GENESEE COUNTY PURCHASING
A Division of the Genesee County Controller’s Office
COUNTY ADMINISTRATION BLDG
1101 BEACH STREET, ROOM 361,
FLINT, MICHIGAN 48502
Phone: (810) 257-3030 Fax (810)257-3560
www.gc4me.com

Nerahoo Hemraj
Controller

December 10, 2019

GENESEE COUNTY REQUEST FOR INVITATION TO BID #19-210

Sealed bids will be received until 3:00 a.m. (EDT), Thursday, January 2, 2020, at the Genesee County Purchasing Department, 1101 Beach Street, Room 361, Flint, MI, 48502 for RE-DEVELOPMENT OF CAMPING AREA C OF WOLVERINE CAMPGROUND.

This procurement is conducted in accordance with the Genesee County Purchasing Regulations, a copy of which is on file and available for inspection at the Genesee County Purchasing Department.

A mandatory pre-bid meeting will be held on Wednesday, December 18, 2019 at 10:00 a.m. (EDT), in the conference room of the Genesee County Parks and Recreation Administration Building, 5045 Stanley Road, Flint, Michigan 48506. Attendance at this meeting is required for the submission and consideration of any bid. Any questions on this ITB may be submitted before December 16, 2019 before 12:00 PM (EDT).

Questions submitted will be addressed during the meeting.

Each offeror is responsible for labeling the exterior of the sealed envelope containing the bid response with the bid number, bid name, bid due date and time, and your firm’s name. The bid request number and due date for this ITB are:

<table>
<thead>
<tr>
<th>DUE DATE:</th>
<th>3:00 PM (EDT), Thursday, January 2, 2020, before 3:00 PM</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRE-BID MEETING</td>
<td>Wednesday, December 18, 2019 @ 10:00 AM</td>
</tr>
<tr>
<td>BID REQUEST NUMBER</td>
<td>#19-210</td>
</tr>
</tbody>
</table>

Derrick Jones, Purchasing Administration

bid2\2019\19-210
Attachments

GENESEE COUNTY IS AN EQUAL OPPORTUNITY EMPLOYER
www.gc4me.com

ITB #19-210

1
TABLE OF CONTENTS

SECTION 1 - INSTRUCTIONS TO PROPOSERS .................................................. 3
SECTION 2 - STANDARD TERMS & CONDITIONS ........................................... 4
SECTION 3 - ADDITIONAL TERMS & CONDITIONS ...................................... 5
SECTION 4 - QUALIFICATIONS OF PROPOSERS .......................................... 8
SECTION 5. SCOPE OF WORK & SPECIFICATION ....................................... 8
SECTION 6. SUPPLEMENTAL CONDITIONS ............................................... 8
SECTION 7 - INFORMATION REQUIRED FROM PROPOSERS ..................... 9
SECTION 8 - EVALUATION CRITERIA & SELECTION PROCEDURE ............ 10
BID FORM .................................................................................................. 11
SIGNATURE PAGE ..................................................................................... 12
GENESEE COUNTY INSURANCE CHECKLIST ......................................... 13
REFERENCES ......................................................................................... 14
ATTACHMENT A – TECHNICAL SPECIFICATION ..................................... 15
ATTACHMENT B – COUNTY PROPOSED CONTRACT ............................... 16
ITB #19-210 RE-DEVELOPMENT OF CAMPING AREA C OF WOLVERINE CAMPGROUND

SECTION 1 - INSTRUCTIONS TO PROPOSERS

1. Sealed bids will be received until 3:00 p.m. (EDT), Thursday, January 2, 2020, at the Genesee County Purchasing Department, 1101 Beach Street, Room 361, Flint, MI, 48502. The Genesee County Purchasing Department hours of operation are 8:00 a.m. to 5:00 p.m., closed holidays and furlough days, check website for closed days. Label the envelope containing the bid response as described on page 1. LATE BIDS AND BIDS SENT BY FACSIMILE OR E-MAIL WILL NOT BE ACCEPTED.

2. A mandatory pre-bid meeting for this project will be held at 10:00 a.m. on Wednesday, December 18, 2019 in the conference room of the Genesee County Parks and Recreation Administration Building, 5045 Stanley Road, Flint, Michigan 48506. Attendance at this meeting is required for the submission and consideration of any bid. Any questions on this ITB may be submitted before Monday, December 16, 2019 before 12:00 PM (EDT). Questions submitted will be addressed during the meeting.

3. Please carefully review this document. It provides information necessary to aid participating vendors in formulating a thorough response. A formal, comprehensive review period will be conducted to ensure that Genesee County selects the best possible vendor that will provide the best value and service.

4. Submit one original, one paper copy and one electronic copy of your bid. All bids become the property of Genesee County. The original must include a signature on the Signature Page of a person authorized to make a binding offer. Additionally the bid response must consist of one copy in electronic format on a CD, DVD or USB flash drive formatted in Adobe (.pdf), Microsoft Word, and/or Microsoft Excel. Failure to provide the required number of duplicate copies may result in rejection of your bid. Bids may not be submitted at the MITN site for this offering.

5. Michigan Inter-governmental Trade Network— an alternate review of the ITB RE-DEVELOPMENT OF CAMPING AREA C OF WOLVERINE CAMPGROUND can be done at: http://www.bidnetdirect.com/mitn
   a. Genesee County has partnered with BidNet as part of the Michigan Inter-governmental Trade Network and will post their bid opportunities to this site. As a vendor, you can register with Michigan Inter-governmental Trade Network (use hyperlink or https://www.mitn.info/Registration.asp?ID=2340) and be sure that you see all available bids and opportunities. By selecting automatic bid notification, your company will receive emails once Genesee County has a bid opportunity that matches your company’s business. In addition, the site handles bid opportunities, ITBs, and RFQs for other member governmental agencies. If you need help registering, please call Michigan
6. All communications, any modifications, clarifications, amendments, questions, responses or any other matters related to this ITB, shall be made by and through the purchasing contact reference in this solicitation. No contact regarding this solicitation made with other County employees is permitted. Any violation of this condition may result in immediate rejection of bid.

7. All prospective proposers shall be responsible for routinely checking the Genesee County Purchasing Department website at http://www.gc4me.com/departments/purchasing for issued addenda and other relevant information. Genesee County shall not be responsible for the failure of a prospective proposer to obtain addenda and other information issued at any time related to this ITB.

8. The County’s Standard Proposed Contract is attached to this ITB (See Attachment B). After the award is made to the successful proposer, the County and the successful proposer will negotiate a final contract that substantially conforms to the Standard Proposed Contract. Any exceptions to the terms and conditions of the Standard Proposed Contract and this ITB must be clearly set forth in your bid and referenced on company letterhead. The County will not entertain negotiations to change any terms and conditions of the Standard Proposed Contract or ITB unless those changes are requested in your bid.

9. The County of Genesee requires a signed Genesee County Insurance Checklist with each bid submitted (see page 14). Insurance required per the specifications governing this work must be provided prior to the contract starting date and kept in full effect and compliance during entire contract period. Failure to comply with these provisions will cause termination of the contract.

The contractor agrees to be responsible for any loss or damage to property or persons due to the performance of services herein contracted and further agrees to indemnify and defend the County of Genesee against all claims or demands whatsoever, and to hold the County of Genesee harmless from any loss or damage resulting therefrom.

10. **Bid Format:** Bids must be submitted in the format outlined in Section 7. **INFORMATION REQUIRED FROM PROPOSERS** to be deemed responsive.

**SECTION 2 - STANDARD TERMS & CONDITIONS**

See Genesee County website, Purchasing Department for Standard Terms and Conditions by going to the following link:
http://www.gc4me.com/Std%20T%20C%20SECTION%202016.pdf
SECTION 3 - ADDITIONAL TERMS & CONDITIONS

1. **Purpose:** Through this ITB, Genesee County ("the County") is soliciting bids from qualified contractors to provide labor and materials for the re-development of Camping Area C of the Wolverine Campground.

2. **Issuing Office:** This ITB is issued by the Genesee County Purchasing Department on behalf of the Genesee County Parks and Recreation. The contact person is Derrick Jones, Purchasing Administrator, Genesee County, 1101 Beach Street, Room 361, Flint, Michigan 48502, phone: (810)-257-3030, fax: (810) 257-3560 and djones@co.genesee.mi.us. Email is the preferred method of contact.

3. **Bid Bond:** A bid bond is required upon submission of bid. Contractor must furnish a bid bond or cashier's check (payable to Treasurer, County of Genesee) equal to five percent (5%) of the total amount of the submitted bid price.

4. **Questions & Inquiries:** All questions regarding this ITB shall be submitted in writing and received no later than **Monday, December 16, 2019 by 12:00 p.m (EDT)**, to the Genesee County Purchasing Department as listed above. E-mail is the preferred method of contact for all inquiries concerning this ITB. No verbal interpretation to any respondent as to the meaning of any requirement stated in this ITB shall be binding on Genesee County. All responses to questions regarding this ITB shall be issued in writing and distributed as an addendum by Genesee County.

5. **Addenda:** Genesee County reserves the right to amend and provide clarification of this ITB prior to the date for bid submission. In such an event, an addendum will be posted on the Purchasing Department website (http://www.gc4me.com/Purchasing/currentbids.htm). Further, all proposers shall acknowledge having seen any and all addendums issued (1, 2, 3, etc.) on the Signature Page.

6. **Bid Considerations:** All costs incurred in the preparation of a response to this ITB or any costs prior to approval of the contract by Genesee County and formal notification to the selected proposer will be the responsibility of the respondent, and will not be reimbursed by Genesee County. Bids should be prepared simply and economically, providing a straightforward, concise description of the proposer’s ability to meet the requirements of this ITB.

7. **Responsive Bids:** To ensure proper consideration, all proposers are encouraged to submit a complete response to this ITB using the format outlined in **Section 7, INFORMATION REQUIRED FROM PROPOSERS.** In addition, at least one of the paper bids must be signed with an **original signature** of the official authorized to bind the proposer to its provisions.
8. **Bid Modifications:** Clarifications, modifications, or amendments to any Bid that has been submitted, but prior to the Bid Opening Date, may be made only within the discretion and written approval of the Purchasing Manager.

9. **Withdrawal of Bid:** Bids may only be withdrawn by a proposer with written notice prior to the date and time set for the opening of bids.

10. **Validity Period:** Any bid submitted as a result of this Request for Bid shall be binding on the proposer for 120 calendar days following the due date.

11. **Right To Reject:** Genesee County reserves the right to reject any and all bids received in response to this ITB.

12. **Disclosure:** All information in an offeror's bid is subject to disclosure under the provisions of Public Act N. 442 of 1976 known as the "Freedom of Information Act". This Act also provides for the complete disclosure of contracts and attachments thereto. In the event that a proposer wishes to designate any portion of their submission as "confidential" or "proprietary," the proposer must contact the Purchasing Manager prior to submission of the bid. All requests regarding disclosure and requests for confidentiality of a bid response to this ITB shall be submitted in writing and received no later than Monday, November 4, 2019 by 12:00 p.m. (EDT), to the Genesee County Purchasing Department as listed above.

13. **Errors, Omissions, And Discrepancies:** If a Proposer discovers any ambiguity, conflict, discrepancy, omission, or other error in the ITB, it shall immediately notify the Genesee County Purchasing Manager of such error in writing and request modification or clarification of the document prior to the deadline for submitting questions. Genesee County will make modifications by issuing a written addendum. The proposer is responsible for clarifying any ambiguity, conflict, discrepancy, omission, or other error in the Request for Bids prior to submitting a bid or it shall be waived.

14. **Best and Final Offers:** Discussions may be undertaken with those proposers whose bid has been determined to be reasonably susceptible of being selected for award. After discussions are held, and prior to award, proposers may be allowed the opportunity to submit revisions to their bids for the purpose of obtaining best and final offers.

During the aforementioned procedures, neither the names of any of the proposers nor the contents of any bid will be disclosed until the completion of negotiations and revision of bids (Best and Final Offers).

The contract that may be entered into will be awarded based on the bid response and, where applicable, the Best and Final Offer that is the most advantageous to Genesee County, per the evaluation criteria included in this ITB.

15. **Prime Contractor Responsibilities:** The successful offeror(s) shall be required to assume responsibility for all services offered in the bid regardless of who
produces them. Further, the County will consider the successful offeror to be the sole point of contact with regard to contractual matters, including payment of any and all charges resulting from the contract.

16. **Non-Assignability:** The contract may not be assigned, transferred, or conveyed by the Contractor without the expressed written consent of Genesee County.

17. **Independent Contractor:** It is understood and agreed to, by and between the Contractor and Genesee County, that any and all acts that the Contractor or its personnel, employees, and servants perform pursuant to the terms of the Contract shall be undertaken as independent contractors and not as employees of Genesee County by or with a contract or agreement, nor impose any liability upon Genesee County. All acts and contracts of the Contractor shall be in its own name and not in the name of Genesee County.

18. **Subcontracts:** The Contractor shall not enter into subcontracts to this Agreement with additional parties without obtaining prior written approval of Genesee County. A condition of granting such approval is that such subcontractors shall be subject to all conditions and provisions of this contract. The Contractor shall be responsible for the performance of all subcontractors.

19. **Statement of Exceptions:** The proposer shall furnish a statement on company letterhead giving a complete description of all exceptions to the terms, conditions, and specifications set forth in the bid. Failure to furnish this statement shall mean that the proposer agrees to meet all requirements set forth in this solicitation.

20. **Acceptance of Bid Content:** It is proposed that, if a contract is entered into as a result of this ITB, the ITB will serve as the basis for the contract. The contents of the bid of the successful offeror may become contractual obligations if a contract is issued. Failure of the successful offeror to accept these obligations will result in cancellation of contract award.

21. **Termination for Misrepresentation:** If the successful proposer receives a contract and is subsequently found to have misrepresented any information in its bid and/or Best and Final Offer submission, the contract may be terminated at the discretion of Genesee County.

22. **Acceptable Deviations:** The decision of Genesee County shall be final as to what constitutes acceptable deviations from specifications or requirements.

23. **News Release:** News releases pertaining to this ITB or the services to which it relates will not be made without prior written Genesee County approval, and then only in accordance with the instructions from the contract administrator. No information regarding the procurement and services shall be released without prior approval of the contract administrator.
SECTION 4 - QUALIFICATIONS OF PROPOSERS

In order to qualify for award, a proposer shall have the capability in all respects to perform the work and the integrity and reliability, which will assure good faith performance. This requirement shall include, but is not limited to, the availability of the appropriate financial, material, equipment, facility, personnel, ability, expertise and experience necessary to meet all procurement requirements.

No bid will be considered from any proposer unless known to be skilled and regularly engaged in work of a character similar to that covered by the solicitation documents.

At a minimum, the following requirements are necessary for consideration of contract award:

1. Proposer shall be financially stable and have the financial wherewithal to carry out the requirements of this solicitation.

2. The proposer must be five (5) years of previous direct experience in the provision of the required services referenced in this solicitation.

3. Services provided/worked performed by the proposer for clients identified as references must be described as superior or better by the proposer’s references.

4. The proposer’s personnel and management to be utilized in the services required shall be knowledgeable in their areas of expertise. The County reserves the right to perform investigations as may be deemed necessary to insure that competent persons will be utilized in the performance of the work.

5. Willingness to supply information requested by the COUNTY concerning a determination of its responsibility. If the proposer fails to supply any requested information, the COUNTY will base its determination of responsibility upon any available information, or may find the proposer non-responsive if such failure is unreasonable.

If a proposer does not convince Genesee County that it possesses the above qualifications with the bid submission, Genesee County shall not consider its bid for award.

SECTION 5. SCOPE OF WORK & SPECIFICATION

Technical specification is attached for this project. Please see Attachment A for details.

SECTION 6. SUPPLEMENTAL CONDITIONS

1. Reference Form: All proposers shall include information for current or prior project references similar to the requested services referenced in this solicitation (see Reference Page). The name, address, and telephone numbers of the appropriate contact for each reference shall be submitted as part of the bid. Particular attention will be paid to references from other municipalities and/or public sector entities in the state of Michigan.
2. **Surety Bonds:**
   A. **Performance Bond:** The successful proposer must provide a Performance Bond insuring the Contractor's performance of awarded structures/projects.
   
   B. **Payment Bond:** The successful proposer must provide a Materials & Labor Payment Bond insuring that the Contractor's subcontractors will be paid according to their subcontracts.
   
   C. **Maintenance Bond:** The successful proposer must provide a Maintenance bond for a period of two (2) years, which is to commence upon final acceptance of the project.
   
   D. **General Conditions:** The Performance, Payment, and Maintenance Bonds must be issued by a surety authorized to issue bonds in the State of Michigan and must have a penal amount at least equal to 100% of the total amount due to the Contractor under this Agreement. In addition, the surety bonds must be submitted to the County as a condition of contract execution. The County reserves the right to reject any surety proposed by the successful proposer if the County, in its sole discretion, determines that the surety proposed by the successful proposer is unable to provide adequate protection for the County.

3. **Payment:** Payment shall be made to the contractor(s) for the successful completion of the work outlined in this bid within 60 day and upon complete satisfaction of the COUNTY.

4. **Prevailing Wage Requirement:** All contractors and subcontractors shall pay its laborers and mechanics not less than the prevailing wage rates and fringe benefits for corresponding classes of laborers and mechanics employed on similar projects in the area.

**SECTION 7 - INFORMATION REQUIRED FROM PROPOSERS (BID FORMAT)**

In order to be deemed responsive, bids must be submitted in the format outlined below:

**Administrative Bids**

1) **Work Plan:** Describe in narrative form your plan for accomplishing the work. Include in the work plan the time frame or schedule to which you would adhere based on staffing and current workload from all clients. Include the number of labor hours you have allocated for each task including cost per labor hour. State the amount of time for completion from the date of Notice to Commence.

2) **Labor Requirements, Staff Qualifications & Experience:** The contractor must be able to provide an appropriate, experienced and knowledgeable team. Include the number personnel by skill and qualification that will be involved in providing the services. Identify key individuals by name and title. Provide licensing and other qualifications of key personnel that are proposed to be involved in the project.
3) Statement of the Project: State in precise terms your understanding and interpretation of the project requirements. Include a narrative description of the product that will be delivered.
   a) Description of your company's "Safety Program" to be used while performing the required services. Include a copy of the Safety Program.
   b) Please describe any lawsuits that were filed against your company in the last five (5) years and the results of those lawsuits.
   c) Please describe any mediation or arbitrations your company has been involved with in the last five (5) years and the results of those arbitrations/mediations.

4) Furnish a bid bond or cashier's check (Payable to Genesee County Treasurer) equal to 5 percent (5%) of the total amount of the submitted bid price.

5) Additional information and comments include any other information that is believed to be pertinent but not specifically asked for elsewhere. Genesee County welcomes innovative and unique strategies from proposers.

Submit the required submittals contained in the ITB that are required to substantiate a responsive bid as indicated below.

1. Business organization, state the full name and address of your organization, and, if applicable, the branch office or other subordinate element that will perform or assist in performing the work. Include the names and phone numbers of personnel at your organization authorized to negotiate the proposed contract.

2. Statement of Exceptions: See Section 1.7 for clarification.

3. Completed "Bid Form:" See page 12.


6. References: See page 15 of this solicitation. Prior experience with similar projects is essential for any firm to provide the services required in this solicitation. This section shall consist of a minimum of three (3) references with project descriptions. In addition, contact information for each reference shall be provided with the name, address, phone number and email address. The contacts for each reference must be knowledgeable of the offeror's performance on the referenced project and the scope of services performed by the proposer.

SECTION 8 - EVALUATION CRITERIA & SELECTION PROCEDURE

It is the intent of the Genesee County to conduct a comprehensive, fair, and impartial evaluation of bids received. Award shall be made to the lowest responsive, qualified proposer for each structure referenced in Section 5 Scope of Work and the Bid Form. As such, the COUNTY may award bids to multiple proposers in the best interest of the COUNTY.
BID FORM

GENESEE COUNTY ITB #19-210 Re-Development of Camping Area C of Wolverine Campground

Owner: Genesee County
1101 Beach St.
Flint, MI 48502

To: Genesee County Purchasing Dept.
Genesee County Administration Building
1101 Beach Street, Room 361
Flint, MI 48502

Contractor must complete the following table:

<table>
<thead>
<tr>
<th>Description</th>
<th>Quantity</th>
<th>Unit of Measure</th>
<th>Price (Completed by Contractor)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Base Bid:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mobilization</td>
<td>1</td>
<td>LSUM</td>
<td></td>
</tr>
<tr>
<td>Removals</td>
<td>1</td>
<td>LSUM</td>
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</tr>
<tr>
<td>Site grading</td>
<td>1</td>
<td>LSUM</td>
<td></td>
</tr>
<tr>
<td>Aggregate surface, 4inch</td>
<td>6523</td>
<td>Syd</td>
<td></td>
</tr>
<tr>
<td>Electrical</td>
<td>1</td>
<td>LSUM</td>
<td></td>
</tr>
<tr>
<td>Water Service, 2 inch HDPE and fittings</td>
<td>3200</td>
<td>Ft</td>
<td></td>
</tr>
<tr>
<td>Erosion Control, Silt Fence</td>
<td>1000</td>
<td>Ft</td>
<td></td>
</tr>
<tr>
<td>Storm, 12 inch</td>
<td>34</td>
<td>Ft</td>
<td></td>
</tr>
<tr>
<td>Storm, 6 inch</td>
<td>35</td>
<td>Ft</td>
<td></td>
</tr>
<tr>
<td>Utility shed</td>
<td>1</td>
<td>LSUM</td>
<td></td>
</tr>
<tr>
<td>Water pedestals</td>
<td>37</td>
<td>Ea</td>
<td></td>
</tr>
<tr>
<td>Sign markers</td>
<td>37</td>
<td>Ea</td>
<td></td>
</tr>
<tr>
<td>Turf Establishment</td>
<td>1</td>
<td>LSUM</td>
<td></td>
</tr>
<tr>
<td><strong>TOTAL (Base Bid)</strong></td>
<td></td>
<td></td>
<td>[Total]</td>
</tr>
<tr>
<td>Add Alternate 1:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vault toilet remove and replace</td>
<td>1</td>
<td>LSUM</td>
<td></td>
</tr>
<tr>
<td><strong>TOTAL (Base Bid + Alternate 1)</strong></td>
<td></td>
<td></td>
<td>[Total]</td>
</tr>
</tbody>
</table>

Upon receipt of a notice to commence, the contractor will be able to complete the work within [_________] days.

(fill in number of days)

The proposer having familiarized himself/herself with all local conditions likely to be encountered affecting the cost of the work and having carefully examined the Solicitation Documents, does hereby propose to furnish all labor, materials, tools and equipment, and services necessary to perform and complete in a workmanlike manner required in connection with the above set forth project, all in accordance with the Solicitation Documents dated [__________________________].

ITB #19-210 11
SIGNATURE PAGE
GENESEE COUNTY ITB #19-210
RE-DEVELOPMENT OF CAMPING AREA C OF WOLVERINE CAMPGROUND

The undersigned represents that he or she:

1. is duly authorized to make binding offers on behalf of the company,
2. has read and understands all information, terms, and conditions in the ITB,
3. has not engaged in any collusive actions with any other potential proposers for this ITB,
4. hereby offers to enter into a binding contract with Genesee County for the products and services herein offered, if selected by Genesee County within 120 days from bid due date,
5. certify that it, its principals, and its key employees are not "Iran linked businesses," as that term is described in the Iran Economic Sanctions Act, P.A. 2012, No. 517, codified as MCL 129.311, et seq.
6. acknowledges the following addenda ____________ issued as part of the ITB:

Conflict of Interest:

____To the best of our knowledge, the undersigned firm has no potential conflict of interest due to any other County contracts, or property interest for this bid.

____The undersigned firm by attachment to this form, submits information which may be a potential conflict of interest due to other County contracts, or property interest for this Bid.

Exceptions to Solicitation and/or Standard Contract: NO_____ YES_____ (include attached statement)

Name (typed): ________________________________________________

Signature: __________________________________ Title: __________________________

Company: ___________________________________________________

Federal Employee Identification Number (FEIN): ______________________

DUNS Number: _______________________________________________

Date: ________________________________________________________

Contact Person of company representative for matters regarding this ITB

__________________________________________

CONTACT NAME

POSITION

__________________________________________

E-MAIL

__________________________________________

MAILING ADDRESS CITY STATE ZIP CODE

__________________________________________

PHONE FAX

ITB #19-210
GENESEE COUNTY INSURANCE CHECKLIST

PROFESSIONAL SERVICES CONTRACT FOR: 19-210 ITB, Re-Development of Camping Area C of Wolverine Campground – P+R
Limits (Figures denote minimums)

Coverage Required

☐ 1. Workers' Compensation  Statutory limits of Michigan
☐ 2. Employers' Liability  $100,000 accident/disease
  $500,000 policy limit, disease
  Including Premises/operations
☐ 3. General Liability  $1,000,000 per occurrence with $2,000,000 aggregate
  Including Products/Completed Ops and
  Contractual Liab./ Per Project Aggregate Endsmnt
☐ 4. Professional liability  $1,000,000 per occurrence with $2,000,000 aggregate
  Including errors and omissions
☐ 5. Medical Malpractice  $200,000 per occurrence $800,000 in aggregate
☐ 6. Automobile liability  $1,000,000 combined single limit each accident-
  Owned, Hired, Non-owned
☐ 7. Umbrella liability/Excess Coverage  $2,000,000 BI & PD and PI

☐ 8. Genesee County named as an additional insured on other than workers' compensation via
endorsement. A copy of the endorsement or evidence of blanket Additional Insured
language in the policy must be included with the certificate.

☐ 9. Other insurance required: Contractor must provide a Builder's Risk "all risk" policy
sufficient to cover all materials and equipment that will be on site. Also, a
Contractor's Pollution Liability Policy with limits of $1,000,000.

NOTE: A $3,000,000 Owners' and Contractors Protective Liability (OCP) Policy may be
substituted for the Per Project Aggregate Limit Endorsement under the general liability.

☐ 10. Best's rating: A VIII or better, or its equivalent (Retention Group Financial Statements)

☐ 11. The certificate must state bid number and title

Insurance Agent’s Statement

I have reviewed the requirements with the bidder named below. In addition:

☐ The above required policies carry the following deductibles:

☐ Liability policies are occurrence claims made

Insurance Agent  Signature

Prospective Contractor's Statement

I understand the insurance requirements and will comply in full if awarded the contract.

Contractor  Signature

Required general insurance provisions are provided in the checklist above. These are based on the contract and exposures of the
work to be completed under the contract. Modifications to this checklist may occur at any time prior to signing of the contract. Any
changes will require approval by the vendor/contractor, the department and County Risk Manager. To the degree possible, all
changes will be made as soon as feasible.
REFERENCES

List 3 references

<table>
<thead>
<tr>
<th>Company/Client:</th>
<th>Contacts:</th>
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<tbody>
<tr>
<td></td>
<td>Name:</td>
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<tr>
<td></td>
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<td>Phone:</td>
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<td>Dates of Service:</td>
<td>Email:</td>
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<td></td>
<td>Address:</td>
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<td></td>
<td>City, State:</td>
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<table>
<thead>
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<th>Company/Client:</th>
<th>Contacts:</th>
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<tr>
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<td>City, State:</td>
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ATTACHMENT A

Technical Specifications 19C0006 – Re-Development of Camping Area C of Wolverine Campground
<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>01 25 00</td>
<td>Materials and Equipment</td>
</tr>
<tr>
<td>01 32 14</td>
<td>Schedule Requirements</td>
</tr>
<tr>
<td>01 33 00</td>
<td>Submittal Procedures</td>
</tr>
<tr>
<td>01 41 26</td>
<td>Permit Requirements</td>
</tr>
<tr>
<td>01 45 16.02</td>
<td>Density and Aggregate Testing</td>
</tr>
<tr>
<td>01 50 00</td>
<td>Construction Facilities and Temporary Controls</td>
</tr>
<tr>
<td>01 71 23.16</td>
<td>Construction Staking by Contractor</td>
</tr>
<tr>
<td>03 30 53</td>
<td>Concrete</td>
</tr>
<tr>
<td>06 10 00</td>
<td>Rough Carpentry</td>
</tr>
<tr>
<td>08 12 00</td>
<td>Hollow Metal Door Frames</td>
</tr>
<tr>
<td>08 70 00</td>
<td>Door Hardware</td>
</tr>
<tr>
<td>22 11 23</td>
<td>Submersible Water Well Pumps</td>
</tr>
<tr>
<td>31 10 01</td>
<td>Clearing and Removal of Miscellaneous Structures</td>
</tr>
<tr>
<td>31 23 02</td>
<td>Excavating and Backfilling for Utility Construction</td>
</tr>
<tr>
<td>31 25 00</td>
<td>Soil Erosion and Sedimentation Control</td>
</tr>
<tr>
<td>32 15 00</td>
<td>Aggregate Surface</td>
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<tr>
<td>32 92 00</td>
<td>Turf Establishment</td>
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<td>33 11 00</td>
<td>Water Main</td>
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<td>Water Wells</td>
</tr>
<tr>
<td>33 42 00</td>
<td>Culverts</td>
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</table>
PART 1 - GENERAL

1.01 Work Included

Unless specifically indicated otherwise on the plans or in the contract documents, all materials and equipment shall be new and undamaged.

