



## **COUNTY PARK WEST SEWER REPLACEMENT 2023**

**MERIDIAN TOWNSHIP**

**DEPARTMENT OF PUBLIC WORKS & ENGINEERING**

**INGHAM COUNTY, MICHIGAN**

# COUNTY PARK WEST SEWER REPLACEMENT 2023

FOR  
MERIDIAN TOWNSHIP

## TABLE OF CONTENTS

ADVERTISEMENT	AD-1
INSTRUCTIONS TO BIDDERS	IB-1 to IB-2
ADDENDUM 1	AM-1
PROPOSAL	P-1 to P-3
CONTRACT	C-1 to C-3
NOTICE OF AWARD	NA-1
NOTICE TO PROCEED	NP-1
GENERAL CONDITIONS	GC-1 to GC-10
GENERAL SPECIFICATIONS	GS-1 to GS-5
TECHNICAL SPECIFICATIONS	
Ingham County Road Commission Permit Specifications	ICRD-1 to ICRD-6
Division 1 – Earthwork	D1-1 to D1-7
Division 2 – Sanitary Sewer	D2-1 to D2-10
Dewatering	DW-1 to DW-2
PAY ITEMS (DIVISION 7)	7-1 to 7-9
SPECIAL PROVISIONS	SP-1 to SP-8
APPENDICES:	
Special Trench Detail	APX – A
Geotechnical Report	APX – B-1 to B-30
Traffic Control Details	APX – C-1 to C-12

MERIDIAN TOWNSHIP  
**COUNTY PARK WEST SEWER REPLACEMENT 2023**  
ADVERTISEMENT FOR BIDS

Sealed proposals will be received by Meridian Township, Ingham County, Michigan, at the Meridian Township Clerk's Office, Municipal Building, 5151 Marsh Road, Okemos, Michigan, 48864-1198, Ph. (517) 853-4000, up to 11:00 a.m., local time on Thursday, December 7<sup>th</sup>, 2023 for the replacement of sanitary sewer mains and manholes, after which time, proposals will be publicly opened and read aloud.

Bids are solicited on a unit price basis. The work involves the following major bid items:

- Replacement of 1305 feet of 8" Sanitary Gravity Sewer;
- Replacement of 1450 feet of 6" Sanitary Force main;
- Replacement of six (6) 48" diameter Manholes;
- Connection of 22 new Service Stubs to Existing House Leads;
- Bypass Pumping of the Forcemain (250gpm); and,
- Dewatering of the construction zone.

Proposals shall include the furnishing of all labor, material, and equipment to complete the project.

**Work on the project may commence any time after issuing the Notice to Proceed and shall be complete by April 12<sup>th</sup>, 2024.**

Each proposal shall be accompanied by a certified check or a bid bond by a recognized surety company similar to a U.S. Government Standard form bid bond, in the amount of five percent (5%) of the bid, payable to the Meridian Township, Ingham County, Michigan as security for the acceptance of the Contract.

Insurance and bonds are required from the successful bidder for this project; please see pages GC-2 thru GC-3 for those requirements. *Please note Owner/Contractors Protective Liability is required for all of our contracts.* The contract documents may be examined at the following location:

- Meridian Township, Dept of Public Works, 5151 Marsh Road, Okemos, MI 48864

Copies of the contract documents for the work may be obtained from the Department of Public Works & Engineering at 5151 Marsh Road, Okemos, Michigan, for a non-refundable fee of ten dollars (\$10). There is a five dollar (\$5.00) fee for mailing contract documents. Contract documents may be obtained via email free of charge. Questions regarding this contract may be addressed to Meridian Township Department of Public Works & Engineering by phone at (517) 853-4440, or by email at [DPW@meridian.mi.us](mailto:DPW@meridian.mi.us).

The Vendor's agreement to pay prevailing wage rates is one relevant consideration that Meridian Township may make in its determination of which bidder should receive this contract. Meridian Township may thus consider in awarding this contract whether any vendor voluntarily pays employees and sub-contractors, directly upon the site of work, at least the prevailing wages and fringe benefits as determined and published by the United States Department of Labor for the Ingham County area.

In submitting this bid, it is understood that the right is reserved by the Owner to reject any or all bids, to award the Contract to other than the low bidder, to award separate contracts for each project and/or phase, to waive irregularities and/or formalities, and in general, to make award in any manner deemed by it, in its sole discretion, to be in the best interest of the Owner.

**Copies of the Inspection reports, Water & Sewer Cards, and Videos for the project are available upon request. Please contact [DPW@meridian.mi.us](mailto:DPW@meridian.mi.us) for a link to these items.**

## **INSTRUCTIONS TO BIDDERS**

### **1. PROPOSALS**

Proposals must be made upon the forms provided, without modifications or changes, and all other data submitted as required.

The proposal must be enclosed in a sealed envelope marked “**Bid Proposal – County Park West Sewer Replacement 2023**” clearly indicating the name and address of the bidder, and filed at the place and by the time specified in the Advertisement.

### **2. BASIS OF PROPOSALS**

Proposals may be submitted for any one or all of the projects or phases as may be applicable.

Proposals are solicited on the basis of unit prices for the entire work of the contract.

The right is reserved by the Owner to reject any and all bids, to award the Contract to other than the low bidder, to award separate Contracts for each project and/or phase, to waive irregularities and/or formalities, and in general, to make award in any manner deemed by it, in its sole discretion, to be in the best interest of the Owner.

### **3. BID DEPOSITS**

Each proposal shall be accompanied by a certified check, or bid bond from a recognized surety company, in the amount of five percent (5%) of the total amount of the bid, payable to the order of the Owner, to be forfeited to the Owner in case of failure on the part of the successful bidder to enter into the attached form of Contract to do the work covered by such Proposal at the price and within the time stated therein. The bid deposit of all except the successful bidder will be returned within four weeks after opening of bids. The bid deposit of the successful bidder will be returned within 48 hours after the executed Contract has been finally approved by the Owner.

### **4. QUALIFICATION OF BIDDERS**

It is the intention of the Owner to award the Contract(s) to contractor(s) fully capable, both financially and as regards experience to perform and complete all work in a satisfactory manner. Evidence of such competency must be furnished, including a listing of similar projects which the bidder has satisfactorily undertaken and completed.

### **5. INTERPRETATION OF DOCUMENTS**

If the bidder is in doubt as to the true meaning of any part of the plans, specifications or Contract Documents, he may submit to the Engineer a written request for an interpretation thereof. Any interpretation made in response to such query will be mailed or duly delivered to each prospective bidder. The Owner will not be responsible for any other explanation or interpretation of the Contract Documents.

### **6. REQUIREMENT OF SIGNING BIDS**

Bids which are not signed by the individual making them shall have attached thereto a power of attorney evidencing authority to sign the bid in the name of the person for whom it is signed.

Bids, which are signed by a partnership, shall be signed by all of the partners or by an attorney-in-fact. If signed by an attorney-in-fact, there shall be attached to the bid a power of attorney evidencing authority to sign the bid, executed by the partners.

Bids which are signed for a corporation shall have the correct corporate name thereof and the signature of the president or other authorized officers of the corporation manually written below the corporate name following the word “By”. If such a bid is manually signed by an officer other than the president of the corporation, a certified copy of a resolution of the board of directors evidencing the authority of such official to sign the bid shall be attached to it. Such a bid shall also bear the attested signature of the secretary of the corporation and the impression of the corporate seal.

## **INSTRUCTIONS TO BIDDERS**

### **7. EXECUTION OF AGREEMENT**

The bidder to whom an award is made will be required to enter into the written contract included herein, within ten (10) calendar days after being notified of the acceptance of his bid and receipt by him of the copies of the documents to be executed. In case of failure to comply with this requirement, he may be considered to have abandoned all his rights and interests in the award and his certified check or amount of bidder's bond may be declared to be forfeited to the Owner and the Contract may be awarded to another bidder.

### **8. INSURANCE (Ref. General Conditions - GC.2)**

The contractor will be required to carry Worker's Compensation Insurance, Bodily Injury and Property Damage, Builder's Risk Insurance and Owner's Protective Liability in the amounts specified in the General Conditions. Certificates of such insurance must be attached to each copy of the executed Contract Documents.

### **9. BONDS (Ref. General Conditions - GC.1)**

The successful bidder will be required to furnish for each set of executed Contract Documents and conformed copies thereof an original completed Performance Bond, and Labor and Material Bond with surety acceptable to the Owner as set forth in the General Conditions.

### **10. BIDDER'S RESPONSIBILITY FOR EXAMINING PLANS AND SITE**

At the time of opening bids, each bidder will be presumed to have made a personal investigation of the site of the work and of existing structures, and to have read and be thoroughly familiar with the plans, specifications and Contract Documents (including all addenda). He shall determine to his own satisfaction the conditions to be encountered, the nature of the ground, difficulties involved in completing the Contract and all factors affecting the work proposed under this Contract.

The bidder to whom this contract is awarded will not be entitled to any additional compensation by reason of his failure to fully acquaint himself with the conditions at the site or by his failure to fully examine the plans, specifications and Contract Documents.

### **11. NON-DISCRIMINATION IN EMPLOYMENT**

The Contractor shall adhere to all applicable Federal, State and local laws, ordinances, rules and regulations prohibiting discrimination with regards to employees and applicants for employment. The contractor and his/her subcontractors shall not discriminate against an employee or applicant for employment with respect to hire, tenure, terms, conditions or privileges of employment, including a benefit plan or system or a matter directly or indirectly related to employment, because of race, color, religion, national origin, sex, age, height, weight, condition of pregnancy, marital status, physical or mental limitation, disability, source of income, familial status, educational association, sexual orientation, gender identity or expression, or HIV status. Breach of this section shall be regarded as a material breach of this Contract.



FOR IMMEDIATE RELEASE  
November 20, 2023

CONTACT: Jack Hughes, Project Engineer  
517.853.4470 | [hughes@meridian.mi.us](mailto:hughes@meridian.mi.us)

**ADDENDUM #1**

*County Park West Sewer Replacement 2023*

Addendum #1 includes five (5) revised contract pages: P-2, SP-2, SP-5, SP-6, APX-A and two (2) revised Plan Sheets: 2, 5.

**Please note: you must sign this addendum and include it with your proposal.**

This addendum is intended to answer common questions, remove a pay item, remove asphalt re-pavement requirements and clarify the relevant diagrams and special provisions.

Extra Sand Backfill

- 1) Pay Item 3 "Extra Sand Backfill" has been removed from the Proposal. Previously this backfill quantity was to be paid for separately under its own line item. It has been revised so that *all backfill is now incidental to the construction of the sewers.* Plan Sheet 2 and the Special Provisions of items 20a-20c, the Sanitary Sewers, have been altered to reflect this.

Pavement Restoration

- 2) Pay Item 2b "Pavt, Restoration, County Park Boat Launch" has been changed to *no longer require hot mix asphalt* as part of the restoration to its pre-construction state. Instead 21AA aggregate road base or Millings will be used to create a substitute surface, similar to Pay Item 2a. The Appendix A - "Special Trench Detail" and Plan Sheet 5 have been updated to show this.
- 3) To clarify, we are not expecting Quail St and E Reynolds Rd to be re-paved upon completion.

Date	_____	Company Name	_____
By	_____	Address	_____
	Signature		
	_____		_____
	Printed Name		
Title	_____	Phone Number	_____
		Email Address	_____

The community of Meridian Township is in close proximity to the Michigan State Capitol and Michigan State University. The Township serves the community through exceptional services, beneficial amenities and an outstanding quality of life. It is a welcoming community that celebrates quality education, recreation and lifestyles.



**PROPOSAL**

**TO:** Meridian Township  
5151 Marsh Road  
Okemos, MI 48864

**RE: COUNTY PARK WEST SEWER REPLACEMENT 2023**

Board of Trustees:

The undersigned, as a bidder, hereby declares that these bids are made in good faith, without fraud or collusion with any person or persons bidding on the same Contract, that he has read and examined the Advertisement, Instruction to Bidders, Proposal, Contract, General Conditions, Specifications, Special Provisions and Plans and understands all of the same; that he or his representative has made personal investigation at the site and has informed himself fully with regard to the conditions to be met in the execution of the Contract.

In submitting this bid, it is understood that the right is reserved by the Owner to reject any or all bids, to award the Contract to other than the low bidder, to award separate contracts for each project and/or phase, to waive irregularities and/or formalities, and in general, to make award in any manner deemed by it, in its sole discretion, to be in the best interest of the Owner.

It is further understood and agreed by the undersigned that any qualifying statement or conditions made to this proposal as originally published, as well as any interlineation, erasures, omissions or entered wording obscure as to its meaning, may cause the bid to be declared irregular and may be cause for rejection of the bid.

The undersigned agrees to start work within ten (10) days of issuance of the Notice to Proceed. The undersigned further agrees to complete all work covered by this Proposal to the point of use of the project by the Owner by the completion date stated in the Advertisement or within the number of calendar days stated in the Advertisement; and that for all days thereafter until final acceptance, there will be charged, as liquidated damages, the sum of \$2,000.00 per calendar day per project for each and every day thereafter until final acceptance. **This adjusted rate reflects the importance of completing the work before a scheduled road resurfacing project reaches this area.**

The bidder’s agreement to pay prevailing wage rates is one relevant consideration that Meridian Township may make in its determination of which bidder should receive this contract. Meridian Township may thus consider in awarding this contract whether any bidder voluntarily pays employees and sub-contractors, directly upon the site of work, at least the prevailing wages and fringe benefits as determined and published by the United States Department of Labor for the Ingham County area.

Will the bidder voluntarily pay its employees and sub-contractors, directly upon the site of work, at least the prevailing wages and fringe benefits as determined and published by the United States Department of Labor for the Ingham County area. Please circle one below:

**Yes or No**

The undersigned hereby proposes to perform everything required to be performed and to furnish all labor, materials, tools, equipment and all utility and transportation services necessary to complete in a workmanlike manner all the work to be done under this Contract, including addenda thereto, for the sums set forth in the following Bidding Schedule:

**COUNTY PARK WEST SEWER REPLACEMENT 2023**  
**PROPOSAL**

<b><u>ITEM</u></b>	<b><u>DESCRIPTION</u></b>	<b><u>QTY</u></b>	<b><u>UNIT</u></b>	<b><u>UNIT PRICE</u></b>	<b><u>AMOUNT</u></b>
1a.	Traffic Control, Quail St and E Reynolds Rd	1	LSum	\$ _____	\$ _____
1b.	Traffic Control, County Park Boat Launch	1	LSum	\$ _____	\$ _____
2a.	Pavt, Restoration, Quail St and E Reynolds Rd	1	LSum	\$ _____	\$ _____
2b.	Pavt, Restoration, County Park Boat Launch	1	LSum	\$ _____	\$ _____
4.	Extra Stone Bedding	250	CY	\$ _____	\$ _____
6.	Deep Foundation Sets	3	Ea	\$ _____	\$ _____
7.	Dewatering	1	LSum	\$ _____	\$ _____
10a.	Mobilization	1	LSum	\$ _____	\$ _____
10b.	Bypass Pumping, Force Main, 250 gpm	1	LSum	\$ _____	\$ _____
10c.	Bypass Pumping, Gravity Main, 8 gpm	1	LSum	\$ _____	\$ _____
10d.	Geotextile, Stabilization, Non-woven	1,010	SY	\$ _____	\$ _____
20a.	Sanitary Sewer, PVC, 8 inch, Gravity, Typical Trench Detail	610	Ft	\$ _____	\$ _____
20b.	Sanitary Sewer, PVC, 8 inch, Gravity, Special Trench Detail	695	Ft	\$ _____	\$ _____
20c.	Sanitary Sewer, 6 inch, Force Main	1,450	Ft	\$ _____	\$ _____
20d.	Sanitary Sewer, PVC, 8 inch, Connect to Lift Station Wetwell	1	Ea	\$ _____	\$ _____
20e.	Sanitary Sewer, Force Main, Connect to Lift Station Effluent	1	Ea	\$ _____	\$ _____
20f.	Sanitary Sewer, VCP, 8 inch, Abandon (Existing Gravity)	1,295	Ft	\$ _____	\$ _____
20g.	Sanitary Sewer, CI, 6 inch, Abandon (Existing Force Main)	1,450	Ft	\$ _____	\$ _____
21a.	Sanitary Structure, 48 inch dia	5	Ea	\$ _____	\$ _____
21b.	Sanitary Structure, Drop Manhole, 48 inch dia	1	Ea	\$ _____	\$ _____
21c.	Sanitary Structure, 48 inch dia, Remove	6	Ea	\$ _____	\$ _____
22a.	Sanitary Sewer, Service Stub, PVC, 6 inch	22	Ea	\$ _____	\$ _____
51.	Landscaping, Fence, Moving	15	Ft	\$ _____	\$ _____
53a.	Soil Erosion and Sediment Control	1	LSum	\$ _____	\$ _____
54.	Site Restoration	1	LSum	\$ _____	\$ _____

**TOTAL BID:\$ \_\_\_\_\_**



Give the name of the Owners and dates of other projects which the Bidder has constructed or has had responsible charge of construction:

**NAME**

**DATE**

---

---

---

The Bidder acknowledges that his bid is in accordance with the information contained in Addendum No. \_\_\_\_, \_\_\_\_, \_\_\_\_, \_\_\_\_.

The Bidder is hereby reminded that the Pay Items listed under the Bidding Schedule are the only items for which he will receive payment under this Contract. In the event that lesser or greater quantities of specific Pay Items are required to complete the work and place the system in operation, the total amount bid for the specific item will be adjusted by the unit price bid to the actual quantities utilized. In the event that an error is made in extending the unit prices, the Bidder is hereby notified that the unit prices as bid, will govern in determining the Total Base Bid. It is expressly understood and agreed that the Total Base Bid is the basis for establishing the amount of Bid Security on this Proposal and for comparison of bids only and is not to be constructed as a lump sum Proposal.

