of 2 inches. Stone dry density shall be a minimum of 165 pounds per cubic foot.

I. Meander gravel: MDOT 6A, no crushed particles.

J. Meanders: Gravel point bar material:
1. MDOT 6A, 0 percent crushed material.

PART 3 - EXECUTION

3.01 PREPARATION:

A. Implement temporary controls under provisions of Section 01500: Temporary Controls for soil erosion prevention and erosion control.

B. Identify the areas of work specified in this Section.

C. Temporary diversion dams may be necessary for construction. Use when approved or required by ENGINEER.

3.02 EXECUTION:

A. Grade and bank protection:
1. Over excavate protection area equal to the thickness of the protection.
2. Place filter fabric with all edges "toed in" a minimum of 12 inches.
3. Place protection on filter fabric.
4. Tamp protection until individual pieces are firmly bedded.

B. Riprap spillways:
1. Prepare sideslope as shown on the Drawings.
2. Over excavate protection area equal to the thickness of the protection.
3. Place filter fabric with all edges "toed in" a minimum of 12 inches.
4. Place protection on filter fabric.
5. Tamp protection until individual pieces are firmly bedded.

C. Riffle zones:
1. Prepare streambed and streambanks for placement of stone, soil erosion fabric and log revetments. Remove all soil and debris to meet the grading requirements.
2. Place non-woven geotextile fabric "toed in" on all edges at minimum 1 foot and overlapped in seam locations a minimum 2 feet.
3. Place stone as shown on the details placing 18-inch to 24-inch diameter stones with a 1-foot separation, face to face.
4. Place erosion control blanket as shown on the detail, livestake and seed as specified in this Section.

D. Meanders:
1. Prepare streambed and streambank for installation. Excavate pool area.

2. Install gravel point bar material as shown on the plans.
3. With ENGINEER, determine if pool material is suitable to construct meander.
    a. If material is not suitable, OWNER's representative will assist in identifying local native material to be used. If barrow material is not from pool area, construct meander fill around point bar.
    b. If soil is suitable for construction of meander, place spoil in identified fill section. If spoil is not suitable, dispose of spoil off-site.
    c. Install coir logs and rip rap at outer banks per detail

E. Cross vanes:
1. Prepare streambed and streambanks for placement of limestone. Remove all soil and debris to meet the grading requirements.
2. Excavate pool area for cross vanes.
3. Place stone as shown on the details, placing 12-inch to 18-inch diameter limestone.
4. Place erosion control blanket as shown on the detail, livestake and seed as specified in this Section.

F. Rock clusters:
1. Prepare streambed and streambanks for placement of stone and soil erosion fabric. Remove all soil and debris to meet the grading requirements.
2. Place non-woven geotextile fabric toed in on all edges at minimum 1.0 feet and overlapped in seam locations of a minimum 2.0 feet.
3. Place riprap as shown on the details.
4. Place erosion control blanket as shown on the detail and seed as specified in this Section.

END OF SECTION

SECTION 02271

RIPRAP

PART 1 - GENERAL

1.01 SUMMARY:

A. Section includes:
1. This Section includes, but is not necessarily limited to, the major items listed below, as indicated on the Drawings, as specified herein, and as necessary for the proper and complete performance of the Work.
2. Major items:
a. Preparation of subgrade.
b. Geotextile fabric.
c. Riprap.
3. Grout.

B. Related Sections:
1. Documents affecting work of this Section include, but are not necessarily limited to:
a. General Conditions, Supplementary Conditions and Sections in Division 1 of these Specifications.
b. Section 02210: Site Grading.
c. Section 02222: Excavating, Backfilling and Compacting for Utilities.
d. Section 02261: Open Channel Excavation.

1.02 REFERENCES:

A. Except as herein specified or as indicated on the Drawings, the work of this Section shall comply with the following:
1. MDOT:
a. 2012 Standard Specifications for Construction.
b. Standard Plans.
2. AASHTO Standard Specifications:
a. M288 - Geotextiles Used for Subsurface Drainage Purposes.

1.03 DELIVERY, STORAGE AND HANDLING:

A. Receiving and storage:
1. Geotextile fabric shall be delivered in original, unbroken, brand marked containers or wrapping indicating Manufacturer's name and Product description.
2. Handle and store materials:
a. In a manner which will prevent:
i. Deterioration or damage.
ii. Contamination with foreign matter.
iii. Damage by weather or elements.
b. In accordance with Manufacturer's directions.

B. Rejected material and replacements:
1. Reject damaged, deteriorated or contaminated material and immediately remove from the Site.
2. Replace rejected materials with new materials at no additional cost to OWNER.

1.04 SUBMITTALS:

A. Submit in accordance with Section 01300: Submittals.

B. Product data:
1. Submit for geotextile material.

C. Shop Drawings:
1. Submit for precast concrete blocks.
2. Required information:
a. Dimensions.
b. Details of construction and installation.

D. Quality control Submittals:
   1. Certificates:
      a. Submit for grout.
      b. Submit for concrete used for precast concrete blocks.
      c. Submit for concrete used for bag riprap.

PART 2 - PRODUCTS

2.01 MATERIALS:

A. Geotextile fabric:
   1. Comply with MDOT 910.03.
   2. Nonwoven:
      a. Mirafi, Inc.: Mirafi, 140N.
      b. Or equal.

B. Riprap:
   1. Comply with MDOT 813 except as herein specified.
   2. Rock:
      a. Sound, tough and durable rock.
      b. Smaller pieces may be used for filling spaces between riprap rock.
      c. Minimum dimension:
         i. Small cobblestones: 3 inches.
         ii. Cobblestones: 6 inches.
         iii. Riprap: 8 inches.
         iv. Heavy riprap: 16 inches.

PART 3 - EXECUTION

3.01 PREPARATION:

A. Grading:
   1. Slope bank to a minimum slope of 1½ horizontal to 1 vertical.
   2. Compact subsurface to 90 percent of Maximum Unit Weight.
   3. Tolerance: +0.2-feet from plan grade.