A. Materials and Equipment

1. Materials and equipment incorporated into the work shall conform to applicable specifications and standards. Materials and equipment shall comply with size, make, type, and quality specified or as specifically approved by the Engineer.

2. Manufactured and fabricated products shall be designed, fabricated, and assembled in accordance with the best engineering and shop practices. Like parts of duplicate units are to be manufactured to standard sizes and gauges to be interchangeable. Two or more items of the same kind shall be identical and manufactured by the same manufacturer. Products shall be suitable for the service conditions. Equipment capacities, sizes, and dimensions shown or specified shall be adhered to unless variations are specifically approved in writing. Materials or equipment shall not be used for any purpose other than that for which it is designed or specified.

1.02 Substitutions

A. Where specific materials and equipment items are identified in the specifications by manufacturer's name or model number, bids shall be based on the products of one of the manufacturers so named or added thereto by addendum during the bidding period.

B. During the bidding period, all requests for substitutions will be given full consideration by the Engineer; and if approved, an addendum will be issued to incorporate the approved material or equipment into the contract documents.

C. Requests for substitutions must be received by the Engineer in ample time, not later than ten days before the bid due date, so that any necessary addendum will be received by all prospective bidders before submission of the bids.

D. After award of the contract, requests for substitutions will be considered only for one of the following reasons:

1. Increased value to the Owner
2. Decreased cost to the Owner
3. Specified items not procurable

E. Requests for substitutions after award of the contract shall be accompanied by manufacturer's data or other detailed descriptions of the proposed material or equipment.

F. A request for a substitution constitutes a representation that the Contractor has investigated and determined the proposed product is equal to or superior in all respects to that specified.
G. The Contractor shall coordinate the installation of an accepted substitution into the project to provide a complete and operable system. Modifications or re-work of other parts of the project resulting because of substitutes will be at the Contractor's expense.

H. The Engineer shall be the judge of the acceptability of the proposed substitutions.

1.03 Manufacturer's Instructions

A. When contract documents require that installation of work shall comply with the manufacturer's printed instructions, the Contractor shall obtain and distribute copies of such instructions to the parties involved in the installation, including two sets to the Engineer. The instructions shall be provided in advance of installation. The Contractor shall notify the Engineer in the event job conditions or the requirements of the plans or specifications conflict with the manufacturer's instructions.

B. The Contractor shall handle, install, connect, clean, condition, and adjust products in accordance with such instructions and in conformity with the specified requirements.

C. The Contractor shall perform work in accordance with manufacturer's instructions. No preparatory step or installation procedures shall be omitted unless specifically modified or exempted by contract documents.

PART 2 - PRODUCTS

Not Applicable

PART 3 - EXECUTION

3.01 Transportation and Handling

A. The Contractor shall arrange deliveries of products in accordance with construction schedules and coordinate them to avoid conflict with work and conditions at the site.

1. Products shall be delivered in undamaged condition, in the manufacturer's original containers or packaging with identifying labels intact and legible.

2. Immediately upon delivery, the Contractor shall inspect shipments to assure compliance with requirements of contract documents and approved submittals and that products are properly protected and undamaged.

B. The Contractor shall provide equipment and personnel to handle products by methods to prevent soiling or damage to products or packaging.

3.02 Storage and Protection

A. Products shall be stored in accordance with the manufacturer's instructions, with seals and labels intact and legible.

1. Products subject to damage by the elements shall be stored in weather tight enclosures.

2. Temperature and humidity shall be maintained within the ranges required by manufacturer's instructions.
B. The Contractor shall arrange storage in a manner to provide easy access for inspection and make periodic inspections to assure that products are maintained under specified conditions and free from damage or deterioration.

C. For products specified by naming one or more products or manufacturers and "or equal", the Contractor must submit a request for substitutions for any product or manufacturer not specifically named.

***END OF SECTION***
PART 1 - GENERAL

1.01 Work Included

The Contractor shall develop a detailed schedule, identifying various phases or divisions of work, indicating a start date and duration required for each. The schedule shall be presented to the Engineer or Owner in sufficient detail, as may be required by the Engineer or Owner, for their approval.

Periodically through the life of the project and as required by the Engineer or Owner, the Contractor shall update the schedule and provide copies to the Engineer and Owner.

1.02 Requirements

The Contractor shall schedule work to be performed during normal business hours, unless otherwise directed on the plans or approved by the Engineer.

Once work has begun on the project, the Contractor shall work continuously and expeditiously to complete all work provided for by the contract.

Project shall be substantially completed in accordance with the date specified in the agreement. Substantial completion is the stage of completion where the project is fit for occupancy and use without hindrance for its intended purpose.

Project shall be fully completed and ready for final payment in accordance with the date specified in the agreement.

PART 2 - PRODUCTS

Not Applicable

PART 3 - EXECUTION

Not Applicable

***END OF SECTION***
PART 1 - GENERAL

1.01 Work Included

A. This section includes procedures for preparing and transmitting submittals required by specification sections for a product, material, or construction method. Submittals shall include the following:

1. Shop drawings
2. Product data
3. Manufacturer's certificates
4. Design data and calculations
5. Manufacturer's instructions
6. Manufacturer's field service reports
7. Samples
8. Operation and maintenance manuals (timing, quantity, content, and form)

B. It is the responsibility of the General Contractor to convey the requirements of this section to their sub-contractors and their suppliers and vendors.

1.02 Submittals

A. Schedule submittals to expedite work. Unless otherwise indicated in this section, submittals shall be submitted within 30 days of date of Notice to Proceed.

B. Preparation

1. Provide separate submittals for each specification section requiring submittals. Where multiple sections relate to the same system or element and are being provided from the same source, a single combined submittal is acceptable.

2. Coordinate submission of related items. Group submittals of related products in a single transmission.

3. Include all submittal material requested for that section.

4. Identify variations from requirements of contract documents. State product and system limitations which may adversely affect work.

5. Mark or show dimensions and values in same units as specified.

C. Contractor Responsibilities

1. Review submittals prior to transmittal. Verify compatibility with field conditions and dimensions, product selections and designations, quantities, and conformance of submittal with requirements of contract documents. Return non-conforming submittals to preparer for revision, rather than submitting for review.
2. Coordinate submittals to avoid conflicts between various items of work.

3. Submittal Transmittal Form
   a. Include with each submittal a transmittal form. A sample copy of an acceptable form is included in Attachment A. The Contractor's standard submittal form may be used, provided it contains essentially the same information as the sample.
   b. Identify project, Contractor, subcontractor, supplier, manufacturer, pertinent drawing sheet and detail numbers, and associated specification section numbers.
   c. Sequentially number transmittal forms. Re-submittals shall have original number with a suffix. Acceptable form of number is SS SS SS-NN-T where:
      i. SS SS SS indicates specification section number;
      ii. NN indicates different submittals for that specification section; and
      iii. T indicates the number of times that submittal has been made.

4. Failure of the Contractor to review submittals, prior to transmittal for review, shall be cause for rejection.

5. Incomplete, improperly packaged, and submittals from sources other than the Contractor will not be accepted.

D. Transmittal
   Where possible, transmit all submittals electronically. Where electronic submittal is not possible, submit four paper copies for the Engineer's retention, plus as many copies as the Contractor desires returned after review. Samples shall be submitted as described elsewhere in this specification.

E. Review
   The Engineer will review and return submittals with comments.

F. Do not fabricate products or begin work which requires submittals until return of reviewed submittal with A/E or SNL SE acceptance.

G. On return, promptly distribute reviewed submittals to concerned parties. Instruct parties to promptly report any inability to comply with provisions.

H. Resubmission
   1. Revise and resubmit submittals, as required, within 15 days of return from initial review.
   2. Make re-submittals under procedures specified for initial submittals.
   3. Identify all changes made since previous submittal.

1.03 Quality Assurance and Quality Control
   A. Where required by specification sections, provide quality assurance submittals:
   1. Qualification Data
      Contractor shall submit written information demonstrating capabilities and experience of firm or person. Include lists of complete projects with names and contact information for references.
2. Manufacturer's Certificates
   Submit reference data, affidavits, and certifications on manufacturer's letterhead certifying that products conform to or exceed specified requirements. Certificates may be based on recent or previous test results supplied by manufacturer and accepted by the Engineer.

3. Installer Approval
   Certification on manufacturer's letterhead that installer complies with requirements and is approved for installing manufacturer's products.

4. Welding Certificates
   Written certification that welding procedures and personnel comply with requirements. Submit record of Welding Procedure Specifications (WPS) and Procedure Qualification Record (PQR) on American Welding Society (AWS) forms. Include names of firms and personnel certified.

5. Field Test Reports
   Written reports from qualified testing agency indicating and interpreting results of field tests performed either during or after installation for compliance with specified requirements.

1.04 Submittal Review

   A. The Engineer will review submittals for the sole purpose of verifying general conformance with design intent and general compliance with contract documents. Approval of submittal by the Engineer does not relieve the Contractor of responsibility for correcting errors which may exist in submittal, or from meeting requirements of contract documents.

   B. Review Time
      Initial review will be performed within 14 days of receipt. Reviewer reserves the right to withhold action on a submittal requiring review of related submittals, until related submittal is received. Additional time will be required if processing must be delayed to permit review of related subsequent submittals. The Engineer will review re-submittals within 14 days.

   C. Review Actions
      After review, submittals will be returned and marked as follows to indicate action taken:

      1. Reviewed, No Comments
         Part of work covered by submittal may proceed, provided it complies with requirements of contract documents. Final acceptance will depend upon that compliance.

      2. Reviewed, With Comments
         Part of work covered by submittal may proceed, provided it complies with notations and corrections on submittal and requirements of contract documents. Final acceptance will depend upon that compliance.

      3. Revise and Resubmit
         Do not proceed with part of work covered by submittal including purchasing, fabricating, and delivering. Revise or prepare new submittal in accordance with notations and resubmit.
1.05 Drawings

A. Where required by specifications or otherwise needed, prepare drawings illustrating portion of work for use in fabricating, interfacing with other work, and installing products. Contract drawings shall not be reproduced and submitted as shop drawings.

B. When construction is complete, prepare and submit red-lined copies of the contract drawings showing clearly how construction deviated from the design, along with the authority for the deviation or change.

C. Electronic Format

1. Size printable to: 8½ inches by 11 inches minimum and 24 inches by 36 inches maximum.

2. Present in a clear and thorough manner. Title each drawing with project name. Identify each element of drawing with reference number.

3. Plans, elevations, sections, and detail shop drawings shall be to scale, with scale indicated.

4. Indicate field verified dimensions. Show relationship of products to adjacent work. Note coordination requirements.

5. Schematics and diagrams shall be logically arranged and presented in a clear, understandable manner with all items labeled.

6. Internal wiring diagrams: Provide internal wiring and elementary ladder diagrams for factory pre-wired equipment.

7. Control diagrams: Show relative positions of each component as a system diagram.

1.06 Product Data

A. Provide product data such as manufacturer's brochures, catalog pages, illustrations, diagrams, tables, performance charts, and other material which describe appearance, size, attributes, code and standard compliance, ratings, and other product characteristics.

B. Form

1. Provide all critical information such as reference standards, performance characteristics, capacities, power requirements, wiring and piping diagrams, controls, component parts, finishes, dimensions, and required clearances.

2. Submit only data which are pertinent. Mark each copy of manufacturer's standard printed data to identify products, models, options, and other data pertinent to project.

3. Modify manufacturer's standard schematic drawings and diagrams and supplement standard data to provide specific information applicable to project. Delete information not applicable.

4. Colors and Patterns: Unless color and pattern is specified for product, submit accurate color and pattern charts or samples illustrating manufacturer's full range for selection by the Engineer. Submit two hard copies only.

1.07 Design Data and Calculations

A. Where required by specification sections, provide basic calculations, analyses, and data to support design decisions and demonstrate compliance with specified requirements. State
assumptions and define parameters. Give general formulas and references. Provide sketches, as required, to illustrate design method and application.

B. Arrange calculations and data in a logical manner, with suitable text to explain procedures and order.

C. Indicate name, title, and telephone number of individual performing design and include professional seal of designer where applicable or required.

1.08 Manufacturer's Instructions

A. Where required by specification sections, provide manufacturer's instructions for activities such as delivery, storage, assembly, installation, wiring, start-up, adjusting, and finishing.

B. Indicate pertinent portions and identify conflicts between manufacturer's instructions and contract documents.

C. Where appropriate, include preparation procedures; service connection requirements; critical ambient conditions; foundation requirements; special precautions; adjustment requirements; alignment procedures; leveling; purging; charging; lubrication; and cleaning prior to operation and/or Owner's acceptance.

D. Installation (e.g., assembly, mounting, or wiring) and start-up instructions shall be submitted and available for review in the field prior to scheduled material or equipment installation.

1.09 Samples

A. Submit samples to illustrate functional and aesthetic characteristics of products with all integral parts and attachment devices. Include full range of manufacturer's standard finishes, indicating colors, textures, and patterns for Engineer selection.

B. Submission

   Submit the number of samples specified in individual specification sections. One sample will be retained by the Engineer.

C. Label with identification related to submittal transmittal form.

1.10 Manufacturer's Field Service Reports

A. When an individual specification section requires services of manufacturer's field representative, submit report of observations, site decisions, and instructions given to installers.

B. Form

   1. Present complete information in clear concise manner.

   2. Bind with titled cover in folder or binder.

C. Report shall include:

   1. Time, location, conditions, and duration of activity;

   2. Names of persons performing and witnessing activity;

   3. Equipment used;

   4. Description of activity, data recorded, and results;
5. Deficiencies found, corrective measures, and results of retesting; and
6. Other pertinent data.

D. Submit report within 30 days of construction site service visit.

1.11 Operation and Maintenance Data

A. Where required by specification sections, provide operation and maintenance manuals.

PART 2 - PRODUCTS

Not Applicable

PART 3 - EXECUTION

Not Applicable

***END OF SECTION***

ATTACHMENT A - SAMPLE SUBMITTAL TRANSMITTAL FORM
Attachment A

SAMPLE SUBMITTAL TRANSMITTAL FORM

PROJECT: ____________________________

CONTRACT NUMBER: ____________________________

SUBMITTAL NUMBER: ____________________________  RESUBMITTAL: YES NO

DATE: ____________________________ NUMBER OF COPIES SUBMITTED: ____________

SUBMITTAL DESCRIPTION: ____________________________

RELATED DESIGN DISCIPLINE (circle):

Civil
Mechanical
Fire Protection

Architectural
Electrical
Controls

Telecommunications

Security

Other: ____________________________

ASSOCIATED SPECIFICATION SECTION NO: ____________________________

REFERENCED DRAWING SHEET NO: ____________________________

SUBCONTRACTOR/SUPPLIER/MANUFACTURER PROVIDING SUBMITTAL DATA:

Name: ____________________________

Address: ____________________________ Telephone Number: ____________________________

CONTRACTOR:

Name: ____________________________

Address: ____________________________ Telephone Number: ____________________________

CONTRACTOR’S CERTIFICATION:

The undersigned, as representative of the Contractor for the above project, submits the following and certifies that:

1. Submittal has been reviewed and it is complete and conforms to requirements of contract documents, except as noted.

2. Required dimensions have been field verified and are acceptable for installation of proposed products and construction of proposed work.

3. Required quantities for products and materials covered by this submittal have been verified as correct.

4. Fabrication processes and construction methods proposed in this submittal are acceptable for this project and will result in a complete, functional installation.

5. Submittal has been coordinated with other submittals and work and proposed products and construction will properly interface with other construction.

NAME OF CONTRACTOR REVIEWER: ____________________________

SIGNATURE OF CONTRACTOR REVIEWER: ____________________________

DATE: ____________________________

SUBMITTAL PROCEDURES
SECTION 01 33 00 – PAGE 7
PART 1 - GENERAL

1.01 Work Included

The Contractor shall complete work in accordance with all applicable regulations, laws, and ordinances. Work shall be completed in accordance with permits issued by regulatory agencies.

The Contractor shall obtain permits, including the paying of fees, posting bonds, and providing insurance coverage, to secure permits which have not been obtained by the Owner.

Where permits have been obtained by the Owner, the Contractor shall conduct work and operations consistent with the requirements of the permits.

Where changed conditions or other issues arise such that the conditions of a permit which has been issued cannot be met, the Contractor shall promptly notify the Owner and the permitting agency. The Contractor shall provide such additional information as may be necessary to secure a modification to the original permit to allow the planned work to continue.

PART 2 - PRODUCTS

Not Applicable

PART 3 - EXECUTION

3.01 Permits to be Obtained by Contractor

A. Permit Applications Completed by the Owner

The Owner has submitted information and reviewed the proposed work with the following agencies. Final permits have not yet been issued. The Contractor is required to obtain the permits for the proposed project including the paying of fees, posting bonds, and providing insurance coverage to secure permits.

<table>
<thead>
<tr>
<th>Permit Agency</th>
<th>Permit Type</th>
<th>Requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>EGLE</td>
<td>State Campground and Joint Permit</td>
<td>Contractor to follow permit requirements; permit fees paid by Owner.</td>
</tr>
<tr>
<td>Genesee County Water and Waste</td>
<td>Soil Erosion and Sedimentation Control</td>
<td>Contractor to execute permit.</td>
</tr>
<tr>
<td>Genesee County Health Department</td>
<td>Well Permit</td>
<td>Contractor to apply for well permit and pay all associated fees.</td>
</tr>
<tr>
<td>Richfield Township</td>
<td>Building and Electrical Permit</td>
<td>Contractor to apply for building and electrical permit, inspection, and associated fees.</td>
</tr>
</tbody>
</table>
B. Other Permits to be Obtained by the Contractor
The Contractor is responsible to obtain all permits necessary to complete the proposed work, which have not been obtained by the Owner.

***END OF SECTION***
PART 1 - GENERAL

1.01 Work Included

This work includes material testing of soil, aggregates, stabilized mixtures, and pulverized pavement mixtures.

1.02 References

A. Michigan Department of Transportation 2012 Standard Specifications for Construction
B. Michigan Department of Transportation Density Testing and Inspection Manual
C. Michigan Test Methods (MTM)

1.03 Related Work

A. Section 31 23 02 — Excavating and Backfilling for Utility Construction
B. Section 32 15 00 — Aggregate Surface
C. Section 33 11 00 — Water Main
D. Section 33 42 00 — Culverts

1.04 Quality Assurance and Quality Control

A. Soil and Aggregate Density Testing

1. The Contractor is responsible for all quality control density testing on this project. The Engineer will complete quality assurance density testing at a random rate.

B. Sand and Aggregate Gradation

The Contractor is to supply sand and aggregates in the Michigan Department of Transportation gradations, as specified by the project specifications.

Contractors are encouraged to use “prequalified” Michigan Department of Transportation aggregate sources. If the Contractor elects to use a non-prequalified source, then the Contractor shall be responsible for supplying the Engineer with Sieve Analysis (MTM109) and Loss by Washing (MTM108) at the following rates:

- Course Aggregates: 1 per 1,000 tons
- Dense-Graded Aggregates: 1 per 1,000 tons
- Open-Graded Aggregates: 1 per 1,000 tons
- Granular Material Class I: 1 per 1,000 tons
- Granular Material Class II and IIA: 1 per 3,000 cubic yards
- Granular Material Class III: 1 per 10,000 cubic yards
- Fine Aggregate: 1 per 1,000 tons

All Sieve Analysis and Loss by Washing reports shall be signed and sealed by a Professional Engineer.
1.05 Job Conditions

A. Access for Testing
   The Contractor shall provide the Engineer safe access for testing technicians to complete any required testing. Reasonable time for testing shall be allowed by the Contractor.

B. Safety
   The Contractor is responsible for conducting operations in a safe and orderly manner and in conformance with MIOSHA P.A. 154.

PART 2 - PRODUCTS

2.01 Submittals

   The Contractor shall submit a Quality Control Testing plan to be approved by the Engineer. The Quality Control Testing plan shall include, at a minimum, the company performing the testing, certifications, equipment calibration reports, frequency of testing, procedure for notifying the Engineer if tests fail to meet specifications, corrective action plan, and sample form that will be used to document material testing results. The Contractor shall submit the approved form documenting results within three days of material testing.

PART 3 - EXECUTION

3.01 Minimum Percent of Compaction for Aggregates

   The following are a minimum percent compaction for typical items of work. Note: Higher percent compaction may be required for specific items of work, see specifications for those items.

A. Original Ground
   Road Embankment Areas 90 percent
   Bridges – within the limits as shown on the plans 95 percent

B. Cut Areas
   Cuts requiring Sand Subbase 95 percent
   Cuts not requiring Sand Subbase 95 percent
   Subgrade for HMA Base, Aggregate Base, and Concrete Widening 95 percent

C. Embankments and Backfill
   Regular 95 percent
   Abutments with Piling 95 percent
   Abutments without Piling 100 percent
   Foundation Undercut Backfill 100 percent
   Backfill for Bridges, Culverts, Utilities, Manholes, Catch Basins, Edge Drains, and Subgrade Undercuts 95 percent
   Foundations and Miscellaneous Structures 95 percent

D. Pavement Structure
   Subbase 95 percent
   Subbase for Slope Paving 90 percent
   Aggregate Base under Concrete Pavement 95 percent
   Aggregate Base under HMA Pavement 98 percent
   Pulverized HMA Aggregate Base 98 percent
Recycled Concrete Aggregate Base – under Concrete Pavement 95 percent
Recycled Concrete Aggregate Base – under HMA Pavement 98 percent
Aggregate Base – Sleeper Slab and Bridge Approach 98 percent
Shoulders – Class I 98 percent
Shoulders – Class II and III 95 percent

3.02 HMA Density

The density control target, “Theoretical Maximum Density” (TMD) for HMA shall be calculated using the Gmm from the Contractors approved HMA mix design. TMD = Gmm X 62.4.

HMA Base Course 92 percent to 98 percent
HMA Leveling Course 92 percent to 98 percent
HMA Top Course 92 percent to 98 percent

The HMA layer must meet the required density target before the succeeding lift or traffic is placed on the pavement.

3.03 Testing Frequency

Each layer must be tested and meet compaction requirements before the succeeding layer is placed. The Engineer will test at a rate that is warranted for field conditions and Contractor means and methods. The list of frequencies below are minimums.

Subgrade 1 test per 500 feet per width of 24 feet or less
Embankment 1 test per 300 cubic yards of material
Subbase 1 test per 500 feet per width of 24 feet or less
Backfill 1 test per 300 cubic yards of material
Aggregate Base Course 1 test per 500 feet per width of 24 feet or less
HMA Mixtures 1 test per 500 feet per width of 24 feet or less
Shoulders 1 test per 500 feet each side
Sleeper Slab 1 test per bridge approach
Foundations and Miscellaneous Structures 1 test per 1-foot lift or per 300 cubic yards

3.04 Compaction Efforts

The Contractor shall continue to make compaction efforts to obtain the minimum standards given within this specification upon notification of a failing test. A passing test is required at every location of a failing test prior to starting the next related item of work.

***END OF SECTION***
SECTION 01 50 00
CONSTRUCTION FACILITIES AND TEMPORARY CONTROLS

PART 1 - GENERAL

1.01 Work Included

This work includes providing temporary facilities and controls during the construction of the project.

PART 2 - PRODUCTS

Not Applicable

PART 3 - EXECUTION

3.01 Electricity

Electricity for use by the Contractor during the construction of the project shall be provided by the Contractor. The Contractor shall provide such temporary systems necessary to convey the electricity to the work area from the point of supply.

Temporary power supply systems shall comply with all applicable codes.

3.02 Lighting

The Contractor shall provide lighting for construction activities. The Contractor shall provide fixtures, switches, conductors, and other equipment for a complete system. The lighting system shall meet the requirements of all applicable codes.

Electricity for lighting will be paid for as described in Section 3.01.

3.03 Heat, Ventilation

The Contractor shall provide heat and ventilation, as required, to maintain specified conditions for construction operations and to protect materials, equipment, and finishes from damage due to temperature or humidity.

The Contractor shall provide ventilation of enclosed areas to cure materials, to disperse humidity, and to prevent accumulations of dust, fumes, vapors, or gases.

The Contractor shall provide ventilation of enclosed areas, as necessary, to maintain safe working areas as required by applicable codes.

3.04 Water

The Owner will provide water for construction activities, at the location of existing water lines, faucets, and hydrants. The Contractor shall provide such piping extensions, as necessary, to deliver the water to the location(s) required for construction activities.
3.05 Barriers

The Contractor shall provide barriers to prevent entry to construction areas or hazardous areas.

3.06 Enclosures

The Contractor shall provide temporary weather tight enclosures of openings in exterior surfaces to provide acceptable working conditions, protection of materials from the elements, and to prevent entry of unauthorized persons.

3.07 Protection of Installed Work

The Contractor shall control vehicle and pedestrian traffic and/or provide temporary protective coverings, as required, to protect installed or uncompleted work from damage.

3.08 Water Control

The Contractor shall grade the site to drain. Excavations shall be kept free of water. The Contractor shall provide pumps as required.

Water shall not be run to detrimentally affect adjacent buildings or properties.

3.09 Cleaning

The Contractor shall maintain the construction area free of debris and waste material. Debris and waste material resulting from construction operations shall be properly disposed of by the Contractor.

The Contractor shall clean areas, as required, for proper execution of the project work.

3.10 Drinking Water

The Contractor shall furnish drinking water for their workers.

3.11 Sanitary Facilities

The Contractor shall provide sanitary facilities for their workers as required by laws and regulations. The Contractor shall service and clean the facilities.

***END OF SECTION***
SECTION 01 71 23.16
CONSTRUCTION STAKING BY CONTRACTOR

PART 1 - GENERAL

1.01 Work Included

The Contractor is responsible to provide all staking and layout necessary for construction of the project.

1.02 Notifications

In the event that it appears there is an error or contradiction between plan grades, construction stakes, and/or actual conditions, the Contractor shall notify the Owner or Engineer immediately.

PART 2 - PRODUCTS

Not Applicable

PART 3 - EXECUTION

3.01 Requirements

The Contractor is responsible to provide such layout and control work as may be required for construction of the proposed improvements.

The Contractor shall provide workers competent in the layout and control work necessary. The Contractor shall provide the equipment and materials necessary for establishing the necessary control and layout.

Pipelines, 8 inches or larger that are to be laid at a uniform grade, shall be laid using a laser for alignment control.

3.02 Plan Grades and Alignment

The horizontal alignment of manholes and drainage structures will be from the center of casting, unless otherwise noted.

Final casting elevation for drainage structures and manholes shall be determined by the Engineer after grading is completed.

***END OF SECTION***
PART 1 - GENERAL

1.01 Work Included

This work includes furnishing labor, equipment, and materials for the construction of cast-in-place concrete structures, foundations, walls, floor, slabs, and related members. Included in this work is the construction of formwork, including shoring, bracing, and anchorage.

This work includes furnishing and installing reinforcing, including supports.

This work includes curing of concrete and stripping of formwork.

1.02 References

A. ASTM A615 – Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement
B. ASTM A82 – Standard Specification for Steel Wire, Plain, for Concrete Reinforcement
C. ASTM A185 – Standard Specification for Steel Welded Wire Reinforcement, Plain, for Concrete
E. Michigan Department of Transportation 2012 Standard Specification for Construction
F. ASTM C33 – Standard Specification for Concrete Aggregates
G. ASTM C260 – Standard Specification for Air Entraining Admixtures for Concrete
H. ASTM C494 – Standard Specification for Chemical Admixtures for Concrete
K. ASTM C309 – Standard Specification for Liquid Membrane—Forming Compounds for Curing Concrete
L. ACI 301 – Specifications for Structural Concrete
M. ACI 318 – ACI Building Code Requirements for Structural Concrete
N. CRSI Manual of Standard Practice

1.03 Submittals

The Contractor shall prepare shop drawings showing layout of reinforcement and submit them to the Engineer for review. The drawings shall indicate sizes, lengths, spacing, locations and quantities of reinforcing steel; bending and cutting schedules; splicing; stirrup spacing; and
supporting and spacing devices. Dimensions and spacing shall be shown based on computed figures, not scaled dimensions from the plans.