The undersigned attaches hereto a certified check or bidder's bond in the sum of not less than five percent (5%) of the Total Base Bid as required by the Advertisement and Instructions to Bidders and the undersigned agrees that in case he shall fail to fulfill his obligations under this Proposal and/or shall fail to furnish bonds, as specified, the Owner may, at its option determine that the certified check or amount of said certified check or bidder's bond accompanying this Proposal has been forfeited to the Owner, but otherwise the said certified check or bidder's bond shall be returned to the undersigned upon the execution of the Contract and acceptance of the bond.

The undersigned further agrees that this proposal shall be effective for a period of sixty (60) days from the date established for opening of all bids.

Date \_\_\_\_\_ Company Name \_\_\_\_\_

By \_\_\_\_\_ Address \_\_\_\_\_  
Signature

\_\_\_\_\_  
Printed Name

Title \_\_\_\_\_ Phone Number \_\_\_\_\_

## COUNTY PARK WEST SEWER REPLACEMENT 2023

**THIS CONTRACT**, dated \_\_\_\_\_, by and between \_\_\_\_\_, hereinafter called the "CONTRACTOR", and Meridian Township, 5151 Marsh Road, Okemos, MI 48864, hereinafter called the "OWNER".

**WITNESSETH**, that the CONTRACTOR and the OWNER for the consideration herein agree as follows:

### **ARTICLE I. SCOPE OF WORK.**

The CONTRACTOR shall perform everything required to be performed and shall provide and furnish all labor, materials, necessary tools, expendable equipment and all utility and transportation services required to perform and complete in a workmanlike manner all the work required for constructing the project as described in the Advertisement and Proposal and for performing all related work for the OWNER, required by and in strict accordance with the plans and specifications, including any and all addenda, and other Contract Documents mentioned and made a part hereof.

### **ARTICLE II. THE CONTRACT PRICE.**

The OWNER shall pay for constructing the project complete with all labor, materials, equipment, appurtenances, surface restoration and related work in strict accord with the Plans and Specifications, ready for use, the unit prices as listed in the Proposal and herein made a part of this Contract. Payment shall be made to the CONTRACTOR in accordance with and subject to the conditions specified under General Conditions.

### **ARTICLE III. TIME.**

Time is of the essence in the performance of this contract. The CONTRACTOR agrees to start work within ten (10) days of issuance of the Notice to Proceed and to fully complete the work so as to permit use of the project by the OWNER by the completion date stated in the Advertisement or within the number of calendar days listed in the Advertisement.

#### **ARTICLE IV. DELAYS AND DAMAGES.**

If the CONTRACTOR refuses or fails to prosecute the work, or any separate part thereof, with such diligence as will insure its substantial completion, ready for use by the OWNER by the completion date stated in the Advertisement or within the number of consecutive calendar days stated in the Advertisement, or any extension thereof, or fails to complete said work within such time, the OWNER may, by written notice to the CONTRACTOR, terminate the CONTRACTOR's right to proceed with the work or such part of the work as to which there has been delay. In such event, the OWNER may take over the work and prosecute the same to completion by contract or otherwise, and the CONTRACTOR and his sureties shall be liable to the OWNER for any excess cost occasioned thereby. If the CONTRACTOR's right to proceed is so terminated, the OWNER will take possession of and utilize in completing work such materials, appliances, and plant as may be on the site of the work and necessary therefore.

If the OWNER does not terminate the right of the CONTRACTOR to proceed, the CONTRACTOR shall continue to work, in which event the actual damages for the delay will be impossible to determine and in lieu thereof the CONTRACTOR shall pay the OWNER the sum of two thousand dollars (\$2,000.00) per day as fixed, agreed, and liquidated damages for each calendar day of delay until the work is substantially completed, ready for operation and the CONTRACTOR and his sureties shall be liable for the amount thereof. However, the right of the CONTRACTOR to proceed shall not be terminated or the CONTRACTOR charged with liquidated damages because of any delays in the completion of the work due to unforeseeable causes beyond control and without the fault or negligence of the CONTRACTOR, including, but not restricted to acts of God, or of the public enemy, acts of the OWNER, fires, floods, epidemics, quarantine restrictions, delays of subcontractors due to such causes, if the CONTRACTOR shall, within ten (10) days from the beginning of any such delay (unless the OWNER shall grant a further period of time prior to the date of final settlement of the Contract) notify the OWNER in writing of the cause of delay and extend the time for completing the work when, in OWNER's judgement, the finding of fact justify such an extension and OWNER's findings of fact thereon shall be final and conclusive on the parties thereto. In no event shall bankruptcy or labor disputes, or the like, either of CONTRACTOR or any of its subcontractors or suppliers, be considered as an unforeseeable cause beyond the control and without the fault or negligence of the CONTRACTOR.

#### **ARTICLE V. COMPONENT PARTS OF THIS CONTRACT.**

This Contract consists of the following component parts, all of which are as fully a part of the Contract as if herein set out verbatim, or, if not attached:

- |                            |                                                 |
|----------------------------|-------------------------------------------------|
| 1. Advertisement           | 8. General Specifications                       |
| 2. Instructions to Bidders | 9. Ingham County Road Commission Specifications |
| 3. Proposal                | 10. Standard Specifications                     |
| 4. Addenda                 | 11. Special Provisions                          |
| 5. Contract                | 12. Plans                                       |
| 6. Bonds and Insurance     | 13. Notice of Award                             |
| 7. General Conditions      | 14. Notice to Proceed                           |

**IN WITNESS WHEREOF**, the parties hereto have caused this instrument to be executed in three (3) original counterparts the day and year first above written.

\_\_\_\_\_  
**CONTRACTOR**

**WITNESS:**

By: \_\_\_\_\_

\_\_\_\_\_

Title: \_\_\_\_\_

Date: \_\_\_\_\_

**Meridian Township**  
\_\_\_\_\_

**OWNER**

**WITNESS:**

BY: \_\_\_\_\_

\_\_\_\_\_

Dan Opsommer

TITLE: Assistant Township Manager  
Director of Public Works & Engineering

DATE: \_\_\_\_\_

**NOTICE OF AWARD**  
**County Park West Sewer Replacement 2023**

**Dated:** \_\_\_\_\_

**TO:** \_\_\_\_\_  
\_\_\_\_\_

**ADDRESS:** \_\_\_\_\_  
\_\_\_\_\_

**CONTRACT: COUNTY PARK WEST SEWER REPLACEMENT 2023**

You are notified that your Bid dated \_\_\_\_\_ for the above Contract has been considered. You are the apparent Successful Bidder and have been awarded a Contract for **County Park West Sewer Replacement 2023.**

The Contract Price of your Contract is: \$ \_\_\_\_\_.

**Three** copies of each of the proposed Contract Documents accompany this Notice of Award.

You must comply with the following conditions within 10 days of the date you receive this Notice of Award.

1. Deliver to the OWNER **three** fully executed counterparts of the Contract Documents. (Each of the Contract Documents must bear your signature on page C-3.)
2. Deliver with the executed Contract Documents the Contract security (Bonds and Insurance) as specified in General Conditions (GC).

Failure to comply with these conditions within the time specified will entitle OWNER to consider your Bid in default, to annul this Notice to Award and to declare your Bid security forfeited.

Within ten days after you comply with the above conditions, OWNER will return to you one fully executed counterpart of the Contract Documents.

**MERIDIAN TOWNSHIP**

By: \_\_\_\_\_  
Dan Opsommer  
Assistant Township Manager  
Director of Public Works & Engineering

**NOTICE TO PROCEED**

Dated: \_\_\_\_\_

**TO:** \_\_\_\_\_  
\_\_\_\_\_

**ADDRESS:** \_\_\_\_\_  
\_\_\_\_\_

**CONTRACT:**        **COUNTY PARK WEST SEWER REPLACEMENT 2023**

---

You are notified that the Contract Times under the above Contract will commence to run on \_\_\_\_\_, **2023**. In accordance with Article III of the Contract, the date of Completion for the project is \_\_\_\_\_, **2023**.

Deliver to **OWNER** an acknowledged copy of this Notice to Proceed.

**MERIDIAN TOWNSHIP**

By: \_\_\_\_\_  
Younes Ishraidi, P.E.  
Township Engineer/  
Deputy Director of Public Works & Engineering

**ACKNOWLEDGEMENT OF ACCEPTANCE OF NOTICE TO PROCEED**

**CONTRACTOR** acknowledges acceptance of this Notice to Proceed this \_\_\_\_\_ day of \_\_\_\_\_.

By: \_\_\_\_\_

## GENERAL CONDITIONS

### INDEX

- GC.1 CONTRACT SECURITY
- GC.2 CONTRACTORS' AND SUBCONTRACTORS' INSURANCE
  - A. Policies, Coverages and Endorsements
  - B. ~~Builder's Risk Insurance (Fire and Extended Coverage)~~
  - C. Owner's Protective Liability
  - D. Insured Parties
  - E. Acceptable Insurance Companies
  - F. Indemnification and Hold Harmless
- GC.3 QUALIFICATION FOR EMPLOYMENT
- GC.4 PROGRESS SCHEDULE
- GC.5 ACCIDENT PREVENTION
- GC.6 CONTRACT PRICE SCHEDULE
- GC.7 PAYMENT TO CONTRACTOR
- GC.8 SUBCONTRACTING
- GC.9 ASSIGNMENTS
- GC.10 EXTRAS
- GC.11 CHANGES IN WORK/PAYMENT ADJUSTMENTS
- GC.12 TIME OF MAKING CLAIMS
- GC.13 MATERIALS, SERVICES, AND FACILITIES
- GC.14 TERMINATION FOR BREACH
- GC.15 OWNER'S RIGHT TO WITHHOLD CERTAIN AMOUNTS AND MAKE APPLICATION THEREOF
- GC.16 SUPERINTENDENCE
- GC.17 NOTICE AND SERVICE THEREOF
- GC.18 COMPLIANCE WITH LAW
- GC.19 PERMITS
- GC.20 ROYALTIES AND PATENTS
- GC.21 INSPECTIONS
- GC.22 CORRECTION OF WORK AFTER FINAL PAYMENT
- GC.23 PROTECTION OF WORK
- GC.24 USE OF JOB SITE
- GC.25 "OR EQUAL" CLAUSE
- GC.26 PLANS AND SPECIFICATIONS
- GC.27 OWNER'S RIGHT TO DO WORK
- GC.28 CLEANING UP
- GC.29 REPORTS, RECORDS AND DATA
- GC.30 NON-DISCRIMINATION IN EMPLOYMENT
- GC.31 DEFINITIONS

**GC.1 CONTRACT SECURITY**

The Contractor shall furnish a surety bond, by a duly authorized surety company satisfactory to the Owner, in an amount equal to 100 percent (100%) of the Contract price as security for the faithful performance of this Contract. The Contractor shall also furnish a separate surety bond, by a duly authorized surety company satisfactory to the Owner, in an amount equal to 100 percent (100%) of the Contract price as security for the payment of all persons performing labor and/or furnishing materials.

The surety company writing the bid, performance, labor and material, and maintenance bond shall be: 1) acceptable to the Owner, 2) be listed in the Federal Register as published by the U.S. Department of Treasury under most recently revised Circular 570; 3) have an A.M. Best Company’s Insurance reporting rating of no less than A- (Excellent); and 4) authorized to do business in the State of Michigan by the Michigan Department of Licensing & Regulatory Affairs Office of Financial and Insurance Regulations. Upon request, the Contractor shall submit evidence of such insurance.

**GC.2 CONTRACTORS' AND SUBCONTRACTORS' INSURANCE**

The Contractor shall not commence work under this Contract until he/she has obtained all the insurance required under this section and such insurance has been approved by the Owner, nor shall the Contractor allow any subcontractor to commence work on his/her subcontract until all similar insurance required of the subcontractor has been so obtained and approved. Contractors and subcontractors are required to file with the Owner completed certificates of insurance, as evidence that they carry adequate insurance to comply with the requirement of this section. New Certificates of Insurance shall be furnished to the Owner at the renewal date of all policies named on these certificates.

**A. Policies, Coverages, and Endorsements**

The Contractor agrees to maintain, or to cause its personnel providing services under this Contract to maintain, at its sole cost and expense or the cost and expense of his personnel, the following insurance policies, with the specified coverages and limits, to protect and insure the Owner and Contractor against any claim for damages arising in connection with Contractors responsibilities or the responsibilities of Contractors personnel under this Contract and all extensions and amendments thereto.

**1. Commercial General Liability**

- a. General Aggregate \$2,000,000
- b. Each Occurrence \$1,000,000

Such insurance shall include, but not be limited to, coverage for: Comprehensive form, Premises-operations, Explosion and collapse hazard, Underground hazard, Products/completed operations hazard, Contractual insurance, Broad form property damage, Independent contractor, Personal injury

**2. Workers' Compensation & Employer' Liability (if applicable)**

- a. Medical & Indemnity Statutory Requirements
- b. Bodily Injury by Accident \$500,000 Each Accident
- c. Bodily Injury by Disease \$500,000 Each Employee
- d. Bodily Injury by Disease \$500,000 Policy Limit
- e. Employers Liability \$500,000

**3. Automobile Liability**

Including hired and non-owned Automobiles \$1,000,000 (Combined Single Limit)  
Such insurance shall include, but not be limited to, coverage for:  
Comprehensive form, Owned vehicles, Hired vehicles, Non-owned vehicles



## **GC.2 CONTRACTORS' AND SUBCONTRACTORS' INSURANCE (Cont'd.)**

### **~~B. Builder's Risk Insurance (Fire and Extended Coverage)~~**

~~Until the project is completed and accepted by the Owner, the Contractor is required to maintain Builder's Risk Insurance (fire and extended coverage) on a 100 percent completed value basis on the insurable portion of the project for the benefit of the Owner, the Contractor, and subcontractors as their interests may appear.~~

### **C. Owner's Protective Liability**

The Contractor shall procure and shall maintain during the life of this Contract Owner's/Contractor's Protective Liability Insurance, listing the Owner as the named insured. The minimum limit of liability shall be not less than \$1,000,000.00 per occurrence/aggregate.

### **D. Insured Parties**

All policies shall contain a provision naming the Owner (and its officers, agents and employees) as Additional Insured parties on the original policy and all renewals or replacements during the term of this Contract.

### **E. Acceptable Insurance Companies**

All insurance companies required by this section shall be: 1) acceptable to the Owner; 2) authorized to do business in the State of Michigan by the Michigan Department of Licensing & Regulatory Affairs Office of Financial and Insurance Regulations, and 3) have an A.M. Best Company's Insurance reporting rating of no less than A- (Excellent). Upon request, the Contractor shall submit evidence of such insurance.

### **F. Indemnification and Hold Harmless**

The Contractor shall, at its own expense, protect, defend, indemnify and hold harmless the Owner and its elected and appointed officers, employees, and agents from all claims, damages, costs, lawsuits and expenses, including, but not limited to, all costs for administrative proceedings, court costs and attorney fees that they may incur as a result of any acts, omissions, or negligence of the Contractor, its subcontractors, sub-subcontractors or any of their officers, employees, or agents. This includes but is not limited to injury or death to any person or persons, including the contractors employees, and damage to property. The furnishing by the Contractor of any insurance required by this Contract, or the acceptance or approval thereof by the Owner as provided in this Contract, or otherwise, shall not diminish the Contractor's obligation to fully indemnify the Owner, its elected and appointed officers, employees, and agents as required in this section.

The Contractor shall not cancel or reduce the coverage of any insurance required by this section without providing 30-day prior written notice to the Owner. All such insurance must include an endorsement whereby the insurer shall agree to notify the Owner immediately of any reduction by the Contractor. The Contractor shall cease operations on the occurrence of any such cancellation or reduction, and shall not resume operations until new insurance is in force.

## **GC.3 QUALIFICATION FOR EMPLOYMENT**

The Contractor shall employ competent laborers and mechanics for the work under this Contract, and shall comply with all applicable regulations of the United States Department of Labor and any other agencies having jurisdiction.

## **GC.4 PROGRESS SCHEDULE**

The Contractor, if requested by the Owner, immediately after being awarded the Contract, shall prepare and submit to the Owner and its representative an estimated progress schedule for the work in relation to the entire project. This schedule shall indicate the dates for the starting and completion of the various stages of construction.

#### **GC.4 PROGRESS SCHEDULE (Cont'd.)**

If the Contractor chooses to work overtime, they will be backcharged for inspection. Overtime is any Township recognized holiday and/or any time other than 8:00 a.m. to 5:00 p.m., local time, Monday through Friday. No work will be allowed at the site prior to 7:00 a.m. or after 7:00 p.m., or dusk, of any working day. No work will be allowed on Sundays with the exception of work necessitated by an emergency.

#### **GC.5 ACCIDENT PREVENTION**

Precaution shall be exercised at all times for the protection of persons (including employees) and property, and hazardous conditions shall be guarded against or eliminated. The Contractor is entirely responsible for all aspects of job safety and shall execute the work under this Contract in strictest conformance with all state and local safety codes, rules and regulations.

#### **GC.6 CONTRACT PRICE SCHEDULE**

The Contractor, if requested by the Owner, shall submit to the Owner a cost breakdown for the various items of the work. The schedule shall be prepared in a manner acceptable to the Owner as to both form and completeness and supported by data as necessary to substantiate its correctness.

#### **GC.7 PAYMENT TO CONTRACTOR**

The Contractor shall submit semi-monthly, or at longer intervals, if he so desires, an invoice covering work previously performed for which he believes payment, under the Contract terms, is due, and shall deliver said invoice to the Owner. Each request for payment shall be accompanied by a statement certifying that all bills for labor and materials have been paid up for all previous pay requests.