3.02 INSTALLATION:

A. Comply with MDOT 813.03 except as herein specified.

B. Geotextile fabric:
   1. Secure geotextile fabric in foundation and bank area prior to placing riprap. Toe in edges of geotextile fabric under pipe outlets and at upstream end of each roll a minimum of 12 inches.
   2. Secure geotextile fabric against movement during placement of riprap.
   3. Unroll textile material perpendicular to direction of flow of water.
   4. Overlap at joints: 2 feet minimum.
   5. Comply with Manufacturer's direction.
   6. Required where indicated on Drawings only.

C. Filter blanket.

D. Riprap:
   1. Rock:
      a. Place rock with minimum dimension perpendicular to slope.
      b. Place material above filter blanket and beginning at toe of slope and progress up slope.

END OF SECTION

SECTION 02272

SOIL EROSION AND SEDIMENTATION CONTROL

PART 1 - GENERAL

1.01 SUMMARY:

A. Section includes:
1. This Section includes but is not necessarily limited to, the furnishing and installation of soil erosion and sedimentation control measures as indicated on the Drawings, as specified herein, and as necessary for the proper and complete performance of the Work.

B. Related Sections:
1. Documents affecting work of this Section include, but are not necessarily limited to:
a. General Conditions, Supplementary Conditions and Sections in Division 1 of these Specifications.
b. Section 02110: Clearing, Grubbing and Snagging.
c. Section 02210: Site Grading.
d. Section 02222: Excavating, Backfilling and Compacting for Utilities.
e. Section 02261: Open Channel Excavation.
f. Section 02271: Riprap.
g. Section 02930: Lawns and Grass.
h. Section 02941: Open Channel Seeding.

1.02 REFERENCES:

A. Except as herein specified or as indicated on the Drawings, the work of this Section shall comply with the following:
1. Soil erosion control and sedimentation rules and guidelines of:
a. Michigan EGLR.
b. Michigan Association of County Drain Commissioners.
c. Muskegon County Drain Commissioner

B. MDOT:
1. 2012 Standard Specifications for Construction.
2. Standard Plans.

C. ASTM Specifications:
1. A 690 – High-Strength Low-Alloy Steel H-Piles and Sheet Piling for Use in Marine Environments.

1.03 SUBMITTALS:

A. Submit in accordance with Section 01300: Submittals.

B. Manufacturer’s literature and Product data:
1. Submit for soil erosion control materials:
a. Product Samples.
b. Name of Manufacturer.
c. Trade Name.

1.04 QUALITY ASSURANCE:

A. OWNER: Reserves the right to issue a stop work order if soil erosion and sedimentation controls are not properly installed or maintained.

B. Work performed under a stop work order will not be considered for payment.

1.05 DELIVERY, STORAGE AND HANDLING:

A. Receiving and storage:
1. All materials shall be delivered in original, unbroken, brand marked containers or wrapping as applicable.
2. Handle and store materials:
a. In a manner which will prevent:
i. Deterioration or damage.

ii. Contamination with foreign matter.
iii. Damage by weather or elements.
b. In accordance with Manufacturer's directions.

B. Rejected material and replacements:
1. Reject damaged, deteriorated or contaminated material and immediately remove from the Site.
2. Replace rejected materials with new materials at no additional cost to OWNER.

PART 2 - PRODUCTS

2.01 SOIL EROSION AND SEDIMENTATION CONTROL MATERIALS:

A. Vegetation:
1. Temporary vegetative cover: Perennial ryegrass.
2. Permanent vegetative cover: Seed, fertilizer, mulch and sod as specified in Section 02930: Lawns and Grass and Section 02941: Open Channel Seeding.

B. Mulch Blanket:
1. Biodegradable:
a. Coconut & Jute: North American Green C-125BN; or equal.
2. Non degradable:
a. Polyester: North American Green P-300; or equal.
3. Anchoring staples or pins: Wood pegs at least 12 inches long. Steel wire not permitted.

C. Riprap:
1. In accordance with Section 02271: Riprap.

D. Filter bags:
1. Made from geotextile blanket:
a. Comply with MDOT 910.
b. Dandy Bag II or equal for concrete structures.
c. ADS Flexstorm or equal for plastic structures.

E. Geotextile silt fence:
1. Comply with MDOT 910 except as herein specified.
2. Manufacturer:
a. Synthetic Industries, Terra Tex SC.
b. Or equal.

F. Sediment basin outlet barrier:
1. Rock:
a. Sound, tough, durable rock.
b. Graded with a nominal diameter of 16 inches.

PART 3 - EXECUTION

3.01 GENERAL:

A. Standard:
1. Achieve effective erosion control:
a. Provide all materials.
b. Promptly take all actions necessary.
2. Comply with MDOT 208 and 816 except as herein specified.

B. Site evaluation:
1. Conduct a field evaluation of the Site:
a. Prior to start of the Work.
b. With representatives of:
i. ENGINEER.
ii. County enforcing agency.
iii. OWNER.

3.02 TEMPORARY VEGETATIVE COVER:

A. General:
1. Temporary vegetative cover under this Section will be required for areas which, within the time limits specified herein, are not:
a. Permanently seeded or sodded in accordance with Section 02930: Lawns and Grass.
b. Covered with permanent structures such as: Buildings, pavement, walks and parking lots.
c. Used for other soil erosion control measures such as: Sedimentation basin and silt fences.
2. Seed, fertilize and mulch bare soil unless otherwise required by the Contract Documents:
a. Within 30 days from the time final grade has been established if permanent measures are not completed within 15 days.
b. Immediately upon completion of a section of the Work as required by ENGINEER.