The Contractor shall submit a mix design for each mixture that is proposed for use on the project. The cost for testing of aggregate and materials for the purpose of preparing mix designs shall be the Contractor's responsibility.

The Contractor shall submit technical data on any proposed admixtures and curing agents for review by the Engineer.

PART 2 - PRODUCTS

2.01 Forms

Forms shall be one of the following:

A. Plywood
   Douglas Fir species; materials shall minimally be select sheathing-tight face grade; sound, undamaged sheets with straight edges.

B. Steel
   Minimum 16-gauge sheet, well matched, tight fitting, stiffened to support weight of concrete without deflection detrimental to tolerances and appearance of finished surfaces.

C. Fiberglass Reinforced Plastic
   Matched, tight fitting, stiffened to support weight of concrete without deflection detrimental to structural tolerances and appearance of finished concrete surface; as manufactured by:
   1. Symons Corporation
   2. Greenstreak Plastic Products
   3. Another approved system

2.02 Formwork Accessories

A. Form Ties
   Removable or snap-off metal of fixed length; cone type; 1-inch break back dimension; free of defects that will leave holes no larger than 1-inch diameter in concrete surface.

B. Form Release Agents
   Colorless material which will not stain concrete, absorb moisture or impair natural bonding or color characteristics of rubbed finish intended for use on concrete.

C. Fillets for Chamfered Corners
   Wood strips, typically \(\frac{3}{4}\)-inch by \(\frac{3}{4}\)-inch size; maximum possible lengths.

D. Dovetail Anchor Slots
   Minimum 22-gauge galvanized steel; sealed slots; 16-gauge bent tab anchors; securable to concrete formwork; acceptable manufacturers are:
   1. National Wire Products Corporation
   2. Heckmann Building Products
3. Dur-O-Wal
4. A.A. Wire Products Co.
5. Approved equal

E. Flashing Reglets
   Twenty-four-gauge galvanized steel; longest possible lengths; sealed slots; with alignment splines for joints; securable to concrete formwork; acceptable manufacturers are:
   1. Fry Reglet Corporation
   2. MM Systems Corporation
   3. Approved equal

F. Nails, Spikes, Lag Bolts, Through Bolts, Anchorages
   Sized as required; strength and character to maintain formwork in place while placing concrete.

2.03 Reinforcing Steel

A. Reinforcing Bars
   ASTM A615, 60 ksi yield grade billet-steel deformed bars, uncoated finish; or 40 ksi as indicated on drawings.
   1. No. 3 bars and column ties may be Grade 40 steel.
   2. Stirrup steel shall meet requirements of ANSI/ASTM A82.
   3. All other re-steel shall be Grade 60.

B. Reinforcing Steel Fabric
   Welded steel wire fabric shall conform to ANSI/ASTM A185 plain type; in flat sheets; uncoated finish. Sized per drawings.

C. Accessories for Steel Reinforcement
   1. Tie Wire
      Tie wire shall be minimum 16-gauge annealed type.
   2. Chairs, Bolsters, Supports
      Chairs, bolsters, bar supports, and spacers adjacent to exposed architectural concrete surfaces shall be plastic coated, plastic tipped or stainless steel type, sized and shaped as required.

      Chairs, bolsters, bar supports, and spacers shall be sized and shaped for strength and support of reinforcement during installation and placement of concrete.

2.04 Concrete Materials

A. Portland Cement
   Portland Cement shall be ASTM C150 Type I.

B. Air-Entrained Portland Cement
   Air-Entrained Portland Cement shall be ASTM C150, Type IA.
C. Fine Aggregate
Fine aggregate shall be clean, hard, natural sand conforming to Michigan Department of Transportation 2012 Standard Specifications for Construction and gradation for 2NS-fine aggregate.

D. Coarse Aggregate
Coarse aggregate shall be clear, hard, uncoated crushed stone conforming to ASTM C33 and shall conform to the grading requirements for coarse aggregates.

E. Mixing Water
Mixing water shall be fresh, clean, potable quality water which is free of oils, alkalis, organic matter, or deleterious substances.

2.05 Admixtures
A. Air-Entraining Admixtures
Air-entraining admixtures shall conform to ASTM C260.

B. Chemical Admixtures
Water-reducing admixtures, retarding admixtures, accelerating admixtures, water-reducing and retarding admixtures, and water-reducing and accelerating admixtures, where permitted by the Engineer, shall conform to ASTM C494.

C. Calcium Chloride
Calcium chloride shall not be an admixture nor constitute a part of any admixture. Submit manufacturer certification that material supplied for this project is identical in all respects, including concentration and chloride content, to material tested in accordance with ASTM C260 and C494.

D. Acceptable Manufacturers
Acceptable manufacturers for admixtures are:
1. Chemical Corporation
2. Master Builders
4. Engineer-approved equal

2.06 Concrete Accessories
A. Bonding Agents
Bonding agents shall be ready-to-use resin emulsion applied in accordance with manufacturer's recommendations. Acceptable manufacturers are:
2. L & M Construction Chemicals “Everbond”
3. Larsen Products Corp. “Weld-crete”
4. Engineer-approved equal
B. Non-Shrink Grout
Non-shrink grout shall be non-metallic, non-staining, dimensionally stable, premixed inorganic grout. Prepare area, form, mix and place grout in accordance with the manufacturers written recommendations. Acceptable manufacturers are:

2. Master Builders “Set Non-Shrink Grout”
4. Engineer-approved equal

C. Joint Filler
Joint filler shall be black, closed cell neoprene conforming to ASTM C509 and D1056. Other properties are as follows:

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Density (PCF)</td>
<td>12 to 35</td>
</tr>
<tr>
<td>Compression Set</td>
<td>15 percent</td>
</tr>
<tr>
<td>Water Absorption</td>
<td>15 percent maximum</td>
</tr>
<tr>
<td>Flammability</td>
<td>Self extinguishing</td>
</tr>
<tr>
<td>Temperature Resistance</td>
<td>-40 degrees Fahrenheit to +158 degrees Fahrenheit</td>
</tr>
</tbody>
</table>

Acceptable Manufacturers are:

1. Williams Products, Inc.: “Everlast Neoprene Type NN-1”
2. W.L. Brady Co: “Closed Cell Neoprene”
3. Engineer-approved equal

D. Joint Sealer
Joint sealer shall match the color of adjacent concrete. Sealer shall be a two-part polyurethane sealant. Self-leveling type sealant shall be used on horizontal joints, and non-sagging type shall be used on vertical joints.

Approved manufacturers are:

1. W.R. Grace & Co.: “Daraseal-U”
3. Pecora Corporation: “Urexpam NR-200”
4. Tremco: “THC-900”
5. Engineer-approved equal

E. Liquid Membrane Curing Compound
Curing compound shall be provided in accordance with the following schedule:

<table>
<thead>
<tr>
<th>Surface to be Treated</th>
<th>Compound Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Concrete surfaces exposed after completion of structure to 1 foot below finish grade</td>
<td>Waterproofing Acrylic Sealer</td>
</tr>
<tr>
<td>Exposed floors in dry area; buildings, galleries</td>
<td>Silicate cure &amp; hardener</td>
</tr>
</tbody>
</table>
### Surface to be Treated

<table>
<thead>
<tr>
<th>Surface to be Treated</th>
<th>Compound Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exposed floors in wet areas; tanks, flumes, wetwells, top surface of tank</td>
<td>Acrylic cure seal &amp; dustproofer</td>
</tr>
<tr>
<td>Other surfaces not in contact with forms &amp; formed surfaces if forms period</td>
<td>Resin cure ASTM C309 Type 1-0 with dye.</td>
</tr>
</tbody>
</table>

### Suggested manufacturers and products for curing compound follow:

<table>
<thead>
<tr>
<th>Compound Description</th>
<th>Manufacturer/Product</th>
<th>Manufacturer/Product</th>
<th>Manufacturer/Product</th>
</tr>
</thead>
<tbody>
<tr>
<td>L&amp;M Cont. Chemicals</td>
<td>Sonneborn</td>
<td>Toch Division of Carboline</td>
<td></td>
</tr>
<tr>
<td>Waterproofing</td>
<td>Hydro Pel</td>
<td>White Poc 8</td>
<td>Toxstop</td>
</tr>
<tr>
<td>acrylic sealer</td>
<td>L&amp;M Cure Chem Hard</td>
<td>Sonosil</td>
<td>Curetox</td>
</tr>
<tr>
<td>Silicate cure &amp;</td>
<td>Dress &amp; Seal</td>
<td>Kure-N-Seat</td>
<td>Seal Kure</td>
</tr>
<tr>
<td>hardener</td>
<td>L&amp;M Cure Resin</td>
<td>Hydrocide Curing</td>
<td>Torkline</td>
</tr>
<tr>
<td>Acrylic cure seal &amp;</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>dustproofer</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Resin cure</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Alternate manufacturers may be utilized, with Engineers approval. Apply compounds in accordance with the manufacturer's written recommendations. Apply compounds which are compatible with subsequent surface treatment.

**F. Floor Hardener**

All interior concrete floors, stair treads, landings, and ramps not receiving floor covering or paint shall receive two coats of chemical floor hardener. Application shall be in accordance with the manufacturer's written recommendations. Acceptable manufacturers are:

1. Sonneborn Building Products "Lapidolith"
2. Gifford - Hill & company "Hardtop"
3. Engineer-approved equal

**G. Vapor Barrier**

Vapor barrier shall be polyethylene film; Ethyl Corp. "Visqueen", Union Carbide Corp. "Zendel" or equal, 6 mil natural thickness. Vapor barrier shall be applied over areas of prepared subgrade, as indicated on the drawings. Use the widest practicable seamless width, lap edges 6 inches minimum and seal with tape. Place top lap in direction of placement.

**H. Waterstop**

Waterstops shall be manufactured from a plastic compound with base resin of polyvinyl chloride (PVC) and shall not contain scrap or reclaimed material. Waterstop shall be inert to bacterial atmosphere, chlorinated water, salt water acids, alkali, sewage wastes, and oil. Waterstops shall possess the following physical properties:

- Specific Gravity: 1.33 maximum
- Durometer Hardness: 65 - 80
- Tensile Strength: 2.0 ksi
- Elongation: 300 percent minimum
- Temperature Range: -35 degrees Fahrenheit to +176 degrees Fahrenheit
Concrete Mixtures

Concrete shall be a mixture of cement, fine aggregate, coarse aggregate, water and admixtures. Use methods and materials to produce a dense, homogeneous, impervious, watertight, durable, and workable concrete of the highest quality without defects of any kind. Only one brand of cement produced by the same mill shall be used. Aggregates shall be sampled and tested in accordance with ASTM C33. Fine aggregate shall be natural sand; loss by washing shall not exceed 3 percent. Coarse particles, chert and hard absorbent particles shall not exceed 3 percent by weight. Thin or elongated particles shall not exceed 10 percent.

Provide concrete mixtures with the following characteristics

Mud Mat Concrete

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compressive Strength (28-day)</td>
<td>2.0 ksi</td>
</tr>
<tr>
<td>Cement Type</td>
<td>I</td>
</tr>
<tr>
<td>Cement Content (min)</td>
<td>376 lb/cyd</td>
</tr>
<tr>
<td>Aggregate (fine) (MDOT 2012)</td>
<td>2NS</td>
</tr>
<tr>
<td>Aggregate (coarse) (MDOT 2012)</td>
<td>6A</td>
</tr>
</tbody>
</table>

All Other Concrete

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compressive Strength (28-day)</td>
<td>3.5 ksi</td>
</tr>
<tr>
<td>Cement Type</td>
<td>1 or IA</td>
</tr>
<tr>
<td>Cement Content (min)</td>
<td>517 lb/cyd</td>
</tr>
<tr>
<td>Water/Cement Ratio (max)</td>
<td>5.0 gal/94 lb</td>
</tr>
<tr>
<td>Aggregate (fine) (MDOT 2012)</td>
<td>2NS</td>
</tr>
<tr>
<td>Aggregate (coarse) (MDOT 2012)</td>
<td>6AA</td>
</tr>
<tr>
<td>Air Content</td>
<td>5 percent + 1 percent</td>
</tr>
<tr>
<td>Chemical Admixture*</td>
<td>Type A</td>
</tr>
<tr>
<td>Slump (max)</td>
<td>4 inches</td>
</tr>
</tbody>
</table>

*Use Type D admixture in hot weather; Type E admixture in cold weather.

Slump tolerances of up to 1 inch above the indicated maximum shall be allowed for individual batches provided the average for all the batches, or the most recent ten batches tested, whichever is fewer, does not exceed the maximum specified. Concrete of lower slump than specified may be used, provided it is properly placed and consolidated.

PART 3 - EXECUTION

3.01 Formwork

The Contractor shall verify lines, levels, and measurements before proceeding with formwork.

Earth forms are not permitted. Minimize form joints. Symmetrically align joints and make them water-tight to prevent leakage of mortar. Arrange and assemble formwork to permit dismantling and stripping so that concrete is not damaged during its removal. Arrange forms to allow stripping without removal of principal shores where required to remain in place.

Provide bracing to ensure stability of formwork. Camber slabs and beams to achieve ACI 30 tolerances. Provide temporary ports in formwork to facilities cleaning and inspection. Locate
openings at bottom of forms to allow flushing water to drain. Close ports with tight fitting panels, flush with inside face of forms, neatly fitted so that joints will not be apparent in exposed concrete surfaces.

Provide chamfer strips on external corners of beams, columns, and walls as shown on drawings. Do not displace or damage vapor barrier.

3.02 Formwork Tolerances

Unless otherwise specified, formwork shall be constructed so that the concrete surfaces will conform to the tolerance limits listed in "Specifications for Structural Concrete for Buildings" (ACI 301) as follows:

A. Variation from plumb:
   1. In the line and surfaces of columns, walls, arises, etc.:
      
      In any 10 feet of length  \( \frac{1}{4} \) inch
      Maximum for the entire length  1 inch
   2. For exposed corner columns, control-joint grooves, etc.:
      
      In any 20 feet length  \( \frac{1}{4} \) inch
      Maximum for the entire length  \( \frac{1}{2} \) inch

B. Variation from the level or from the grades shown on the plans:
   1. In slab soffits, ceilings, beam soffits, and in arises, measured before removal of support shores:
      
      In any 10 feet length \( \frac{1}{4} \) inch
      In any bay or in any 20 feet length \( \frac{3}{8} \) inch
      Maximum for entire length \( \frac{3}{4} \) inch
   2. In exposed lintels, sills, parapets, horizontal grooves, and other conspicuous lines:
      
      In any bay or in 20 feet length \( \frac{1}{4} \) inch
      Maximum for entire length \( \frac{1}{2} \) inch

C. Variation of the linear building lines from established position in plan and related position of columns, walls, and partitions:
   
   In any bay \( \frac{1}{2} \) inch
   In any 20 feet length \( \frac{1}{2} \) inch
   Maximum for the entire length 1 inch

D. Variation in the sizes and location of sleeves, floor openings, and wall openings:
   \( \pm \frac{1}{4} \) inch

E. Variation in cross-sectional dimensions of columns and beams and in the thickness of slabs and walls:
   
   Minus \( \frac{1}{4} \) inch
   Plus \( \frac{1}{2} \) inch
F. Foundation (Piers and Footage):
   1. Variations in dimensions in plan:
      Minus 1/2 inch
      Plus 2 inches
   2. Misplacement or eccentricity:
      Two percent of the footing width in the direction of misplacement but not more than 2 inches.

      The Contractor shall establish and maintain, in an undisturbed condition and until final completion and acceptance of the project, sufficient control points and benchmarks to be used for reference purposes to check tolerances.

3.03 Application of Form Release Agent

   Apply form release agent on formwork in accordance with the manufacturer's instructions. Apply prior to placing reinforcing steel, anchoring devices, and embedded items. Do not apply form release agent where concrete surfaces are scheduled to receive special finishes or applied coverings which may be affected by agent. Soak contact surfaces of untreated forms with clean water. Keep surfaces wet prior to placing concrete.

3.04 Inserts, Embedded Parts, and Openings

   Provide formed openings where required for work embedded in or passing through concrete. Coordinate work of other sections in forming and setting openings, slots, recesses, chases, sleeves, bolts, anchors, and space other inserts. Install accessories in accordance with the manufacturer's instructions, level and plumb. Ensure items are not disturbed during concrete placement.

3.05 Form Removal

   Engineer shall be notified prior to removal of formwork. Do not disturb formwork until concrete has hardened adequately. Determine possible start of formwork disturbance or removal on the basis of minimum time and minimum strength, as follows.

<table>
<thead>
<tr>
<th>Element</th>
<th>Minimum Time</th>
<th>Minimum Strength</th>
</tr>
</thead>
<tbody>
<tr>
<td>Walls, Columns, Sides of Beams</td>
<td>20-24 hours</td>
<td>No Minimum</td>
</tr>
<tr>
<td>Beam or Joist Soffits</td>
<td>7 days</td>
<td>60 percent of specified compressive strength</td>
</tr>
<tr>
<td>Slabs:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Clear span under 10 feet</td>
<td>4 days</td>
<td></td>
</tr>
<tr>
<td>Clear span 10 feet to 20 feet</td>
<td>5 days</td>
<td></td>
</tr>
<tr>
<td>Clear span over 20 feet</td>
<td>7 days</td>
<td></td>
</tr>
</tbody>
</table>

   Notes:
   (a) Minimum time is cumulative period during which concrete is curing with air temperature above 50 degrees Fahrenheit.
   (b) Shores or re-shores shall not be removed until supported element has attained specified compressive strength.

   Re-shore structural members due to design requirements or construction conditions to permit successive construction, as required. Remove formwork progressively so no unbalanced loads are
imposed on structure. Do not damage concrete surfaces during form removal. Remove formwork in same sequence as concrete placement to achieve similar concrete surface coloration. Store reusable forms for exposed architectural concrete to prevent damage to contact surfaces. Patched formwork for exposed concrete shall not be used.

3.06 Cleaning

Clean forms to remove foreign matter as erection proceeds. Ensure that water and debris drain to exterior through clean-out ports.

During cold weather, remove ice and snow from forms. Do not use deicing salts. Do not use water to clean out completed forms, unless formwork and construction proceed within heated enclosure. Use compressed air to remove foreign matter where possible.

3.07 Bending of Reinforcement

Bending of steel shall be in compliance with the provisions of ACI 318-83. Bend bars accurately to the dimensions shown on the approved shop drawings, within tolerances shown on the drawings. Bars shall be bent cold. Do not shop weld reinforcement.

3.08 Placement of Reinforcement

All reinforcement shall be held in position by wiring reinforcement together and to suitable chairs, bolsters, or other approved devices which will ensure accurate spacings, both horizontally and vertically, and which will be sufficient to avoid displacement of bars during placing of concrete. Welding of reinforcement is not permitted. Wire tie bars at intersections at 18 inches maximum, in any direction. When concrete is to be placed over membrane or vapor barrier, continuous rod supports shall be used to prevent punctures. Tolerances shall be as indicated in the drawings. Where reinforcement in beams is placed in two or more layers, the clear distance between layers shall not be less than 1 inch and the bars in the upper layer shall be placed directly above those in the bottom layer. Reinforcement shall continue through all construction joints and additional shear reinforcement provided as necessary. Terminate reinforcement at expansion joints with a minimum cover of 2 inches at the end of bars. Prior to placement of concrete, check all reinforcing after it is placed to ensure that placement conforms to contract drawings, approved shop drawings, and specification requirements. Engineer shall be notified a minimum of 24 hours prior to concrete placement in order to verify placement of reinforcement.

Reinforcement supports shall be as follows:

<table>
<thead>
<tr>
<th>Concrete Element</th>
<th>Location of Reinforcement</th>
<th>Type of Support</th>
</tr>
</thead>
<tbody>
<tr>
<td>Slabs placed on ground or mud mat</td>
<td>Top</td>
<td>Contractor option</td>
</tr>
<tr>
<td></td>
<td>Bottom</td>
<td>Precast conc.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Black w/wires</td>
</tr>
<tr>
<td>Concrete surfaces exposed to view in</td>
<td>All</td>
<td>Plastic</td>
</tr>
<tr>
<td>finished structure</td>
<td></td>
<td></td>
</tr>
<tr>
<td>All other concrete</td>
<td>All</td>
<td>Basic bright</td>
</tr>
</tbody>
</table>

Bar supports shall conform to CRSI "Manual of Standard Practice," except as otherwise noted. Principal reinforcement shall not be relocated to support bar mats. Provide additional net support
bars as required. Woven Wire Fabric may be placed after concrete below the specified reinforcement level has been placed.

3.09 Protection of Reinforcement

Reinforcement protection shall be as indicated on the drawings. Reinforcing bars extending between two or more adjacent subsequent concrete placements, intended for bonding with the subsequent placements, shall be protected during the preceding placement from becoming coated with concrete, mortar, or other material which may adversely affect bonding capacity.

3.10 Splices

All splices shall be in conformance with ACI 318-83, or as shown on design drawings or approved shop drawings.

3.11 Embedded Electrical Conduit

Minimum concrete protection for conduit shall be 1½ inches clear. Embedded conduit shall be located between the layers of reinforcement.

3.12 Embedded Items

Embedded items include anchors; bolts; conduits; dowels; drains; frames for checkered plate, grating or manholes; inserts; manhole steps; steel curbs; sleeves; stair nosings; sump linings; ties; waterstops; weep holes; and other items to be cast in concrete.

See architectural, electrical, and mechanical drawings for embedded items. Contractor shall refer to approved shop drawings for placement of embedded items, where applicable.

Provide sleeves, as detailed in the drawings, for conduits, ducts, pipes and other items passing through concrete floors and walls. Notify Contractors whose work is related to concrete or must be supported by it, to allow for placement of embedded items prior to placement of concrete.

Embedded items shall be accurately and securely fastened to prevent displacement prior to and during concrete placement. Voids in anchor slots, inserts, and sleeves shall be temporarily filled with readily removable material to prevent entry of concrete into voids. Exposed metal surfaces shall be protected from cement oversplash with readily removable material.

Contractor shall notify the Engineer a minimum of 24 hours prior to each placement of concrete, in order to provide ample time for inspection of forms, reinforcement and embedded items.

3.13 Treatment of Hardened Concrete

Before depositing fresh concrete on or against hardened concrete, prepare the surface as follows:
A. Clean surface thoroughly to remove foreign material and laitance.
B. Wet surface and remove excess water.
C. Apply bonding agent.
D. Brush surface with two coats of metallic waterproofing.
E. Slush vertical surface with grout of same proportions as mortar in concrete mixture, as thickly as possible.

F. Coat horizontal surface with grout of same proportion as mortar in concrete mixture to a minimum thickness of 2 inches.

G. Place fresh concrete.

3.14 Cold Joints

Avoid cold joints by coordinating size of placement with weather conditions, equipment, and labor to provide continuous concrete placement. The Engineer shall be notified immediately if an unavoidable situation arises to interrupt continuous placement and which might result in cold joints.

Salvage as much of the placed concrete as possible, unless otherwise instructed by proceeding as follows:

Walls: Level off concrete and install shear key.
Slabs and beams: Install full depth vertical bulkhead with shear key in a line perpendicular to face of support.

Install waterstop if adjacent construction joints require them.

3.15 Construction Joints

Locate construction joints as indicted on the drawings. Vertical wall and slab joints shall be located in the same plane, unless otherwise shown. Horizontal joints shall be screed level. Joints shall be truly horizontal or vertical and perpendicular to reinforcement. Slabs and beams shall be placed monolithically, unless otherwise noted on the drawings. Any proposed deviation from joints indicted on the drawings shall be submitted for approval.

Vertical construction joints shall be spaced as follows:

Walls: 40 feet o.c max
Slabs and Beams: 80 feet o.c max
Topping: 20 feet o.c max

Waterstops shall be placed symmetrically in construction joints where possible. When slab reinforcement does not permit symmetrical placement, locate waterstop in contact with reinforcement, with remainder projecting into next placement.

3.16 Preparation before Placing

Formwork shall be completed and free of ice, snow, or water. Reinforcement and embedded items shall be installed and secured.

3.17 Concrete Placement

Concrete shall be handled from the truck to the place of deposit as rapidly as practicable, using methods that prevent segregation or loss of ingredients, in a manner which will maintain the required concrete quality. Conveying equipment shall be of sufficient size and design, such that detectable settling of concrete shall not occur before adjacent concrete is place. Conveying
equipment shall be cleaned at frequent intervals during placement. Concrete shall be placed at a rate which will allow integration with fresh plastic concrete and within 45 minutes of prior placement. Hoppers with "elephant trucks" shall be utilized to prevent concrete free fall to 4 feet or less within formed sections. Concreting operation shall be conducted in a manner to prevent segregation and mortar splash. Concrete shall be deposited as near as practicable to its final position to avoid segregation and mortar splash. Concrete shall be deposited as near as practicable to final position to avoid segregation due to rehandling and flowing. Vibrators shall not be used to transport concrete. Concrete shall be deposited in layers not exceeding 24 inches and consolidated following placement. Consolidate concrete using mechanical internal vibrating equipment, having a minimum frequency of 8,000 vibrations per minute, and of sufficient amplitude to consolidate concrete effectively. Vibrator shall be operated by a competent, energetic worker. The vibrator shall be inserted at approximately 18-inch spacing, and withdrawn after 5 to 15 seconds. The vibrator shall partially penetrate the previous lift of concrete placed. A spare vibrator, in good working order, shall be kept onsite during concrete placement operations. Placement of supported elements shall be delayed for a minimum of two hours, and at least until previously placed concrete in columns and walls is no longer plastic. Threads of all anchor bolts and dowels, where required, shall be greased before placing concrete and protected with weatherproof wrapping.

3.18 Repair Surface Defects

Areas displaying surface defects or honeycomb shall be repaired as follows:

A. Defective concrete shall be removed to sound concrete. Edges shall be cut perpendicular to the surface or slightly undercut to a minimum depth of 1 inch. Feathered edges shall not be permitted.

B. The surface shall be thoroughly cleaned of all base material. Patch area shall be washed with clean water prior to filling with patching mortar.

C. Slush surface with approved bonding agent and patching material. All exposed surface, reinforcing steel, and embedded items shall be thoroughly covered with slush coat.

D. Point repair area in successive ½-inch to 1-inch layers, with a patching mortar coating of approved premixed patching material mixed with a 1 to 3 mixture of approved bonding agent and water. Each layer shall be scratched prior to applying the successive layer. If patched area heats excessively, cool with water.

E. Immediately after filling patch areas, coat with approved concrete finish material.

F. Approved Materials:

1. Patching material shall be quickset hydraulic cement, prepared and ready to use when mixed with water. Material shall be of non-shrink type, and shall not contain calcium chloride, waxes, tars, emulsions or metallic materials. Material shall be "Thorite", Thoro System Products, Inc., or equal.

2. Bonding agent shall be a ready to use liquid, composed of acrylic polymers and modifiers. Material shall be flexible when applied, resistant to ultraviolet light, resistant to heat, and exhibit good adhesive qualities. Material shall be "Acry 60", Thoro System Products, Inc., or equal.

G. The Contractor shall adhere to manufacturer's written recommendations for proper use and application of materials.
3.19 Grout Surface Finish

Grout surface finish shall consist of a pre-mixed, waterproofing cement compound suitable for interior or exterior use. Compound shall be mixed with one part of approved bonding compound and three parts water, to the consistency of thick paint. Prior to application of grout surface finish, all wall ties shall be cut to a depth of 1 inch (minimum), and patched as specified. Mix cement compound as specified above and apply heavy first coat at 2 pounds per square yard. The first coat shall be applied with manufacturer recommended brush, and shall fill completely all air bubbles and voids. After the first coat has set, a second coat shall be applied at the same rate as the first coat. After the finish coat has set, float to a uniform texture with sponge float.

A. Approved Materials:

1. Waterproofing Cement Compound: "Thoroseal", Thoro System Products, or equal.

2. Bonding compound: "Acryl 60", Thoro System Products, Inc., or equal.

The Contractor shall adhere to manufacturer’s written recommendations for approved methods of product application and use of materials.