Each progress payment request shall be paid within one of the following time periods, whichever is later:

- A. Thirty (30) days after the Owner has certified that the work is in place in the portion of the facility covered by the applicable request for payment in accordance with the documents.
- B. Fifteen (15) days after the Owner has received the funds with which to make the progress payment from a department or agency of the federal or state government, if any funds for the facility are to come from either of these sources.

To assure proper performance of the Contract by the Contractor, the Owner shall retain ten percent (10%) of the dollar value of all work in place until the work is fifty percent (50%) in place. After the work is fifty percent (50%) in place, additional retainage shall not be withheld unless the Owner determines that the Contractor is not making satisfactory progress, or for other specific cause relating to the Contractor's performance under the Contract. In the event of such a determination the Owner may retain up to but not to exceed ten percent (10%) of the dollar value of the work more than fifty percent (50%) in place.

Any funds retained by the Owner shall not exceed the prorated share of the Owner's matching requirement if the project is funded, in part, with federal or state funds. Any retained funds shall not be commingled with other funds of the Owner and shall be deposited in an interest-bearing account in a regulated financial institution.

At any time after ninety-four percent (94%) of the work under the Contract is in place, and at the request of the Contractor, the Owner shall release the retainage plus interest, only if the Contractor provides to the Owner an irrevocable letter of credit in the amount of the retainage plus interest, issued by a bank authorized to do business in the State of Michigan, containing terms mutually acceptable to the Contractor and Owner.

Retainage shall be released to the Contractor together with the final progress payment.

#### **GC.7 PAYMENT TO CONTRACTOR (Cont'd.)**

Owner and Contractor agree that disputes concerning retainage, at the option of the Owner, shall be submitted to the decision of the agent as provided in Section 4 of Act 524 of the Michigan Public Acts of 1980 (MCLA 125.1564; MSA 5.2949 (104)) and that interest earned on retainage shall be released to the Contractor together with the final progress payment except as provided in said Section 4 of 1980 PA 524.

The final progress payment request by the Contractor shall include:

- A. A final invoice in a form satisfactory to the Owner.
- B. A sworn statement certifying that all bills for labor and materials have been paid by the Contractor.
- C. A sworn statement waiving any further claims (other than the final payment, retainage and interest, if any) by the Contractor against the Owner.
- D. A certificate from Contractor's bonding company approving issuance of final payment.

All payments shall take due account of additions to or deductions from the Contract price as herein provided.

The acceptance by the Contractor of payment on the final progress payment request shall be conclusive evidence of Contractor's acceptance and approval of estimates, accounting and deductions, and of full payment by the Owner for all work, labor, materials and services done or furnished hereunder, and a full satisfaction, discharge, release and waiver of all claims and demands of or on behalf of the Contractor, its agents or employees against the Owner arising out of this agreement.

#### **GC.8 SUBCONTRACTING**

The Contractor shall not award any work to any subcontractor, supplier, manufacturer or fabricator without prior written approval of the Owner, which approval will not be given until the Contractor submits a written statement to the Owner concerning the proposed award to the subcontractor. Said statement shall contain such information as the Owner may require.

The Contractor shall be as fully responsible to the Owner for the acts and omissions of his subcontractors and of persons either directly or indirectly employed by them, as he is for the acts and omissions of persons directly employed by him.

The Contractor shall cause appropriate provisions to be inserted in all subcontracts relative to the work to bind subcontractors to the Contractor by the terms of the General Conditions and other Contract documents insofar as applicable to the work of the subcontractors, and to give the Contractor the same power of terminating any subcontract that the Owner may exercise over the Contractor under any provision of the Contract documents.

Nothing contained in this Contract shall create any contractual relation between any subcontractor and the Owner.

#### **GC.9 ASSIGNMENTS**

The Contractor shall not assign the whole or any part of this Contract or any monies due or to become due hereunder without written consent of the Owner. In case the Contractor assigns all or any part of any monies due or to become due under this Contract, the instrument of assignment shall contain a clause substantially to the effect that it is agreed that the right of the assignee in and to any monies due or to become due to the Contractor shall be subject to prior liens of all persons, firms and corporations for services rendered or materials supplied for the performance of the work called for in this Contract.

## **GC.10 EXTRAS**

Except as otherwise herein provided, no charge for any extra work or materials will be allowed unless the same has been ordered in writing by the Owner and the price stated in such order.

## **GC.11 CHANGES IN WORK/PAYMENT ADJUSTMENTS**

Adjustments, if any, in the amounts to be paid by the Contractor by reason of changes in, additions to, or deductions from the work to be performed or the materials to be furnished under this Contract, shall be made on the basis of the acceptable unit prices or lump sums submitted by the Contractor covering such changes, additions or deductions.

Failing an acceptable lump sum or unit price basis for extra work caused by changes or additions, the Contractor may be directed to proceed with extra work on the basis of actual total cost of:

- A. Labor, including foremen (including fringe benefits);
- B. Materials entering permanently into the work;
- C. The ownership or rental cost of construction plant and equipment during the time of use on the extra work at a rate not to exceed AGC rates;
- D. Power and consumable supplies for the operation of power equipment;
- E. Insurance;
- F. Social Security and unemployment contributions.

To the cost of the six items above, there shall be added a fixed fee, to be agreed upon but not to exceed fifteen percent (15%) of the actual cost of the work. The single fee shall be compensation to both the Contractor and/or subcontractor to cover the cost of supervision, overhead, bond, profit and any other general expenses.

Failing an acceptable lump sum or unit price basis for adjustment for any decrease in work caused by changes or deductions, the amount of such adjustment may be determined on a similar basis to that described for extra work, with the Contractor furnishing all pertinent cost data from his/her books and records that may be available and necessary for determination of the amount of adjustment.

All changes in, additions to, or deductions from the work specified shall be made only by written order by the Owner or by an authorized representative of the Owner. No claim for extra work will be allowed, unless ordered in writing as above stated, and the claim therefore presented in writing by the Contractor on or before the fifth (5th) day of the month following that in which the work was done.

## **GC.12 TIME OF MAKING CLAIMS**

If the Contractor shall claim compensation or extension of time for any losses, damages, or delays sustained by reason of the acts of the Owner or its agents or other causes, he/she shall make a written statement of the nature of the loss, damage, or delay sustained to the Owner, within ten (10) days after the sustaining of such loss, damage, or delay. At the time of delivery and as a part of the Contractor's Declaration as hereinafter provided, the Contractor shall file with the Owner an itemized statement of the details and amounts of the loss, damage, or delay, and unless the statement shall be made as thus required, the Contractor's claim for compensation or extension of time shall be forfeited and invalidated, and he/she shall not be entitled to payment or extension of time on account of any such loss, damage or delay.

**GC.13 MATERIALS, SERVICES, AND FACILITIES**

It is understood that except as otherwise specifically stated in the Contract documents, the Contractor shall provide and pay for all materials, labor, tools, equipment, water, light, power, transportation, superintendence, temporary construction of every nature and all construction facilities whatsoever necessary to execute, complete, and deliver the work within the specified time.

Any work necessary to be performed after regular working hours, or Sundays and legal holidays, shall be performed without additional expense to the Owner.

**GC.14 TERMINATION FOR BREACH**

In the event that any of the provisions of this Contract are violated by the Contractor or by any of his subcontractors, the Owner may serve written notice upon the Contractor and the Surety of its intention to terminate the Contract, such notice to contain the reasons for terminating the Contract, and unless within ten (10) days after the serving of such notice upon the Contractor, the violation shall cease and satisfactory arrangements for correction be made, the Contract shall cease and terminate. In the event of a termination of the Contract, the Owner shall immediately serve notice thereof upon the Surety and the Contractor, and the Surety shall have the right to take over and perform the Contract.

However, if the Surety does not commence performance thereof within 30 days from the date of mailing said Notice of Termination to such Surety, the Owner may take over the work and prosecute the same to completion by contract for the account and at the expense of the Contractor. The Contractor and his Surety shall be liable to the Owner for any excess cost incurred by the Owner in completing the work, and Owner may take possession of and utilize in completing the work, all materials, appliances and plants as may be on the site of the work and necessary therefore.

**GC.15 OWNER'S RIGHT TO WITHHOLD CERTAIN AMOUNTS AND MAKE APPLICATION THEREOF**

The Owner may withhold a sufficient amount of any payment otherwise due to the Contractor to cover:

- A. Payments that may be past due and payable for just claims for labor, materials, or equipment furnished in and about the performance of the work on the project under this Contract.
- B. For defective work not remedied.
- C. For failure of the Contractor to make proper payments to his subcontractors.

The Owner shall disburse and shall have the right to act as agent for the Contractor in disbursing such funds as have been withheld pursuant to this paragraph to the party or parties who are entitled to payment therefrom. Any payment so made by the Owner shall be considered as a payment made under the Contract by the Owner to the Contractor. The Owner will render to the Contractor a proper accounting of all funds disbursed in behalf of the Contractor.

**GC.16 SUPERINTENDENCE**

The Contractor shall give his/her personal superintendence to the work or have a competent foreman or superintendent, satisfactory to the Owner, on the worksite at all times during work progress, with authority to act for the Contractor.

#### **GC.17 NOTICE AND SERVICE THEREOF**

Where in any of the Contract documents there is any provision in respect to the giving of any notice, such notice shall be deemed to have been given; as to the Owner, when written notice shall be delivered to the Owner, or shall have been placed in United States mails with first-class postage pre-paid addressed to the chief executive officer of the Owner at the place where the bids or proposals for the Contract were opened; as to the Contractor, when a written notice shall be delivered to the chief representative of the Contractor, at the site of the project or by mailing such written notice in the United States mails with first-class postage pre-paid addressed to the Contractor at the place stated in the papers prepared by him to accompany his proposal as to the address of his permanent place of businesses; as to the Surety, when a written notice is placed in the United States mails with first-class postage pre-paid addressed to the Surety at the home office of such Surety or to its agent or agents who executed bonds in behalf of such surety.

#### **GC.18 COMPLIANCE WITH LAW, APPLICABLE LAW, AND VENUE**

The Contractor shall comply with all applicable Federal, State, County, and Municipal laws, ordinances, rules and regulations.

This contract shall be construed according to the laws of the State of Michigan.

The venue for the bringing of any legal or equitable action under this contract shall be the County of Ingham, of the State of Michigan. In the event that any action is brought under this Contract in Federal Court, the venue for such action shall be the Federal Judicial District of Michigan, Western District, Southern Division.

#### **GC.19 PERMITS**

The Township will secure and pay for the Building Permit from the Meridian Township Building Department. All other permits or licenses which may be needed for prosecution of the work are to be obtained by the Contractor at the Contractor's expense.

#### **GC.20 ROYALTIES AND PATENTS**

The Contractor shall pay for all royalties and patents, and defend all suits or claims for infringement on any patent right, and shall save and hold harmless the Owner from loss on account thereof.

#### **GC.21 INSPECTIONS**

The Owner and its representative shall at all times have access to the work wherever it is in preparation or progress and the Contractor shall provide facilities for such access and for inspection.

The Owner and/or its representative shall have the right to reject materials and workmanship which are defective, or require their correction. Work on the project may be ordered terminated until correction is made. Rejected workmanship shall be satisfactorily corrected, and rejected materials shall be removed from the premises without charge to the Owner. If the Contractor does not correct condemned work and remove rejected materials within a reasonable time, fixed by written notice, the Owner may remove them and charge the expense to the Contractor.

Should it be considered necessary or advisable by the Owner at any time before final acceptance of the entire work to make an examination of work already completed, by removing or tearing out same, the Contractor shall on request promptly furnish all necessary facilities, labor, and materials. If the work is found to be defective in any material respect, due to fault of the Contractor or their subcontractors, they shall defray all the expenses of examination and satisfactory reconstruction. If, however, the work is found to meet the requirements of the Contract, the actual cost of labor and material necessarily involved in the examination and replacement, plus 15 percent (15%) shall be allowed the Contractor.

#### **GC.22 CORRECTION OF WORK AFTER FINAL PAYMENT**

Neither the final payment nor any provision in the Contract documents nor partial or entire occupancy of the premises by the Owner shall relieve the Contractor of the responsibility for negligence or faulty materials or workmanship within the extent and period provided by law, and, upon written notice, he/she shall repair any defects due thereto and pay for any damage due to other work resulting therefrom, which shall appear within **one year** after date of completion and acceptance.

#### **GC.23 PROTECTION OF WORK**

The Contractor shall continuously maintain adequate protection of all his/her work from damage and shall protect the Owner's and adjacent property from injury arising in connection with this Contract, and shall be responsible for all damage and/or injury caused by or arising out of his operations.

#### **GC.24 USE OF JOB SITE**

The Contractor shall confine his/her equipment apparatus, the storage of materials and operations of his/her workmen to limits indicated by law, ordinances, permits or directions of the Owner and shall not encumber the premises with his materials.

#### **GC.25 "OR EQUAL" CLAUSE**

Whenever in any of the Contract documents an article, material or equipment is defined by describing a proprietary product, or by using the name of a manufacturer or vendor, the term "or equal" if not inserted, shall be implied. The specific article, material or equipment mentioned shall be understood as indicating the type, function, minimum standard of design, efficiency, and quality desired and shall not be construed in a manner so as to exclude manufacturer's products of comparable quality, design and efficiency. The Contractor shall comply with the requirement of the Contract documents relative to the Owner's approval of materials and equipment before they are incorporated in the project.

#### **GC.26 PLANS AND SPECIFICATIONS**

The Contractor shall keep on the worksite a copy of the drawings and specifications and shall at all times give the Owner access thereto. Anything mentioned in the specifications and not shown on the drawings, or shown on the drawings and not mentioned in the specifications, shall be of like affect as if shown or mentioned in both. In case of difference between drawings and specifications the specifications shall govern. In any case of discrepancy in the figures, drawings or specifications, the matter shall be immediately submitted to the Owner, without whose decision said discrepancy shall not be adjusted by the Contractor, save only at his/her own risk and expense.

The Owner shall furnish from time to time such detail drawings and other information as he/she may consider necessary, unless otherwise provided. The Contractor shall keep such drawings at the site of the work.

#### **GC.27 OWNER'S RIGHT TO DO WORK**

If the Contractor should neglect to prosecute the work properly or fail to perform any provision of this Contract, the Owner three (3) days after given written notice to the Contractor and his/her Surety may, without prejudice to any other remedy the Owner may have, make good such deficiencies and may deduct the cost thereof from the payment due to the Contractor.

### **GC.28 CLEANING UP**

The Contractor shall at all times keep the premises free from accumulations of waste material or rubbish caused by his/her employees or work, and at the completion of the work he/she shall remove all his/her rubbish from and about the work and all his/her tools, equipment, scaffolding and surplus materials and shall leave his/her work clean and ready for use. In case of dispute, the Owner may remove the rubbish and surplus materials and charge the cost to the several Contractors in proportion to the amounts as shall be determined to be just.

### **GC.29 REPORTS, RECORDS AND DATA**

The Contractor and each of his/her subcontractors shall submit to the Owner such schedules of quantities, costs, progress schedules, payrolls, reports, estimates, records, and other data as the Owner may request concerning work performed or to be performed under this Contract.

### **GC.30 NON-DISCRIMINATION IN EMPLOYMENT**

The Contractor shall adhere to all applicable Federal, State and local laws, ordinances, rules and regulations prohibiting discrimination with regards to employees and applicants for employment. The Contractor, as required by law, shall not discriminate against an employee or applicant for 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 handicap that is unrelated to the individual's ability to perform the duties of a particular job or position. Breach of this section shall be regarded as a material breach of this Contract.

### **GC.31 DEFINITIONS**

The following terms as used in these Contract documents are respectively defined as follows:

- (a) "Contractor" The person, firm or corporation to whom the within Contract is awarded by the Owner and who is subject to the terms hereof.
- (b) "Subcontractor" A person, firm or corporation other than a Contractor, supplying labor and materials or labor for work at the site of the project.
- (c) "Project" The total construction proposed by the Owner to be constructed in part or in whole pursuant to the within Contract.
- (d) "Work on the Project" Work to be performed, including work normally done, at the location of the project.
- (e) "Surety" Any person, firm or corporation that has executed, as surety, the Contractor's performance and/or labor and material bonds securing the attached Contract.
- (f) "Owner" The public body or authority for whom the work is to be performed and as identified in the advertisement and proposal.
- (g) "Engineer" The Director of Public Works and Engineering for the Meridian Township or their authorized representative.



## GENERAL SPECIFICATIONS

### GENERAL SPECIFICATIONS

#### INDEX

GS.1	Definition
GS.2	Elevations
GS.3	Quality of Materials and Equipment Furnished
GS.4	Care of Existing Structures
GS.5	Care of New Structures
GS.6	Existing Public Utilities
GS.7	Protection of Trees and Shrubs
GS.8	Safety Precautions
GS.9	Sanitary Requirements
GS.10	Utilities
GS.11	Pumping and Drainage
GS.12	Winter Construction
GS.13	Use of Facilities before Final Completion
GS.14	Test of Materials
GS.15	Other Work
GS.16	Lines and Grades
GS.17	Complete Work Required
GS.18	Property Markers
GS.19	Records and Measurements
GS.20	Guarantee

#### GS.1 DEFINITION

The Contractor shall furnish all materials specified herein, shown on the plans, and required to be incorporated in the work of the Contract. They shall furnish all labor, construction equipment, tools, supplies and facilities required to construct the elements designated by the Contract documents and shall construct all of the designated elements complete and in full conformance with the requirements of these documents. They shall comply with all regulatory provisions of the Contract, General Conditions and the Specifications.