B. Seed:
1. Apply uniformly at a minimum rate of:
a. Temporary vegetative cover: 70 pounds per acre.
2. Fertilizer:
a. Comply with MDOT 816.03 except as herein specified.
3. Mulch:
a. Comply with MDOT 816.03 except as herein specified.
4. Mulch blanket:
a. In accordance with Manufacturer's directions.
b. Fibers in direct contact with soil.
c. Staple pattern as specified in Manufacturer's literature for Site conditions.
d. Direction of installation:
i. Shorelines and channel banks: Parallel with direction of flow.
ii. Slopes and steep channel banks: Vertical to the slope.

3.03 GEOTEXTILE SILT FENCE:

A. Install silt fence in accordance with Manufacturer's instructions.

B. Regularly inspect and maintain silt fence to verify it is functioning as designed.

3.04 SEDIMENT BASIN:

A. Size as indicated on the Drawings.

B. Outlet barrier:
1. Construct prior to excavation of the sediment basin.
2. Construct of dumped rock or broken concrete.

C. Construct of temporary sheet piling with rock placed at downstream face.

D. Maintenance:
1. Remove sediment when sump basin is 50 percent full.
2. Remove sediment prior to Final Completion.
3. Remove outlet barrier when soil disturbed by the work has stabilized.

3.05 VEGETATED SPILLWAY SIDE INLET:

A. General:
1. Conform to slopes and dimensions indicated on the Drawings.

B. Grading:
1. Excavate to finished grade of required section and slope.
2. Dig trenches to upstream and downstream toe.
3. Hand rake grade to prepare seed bed.
4. Remove all rocks, clods and clumps larger than ½ inch in diameter.

C. Seeding:
1. Spread fertilizer at a rate of 2 pounds per 100 square feet and rake into seed bed.
2. Spread seed at a rate of 2 pounds per 100 square feet.

D. Placing mulch blanket:
1. Place mulch blanket over seed and extend ends into both trenches.

2. Fill upstream trench with earth and downstream trench with small cobblestone riprap.
3. Ensure continuous contact between mulch blanket and soil.
4. When required, overlap adjacent rolls of mulch blanket a minimum of 18 inches.
5. Staple mulch blanket at 2-foot intervals. Additional staples shall be used as necessary.

3.06 OPEN CHANNEL EXCAVATION:

A. Power equipment such as bulldozers shall not enter the water unless approved by ENGINEER.

B. Complete excavation, clearing, grubbing, snagging, tree cutting, pulling, raking, and related work in such a way as to minimize erosion of soil in the areas in which work is completed.

C. Construct sediment basins prior to excavation.

D. Comply with all measures for soil erosion and sediment control as indicated on the Drawings.

END OF SECTION

SECTION 02510

ASPHALT PAVING

PART 1 - GENERAL

1.01 SUMMARY:

A. Section includes:
1. This Section includes, but is not necessarily limited to, the furnishing and installation of the major items listed below, as indicated on the Drawings, as specified herein, and as necessary for the proper and complete performance of the Work.
2. Major items:
a. Hot mix asphalt base course.
b. Hot mix asphalt leveling course.
c. Hot mix asphalt top course.

B. Related Sections:
1. Documents affecting work of this Section include, but are not necessarily limited to:
a. General Conditions, Supplementary Conditions and Sections in Division 1 of these Specifications.
b. Section 02210: Site Grading.
c. Section 02222: Excavating, Backfilling and Compacting for Utilities.
d. Section 02230: Base Courses.

1.02 REFERENCES:

A. Except as herein specified or as indicated on the Drawings, the work of this Section shall comply with the following:
1. ASTM:
a. D 1557 – Test Methods for Moisture-Density Relations of Soils and Soil Aggregate Mixtures Using 10 lb. Hammer and 18-inch Drop.
2. MDOT:
a. 2012 Standard Specifications for Construction.
b. Standard Plans.

1.03 SUBMITTALS:

A. Submit in accordance with Section 01300: Submittals.

B. Quality control submittals:
1. Hot mix asphalt mixtures:
a. Source.
b. MDOT Classification.
c. Mix design.
d. Aggregate gradation.

1.04 QUALITY ASSURANCE:

A. Qualifications:
1. Installation personnel:
a. Trained and experienced in the fabrication and installation of the materials and equipment.
b. Knowledgeable of the design.

B. Testing of hot mix asphalt materials and base courses: In accordance with Section 01410: Testing Services.

C. Compaction:
1. Determine density by the Modified Proctor Method, ASTM D 1557.
2. Refer to MDOT Special Provision for Acceptance of HMA Mixtures 03SP502(0) – Compact to 92-96 percent of GMM density.

D. Weight slips:
1. Furnish weight slips for all material incorporated in the Project to verify that the required tonnage has been applied.

1.05 DELIVERY, STORAGE AND HANDLING:

A. Rejected material and replacements:
1. Reject damaged, deteriorated or contaminated material and immediately remove from the Site.
2. Replace rejected materials with new materials at no additional cost to OWNER.

B. Protection:
1. Use all means necessary to protect the materials of this Section before, during, and after installation.

PART 2 - PRODUCTS

2.01 MATERIALS:

A. Subgrade: In accordance with Section 02210: Site Grading.

B. Subbase and base course: In accordance with Section 02230: Base Courses.

C. Hot mix asphalt material:
1. Asphalt cement:
a. Penetration grade: PG58-28 (AWI 220) on all streets and driveways.
2. Bond coat:
a. 0.05 – 0.10.
3. Leveling course:
a. Hot mix asphalt mixture 13A.
b. Weight: 220 lb/sq yd. for roadways.
c. Weight: 165 lb/sq yd. for driveways.
4. Top Course:
a. Hot mix asphalt mixture 13A.
b. Weight: 220 lb/sq yd. for roadways.
c. Weight: 165 lb/sq yd. for driveways.
d. Percentage of shale, siltstone, and clay ironstone particles in aggregate:
i. Determined on that portion of the sample retained on all sieves down to and including No. 4.
ii. Sum of shale and siltstone particles: Maximum 5.0 percent.
iii. Clay ironstone particles: Maximum 12.0 percent.