3.20 Concrete Formed Surface Finish

Formed concrete surface finishes shall be as indicated in the following table:

<table>
<thead>
<tr>
<th>Formed Element&lt;sup&gt;a&lt;/sup&gt;</th>
<th><strong>As Cast</strong></th>
<th><strong>After Removal of Form</strong></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>Type of Finish</strong></td>
<td><strong>Facing Material</strong></td>
<td><strong>Remove</strong></td>
</tr>
<tr>
<td>Surface exposed to earth after completion of structure to 1'0&quot; below finish grade</td>
<td>Rough form</td>
<td>Contractor’s option</td>
<td>Fins over 1/4-inch by chipping or rubbing</td>
</tr>
<tr>
<td>Exterior surfaces exposed after completion of structure to 1'0&quot; below finish grade</td>
<td>Smooth form</td>
<td>Plywood, form grade tempered hardboard, plastic, or approved material&lt;sup&gt;b&lt;/sup&gt;</td>
<td>Fins, rough spots &amp; hardened mortar removed completely by rubbing&lt;sup&gt;c&lt;/sup&gt;</td>
</tr>
<tr>
<td>All other formed surfaces</td>
<td>Remove stains&lt;sup&gt;d&lt;/sup&gt;</td>
<td>Remove stains&lt;sup&gt;d&lt;/sup&gt;</td>
<td>Remove stains&lt;sup&gt;d&lt;/sup&gt;</td>
</tr>
</tbody>
</table>

Notes:

(a) Related uniform surfaces, such as tops of walls, horizontal offsets, and similar surfaces shall be struck smooth and floated to a texture consistent with formed surface. Final treatment on formed surfaces shall continue across unformed surfaces.

(b) Material with raised grain, torn surfaces, worn edges, patches, dents, or other defects that will impair the concrete surface texture shall not be used.

(c) Rub with abrasive stone or hone. The use of power driven grinders is permissible.

(d) Remove stains caused by excessive use of form coating material by rubbing wetted surfaces with 5 percent to 10 percent solution of muriatic acid using bristle brushes; rinse with clean water.
Concrete Slab Finishes

Concrete slab surface finishes shall be as indicated in the following table:

<table>
<thead>
<tr>
<th>Slab Surface</th>
<th>Type Of Finish</th>
<th>Tolerance Measured In Any Direction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Surface to receive bonded concrete topping</td>
<td>Struck off and leveled</td>
<td>1/4-inch in 2 feet</td>
</tr>
<tr>
<td>Surface to receive waterproof membrane or non composite topping</td>
<td>Struck off and leveled</td>
<td>1/8-inch in 10 feet</td>
</tr>
<tr>
<td>Exterior slabs; interior slabs subject to vehicular traffic</td>
<td>Floated</td>
<td>1/8-inch in 10 feet</td>
</tr>
<tr>
<td>Landings and stairs</td>
<td>Floated</td>
<td>1/8-inch in 10 feet</td>
</tr>
<tr>
<td>Floors of buildings, tanks, wetwells, and all other surfaces</td>
<td>Floated</td>
<td>1/8-inch in 10 feet</td>
</tr>
</tbody>
</table>

Notes:
(a) Abrasive aggregate shall be applied at 50 pounds per 100 square feet. Apply in accordance with manufacturer's recommendation. Product to be "Frictex H", Sonneborn Building Products, or equal.

Separate Floor Topping

Where indicated in the plans, a separate floor topping shall be placed over an existing concrete floor or slab.

Prior to placing, all loose scaled concrete; aggregates and/or cement paste; dirt; oil; grease; fungus; mildew; paint; previous coatings; form release and curing agents; laitance and any other foreign materials shall be removed so that a clean substrate remains. High-pressure water-blasting, scrubbing, sandblasting, wet-blasting, steam-cleaning, or other Engineer-approved method may be used to prepare the substrate surface.

Any holes, pockmarks, spalls, or other surface defects greater than 3/8 inches in depth shall be patched with a cement base acrylic patching material compatible with the floor topping material.

Apply approved bonding agent on base course in accordance with the manufacturer's recommendations. All exposed surfaces shall be thoroughly covered with bonding agent. A slurry coat consisting of grout of same proportions as mortar in concrete shall be placed on the base course immediately prior to placing topping.

Place concrete topping to the required lines and levels as indicated in the drawings. The concrete mixture shall be as specified elsewhere within these specifications. Methods of placement shall be as specified elsewhere within these specifications. Concrete slab shall be finished, cured, and hardened as specified elsewhere within these specifications. Joints which exist in the substrate shall be recut in the topping material after curing. Contractor shall mark joints prior to applying topping in order to accurately locate joints. Contractor shall adhere strictly to manufacturer's written recommendations for approved methods of product application and use of materials.

***END OF SECTION***
SECTION 06 10 00
ROUGH CARPENTRY

PART 1 - GENERAL

1.01 Work Included

This work includes the following:

A. Framing with dimension lumber
B. Wood furring, grounds, nailers, and blocking
C. Sheathing
D. Subflooring
E. Underlayment
F. Rooftop equipment bases and support curbs
G. Fasteners and metal framing anchors

1.02 References

A. AFFA Manual for Wood Frame Construction
B. ANSI A208.1 Mat-Formed Manufactured Panels
C. Engineered Wood Association, Form E30, Engineered Wood Design/Construction Guide
D. ASME B18.2.1 – Square and Hex Bolts and Screws - Inch Series
E. ASME B18.6.1 – Wood Screws (Inch Series)
F. ASTM A153 – Specification for Zinc-Coating (Hot-Dip of Iron and Steel Hardware)
G. ASTM A307 – Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength
H. ASTM A563 – Specification for Carbon and Alloy Steel Nuts
I. ASTM A653 – Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
J. ASTM D245 – Practice for Establishing Structural Grades and Related Allowable Properties for Visually Graded Lumber
K. ASTM D2555 – Test Method for Establishing Clear Wood Strength Values
L. AWPA C2 – Lumber, Pressure Treatment
M. AWPA C9 – Plywood, Pressure Treatment
N. AWPA C20 – Structural Lumber, Fire-Retardant Pressure Treatment
O. AWPA C27 – Plywood, Fire-Retardant Pressure Treatment
P. AWPA M4 – Standard for the Care of Preservative-Treated Wood Products
T. U.S. Department of Commerce, National Institute of Standards and Technology PS 2 Performance Standard for Wood-Based Structural-Use Panels

1.03 Submittals

Submit the following in accordance with the conditions of contract and Section 01 33 00 – Submittal Procedures.

A. Product Data
   Submit manufacturer’s product data for each distinct product specified.

B. Material certificates for dimension lumber specified to comply with minimum allowable unit stresses. Indicate species and grade selected for each use and design values approved by American Lumber Standards Committee’s (ALSC) Board of Review.

C. Wood treatment data as follows, including chemical treatment manufacturer’s warranty and instructions for handling, storing, installing, and finishing treated materials:

   1. For each type of preservative-treated wood product, include certification by treating plant stating type of preservative solution and pressure process used, net amount of preservative retained, and compliance with applicable standards.

   2. For waterborne-treated products, include statement that moisture content of treated materials was reduced to levels indicated before shipment to project site.

   3. For fire-retardant-treated wood products, include certification by treating plant that treated materials comply with specified standard and other requirements, as well as data relative to bending strength, stiffness, and fastener-holding capacities of treated materials.

1.04 Quality Assurance

A. Single-Source Responsibility for Fire-Retardant-Treated Wood
   Obtain each type of fire-retardant-treated wood product from one source and by single producer.

1.05 Delivery, Storage, and Handling

A. Deliver wood products bundled or crated to provide adequate protection during transit and job storage, with required grade marks clearly identifiable. Inspect wood products for damage upon delivery. Remove and replace damaged materials.

B. Keep materials under cover and dry. Protect from weather and contact with damp or wet surfaces. Stack lumber, plywood, and other panels. Provide for air circulation within and around stacks, and under temporary coverings. For lumber and plywood pressure treated with waterborne chemicals, place spacers between each bundle to provide air circulation.

C. Protect sheet materials during handling to prevent breaking of corners and damage to surfaces.
PART 2 - PRODUCTS

2.01 Lumber, General

A. Lumber Standards
   Comply with PS 20-99, “American Softwood Lumber Standard,” and with applicable grading
   rules of inspection agencies certified by ALSC’s Board of Review. Lumber design values are
   to comply with ASTM D245 and ASTM D2555.

B. Inspection Agencies
   Inspection agencies and their grading rules include the following:
   1. Northeastern Lumber Manufactures Association (NELMA) Standard Grading Rules
   2. National Lumber Grades Authority (NLGA) (Canadian) Standard Grading Rules
   3. Redwood Inspection Service (RIS) Standard Specifications for Grades of California
      Redwood Lumber
   4. Southern Pine Inspection Bureau (SPIB) Standard Grading Rules for Southern Pine
      Lumber
   5. West Coast Lumber Inspection Bureau (WCLIB) No. 17 – Standard Grading Rules for
      West Coast Lumber
   6. Western Wood Products Association (WWPA) Western Lumber Grading Rules

C. Grade Stamps
   Provide lumber with each piece factory marked with grade stamp of inspection agency
   evidencing compliance with grading rule requirements and identifying grading agency, grade,
   species, moisture content at time of surfacing, and mill.

   For exposed lumber, furnish pieces with grade stamps applied to ends or back of each piece, or
   omit grade stamps and provide grade-compliance certificates issued by inspection agency.

D. Where nominal sizes are indicated, provide actual sizes required by PS 20-99 for moisture
   content specified. Where actual sizes are indicated, they are minimum dressed sizes for dry
   lumber.
   1. Provide dressed lumber, surfaced four sides (S4S), unless otherwise indicated.
   2. Provide dry lumber with 19 percent maximum moisture content at time of dressing for 2-
      inch nominal (38-millimeter actual) thickness or less, unless otherwise indicated.

2.02 Wood-Preservative-Treated Materials

A. General
   Where lumber or plywood is indicated as preservative treated or is specified to be treated,
   comply with applicable requirements of AWPA C2 (lumber) and AWPA C9 (plywood). Mark
   each treated item with quality mark requirements of inspection agency approved by ALSC’s
   Board of Review.

   For exposed items indicated to receive stained finish, use chemical formulations that do not
   bleed through, contain colorants, or otherwise adversely affect finishes.
B. Pressure treat aboveground items with waterborne preservatives to minimum retention of ¼ pound per cubic feet (4 kilograms per cubic meter). After treatment, kiln-dry lumber and plywood to maximum moisture content of 19 and 15 percent, respectively. Treat indicated items and the following:

1. Wood cants; nailers; curbs; equipment support bases; blocking; stripping; and similar members in connection with roofing, flashing, vapor barriers, and waterproofing.

2. Wood sills; sleepers; blocking; furring; stripping; and similar concealed members in contact with masonry or concrete.

3. Wood framing members less than 18 inches (460 millimeter) above grade.

4. Wood floor plates installed over concrete slabs directly in contact with earth.

C. Pressure treat wood members in contact with ground or freshwater with waterborne preservatives to minimum retention of 0.4 pounds per cubic feet (6.4 kilograms per cubic meter).

D. Complete fabrication of treated items before treatment, where possible. If cut after treatment, apply field treatment complying with AWPA M4 to cut surfaces. Inspect each piece of lumber or plywood after drying and discard damaged or defective pieces.

2.03 Fire-Retardant-Treated Materials

A. General

Where fire-retardant-treated wood is indicated, comply with applicable requirements of AWPA C20 (lumber) and AWPA C27 (plywood). Identify fire-retardant-treated wood with appropriate classification marking of Underwriter Laboratory (UL), U.S. Testing, or Timber Products Inspection, Inc.

B. Interior Type A

For interior locations, use chemical formulation that produces treated lumber and plywood with the following properties under conditions present after installation:

1. Bending strength, stiffness, and fastener-holding capacities are not reduced below values published by manufacturer of chemical formulation under elevated temperature and humidity conditions simulating installed conditions when tested.

2. No form of degradation occurs due to acid hydrolysis or other causes related to treatment.

3. Contact with treated wood does not promote corrosion of metal fasteners.

C. Exterior Type

Use for exterior locations and where indicated.

D. Inspect each piece of treated lumber of plywood after drying and discard damaged or defective pieces.

2.04 Dimension Lumber

A. General

If not indicated on contract documents, provide dimension lumber of any species and grades indicated for applicable use category listed in table below. Lumber shall comply with ALSC National Grading Rule (NGR) provisions of inspection agency applicable to species.
<table>
<thead>
<tr>
<th>Product (Nominal Dimension)</th>
<th>Grade</th>
<th>Use</th>
</tr>
</thead>
<tbody>
<tr>
<td>Structural Light Framing 2 to 4 inches thick</td>
<td>Select Structural No. 1, No. 2, No. 3</td>
<td>Structural applications where highest design values are needed in light framing sizes.</td>
</tr>
<tr>
<td>Structural Light Framing 2 to 4 inches wide</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Light Framing 2 to 4 inches thick</td>
<td>Construction Standard Utility</td>
<td>Where high-strength values are not required, such as wall framing, plates, sills, cripples, and blocking.</td>
</tr>
<tr>
<td>2 to 4 inches wide</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stud 2 to 4 inches thick</td>
<td>Stud</td>
<td>Optional all-purpose grade designed primarily for stud uses, including bearing walls.</td>
</tr>
<tr>
<td>2 inches and wider</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Structural Joists and Planks 2 to 4 inches thick</td>
<td>Select Structural No. 1, No. 2, No. 3</td>
<td>Intended to fit engineering applications for lumber nominal 5 inches and wider, such as joists, rafters, headers, beams, trusses, and general framing.</td>
</tr>
<tr>
<td>5 inches and wider</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

B. Species and grades must meet or exceed the following values, unless indicated otherwise on contract documents.

1. $F_b$ (extreme fiber stress in bending): Minimum 850 psi (5.9 MPa)
2. $E$ (modulus of elasticity): Minimum 1,300,000 psi (8,950 MPa)

C. Exposed Framing

Refers to dimension lumber which is not concealed by other work and is indicated to receive stained, painted, or natural finish.

Provide material hand-selected from lumber of species and grade indicated for type of use, for uniformity of appearance, and freedom from characteristics that would impair finish appearance.

2.05 Miscellaneous Lumber

A. General

Provide lumber for support or attachment of other construction, including rooftop equipment; curbs and support bases; cant strips; bucks; nailers; blocking; furring; grounds; stripping; and similar members.

B. Fabricate miscellaneous lumber from dimension lumber of sizes indicated and into shapes shown on contract documents.

C. Moisture Content

Nineteen percent maximum for lumber items not specified to receive wood preservative treatment.

D. Grade and Species

For dimension lumber sizes, provide No. 3 or Standard Grade lumber per ALSC’s NGRs of any species. For board-size lumber, provide No. 3 Common or Standard Grade per WWPA of any species.
2.06 Wood-Based Structural-Use Panels, General

A. Structural-Use Panel Standards
   Panel thickness, grade, veneer qualities and group number or span rating shall be as shown on
   drawings and in accordance with recommendations of APA. Comply with PS 1 for plywood
   panels, and PS 2 for products not manufactured under PS 1 provisions.
   
   1. Panels which have any edge or surface permanently exposed to weather shall be classed
      Exterior Grade.
   
   2. Panel thickness, grade, and group number or span rating shall be at least equal to that shown
      on drawings.
   
   3. Application shall be in accordance with recommendations of APA.

B. Trademark
   Factory-mark each structural-use panel with APA trademark evidencing compliance with grade
   requirements.

2.07 Concealed, Performance-Rated Structural-Use Panels

A. General
   Where structural-use panels are indicated for concealed types of applications, provide APA
   performance rated panels complying with requirements indicated for grade designation, span
   rating, exposure durability classification, and edge detail (where applicable).
   
   1. Provide panel clips for edge support as recommended by panel manufacturer, or where
      required by IBC.
   
   2. Provide panels of thickness meeting requirements specified, but not less than thickness
      indicated.

B. Combination Subfloor-Underlayment: APA-Rated Sturd-I-Floor
   
   1. Exposure Durability Classification: Exposure 1
   
   2. Span Rating: As required to suit joist spacing indicated
   
   3. Edge Detail: Tongue and groove
   
   4. Surface Finish: Fully sanded face

C. Subflooring: APA-Rated Sheathing
   
   1. Exposure Durability Classification: Exposure 1
   
   2. Span Rating: As required to suit joist spacing indicated

D. Wall Sheathing: APA-Rated Sheathing
   
   1. Exposure Durability Classification: Exposure 1. Where sheathing is exposed on any side,
      it shall be Exposure Durability Classification “Exterior.”
   
   2. Span Rating: As required to suit stud spacing indicated

E. Roof Sheathing: APA-Rated Sheathing
   
   1. Exposure Durability Classification: Exposure 1
2. Span Rating: As required to suit joist or truss spacing indicated

2.08 Structural-Use Panels for Backing
   A. Plywood Backing Panels
      For mounting electrical or telephone equipment, provide fire-retardant-treated plywood panels with Grade C-D Plugged Exposure 1, in thickness indicated on contract documents or, if not otherwise indicated, not less than $15/32$-inch (11.9 millimeters) thick.

2.09 Particleboard
   A. General: Comply with and factory mark each panel according to ANSI A208.1. Provide thickness indicated on contract documents.
   B. Particleboard Wall Sheathing: Grade M-1-Exterior Glue

2.10 Fasteners
   A. General: Provide fasteners of size and type indicated that comply with requirements specified.
   B. Where rough carpentry work is exposed to weather, in ground contact, or in areas of high relative humidity, provide fasteners with hot-dip, zinc-coating per ASTM A153.
   C. Nails, Wire, Brads, and Staples: ASTM F1667
   D. Wood Screws: ASME B18.6.1
   E. Lag Bolts: ASME B18.2.1
   F. Bolts: Steel bolts complying with ASTM A307, Grade A with ASTM A563 hex nuts and, where indicated, flat washers.

2.11 Metal Framing Anchors
   A. General
      Provide galvanized steel framing anchors of structural capacity, type, and size indicated, with allowable design loads as published by manufacturer, that meet or exceed those indicated.
   B. Galvanized Steel Sheet
      Hot-dip, zinc-coated steel sheet complying with ASTM A653, G60 coating designation; structural, commercial, or lock-forming quality, as standard with manufacturer for type of anchor indicated.

PART 3 - EXECUTION

3.01 Installation, General
   A. Discard units of material with defects that impair quality of rough carpentry and that are too small to use with minimum number of joints or optimum joint arrangement.
   B. Set rough carpentry to required levels and lines, with members plumb, true to line, cut, and fitted.
   C. Fit rough carpentry to other construction, scribe and cope as required for accurate fit. Correlate location of furring, nailers, blocking, grounds, and similar supports to allow attachment of other construction.
D. Apply field treatment complying with AWPA M4 to cut surfaces of preservative-treated lumber and plywood.

E. Securely attach rough carpentry work to substrate by anchoring and fastening as indicated, complying with IBC Table 2304.9.1 Fastening Schedule.

3.02 Wood Grounds, Nailers, Blocking, and Sleepers

A. Install wood grounds, nailers, blocking, and sleepers where shown, and where required for screeding or attaching other work. Form to shapes shown and cut as required for true line and level of attached work. Coordinate locations with other work involved.

B. Attach to substrates to support applied loading. Recess bolts and nuts flush with surfaces, unless otherwise indicated. Build into masonry during installation of masonry work. Where possible, anchor to formwork before concrete placement.

C. Install permanent grounds of dressed, preservative-treated, key-beveled lumber not less than 1½ inches (38.1 millimeters) wide, and of thickness required to bring face of ground to exact thickness of finish material. Remove temporary grounds when no longer required.

3.03 Wood Furring

A. Install plumb and level with closure strips at edges and openings. Shim with wood, as required, for tolerance of finish work.

B. Firestop furred spaces of walls at each floor level and at ceiling with wood blocking or noncombustible materials, accurately fitted to close furred spaces.

3.04 Wood Framing, General

A. Framing Standard: Comply with AFPA's *Manual for Wood Frame Construction*, unless otherwise indicated.

B. Install framing members of size and at spacing indicated.

C. Do not splice structural members between supports.

D. Firestop concealed spaces of wood-framed walls and partitions at each floor level and at ceiling line of top story. Where firestopping is not inherent in framing system used, provide closely fitted wood blocks of 2-inch nominal (38-millimeter actual) thickness lumber of same width as framing members.

E. Arrange studs so that wide face of stud is perpendicular to direction of wall or partition and narrow face is parallel.

1. Provide single bottom plate and double top plates using members of 2-inch nominal (38-millimeter actual) thickness whose widths equal that of studs; except single top plate may be used for non-load-bearing partitions. Nail or anchor plates to supporting construction, unless otherwise indicated.

2. For exterior walls, provide 2-inch by 6-inch nominal (38 mm by 140 mm actual) size wood studs spaced 24 inches (610 millimeters) o.c., except where otherwise indicated or required.
3. For interior partitions and walls, provide 2-inch by 4-inch nominal (38 by 89 millimeters actual) size wood studs spaced 16 inches (406 millimeters) o.c., except where otherwise indicated or required.

F. Construct corners and intersections with three or more studs. Provide miscellaneous blocking and framing as shown, and as required to support facing materials, fixtures, specialty items, and trim.

Provide continuous horizontal blocking at mid-height of single-story partitions over 96 inches (2.4 meters) high and multistory partitions, using members of 2-inch nominal (38-millimeter actual) thickness and of same width as wall or partitions.

G. Frame openings with multiple studs and headers. Provide nailed header members of thickness equal to width of studs. Set headers on edge and support on jamb studs.

1. For non-load-bearing partitions, provide double-jamb studs with headers not less than 4-inch nominal (89-millimeter actual) depth for openings 36 inches (914 millimeters) and less in width, and not less than 6-inch nominal (140-millimeter actual) depth for wider openings.

2. For load-bearing walls, provide double-jamb studs for openings 72 inches (1.8 meters) and less in width, and triple-jamb studs for wider openings. Provide headers of depth shown as indicated on contract documents.

H. Provide bracing in exterior walls and at interior load-bearing walls (that are not more than 25 feet [7.6 meters] from other parallel braced walls) at each end and at not more than 25 feet (7.6 meters) apart, to comply with IBC Section 2308.9.3 “Bracing” and IBC Table 2308.9.3(I).

3.05 Rafter and Ceiling Joist Framing

A. Ceiling Joists
Install ceiling joists with crown edge up and complying with requirements specified above for floor joists. Face nail to ends of parallel rafters.

B. Rafters
Notch to fit exterior wall plates and toe nail or use metal framing anchors. Double rafters to form headers and trimmers at openings in roof framing, if any, and support with metal hangers. Where rafters abut at ridge, place directly opposite each other and nail to ridge member or use metal ridge hangers.

C. Provide collar beams (ties) as shown or, if not shown, provide 1-inch by 6-inch nominal (19-millimeter by 140-millimeter actual) size boards between every third pair of rafters, but not more than 48 inches (1,219 millimeters) o.c. Locate below ridge member, at third point of rafter span. Cut ends to fit roof slope and nail to rafters.

D. Rafter Ties
Tie straps shall be provided from each roof framing member to exterior studs, posts or other supporting members below the roof. Opposing rafters at ridges shall be aligned and connected with straps.

***END OF SECTION***
PART 1 - GENERAL

1.01 Work Included

Provide all steel doors and steel door frames, complete in-place, not specifically described in other sections of these specifications, but indicated on the drawings or otherwise required for a complete and operable facility.

1.02 Submittals

The Contractor shall submit the following to the Engineer for review:

A. Complete materials list of all items proposed to be furnished and installed under this section.

B. Manufacturer's specifications and other data required to demonstrate compliance with the specified requirements.

C. Shop drawings showing details of each frame type, elevations of each design type, details of all openings, and all details of construction, installation, and anchorage.

D. Manufacturer's recommended installation procedures.

The manufacturer's recommended installation procedures, when approved by the Engineer, will become the basis for inspecting and accepting or rejecting actual installation procedures used on the work.

1.03 Qualifications

Products used in the work of this section shall be produced by manufacturers regularly engaged in manufacture of similar items and with a history of successful production acceptable to the Engineer.

The Contractor shall use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts, and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this section.

All work of this section shall be produced by a single manufacturer unless otherwise approved by the Engineer.

1.04 Product Handling

The Contractor shall use all means necessary to protect materials of this section before, during, and after installation and to protect installed work and materials of all other trades.

In the event of damage, the Contractor shall immediately make all repairs and replacements necessary to the approval of the Engineer and at no additional cost to the Owner.
PART 2 - PRODUCTS

2.01 Materials

A. Hot Rolled Steel Sheets and Strip
   Commercial quality carbon steel, pickled and oiled, complying with ASTM A569 and ASTM A568.

B. Cold Rolled Steel Sheets

C. Supports and Anchors
   Fabricate of not less than 18-gauge galvanized sheet steel.

D. Inserts, Bolts, and Fasteners
   Manufacturer's standard units, complying with ASTM A153, Class C or D, as applicable.

E. Shop Applied Paint
   For steel surfaces, use rust-inhibitive baked enamel or paint, suitable as a base for specified
   finish paints.

2.02 Fabrication

A. General
   Steel frame units shall be fabricated to be rigid, neat in appearance and free from defects, warp
   or buckle. Metal shall be accurately formed to the required sizes and profiles.

   Wherever practicable, fit and assemble units in the manufacturer's plant. Clearly identify work
   that cannot be permanently factory-assembled before shipment to assure proper assembly at
   the site.

   Frames shall be fabricated from either cold-rolled or hot-rolled steel (at fabricator's option).

B. Exposed Fasteners
   Provide countersunk flat Phillips or Jackson heads for exposed screws and bolts.

C. Finish Hardware Preparation
   Prepare hollow metal units to receive masonry and concealed finish hardware, including
   cutouts, reinforcing, drilling and tapping in accordance with final finish hardware schedule and
   templates provided by hardware suppliers. Comply with applicable requirements of ANSI
   A115.

   Reinforce hollow metal units to receive surface-applied hardware. Drilling and tapping for
   surface-applied finish hardware may be done at site.

   Locate finish hardware in accordance with Recommended Locations for Builders Hardware,
   published by the National Builders Hardware Association.

D. Shop Painting
   Clean, treat, and paint exposed surfaces of fabricated hollow metal units, including galvanized
   surfaces.
Clean steel surfaces of mill scale, rust, oil, grease, dirt, and other foreign materials before the application of the shop coat of paint.

Apply shop coat of prime paint of even consistency to provide a uniformly finished surface ready to receive field-applied paint.

1. Standard Steel Frames

Provide metal frames of the types and styles indicated on the drawings or schedules and complying with S.D.I. 100 for minimum materials and construction requirements.

Provide metal frames for doors and other openings as shown on the drawings. Conceal all fastenings unless otherwise shown.

Fabricate frames of welded construction. Miter all corners.

Drill stops to receive two silencers on strike jambs on single-swing frames and two silencers on heads of double-swing frames.

Provide 26-gauge steel plaster guards or mortar boxes, welded to the frame, at back of all finish hardware cutouts where mortar or other materials might obstruct hardware operation.

P A R T 5 - E X E C U T I O N

3.01 Inspection

The Contractor shall examine the areas and conditions under which work of this section will be performed and correct conditions detrimental to the proper and timely completion of the work. Do not proceed until unsatisfactory conditions have been corrected.

3.02 Installation

A. General

Install hollow metal units and accessories in accordance with manufacturer's data and as herein specified.

B. Placing Frames

Comply with the provisions of S.D.I. 100 unless otherwise indicated.

Except for frames located at in-place concrete or masonry openings, place frames prior to construction of enclosing walls and ceilings. Set frames accurately in position, plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is completed, remove temporary braces and spreaders leaving surfaces smooth and undamaged.

In masonry construction, locate three wall anchors per jamb at hinge and strike levels.

At in-place concrete or masonry construction, set frames and secure to adjacent construction with machine screws and masonry anchorage devices. If attached with screws, provide "Z" fillers at each screw location to prevent collapse or distortion of frame when screws are tightened.
When installed in prepared openings in concrete or masonry construction, install sealant between frame and concrete or masonry.

3.03 Adjust and Clean

A. Final Adjustments
Check and readjust operating finish hardware items in hollow metal work just prior to final inspection. Leave work in complete and proper operating condition. Remove and replace defective work, including doors or frames which are warped, bowed or otherwise damaged.

B. Prime Coat Touch-up
Immediately after erection, sand smooth all rusted or damaged areas of prime coat and apply touch-up of compatible air-drying primer.

***END OF SECTION***
SECTION 08 70 00
DOOR HARDWARE

PART I - GENERAL

1.01 Work Included

The Contractor shall furnish and deliver to the job site all finish hardware required to complete the work and provide fully operational doors. Provide all trim attachments and fastenings specified or required for proper and complete installation.

1.02 Submittals

The Contractor shall submit the following to the Engineer for review:

A. Complete materials list of all items proposed to be furnished and delivered under this section.
   1. Identify each hardware item by manufacturer, the manufacturer's catalog number, and the location of the item in the work.
   2. Make the list in form suitable for review by the Engineer.

B. Manufacturer's specifications, catalog cuts, and other data required to demonstrate compliance with specified requirements.

Approval of the hardware list by the Engineer shall not relieve the Contractor from the responsibility for furnishing all required finish hardware.