#### GS.2 ELEVATIONS

All the elevations shown on the plans or referred to herein are in feet above mean sea level datum as established by the United States Geological Survey, unless otherwise noted. The Contractor shall verify all the existing structure locations and elevations at points of connection or possible interference between their work and the existing structures and shall report at once to the Engineer any interference's or discrepancies discovered.

#### GS.3 QUALITY OF MATERIALS AND EQUIPMENT FURNISHED

All materials and equipment furnished by the Contractor hereunder shall be new and conform to specifications herein.

Materials, supplies, and equipment, whether furnished by the Contractor or the Owner, shall be stored at the site of the work in such manner as not to interfere with traffic, convenience to public or other Contractors on the site or in the vicinity. The Contractor shall be responsible for any damage caused to new or existing structures by reason of such storage or handling of materials, supplies, or equipment.

Flammable materials in portable containers are not to be stored overnight on the site. This includes, but is not limited to, gasoline and diesel fuel for use in construction machinery. Portable containers suitably protected, will be allowed overnight at the site, if confined to permanent tanks which are a normal part of the construction machinery.

## **GENERAL SPECIFICATIONS**

### **GS.3 QUALITY OF MATERIALS AND EQUIPMENT FURNISHED** (Cont'd.)

Where the Contractor is required to do work within rights of way under the jurisdiction of governmental bodies, they shall meet the requirements of said governmental bodies for work and storage within their jurisdiction. Such requirements must be met as a minimum requirement, and if the specifications given herein impose further limitation on the work, they shall also be met as the required work standard.

The Contractor's attention is directed to the Ingham County Road Department permit specifications, Section 5. Restoration and Maintenance of Right-Of-Way (e.), for dust control requirements.

### **GS.4 CARE OF EXISTING STRUCTURES**

The Contractor shall be solely responsible for any damage to any existing underground services or structures, or to structures and roadway above ground caused by their operations or those of their subcontractors and suppliers.

### **GS.5 CARE OF NEW STRUCTURES**

The Contractor shall use every reasonable precaution to prevent injury to the new structures being constructed hereunder. They shall be responsible to correct all injury or damage resulting from their operations and/or occurring while the work is under their supervisory control. They shall furnish and install such guards, coverings and other protection as may be needed to insure that the structures remain undamaged prior to completion of the entire work.

In the event damage does occur to the finished portions of the work, or to the work in progress, the Contractor shall take such corrective action and measures as may be necessary to repair the damage to the satisfaction of the Engineer.

### **GS.6 EXISTING PUBLIC UTILITIES**

Existing public utilities and underground structures such as pipelines, electric conduits and sewers are shown on the drawings from available information. The Contractor shall, through Miss Dig and any other reasonable measures, verify the exact location of underground utilities for themselves.

The Contractor shall conduct their operations so as not to damage any existing utility whether or not shown on the plans. The Contractor shall correct, at their own expense, any damage or injury that may be caused by them during their operations or damage or injury caused during the operations of their subcontractors or suppliers.

The Contractor shall be responsible for coordinating relocation or repair of existing public and private utilities with the appropriate utility or owner. No extra payment will be allowed for repairs.

If the Contractor desires, or is required by the utility companies, to relocate any power or telephone poles to facilitate their work, any expense encountered from such relocation shall be borne by the Contractor.

### **GS.7 PROTECTION OF TREES AND SHRUBS**

All trees and shrubs encountered along the route of the project shall be protected from damage by the Contractor and saved from harm resulting from any of their operations or operations of their subcontractors and suppliers. Only those trees and shrubs marked for removal on the plans shall be removed. All others will be saved from damage by tunneling or by slightly adjusting the alignment of the project as directed by the Engineer.

## **GENERAL SPECIFICATIONS**

### **GS.8 SAFETY PRECAUTIONS**

During the progress of the work, the Contractor shall maintain adequate facilities for the protection and safety of all persons and property. The Contractor and all their subcontractors and suppliers shall comply with the "Construction Safety and Health Standards" as published by the Michigan Occupational Safety and Health Administration, and to all other local, state and federal laws, ordinances, rules and regulations pertaining to safety of persons or property.

### **GS.9 SANITARY REQUIREMENTS**

The Contractor shall provide adequate sanitary facilities for all persons employed on this Project. The sanitary facilities shall conform in every way to the requirements of the "Construction Health and Safety Standards" as published by the Construction Safety Standards Commission of the State of Michigan.

### **GS.10 UTILITIES**

The Contractor shall make all necessary arrangements for the provision of all utility services required to prosecute the work under this Contract. The Contractor shall pay the costs for such connections and service. Where the Owner has utility service at the site, the Contractor may obtain service by connection to the Owner's service, subject to reasonable regulation of its use and satisfactory agreement as to charges. In the event that the Contractor's use of any or all of the Owner's utility services causes the Owner to have an inadequate supply of such service, the Contractor shall disconnect said service and provide their own separate supply at no cost to the Owner.

All utility services shall be inspected by and meet the requirements of the applicable local codes and governmental bodies.

### **GS.11 PUMPING AND DRAINAGE**

Adequate pumping and drainage facilities shall be provided and water from whatever sources entering the work during any stage of construction shall be removed promptly and disposed of. All pumping and drainage shall be done with no damage to property or structures and without interference with the right of the public, owners of private property, pedestrians, vehicular traffic, or the work of other contractors. Dewatering shall be done in such a manner that the soil under or adjacent to existing structures shall not be disturbed, removed or displaced.

The overloading or obstructing of existing drainage facilities shall not be permitted, and the Contractor shall be solely responsible for damages caused to such existing drainage facilities by their operations. Additionally, sufficient measures shall be utilized to prevent migration of soil from the site due to any pumping or drainage activities.

### **GS.12 WINTER CONSTRUCTION**

The Engineer has authority over approving the prosecution of work which is proposed to be done during the winter months. The Contractor shall provide adequate weather protection, temporary heating and take any other measures which are necessary to ensure that work performed during the winter months is properly installed and protected against damage from freezing.

Reference is made in Division 4 of the Technical Specifications to the requirements for performing concrete construction and masonry construction in cold weather.

### **GS.13 USE OF FACILITIES BEFORE FINAL COMPLETION**

The Owner shall have the right to make use of, during construction, such portions of completed and acceptably tested facilities as it finds practicable. Such use by the Owner shall not relieve the Contractor from responsibility for any defective work which may be subsequently discovered.

## **GENERAL SPECIFICATIONS**

### **GS.14 TEST OF MATERIALS**

All laboratory tests, except as otherwise noted, are to be made at the expense of the Contractor as specified in the Technical Specifications. The Contractor shall furnish satisfactory containers for taking and shipping samples. The name of the laboratory making the test must be submitted by the Contractor to the Engineer for approval.

In all cases "laboratory" refers to an independent laboratory of recognized standing. Acceptance of materials tested shall be based upon compliance with the specifications hereinafter stated for the various items. Where no particular tests are specified, the tests shall be those normally made for determination of the fitness of the particular material. Certificates of tests shall be furnished by the testing laboratory or producer, in triplicate, to the Engineer.

The Owner may require, at its own option and expense, additional mill and/or shop inspection by competent parties. The Owner may require, at its own option and expense, additional field inspection by a qualified inspector.

All materials failing to meet the requirements of the specifications, as determined by test or otherwise, shall be rejected and not used in the work. The cost of testing materials which fail to meet requirements shall be paid by the Contractor. All follow-up testing required shall also be paid by the Contractor. Materials, if rejected at the site, shall be immediately removed therefrom and shall not be used in the work.

### **GS.15 OTHER WORK**

The Contractor shall cooperate with other Contractors on the site or adjoining work to the end that the entire Project may proceed with the utmost harmony and with a minimum of delay.

Where the work under this Contract is to involve work completed under other contracts or existing facilities or structures, the Contractor shall investigate the condition of such other work or facility to determine its suitability for incorporation into the work of this Contract. Any defect or discrepancy in other work of facility making it unsuitable for proper execution of this Contract shall be immediately reported to the Owner who shall order such adjustments in the work of the project as necessary for proper completion, and unless such defect or discrepancy is reported promptly, the Contractor shall be solely responsible for any adjustments in the work as shall be found necessary to properly complete the work on this project.

### **GS.16 LINES AND GRADES**

General control lines and grades will be established by the Owner. The Contractor shall notify the Engineer no less than 48 hours prior to requiring such control. The Contractor shall furnish all stakes and labor for driving them and rodmen to assist the Owner in this work. The Contractor shall carefully preserve the general control lines and grades established by the Engineer. The cost of replacement of stakes which are damaged or lost shall be borne by the Contractor.

Construction lines and grade shall be transferred and set by the Contractor from the control lines and grades established by the Engineer, and the Contractor shall furnish necessary instruments and competent personnel for performing such work, and they shall be responsible for the accuracy of the transferred line and grade. The Owner will check the work at intervals, as it deems necessary, and the Contractor shall make correction of error, if any, at their own expense, as may be required for the proper function and performance of the structure and installed equipment.

### **GS.17 COMPLETE WORK REQUIRED**

It is the intent of the Contract documents to provide that the Project to be constructed under this Contract will be complete and ready for use. Any minor items not specifically called for on the plans or specifications, but which are clearly necessary, are to be included.

## **GENERAL SPECIFICATIONS**

### **GS.18 PROPERTY MARKERS**

The Contractor shall take precautions not to move or destroy any monuments or stakes marking the boundaries of property along or near the work. A licensed surveyor shall reestablish property irons in the proper location if disturbed. Buried property irons shall be extended 1/2" diameter rods. The Contractor shall pay for reestablishment.

### **GS.19 RECORDS AND MEASUREMENTS**

The Contractor shall keep careful records showing measured overall length of underground facilities installed and distances of such from any available line as may be designated by the Engineer. Such records shall be turned over to the Engineer as the work progresses and the records must be accurate and complete.

### **GS.20 GUARANTEE**

The Contractor shall guarantee and shall secure from the manufacturer of each item of manufactured equipment used in the project a written guarantee that all materials and equipment furnished by them shall be first class and free from defects, and the guarantor agrees that they will, upon notice and without delay, make good or repair without expense to the Owner the whole or any part of the equipment furnished by them hereunder, which within a year from date of acceptance of that portion of completed work incorporating such equipment shall fail or develop unfitness for the purpose for which it is intended as a result of any defect in design, material, workmanship, erection or construction.

**INGHAM COUNTY ROAD DEPARTMENT  
SUPPLEMENTARY PERMIT SPECIFICATIONS  
FOR UTILITY INSTALLATIONS**

As referred to herein:

“Board” shall denote the Board of Ingham County Road Commissioners or its duly appointed agents.

“Utility” shall denote any cable, conduit, pipe, structure, or similar facility installed within the road right-of-way.

“Contractor” shall denote an individual or legal entity contracted to perform a proposed utility’s installation.

1. GENERAL

- a. All proposed utility installations within county road right-of-way shall be reviewed and approved by means of a permit issued by the Board, regardless of the type, size, location, or installation method. The Board shall have absolute authority over any work to be performed within the county road right-of-way and shall exercise said authority at its discretion. The Board reserves the right to impose, at its discretion, cash bond requirements for any permit granted. The cash bond may be used to reimburse the Board for work not performed by the Contractor, restoration of roadways caused by Contractor activities, costs associated with detour signing, and other reasonable expenses incurred by the road commission.
- b. The Board shall have the authority to direct any work or stop any work, permitted or not permitted, that in its opinion is not being performed to the Board’s satisfaction. All costs for corrective work or work stoppages shall be the responsibility of the Contractor.
- c. To issue a utility installation permit, the applicant must provide drawings that illustrate all the work to be performed, the method of installation, and materials to be used. If road or lane closures are proposed, along with the information required below, the approximate start and completion date shall be provided on the permit application.

2. ROAD CROSSINGS

- a. All proposed utility crossings of county roads shall be performed using methods other than open cut methods unless otherwise permitted by the Board. The following are general specifications or provisions to be followed when installing utilities using methods other than open cut methods.
  1. The methods of utility installation described in this section include, but are not limited to, tunneling, bore and jacking, and directional boring. These methods represent preferred installation methods and are employed to allow installation of utility road crossings without closing the road to through traffic or damaging the existing road pavement. The Board, at its discretion, may require that a particular installation method be employed by the Contractor.
  2. When a utility is to be installed by tunneling methods, the tunnel shall be adequately sheeted and shored to prevent the tunnel walls from collapsing and the road pavement from settling or cracking.
  3. When a utility is to be installed by bore and jacking methods, a casing pipe will be required with the utility to be installed inside the casing pipe. The annular space between the utility and the casing pipe shall be filled and sealed using pressure grouting or other approved methods.
  4. All shafts or pits not sheeted and shored shall be located, at least, 10 feet off the edge of road pavement in rural sections and 6 feet behind the back of curb in urban sections.

5. If any settlement or other changes in grade occur in the vicinity of the utility crossing within one year of the work, upon notification the road shall be immediately reconstructed to the proper grade at the Contractor's expense. In addition, damage to the roadway embankment, shoulder, and pavement shall also be immediately repaired to the Board's satisfaction.
  6. Unless otherwise approved by the Board, all utilities shall have a minimum cover of 4 feet below the road surface. Where approved construction plans indicate cover greater than 4 feet, the plan depth shall govern.
  7. All costs for maintaining traffic, including flagging operations, shall be the responsibility of the permitted party. Traffic control shall be erected in accordance with the current edition of the Michigan Manual of Uniform Traffic Control Devices (MMUTCD) or as directed by the Board. Modifications to traffic control measures may be ordered by the Board, at its discretion, and the cost of any modifications shall be the responsibility of the Contractor. Once work is completed for the day, traffic control signs which are not appropriate shall be covered or removed so that the motoring public is made aware of the road's condition and how to safely traverse through the work zone.
  8. If, in the opinion of the Board, traffic conditions warrant suspension of utility installation operations and restoration of a road's full capacity, the Contractor shall comply immediately. All costs associated with such an action shall be borne by the Contractor.
- b. If the Board permits a proposed utility crossing of a county road using open cut methods, the following general specifications or provisions shall be followed:
1. Large projects that involve many utility crossings and or may extend for several months shall be completed in "sections". The intent being, that once a particular crossing, of many, is completed or a 1/4 mile "section" of a multi-mile utility has been installed, the Contractor shall restore the road and right-of-way to the satisfaction of the Board before moving on to the next crossing or section of utility installation.
  2. In general, open cut utility crossings will not be allowed during winter months.
  3. Open cut utility crossings shall be performed during off-peak traffic hours unless specifically permitted by the Board. Off-peak hours vary, but they are typically between the hours of 9:00 am to 3:00 pm.
  4. Unless otherwise approved by the Board, all utilities shall have a minimum cover of 4 feet between the utility and the road surface. Where approved construction plans indicate cover greater than 4 feet, the plan depth shall govern.
  5. All costs for maintaining traffic, including flagging operations, shall be the responsibility of the permitted party. For road closures intended to last one or two days, the contractor will submit a deposit with the permit application, the Ingham County Road Department will set up, maintain, and dismantle the road closure, the actual costs incurred will be subtracted from the deposit and the remainder returned to the contractor. If incurred costs exceed the deposit, the contractor will be billed for the overage. For road closures intended to last an extended period of time, the Contractor shall set up, maintain, and dismantle the closure per the approved detour plan. Regardless, traffic control shall be erected in accordance with the current edition of the Michigan Manual of Uniform Traffic Control Devices (MMUTCD) or as directed by the Board. All traffic control schemes are to be approved prior to the beginning of work. Modifications to traffic control measures may be ordered by the Board, at its sole discretion, and the cost of any modifications shall be the responsibility of the Contractor.

6. If a proposed road closure is not permitted, at least one lane of traffic shall be maintained with proper flagging operations in effect throughout the work day. Road cuts shall be backfilled, flush with the driving surface at the end of each working day, appropriately signed, and opened for overnight traffic. Depending on traffic volumes and other conditions, the Board may require the permit applicant to provide by-pass lanes (either paved or unpaved) to maintain traffic.
7. Maintenance of open cut work zones is the responsibility of the Contractor and shall be in effect 24 hours a day for the duration of the work.

### 3. PAVEMENT AND GRAVEL SURFACE REMOVAL AND REPLACEMENT

- a. All proposed open cut utility installations or existing utility installations needing corrective reconstruction shall conform to the following specifications or provisions:
  1. All pavement to be removed shall be saw cut, full depth, to its removal limit and carefully removed as to not damage the saw cut edge. All damaged edges shall be subsequently saw cut and removed back to sound pavement. The pavement removal limit shall extend, at least, 1 foot beyond both sides of the open cut trench.
  2. Both bituminous and concrete pavement removal shall have a minimum width of 6 feet, be perpendicular to the centerline of the road, and extend the full width of existing lanes. Diagonal pavement removal and replacements will not be allowed unless approved by the Board.
  3. Concrete pavement removal limits are to utilize existing joints whenever possible. The minimum distance between a concrete replacement slab and an existing pavement joint shall be 5.5 feet unless approved by the Board. The Contractor shall verify concrete pavement removal limits with the Board prior to pavement replacement.
- b. Pavement replacement and gravel road surface restoration shall conform to the following specifications or provisions:
  1. Aggregate base material under pavement shall be a minimum of 8-inches thick and meet MDOT 21AA or 22A aggregate specifications, as determined by the Board. The proposed aggregate base material shall conform to the characteristics of the insitu aggregate base material as much as possible. Bituminous pavement replacement shall either match the existing pavement thickness or be 5-inches thick, whichever is greater, and utilize hot mix asphalt materials that meet or exceed MDOT 13A bituminous mix specifications. Concrete pavement replacement shall either match the existing pavement thickness or be 7-inches thick, whichever is greater, and utilize 4500 psi strength concrete that meets or exceeds MDOT specifications. Concrete pavement patch size and geometry shall be determined by the Board and shall be doweled into adjacent concrete pavement. Aggregate surfaced roads and shoulder material shall be a minimum of 6-inches thick and meet MDOT 22A or 23A aggregate specifications. Aggregate base shall be compacted to 95% of its maximum density, hot mix asphalt is to be compacted to 97% of its maximum density, and aggregate shoulder material shall be sufficiently graded and compacted to prevent standing water and erosion problems.
  2. The finished driving surface shall be installed to conform to the vertical profile of the existing roadway and not exhibit “dips” or “humps” that are noticeable to the motoring public. “Mounding” over excavations to allow for future settlement will not be permitted. If settling or upheavals occur at pavement replacement locations, the Contractor may be required to remedy the situation. Failure to do so may result in a stoppage of subsequent work or denial of subsequent permits.