PART 3 - EXECUTION

3.01 EXCAVATION, FILLING, AND GRADING:

A. Subgrade:
1. In accordance with:
a. Section 02210: Site Grading.
b. Section 02222: Excavating, Backfilling and Compacting for Utilities.

B. Base course: In accordance with Section 02230: Base Courses.

3.02 PREPARATION:

A. Fine grading:
1. Immediately prior to placing paving materials, test the base course for conformity to the elevations and cross-section indicated on the Drawings.
2. Fine grade as necessary to bring base course into conformance with the proper elevation and cross-section.
3. Compact all areas which have been regraded.

B. Place no hot mix asphalt material until the aggregate surface has been inspected and approved by ENGINEER.

C. Immediately before placing the hot mix asphalt material, remove all excess loose material remaining on the surface to the shoulder.

3.03 INSTALLATION:

A. Placing the hot mix asphalt mix:
1. Do not begin paving work until unsatisfactory base course conditions have been corrected.
2. Place the hot mix asphalt mixtures on the prepared base course surface. Spread and strike-off using an acceptable hot mix asphalt paver.
3. Spread mixture at minimum temperature of 225 degrees F.
4. Inaccessible and small areas may be placed by hand.

B. Bond Coat:
1. Clean contact surfaces of sand, dirt, or other objectionable material before applying bond coat.
2. Apply a bond coat to each layer of hot mix asphalt material immediately prior to applying the succeeding layer.
3. Application rate: 0.05 to 0.10 gallons per square yard.
4. Use whatever means necessary to prevent bond coat from coming into contact with structures near the areas to be paved.

3.04 CLEANING:

A. Prior to acceptance of work of this Section, clean the pavement and related areas.

END OF SECTION

SECTION 02720

STORM SEWER SYSTEM

PART 1 - GENERAL

1.01 SUMMARY:

A. Section includes:
1. This Section includes, but is not necessarily limited to, the furnishing and installation of storm sewer system as indicated on the Drawings, as specified herein, and as necessary for the proper and complete performance of the Work.

B. Related Sections:
1. Documents affecting work of this Section include, but are not necessarily limited to:
   a. General Conditions, Supplementary Conditions and Sections in Division 1 of these Specifications.
   b. Section 02222: Excavating, Backfilling and Compacting for Utilities.

1.02 REFERENCES:

A. Except as herein specified or as indicated on the Drawings, the work of this Section shall comply with the following:
1. ASTM Standard Specifications:
   a. A 48 - Gray Iron Castings.
   b. A 536 - Ductile Iron Castings.
   c. C 14 - Concrete Sewer, Storm Drain, and Culvert Pipe.
   d. C 55 - Concrete Building Brick.
   e. C 62 - Building Brick (Solid Masonry Units made from Clay or Shale).
   f. C 76 - Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe.
   g. C 139 - Concrete Masonry Units for Construction of Catch Basins and Manholes.
   h. C 270 - Mortar for Unit Masonry.
   i. C 443 - Joints for Circular Concrete Sewer and Culvert Pipe, Using Rubber Gaskets.
   j. C 478 - Precast Concrete Manhole Sections.
   k. C 923 - Resilient Connectors between Reinforced Concrete Manhole Structures and Pipes.
   l. D 449 - Asphalt used in Dampproofing and Waterproofing.
   m. F 405 - Corrugated Polyethylene (PE) Tubing and Fittings.
   n. F 667 - Large Diameter Corrugated Polyethylene Tubing and Fittings.
2. ASTM Standards:
   a. C 497 - Method of Testing Concrete Pipe, Sections, or Tile
   b. C 822 - Definitions of Terms Relating to Concrete Pipe and Related Products.
   c. C 924 - Practice for Testing Concrete Sewer Lines by Low Pressure Air Test Method.
   d. F 449 - Subsurface Installation of Corrugated Thermoplastic Tubing for Agricultural Drainage or Water Table Control.
3. AASHTO Standards:
   a. Corrugated Steel Pipe, Metallic-Coated for Sewers and Drains.
   b. M218 - Steel Sheet, Zinc-Coated (Galvanized) for Corrugated Steel Pipe.
   c. M274 - Steel Sheet, Aluminum-Coated (Type 2) for Corrugated Steel Pipe.
   d. M252 - Corrugated Polyethylene Drainage Tubing.
   e. M294 - Corrugated Polyethylene Pipe, 12 to 24-inch diameter.
   f. M288 - Geotextiles Used for Subsurface Drainage Purposes, as modified in MDOT Section 910.03.
4. MDOT:
   a. 2012 Standard Specifications for Construction.
   b. Standard Plans.

1.03 DEFINITIONS:

A. Abbreviations:
1. EJIW - East Jordan Iron Works.
2. CSP - Corrugated steel pipe.
3. PVC - Polyvinyl chloride.

4. RCP - Reinforced concrete pipe.
5. PE - Polyethylene pipe.
6. DIP - Ductile iron pipe.

1.04 SUBMITTALS:

A. Submit in accordance with Section 01300: Submittals.

B. Shop Drawings:
1. Submit for junction chambers and structures.
2. Required information:
a. General:
i. Dimensions.
ii. Details of construction and installation.

C. Go, no-go gage and proving ring for plastic pipe.

D. Quality control submittals:
1. Design data.
2. Test reports:
a. MDOT single and triple spot coating test results for CSP.

E. Certificates:
1. Manufacturer’s certification and sworn statement for CSP.

1.05 QUALITY ASSURANCE:

A. Qualifications:
1. Fabrication and installation personnel:
a. Trained and experienced in the fabrication and installation of the materials and equipment.
b. Knowledgeable of the design and the reviewed Shop Drawings.
2. Testing of materials:
a. Corrugated steel pipe (CSP):
i. Furnish Manufacturers' certification with chemical and mechanical Specifications.
ii. Furnish acceptable MDOT single and triple spot coating test results in accordance with MDOT 909.05.
3. Testing of material installation:
a. Light or reflected light test for alignment.
b. Visual inspection for leakage and workmanship.
c. Deflection Testing for PVC installed.
i. Electronic Deflectometer.
ii. Rigid "Go, No-Go" device.