In a timely manner, to ensure orderly progress of the work, deliver templates or physical samples of the approved finish hardware items to pertinent manufacturers of interfacing items, such as door and frames.

1.03 Quality Assurance and Quality Control

Products used in the work of this section shall be produced by manufacturers regularly engaged in manufacture of similar items and with a history of successful production acceptable to the Engineer.

1.04 Product Handling

Each unit of finish hardware shall be individually packaged, complete with proper fastenings and appurtenances, clearly marked on the outside to indicate the contents and specific locations in the work.

Use all means necessary to protect materials of this section before, during, and after delivery to the job site and to protect the work and materials of all other trades.

In the event of damage, the Contractor shall immediately make all repairs and replacements necessary to the approval of the Engineer and at no additional cost to the Owner.
PART 2 - PRODUCTS

2.01 General

A. Proprietary Products
References to specific proprietary products are used to establish minimum standards of utility and quality. Unless otherwise approved by the Engineer, provide only the specific products. Design is based on the materials specified.

B. Acceptable Manufacturers
Door hardware shall be manufactured by the following companies, unless another is specifically approved by the Engineer.

1. Locksets/Latchsets:
   a. Schlage

2. Hinges:
   a. Hager
   b. Stanley
   c. Soss

3. Closer:
   a. LCN
      * All door closers to have S.R.I. (special rust inhibiting finish) on cylinders, arms and plates.

4. Push/Pulls:
   a. Rockwood
   b. Brookline
   c. Baldwin

5. Kickplates:
   a. Rockwood
   b. Brookline
   c. Baldwin

6. Stops:
   a. Rockwood
   b. Brookline
   c. Baldwin

7. Thresholds:
   a. Reese

8. Weatherstripping:
   a. Durable
   b. Reese
   c. Design

9. Coordinators:
   a. Glynn/Johnson
   b. Ives
10. Automatic Flush Bolts:
   a. Glynn/Johnson
   b. Ives

C. Fasteners
   Furnish all finish hardware with all necessary screws, bolts, and other fasteners of suitable size and type to anchor the hardware in position for long life under hard use.

   Furnish fastenings, where necessary, with expansion shields, toggle bolts, and other anchors approved by the Engineer, according to the material to which the hardware is to be applied and the recommendations of the hardware manufacture.

   All fastenings shall harmonize with the hardware as to material and finish.

D. Finishes
   Finishes of all hardware shall match the finish of the locksets. Take special care to coordinate all of the various manufactured items furnished under this section to ensure acceptably uniform finish.

2.02 Materials

A. Butts
   Where doors are required to swing 180 degrees, furnish hinges of sufficient throw to clear the trim.

   Furnish non-removable pins at out-swinging exterior doors.

B. Locksets and Latchsets
   Locksets and latchsets shall be heavy-duty cylindrical type.

C. Closers
   Furnish parallel arms at outswinging exterior doors and at interior doors where required.

   Size the closers in accordance with the manufacturer's recommendations, as approved by the Engineer.

D. Kick Plates and Push Plates
   Kick plates and push plates shall be 18-gauge 18-8 stainless steel. Countersink the screw holes and furnish stainless steel wood screws.

E. Door Silencers
   Furnish silencers for door frames at the rate of one for each single door and two for each pair of doors, except weather-stripped doors and doors with light seals or sound seals.

F. Door Stops
   Furnish door stops of height to engage the doors.

G. Miscellaneous
   All other items, not specifically described but required for a complete and proper installation of finish hardware, shall be as selected by the Contractor subject to the approval of the Engineer.
2.03 Keying

Furnish three keys for each lock.

2.04 Tools and Manuals

With the delivery of permanent keys, deliver to the Owner one complete set of adjustment tools and one set of maintenance manuals for locksets, latchsets, and closures.

PART 3 - EXECUTION

3.01 Deliveries

Stockpile all items sufficiently in advance to ensure their availability, and make all necessary deliveries in a timely manner to ensure orderly progress of the total work.

3.02 Inspection and Installation

Upon completion of the installation, and as a condition of its acceptance, visually inspect all finish hardware furnished under this section and place in optimum working condition.

3.03 Hardware Schedule

Furnish the following hardware groups in the amounts indicated on the drawings or required for a complete and proper installation.

<table>
<thead>
<tr>
<th>Door</th>
<th>Hardware</th>
<th>Finish</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Lockset – Schlage D Series, Lever&lt;br&gt;1½ hinges (3)&lt;br&gt;Threshold&lt;br&gt;Weather-stripping&lt;br&gt;Closer&lt;br&gt;Kickplate</td>
<td>Brass</td>
</tr>
</tbody>
</table>

***END OF SECTION***
PART 1 - GENERAL

1.01 Work Included

This work includes furnishing labor, equipment, and materials necessary to provide water well pumps and accessories as described herein and shown on the plans. This work includes all pipework and electrical work as necessary for complete installation of the pumping equipment.

1.02 Related Work

A. Section 31 23 02 – Excavating and Backfilling for Utility Construction
B. Section 33 21 00 – Water Wells

1.03 Submittals

A. Submittal Data for Review

The Contractor shall submit copies of the manufacturer's technical information on the proposed pumping systems to the Engineer for review. The submittal information shall include copies of the pump operating curve(s).

B. Operation and Maintenance Manuals

The Contractor shall furnish four copies of operation and maintenance manuals covering procedures for operating and maintaining the pumping systems proposed. Manuals are to be furnished before the equipment is started up.

1.04 Start-Up

The manufacturer shall provide the services of a factory trained technician to inspect the installation of the equipment furnished and installed under this section of work prior to placing it in operation. The representative shall witness the initial startup of the equipment and make such tests as might be necessary to verify proper operation.

The technician shall furnish the Engineer with a written report of the installation check and startup testing. Any deficiencies shall be specifically noted.

PART 2 - PRODUCTS

2.01 Equipment

A. Submersible Water Well Pumps

Pump and motor shall be coupled together and designed for submerged operation inside of a well casing of the diameter noted on the pump schedule. The pump shall be of stainless steel construction, including the bowl, diffuser, impeller, casing, cable guard, and strainer. All hardware shall be stainless steel. The shaft and coupling shall be series 400 stainless steel.

The motor shall be provided with a stainless steel casing and epoxy coated end bells. The stator shall be hermetically sealed to prevent moisture from accumulating in the motor windings. The
motor rating shall be suitable for operation at any point on the pump's operating curve without overloading.

Suggested manufacturers for submersible water well pumps are Goulds, Flint and Walling, or an approved equal.

2.02 Operating Conditions

Pumps furnished under this section shall meet the requirements shown on the pump schedule. Pump motors shall be sized to be non-overloading at all points on the performance curve. For this purpose, non-overloading is considered as BHP less than 85 percent of the motor nameplate horsepower multiplied by the motor service factor.

2.03 Schedules

A. Water Pump Schedule

1. Pump Identification: PW-1
2. Type: Submersible
3. Well Casing Diameter: 6-inch
4. Design Flow and TDH: 60 gpm @ 240 feet
5. Maximum RPM: 3,500
6. Maximum BHP: 5
7. Shutoff Head (minimum): 360 feet
8. Power: 230-volt, 3-phase

Note: The above information is based on available records. The actual pump duty point / horsepower will be determined upon successful completion of the well drilling. The well pump will be equipped with a variable frequency drive. Refer to electrical specifications for additional information.

PART 3 - EXECUTION

3.01 General Installation Requirements

The Contractor shall install pumps and related accessories substantially as shown on the drawings. The installation shall conform to the requirements of the pump manufacturer.

***END OF SECTION***
SECTION 31 10 01
CLEARING AND REMOVAL OF MISCELLANEOUS STRUCTURES

PART 1 - GENERAL

1.01 Work Included

This work includes, but is not limited to, clearing, topsoil removal, tree and stump removal, and the removal and protection of miscellaneous items within the project area.

1.02 Related Work

A. Section 33 42 00 – Culverts

PART 2 - PRODUCTS

Not Applicable

PART 3 - EXECUTION

3.01 Location of Underground Utilities

The Contractor shall call MISS DIG at least three work days before excavating in an area so that utility companies can identify their buried utilities. The Contractor shall notify area municipalities and other utilities in the area that do not participate in the MISS DIG program for location of their utilities.

3.02 Stripping and Stockpiling of Topsoil

Prior to excavating, the existing topsoil surface shall be stripped and stockpiled from within the limits of the proposed excavation.

3.03 Removal of Fences, Signs, Mailboxes, Ornaments, and Other Objects

Fences, signs, mailboxes, ornaments, and similar objects that fall within the project area shall either be protected or removed. If removed, the materials shall be carefully taken apart and stored in a place where they will not be damaged or stolen.

If any of the materials to be removed are damaged or badly deteriorated before the Contractor removes them, the Contractor shall notify the Engineer before the object is removed. Materials that are damaged, stolen, or lost after they have been removed shall be replaced by the Contractor at no increase in project cost.

3.04 Trees and Brush

Brush lying within the limits of the proposed excavation shall be cleared by the Contractor. Brush shall be removed from the project area and disposed of properly.

Trees lying within the limits of the proposed excavation that are to be removed shall be cut down by the Contractor. Plans may not show all trees of all nature and the Contractor shall become familiar with the project and base their work on their own assessment. The Contractor shall
coordinate with the Owner as to which trees are to be left in place and those that will be acceptable to remove. The Contractor shall notify the property owner (or the adjacent property owner if the tree is located in a public right-of-way) in advance of cutting down tree(s). The wood from the tree(s) shall be offered to the landowner. If the landowner wants the wood, the tree shall be cut into sections 8 feet long and stacked adjacent to the project area.

Small branches, limbs, and other debris shall be removed from the area by the Contractor and disposed of properly. If the landowner does not want wood from the trees, all wood including branches, limbs, and other debris shall be removed from the area by the Contractor and disposed of properly.

Stumps shall be removed in their entirety and disposed of away from the project area in an acceptable manner. Burning or burying along the project route is not acceptable.

***END OF SECTION***
SECTION 31 23 02
EXCAVATING AND BACKFILLING FOR UTILITY CONSTRUCTION

PART 1 - GENERAL

1.01 Work Included

This work includes preparation, excavating, bedding, and backfilling for the construction of utilities, pipelines, manholes, and other related appurtenances.

1.02 References

A. ASTM C618 – Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete

B. Michigan Department of Transportation 2012 Standard Specifications for Construction

1.03 Related Work

A. Section 01 41 26 – Permit Requirements

B. Section 01 45 16.02 – Density and Aggregate Testing

C. Section 31 10 01 – Clearing and Removal of Miscellaneous Structures

D. Section 31 25 00 – Soil Erosion and Sedimentation Control

E. Section 33 11 00 – Water Main

1.04 Safety

The Contractor is responsible for conducting operations in a safe and orderly manner and in conformance with MIOSHA P.A. 154.

1.05 Permit

Unless otherwise provided, the Contractor is responsible to obtain and comply with permits required under Parts 31 and 91 of Michigan PA 451 of 1994 (Natural Resources and Environmental Protection Act) and any local ordinances.

1.06 Notifications

The Contractor shall contact MISS DIG (800-482-7171 or 811) for the location of underground utilities at least three working days in advance of beginning any excavation. The Contractor shall contact utility agencies, which are not part of the MISS DIG system, to arrange for the location of their utilities in advance of beginning excavation.

PART 2 - PRODUCTS

2.01 Trench Backfill

Backfill material, unless specified otherwise, shall be soil or soil-rock mixture which is free from organic matter and other deleterious substance. It shall contain no rocks or lumps over 6 inches in greatest dimension, and not more than 15 percent of the rocks or lumps shall be larger than 2 1/2
inches in greatest dimension. Backfill placed within 12 inches of the proposed pipeline or structures shall be free of any rocks or lumps.

2.02 Sand for Bedding or Backfill

Sand shall meet the requirements of Granular Material Class II, as specified in the Michigan Department of Transportation 2012 Standard Specifications for Construction.

2.03 Stone for Pipe Bedding

Stone shall meet the requirements of Series 6A aggregate, as specified in the Michigan Department of Transportation 2012 Standard Specifications for Construction.

2.04 Flowable Fill

Flowable fill shall be a mixture of Portland cement, fly ash, sand, and water in the following proportions.

<table>
<thead>
<tr>
<th>Material</th>
<th>Type</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Portland Cement</td>
<td>Type I or IA</td>
<td>50 lb/cyd</td>
</tr>
<tr>
<td>Fly Ash</td>
<td>ASTM C618, Class C or F</td>
<td>500 lb/cyd</td>
</tr>
<tr>
<td>Sand</td>
<td>MDOT 2NS</td>
<td>2,850 lb/cyd</td>
</tr>
<tr>
<td>Water</td>
<td></td>
<td>Approx. 376 lb/cyd (sufficient to produce desired flowability)</td>
</tr>
</tbody>
</table>

Flowable fill shall be produced and delivered at a minimum temperature of 50 degrees Fahrenheit. Mixtures shall be transported to the point of placement in a revolving drum mixer or agitator.

PART 3 - EXECUTION

3.01 Existing Utilities

The location of existing piping and underground utilities, such as gas mains, water mains, electric duct lines, telephone conduits, etc., as shown on the contract drawings, have been determined from the best available information by actual surveys, or furnished and taken from the records of the utility companies and drawings of the existing facilities. However, the Owner does not assume responsibility for the possibility that during construction, utilities other than those shown may be encountered, or that actual location of those shown may be different from the locations designated on the contract drawings.

The location of the proposed pipes and structures shown on the drawings has been selected to limit interference with, or the crossing of, existing utilities. However, where the actual conditions result in interference with the proposed construction, the Owner may make appropriate adjustments to the alignment of the proposed work.

The Contractor shall furnish all labor and tools to either verify and substantiate the record drawing location, or definitely establish the position of the facilities. The actual location of all utilities shall be determined by the Contractor in advance of excavation and pipelaying work to allow sufficient time and space to make adjustments to the alignment of the proposed pipeline or related structures.
3.02 Dust Control

Dust caused by the Contractor's operations during performance of the work, or resulting from the condition in which the Contractor leaves the site, shall be controlled by the Contractor. The Contractor shall use all means necessary to control dust on and near the work zone and all off-site borrow areas.

All surfaces shall be thoroughly moistened, as required to prevent dust from being a nuisance to the public, neighbors, and concurrent performance of other work on the site.

3.03 Trench Excavation

The Contractor shall excavate open trenches of sufficient width and depth to provide ample room for the proper construction of the proposed pipeline and its appurtenances as shown on the contract drawings, and for removing any material that the Engineer may deem unsuitable for foundation.

The trench width at a level of 12 inches over the crown of the pipe shall not be greater than the maximum width shown on the plans. Where the plans do not specifically show limits for the width of the trench, the trench width shall not exceed 30 inches. The trench depth shall be undercut below the proposed grade of the pipeline or structure to allow sufficient space for the required bedding.

The excavation of the trench shall not advance ahead of the completed manhole and pipe work.

Trench excavation includes clearing the site of the work, loosening, loading, removing, transporting, and disposing of all materials necessary to be removed for the construction of the proposed work. Excavation shall be completed to the lines, grades, and locations necessary to complete the work shown on the contract drawings. If encountered within the limits of the excavation, the removal of quicksand; hardpan; boulders; clay; rubbish; unforeseen obstacles; abandoned conduits, pipes, tile, and telephone ducts; tree roots and stumps; masonry structures; railroad tracks; pavements; and sidewalks are included in the work of excavation and will not be paid for separately.

The Contractor shall coordinate with the owners or users of any poles, pipes, tracks, or conduits, or other systems that might be affected by the construction of the project, to maintain and protect such facilities during construction. Any costs for protecting, maintaining, or restoring these systems will be the Contractor's responsibility, and not paid for separately.

Excavated material shall not be placed outside the limits of the public right-of-way or the limits of easements for the utility. Excavated material shall not be placed on adjacent lawn areas, unless there is no other suitable place to put it. Excavated material shall be placed on pavements or sidewalks, only if approved by the Owner.

Sidewalks and pavements shall not be blocked or obstructed by excavated material, except on the authorization of the Engineer. Adequate provisions shall be made for the safe temporary passage of pedestrians and vehicles. Adequate bridging and planked crossings shall be provided and maintained across all open trenches for pedestrians and vehicles.

The Contractor shall provide all temporary sheeting, shoring, timbering, and bracing required to maintain the excavation in a condition to furnish safe working conditions and to permit the safe and efficient installation of all items of contract work. Shoring and supports shall be designed by a licensed Engineer. The Contractor shall shore up, or otherwise protect all fences, shrubs,
buildings, walls, walks, curbs, or other property adjacent to any excavation which might be disturbed during the progress of the work.

Sheeting and bracing shall be removed as the work progresses, in such a manner as to prevent the caving in of the excavations, or any damage to the project. All voids resulting from the removal of sheeting and bracing shall be carefully filled with fine sand and rammed to eliminate voids and prevent future settlement.

The contract price in this contract shall include the cost of all temporary supports and braces that may be necessary to secure a safe prosecution of the work until the permanent structure is complete.

Whenever the excavation is carried beyond the lines and grades shown on the contract drawings or given by the Owner, the Contractor shall, at their own expense, refill all such excavated space with stone material or flowable fill in such a manner as may be directed.

Excavated material shall be deposited so as to interfere as little as possible with the excavation of the whole work. Unsuitable and surplus excavated material, not incorporated in the improvement, shall be disposed of by the Contractor at their own expense, unless otherwise designated.

If private land is used by the Contractor as a spoil site, the Contractor shall obtain written permission from the owner or agent of the land agreeing to its use for this purpose and provide the project Owner with a certified copy of such agreement.

Excavated material that is suitable for backfill and is planned to be used for backfill, shall be neatly piled adjacent to the excavation so as to prevent cave-ins of the excavation and damage to adjacent trees, shrubs, fences, and other property.

The excavated area shall be kept free of water at all times. The Contractor shall furnish and maintain any wells, pumps, or other measures needed to provide a dry, stable trench for pipelaying. Sheeting and shoring shall be provided, if necessary, for the protection of the workers.

Backfilling shall follow immediately behind trench excavation and pipelaying operations. In no case shall more than 100 feet of trench excavation be open at any one time. Any excavation left open and unattended shall be protected with lighted barricades and a "snow fence" constructed around the perimeter of the excavation.

The Contractor shall excavate to the depths required to construct the water main and appurtenances as described on the plans. For water main construction, trench excavation shall be to a depth as shown on the plans and a 4-inch sand cushion below the pipe. The trench width at a level of 12 inches above the pipe shall be no greater than the pipe diameter plus 24 inches.

In areas where the proposed construction may interfere with existing utilities, additional excavation may be required to determine the exact location of said existing utilities. This work will be included in the other pay items and no additional compensation will be due to the Contractor for this work.

3.04 Bedding

Pipe bedding shall be a 4-inch sand cushion, unless shown otherwise on the drawings.
The pipe bedding shall be shaped to match the bottom ¼ of the pipe’s shape. The bedding shall be excavated to accommodate the pipe bells. The completed bedding shall provide uniform support of the entire length of pipe.

3.05 Dewatering

The excavation shall be maintained free of water (including groundwater, surface water, storm runoff, or sanitary wastewater) during the performance of the work.

The Contractor shall provide such dewatering as may be necessary to keep the excavation free of water, including ditching, pumping, wells, well pointing, or bailing. All water removed by the Contractor’s dewatering operations shall be discharged without damage to adjacent properties.

Necessary precautions shall be taken to protect all construction against flooding.

The Contractor shall supply water to homeowners if wells go dry due to construction. Any damage to neighboring wells caused by dewatering efforts shall be repaired by the Contractor at the Contractor’s expense.

3.06 Structure Excavation

Excavation for manholes or special structures shall be made to the depth and dimensions necessary for the proper installations of all structures shown on the contract drawings. Care shall be taken that the foundation area of the structure is not excavated below grade, except when rock is encountered. Where masonry is built directly against the sides or bottom of the excavations, the final trimming shall be done just before the masonry is placed.

3.07 Rock Excavation

Excavation includes the removal of rock.

3.08 Foundations, Strengthening

Whenever the ground is sufficiently firm and unyielding, the masonry shall be laid directly on the sand or crushed stone bedding of the excavation and pipes or conduits shall be laid as specified.

When so designated on the contract drawings, or directed by the Engineer, excavated areas shall be strengthened for foundation purposes by furnishing and placing crushed rock or gravel refill, flowable fill, concrete cradle or encasement, timber cradles, timber piling, or a combination of these materials.

After the excavation is opened and to grade, it will be examined by the Engineer who will determine whether or not it is a satisfactory foundation for masonry or pipes, or if it is necessary to stabilize the base. Where directed by the Engineer, a soil load test shall be made to determine the safe bearing capacity of the ground.

3.09 Backfill

Unless otherwise directed, all trenches and excavation shall be backfilled as the pipe is laid. No pipes shall be backfilled until the sewer elevations, gradient, alignment, and the pipe joints have been observed by the Engineer.
The trench shall be backfilled to the proposed final elevations with suitable materials. Unless other compaction methods are demonstrated and approved by the Engineer, backfill shall be placed in 8-inch lifts and compacted to the required density as stated in Section 01 45 16.02 – Density and Aggregate Testing.

In areas which are not to be restored with a pavement or aggregate surface, the backfill shall be graded to a height slightly above the adjacent surface. When final restoration of the area is completed by the Contractor, the backfill surface shall be excavated (or filled if settlement has occurred), trimmed, or graded, as necessary, to provide for the required depth of topsoil and its transition to adjacent, undisturbed areas.

The Contractor shall correct any areas where the trench backfill settles by adding fill, topsoil, and re-seeding.

3.10 Miscellaneous Pipe Repair

When an existing sewer pipe, drain pipe, field tile, or other existing pipe is damaged as a result of construction activities and is not designated for removal or abandonment on the plans or by the Engineer, it shall be repaired by the Contractor.

The section of damaged pipe shall be removed to existing joints or to sawed joints where the existing pipe is sound and undamaged. A length of new pipe of the same size as the original pipe shall be furnished and installed to replace the section of pipe removed. The new pipe may be any one of the following materials:

A. Same material, class or thicknesses, as the original pipe
B. PVC Schedule 40, for pipes 8 inches or less in diameter
C. PVC SDR 26, for pipes 8 inches or greater in diameter
D. Other pipe material approved by the Engineer

Each end of the new section of pipe shall be connected to the remaining sections of existing pipe using a rubber gasketed sleeve, suitable for the pipe materials and sizes being joined, to provide a watertight connection. The repaired section of pipe shall be firmly bedded in sand or stone, compacted according to Section 01 45 16.02 – Density and Aggregate Testing.

***END OF SECTION***
SECTION 31 25 00
SOIL EROSION AND SEDIMENTATION CONTROL

PART 1 - GENERAL

1.01 Work Included

The Contractor shall provide permanent and/or temporary erosion and sedimentation control as called for on the plans and as required by the county soil erosion agent and permit.

1.02 Definitions

A. Major rainfall event – ¼-inch or more precipitation over a period, delineated by dry periods of at least 24 hours.

1.03 References

A. ASTM D3786 – Standard Test Method for Bursting Strength of Textile Fabrics-Diaphragm Bursting Strength Tester Method

B. ASTM D4355 – Standard Test Method for Deterioration of Geotextiles by Exposure to Light, Moisture and Heat in a Xenon Arc Type Apparatus

C. ASTM D4491 – Standard Test Method for Water Permeability of Geotextiles by Permittivity


H. Michigan Department of Transportation 2012 Standard Specifications for Construction

1.04 Related Work

A. Section 01 41 26 – Permit Requirements

B. Section 32 92 00 – Turf Establishment

1.05 Permit

The Contractor shall apply for and obtain an Act 451 permit from the local Soil Erosion and Sedimentation Control Enforcing Agent. The Contractor shall pay all permit fees and provide any required bonds or insurance.

1.06 Scheduling

A. Control measures shall be constructed by the Contractor prior to the time construction starts uphill or upstream from the control measure location. Note: The soil erosion and sedimentation control permit will not be issued until the soil erosion and sedimentation control measures have been installed by the Contractor and inspected by the Lapeer County Health Department.
B. The Contractor shall inspect all temporary erosion control measures weekly and within 18 hours of major rainfall events.

C. Maintenance and replacement of erosion control measures shall be completed by the Contractor when necessary, or as directed by the soil erosion control agent or the Engineer.

D. Removal and cleanup of temporary control structures shall be provided by the Contractor within one week after the control measure is no longer needed.

1.07 General Soil Erosion and Sedimentation Control Procedures

A. Keep disturbed areas small.

B. Stabilize and protect disturbed areas as soon as possible.

C. Keep storm water runoff velocities low.

D. Protect disturbed areas from runoff.

E. Retain sediment within the construction area.

PART 2 - PRODUCTS

2.01 Materials

A. Geotextiles

Geotextiles for filters shall be non-woven, meeting the requirements of the table below.

Silt fence geotextiles shall meet the requirements of the following table and shall be designed to collect eroded sediment transported in storm water runoff. The fabric shall have at least 70 percent minimum retained strength after 500 hours of U.V. exposure when tested according to ASTM D4355.

<table>
<thead>
<tr>
<th>Geotextile Category</th>
<th>Property/Test Method</th>
<th>Property/Test Method</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Grab Tensile Strength (min) ASTM D4632 lbs</td>
<td>Trapezoid Tear Strength (min) ASTM D4533 lbs</td>
</tr>
<tr>
<td>Filters</td>
<td>90</td>
<td>45</td>
</tr>
<tr>
<td>Silt Fence</td>
<td>100(c)</td>
<td>45</td>
</tr>
</tbody>
</table>

Mullen burst strength (min) ASTM D3786 psi (a) | Permittivity ASTM D4491 Per second | Apparent Opening Size (max) ASTM D4751 (b) Millimeters

<table>
<thead>
<tr>
<th>Geotextile Category</th>
<th>Mullen burst strength (min) ASTM D3786 psi (a)</th>
<th>Permittivity ASTM D4491 Per second</th>
<th>Apparent Opening Size (max) ASTM D4751 (b) Millimeters</th>
</tr>
</thead>
<tbody>
<tr>
<td>Filters</td>
<td>140</td>
<td>0.5</td>
<td>0.21</td>
</tr>
<tr>
<td>Silt Fence</td>
<td>--</td>
<td>0.1</td>
<td>0.60</td>
</tr>
</tbody>
</table>

(a) ASTM D3786. The fluid displacement rate for the Mullen burst test equipment must be 170± 5 ml/minute. Subtract tare strength from the ultimate burst strength as specified by ASTM.

(b) Filtration opening size (FOS, Canadian General Standards Board, method 148.1 No. 10) is permitted as an alternate test method to ASTM D4751 for non-woven geotextiles.

(c) Elongation at the specified grab tensile strength not to exceed 40 percent for silt fence.

B. Stone

Unless otherwise directed, stone shall meet the requirements of Series 6A as specified in Michigan Department of Transportation 2012 Standard Specifications for Construction.
2.02 Mixtures
    A. Seed
        Seed shall meet the requirements of Section 32 92 00 – Turf Establishment.

2.03 Fabricated Items
    A. Silt Fence
        Geotextile for silt fences shall meet the requirements of Section 2.01. The geotextile shall be
        attached to machine pointed No. 2 common grade hardwood posts, using at least 5 staples
        through wood lath a minimum of 3/8-inch thick and 2 feet long. Post spacing shall not exceed
        6½ feet. Posts must be of sufficient length and cross-section to support the installed silt fence
        under full sediment load; however, posts shall have cross-sectional area of at least 2½ square
        inches and shall be a minimum of 36 inches in length. Silt fence fabric must be a minimum
        height of 2½ feet. Silt fence shall have at least two permanent markings or affixed labels per
        assembled roll which positively identifies the fabricator.

    B. Mulch Blankets
        Mulch blankets shall meet the requirements of Section 32 92 00 – Turf Establishment.

    C. Filter Sacks
        All materials shall adhere to the requirements of the Michigan Department of Transportation
        2012 Standard Specifications for Construction, except fabric drop, which shall consist of a
        geotextile filter sack inserted into the drainage structure under the cover.

        Filter sack shall be as manufactured by “Silt sack”, “Catch-All”, “Ultra-Urban Filter”, “Flogard
        + Plus”, or approved equal. The filter sacks shall be installed and maintained in accordance
        with the manufacturer’s specifications.

PART 3 - EXECUTION

3.01 General Requirements

    The Contractor shall perform work on the project in a manner which prevents or reduces erosion
    and controls sedimentation. The Contractor shall provide controls which keep sedimentation from
    the project area, within the limits of the project area, and out of any lake, river, stream, wetland, or
    storm drain.

    The Contractor shall install appropriate controls or measures to control or prevent erosion or
    sedimentation from the project area before beginning any earth disturbance operations. Temporary
    erosion and sedimentation control measures shall be maintained by the Contractor, until such times
    as disturbed areas have become permanently stabilized.