3. Bituminous pavements shall not be replaced using lifts that exceed 250 lbs/syd (2 1/4 inches thick). A tack coat emulsion shall be applied between successive lifts of bituminous paving.
4. Replacement concrete pavement shall be doweled into adjacent pavement using 18-inch long by #9 and #5 epoxy coated deformed bars. The dowels shall be drilled, inserted 9-inches, and grouted in accordance with current MDOT specifications. Dowels installed along the pavement edge, parallel to the lane lines (#9), shall be spaced at 18-inches on center. Dowels installed along the pavement edge, perpendicular to the lane lines (#5), shall be spaced at 24-inches on center.
5. Composite pavements, such as asphalt overlaying concrete pavement shall be replaced to match the existing pavement structure using the same provisions described above. If approved by the Board, composite pavements may be replaced with full depth asphalt equal in thickness to the existing pavement structure.

4. BACKFILLING AND COMPACTION

- a. All utility trenches, holes, bore pits, and other excavations within the county road right-of-way shall be backfilled with granular material that meets or exceeds MDOT class II material. Excavation backfill shall be placed and compacted to 95% of its maximum density in successive layers that are no more than 12-inches thick. In-place backfill density shall be verified and reported to the Board by an independent testing laboratory. The cost of said verification and reporting shall be the responsibility of the Contractor. The above backfilling and compaction provisions shall apply to that portion of the subgrade that is within the influence of the roadway pavement structure, including the shoulder. Refer to MDOT Trench Detail "B". Failure to meet said backfill and compaction requirements may result in a stoppage of subsequent work, replacement of deficient backfill, and denial of subsequent permits.
- b. All under drain systems and similar facilities destroyed or disturbed due to the utility installation shall be rebuilt using similar materials and in a manner that completely restores their function.

5. RESTORATION AND MAINTENANCE OF RIGHT-OF-WAY

- a. All drainage courses shall be restored with topsoil, seed, and mulch immediately after completion of utility installations. The Contractor shall employ and maintain soil erosion and sedimentation measures to stabilize all disturbed grounds per the Ingham County Drain Commissioner's (ICDC) standards. Disturbed drainage courses or backslopes that have steep grades, as determined by the Board, shall be stabilized with mulch blanket, rock check dams, or both. The Contractor shall follow ICDC and Michigan Department of Environmental Quality (MDEQ) Best Management Practices (BMS) for soil erosion and sedimentation control.
- b. All existing storm sewer, drainage structures, culverts, and similar facilities shall be protected during utility installation. If permitted by the Board and the structure owner, the Contractor may remove and replace said facilities if needed for utility installation. All replacement facilities shall be in accordance with current agency (owner) requirements for materials and construction standards, regardless of existing condition. Any damaged facilities left in place during utility installation shall be fully repaired to the satisfaction of the Board, or be replaced in accordance with current agency (owner) requirements. It is the responsibility of the contractor to research and obtain permission from the appropriate "owner" for the proposed work.
- c. All traffic signs requiring replacement or that need to be relocated due to utility installation shall be replaced or relocated by Ingham County Road Department personnel and their costs reimbursed by the Contractor.

- d. Encroachments (private installations) within the road right-of-way, such as fences, mailboxes, and hedges that must be removed due to utility installation may be replaced or re-installed, within the right-of-way, upon approval of the Board. In general, removed objects, other than mailboxes, cannot be re-installed within the road right-of-way. Please be aware that the Ingham County Road Department will not become involved with negotiations between the utility owner and property owners relative to encroachment removal and replacement, but the Board will ultimately approve or disapprove whether replacements are allowed, and their subsequent locations.
- e. The Contractor shall maintain a safe work area, free from dust and free from dirt and mud being tracked onto the adjacent roadway. The Contractor shall make arrangements to have paved roads swept and gravel roads treated with dust palliative for the duration of installation activities. If requested by the Board, the Contractor shall sweep roads or apply dust palliative within 4 hours of the request. Failure to do so may result in a stoppage of work.

6. MANHOLE CASTING, VALVE, AND FIRE HYDRANT LOCATIONS

- a. Permitted utility manhole structures and vaults shall conform to the following specifications or provisions:
  - 1. In general, proposed manhole castings and valve boxes shall be located outside the paved road surface and somewhere other than in the roadside ditch. If approved by the Board, manhole castings and valve boxes installed within a paved surface or parkway shall be located flush with the existing surface, manhole castings and valve boxes installed within the traveled portion of a gravel road shall be located 6-inches below the road's surface, and manhole castings and valve boxes installed in a ditch bottom shall be located, at least 12-inches below the ditch bottom. The contractor may be required to re-route the ditch around manhole castings and valve boxes, at the discretion of the Board.
  - 2. Manhole castings and valve boxes shall not protrude from the backslope of the road or above the normal ground contour by more than 6-inches. The contractor may be required to adjust a manhole casting or regrade the area, to the Board's satisfaction, at their expense.
  - 3. Proposed manhole casting and valve box type shall be approved by the Board prior to the start of installation. If at any future time it is determined that the type of casting or valve box must be changed due to road reconstruction, widening, resurfacing, etc., the utility owner agrees, by performing under permit, to bear all costs for the change
  - 4. Proposed fire hydrant installations shall be approved by the Board prior to the start of installation. If at any future time it is determined that the fire hydrant must be moved due to road reconstruction, widening, resurfacing, etc., the utility owner agrees, by performing under permit, to bear all costs for moving the fire hydrant.

7. TREE REMOVAL, TRIMMING, AND TUNNELING

- a. All tree removals, trimming, and tunneling within county road right-of-way shall be reviewed and approved by means of permit by the Board of Ingham County Road Commissioners. Any trees, regardless of their location, that cannot be protected due to utility installation or are in eminent danger of dying as a result of utility installation shall be removed by the Contractor. All stumps shall either be removed or ground flush with the average ground surface in the vicinity of the stump.
- b. Proposed tree removals, trimming, and tunneling shall be sufficiently illustrated on construction plans along with the tree's species and size so that a proper review and site visit can be performed.
- c. Trees that are located close to proposed utility installations, in the county road right-of-way, and reside within maintained lawn areas shall be protected from above ground and below ground

damage. Any trees, as described above, that are to be removed due to utility installation, shall only be removed after the Contractor has given notice to the adjacent property of the intent to remove the tree(s) and offered replacement trees. In general, the Board will require the Contractor to replace “lawn” trees removed due to utility installation. Replacement trees shall be planted outside the road right-of-way or at locations approved by the Board.

- d. All stumps, logs, limbs, and litter shall become the property of the utility installation contractor and be properly disposed of. The adjacent property owners have the right of ownership of wood felled within the right-of-way, therefore the Contractor shall offer to leave the felled wood for the property owners use. Wood requested by the property owner shall be left outside of the county road right-of-way.

## 8. CONDUCT OF OPERATIONS

- a. The Contractor shall control and ensure that trucking operations related to utility installations adhere to the current Michigan Vehicle Code and restrictions imposed by the Board, including spring weight restrictions. Failure to do so will result in the truck operator being ticketed and may also result in a stoppage of work.
- b. Contractors, permitted or not permitted, who conduct utility installation operations in a manner detrimental to the Board’s statutory obligation to maintain county roads reasonably safe for the public will be required to cease utility installation activities and correct all detrimental conditions immediately. If deemed necessary by the Board, cash deposits to cover the cost of a full-time ICRD inspector to ensure proper operations may have to be submitted to the Board before utility installation continues.
- d. Dewatering water disposed of by the Contractor within the county road right-of-way must be approved by the Board in advance of any discharge and conform to Michigan Department of Environmental Quality (MDEQ) Best Management Practices (BMS) for soil erosion and sedimentation control. In general, discharge of water into roadside ditches for more than a couple of hours will not be allowed. If the Board deems it necessary that dewatering activities be modified or discontinued altogether, the Contractor shall comply and devise another method to complete their work. The Contractor, by performing under permit, accepts the responsibility of restoring the road right-of-way and affected drainage system to the satisfaction of the Board and the Ingham County Drain Commissioner after dewatering system removal.
- e. The Contractor shall store construction materials as far off the road so that the materials do not pose a hazard nor block the vision of the traveling public and those seeking egress and ingress to private property. Only materials to be installed immediately can be stored within the right-of-way. All other materials and equipment shall be stored outside of the right-of-way.
- e. For location of underground utilities, the Contractor shall call Miss Dig at 1-800-482-7171 a minimum of three working days prior to utility installation.

Rev. 01-06

EARTHWORK (DIVISION 1)

**MERIDIAN TOWNSHIP TECHNICAL SPECIFICATIONS  
DIVISION 1**

**EARTHWORK**

**INDEX**

**1.01 SCOPE**  
**1.02 CONSTRUCTION METHODS**

1. CLEARING THE SITE
2. PROTECTION OF TREES
3. EROSION CONTROL
4. EXCAVATION
5. BACKFILLING & ROUGH GRADING
6. EXTRA SAND BACKFILL
7. EXTRA STONE BEDDING
8. RESTORATION & CLEAN UP

**1.01 SCOPE**

The Contractor shall furnish all labor, materials, tools and equipment for all excavation and backfilling required for work under this contract, including all sheeting, shoring and bracing, dewatering of excavation, and other work as herein specified. All work shall be done in accordance with the current Michigan Department of Transportation Standard Specifications for Construction, except as stated within this specification.

**1.02 CONSTRUCTION METHODS**

**1. Clearing the Site**

The Contractor shall clear the site of all brush and debris which may be present and interfering with construction operations and shall remove and dispose of the same. No trees or shrubs are to be removed unless shown on the plans or permitted by the Engineer. Concrete, asphalt, trees, and shrubs shown on the plans to be removed shall be disposed of at a suitable location off the site of the work.

**2. Protection of Trees**

All trees which are to be preserved or which, in the opinion of the Engineer, might be subject to damage by the Contractor's operations, shall be adequately protected against damage to the bark by 2-inch thick vertical planking securely wired or tied completely around the tree trunk. Such protection shall not be removed until authorized by the Engineer.

No excavation greater than 1 foot in depth shall be made by machine within 5 feet of any tree. If the excavation cuts within the canopy (dripline) of a tree, the Contractor shall tunnel under roots and protect them from injury throughout the work. All roots greater than 2" shall be cleanly cut, if removed.

Trees which interfere with the work, and the removal of which is permitted, shall be removed by the Contractor in a safe manner and incidental to construction unless otherwise noted on plans and proposal. No trees are to be removed without the expressed approval of the governmental body or property owner having jurisdiction thereof, and of the Engineer.

## EARTHWORK (DIVISION 1)

### 1.02 **CONSTRUCTION METHODS (CONT'D.)**

#### 2. **Protection of Trees (Cont'd.)**

Trees, trunks, and limbs to be removed that are greater than six inches in diameter shall be trimmed and cut into lengths less than eight feet and piled outside of the right of way for use if the abutting property owner so desires. If the property owner does not desire the timber, the timber becomes the property of the Contractor. All other timber, brush, limbs, and stumps shall be disposed of by the Contractor. Onsite burning will not be allowed.

#### 3. **Erosion Control**

Erosion Control devices shall be installed as shown on the plans and as needed to eliminate the migration of soil from the worksite. Typical devices include catch basin fabric drops (silt sacks) and silt fence. Additional requirements, as necessary, can be found in the Special Provisions.

Fabric drops shall be designed and constructed for use in the specified structure. Drops shall be installed prior to construction, cleaned and maintained in a working state for the duration of the project, and removed and disposed of upon final completion and restoration of the construction site.

Silt fence shall be a product in accordance with the MDOT 2012 SSC, Section 910.

Grass shall be growing before the erosion control measures are removed. Retainage will not be released until the sediment guards are removed.

#### 4. **Excavation**

##### A. General

Trench excavation shall be by open cut, except as otherwise shown or permitted. Excavation may be performed by any practical method consistent with the integrity and protection of the work, adjoining structures, and the protection of workers and the public.

Excavation of trenches for piping shall provide a minimum net clearance of six inches outside the barrel of the pipe and, in all cases, shall be of sufficient width to permit the convenient placing of pipe and making of joints. The bottom of the trench shall be shaped so as to conform as nearly as possible to the outside of the pipe, particular care being taken to recess the bottom of the trench in such a manner as to relieve the bell of all load and to provide continuous soil bedding under the lower quadrant of the pipe.

Excavation for structures shall be extended sufficiently beyond the limits of the structure to provide ample room for practical construction methods to be followed.

If excess excavation is made or the material becomes disturbed so as to require removal beyond the prescribed limits, the resulting space shall be refilled with selected material. It shall be thoroughly tamped into place in not more than six inch layers, to the satisfaction of the Engineer, before the construction work proceeds. Alternatively it may be filled with Class B Concrete or Flowable Fill.

## EARTHWORK (DIVISION 1)

### 1.02 **CONSTRUCTION METHODS**

#### 4. **Excavation**

##### A. General (Cont'd.)

Foreign materials such as slabs of wood, boulders, etc. which obstruct the excavation, shall be removed with other excavation; and where such obstructions occur at or near the bottom, requiring excavation below grade for their removal, the excavated area shall be brought back to grade as in the previous paragraph, and incidental to construction. Unnecessary excavation below grade by the Contractor shall be refilled to grade as in previous paragraph, and at the Contractor's expense.

##### B. Existing Utilities and Structures

The Contractor shall cooperate with all utility firms, in advance, to locate and avoid interference with and damage to existing facilities, insofar as possible. Means for elimination of interference and correction of damage shall be subject to the instruction or approval of the Engineer. Where any apparent conflicts with underground utilities become evident, the Contractor shall excavate the utility in advance of working in the area. The Engineer shall then determine if any conflict exists and, if so, shall determine the action to be taken. Exploration for underground utilities is incidental to the other work performed.

Underground pipes or structures encountered in excavation shall be adequately supported during the Contractor's operations. Before backfilling, the structure shall receive a permanent support of a suitable material approved by the Engineer, extending from the bottom of the excavation to the underside of the pipe or other structure.

The Contractor shall use care not to damage adjoining structures and existing underground utilities. Existing underground pipes and cables are shown on the plans insofar as information is reasonably available. The Contractor shall be responsible to ascertain the locations of all utilities, whether shown on the plans or not.

Work within MDOT and Ingham County Road Department (ICRD) rights of way is done under separate permit from the agency involved. In addition, to these specifications, the Contractor shall adhere to all conditions contained in such permits.

When excavating along paved roads, extreme care shall be taken that the existing pavement and structures will not be damaged or undermined. All sheeting, bracing, and other equipment necessary to prevent damage shall be furnished by the Contractor. Where a trench must be cut through a roadway or driveway, particular care shall be taken not to unnecessarily damage adjoining areas of pavement. Existing pavement shall be sawcut prior to excavation.

Sheeting or other suitable protection, as required, shall be provided wherever excavation is performed adjacent to an existing structure. Any material removed from beneath the foundation of an existing structure shall be replaced with Class B concrete. Sheeting, bracing, and shoring required to support the sides of excavation shall be removed with care after completion of the work. Any injury to the work or to adjacent property resulting from the removal shall be repaired by the Contractor.

## EARTHWORK (DIVISION 1)

### 1.02 **CONSTRUCTION METHODS**

#### 4. **Excavation**

##### B. Existing Utilities and Structures (Cont'd.)

The Contractor shall be responsible for any damage caused by their operations to pipes, structures, poles and accessories, and the like above or below ground, whether shown on the plans or not. They shall make good and repair any such damage to the satisfaction of the Engineer. Particular care shall be exercised where excavation or other work is being prosecuted near electric or telephone lines.

##### C. Ground Water

Excavations shall be kept dry during placing of pipe and initial backfill. The Contractor shall supply stone sumps and pumps as necessary to maintain satisfactory conditions. This work is considered incidental to the pipe cost.

The Contractor shall take all necessary precautions to prevent the accumulation of water to such a level as might cause damaging uplift pressure to partially completed structures. The Contractor shall be responsible for any damage to partially completed structures because of inadequate or improper protection from uplift pressure, and shall repair or remove and replace at their own expense, to the satisfaction of the Engineer, all work so damaged.

##### D. Wells/Well Points

The Engineer may direct the installation of wells/well points if they deem it necessary to lower the adjacent water table. This is a pay item which includes all costs to furnish and operate the system, including down-time and remobilization. This method will be used only when normal methods, outlined in above paragraph (4C), prove to be insufficient.

#### 5. **Backfilling and Rough Grading**

##### A. Bedding and Initial Backfill

The backfilling and bedding of utilities shall not incorporate frozen materials. Trench backfill shall be carefully placed such that pipeline and grade are not disturbed. Bedding and initial backfill shall be as specified for ductile iron, plastic, and concrete pipe in Division 2 and for ductile iron pipe in Division 3 of the Technical Specifications.