1.06 DELIVERY, STORAGE AND HANDLING:

A. Receiving and storage:
1. All materials shall be delivered in original, unbroken, brand marked containers or wrapping as applicable.
2. Handle and store materials:
a. In a manner which will prevent:
i. Deterioration or damage.
ii. Contamination with foreign matter.
iii. Damage by weather or element.
3. In accordance with Manufacturer's directions.

B. Rejected material and replacements:
1. Reject damaged, deteriorated or contaminated material and immediately remove from the Site.
2. Replace rejected materials with new materials at no additional cost to OWNER.

PART 2 - PRODUCTS

2.01 MANUFACTURERS:

A. Reinforced concrete pipe (RCP) and concrete pipe:
1. Premarc Corporation, Northern Concrete Pipe; or equal.

B. Corrugated steel pipe (CSP):
1. Contec, Republic; or equal.

2.02 PIPE MATERIALS:

A. Concrete pipe:
1. General: Type and class as indicated on the Drawings.
2. Types:
a. Reinforced concrete (RCP): ASTM C 76.
3. Joints:
a. Premium: O-ring gasket.
b. Plain with mastic: DeWitt's No. 10WN; Carey, Sewertite; J.P. Petroleum Products, Tex-Mastic 726; Gralm, Anchor-Tite Plastic Mastic; or equal.
c. Lubricants:
i. Furnished by pipe Supplier.
d. Geotextile fabric:
i. In accordance with MDOT Section 910.03.
ii. Width: 3 feet.
e. Gaskets:
i. ASTM C 443.
ii. Furnished by pipe Supplier.
4. End Sections:
a. As indicated on the Drawings.
5. Flared end section.
a. Flared end section with concrete footing:
i. MDOT Standard Plan R-86-E.

B. Corrugated steel pipe (CSP):
1. General: type, gauge and corrugations as indicated on the Drawings.
2. Types:
a. Aluminized Type II Coating.
i. Aluminum-coated sheets: AASHTO M274.
3. Corrugations:
a. Helical corrugations: 1) Helical corrugations for pipe sizes 6 through 21-inches shall form a minimum 45-degree angle with the longitudinal axis.
b. End finish for pipe sizes 12-inches and larger:
i. Pipe shall be rerolled to form at least two annular corrugations (reformed) or to form two annular corrugations with an upturned flange (reformed with flange) in accordance with AASHTO M36.
c. Pitch and depth:
i. 6-inch to 10-inch diameter: 1½-inch x ¼-inch.
ii. 12-inch to 72-inch diameter: 2-2/3-inch x ½-inch.
d. 36-inch to 144-inch diameter: 3-inch x 1-inch.
e. 48-inch to 108-inch diameter: 5-inch x 1-inch.
4. Wall thickness:
a. MDOT Class B.
5. Minimum: 0.081-inches (12-gauge), unless specified otherwise.
6. Coupling bands:
a. Pipe diameters less than 12 inches with helical corrugations: Flat or universal band with sleeve gasket.
b. Pipe diameters 12 inches and larger with annular corrugations or reformed ends:
i. Corrugated band with sleeve gasket.
ii. Semi-corrugated band with O-rings.
iii. Flat band with O-rings.
c. Not allowed for culvert pipe diameters 36 inches and larger. One piece only shall be installed of the size and length specified on the Drawing.

d. Pipe diameters 12 inches and larger with reformed end flange: Channel or wing channel bands with mastic.
e. Coating: Match pipes being connected.
f. Wall thickness: Match pipes being connected.
g. Width:

Coupling Width	Pipe Diameter
7 inches	8 inches and less
12 inches	24 through 60 inches
24 inches	Over 60 inches

7. End sections:
   a. As indicated on the Drawings.
   b. Type:
      i. Flared end section.
   c. Beveled end section.

2.03 FABRICATION:

A. Bends:
1. Fabricated from segments of a steel cylinder with concrete mortar lining and reinforced concrete exterior covering, or from segments of concrete pipe miter-cut while the pipe is still green.
2. Steel cylinder:
   a. US S 10 gauge.
   b. Lined with mesh reinforced concrete or mortar a minimum of 3/4-inch thick.
   c. Designed for the same three-edge bearing loads as adjacent pipe.
3. Miter-cut:
   a. Remove concrete from around reinforcing steel as necessary.
   b. Weld steel.
   c. Replace concrete.

PART 3 - EXECUTION

3.01 PREPARATION:

A. Alignment and grade:
1. If there is a grade discrepancy or an obstruction which is not indicated on the Drawing, notify ENGINEER and obtain instructions prior to proceeding.
2. Where storm sewer crosses water main:
   a. Expose water main prior to laying storm sewer to verify existing depth.
   b. Maintain minimum clearance of 18 inches unless otherwise indicated on Drawings or approved by ENGINEER.
   c. Space joints equidistant from crossing.
3. Control:
   a. Laser beam:
      i. Check line and grade at: Set-up point, 25 feet, 50 feet, 100 feet and 100-foot intervals thereafter.
      ii. Reset projector at each manhole with a 600-feet maximum.
   b. Allowable deflection:
      i. Horizontal: 0.20 feet.
      ii. Vertical: 0. 10 feet.

3.02 INSTALLATION:

A. General:
1. Install pipe, fittings and appurtenances in accordance with Manufacturer's recommendations except as herein specified or indicated on the Drawings.
2. Prevent entrance of foreign material.
3. 12-inch and larger P.E. pipe: Excavate trench with a hydraulic excavator or backhoe.