    During the life of the project, the Contractor shall provide any additional soil erosion or
    sedimentation control measures necessary to address specific problems which develop in and
    adjacent to the project area.

3.02 Time Limitations

    Grading operations shall be completed as soon as practical. Permanent soil erosion controls for
    disturbed areas shall be completed within 5 calendar days of the completion of grading, except that
permanent measures shall be completed within 24 hours when the disturbed area is within 150 feet of a lake, stream, river, or wetland area.

Temporary soil erosion measures shall be implemented when it is not practical to complete the permanent measures.

3.03 Area Limitations

For linear projects (roads, sewers, water main, etc.), the length of the disturbed area shall be limited to 1/2-mile, unless otherwise approved by the Engineer.

Areas outside the project right-of-way or outside the grading limits shown on the drawings shall not be disturbed, unless otherwise approved by the Engineer.

3.04 Construction of Erosion and Sedimentation Controls

The Contractor shall provide all permanent and temporary erosion and sedimentation controls shown on the drawings, required by the permitting agency, or necessary to appropriately control erosion and sedimentation from the project area.

A. Check Dams

Check dams shall be installed and maintained across ditches and watercourses, which might convey surface runoff from disturbed areas within the project area, or where shown on the drawings or required by the Engineer or permitting agency.

B. Silt Fence

The Contractor shall furnish, erect, and maintain silt fence around the perimeter of the project area where earth will be disturbed and sediment from the disturbed area could be conveyed.

C. Filters

Fabric or stone filters shall be installed in waterways or in advance of inlets to drainage courses or storm sewers.

D. Sediment Traps and Basins

Sediment traps shall be excavated upstream of check dams and where shown on the drawings or directed by the Engineer or permitting agency. Check dams shall be installed downstream of the sediment traps and basins prior to the sediment traps and basins being excavated.

E. Seeding

Earth areas shall be stabilized with turf immediately following the completion of earthwork and grading activities. Where permanent seeding cannot be completed, earth areas shall be stabilized with temporary seeding. Areas which are properly seeded temporarily for stabilization shall be permanently seeded, as shown, as the work can be appropriately completed.

F. Mulch Blankets

Areas susceptible to erosion from moving water, which are not to be paved, shall be seeded and protected with high velocity mulch blankets.
3.05 Maintenance and Erosion and Sedimentation Control

The Contractor shall maintain all temporary erosion and sedimentation controls until such time as the permanent measures have been completed and established.

The Contractor shall inspect all erosion and sedimentation controls weekly and within 18 hours of a major rain event.

Damaged controls or measures shall be replaced or repaired. Sediment shall be cleaned from traps, sumps, basins, filters, and fences periodically. Sediment shall be removed to prevent the accumulation of sediment from exceeding half of the volume of traps, sumps, and basins. Sediment or debris along silt fences shall be removed before the accumulation reaches half the height of the fence.

Sediment and debris removed from soil erosion and sedimentation control devices shall be disposed of properly by the Contractor. Sediment shall not be used for fill or backfill in the project area, except when an area is specifically designated on the plans or by the Engineer.

Drainage filters shall be cleaned when an accumulation of silt might reduce flow and result in flooding.

Any sediment from the construction area which enters storm sewers or drainage ditches shall be removed by the Contractor. Since sediment can be carried great distances within storm sewers, it may be necessary for many segments of downstream storm sewer segments to be televised, jetted, and vacuumed. If the Engineer believes that the Contractor has allowed or provided the potential for sediment to enter storm sewers or drainage courses, the Contractor will be responsible for the costs of inspection and removing sediment from downstream drains, whether it can be conclusively proven that the sediment was the result of the Contractor’s actions (or inaction).

3.06 Removal of Erosion and Sedimentation Control Devices

Temporary soil erosion and sedimentation control devices shall be removed or obliterated by the Contractor when the permanent measures are in place and established. Any areas damaged by the removal of the temporary devices shall be corrected by the Contractor.

Mulch used for temporary erosion control may either be removed or worked into the soil before the permanent topsoil and seeding is completed.

***END OF SECTION***
SECTION 32 15 00
AGGREGATE SURFACE

PART 1 - GENERAL

1.01 Work Included

This specification describes the requirements for constructing an aggregate surface for roadways, driveways, shoulders, and parking areas.

1.02 References

A. Michigan Department of Transportation 2012 Standard Specifications for Construction

1.03 Related Work

A. Section 01 45 16.02 – Density and Aggregate Testing

PART 2 - PRODUCTS

2.01 Materials

A. Aggregate shall meet the requirements of Series 21AA aggregate, as described in the Michigan Department of Transportation 2012 Standard Specifications for Construction, unless otherwise noted on the plans, proposal, or specifications.

PART 3 - EXECUTION

3.01 Subgrade Preparation

Aggregate shall not be placed until the subgrade is properly prepared. The subgrade shall be graded to the required elevations and shaped for placement of the specified aggregate thickness. The subgrade shall be compacted according to Section 01 45 16.02 – Density and Aggregate Testing. Soft or yielding spots shall be excavated and replaced with sound material.

3.02 Placement

Aggregate shall be placed in a manner that provides a uniform cross section of the specified thickness and the required surface grades. The edges of the area of aggregate surface shall be straight and uniform.

Aggregate shall be placed in lifts not exceeding 8 inches (loose measure) and compacted according to Section 01 45 16.02 – Density and Aggregate Testing.

***END OF SECTION***
PART 1 - GENERAL

1.01 Work Included

This work includes soil preparation, seeding, fertilizing, and mulching on those areas designated for turf establishment.

1.02 References

A. Michigan Department of Transportation Qualified Products List

1.03 Related Work

A. Section 31 25 00 – Soil Erosion and Sedimentation Control

1.04 Performance Requirements for Guaranteed Growth and Smooth Ground Surface

The Contractor is responsible to provide turf, substantially free of bare spots and free of weeds. The ground in turf areas shall be smooth, graded to provide positive drainage, and graded to provide a smooth transition to adjacent areas. The Engineer will determine when the requirements of guaranteed growth and smooth ground surface have been met.

Materials, requirements, and methods described in this specification are provided to establish minimum levels. Where the Contractor believes that other materials or methods are appropriate for the specific site conditions or better suited to the Contractor’s schedule, the Contractor shall submit details of the alternative materials and/or methods to the Engineer for approval.

The Contractor shall provide re-seeding, watering, and herbicides, as necessary, to achieve the desired results.

There will be no adjustment in project cost for re-seeding, watering, application of herbicides, or using alternative methods of turf establishment.

1.05 Areas Designated for Turf Establishment

All areas disturbed by the Contractor’s activities or as a result of the project, which are not to be restored with a pavement or aggregate surface, are to be restored with turf, unless specifically directed otherwise.

Turf shall be established on borrow areas and areas where excess soil is stockpiled.

When shown on the drawings or directed by the Engineer, the Contractor shall establish turf in other areas.
PART 2 - PRODUCTS

2.01 Materials

A. Topsoil

Topsoil shall be a humus-bearing, natural mineral soil of loam, sandy loam, silty loam, or clay loam classification. Topsoil shall neither be excessively acidic or alkaline.

Topsoil shall be screened and free of stones, roots, debris, and other foreign matter. Topsoil which is stripped from the project area shall be removed, transported, and stockpiled in a manner which prevents it from becoming mixed with sub-soils.

B. Fertilizer

Fertilizers shall be standard, commercial packaged or bulk products in granular or liquid form. Each container of packaged fertilizer shall be marked by the manufacturer with the following information: manufacturer name; lot number; date; analysis of contents, including the minimum percentages of total nitrogen, available phosphoric acid, and soluble potash; and the net weight. Bulk fertilizer shall be accompanied with an invoice indicating the manufacturer name; lot number; date; analysis of contents, including the minimum percentages of total nitrogen, available phosphoric acid, and soluble potash; and the net weight or volume.

Fertilizer for seeding and sodding shall be comprised of both a water insoluble component and a water soluble component. The water insoluble nitrogen must be from ureaformaldehyde and/or coarse grade isobutylidene diurea.

Fertilizer shall provide 33 pounds of actual water insoluble nitrogen per acre. The water soluble component of the fertilizer shall provide 65 pounds of actual nitrogen, phosphorus, and potassium nutrient per acre, in equal proportions. The water soluble component of the fertilizer shall include urea, diammonium phosphate, and potassium chloride.

C. Mulch

1. Loose Mulch

Mulch shall be straw or marsh hay, in an air-dried condition. Mulch material must be clean, undamaged, and rot-free. It must be substantially free of weed seed and other objectionable foreign matter.

2. Turf Mulch Blankets

Mulch blankets shall be manufactured by a company currently listed on the Michigan Department of Transportation’s Qualified Products List.

Mulch blankets shall have a net covering on both sides of the blanket and shall be manufactured from either excelsior or straw. Excelsior blankets shall be manufactured from a uniform layer of interlocking excelsior fibers cut from sound, green timber, with an average dry weight of 12 ounces per square yard. Straw blankets shall be made of a uniform layer of clean wheat straw, free of weeds and weed seed, with the straw and net covering securely stitched together to form a uniform mat having an average dry weight of 8 ounces per square yard.
3. Mulch Anchoring

Mulching anchoring shall be manufactured by a company currently listed on the Michigan Department of Transportation’s Qualified Products List.

Latex-based anchoring shall have a composition, by weight, of 48 percent styrene, 50 percent butadiene, and 2 percent additive, 42 percent to 46 percent solids, and a pH of 8.5 to 10.

Recycled newsprint mulch shall be comprised of specifically prepared, biodegradable, shredded newspaper particles consisting of recycled newsprint fibers. The recycled newsprint must contain a wetting agent, defoaming agent, and nontoxic dyestuff that will impart a bright green or blue color. The dyestuff must adhere tightly to the fiber. Recycled newsprint shall meet the following minimum requirements:

<table>
<thead>
<tr>
<th>Property</th>
<th>Requirement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Moisture content (total weight)</td>
<td>12 percent maximum</td>
</tr>
<tr>
<td>Shredded high-grade newsprint (oven dry)</td>
<td>96 percent minimum</td>
</tr>
<tr>
<td>Tackifier, by weight</td>
<td>1½ percent to 3 percent</td>
</tr>
<tr>
<td>Water holding capacity (water per 3½ ounces of fiber)</td>
<td>32 ounces minimum</td>
</tr>
</tbody>
</table>

Wood fiber shall be specially prepared, biodegradable, air-dried virgin wood fibers manufactured from 100 percent whole wood chips. The wood fiber must be manufactured with a tackifier. Recycled materials are not acceptable. The fibers must be dyed with a green or blue biodegradable dye to aid in visual metering during construction. The process and materials must not contain growth or germination inhibiting materials. The wood fiber must conform to the following specifications:

<table>
<thead>
<tr>
<th>Property</th>
<th>Requirement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Moisture content (total weight)</td>
<td>12 percent maximum</td>
</tr>
<tr>
<td>Organic wood fiber (oven dry)</td>
<td>95 percent minimum</td>
</tr>
<tr>
<td>Tackifier, by weight</td>
<td>3 percent to 5 percent</td>
</tr>
<tr>
<td>Water holding capacity (water per 3½ ounces of fiber)</td>
<td>35 ounces minimum</td>
</tr>
</tbody>
</table>

Guar gum tackifiers shall contain a minimum of 95 percent guar gum by weight. The remaining components shall be dispersing and crosslinking additives.

Other tackifiers may include water soluble natural vegetable gums, or guar gums blended with gelling and hardening agents, or a water soluble blend of hydrophilic polymers, viscosifiers, sticking aids, and other gums.

4. Mulch Netting

Netting shall have a mesh size not larger than 1½ inches by 2 inches and not smaller than ½-inch by ½-inch. The netting shall be fabricated from a plastic formulated from or treated with a chemical which will promote the breakdown of the net within the first growing season after its placement. The net shall have sufficient strength to hold the mulch in place and still deteriorate rapidly upon exposure to sunlight. Steel staples or pins shall not be used for anchoring of netting.

D. Weed Control

Herbicides must be approved for use by the Michigan Department of Agriculture and the U.S. Environmental Protection Agency.
2.02 Seeding Mixtures

Seed shall be furnished in durable bags, each with a tag indicating the seed supplier, lot number, date, mixture proportions, purity, germination, and net weight.

Seed mixtures shall meet the requirements of one or more of the following mixtures, or other mixtures that are approved in advance by the Engineer. Where the Contractor believes that another mixture is appropriate for areas within the limit of the project, the Contractor shall request that the Engineer review and approve the substituted mixture(s). Requests for substitutions shall include the name of the seed supplier, the mixture proportions, the purity, and the germination.

<table>
<thead>
<tr>
<th>Species</th>
<th>Purity, Minimum (percent)</th>
<th>Germination (percent)</th>
<th>Mixture Proportions (percent by weight)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kentucky Blue Grass</td>
<td>98</td>
<td>85</td>
<td>5 15 10 10 30</td>
</tr>
<tr>
<td>Perennial Ryegrass</td>
<td>96</td>
<td>85</td>
<td>25 30 20 20 20</td>
</tr>
<tr>
<td>Hard Fescue</td>
<td>97</td>
<td>85</td>
<td>25 20 30</td>
</tr>
<tr>
<td>Creeping Red Fescue</td>
<td>97</td>
<td>85</td>
<td>45 45 40 40 50</td>
</tr>
<tr>
<td>Fults Salt Grass</td>
<td>98</td>
<td>85</td>
<td>10 10</td>
</tr>
<tr>
<td>Cereal Rye</td>
<td>85</td>
<td>85</td>
<td></td>
</tr>
<tr>
<td>Spring Oats</td>
<td>85</td>
<td>85</td>
<td></td>
</tr>
</tbody>
</table>

PART 3 - EXECUTION

3.01 Preparation for Turf Establishment

A. Topsoil Stripping

Prior to performing any excavation, filling, grading, or other earthwork, the Contractor shall strip and stockpile topsoil for later use on the project. Excess topsoil shall not be removed from the project site unless specifically provided elsewhere in the contract documents.

B. Finish Grading

The areas that are to be seeded shall be properly graded, sloped, and shaped with an allowance for the thickness of the topsoil layer. The earth bed upon which topsoil will be placed shall be friable to a depth of at least 4 inches. Earth beds not in a friable condition shall be harrowed with a disk, spring tooth drag, or similar equipment.

C. Placement and Preparation of Topsoil

Topsoil shall be spread on the prepared areas to a depth of 3 inches (in place, after rolling or compaction), unless otherwise shown on the plans or proposal. After spreading, any large clods or lumps shall be broken and all stones larger than 1-inch diameter, rocks, roots, litter, and other foreign debris shall be raked up and disposed of by the Contractor. After spreading and raking, the topsoil surface shall be in a friable condition and the surface shall be reasonably close to the proposed grades and cross section.

The topsoil surface shall be shaped to provide proper drainage. Where proposed grades are not shown on the plans, the topsoil surface shall be graded to provide a smooth transition between the new construction and the existing, adjacent ground.
Excess topsoil shall be stockpiled in a location acceptable to the Owner and neatly trimmed to present a neat appearance.

3.02 Turf Establishment

A. Permanent Seeding and Fertilizing

Disturbed areas shall be seeded upon completion of earthwork and grading operations. Disturbed areas shall be stabilized with temporary seeding if permanent seeding cannot be completed.

Seed mixtures for permanent seeding shall be appropriate for the soil type and location, as indicated in the following table. The Contractor may propose and submit alternative mixtures to the Engineer for review and approval. It is the Contractor’s responsibility to provide turf areas which are substantially free of bare spots and generally weed-free.

<table>
<thead>
<tr>
<th>Mixture Designation</th>
<th>Soil Type</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>TDS</td>
<td>Dry Sandy to Sand Loam</td>
<td>Rural or Urban</td>
</tr>
<tr>
<td>THV</td>
<td>Heavy</td>
<td>Rural</td>
</tr>
<tr>
<td>TUF</td>
<td>All Types</td>
<td>City Streets</td>
</tr>
<tr>
<td>TGM</td>
<td>Medium to Heavy</td>
<td>All</td>
</tr>
<tr>
<td>THM</td>
<td>Loamy to Heavy</td>
<td>Residential / Commercial</td>
</tr>
</tbody>
</table>

Fertilizer and seed shall be applied uniformly on areas prepared for seeding. Seed shall be applied at a rate of 220 pounds per acre. Seed and fertilizer may be applied by drilling, broadcasting, or hydraulically. Seed and fertilizer shall be applied before applying mulch. Seed and fertilizer shall be lightly raked or rolled into the prepared topsoil surface.

Neither broadcast seeding nor hydraulic seeding shall be performed during windy weather.

There shall be provisions for mixing or agitating the seed – fertilizer mixture used for hydraulic seeding to keep it evenly distributed in suspension. Mixtures shall be applied within an hour of mixing the seed with water; unused portions shall be discarded.

B. Temporary Seeding

Temporary seeding shall be completed when the permanent seeding cannot be completed because of seasonal conditions. Temporary seeding shall be applied at a rate of 100 pounds per acre, and shall be of the following designation.

<table>
<thead>
<tr>
<th>Mixture Designation</th>
<th>Soil Type</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>CR</td>
<td>All Types</td>
<td>Temporary, less than 6 months</td>
</tr>
<tr>
<td>TSM</td>
<td>All Types</td>
<td>Temporary, more than 6 months</td>
</tr>
</tbody>
</table>

Before completion of the contract, the Contractor shall complete permanent seeding of all areas which are temporary seeded.

C. Dormant Seeding

Dormant seeding should be used only when necessary to complete a project when seasonal conditions are not conducive to permanent seeding. Dormant seeding shall not be completed on frozen ground. Dormant seeding shall be completed, as required, for permanent seeding.
The Contractor is responsible to establish turf which is substantially free of bare spots and generally free of weeds.

3.03 Mulching

A. Mulch Placement

Immediately after the seed has been set into the topsoil surface by light raking or rolling, the Contractor shall spread mulch and anchor it as appropriate. Mulching shall not be performed during windy conditions.

Loose mulch shall be placed thick enough to shade the ground, conserve moisture, and resist erosion, but open enough to allow sunlight to penetrate and air to circulate.

The Contractor shall maintain mulched areas and repair any areas where damage from erosion, wind, traffic, fire, or other causes occur.

Mulch shall be applied at a uniform rate of 2 tons per acre, except that a rate of 3 tons per acre is required with dormant seeding.

B. Mulch Anchoring

Mulch anchoring (tackifiers) shall be sprayed immediately after the mulch is placed. Spraying shall not be performed when wind might prevent the proper placement of the adhesive. The Contractor shall provide protection measures, as necessary, to protect traffic, signs, structures, and other objects from being marked or disfigured by tackifier materials.

Latex based adhesive shall be mixed at a rate of at least 15 gallons of adhesive with a minimum of 250 pounds of recycled newsprint and 375 gallons of water.

Recycled newsprint shall be mixed at a minimum rate of 750 pounds of newsprint with 1,500 gallons of water.

Wood fiber shall be mixed at a minimum rate of 750 pounds of wood fiber with 1,500 gallons of water.

Guar gum shall be mixed at a minimum rate of 100 pounds of dry adhesive and a minimum of 250 pounds of recycled newsprint and 1,300 gallons of water.

Other tackifiers shall be mixed at a minimum rate of 100 pounds of dry adhesive with a minimum of 250 pounds of recycled newsprint with 1,300 gallons of water.

C. Mulching Netting

When netting is used to secure mulch, it shall be secured with anchors, staples, or pins. The net shall be spread over the mulch so that a worker can walk between adjacent widths of the net. The edges of adjacent widths of net shall be pulled together and held in place with net anchors. Net anchors shall be spaced not more than 30 inches apart along the edges, joints, and centerline. The net shall not be installed in direct contact with the ground. If the Contractor elects to use mulch netting or blankets, the Contractor will be required to remove the netting fabric once the turf is established.

D. Mulch Blankets

Mulch blankets shall be installed within one day of seeding. The side edges of blankets shall
be overlapped by 2 inches. Blanket ends shall be shingle lapped 6 inches. Non-metallic staples or pegs shall be placed along all joint edges and along blanket centerlines at a maximum spacing of 2 feet. Blankets in waterways shall be shingle lapped 12 inches on the downslope edge. If the Contractor elects to use mulch netting or blankets, the Contractor will be required to remove the netting fabric once the turf is established.

High velocity blankets shall be installed on slopes of 1:2, or steeper, on ditch bottoms, on ditch side slopes (to an elevation 1 foot above the ditch bottom), and where specifically shown on the drawings or directed by the Engineer.

3.04 Weed Control

Weed control shall be provided by the Contractor, as necessary, to develop turf areas which are relatively free of weeds. Herbicides shall be applied in accordance with federal, state, and local regulations. Herbicides shall be applied in accordance with manufacturer’s instructions. Herbicides shall be applied by commercial applicators, licensed in the State of Michigan and certified by the Michigan Department of Agriculture in the appropriate category(ies).

Target weeds shall be sprayed in the newly seeded turf when the new turf grass is sufficiently established to withstand the application of herbicide. Herbicide application shall be repeated if the first application failed to control target weeds.

The Contractor shall take appropriate measures to preserve and protect adjacent property from damages resulting from the application of herbicides. Herbicides shall not be applied when wind may carry it to adjacent areas.

***END OF SECTION***
SECTION 33 11 00
WATER MAIN

PART 1 - GENERAL

1.01 Work Included

The Contractor shall install water main and appurtenances in accordance with this specification. This work includes excavation, pipelaying, backfilling, and testing.

The Contractor shall protect existing utilities during construction, whether the existing utilities are shown on the plans or not. Utilities damaged by construction shall be repaired in a manner satisfactory to the Engineer and at the Contractor's expense. The Contractor shall call MISS DIG (800-482-7171) for staking and locating the existing utilities.

The Owner will assist the Contractor in locating existing water service leads and mains.

The Contractor shall contact the Owner to schedule work that may interfere with existing water service.

The Contractor shall develop a construction sequencing plan and submit to the Engineer and Owner for approval. The construction sequence shall minimize interruption of service.

1.02 References

E. ANSI A21.51/AWWA C151 – American National Standard for Ductile-Iron Pipe, Centrifugally Cast, for Water
G. AWWA C110 – Ductile-Iron and Gray-Iron Fittings
H. AWWA C115 – Flanged Ductile-Iron Pipe With Ductile-Iron or Gray-Iron Threaded Flanges
I. AWWA C500 – Metal-Seated Gate Valves for Water Supply Service
J. AWWA C502 – Dry-Barrel Fire Hydrants
K. AWWA C504 – Rubber-Seated Butterfly Valves
L. AWWA C509 – Resilient-Seated Gate Valves for Water Supply Service
M. AWWA C512 – Air Release, Air/Vacuum, and Combination Air Valves for Water and Wastewater Service
N. AWWA C515 – Reduced-Wall, Resilient-Seated Gate Valves for Water Supply Service
O. AWWA C600 – Installation of Ductile Iron Water Mains and Their Appurtenances
P. AWWA C605 – Underground Installation of Polyvinyl Chloride (PVC) and Moleculally Oriented Polyvinyl Chloride (PVCO) Pressure Pipe and Fittings
Q. AWWA C651 – Disinfecting Water Mains
R. AWWA C800 – Underground Service Line Valves & Fittings
S. AWWA C900 – Polyvinyl Chloride (PVC) Pressure Pipe and Fabricated Fittings, 4 In. Through 12 In. (100 mm Through 300 mm), for Water Transmission and Distribution
T. AWWA C906 – Polyethylene (PE) Pressure Pipe and Fittings, 4 In. Through 65 In. (100 mm Through 1,650 mm), for Waterworks
U. AWWA C908-97 – Standard for PVC Self-Tapping Saddle Tees for Use on PVC Pipe
V. AWWA C909 – Molecularly Oriented Polyvinyl Chloride (PVCO) Pressure Pipe, 4 In. (100 mm) and Larger
W. ASTM B88 – Standard Specification for Seamless Copper Water Tube
X. ASTM B251 – Standard Specification for General Requirements for Wrought Seamless Copper and Copper-Alloy Tube
AA. ASTM D1248 – Standard Specification for Polyethylene Plastics Extrusion Materials for Wire and Cable
BB. ASTM D2657 – Standard Practice for Heat Fusion Joining of Polyolefin Pipe and Fittings
CC. ASTM D3035 – Standard Specification for Polyethylene (PE) Plastic Pipe (DR-PR) Based on Controlled Outside Diameter
EE. ASTM D3350 – Standard Specification for Polyethylene Plastics Pipe and Fittings Materials
FF. ASTM F714 – Standard Specification for Polyethylene (PE) Plastic Pipe (DR-PR) Based on Outside Diameter
GG. ISO 9002 – Model for Quality Assurance in Production, Installation and Servicing
HH. DIPRA – Polyethylene Encasement Installation Guide
II. DIPRA – Thrust Restraint Design for Ductile Iron Pipe
1.03 Related Work

A. Section 01 25 00 – Materials and Equipment
B. Section 01 45 16.02 – Density and Aggregate Testing
C. Section 01 71 23.16 – Construction Staking by Contractor
D. Section 31 10 01 – Clearing and Removal of Miscellaneous Structures
E. Section 31 23 02 – Excavating and Backfilling for Utility Construction
F. Section 31 25 00 – Soil Erosion and Sedimentation Control
G. Section 32 15 00 – Aggregate Surface
H. Section 32 92 00 – Turf Establishment
I. Section 33 42 00 – Culverts

1.04 Submittals

Submit shop drawings or manufacturer's data to the Engineer for review and approval prior to ordering for the following:

A. Valves
B. Pipe, including fittings and joints
C. Restraints
D. Curb stops, corporation taps, and curb stop boxes
E. Tracer wire and splice connections

1.05 Quality Assurance and Quality Control

A. Leakage
   The completed pipeline shall be subjected to a hydrostatic pressure test in accordance with Section 3.16.

B. Bacteriological
   Following disinfection, a bacteriological test shall be completed in accordance with Section 3.16.

1.06 Local Standards

The Owner’s standards for materials are shown on the plans. Where there is a conflict between the Owner’s standards and the specifications, the Owner’s standards prevail.
PART 2 - PRODUCTS

2.01 Materials

A. Pipe

Pipe may be any of the following materials, except where a specific material is indicated on the plans or in the proposal.

1. PVC Pipe

PVC pipe water main shall be SCH80, meeting the requirements of ASTM D1784 and D1785 or PVC Standard Dimensional Ratio (SDR) 21, meeting the requirements of ASTM D2241. All materials shall be manufactured of virgin rigid PVC vinyl compounds.

Pipe shall meet both NSF/ANSI Standard 61 and NSF/ANSI Standard 14. Pipe shall be marked with “NSF-PW” to indicate its compliance with these standards.

The pipe manufacturer and class shall be marked on each length of pipe.

Joints for pipe shall be push-on type with elastomeric gaskets meeting the requirements of ASTM D3139.

B. Fittings

Fittings shall be manufactured by the same pipe manufacturer. All fittings shall be manufactured in the United States. Unless otherwise approved, all fittings shall be glued fittings using a two-step process with primer (ASTM 1668 and ASTM D 2774) and solvent cement (ASTM D2564).

C. Ball Valves

Ball valves shall meet the Owner’s standards for manufacturer, style, and opening direction.

Ball valves shall be manufactured of brass conforming to AWWA C800. All valves shall be certified lead free and conform to NSF 61 and NSF 372. All valves shall be supplied with a box and curb box rod extension. Ball valves shall be manufactured by Ford or approved equal.

D. Service Boxes

Water services boxes shall be of a style conforming to the Owner's standard. Boxes shall be adjustable, a minimum of 6 inches above and below finish grade.

E. Valve Boxes

Valve boxes shall be made of good quality cast iron and shall be of the sectional type. The lower section shall be a minimum of 5 inches in diameter, enlarged at the base to fit around the bonnet of the valve. The upper section shall be arranged to slide or screw down over the adjoining lower section and shall be full diameter throughout. Valve boxes shall be provided with cast iron lids or covers. Lids or covers shall be marked "WATER". The over-all length of valve boxes shall be sufficient to permit the top to be set flush with the final ground surface grade. Valve boxes shall be as manufactured by Traverse City Iron Works, Clow Corporation, or equal.

F. Tracer Wire

Tracer wire shall be designed and manufactured for the purpose of detecting buried utilities. Tracer wire shall be 12 AWG (minimum) copper wire coated with a 30 mil (minimum)
polyethylene jacket. The Contractor shall use larger wire, when necessary, for installation without damage during bored installations.