##### B. Final Backfill Outside Right of Way

The remainder of the trench, if not in a roadway, may be backfilled with excavated material unless it contains peat, muck, cinders, stones larger than 6" in diameter, or other undesirable material as determined by the Engineer. This undesirable material shall, upon written order of the Engineer, be removed and replaced with Extra Sand Backfill or material approved by the Engineer.

## EARTHWORK (DIVISION 1)

### 1.02 **CONSTRUCTION METHODS**

#### 5. **Backfilling and Rough Grading**

##### B. Final Backfill Outside Right of Way (Cont'd.)

In a field, above a point 12-inches over the pipe, water main trenches may be backfilled completely with loose material and compacted from the top of the trench. Sewer trenches shall be backfilled and compacted in layers of 3'. In lawn areas the layers in each case shall not exceed 12".

Excavated material, above a point 12-inches over the top of the pipe, shall be compacted by running the wheel or track of excavation equipment along the trench or by methods and equipment approved by the Engineer. At least 30" cover over the top of pipe is required for wheeled or tracked vehicles and 48" cover for machine mounted compactors. Temporary mounding of excess material over the trench will be allowed only until such time as lawn repairs are completed.

##### C. Backfill within Roadway Zone of Influence

Where excavation cuts through a road, drive, or sidewalk, or is in the zone of influence of a pavement, the trench shall be backfilled with granular material and compacted in accordance with MDOT or ICRD specifications, whichever is applicable. Road crossings are incidental to pipe installation. Longitudinal trenches will be paid as the bid item Extra Sand Backfill, unless otherwise specified.

##### D. Rough Grading

At the end of each working day, all excavations shall be completely backfilled up to existing grade with all excess excavated material being removed from the site. The excavation at the point where pipe installation is to start on the next working day need not be backfilled if it is greater than 6 feet deep, adequately protected, fenced, and lighted. However, in all cases, roadways and driveways should be made accessible overnight.

Excessive soil settlement and any resulting damage which occurs within one year of final approval shall be repaired by the Contractor at no cost to the owner.

#### 6. **Extra Sand Backfill**

When the Engineer deems the native backfill material above the pipe to be unsuitable (such as rocks, peat or landfill outside the right of way or clay within the right of way) they may order extra sand backfill.

The unsuitable material shall be removed from the site and replaced with an approved granular material. This granular material shall be compacted as previously specified for excavated material.

Sand used under paved driveways, for road crossings, for pavement sub-base or for pipe bedding and backfill to a point 12" over the pipe is considered incidental to the project and does not qualify as Extra Sand Backfill, unless it is the result of a plan change.



## EARTHWORK (DIVISION 1)

### 1.02 **CONSTRUCTION METHODS** (Cont'd.)

#### 7. **Extra Stone Bedding**

This item is used, as directed by the Engineer, to replace any unsuitable earth foundation, (such as muck, landfill or rubble), below the pipe bedding or trench bottom. The unsuitable material shall be removed from the site and replaced with one-inch crushed stone.

Stone used for dewatering purposes and for pipe bedding and backfill is considered incidental to the project and does not qualify as Extra Stone Bedding.

#### 8. **Restoration & Clean-Up**

As construction operations proceed, the Contractor shall follow their operations with a general clean-up which shall include rough grading, removal of debris, temporary replacement of mailboxes, temporary restoration of driveways, etc. The general clean-up shall follow construction such that no more than 1000 feet shall remain uncompleted at any time. Access to individual homes and parcels shall remain uninterrupted during construction operations with all driveways temporarily restored to use at the end of each working day. Temporary driveways and roads shall be maintained by the Contractor during the period of construction.

After all construction has been completed, the Contractor shall finish, grade and rake all areas disturbed by construction. Topsoil shall then be spread on the prepared areas to a depth of 3-inches. All stones and lumps larger than 1-inch diameter plus all roots, litter and other foreign material shall be raked out prior to seeding or sodding.

Lawn areas and vacant land shall be repaired with seeding, fertilizer and mulch. 12-12-12 fertilizer shall be evenly applied at a rate of 200 lbs./acre. Seed shall be MDOT "THM" mixture and shall be sown following or in conjunction with the fertilizer and while topsoil is in a friable condition. Seed shall be evenly sown at a rate of 220 pounds per acre and shall not be sown through mulch. Mulch blankets shall be installed immediately after seeding and shall be pinned in place, unless otherwise specified.

If called for, lawn areas shall be repaired with first-quality commercial lawn sod. The existing sod in the excavated areas shall be cut, trimmed and removed as necessary to accept a minimum 12-inch width of new sod without overlapping new sod onto the existing or without leaving gaps between the new sod and existing. Watering of new sod shall be the responsibility of individual property owners.

Driveways and approaches shall be repaired with material of the same quality, width and thickness as that which existed prior to construction, but shall not be less than the following:

- A. Concrete shall be 6-sack, transit-mixed; formed, jointed and finished to match existing. Slabs less than 24-inches wide shall be removed and replaced with new concrete – see Division 4 of the Technical Specifications for additional requirements.

## EARTHWORK (DIVISION 1)

### 1.02 **CONSTRUCTION METHODS**

#### 8. **Restoration & Clean-Up** (Cont'd.)

- B. Asphalt shall be MDOT HMA 13A, three inches compacted thickness and rolled to a uniform, dense surface. Prior to placing of new asphalt, the existing asphalt shall be trimmed with a concrete saw to straight edges which are parallel with the adjoining roadway. Overlays shall be preceded by an asphalt primer. Thicknesses greater than two inches shall be placed in two layers that have cooled between courses.

It is the intent that upon completion of the work all surfaces will be returned to the standard of profile and conditions that existed prior to this work. All gravel, top soil, seeding, sodding, surface restoration, paving, etc., shall be performed under this contract. Surface restoration shall include replacement of mailboxes, posts, fences, signs, culverts, ditches and other miscellaneous improvements. No deviations from existing conditions will be allowed without the written permission of both the Engineer and the affected property owner.

SANITARY SEWER COLLECTION SYSTEM (DIVISION 2)

**MERIDIAN TOWNSHIP TECHNICAL SPECIFICATIONS  
DIVISION 2**

**SANITARY SEWER COLLECTION SYSTEM**

**INDEX**

**2.01 SCOPE**

**2.02 PIPE MATERIALS**

- A. Sanitary Service Pipe**
  - 1. House Service**
  - 2. Stubs, Risers, and House Services**
- B. Sanitary Main Pipe**
  - 1. Polyvinyl Chloride (PVC)**
  - 2. Reinforced Concrete**
  - 3. Ductile Iron (DI)**

**2.03 INSTALLATION OF MAINS**

- A. Trenching**
- B. Installation of Pipes**

**2.04 BUILDING SERVICES**

- A. Stub or Service Connections**
- B. Riser Pipe**
- C. House Service Line**
- D. Tapping Existing Main**
- E. Guarantee**

**2.05 MANHOLES**

- A. Precast Sections**
- B. Manhole Steps**
- C. Castings**
- D. Mortar Castings**
- E. Adjusting Rings**
- F. Concrete**
- G. Installation**

**2.06 CLEANING AND TESTING**

- A. Cleaning**
- B. Testing**

**2.01 SCOPE**

The Contractor shall furnish all labor, equipment and materials to completely construct, test and place in operation the sanitary sewer systems as shown on the plans and specified herein.

## SANITARY SEWER COLLECTION SYSTEM (DIVISION 2)

### 2.02 PIPE MATERIALS

#### A. Sanitary Service Pipe

The pipe used for risers and house services shall be constructed of the following material:

1. House Service  
4-inch pipe shall be one of the following:
  - a) PVC conforming to ASTM D 2665 with 0.237-inch wall thickness (Schedule 40).
  - b) ABS conforming to ASTM D 2751 with 0.180-inch wall thickness (SDR 23.5).
2. Stubs, Risers, and House Services  
6-inch pipe shall be one of the following:
  - a) PVC conforming to ASTM D 3033 or D 3034 with 0.180-inch wall thickness (SDR-35) or ASTM D2729 with a 0.280" wall thickness (schedule 40).
  - b) ABS conforming to ASTM D 2751 with 0.180-inch wall thickness (SDR-35).

Joints for PVC and ABS shall be either glued or bell and spigot with a rubber gasket. Glue shall be as recommended by the manufacturer of the pipe.

#### B. Sanitary Main Pipe

1. Polyvinyl Chloride (PVC) Pipe
  - a) Pipe and Fittings – All PVC sewer pipe and fittings shall be manufactured in accordance with one of the following Standard Specifications:
    - i. ASTM D3034, "Standard Specification for Type PSM Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings"
    - ii. ASTM F679, "Standard Specification for Poly (Vinyl Chloride) (PVC) Large Diameter Plastic Gravity Sewer Pipe and Fittings"

All fittings shall be compatible with the pipe to which they are attached.

- b) Joints – All PVC pipe joints shall be gasketed, bell-and-spigot, push-on type conforming to ASTM D3212, "Standard Specification for Joints for Drain and Sewer Plastic Pipes Using Flexible Elastomeric Seals." Since each pipe manufacturer has a different design for push-on joints, gaskets shall be part of a complete pipe section and purchased as such. Gaskets may be factory installed or field installed as recommended by the pipe manufacturer. Lubricant shall be as recommended by the pipe manufacturer.
- c) Pipe Stiffness – All PVC sewer pipe shall have a minimum pipe stiffness that equals or exceeds 46 lbs / in-in.
- d) Acceptance – Pipe or fittings may be rejected for failure to comply with any requirement of this specification.

2. Reinforced Concrete Pipe

Sewers 15" and larger shall be reinforced concrete, of a class heavy enough to withstand live and dead loads imposed. This class shall be as shown on the plans.

## SANITARY SEWER COLLECTION SYSTEM (DIVISION 2)

### 2.02 PIPE MATERIALS

#### 2. Reinforced Concrete Pipe (Cont'd.)

All reinforced concrete pipe used in this work shall be made by or under the direct supervision of some well-known and reputable manufacturer, whose type of pipe has been used for at least three years. It shall be furnished in sections not less than eight feet in length.

All reinforced concrete pipe shall conform to ASTM C76 or latest revision of Reinforced Concrete Culvert, Storm Drain and Sewer Pipe.

The joints for reinforced concrete sewer pipe shall be of the rubber gasket type meeting the requirements of ASTM C443, latest revision.

#### 3. Ductile Iron (DI) Pipe

Ductile iron pipe used for sanitary sewers shall be equal to the following:

General - All pipe used shall meet the requirements of ANSI/AWWA C151/A21.51 except as stated below.

- a) Joints - The bell of each length of pipe shall provide for the seating of a single rubber gasket, suitable for use with sanitary sewage. The gasket shall be self-centering when the plain end of a pipe enters the bell. Sufficient lubricant shall be furnished to provide a coating on each plain end of pipe. The lubricant shall be non-toxic and have no deleterious effect on the rubber gasket. The lubricant shall be of a consistency that can be easily applied to the pipe in any weather and shall adhere to either wet or dry pipe.
- b) Cement Mortar Lining - Cement mortar lining of pipe shall conform to ANSI/AWWA C151/A21.4, except for the following items. The minimum thickness of lining shall be 3/21-inch. Care shall be taken to insure that no mortar remains in the joint surface of the bell. If mortar is found in the joint surface or lining of greater thickness than allowed, the pipe will be returned.
- c) Length of Pipe - Because of the need to provide uniform spacing of any piling, all pipe furnished shall have a nominal laying length of 18 feet.
- d) Pipe Class - The pipe shall be Class 54. Tolerances will be as allowed in ANSI/AWWA C151/A21.51.
- e) Coating - The inside and outside of the pipe shall be coated with a bituminous coating of either coal-tar or asphalt base one mil thick.
- f) Independent Tests - The supplier shall furnish reports of all tests and inspections as required in ANSI/AWWA C151/A21.51.
- g) Polyethylene Encasement - All ductile iron pipe shall be encased with an eight mil thick polyethylene tube conforming to ANSI/AWWA C105/A21.5. Installation shall be in accordance with manufacturers recommendations. Closures and damaged areas shall be sealed with 1-1/2" by 12 mil polyethylene adhesive tape.

## SANITARY SEWER COLLECTION SYSTEM (DIVISION 2)

### 2.03 INSTALLATION OF MAINS

#### A. **Trenching** (Ref sec 1.02)

The trench shall be dry during the pipe laying operation. The trench bottom shall be prepared as stated in Division 1 and as hereinafter specified. Bell holes shall be excavated so that after placement, the barrel of the pipe will have full bearing on the trench bottom.

The installation, handling, and storage of all pipe shall be in accordance with manufacturer's recommendations. Pipe shall be protected at all times against impact shocks and free fall. Stock piling of pipe at the job site shall be in such a location as to minimize handling.

Trenches shall be excavated so that there will be a minimum clearance of six inches on each side of the barrel of the pipe and a maximum width of trench at the top of the pipe of not more than sixteen inches greater than the O.D. of pipe thirty inch I.D. or smaller and not more than twenty-four inches greater than the O.D. of pipe thirty inch I.D. or larger. They shall be at all times of sufficient width to permit the pipe to be laid and to permit first-class construction methods to be used. Sufficient space shall be provided in the trench to permit the joint to be properly made.

The trench bottom shall be undercut four inches below the final location of the pipe barrel and the trench then filled with sharp sand, fine gravel, or crushed stone bedding compacted with hand tampers to provide a cushion for bedding the pipe. The Contractor shall provide sand, gravel, or stone from off the site, except when the trench passes through well-defined strata of sand, gravel, or both.

Excavation for structures shall be extended sufficiently beyond the limits of the structure to provide ample room for other construction as necessary.

In case unsuitable material, in the opinion of the Engineer, is encountered in the bottom of a sewer trench or underneath a structure, the Engineer may order the removal of this material and its replacement as stated in Division 1 (Earthwork).

#### B. **Installation of Pipes**

The laying of the pipe shall commence at the outlet and proceed upgrade with spigot ends pointing in the direction of flow.

The socket of the pipe last laid shall be wiped clean and the spigot end of the pipe to be laid shall then be centered and pushed home against the base of the socket. The pipe shall be centered so that they will form a sewer with a uniform invert.

Joints shall be made in accordance with the manufacturer's requirements. All surfaces of the joint shall be clean and dry before the lubricant is applied. Care shall be taken in laying, that the pipe does not shift and it must remain in a home position after assembling.

All pipe shall be laid to the line and grade called for on the plans, utilizing an in-line laser beam system for vertical and horizontal control. Each pipe, as laid, shall be checked by the Contractor with a suitable target to insure that this result is obtained. Vertical and horizontal alignment shall, at any point, be within 0.04 foot (½-inch) of plan location.

## SANITARY SEWER COLLECTION SYSTEM (DIVISION 2)

### 2.03 INSTALLATION OF MAINS

#### B. Installation of Pipes (Cont'd.)

After the pipe is laid, sharp sand, fine gravel, or crushed stone shall be placed the entire width of the trench up to the springline of the pipe. Backfill shall be carefully tamped under the haunches of the pipe. Care shall be taken during backfilling and tamping so that the line and grade of the pipe are not disturbed. If concrete is being laid, additional fill shall then be placed until the entire width of the trench is not less than one foot above the top of the pipe. If sand is used for backfill around and over the pipe, it shall be thoroughly compacted with a vibratory compactor; hand compaction will not be acceptable.

If concrete pipe is being laid, fine excavated material free of large stones or lumps may be used for backfill above the springline. The remainder of the backfilling may be done as previously specified in Division 1 (Earthwork).

All pipe shall be so laid that the center of the pipe shall not depart from a straight line from manhole to manhole, by more than twelve inches, or one half the diameter of the pipe, whichever is the smaller.

Main sewer line stubs for future connections shall be furnished and placed by the Contractor according to details shown on the drawings and as directed by the Engineer.

The end of the stub for future connections shall be properly supported on crushed stone and braced when not resting on original ground so that any settlement will not disturb the connection. The end of the main sewer line stub shall be witnessed and marked in the manner described for sanitary sewer leads.

### 2.04 BUILDING SERVICES

#### A. Stub or Service Connections

Stub is defined as that portion of the service between the main and the property line. Stubs to the property line fitted with suitable stoppers shall be provided at such points as are shown on the plans or as directed by the Engineer. The connection shall be made using standard "Y" or "T" fittings as shown on the plans. On vacant lots, the stub connections will generally be located at approximately the mid-point of the front lot line, unless the Owner requests another location.

In order to properly record the locations, the Contractor shall make accurate measurements of all "Y" or "T" fittings before the sewer trench is completely backfilled.

The measurements shall indicate the distance from each "Y" or "T" to the center of the nearest downstream manhole. The Contractor shall furnish the Engineer with a copy of these measurements immediately upon the completion of any block of sewer.

In addition to measurements, the Contractor shall furnish and place a two inch by four inch (2x4) marking stick at each stub of such length that it will reach from the pipe up to a minimum of six inches above the ground surface. Each marker shall be set in a vertical position and held vertical while backfilling the trench.

## SANITARY SEWER COLLECTION SYSTEM (DIVISION 2)

### 2.04 BUILDING SERVICES (Cont'd.)

#### B. Riser Pipe

Where shown on the plans or where directed by the Engineer, the Contractor shall put in 6-inch pipe risers extending from the stub connection in the sewer up to within 9 feet of the ground surface or to a depth adequate to serve the house service elevation shown at the property line. These pipes shall be laid up with a joint as specified and the top pipe shall be closed with a stopper. All risers shall be laid up and held securely in place and the backfill shall be carefully placed around them so as not to disturb them. Crushed stone or concrete six inches thick shall be placed under and around the T or Y fitting and over it to a height of six inches above the sewer main to furnish an adequate support for the riser pipe.

The top of each riser pipe shall be measured and marked by the Contractor in the same manner as specified in paragraph (A) above.