B. Pipe laying:

For concrete pipe

1. Bearing: Support entire length of pipe barrel evenly with extra excavation at joints.
2. Direction: Commence at outlet and proceed up grade with spigot ends pointing in direction of flow.
3. Method:

a. Wipe clean the socket of pipe last laid.
b. Center spigot end of pipe to be laid and push home against base of socket.
c. Center pipe to form a sewer with a uniform invert.

For CSP Culvert

4. Bearing: Support entire length of pipe barrel evenly with extra excavation at joints.
5. Direction: Commence at outlet and proceed upgrade with inside laps of circumferential joints pointing in direction of flow, and with no longitudinal joints in the lower quadrant.
6. Method:
   a. Put coupling band into position at the end of pipe last laid with band open to receive next section.
   b. Bring next section into position within about 1 inch of section last laid.
   c. Clean the interior of band and exterior of pipe of all dirt, stones and debris.
   d. Center pipe to match connecting parts of both the band pipe sections.
   e. Insert bolts and tighten.

C. Jointing:
1. Mastic:
   a. Surfaces of joint: Clean and dry before mastic is applied.
   b. Apply mastic to a depth of ½-inch or more before placing the pipe.
   c. Take care in laying that the pipe does not shift and that it remains in a home position after assembly.
   d. Remove mastic from inside the pipe for diameters 36-inches and larger.
2. Lubricants: As required for coated CSP pipe. As required for gaskets.
3. Gaskets:
   a. Surfaces of joint: Clean and dry before lubricant is applied.
   b. Take care in laying that the pipe does not shift and that gasket remains in a home position after assembly.
4. Band Connector for CSP:
   a. Bar, bolt and strap: Tighten bolts to a torque of 100 to 300 foot pounds.
5. External sealing bond:
   a. In accordance with Manufacturer's recommendations.
   b. Ensure stretch of bond along bottom of pipe and prevent pulling the sealing band into the joint by keeping the weight of the pipe off the bedding until band is fully installed.
6. Geotextile wrap:
   a. Wrap around joint surfaces.
7. Allowable joint tolerance:
   a. Maximum: ½ inch at newest surfaces of the joint.
   b. Allowable joint tolerance shall not affect the lines and grades and their permissible tolerances.

3.03 REPAIR:

A. Treatment of field welds and damaged galvanized steel surfaces:
1. Clean with wire brush.
2. Two coats of zinc rich paint conforming to Federal Specifications ML-P-21035.

3.04 CLEANING:

A. Debris: Remove dirt and debris, including cemented or wedged material, from the inside of sewers, manholes and catch basins.

B. Final acceptance: Clean all sewers, manholes and catch basins before requesting final acceptance.

3.05 TESTING AND INSPECTION:

A. Observation: By ENGINEER.

B. Notification:
1. Testing: Arrange with ENGINEER following backfill, cleaning and pretesting.

C. Equipment and manpower: Provide everything required for testing.

D. Alignment and grade tests:
1. Visual:

a. Each manhole to manhole section.
b. Mirrors or lights: Adequate to illuminate the section.

2. Laser beam:
   a. Set laser beam and target:
      i. At respective manholes.
      ii. Sequentially at ¾-inch offset from:
         1) Invert.
         2) Crown.
         3) Left 1/4 point.
         4) Right 1/4 point.
   b. One or more laser beam discontinuous:
      i. Remove and replace section.
      ii. Undamaged pipe may be reused.

END OF SECTION

SECTION 02930

LAWNS AND GRASS

PART 1 - GENERAL

1.01 SUMMARY:

A. Section includes:
1. This Section includes, but is not necessarily limited to, the furnishing and installation of the major items listed below, as indicated on the Drawings, as specified herein, and as necessary for the proper and complete performance of the Work.
2. Major items:
a. Seed.
b. Fertilizer.
c. Mulch.

B. Related Sections:
1. Documents affecting work of this Section include, but are not necessarily limited to:
a. General Conditions, Supplementary Conditions and Sections in Division 1 of these Specifications.
b. Section 02210: Site Grading.
c. Section 02272: Soil Erosion and Sedimentation Control.

1.02 REFERENCES:

A. Except as herein specified or as indicated on the Drawings, the work of this Section shall comply with the following:
1. MDOT:
a. 2012 Standard Specifications for Construction.
b. Standard Plans.

1.03 DEFINITIONS:

A. Follow-up maintenance: Maintenance required when seeding, sodding, or other vegetative practices do not achieve the desired degree of stabilization.

B. Periodic maintenance: Maintenance performed after the vegetation has been established.

1.04 LOCATION:

A. Sodded areas: As indicated on the Drawings.

B. Seeded areas: All disturbed areas within the project limits not covered by other surface improvements or features.

C. Mulch blankets: As indicated on the Drawings.

1.05 SUBMITTALS:

A. Submit in accordance with Section 01300: Submittals.

B. Product data: Submit for netting and mulch blanket.

C. Samples: Submit for netting and mulch blanket.

D. Quality control submittals:
1. Certificates: Submit Supplier's certified analysis for each seed and fertilizer mixture required.

1.06 QUALITY ASSURANCE:

A. Qualifications:
1. Fabrication and installation personnel:
a. Trained and experienced in the fabrication and installation of the materials and equipment.
b. Knowledgeable of the design and the reviewed submittals.

1.07 DELIVERY, STORAGE AND HANDLING:

A. Receiving and storage:
1. All materials shall be delivered in original, unbroken, brand marked containers or wrapping indicating weight, analysis and Manufacturer's name.
2. Handle and store materials:
a. In a manner which will prevent:
i. Deterioration or damage.
ii. Contamination with foreign matter.
iii. Damage by weather or elements.
b. In accordance with Manufacturer's directions.

B. Rejected material and replacements:
1. Reject damaged, deteriorated or contaminated material and immediately remove from the Site.
2. Replace rejected materials with new materials at no additional cost to OWNER.

PART 2 - PRODUCTS

2.01 MATERIALS:

A. Topsoil: In accordance with Section 02210: Site Grading.

B. Fertilizer:
1. Comply with MDOT 917.10 except as herein specified.
2. Liquid fertilizer for hydroseed: 16-32-4 containing no chlorine.