PART 3 - EXECUTION

3.01 Alignment and Grade

The water mains shall be constructed at the alignment and grades indicated in the plans and specifications, except where changes are directed or approved by the Engineer. Fittings, valves, hydrants, and service connections shall be installed at the locations indicated on the drawings or in the specifications, except where field conditions warrant changes which are directed and approved by the Engineer.

Valves and hydrants shall be installed plumb. Valve operating stems shall be installed in a manner to allow for their proper operation.

3.02 Investigation

Prior to excavation, the Contractor shall call MISS DIG and shall contact utility agencies which are not part of the MISS DIG system to make arrangements for identifying the location of existing utilities in the project area. Where potential conflicts are suggested by the plans and/or the utilities’ locations, the Contractor shall excavate and expose the existing utilities at least 100 feet in advance of pipelaying operations. Where the existing utilities may conflict with the proposed alignment and construction, the Contractor shall make such appropriate modifications to the alignment and grade, as necessary, to prevent a conflict. Changes to the alignment and grade shall be as directed and approved by the Engineer. Changes to the alignment and grade shall be completed by the Contractor at no additional cost to the project.

3.03 Excavation

The Contractor shall excavate all materials to the depths necessary to construct the water main as shown on the plans. Excavation shall include the removal of rock, dirt, abandoned pipelines, old foundations, stumps and roots, and similar materials encountered. Excavation of whatever material encountered shall be included in the contract unit prices for water main installation and will not be paid for separately.

Excavation shall be in accordance with Section 31 23 02 – Excavating and Backfilling for Utility Construction.

3.04 Pipe Handling

Pipe shall be handled in such a manner as to prevent the ends from splitting, damages to the protective coatings, and other undesirable conditions. Pipe shall not be dropped, skidded, or rolled into other pipe. Repairs to damaged pipe must be approved by the Engineer.

3.05 Pipe Cutting

Pipe cutting shall be done in a neat and workmanlike manner, without damage to the pipe or lining, and as to leave a smooth end at right angles to the axis of the pipe. Cutting shall be done by an approved mechanical saw or cutter. Hydraulic squeeze cutters are not acceptable.
3.06 Pipelaying

Pipes located inside structures shall be rigidly supported.

Pipe laid underground shall be uniformly supported through its entire length on a 4-inch cushion of sand. A depression shall be carved out of the sand cushion to accommodate the pipe bells.

Pipe shall be inspected for defects, debris, or dirt while suspended in a sling prior to lowering it into the trench. Defective pipe shall be removed from the project site immediately. Lumps, blisters, and excess coal tar coating shall be removed from inside the bell and outside the spigot. These areas shall be wire-brushed and wiped clean with a dry oil-free rag. No debris, tools, clothing, or other materials shall be allowed in the pipe.

Pipe shall be laid in a dry trench, with bell ends facing in the direction of laying. After placing a length of pipe in the trench, and after installing the gasket and applying the gasket lubricant, the spigot end shall be centered in the bell, and the pipe pushed home and brought to the correct line and grade. The pipe shall be secured in place by tamping sand around it. Precautions shall be taken to prevent soil from entering the joint space.

A watertight plug shall be inserted in the open end(s) of the pipe to prevent water, soil, animals, or other foreign matter from entering the pipe during the construction phase.

3.07 Jointing

A. Fittings

Glued joints shall be installed in accordance with the joint manufacturer's recommendations. Copies of such recommendations shall be furnished to the Engineer prior to the start of construction.

3.08 Tracer Wire

A tracer wire shall be laid along the crown of any plastic pipes. The wire shall be attached to the top of the pipe in such a manner that it will not become displaced during construction and backfilling. Tracer wire shall be continuous (without splices) over each separate run. If wire is damaged or broken during installation, a new wire shall be installed by the Contractor. The wire shall be terminated in valve wells or boxes as approved by the Engineer.

3.09 Backfilling

Backfilling shall be in accordance with Section 31 23 02 – Excavating and Backfilling for Utility Construction.

3.10 Separation and Cover

Where the proposed water main crosses under an existing utility, the proposed water main shall be deflected above or below the existing utility in accordance with the following:

A. Maintain a minimum depth of cover over top of proposed water main as shown on the drawings.

B. Maintain at least 18 inches of vertical separation and 10 feet of horizontal separation between the outside of the proposed water main and the outside of a sewer, drain pipe, or catch basin lead.
C. Maintain at least 1 foot of vertical separation between the outside of the proposed water main and the outside of an existing utility other than a sewer, drain or catch basin lead.

D. When crossing an existing sewer, drain pipe, or catch basin lead, construct the proposed water main so that its joints are equidistant from the utility being crossed.

3.11 Hydrants and Valves

A. General

Hydrants and valves shall be located as shown on the plans or as otherwise directed by the Engineer. Failure by the Contractor to locate said hydrants or valves, as called for, may result in Contractor correcting the error at their own expense.

B. Setting Valves

Valves shall be examined by the Contractor prior to lowering in the trench. All nuts and bolts shall be checked to assure tightness.

Valves shall be installed with the valve closed, supported on two 2-inch by 6-inch by 18-inch hardwood blocks and vertically plumb. The valve box shall be set plumb and its axis shall be in line with the stem. Valve boxes shall have the ability for future adjustments of up to 6 inches, above or below grade.

C. Cutting-in Valves

Where shown on the plans or directed by the Engineer, the Contractor shall install a new valve on an existing line. The existing main shall be uncovered by the Contractor. A section of the existing main shall then be cut out. The length will vary depending on the valve and sleeve dimensions. A suitable mechanical joint cutting-in sleeve shall be slid over one end of the pipe, and a gate valve installed over the other end. After the gate valve is in the "home" position, the sleeve shall be slid into the gate valve. The gaskets shall be positioned and the mechanical joints shall be tightened to the manufacturer's specifications. The valve shall be plumb. Provide support under the valve by placing two 2-inch by 6-inch by 18-inch hardwood boards. The completed installation shall be visually inspected for leaks before the pipe is covered. The valve box shall be installed over gate valve and adjusted to the proposed grade. The excavation shall be backfilled with sand and compacted. That part of the excavation that is not within the 1:1 influence of an existing or proposed roadway or railway, and at least 6 inches above the water main, may be backfilled with suitable excavated material and compacted.

3.12 Thrust Restraint

All tees, plugs, bends, hydrants, offsets, and similar fittings shall be mechanically restrained or braced to undisturbed ground by use of concrete thrust blocks.

Concrete for use as thrust blocks shall have a 28-day compressive strength of not less than 2,500 psi. The thrust block shall be placed so that the pipe, valve, hydrant, or fitting joints are accessible for repair. Details of placement of thrust blocks are shown on the plans. Vertical bends will require blocking and strapping as shown on the plans.

Restrained joints shall be designed in accordance with DIPRA Thrust Restraint Design for Ductile Iron Pipe. The following restraint joint systems are approved for ductile iron pipe, when observed by the Engineer.
<table>
<thead>
<tr>
<th>Pipe Size</th>
<th>Restrained Joint Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>12 inch or less</td>
<td>Field Lok, Fast Grip</td>
</tr>
<tr>
<td>16 inches or larger</td>
<td>FlexRing, TR Flex</td>
</tr>
</tbody>
</table>

Restrained joints for PVC pipe shall be as follows:

A. MEGALUG by EBBA Iron, Series 19MJ00 or approved equal for mechanical joints restraints on C909 PVC pipe.

B. MEGALUG by EBBA Iron, Series 1900 or approved equal for push joint/bell restraints on C909 PVC pipe.

Restrain all mechanical joints with retainer glands. Restrain all joints within length(s) according to restraint schedule, as determined using EBBA Iron Restraint Length Calculator.

Restrained joints are considered included in work of water main construction and will not be paid for separately.

3.13 Conflicts with Existing Utilities

Excavation shall be made sufficiently in advance of pipelaying operations so that water main alignment can be adjusted to go above, below, or around existing pipes, structures, cables, or other obstacles that are encountered. Where such minor adjustments are made to the water main alignment, no additional compensation will be due to the Contractor.

Where existing electric cables, telephone cables, gas mains, or services are damaged, repairs shall be at the Contractor's expense. The repairs shall be made by the appropriate utility.

Where sewer leads are damaged, they shall be repaired by the Contractor at no charge to the Owner. Sewer leads shall be repaired with a section of schedule 40 PVC pipe of the size encountered. Pipe of the same material as that encountered can also be used. The damaged pipe shall be cut square and the "connection" area shall be thoroughly cleaned. Rubber gasketed sleeve couplings, suitable for connecting the pipe sizes and materials encountered, shall be furnished and installed by the Contractor for each reconnection or repair joint.

3.14 Conflicts with Proposed Utilities

This work consists of relocating a portion of existing water main or water service to avoid a conflict with a proposed utility. This work includes furnishing all labor, equipment, and materials required for excavation, installation, disinfection, and backfilling as shown on the plans and specified within this specification.

3.15 Restoration

Areas disturbed by construction activities shall be restored by the Contractor.

3.16 Testing and Disinfection

A. Hydrostatic Pressure Testing for Water Main

   Water main shall be hydrostatically tested immediately after the section to be tested is installed. The Contractor shall provide all labor, equipment, and materials to perform the test, including
pumps, gauges, plugs, corporations, water, miscellaneous pipes and fittings, and a means of measuring lost water. The testing equipment shall be approved by the Engineer.

The Contractor shall fill the main through hydrants or corporations. After completion of the tests, corporations made for the purpose of testing shall be plugged. Water shall be added to the line and air expelled to provide a pressure of 150 psig. When the Contractor has verified that all air is expelled and that the test pressure is maintained, the Contractor shall notify the Engineer to witness the test. The Engineer shall be given at least a 24-hour notice. The test duration shall be two hours. Water shall be added during the test period, as required, to maintain the required pressure to the highest point in the system throughout the test period. The amount of water required to maintain the test pressure is the actual leakage.

If unsatisfactory results are obtained, the Contractor shall locate and repair the leak and the system shall be retested.

B. Tracer Wire Continuity
   The Contractor shall demonstrate continuity of the installed tracer wire to the Engineer.

C. Disinfection
   The Contractor shall flush the water main with potable water until discharge from the main runs clear. The main shall be chlorinated in accordance with AWWA C651. After the chlorination procedure is completed, the water main shall be flushed again until the chlorine content is equal to that of the water being supplied. Sixteen hours or longer after the flushing, the Contractor may begin collecting samples for bacteriological analysis. Samples shall be collected at 24-hour intervals until two consecutive satisfactory results are obtained. Samples shall be collected at the end opposite the chlorine injection, except that in long lines or where contamination is suspected, the Engineer may require other sampling points. Sampling shall be performed under the observation of the Engineer.

Where satisfactory results are not obtained, the main shall be reflushed, redisinfected, and retested. Heavily chlorinated water shall be disposed of properly.

***END OF SECTION***
SECTION 33 21 00
WATER WELLS

PART 1 - GENERAL

1.01 Work Included

This work includes the furnishing of all labor, material, and equipment for the construction and testing of proposed wells. The work includes completing and recording all permitting requirements.

1.02 Submittals

The Contractor shall submit shop drawings or manufacturers data to the Engineer for review and approval prior to incorporating that material into the project.

A. Casing pipe and method of construction
B. Connections to water supply/distribution system
C. Grouting materials and methods
D. Stainless steel screens, slot size, diameter, and location
E. Packer, pitless adaptor, screen filter pack, drive shoe

1.03 State Regulations

All work completed under this contract shall be completed in accordance with Part 127, 1978 P.A. 368 (Michigan Public Health Code), Section 12704, and all rules promulgated thereunder.

All work shall comply with the current Well Construction Code Administrative Rules.

1.04 Scheduling of Well Construction

The Contractor shall notify the Engineer in advance of any drilling or test.

The Contractor shall construct observation wells before the test well is constructed. Logs of the observation wells are to be provided to the Engineer for review before the test well is constructed. After review of the observation well data by the Engineer, the Contractor shall drill the test well.

1.05 Certificate of Registration

The Contractor shall have a current State of Michigan certificate of registration. The well drilling Contractor shall place the registration number in figures not less than 2 inches high, in a conspicuous location, on both sides of the Contractor's well drilling machine.

1.06 Well Location

The general location of the well(s) is shown on the project location map. The Contractor shall be responsible for determining the proposed location in the field. The exact field location will be verified by the Engineer and the Owner prior to the Contractor constructing the well(s).
1.07 Records Required

The well drilling Contractor shall provide the Owner with a water well and pump record (Michigan Department of Environment, Great Lakes, and Energy, formerly Michigan Department of Environmental Quality, Form EQP-2017). The record shall be submitted electronically via the Michigan Department of Environment, Great Lakes, and Energy’s Wellogic program.

PART 2 - PRODUCTS

2.01 Materials

A. Casing

The steel pipe that is used as the permanent well casing shall be new pipe that is manufactured in compliance with the standards of ASTM Specification A53, A106, API5L or A589. Steel pipe that is used as permanent well casing shall be at least standard weight. Weights and dimensions shall be supplied in accordance with the following table.

<table>
<thead>
<tr>
<th>Nominal Pipe Size (inches)</th>
<th>Weight Weight/ Schedule</th>
<th>Pounds Plain End</th>
<th>Per Foot Threaded/ Couplings</th>
<th>Wall Thickness (inches)</th>
<th>Outside Diameter (inches)</th>
<th>Inside Diameter (inches)</th>
</tr>
</thead>
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<tr>
<td>1 ¼</td>
<td>Std. 40</td>
<td>2.27</td>
<td>2.30</td>
<td>.140</td>
<td>1.660</td>
<td>1.380</td>
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<td>Std. 40</td>
<td>2.72</td>
<td>2.75</td>
<td>.145</td>
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<td>1.610</td>
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<td>.154</td>
<td>2.375</td>
<td>2.067</td>
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<td>.203</td>
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<td>Std. 40</td>
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<td>7.70</td>
<td>.216</td>
<td>3.500</td>
<td>3.068</td>
</tr>
<tr>
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<td>9.25</td>
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<td>4.500</td>
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<tr>
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<td>5.563</td>
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<td>18.97</td>
<td>19.45</td>
<td>.280</td>
<td>6.625</td>
<td>6.065</td>
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<tr>
<td>8</td>
<td>Std. 40</td>
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<td>.322</td>
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<tr>
<td>10</td>
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<td>41.85</td>
<td>.365</td>
<td>10.750</td>
<td>10.020</td>
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<td>51.15</td>
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<td>12.000</td>
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<tr>
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<td>Std.</td>
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<td>57.00</td>
<td>.375</td>
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<td>13.250</td>
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<tr>
<td>16</td>
<td>Std.</td>
<td>62.58</td>
<td>65.30</td>
<td>.375</td>
<td>16.000</td>
<td>15.250</td>
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</table>

The casing shall extend not less than 25 feet below, and terminate not less than 12 inches above, the ground surface. The top 25 feet of a well casing shall not be used as a suction line. Casing may be beveled for field welding or threaded for couplings. Couplings shall be field welded to the pipe.
The casing pipe includes a seal casing or packer, a pitless adapter, when required, and a drive shoe, as necessary, for casing installation.

Casing certification shall be supplied to the Engineer prior to installation.

B. Screens
Screens shall be factory constructed of 304 stainless steel and wire wound with a 304 stainless steel bottom plate. Gravel packing to obtain effective groundwater supply to the pumping station shall be included in the screen assembly. Slot openings ranging from 0.060-inch to 0.250-inch with a maximum percentage of open area of 20 percent is recommended. Proper screen length is to be accomplished by welding or couplings. The screen to casing seal shall be with a "k" packer or directly attached to the well casing.

The length and slot size of the screen shall be designed by the Contractor based upon the gradation and thickness of the water bearing formation. The gravel filter media used in conjunction with the screen shall be designed by the Contractor as a complete system to provide production of the design rate indicated.

C. Neat Cement Grout
The Contractor shall place neat cement grout in the annular space between the casing and bore hole for the entire length of the casing pipe. The mixture should weigh 15 pounds/gallon.

A mixture of Portland cement (ASTM C150, TYPE 1) and not more than 6 gallons of clean water per bag (1 cubic foot or 94 pounds) of cement shall be used. The use of special cements, such as bentonite to reduce shrinkage, or other admixtures referenced in ASTM C494 to reduce permeability, increase fluidity, and/or control time of set, and the composition of the result slurry must be approved by the Engineer before use.

The grout is to be placed from the bottom to the top in one continuous operation. All placement shall conform to the provisions of AWWA-A100.

D. Gravel Pack Material
Gravel, if used for stabilizing the annular space between the screen and well bore, shall be at least 94 percent silica, having a uniformity coefficient of no greater than 1.35. The gradation of the gravel shall be suitable for use with the screen and characteristics of the water bearing formation. Gravel pack shall be designed for the design flow indicated for the well.

PART 3 - EXECUTION

3.01 Method

The exact method of construction shall be left to the option of the Contractor. However, all holes shall be excavated by a rotary drilling method. The proposed method of drilling shall be reviewed with the Engineer prior to beginning construction. The conventional fluid rotary drilling or reverse circulation rotary drilling are acceptable methods of construction.

3.02 Construction of Wells

The steel pipe that is used for the permanent well casing shall be watertight throughout its length and shall have threaded or welded joints.
Couplings that are used on threaded steel casing shall be recessed or reamed and drifted couplings that are manufactured in compliance with the standards of ASTM Specification A589. Couplings shall have a design, taper, and type of thread that is consistent with the thread of the pipe and threads shall not be exposed on the pipe.

Welded joints shall be in compliance with the specifications of the table below and provide a structurally sound and watertight joint. Pipe ends shall be free of oil, grease, heavy rust, paint, or other foreign materials, except for tightly adherent mill scale. The weld bead shall be chipped and brushed to remove slag and other extraneous materials between passes.

| Minimum Number Of Passes For Welding Steel Casing |
|---|---|
| Pipe Diameter (inches) | Minimum Number Passes |
| 4 | 2 |
| 5 | 2 |
| 6 | 3 |
| 8 | 3 |
| 10 or larger | 4 |

The jointed casing string shall be lowered into the predrilled hole utilizing the drilling machine.

3.03 Daily Driller’s Report

During the drilling of the bore hole, or the installation of a casing for a test well, or an observation well, a daily detailed driller’s report shall be maintained and delivered to the Engineer. The report shall give a complete description of all formations encountered, number of feet drilled, number of hours on the job, shutdown due to breakdown, the water level in the well at the beginning and end of each shift, water level at each change of formation if readily measurable with the drilling method used, feet of casing set, and such other pertinent data as may be requested by the Engineer.

During the drilling of the test hole, the Contractor shall prepare and keep a complete log setting forth the following:

A. The reference point for all depth measurements.
B. The depth at which each change of formation occurs.
C. The depth at which the first water was encountered.
D. The depth at which each stratum was encountered.
E. The thickness of each stratum.
F. The identification of the material of which each stratum is composed, such as:
   1. Clay
   2. Sand or silt
   3. Sand and gravel - Indicate whether gravel is loose, tight, angular or smooth; color.
   4. Cemented formation - Indicate whether grains (if present) have natural cementing material between them; e.g. silica, calcite, etc.
5. Hard rock - Indicate whether sedimentary bedrock, or igneous (granite-like, basalt-like, etc.)

G. The depth interval from which each water and formation sample was taken.

H. The depth to the static water level (SWL) and changes in SWL with well depth.

As a test well or an observation well is constructed, the Contractor shall also report:

A. Total depth of completed well.

B. Any and all other pertinent information for a complete and accurate log; e.g., temperature, pH, and appearance (color) of any water samples taken.

C. Depth or location of any lost drilling fluid, drilling materials or tools.

D. The depth of the surface seal, if applicable.

E. The nominal hole diameter of the well bore above and below casing seal.

F. The amount of cement (number of sacks) installed for the seal, if applicable.

G. The depth and description of the well casing.

H. The description (to include length, diameter, slot sizes, material, and manufacturer) and location of well screens or number, size, and location of perforations.

I. The sealing off of water-bearing strata, if any, and the exact location thereof.

3.04 Formation Sampling Methods

The method of sampling will be left to the discretion of the Contractor; however, he must collect, identify, and store representative samples, collected with sufficient frequency and at sufficient increments of depth to permit a thorough evaluation of the water-bearing properties of the formations encountered in drilling the test hole. Samples shall be stored by the Contractor and supplied to the Engineer, if requested.

3.05 Temporary Capping

The completed test well and the completed observation well(s) shall be capped with a water-tight welded or threaded cap, or equipped with some other type of "vandal-proof" cover satisfying applicable state or local regulations or recommendations.

3.06 Sanitary Protection of Well

At all times during the progress of the work, the Contractor shall install a suitable threaded, flanged, or welded cap or compression seal so as to prevent any pollutants from entering the well. The watertight casing of any well shall extend not less than 18 inches above the final ground level elevation and not less than 36 inches above the normally anticipated flood level of record. Any equipment, which will permit direct open access to the well, shall also meet the above height requirements and shall be sealed or screened so as to prevent entrance of foreign matter or contaminants. The ground immediately surrounding the top of the well casing or pitless unit shall be sloped away from the well.
3.07 Casing Seating

A. Unconsolidated Formations

In unconsolidated formations, the casing is supported by the collapse and compaction during well development. The completion of the sanitary surface seal will assist in supporting the casing.

B. Consolidated Formations

In consolidated formations, the casing should extend at least 5 feet into the formation to assure a proper seat and bottom seal. It shall be the responsibility of the Contractor to effect a proper seal. Where the casing is to be driven, it shall be fitted with a drive shoe and shall be driven to refusal. Where the casing is to be placed (rather than driven), cement grout shall be placed in the bottom of the hole.

3.08 Grouting

After installation of the well casing, the casing shall be pressure grouted with neat cement with a minimum of 2 inches of grout. The observation well shall be grouted from the surface to the top of the formation, but not less than 25 feet. The Contractor shall verify the volume of neat cement used.

3.09 Screen for Observation Well and Test/Production Wells

The Contractor shall be responsible for providing the proper size screen opening, and, if used, gravel pack material to stabilize the native formation. The Contractor shall also be responsible for providing a sand free water. The screen entrance velocity for the proposed equipping rate of the well shall not exceed 0.1 foot per second. The screen for the observation well shall be a minimum of 4 feet long of stainless steel and set at the depth anticipated for production well use.

3.10 Geophysical Logging

The complete well bore shall be geophysical logged, including an electrical log and gamma-ray log for rotary holes and a gamma-ray log for cable tool holes. Original logs, prepared in graphical form, shall be submitted to ROWE Professional Services Company.

3.11 Placement of Stabilizing Gravel

Gravel used for stabilization shall be placed through a tremie pipe. Dumping of gravel into the bore hole shall not be accepted.

3.12 Well Alignment

The well shall be constructed, and casing set round, plumb, and true to a line defined herein. To demonstrate compliance, the Contractor shall furnish all labor, tools and equipment and shall make the alignment tests described to the satisfaction and in the presence of the Engineer.

Plumbness and alignment shall be measured by lowering a "bird cage" plumb bob down the casing and measuring the deflection and direction of deflection every 5 feet for the entire length of the casing. The plumb bob shall be not more then 1/2-inch smaller than the inside diameter of the casing being tested.
Vertical variance of the casing pipe, in excess of \( \frac{2}{3} \) the inside diameter per 100 feet, shall be corrected by the Contractor at his own expense.

3.13 Well Development

The initial well development shall be by flushing and/or pumping to clear all drill cuttings from the bore hole and shall continue until clear water is obtained. A turbine pump capable of producing two times the proposed equipping rate of the well shall then be installed. The well shall be further developed by surging and over pumping until the water remains clear. The Contractor shall maintain a log describing the development efforts, including hours worked.

3.14 Sand Content of Water

It shall be the responsibility of the Contractor to complete a well that produces sand-free water. The sand content of the water shall average not more than 5 milligrams/liter, for a complete pumping cycle of 2 hours duration, when pumping at the proposed equipping rate.

Not less than ten measurements shall be taken, at equal intervals to permit plotting of sand content as a function of time, for determination of the average content for each cycle.

It shall be the responsibility of the Contractor to do such work as may be necessary to meet this sand content requirement.

3.15 Well Testing for Efficiency

Upon completion of the initial development work, a Step-Drawdown Test shall be conducted on the well. The test shall consist of a two-hour rest period and three steps, each of three hours duration. The first step to be one-third the maximum rate, the second at two-thirds maximum rate, and the third step at maximum rate. No recovery readings are required. The maximum rate shall be at the proposed rated capacity of the well.

The pumping rate shall be measured by a calibrated free fall orifice pipe with a gate valve installed at the pump head to regulate flow. Water level measurements shall be taken in the pumped well and any available nearby test/observation wells. Water level measurements shall be taken by an electric measuring device or wetted tape to the nearest 0.01 foot. The Contractor shall be responsible for disposal of water so that it does not pond or recirculate.

Readings shall be made in accordance with the following schedule.

| Rest Period: | Every 15 minutes |
| Each Step:   | Every 1 minute for first 10 minutes |
|             | Every 5 minutes for next 30 minutes |
|             | Every 10 minutes for next 20 minutes |
|             | Every 15 minutes for remainder of test |

The actual pumping rate shall be recorded when each water level reading is taken.

Upon completion of the Step-Drawdown Test, the data shall be analyzed for well efficiency and the results submitted to ROWE Professional Services Company for review. It will be the responsibility of the Contractor to provide a well having an efficiency of no less than 80 percent. The efficiency shall be that as determined from the Step-Drawdown Test. The well efficiency is
herein defined as the product of the first power losses, as determined from the step test, divided by the total drawdown. It is the Contractor's responsibility to do such additional work to achieve an efficiency of 80 percent.

3.16 Aquifer Testing

Aquifer testing, if required, shall be determined by the health department.

3.17 Location of Discharge

Discharge water shall be conducted from the pump to the nearest surface-water body, storm sewer, or ditch, as approved by the Engineer or his representative, or at least a distance of 600 feet through approved piping or lined ditches to prevent recirculation of discharged water into the aquifer being tested. It is imperative to ensure that no damage by flooding or erosion is caused to the chosen drainage structure or disposal site.

3.18 Record of Pumping Tests

The Contractor shall keep accurate records of the pumping test and furnish copies of all records to the Engineer.

3.19 Measurement of Water Levels

The method of taking water level measurements shall be at the discretion of the Contractor, however, accuracy to within plus or minus 0.05 feet must be attained.

3.20 Well Logs and Tests

Complete well logs and other information shall be provided by the Contractor, including the following information:

A. Accurate well location in State Plane Coordinates.
B. Ground surface and casing elevation in geodetic datum.
C. Lithology/geologic descriptions at 5-foot intervals or at strata changes.
D. Total drilled depth of the well.
E. Static water level.
F. Geophysical logs of wells, including electric and or gamma-ray type.
G. Length, location and description/specifications of the screen.
H. Screen design criteria (e.g. slot size) and supporting sieve analysis from screen manufacturer.

3.21 Collection of Water Samples

The Engineer shall collect or assist the Contractor with the collection of water samples during the pumping test. The frequency and schedule for obtaining samples will be established by the Engineer. Sample bottles will be provided by the Owner. Laboratory analysis of the samples will be provided by the Owner.
3.22 Restoration

Upon completion of the work, the Contractor shall restore the project site to a condition similar to its original condition. Vehicle ruts, eroded areas, and stockpiles of soil shall be leveled and seeded. The Contractor shall repair or replace any property damaged by his operations.

***END OF SECTION***
PART 1 - GENERAL

1.01 Work Included

This work includes constructing new culverts of the size and type shown on the plans. Excavation, laying and jointing the pipe, and backfilling are included.

1.02 References

A. AASHTO M36 – Standard Specification for Corrugated Steel Pipe, Metallic-Coated, for Sewers and Drains
B. AASHTO M170 – Standard Specification for Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe
D. AASHTO M245 – Standard Specification for Corrugated Steel Pipe, Polymer-Precoated, for Sewers and Drains
E. AASHTO M294 – Standard Specification for Corrugated Polyethylene Pipe, 300-mm to 1,500-mm (12-in. to 60-in.) Diameter
F. AASHTO M304 – Standard Specification for Poly (Vinyl Chloride) (PVC) Profile Wall Drain Pipe and Fittings Based on Controlled Inside Diameter
G. Michigan Department of Transportation 2012 Standard Specifications for Construction

1.03 Related Work

A. Section 01 45 16.02 – Density and Aggregate Testing

1.04 Submittals

The Contractor shall submit drawings and manufacturer’s specifications for the following materials.

A. Pipe culverts
B. Jointing
C. End sections

1.05 Quality Assurance and Quality Control

A. Deflection Testing

Plastic pipe culverts shall be tested for deflection between five and ten days before placement of the pavement or final surface. The Contractor shall provide a 9-point mandrel with an effective diameter of 95 percent of the inside pipe diameter. The Contractor shall demonstrate that the pipe deflection resulting from the completed installation does not reduce the pipe diameter by more than 5 percent.
1.06 Notifications

The Contractor shall notify MISS DIG (800-482-7171) at least three work days before excavation.