#### C. House Service Line

House services shall be installed at the locations and elevations as are shown on the plans or as directed by the Engineer. The house services shall connect to the 6-inch stub or riser and generally extend to the house. Fernco® style flexible couplings shall be used when extending a house service from the stub.

Clean-outs shall be installed in a straight run of pipe at a maximum spacing of 90 feet and at all pre-formed bends. Standard wyes must be used to construct clean-outs. Clean-outs must extend to within six inches of finish grade and be securely capped. Clean-outs shall be marked with a minimum 36" length of ½" diameter steel pipe or reinforcing rod or shall have a cast iron cap.

In order to properly mark the location of every house service, the Contractor shall make accurate measurements of each installation. The measurements shall indicate the distance from each house service to the side property line and to two fixed reference points, i.e. power poles, fire hydrants, manholes, or buildings. The Contractor shall furnish the Engineer with a copy of these measurements immediately upon the completion of each street.

#### D. Tapping Existing Mains

Where existing main sewer lines are to be tapped, the Contractor shall use a preformed saddle approved by the Engineer. A hole shall be cut to the proper size in the main line and all rough edges smoothed to prevent obstructions. The exterior of the main line pipe shall be thoroughly cleaned in order to provide a prepared surface for gluing the saddle onto the main line. Glue shall meet manufacturer requirements. The Contractor shall clean the main line of all debris which may have entered during their tapping operation.

The Contractor shall notify the Township Engineer prior to making any connection to the main line and shall not backfill the connection prior to approval of the Township Engineer. If the pipe becomes covered with water or backfill material, the Contractor shall remove the water or material to facilitate the inspection.



## SANITARY SEWER COLLECTION SYSTEM (DIVISION 2)

### 2.04 BUILDING SERVICES (Cont'd.)

#### E. Guarantee

The Contractor shall be responsible indefinitely for the correct elevation and measurements of stub connections and house services. If a stub connection or house service cannot be found, is not at the correct elevation, or has not been installed properly, the Contractor will be notified of the situation. They will then be required to pay for finding the stub connection or house service and fixing or reinstalling, as necessary.

### 2.05 MANHOLES

#### A. Precast Sections

Manholes shall be constructed of circular precast concrete units with circular reinforcement and shall conform to the requirements of the current Specifications for Precast Reinforced Concrete Manhole Risers and Tops ASTM C478, with the following exceptions and additions:

Standard cylinders for compression tests will be required during the manufacturing of the manhole sections. Tests results from the cylinders will be the basis for determining the strength requirements of that days' output of manhole sections and depending on the results, may lead to additional testing of manhole sections.

Marking of the sections shall be done within six days after manufacture.

Cone sections shall be the eccentric type.

Joints between sections shall use a rubber O-ring gasket and a layer of one (1) inch butyl rope. The interior and exterior of the joints shall be treated with a non-shrink cement mortar with a smooth brushed finish. Additionally, the exterior of the joints shall be sealed with a product such as Boa Tape™, Infi-Shield®, EZ WRAP, or approved equal.

Pipe connections into manholes shall be made with an integrally-cast seal boot such as "Kor-N-Seal", "Lock-Joint Flexible Manhole Sleeve" or an approved equal.

#### B. Manhole Steps

Manhole steps shall be plastic-coated steel. They shall be placed sixteen inches apart unless otherwise shown and shall be cast in the manhole walls. It will not be acceptable to grout more than one step in place after the manhole section is poured.

Plastic-coated steel steps shall consist of a 3/8-inch diameter deformed steel reinforcing rod covered with a copolymer polypropylene plastic. The steel rod shall be grade 60 and conform to ASTM-615. The plastic shall conform to ASTM 2146-68, Type II, Grade 49108. The steps shall also conform to ASTM C478.

## SANITARY SEWER COLLECTION SYSTEM (DIVISION 2)

### 2.05 MANHOLES (Cont'd.)

#### C. Castings

1. The joints between the casting and cone shall be treated as shown on the Meridian Township Sanitary Sewer Detail Sheet.
2. Bolt-down covers and frames are required when not in a pavement surface. They shall be Neenah R-1916-F or East Jordan Iron Works 1045-ZPT. Covers shall have "Sanitary" cast into the surface and shall be equipped with (4) stainless steel cap screws. Base flange shall be furnished with (4) anchor bolt holes.
3. Standard frames and cover shall be East Jordan Iron Works 1045 or approved equal with solid, gasketed, self-sealing cover with concealed pick holes. Covers shall have "Meridian Sanitary Sewer" with the tree logo cast into the surface.
4. Top of casting shall be set as follows:
  - (a) Flush with paved or grass surfaces
  - (b) 6-inches below gravel road surface
  - (c) 6-inches above ditch grade

#### D. Mortar Castings

Mortar for block and brick work in manholes and other appurtenances shall be mixed in the proportion of one part Portland Cement to three parts sand. Hydrated lime may be added in proportions not to exceed 10 percent of the volume of the cement.

Mortars mixed by hand shall be prepared in a suitable clean water tight box. The ingredients, except water, shall first be thoroughly mixed dry until of uniform color; then water added and the mixing continued until mortar of proper consistency and uniform texture is produced.

No re-tempered mortar or mortar that has been mixed for more than thirty minutes shall be used in the work. No cement mortar shall be mixed when temperature is below 32 degrees Fahrenheit without properly heating the sand and water. New placed mortar shall be protected from freezing for the first 72 hours.

#### E. Adjusting Rings

Casting adjustment shall be accomplished with pre-cast concrete grade rings conforming to ASTM C478. Each ring shall have an ID not less than 24-inches nor greater than 25-inches, a minimum thickness of 2-inches and a minimum OD of 40-inches. A 1" butyl rope gasket shall be used between all rings and the top ring & casting. Total ring adjustment shall not exceed 12". Longer cone sections shall be used if more than a 12" adjustment is needed.

#### F. Concrete

Class A concrete used in manhole flow line construction shall be transit-mixed with a minimum 28-day compressive strength of 3,500 psi. The approximate proportions of the mix shall be 1 part cement, 2 parts fine aggregate and 3 parts coarse aggregate. The mix shall contain six sacks of cement per cubic yard with a maximum allowable slump of 3 ½ inches.

## SANITARY SEWER COLLECTION SYSTEM (DIVISION 2)

### 2.05 MANHOLES (Cont'd.)

#### G. Installation

Sanitary sewer manholes are to be constructed as shown on the detailed drawings. Precast concrete manhole sections shall be installed in a plumb position.

All manholes shall be finished so that all visible leakage is repaired. The interior and exterior joints between manhole sections and adjusting rings shall be plastered with at least 1/2 inch thick mortar. All plastered areas shall have a brushed finish. All lift holes shall be mortared and finished. The bottom of the manhole, the flow line of the sewer and the steps shall be clean of all mortar, concrete, dirt and other debris.

The flow channels shall be constructed with a minimum depth of one-half the pipe diameter. The flow channel and manhole bottom shall be sloped to prevent accumulation of sewage and shall have a brushed finish.

No sanitary sewer services shall be connected to a sanitary manhole, unless specified on the plans. Standard sanitary sewer services shall connect to the main sewer line.

Where shown on the plans, new sewers shall be connected into existing manholes. In such cases, new channels shall be constructed using concrete. Where required, existing manholes shall be demolished. This work is incidental to the project, unless a separate pay item is explicitly detailed.

### 2.06 CLEANING AND TESTING

#### A. Cleaning

Before the sewer may be tested, the Contractor shall clean the sewer with a hydraulic system consisting of a high pressure pump feeding water to a nozzle which directs the water against the walls and flowline of the pipe, dislodging the debris and flushing it toward a manhole. All debris shall be removed at the nearest downstream manhole.

#### B. Testing

The Contractor shall furnish all equipment and personnel to conduct an acceptance test using low pressure air. The test shall be conducted under the supervision of the Engineer.

All house services shall be securely plugged with suitable stoppers that will withstand the internal test pressures. The section of line being tested shall also be securely plugged at each manhole. All stoppers shall be adequately braced.

Air shall be slowly supplied to the plugged pipe line until the internal air pressure reaches 4.0 pounds per square inch greater than the average back pressure of any ground water that may submerge the pipe. At least two minutes shall be allowed for temperature stabilization before proceeding further.

The rate of air loss shall be determined by measuring the time interval for the 1.0 psi pressure drop is not less than the holding time as specified in ASTM F1417 (PVC) or ASTM C924 (DI).

## SANITARY SEWER COLLECTION SYSTEM (DIVISION 2)

### 2.06 CLEANING AND TESTING

#### B. Testing (Cont'd.)

If the sewer installation fails to meet these requirements the Contractor shall determine the source or sources of the leakage and they shall repair or replace all defective materials or workmanship. The completed sewer installation shall meet the requirement of this test.

For plastic sewer main, the Contractor shall test the pipe for deflection by pulling a mandrel through the sewer after all backfill has been placed and compacted over the pipe. The maximum allowable deflection shall not exceed 5% of the pipe's inside diameter. The outside diameter of the test mandrel shall be equal to the inside diameter of the pipe less 5%. The initial test shall be performed at least 30 days after pipe installation. A second test shall be performed after 10 months of pipe installation or just before line's intended use.

Inspection and testing of the sanitary system shall also include video inspection by CCTV method of sanitary main, air testing of sanitary main, and vacuum testing of sanitary manholes. All inspections and testing shall be performed in the presence of Township inspectors.

MERIDIAN TOWNSHIP  
TECHNICAL SPECIFICATION  
**DEWATERING**

**1.0 GENERAL**

1.1 Description

- A. The CONTRACTOR shall furnish all labor, tools, equipment and materials necessary to dewater the sewer trench excavations, in accordance with the requirements of the contract documents.

1.2 Submittals

- A. The contractor shall submit a dewatering plan to be reviewed by the Owner prior to the beginning of construction activities requiring dewatering.

1.3 Quality Control

- A. It shall be the responsibility of the contractor to control the rate and effect of the dewatering in such a manner as to avoid all objectionable settlement and subsidence.
- B. All dewatering operations shall be adequate to assure the integrity of the finished product and shall be the responsibility of the contractor.
- C. Where any critical structures or facilities exist immediately adjacent to areas of proposed dewatering, reference points shall be established and observed at frequent intervals to detect any settlement which may develop. The responsibility for conducting the dewatering operation in a manner which will protect adjacent structures, roads and other facilities rests solely with the contractor. The costs of repairing any damage to adjacent structures, roads and other facilities shall be the responsibility of the contractor.

**2.0 PRODUCTS**

2.1 Equipment

- A. Dewatering, where required, may include the use of well points, sump pumps, temporary pipelines for water disposal, rock or gravel placement, and other means. Standby pumping equipment shall be maintained on the jobsite.

**3.0 EXECUTION**

3.1 Dewatering

- A. The contractor shall provide all equipment necessary for dewatering. The contractor shall have on hand, at all times, sufficient pumping equipment and machinery in good working condition and shall have available, at all times, competent workers for the operation of the pumping equipment. Adequate standby equipment shall be kept available at all times

- to insure efficient dewatering and maintenance of dewatering operation during power failure.
- B. Dewatering for pipelines shall commence when groundwater is first encountered, and shall be continuous until such times as water can be allowed to rise in accordance with the provisions of this section or other requirements.
  - C. At all times, site grading shall promote drainage. Surface runoff shall be diverted from excavations. Water entering the excavation from surface runoff shall be collected in shallow ditches around the perimeter of the excavation, drained to sumps, and be pumped or drained by gravity from the excavation to maintain a bottom free from standing water.
  - D. Dewatering shall at all times be conducted in such a manner as to preserve the undisturbed bearing capacity of the subgrade soils at the proposed bottom of excavation.
  - E. The contractor shall maintain the water level below the bottom of excavation in all work areas where groundwater occurs during excavation construction, backfilling, and up to acceptance.
  - F. Dewatering systems shall be designed and operated so as to prevent removal of natural soils and so that the ground water level outside the excavation is not reduced to the extent that would damage or endanger adjacent structures or property.
  - G. Flotation shall be prevented by the contractor by maintaining a positive and continuous removal of water. The contractor shall be fully responsible and liable for all damages which may result from failure to adequately keep excavations dewatered.
  - H. If well points or wells are used, they shall be adequately spaced to provide the necessary dewatering and shall be sandpacked and/or other means used to prevent pumping of fine sands or silts from the subsurface. A continual check by the contractor shall be maintained to ensure that the subsurface soil is not being removed by the dewatering operation.
  - I. The contractor shall dispose of water from the work in a suitable manner without damage to the environment or adjacent property. The Owner shall be responsible for obtaining any permits that may be necessary to dispose of water. No water shall be drained into work built or under construction without prior consent of the Owner. Water shall be filtered using an approved method to remove sand and fine sized soil particles before disposal into any drainage system.
  - J. The release of groundwater to its static level shall be performed in such a manner as to maintain the undisturbed state of the natural foundation soils, prevent disturbance of compacted backfill and prevent flotation or movement of structures, pipelines and sewers.
  - K. Dewatering of trenches and other excavations shall be considered as incidental to the construction of the work and all costs thereof shall be included in the various contract prices in the bid forms.

**END OF SECTION**

PAY ITEMS (DIVISION 7)

**MERIDIAN TOWNSHIP TECHNICAL SPECIFICATIONS  
DIVISION 7**

**PAY ITEMS, METHOD OF MEASUREMENT & BASIS OF PAYMENT**

**INDEX**

**7.01 SCOPE**

**7.02 SPECIFIC PAY ITEMS**

**1-19 GENERAL**

1. Traffic Control
2. Road Repair
3. Extra Sand Backfill
4. Extra Stone Bedding
5. Road or R.R. Crossing
6. Wood Pile Sets
7. Wells & Well Points
8. Special Structures
9. Pavement Removal
10. Misc. Items

**20-29 SANITARY**

20. Sewer Mains
21. Manholes
22. Sewer Services

**30-39 WATER**

30. Ductile Iron Pipe
31. Water Main Fittings
32. Valves and Boxes
33. Fire Hydrants
34. Live Tap
35. Water Services

**40-49 PAVEMENT**

40. Concrete Sidewalk
41. Sidewalk Ramps
42. Bituminous Construction
43. Embankment
44. Aggregate Base or Surface Course
45. Curb and Gutter
46. Subgrade Preparation

**50-59 LANDSCAPE**

50. Retaining Wall
51. Fence
52. Ditching
53. Erosion Control
54. Site Restoration
55. Drainage Pipe

**7.03 TRENCH PAY ITEMS (SCHEMATIC)**

**7.04 RAMP PAY ITEMS (SCHEMATIC)**

## PAY ITEMS (DIVISION 7)

### 7.01 **SCOPE**

It is intended that payment for all work done under the Contract Documents including the furnishing of all labor, equipment and materials and the performing of all operations in connection with the construction of the project, will be made under the following pay items. Other work for which there is not a specific pay item will be considered included in the Contract Unit Price for the various specified pay items and no additional compensation will be allowed.

The Owner reserves the right to alter the plans, extend or shorten the improvement and increase or decrease the quantities of work to be performed to accord with such changes, including the deduction or cancellation of any one or more of the Pay Items. Such changes shall not be considered as a waiver of any conditions of the Contract nor to invalidate any of the provisions thereof. A supplemental agreement between the Contractor and the Owner will be required when such changes involve a net increase or decrease in the total amount of the original contract of more than 25 percent. For a net increase or decrease of less than 25 percent, the Contractor will accept payment according to contract prices for such items of work as appear in the original contract.

The work will be done in compliance with the Contract Documents and paid for under the Pay Items or Contract Items herein listed. The Contractor shall take no advantage of any apparent error or omission in the plans or specifications, and the Engineer shall be permitted to make such corrections and interpretations as may be deemed necessary for the fulfillment of the intent of the Contract.

### 7.02 **SPECIFIC PAY ITEMS**

#### **1-19 GENERAL**

##### **1. Traffic Control**

- A. Description: The Contract Unit Price on this item includes labor, equipment, and material necessary to complete traffic control for this project in accordance with the Michigan Manual of Uniform Traffic Control Devices and, as applicable, Michigan Department of Transportation (MDOT) or Ingham County Road Department (ICRD) requirements.
- B. Method of Measurement & Basis of Payment: This item will be paid for at the Contract Unit Price on the following basis: after first use of traffic control measures, 25% will be paid; once 50% of the original contract price is completed, 50% will be paid; once 75% of the original contract price is completed, 75% will be paid; once the contract work is complete, 100% will be paid.

##### **2. Road Repair**

- A. Description: The Contract Unit Price on this item includes restoration of all public roads to at least their conditions as existed prior to the start of construction. Specific examples are furnishing and placing of subbase, gravel or asphalt base and gravel, asphalt or concrete surface plus all other miscellaneous work associated with the complete restoration of all public roads including shoulders. All work shall be done in accordance with the plans and specifications.
- B. Method of Measurement & Basis of Payment: This item will be paid for at the Contract Unit Price when all public roads have been restored to their original condition.



PAY ITEMS (DIVISION 7)

**7.02 SPECIFIC PAY ITEMS**

**1-19 GENERAL** (Cont'd.)

**3. Extra Sand Backfill** [Ref. Sec. 1.02 (E)]

- A. Description: When the Engineer deems the native backfill material above the pipe to be unsuitable (such as rocks, peat or landfill outside the right of way and clay within the right of way) the Engineer may order extra sand backfill. It includes the excavation and disposal of the unsuitable material. Fill material shall be Class II granular material and placed at the direction of and to the satisfaction of the Engineer.

Sand used under paved driveways, for pavement subbase at road crossings, or for pipe bedding and initial backfill is considered incidental to sewers or water main and will not be paid for under this item.