C. Seed:
1. Comply with MDOT 917.12 except as herein specified.
2. Uniform mixtures composed of seed of the following proportions by weight:
a. Lawns:
i. In predominantly sunny areas use a combination of 50 percent Kentucky bluegrass, 25 percent creeping red fescue, and 25 percent perennial ryegrass, such as Madison Parks lawn seed mixture, as manufactured by Michigan State Seed Solutions; or approved equal.
ii. In predominantly shady areas use a combination of 20 percent Kentucky bluegrass, 20 percent chewings fescue, 30 percent creeping red fescue, 20 percent hard fescue and 10 percent perennial ryegrass, such as Shady Place lawn seed mixture, as manufactured by Michigan State Seed Solutions; or approved equal.

D. Mulch:
1. Small grain:
a. Straw.
b. Hay.
2. Anchoring material for small grain mulch:
a. Netting:
i. Biodegradable.
ii. Openings not to exceed 1½ inches x 2 inches.
iii. Minimum roll width: 35 inches.
iv. Anchoring staples or pins: Wood pegs at least 6 inches long.
b. Asphalt emulsion adhesive: MDOT SS-1h.
c. Latex-based adhesive.
3. Hydromulch:

a. Slurry: Minimum 60 percent wood fiber mulch with remaining being recycled cellulose fibers.
b. Tackifier:
   i. Manufacturers: Finn Fiber Plus; Finn Fiber gum; or equal.
   ii. Synthetic fiber or gum.

Mulch blankets:
c. As specified in Section 02272: Soil Erosion and Sedimentation Control.

PART 3 - EXECUTION

3.01 TOPSOIL:

A. In accordance with Section 02210: Site Grading.

3.02 SEEDBED PREPARATION:

A. General:
1. After the areas to be seeded have been brought to the required grade and properly trimmed, bring soil to a friable condition by disking, harrowing, or otherwise loosening and mixing to a depth of 3 to 4 inches. Thoroughly break all lumps and clods.
2. If the prepared seedbed is not fertilized, satisfactorily seeded, and mulched before the friable condition is lost through compaction or crusting, repeat the seedbed preparation prior to seeding or reseeding.

B. Raking: Rake prepared seedbed before seeding.

3.03 FERTILIZING:

A. Dry fertilizer:
1. Broadcast on surface as first step in seeding process.
2. Apply with seeding if drilled.
3. Work fertilizer into the soil to a depth of 1 to 2 inches.
4. Apply uniformly.
5. Application rate: Equivalent to 240 pounds per acre of 12-12-12.

B. Hydroseeding:
1. Apply fertilizer with seed.
2. Application rate: Equivalent to 272 pounds per acre of 16-32-4.

3.04 SEEDING:

A. Scheduling:
1. Within 7 days from the time the area was first disturbed.
2. Channel banks: Within 24 hours from the time the area was first disturbed.
3. Seasonal limitations:
   a. April 20 through November 1.
   b. Dormant seeding after November 1.

B. Sowing:
1. Sow the seed following or in conjunction with the fertilizer and while the seed bed is in a friable condition.
2. Do not sow seeds through mulch.
3. Application rate:
   a. Other areas: Sow seed at a minimum rate of 56 lbs/acre.

C. Finishing:
1. Float and lightly compact areas sown by hydroseeder or the broadcast method to incorporate the seed into the uppermost ½ inch of the soil.

D. Method:
1. Broadcast:
   a. Do not seed when wind velocity exceeds 5 miles per hour.
2. Mechanical drills.
3. Hydroseeder:

a. Use only equipment specifically designed for hydraulic seeding application.
b. Mix seed, fertilizer and pulverized mulch in water until uniformly blended into homogeneous slurry.
c. Continue mixing during application.

E. Inspection:
1. Areas which are sown by hydroseeder or the broadcast method shall be visually inspected for uniformity of application; areas in which visual inspection fails to reveal an average of two seeds per square inch shall be resown at no additional cost to OWNER.

F. Seed on slopes:
1. Protect seeded slopes against erosion with netting, asphalt emulsion adhesive or other methods acceptable to ENGINEER.
2. Protect seeded slopes against erosion with mulch blanket.

3.05 MULCHING:

A. Small grain mulch:
1. Application:
a. Immediately after seeding.
b. Uniform distribution.
c. Allow sunlight to penetrate mulch.
2. Application rate: Two tons per acre (2-1/2 bales per 1,000 square feet).
3. Anchoring:
a. Mulch anchoring tool.
b. Netting.
c. Latex based adhesive.

B. Hydromulch:
1. Apply with hydroseed or following seeding by other method.
2. Application rate: 1,250 pounds per acre.

C. Mulch blankets:
1. Netting on top.
2. Fibers in direct contact with soil.
3. Staple in accordance with Manufacturer's guidelines for slope conditions.
4. Direction of installation:
a. Direction of flow of water in intermittent and ephemeral drains.
b. Perpendicular to sideslopes above normal water level in perennial drains.

3.06 MAINTENANCE:

A. General:
1. CONTRACTOR: Responsible for follow-up maintenance.
2. Reseed, refertilize, remulch, or regrade as necessary to establish a uniform and stable grassed area.

END OF SECTION

SECTION 02941

OPEN CHANNEL SEEDING

PART 1 - GENERAL

1.01 SUMMARY:

A. Section includes:
   1. This Section includes, but is not necessarily limited to, the furnishing and installation of the major items listed below, as indicated on the Drawings, as specified herein, and as necessary for the proper and complete performance of the Work.

B. Major items:
   1. Topsoil.
   2. Seed.
   3. Fertilizer.
   4. Mulch.

C. Related Sections:
   1. Documents affecting work of this Section include, but are not necessarily limited to:
   2. General Conditions, Supplementary Conditions and Sections in Division 1 of these Specifications.
   3. Section 02261: Open Channel Excavation.
   4. Section 02272: Soil Erosion and Sedimentation Control.