When replacing existing driveway culverts, the Contractor shall notify the affected property owner/resident in advance of beginning replacement.

PART 2 - PRODUCTS

2.01 Pipe

Culverts shall be of the size(s) shown on the plans. Materials shall be one of the following unless a specific type, class, or thickness is called for on the plans or in the proposal.

A. Corrugated Metal Pipe

1. Corrugated Galvanized Steel Pipe

Corrugated galvanized steel pipe with circular cross section and reformed corrugated galvanized steel pipe with pipe arch shape shall conform to the requirements of AASHTO M36. The Contractor shall furnish the Owner with two copies of a certification of compliance with the chemical requirements of the base metal, as specified in AASHTO M36.

Corrugated metal pipe culverts shall be provided in accordance with the following table, unless a particular gage is specifically called for on the plans or on the proposal.

<table>
<thead>
<tr>
<th>Round Pipe Size or Arch Pipe Span (inches)</th>
<th>Minimum Gage Acceptable with 2 2/3-inch by 1/2-inch Corrugations</th>
<th>Minimum Gage Acceptable with 3-inch by 1-inch Corrugations</th>
</tr>
</thead>
<tbody>
<tr>
<td>12</td>
<td>16</td>
<td></td>
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<tr>
<td>15</td>
<td>16</td>
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<td>14</td>
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<tr>
<td>36</td>
<td>14</td>
<td>16</td>
</tr>
<tr>
<td>42</td>
<td>14</td>
<td>14</td>
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<tr>
<td>48</td>
<td>12</td>
<td>14</td>
</tr>
<tr>
<td>54</td>
<td>10</td>
<td>14</td>
</tr>
<tr>
<td>60</td>
<td>8</td>
<td>12</td>
</tr>
</tbody>
</table>

For pipe arch shapes, minimum thickness shall be based on the next larger size if the actual span dimension is not listed.

The ends of helical corrugated pipes shall be re-rolled to form at least two circumferential corrugations, or to form an upturned flange in accordance with AASHTO M36 or AASHTO M245.
2. Corrugated Aluminum Alloy Pipe
Corrugated aluminum alloy pipe shall meet the requirements of AASHTO M196, except that pipe must be fabricated from aluminum sheet having the nominal thickness specified below for the size of culvert furnished.

<table>
<thead>
<tr>
<th>Culvert Diameter or Span (inches)</th>
<th>Corrugations (inches)</th>
</tr>
</thead>
<tbody>
<tr>
<td>12</td>
<td>0.064</td>
</tr>
<tr>
<td>15</td>
<td>0.064</td>
</tr>
<tr>
<td>18</td>
<td>0.064</td>
</tr>
<tr>
<td>24</td>
<td>0.064</td>
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<tr>
<td>30</td>
<td>0.064</td>
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<td>36</td>
<td>0.064</td>
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<td>42</td>
<td>0.064</td>
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<tr>
<td>48</td>
<td>0.064</td>
</tr>
<tr>
<td>54</td>
<td>0.079</td>
</tr>
<tr>
<td>60</td>
<td>0.109</td>
</tr>
<tr>
<td>66</td>
<td>0.138</td>
</tr>
<tr>
<td>72</td>
<td>0.138</td>
</tr>
</tbody>
</table>

3. Coupling Bands
The coupling bands for connecting sections of pipe and for attaching end sections to culvert pipe must be circumferentially corrugated with the same size corrugations as on the ends of the pipe being joined, or must be pre-formed channel bands for use on pipe ends with flanges. Coupling bands and coupling band connections shall meet the requirements of AASHTO M36 and M245.

4. Metal End Sections
Culvert end sections shall be flared and beveled to conform with ditch slopes.

Metal end sections shall conform with AASHTO M36, where applicable. The metallic coating on the end sections shall be the same as on the pipe, except that zinc coated steel end sections may be used with aluminum coated steel pipe. End sections shall be furnished complete with coupling bands, or hardware necessary for connecting them to the end of the pipe culvert.

B. Plastic Pipe Culverts

1. Smooth Lined Corrugated Polyethylene Pipe (SLCPP)
Pipe and fittings shall meet the requirements of AASHTO M294, Type S.

2. Corrugated Polyvinyl Chloride Pipe (CPV)
Pipe and fittings shall meet the requirements of AASHTO 304.

3. Corrugated Plastic Pipe Couplings
If a separate coupling is used to join two pipes together, it shall be a solid wall one-piece sleeve fabricated from either polyethylene (PE) or polyvinyl chloride (PVC), with a rubber gasket on both ends.
2.02 Aggregate

A. Sand

Sand shall meet the requirements of Granular Material III, as described in the Michigan Department of Transportation 2012 Standard Specifications for Construction.

PART 3 - EXECUTION

3.01 Removing Culverts

Where existing culverts are to be removed, the Contractor shall carefully remove the pipe and any end sections or appurtenances. Where the culverts are to be salvaged or re-used, the Contractor shall protect them from damage or loss. Where the culverts are to be removed and disposed of, the pipes and appurtenances shall become the Contractor’s property and shall be disposed of properly.

The Contractor shall perform all excavation, as may be necessary, to remove the existing culvert and appurtenances. This may include the removal of headwalls, riprap, broken concrete, rocks, and other material.

Where either the existing culvert or a new culvert is not to be installed at the location, the Contractor shall excavate all soil and material adjacent to the culvert to the original grades and contours. The area shall be graded to provide for proper drainage and to provide a smooth transition to undisturbed areas.

Soil and other material resulting from the removal of culverts shall be disposed of properly by the Contractor.

3.02 Excavation

The Contractor shall excavate, to the depths indicated on the plans, material of whatever nature is encountered. Existing pipes that are to be replaced, headwalls, riprap, and similar items may be encountered, in addition to soil.

Where unsound material underlying the proposed culvert is encountered, the Engineer shall be notified immediately. If, in the Engineer’s opinion, the material is unsuitable, the Contractor shall remove the material to the limits defined by the Engineer. The unsuitable material shall be replaced to the grade of the proposed culvert with sand and compacted according to Section 01 45 16.02 – Density and Aggregate Testing.

Culvert bedding shall be constructed in accordance with the details shown on the plans. The trench shall be undercut at least 6 inches and a sand bedding compacted according to Section 01 45 16.02 – Density and Aggregate Testing. In stable soils, the soil under the pipe shall be hand excavated and shaped to fit the surface of the pipe. The excavation shall be to a depth necessary to support the bottom ¼ of the pipe circumference.

The area at each end of the pipe shall be excavated and shaped to provide a smooth transition to the adjacent ditch or swale.

3.03 Special Requirements for Corrugated Steel Pipe Culverts

The Contractor shall take special care when removing, salvaging, storing, handling, or placing new
culverts or culverts that are to be relaid, so that they are not dented, scraped, or the galvanized coating is otherwise damaged.

Large diameter or long culverts shall be provided with shop attached lift rings to facilitate handling. Lift holes shall not be cut in corrugated steel pipe.

Saw cut ends of corrugated steel pipe shall be reasonably free from excessive jagged burrs or sharp spurs.

Surfaces on which the spelter coating has been damaged, whether by transporting, handling, or installation, shall be thoroughly cleaned by wire brushing and then painted with two coats of zinc rich paint conforming to federal specification: Paint shall be High Zinc Dust Content, Galvanizing Repair (Ready Mixed Type), MIL-P-21035.

3.04 Laying and Jointing Pipe

All pipe shall be laid true to the lines and grades given. Each length shall have full, firm bearing throughout its length.

A. Metal Pipe Jointing

Separate sections of corrugated pipe shall be securely joined together with standard corrugated metal bands. The bands may be up to 2 standard thicknesses lighter than the culvert, but shall not be less than 0.64 inches (16 gage). Bands for culverts shall not be less than the following widths:

<table>
<thead>
<tr>
<th>Pipe Diameter</th>
<th>Band Minimum Width</th>
</tr>
</thead>
<tbody>
<tr>
<td>up to and including 18 inches</td>
<td>7 inches</td>
</tr>
<tr>
<td>21 inches through 60 inches</td>
<td>12 inches</td>
</tr>
<tr>
<td>over 60 inches</td>
<td>24 inches</td>
</tr>
</tbody>
</table>

The corrugations of the band shall match those of the pipes being joined. The band shall be secured with bolts and angles. Couplings may be either one piece or two pieces. Smooth coupling bands, dimpled bands, and helical-rod and lug bands will not be considered acceptable.

3.05 End Sections

End sections shall be attached to the ends of pipe culverts where directed. Metal end sections shall be used on metal culverts and on smooth lined plastic pipe culverts.

End sections shall be installed on firm ground. The slope adjacent to the end section shall be graded and shaped to meet the geometry of the end section.

3.06 Backfill

Backfill material within the 1:1 influence of a pavement or driving surface shall be backfilled with sand. Outside these areas, backfill may be soil which is free of organic material provided the soil can be backfilled according to Section 01 45 16.02 – Density and Aggregate Testing.

Backfill shall be placed evenly and alternately on each side of the pipe. Backfill shall be placed in 10-inch lifts and hand compacted to at least 12 inches over the crown of the pipe. Backfill material
shall be sand and shall be compacted according to Section 01 45 16.02 – Density and Aggregate Testing.

Backfill above 12 inches above the top of the pipe shall be sand and shall be compacted according to Section 01 45 16.02 – Density and Aggregate Testing.

The Contractor shall provide a sufficient cushion of earth over the culvert to protect it from damage if heavy equipment will be operated over it before backfilling and surfacing is complete.

In any case, pipe that is broken, bent, or otherwise damaged by the Contractor's operations shall be removed and replaced at the Contractor's expense.

3.07 Cleanout

The Contractor shall maintain all existing and proposed culverts free of sediment and debris until final acceptance.

***END OF SECTION***
ATTACHMENT B

Copy of County's Standard Proposed Contract
CONSTRUCTION WORK CONTRACT

This Contract for Professional Work (the "Contract") is by and between the County of Genesee, a Michigan Municipal Corporation, whose principal place of business is located at 1101 Beach Street, Flint, Michigan 48502 (the "County"), and Contractor Name, a State Entity, whose principal place of business is located at Contractor Address (the "Contractor") (the County and the Contractor together, the "Parties").

1. Agreement and Authority

This Contract is entered into pursuant to ITB # 19-210 issued by the Genesee County Purchasing Department, and execution of this Contract is authorized by Resolution # ____________ issued by the Genesee County Board of County Commissioners.

2. Work Schedule

2.1 The term of this Contract shall be effective through the completion of the installation of Camping Area C of Wolverine Campground, per ITB #19-210

3. Compensation

The Contractor shall be paid a lump sum of $___________ for the performance of the Work. The Contractor must provide to the County an invoice in a form acceptable to the County, along with any necessary supporting documentation. The County will pay the Contractor within sixty (60) days of the County's acceptance of the invoice and supporting documentation.

4. Taxes. The County is a Michigan Municipal Corporation. The Contractor acknowledges that the County is exempt from Federal Excise Tax and Michigan Sales and Use Tax.

5. Contract Administrator

The contract administrator for this Contract is Matt Armentrout (the "Contract Administrator"). The Contractor acknowledges that the Contract Administrator is the primary County contact for notices and instructions related to this Contract. The Contractor agrees to provide a copy of all notices related to this Contract to the Contract Administrator.

6. Inspection and Acceptance

All goods and equipment provided with the Work are received subject to inspection and testing. If goods are defective or fail to meet the specifications, the County shall have the right to reject the goods or to require the Contractor to correct the defects. The Contractor shall correct the defects at no cost to the County or pay the County for expenses incurred by the County in correcting the
defects. Rejected goods will be held for forty-five days after delivery awaiting instructions from the Contractor. After the forty-five day period, the County will dispose of the goods and the County shall have no further liability to the Contractor. The Contractor is responsible for the costs of handling, packing, and transportation incurred in returning or disposing of defective or non-conforming goods.

7. Prevailing Wage Addendum

The Contractor acknowledges that Section 3-302(3)(a) of the Genesee County Purchasing Regulations requires the Contractor and its subcontractors to pay laborers and mechanics not less than the prevailing wage rates and fringe benefits for corresponding classes of laborers and mechanics employed on similar projects in the area. The Contractor agrees to comply with the provisions of the Prevailing Wage Addendum attached as Exhibit D to this Contract.

8. Warranties

The Contractor warrants that:

8.1 The Work will be performed in a good and workmanlike manner and in accordance with generally acceptable practices in the construction industry.

8.2 For a period of one (1) year following completion of the Work, the Work and any goods provided with the Work shall conform to the specifications.

8.3 The Contractor will comply with all federal, state, and local laws in the performance of the Work.

8.4 The Contractor will comply with the requirements of any federal or state grants used to fund or support this Contract.

8.5 The Contractor will maintain a current Certificate To Do Business with Genesee County issued by the Genesee County Equity and Diversity Officer.

8.6 The Contractor will obtain and maintain all applicable licenses and permits necessary to provide the Work for the entire term of this Contract.

The Contractor agrees to indemnify, defend and hold the County, its officials, officers, agents, and employees harmless from any and all claims, damages, or liability, including defense costs, arising out of the Contractor's breach of these warranties.

9. Insurance Requirements and Indemnification
The Contractor agrees to obtain insurance coverage of the types and amounts required as set forth in the Insurance Checklist attached as Exhibit C and keep such insurance coverage in force throughout the life of this Contract.

9.1 Insurance Certificate and Additional Insured Coverage

The Contractor further agrees to provide certificates of insurance to the County evidencing the coverages specified in the Insurance Checklist, and including the County as an additional insured. Additional insured coverage is to be by proof of blanket additional insured coverage within the general liability policy or as provided by an endorsement specifying the County as an additional insured to the policy. Contractor's agent must provide a copy of the endorsement or language from the policy with the certificate of insurance.

9.2 Indemnification

The Contractor agrees to indemnify, defend and hold the County, its officials, officers, agents, and employees harmless from any and all claims, damages, or liability, including defense costs, arising out of the Contractor's performance of the Work or presence on the County's property or worksite.

10. Suspension of Work

10.1 Order to Suspend Performance

Upon written order of the Contract Administrator, the Contractor agrees to immediately suspend performance of the Work. The Contractor shall not be entitled to compensation for any Work performed during any period in which the Contract Administrator has directed that the Work be suspended.

10.2 Necessary Actions Before Suspension

If immediate suspension of the Work would cause harm, injury, or damage to persons or property, the Contractor must immediately notify the Contract Administrator of the nature of such harm, injury, or damage, and obtain written authorization from the Contract Administrator to take such necessary action as to prevent or minimize such harm, injury or damage. Actions authorized by the Contract Administrator pursuant to this paragraph are compensable.


The Contractor must furnish separate performance, payment, and maintenance bonds to the Customer. The performance bond, payment bond, and maintenance bond should be 100% of the Contract Sum. Each bond furnished by the Contractor must incorporate by reference the terms of this Contract as fully
as though they were set forth verbatim in the bonds. The penal sum of both the
performance and payment bonds will be automatically increased in the amount of
any increase to the Contract Sum. The performance and payment bonds
furnished by the Contractor must be issued by a surety, or sureties acceptable to
the County.

12. Termination

12.1 Termination for Cause

If the Contractor is in breach of any provision of this Contract, and such
breach continues for fourteen (14) days after written notice is issued to the
Contractor by the County of the breach, the County may terminate this
Contract. Such termination for cause is effective upon receipt of the
notice of termination by the Contractor.

In addition to any other remedies provided by law or this Contract, the
Contractor shall be responsible for all costs incurred by the County as a
result of the Contractor’s breach and termination, including any costs to
obtain substitute performance.

12.2 Immediate Termination

If the County, in its discretion, determines that the Contractor’s breach of
this Contract constitutes a threat to public health, safety, or welfare, the
County may terminate this Contract immediately upon notice to the
Contractor.

In addition to any other remedies provided by law or this Contract, the
Contractor shall be responsible for all costs incurred by the County as a
result of the Contractor’s breach and termination, including any costs to
obtain substitute performance.

12.3 Termination for Convenience

If the County determines that it is in the County’s best interests, the
County may terminate this Contract upon thirty (30) days’ written notice to
the Contractor.

The County shall pay for all work properly performed up to the effective
date of the notice of termination.

12.4 Termination for Lack of Funding

If this Contract is funded by public funds or a grant from a public or private
entity, and the funds are not appropriated or the grant is discontinued, the
County may terminate this Contract by written notice specifying the date of
termination.
The County shall pay for all work properly performed up to the effective date of the notice of termination.

13. **Nondiscrimination**

The Contractor covenants that it will not discriminate against an employee or applicant of employment with respect to hire, tenure, terms, conditions, or privileges of employment, or a matter directly or indirectly related to employment, because of race, color, religion, national origin, age, sex, height, weight, marital status or a disability that is unrelated to the individual's ability to perform the duties of a particular job or position, and that it will require the same nondiscrimination assurances from any subcontractor who may be used to carry out duties described in this contract. Contractor covenants that it will not discriminate against businesses that are owned by women, minorities or persons with disabilities in providing Work covered by this Contract, and that it shall require the same assurances from subcontractors. Breach of this covenant shall be regarded as a material breach of this contract.

14. **Freedom of Information Act**

This Contract and all attachments, as well as all other information submitted by the Contractor to the County, are subject to disclosure under the provisions of MCL 15.231, *et seq.*, known as the "Freedom of Information Act".

15. **Audit Rights**

15.1 **Certification of Accurate Information**

Contractor certifies that all information provided to the County by the Contractor relating to the award or modification of this Contract, or any payment or dispute related to this Contract, is true and correct. The Contractor further certifies that its accounting system conforms to generally accepted accounting principles.

15.2 **Inspection**

The Contractor agrees that the County may inspect the Contractor’s plant, place of business, or worksite to ensure compliance with the terms of this Contract. If this Contract is funded or supported with any state or federal grant funds, the state or federal agencies responsible for administering the applicable grants may examine the Contractor’s plant, place of business, or worksite to ensure compliance with the terms of this Contract and the terms of the applicable grant.

15.3 **Audit**

The Contractor agrees that the County may examine the Contractor’s records to ensure compliance with the terms of this Contract. If this Contract is funded or supported with any state or federal grant funds, the
state or federal agencies responsible for administering the applicable grants may examine the Contractor's records to ensure compliance with the terms of this Contract and the terms of the applicable grant.

15.4 Records Retention

The Contractor agrees to maintain any business records related to this Contract or the Contractor's performance under this Contract for a period of at least three (3) years after final payment.

16. Independent Contractor

The Contractor and its agents and employees are independent contractors and are not the employees of the County.

17. General Provisions

17.1 Entire Contract

This Contract, along with any Exhibits attached thereto, embodies the entire agreement between the Parties. There are no promises, terms, conditions, or obligations relating to the Work other than those contained herein. In the event of a conflict between this Contract and any Exhibit, the terms of this Contract shall control.

17.2 No Assignment

The Contractor may not assign or subcontract this Contract without the express written consent of the County.

17.3 Modification

This Contract may be modified only in writing executed with the same formalities as this Contract.

17.4 Binding Effect

The provisions of this Contract shall apply to and bind the heirs, executors, administrators, and assigns all of the parties hereto.

17.5 Headings

The paragraph headings in this Contract are used only for ease of reference, and do not limit, modify, construe, and or interpret any provision of this Contract.

17.6 Governing Law and Venue

This Contract is entered into under the laws of the State of Michigan. Any litigation between the Parties arising out of this Contract must be initiated
within two years of the cause of action accruing and must be brought in a court of competent jurisdiction in Genesee County, Michigan.

17.7 Severability and Survival

In the event that any provision of this Contract is deemed by any court of competent jurisdiction to be legally ineffective, such decision shall have no effect on the remaining provisions of this Contract.

17.8 Interpretation

Each Party has had opportunity to have this Contract reviewed by legal counsel and has had equal opportunity to contribute to its contents. In the event of any dispute concerning the interpretation of this Contract, there shall be no presumption in favor of any interpretation solely because the form of this Contract was prepared by the County.

17.9 Remedies

All remedies specified in this Contract are non-exclusive. The County reserves the right to seek any and all remedies available under this Contract and applicable law in the event that the Contractor fails to abide by the terms of this Contract.

[SIGNATURE PAGE FOLLOWS]
IN WITNESS WHEREOF, the Parties have caused this Contract to be executed by their duly authorized agents.

CONTRACTOR NAME

By: __________________________
Name of Contractor Signatory
Title of Contractor Signatory
Date: _________________________

GENESEE COUNTY BOARD OF COMMISSIONERS

By: _________________________
   Ted Henry,
   Chairperson
Date: _________________________
EXHIBIT A
Description of the Work

Work is to be performed as outlined in the technical specifications of this project.
EXHIBIT C
Prevailing Wage Addendum

1. Contractor and each subcontractor shall pay their laborers and mechanics not less than the prevailing wage rates and fringe benefits for corresponding classes of laborers and mechanics employed on similar projects in the area as of the date of this Contract. For the purposes of this Addendum, a contractor or subcontractor shall be in compliance if the contractor pays wages consistent with the prevailing wage rates published by the United States Department of Labor as of the effective date of this Contract, which can be found at www.WDOL.gov. A copy of the prevailing wage rates effective for this project are attached to this Contract (the "Effective Prevailing Wage Rates").

2. The Contractor and each subcontractor shall keep and maintain a daily sign-in sheet for employees present at the worksite. Such sign-in sheet shall record the time each employee arrived at the worksite, and the time each employee left the worksite.

3. The Contractor and each subcontractor shall submit to the County certified payroll records on Form WH-347, with the accompanying payroll certification, within seven (7) days of the end of each pay period.

4. The contractor shall not misclassify work assignments.

5. The contractor shall ensure that any persons paid at apprentice rates are properly registered with the US Office of Apprenticeship program.

6. If any person believes that the contractor or a subcontractor has not paid wages in accordance with the Effective Prevailing Wage Rates for the project, the person must submit a written complaint to the Genesee County Purchasing Director. The written complaint shall state that the complaining party agrees to abide by the provisions of this Addendum.

7. The Purchasing Administrator will provide a copy of the complaint to the Michigan Fair Contracting Center (the "Auditor"). The Auditor shall conduct an audit of certified payroll and provide a written report to the Purchasing Administrator when completed. The report shall document whether prevailing wages were paid, and note any deficiencies. The Contractor and all subcontractors shall comply with any requests for information or documentation from the Auditor during the compliance audit. The Auditor may conduct onsite interviews of workers during a compliance audit.

8. If the Auditor determines that the Effective Prevailing Wage Rates were not properly paid, the contractor or subcontractor responsible for the wage payments at issue shall remedy the deficiency. The County may withhold payments to the general contractor until such deficiency is remedied.

9. If the Auditor determines that prevailing wages were not properly paid, the Contractor or the subcontractor responsible for the prevailing wage payments at
issue shall compensate the Auditor for the compliance audit at the rates specified in Exhibit B. The Owner may withhold payments otherwise due under the Contract to enforce this requirement. If the Auditor determines that prevailing wages were properly paid, the complaining party shall compensate the Auditor for the compliance audit at the rates specified in Exhibit A. The Auditor shall provide the party responsible for payment of the costs of the compliance audit with a written invoice, and the responsible party shall pay all amounts due within thirty (30) days of the date of the invoice. The Auditor shall provide a copy of the invoice to the Purchasing Director.

10. The Contractor shall include this Addendum in each subcontract entered into on this project, and shall furnish a copy of the Effective Prevailing Wage Rates to each subcontractor.
Rate Determinant for this Project
General Decision Number: MI20190057 09/20/2019

Superseded General Decision Number: MI20180057

State: Michigan

Construction Type: Heavy

County: Genesee County in Michigan.

Heavy, Includes Water, Sewer Lines and Excavation (Excludes Hazardous Waste Removal; Coal, Oil, Gas, Duct and other similar Pipeline Construction)

Note: Under Executive Order (EO) 13658, an hourly minimum wage of $10.60 for calendar year 2019 applies to all contracts subject to the Davis-Bacon Act for which the contract is awarded (and any solicitation was issued) on or after January 1, 2015. If this contract is covered by the EO, the contractor must pay all workers in any classification listed on this wage determination at least $10.60 per hour (or the applicable wage rate listed on this wage determination, if it is higher) for all hours spent performing on the contract in calendar year 2019. If this contract is covered by the EO and a classification considered necessary for performance of work on the contract does not appear on this wage determination, the contractor must pay workers in that classification at least the wage rate determined through the conformance process set forth in 29 CFR 5.5(a)(1)(i) (or the EO minimum wage rate, if it is higher than the conformed wage rate). The EO minimum wage rate will be adjusted annually. Please note that this EO applies to the above-mentioned types of contracts entered into by the federal government that are subject to the Davis-Bacon Act itself, but it does not apply to contracts subject only to the
POWER EQUIPMENT OPERATOR CLASSIFICATIONS

GROUP 1: Backhoe/ Excavator, Boring Machine, Bulldozer, Crane, Grader/ Blade, Loader, Roller, Scraper, Trencher (over 8 ft. digging capacity)

GROUP 2: Trencher (8-ft digging capacity and smaller)

GROUP 3: Boom Truck (non-swinging, non-powered type boom)

GROUP 4: Broom/ Sweeper, Fork Truck, Tractor, Bobcat/ Skid Steer /Skid Loader

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ENGI0326-011 06/01/2018

EXCLUDES UNDERGROUND CONSTRUCTION

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<td>Group 5.................$ 31.02</td>
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</tr>
<tr>
<td>Group 6.................$ 25.16</td>
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FOOTNOTES:

Crane operator with main boom and jib 300' or longer: $1.50 per hour above the group 1 rate.
Crane operator with main boom and jib 400' or longer: $3.00 per hour above the group 1 rate.

GROUP 1: Landscape specialist, including air, gas and diesel equipment operator, lawn sprinkler installer and skidsteer (or equivalent)

GROUP 2: Landscape laborer: small power tool operator, material mover, truck driver and lawn sprinkler installer tender

LAB00334-015 09/01/2018

SCOPE OF WORK:
OPEN CUT CONSTRUCTION: Excavation of earth and sewer, utilities, and improvements, including underground piping/conduit (including inspection, cleaning, restoration, and relining)

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LAB01075-010 06/01/2019

EXCLUDES OPEN CUT CONSTRUCTION

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TRUCK DRIVER: Off the Road

$ 20.82

____________________________________________________________________________________

WELDERS - Receive rate prescribed for craft performing operation to which welding is incidental.

Note: Executive Order (EO) 13706, Establishing Paid Sick Leave for Federal Contractors applies to all contracts subject to the Davis-Bacon Act for which the contract is awarded (and any solicitation was issued) on or after January 1, 2017. If this contract is covered by the EO, the contractor must provide employees with 1 hour of paid sick leave for every 30 hours they work, up to 56 hours of paid sick leave each year. Employees must be permitted to use paid sick leave for their own illness, injury or other health-related needs, including preventive care; to assist a family member (or person who is like family to the employee) who is ill, injured, or has other health-related needs, including preventive care; or for reasons resulting from, or to assist a family member (or person who is like family to the employee) who is a victim of, domestic violence, sexual assault, or stalking. Additional information on contractor requirements and worker protections under the EO is available at www.dol.gov/whd/govcontracts.

Unlisted classifications needed for work not included within the scope of the classifications listed may be added after award only as provided in the labor standards contract clauses (29CFR 5.5 (a) (1) (ii)).

The body of each wage determination lists the classification and wage rates that have been found to be prevailing for the cited type(s) of construction in the area covered by the wage
in the example, is an internal number used in producing the wage determination. 5/13/2014 indicates the survey completion date for the classifications and rates under that identifier.

Survey wage rates are not updated and remain in effect until a new survey is conducted.

Union Average Rate Identifiers

Classification(s) listed under the UAVG identifier indicate that no single majority rate prevailed for those classifications; however, 100% of the data reported for the classifications was union data. EXAMPLE: UAVG-OH-0010 08/29/2014. UAVG indicates that the rate is a weighted union average rate. OH indicates the state. The next number, 0010 in the example, is an internal number used in producing the wage determination. 08/29/2014 indicates the survey completion date for the classifications and rates under that identifier.

A UAVG rate will be updated once a year, usually in January of each year, to reflect a weighted average of the current negotiated/CBA rate of the union locals from which the rate is based.

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WAGE DETERMINATION APPEALS PROCESS

1.) Has there been an initial decision in the matter? This can be:

* an existing published wage determination
* a survey underlying a wage determination
* a Wage and Hour Division letter setting forth a position on a wage determination matter
* a conformance (additional classification and rate) ruling
4.) All decisions by the Administrative Review Board are final.

END OF GENERAL DECISION"