1.02 REFERENCES:

A. Except as herein specified or as indicated on the Drawings, the work of this Section shall comply with the following:
   1. MDOT:
      a. 2012 Standard Specifications for Construction.
      b. Standard Plans.

1.03 SUBMITTALS:

A. Submit in accordance with Section 01300: Submittals.

B. Quality control Submittals:
   1. Certificates: Submit Supplier's certified analysis for each seed and fertilizer mixture required.

1.04 DELIVERY, STORAGE AND HANDLING:

A. Receiving and storage:
   1. All materials shall be delivered in original, unbroken, brand marked containers or wrapping indicating weight, analysis and Manufacturer's name.
   2. Handle and store materials:
      a. In a manner which will prevent:
         i. Deterioration or damage.
         ii. Contamination with foreign matter.
         iii. Damage by weather or elements.
      b. In accordance with Manufacturer's directions.

B. Rejected material and replacements:
   1. Reject damaged, deteriorated or contaminated material and immediately remove from the Site.
   2. Replace rejected materials with new materials at no additional cost to OWNER.

PART 2 - PRODUCTS

2.01 MATERIALS:

A. Topsoil:
   1. Natural loam topsoil.
   2. Uniform quality.

3. Free of undesirable material.
4. Organic content greater than 6 percent by weight.
5. Acidity between pH 5.0 and pH 8.0.

B. Fertilizer:
1. Dry fertilizer: Ready mixed granular material containing equal amounts by weight of available nitrogen (N), readily available phosphoric acid ($P_2 0_5$) and total available potash ($K_2 0$), (12-12-12).
2. Liquid fertilizer for hydroseed: 16-32-4 containing no chlorine.
3. Minimum 40 percent filler by weight.

C. Seed:
1. Uniform mixtures composed of seed of the following proportions by weight:
   a. Drain side slopes, spoil banks, and other disturbed areas:
      i. Loamy soils: 35 percent smooth brome grass, 25 percent perennial ryegrass, 8 percent Kentucky bluegrass, 12 percent alfalfa, 12 percent red clover, 8 percent birdsfoot trefoil.
      ii. Sandy soils: 33 percent red fescue, 45 percent tall fescue, 4 percent Kentucky bluegrass, 7 percent alfalfa, 7 percent red clover, 4 percent birdsfoot trefoil.
   b. Lawns: 30 percent perennial rye grass, 30 percent Kentucky bluegrass, 40 percent creeping red fescue.
2. All legumes shall be inoculated with the proper nitrogen fixing bacteria within 24 hours prior to seeding or as designated by ENGINEER.
3. Germination of all seeds shall be 85 percent minimum.
4. Purity of all seeds shall be 90 percent minimum.

D. Mulch:
1. Small grain:
   a. Straw.
   b. Hay.
2. Anchoring material for small grain mulch:
   a. Netting:
      i. Biodegradable.
      ii. Openings not to exceed 1½ inches x 2 inches.
      iii. Minimum roll width: 35 inches.
      iv. Anchoring staples or pins: Wood pegs at least 6 inches long.
3. Hydromulch:
   a. Slurry: Minimum 60 percent wood fiber mulch with remaining being recycled cellulose fibers.
   b. Tackifier:
      i. Manufacturers: Finn Fiber Plus; Finn Fiber gum; or equal.
      ii. Synthetic fiber or gum.

E. Mulch blankets:
1. As specified in Section 02272: Soil Erosion and Sedimentation Control.

PART 3 - EXECUTION

3.01 TOPSOIL:

A. Lawns: Comply with MDOT 816.03.

3.02 FERTILIZING:

A. Dry fertilizer:
1. Broadcast on surface as first step in seeding process.
2. Apply with seeding if drilled.
3. Apply uniformly.
4. Application rate: Equivalent to 240 pounds per acre of 12-12-12.

B. Hydroseeding:
1. Apply fertilizer with seed.
2. Application rate: Equivalent to 272 pounds per acre of 16-32-4.

3.03 SEEDING:

A. Scheduling:
1. Within 7 days from the time the area was first disturbed.
2. Channel banks: Within 24 hours from the time the area was first disturbed.
3. Seasonal limitations:
a. April 20 through[November 1.
b. Dormant seeding after November 1.

B. Sowing:
1. Sow the seed following or in conjunction with the fertilizer and while the seed bed is in a friable condition.
2. Do not sow seeds through mulch.
3. Application rate:
a. Lawn area: Sow seed at a minimum rate of 100 lbs/acre.
b. Ditch banks, spoil berms, and other areas: Sow seed at a minimum rate of 56 lbs/acre.

C. Finishing:
1. Incorporate the seed into the uppermost ½ inch of the soil.

D. Method:
1. Broadcast:
a. Do not seed when wind velocity exceeds 5 miles per hour.
2. Mechanical drills.
3. Hydroseeder:
a. Use only equipment specifically designed for hydraulic seeding application.
b. Mix seed, fertilizer and pulverized mulch in water until uniformly blended into homogeneous slurry.
c. Continue mixing during application.

E. Inspection:
1. Visually inspected for uniformity of distribution.
2. Reseed areas as required to establish a uniform and stable stand of grass.

3.04 MULCHING:

A. Small grain mulch:
1. Application:
a. Immediately after seeding.
b. Uniform distribution.
c. Allow sunlight to penetrate mulch.
2. Application rate: Two tons per acre (2½ bales per 1,000 square feet).
3. Anchoring:
a. Mulch anchoring tool.
b. Netting.
i. As required for steep side slopes.
ii. Install in accordance with Manufacturer's instructions.

B. Hydromulch:
1. Apply with hydroseed.
2. Application rate: 1,250 pounds per acre.

3.05 MAINTENANCE:

A. Reseed, refertilize, remulch, or regrade as necessary to establish a uniform and stable grassed area.

END OF SECTION