- B. Method of Measurement & Basis of Payment: This item will be paid for at the Contract Unit Price for the total volume actually furnished and placed. Volume will be determined compacted-in-place (CIP) by measurements obtained at the site unless otherwise stated.

**4. Extra Stone Bedding** [Ref. Sec. 1.02 (F)]

- A. Description: The Contract Unit Price on this item includes the furnishing and placing of crushed stone bedding material to replace unsuitable subgrade material under the pipe. This work shall be done at the direction of, and to the satisfaction of, the Engineer.

Stone used for dewatering purposes or to stabilize water sand is considered incidental to sewers or water main and will not be paid for under this item.

- B. Method of Measurement & Basis of Payment: This item will be paid for at the Contract Unit Price for the total volume actually furnished and placed. Volume will be determined in place by measurements obtained at the site unless otherwise stated.

**5. Road and Railroad Crossing**

- A. Description: The Contract Unit Price on this item includes all extra work over and above that described under Sewers, Site Restoration, and Road Repair herein. Specific work includes furnishing and installing the steel casing pipe (by methods other than open cut), placing crushed stone around the carrier pipe, sealing the casing ends plus all miscellaneous related work.

- B. Method of Measurement & Basis of Payment: This item will be paid for the Contract Unit Price after the work is completed. The lineal footage of pipe installed inside the casing will be paid for under the pay item sewer or water main in addition to this item.

**6. Wood Pile Sets**

- A. Description: The Contract Unit Price on this item includes the furnishing and placing of wood pile sets to support the structures and/or pipeline as shown on the plans, including all timber bracing, hardware, trimming of piles to final grade, and all miscellaneous related work as required.

- B. Method of Measurement & Basis of Payment: This item will be paid for at the Contract Unit Price per pile set for the actual number placed and incorporated into the finished work.

## PAY ITEMS (DIVISION 7)

### 7.02 **SPECIFIC PAY ITEMS**

#### **1-19 GENERAL** (Cont'd.)

##### **7. Wells & Well Points** [Ref. Sec. 1.02 (C.3)]

- A. Description: The Contract Unit Price on this item includes the furnishing, installation, operation and removal of all materials and equipment to lower the groundwater level adjacent to the construction area to expedite the excavation for and installation of the work.
- B. Method of Measurement & Basis of Payment: This item will be paid for at the Contract Unit Price per lineal foot of excavation actually dewatered or as lump sum. Measurement will be along the centerline of the pipeline.

##### **8. Special Structure**

- A. Description: The Contract Unit Price on this item includes the furnishing and installation of labor and materials to complete the structure as shown on the plans, including excavation, backfilling, access openings and covers, floor drains and associated piping, pre-cast concrete sections, poured-in-place concrete, waterproofing, vent piping, removal of surplus excavated material and restoration of surface to within three inches of finished grade.
- B. Method of Measurement & Basis of Payment: This item will be paid for at the Contract Unit Price for each special structure as actually installed.

##### **9. Pavement Removal**

- A. Description: The Contract Unit Price on this item includes all labor, equipment, and material necessary to remove and dispose of existing concrete or asphalt as marked in the field by the Engineer and as described herein. The Contractor shall **SAWCUT** the existing pavement to the full depth to ensure clean and proper removal. Any additional sawcutting, removal, and replacement necessitated by damage caused by the Contractor shall be incidental.
- B. Method of Measurement & Basis of Payment: This item will be paid for at the Contract Unit Price as measured in the field.

##### **10. Miscellaneous Items**

- A. Description: This item includes the complete labor, equipment, and materials for constructing and/or placing in service a bid item not found elsewhere in this division.
- B. Method of Measurement & Basis of Payment: This item will be paid for at the Contract Unit Price.

#### **20-29 SANITARY**

##### **20. Sewer Mains**

- A. Description: The Contract Unit Price on this item includes clearing the work site of all trees, brush, structures and other objects which interfere with the placement of the sewer under construction, all excavation, the furnishing and placing of sewer pipe complete including wyes or tees, bedding material, backfilling, removal of surplus excavated material, testing, concrete work, protection and replacement or repair of existing utilities, and restoration of the surface to within three inches of original grade or to bottom of pavement base course. All work shall be done in accordance with the plans and specifications.

PAY ITEMS (DIVISION 7)

**7.02 SPECIFIC PAY ITEMS**

**20-29 SANITARY**

**20. Sewer Mains (Cont'd.)**

- B. Method of Measurement & Basis of Payment: The length of sewers to be paid for at the Contract Unit Price will be determined by measurement along the centerline of the various diameters, classes and depths of pipe as actually furnished and installed. Diameters, classes and depths shall be as shown on the proposal. Measurements shall be from center to center of adjacent manholes with no deduction for manhole diameter. Depth shall be determined by measuring the distance from sewer invert to existing grade at each manhole plus at a point midway between manholes; the average of the three measurements shall be the average depth of the sewer.

**21. Manholes**

- A. Description: The Contract Unit Price on this item includes all excavation, the furnishing and placing of precast sections and cast iron frame and cover, concrete work, drop pipes, connection of existing and new pipes, backfilling, removal of surplus excavated material, and restoration of surface to within three inches of original grade. All work shall be in accordance with the plans and specifications.
- B. Method of Measurement & Basis of Payment: This item will be paid for at the Contract Unit Price per manhole for the various depths as actually installed. The depth shall be determined by measuring the distance from sewer invert to top of casting.

**22. Sewer Services**

- A. Description: The Contract Unit Price on this item includes all the work and materials (~~excepting wyes and tees but~~ including necessary bends) as described in sewer main above.
- B. Method of Measurement & Basis of Payment: The length of sewers to be paid for at the Contract Unit Price will be determined by measurement along the centerline of the pipe including risers as actually furnished and installed. Measurement shall be from end of tee or wye to end of service.

**30-39 WATER**

**30. Ductile Iron Water Mains**

- A. Description: The Contract Unit Price on this item includes clearing the work site of all trees, brush, structures and other objects which interfere with the placement of the water main under construction, all excavation, the furnishing and placing of water main testing, concrete work, disinfecting, backfilling and the removal of surplus excavated material, protection and replacement or repair of existing utilities, and restoration of the surface to within three inches of original grade or to bottom of pavement base course. All work shall be done in accordance with the plans and/or specifications.
- B. Method of Measurement & Basis of Payment: The length of water mains will be paid for on a lineal foot basis for pipe measured along the centerline of the various diameters and classes of pipe actually furnished and installed. There will be no deductions for fitting lengths. Unit price includes all labor and materials and related work described above.

## PAY ITEMS (DIVISION 7)

### 7.02 SPECIFIC PAY ITEMS

#### 30-39 WATER (Cont'd.)

##### **31. Water Main Fittings**

- A. Description: The contract unit price includes the furnishing and installation of the fittings delineated in the proposal.
- B. Method of Measurement & Basis of Payment: Fittings will be paid for at the Contract Unit Price for each piece, complete with restraints, thrust block, and required appurtenances.

##### **32. Water Valves and Boxes**

- A. Description: The Contract Unit Price on this item includes the furnishing and installation of valves and valve boxes. All work shall be done in accordance with the Plans and/or Specifications and result in an operating valve.
- B. Method of Measurement & Basis of Payment: This work will be paid for at the Contract Unit Price per valve specified by size of valve on the proposal, which price includes all labor, materials, and related work as described above.

##### **33. Fire Hydrants**

- A. Description: The Contract Unit Price on this item will consist of furnishing and installing fire hydrants. It shall also include the furnishing and installation of the tee, auxiliary valve, valve box, connecting piping, thrust block, drainage pit, and miscellaneous appurtenances. All work shall be done in accordance with the plans and/or specifications and result in an operating hydrant.
- B. Method of Measurement & Basis of Payment: Fire hydrants will be paid for at the Contract Unit Price per complete Fire Hydrant assembly, which payment includes the furnishing and placing of all materials, the labor, and all related work necessary to complete the work as described above.

##### **34. Live Tap**

- A. Description: The Contract Unit Price on this item will consist of furnishing and installing tapping sleeves and valves on existing mains without loss of pressure in the existing main. It shall also include the installation of a valve box and a thrust block. All work shall be done in accordance with the plans and/or specifications.
- B. Method of Measurement & Basis of Payment: This work will be paid for at the Contract Unit Price per live tap as specified on the proposal, which price includes all labor, materials, and related work as described above.

##### **35. Water Services**

- A. Description: The Contract Unit Price on this item includes the furnishing and installation of corporation stops, curb stops, curb boxes and service pipe in accordance with the plans and or specifications. Work includes all excavation, backfill, furnishing and replacement of sand backfill, tapping of main, and removal of surplus excavated material. Long side service leads includes crossing of roads. Short side service leads are those which do not cross roads.
- B. Method of Measurement & Basis of Payment: This item will be paid for at the Contract Unit Price for each service lead completely installed.

## PAY ITEMS (DIVISION 7)

### 7.02 **SPECIFIC PAY ITEMS** (Cont'd.)

#### **40-49 PAVEMENT**

##### **40. Concrete Sidewalk**

- A. Description: The Contract Unit Price on this item includes furnishing all labor, equipment, and materials required in connection with forming, placing, and curing of the concrete sidewalk to the lines and grade shown on the plans or as directed. All work shall be done in accordance with the plans and specifications.
- B. Method of Measurement: Concrete sidewalk will be measured and paid for in square feet, determined by multiplying the actual length as measured along the centerline of the surface of the pathway, by the actual width. The area of fillets and odd shaped sidewalk will be computed separately. Deductions will be made for structures, crossroads, sidewalk ramps, and other discontinuities in the sidewalk. Sidewalk ramps and other appurtenances included in the contract as pay items will be paid for separately.

##### **41. Sidewalk Ramps**

- A. Description: Sidewalk Ramps consist of several different pay items, the combination of which include all labor, equipment, and material necessary to construct an ADA compliant curb ramp, in accordance with MDOT Special Detail R-28. The ramp pay items are depicted below in **7.04 RAMP PAY ITEMS**. All work shall be done in accordance with the plans and specifications.
- B. Method of Measurement & Basis of Payment: The ramp components will be measured and paid for at each Contract Unit Price.

##### **42. Bituminous Construction**

- A. Description: The Contract Unit Price on this item includes all labor, equipment, and material necessary for the construction of a bituminous surface, on a prepared foundation, at the specified application rate. If the bituminous mixture is not specified, the type used shall meet the approval of the Engineer. Construction methods shall conform to the latest edition of the MDOT Standard Specifications for Construction (SSC). All work shall be done in accordance with the plans and specifications.
- B. Method of Measurement & Basis of Payment: This item will be paid for at the Contract Unit Price as verified at the site through load tickets from the supplier or by field measurements.

##### **43. Embankment**

- A. Description: The Contract Unit Price on this item includes all labor, equipment, and materials required in connection with delivery and placement of granular embankment material. Embankment includes areas requiring fill as called for on the plans and the 3" of base for concrete sidewalk. All work shall be done in accordance with the plans and specifications. Granular material as noted shall mean Class II material per the MDOT 2012 SSC, Section 902.
- B. Method of Measurement & Basis of Payment: Embankment material shall be as measured in the vehicle transporting the material to the site. Load tickets from the supplier are required to verify the delivered amount.

PAY ITEMS (DIVISION 7)

**7.02 SPECIFIC PAY ITEMS**

**40-49 PAVEMENT** (Cont'd.)

**44. Aggregate Base or Surface Course**

- A. Description: The Contract Unit Price for this item includes all labor, equipment, and materials required in connection with the delivery and placement of the material. This work includes the required shaping, grading, and compacting of the material for the foundation of the asphalt ramps and driveway approaches.

The material shall be 21AA or 22A aggregate per the MDOT 2012 SSC, Section 902, unless otherwise specified. All work shall be done in accordance with the plans and specifications.

- B. Method of Measurement & Basis of Payment: Aggregate Surface Course shall be as measured in the vehicle transporting the material to the site. Load tickets from the supplier are required to verify the delivered amount.

**45. Curb and Gutter**

- A. Description: The Contract Unit Price on this item includes furnishing all labor, equipment, and materials required for forming, placing, and curing of the concrete curb and gutter to the line and grade as shown on the plans, including excavation, backfill, reinforcing steel, removal of existing curb and gutter, and all joints and joint materials. All work shall be done in accordance with the plans and specifications.

- B. Method of Measurement & Basis of Payment: The length of curb and gutter to be paid for at the Contract Unit Price will be determined by measurement along the face of the curb as actually installed, with no deductions in length for catch basins, inlet castings or gutters through concrete driveway openings.

**46. Subgrade Preparation**

- A. Description: The work of subgrade preparation includes furnishing all labor, equipment, and material necessary for clearing and grubbing, including all tree and bush removal, tree trimming, topsoil stripping, grading to shape the earth to develop the typical cross section shown on the plans, and any additional excavation required to construct the pavement to the grade shown on the plans.

- B. Method of Measurement & Basis of Payment: This item will be paid on a basis of lineal feet of pathway for work completed according to the specifications.

**50-59 LANDSCAPE**

**50. Retaining Wall**

- A. Description: The Contract Unit Price for this item includes all labor, equipment, and materials required in connection with the construction of a retaining wall, as shown on the plans. All work shall be done in accordance with the plans and specifications.

- B. Method of Measurement & Basis of Payment: Retaining walls will be measured by the square foot of the exposed face, above the pathway/sidewalk.

## PAY ITEMS (DIVISION 7)

### 7.02 SPECIFIC PAY ITEMS

#### 50-59 LANDSCAPE (Cont'd.)

##### **51. Fence**

- A. Description: The Contract Unit Price for this item includes all labor, equipment, and materials required in connection with the construction of a fence, as shown on the plans. All work shall be done in accordance with the plans and specifications.
- B. Method of Measurement & Basis of Payment: The fence will be measured along the centerline of the fence, from centerline to centerline of the end posts.

##### **52. Ditching**

- A. Description: The Contract Unit Price on this item includes all excavation, and grading to develop the cross sections such that upon completion of site restoration the final grade shall be within plus or minus 0.1 foot of the required lines and grade. This item will also include clearing the work site of all trees, brush, structures and other objects which interfere with the performance of the work. All work shall be done in accordance with the plans and specifications. Final restoration will be paid for separately.
- B. Method of Measurement & Basis of Payment: This item will be paid for at the Contract Unit Price when the required cross section has been obtained. Measurement will be made along the centerline of the ditch. Payment for any final trimming of the subgrade required prior to site restoration is included in this pay item.

##### **53. Erosion Control**

- A. Description: The Contract Unit Price on these items includes all labor, equipment, and material necessary to install and maintain the specified erosion control device(s).
- B. Method of Measurement & Basis of Payment: This item will be paid for at the Contract Unit Price for each erosion control item used.

##### **54. Site Restoration**

- A. Description: The Contract Unit Price on this item includes restoration of the ground surface to at least its preconstruction state. Specific examples are final grading of the top three inches of ground surface, furnishing and installation of seed and mulch, driveway and parking area repair, culvert replacement, sidewalk repair, replacement of signs, mailboxes, and fences, plus all other miscellaneous work associated with the complete restoration of the project site. The slope between new sidewalks and a lawn shall not exceed 1:3. All work shall be done in accordance with the plans and specifications.
- B. Method of Measurement & Basis of Payment: This item will be paid for at the Contract Unit Price when the complete project site has been restored to its original condition.

##### **55. Drainage Pipe**

- A. Description: The Contract Unit Price on these items includes all labor, equipment, and material necessary to install drainage pipe of the type and size specified, as shown on the plans.
- B. Method of Measurement & Basis of Payment: This item will be paid for at the Contract Unit Price for the length installed, as measured along the ground surface.

**MERIDIAN TOWNSHIP TECHNICAL SPECIFICATIONS  
DIVISION 7**

**PAY ITEMS, METHOD OF MEASUREMENT & BASIS OF PAYMENT**

**INDEX**

**7.01 SCOPE**

**7.02 SPECIFIC PAY ITEMS**

**1-19 GENERAL**

1. Traffic Control
2. Road Repair
3. Extra Sand Backfill
4. Extra Stone Bedding
5. Road or R.R. Crossing
6. Abandonment
7. Dewatering
8. Special Structures
9. Pavement Removal
10. Misc. Items

**20-29 SANITARY**

20. Sewer Mains
21. Manholes
22. Sewer Services
23. Bypass Pumping

**30-39 WATER**

30. Ductile Iron Pipe
31. Water Main Fittings
32. Valves and Boxes
33. Fire Hydrants
34. Live Tap
35. Water Services

**40-49 PAVEMENT**

40. Concrete Sidewalk
41. Sidewalk Ramps
42. Bituminous Construction
43. Embankment
44. Aggregate Base or Surface Course
45. Curb and Gutter
46. Subgrade Preparation

**50-59 LANDSCAPE**

50. Retaining Wall
51. Fence
52. Ditching
53. Erosion Control
54. Site Restoration
55. Drainage Pipe

**~~7.03 TRENCH PAY ITEMS (SCHEMATIC)~~**

**~~7.04 RAMP PAY ITEMS (SCHEMATIC)~~**



## PAY ITEMS (DIVISION 7)

### **7.01 SCOPE**

It is intended that payment for all work done under the Contract Documents including the furnishing of all labor, equipment and materials and the performing of all operations in connection with the construction of the project, will be made under the following pay items. Other work for which there is not a specific pay item will be considered included in the Contract Unit Price for the various specified pay items and no additional compensation will be allowed.

The Owner reserves the right to alter the plans, extend or shorten the improvement and increase or decrease the quantities of work to be performed to accord with such changes, including the deduction or cancellation of any one or more of the Pay Items. Such changes shall not be considered as a waiver of any conditions of the Contract nor to invalidate any of the provisions thereof. A supplemental agreement between the Contractor and the Owner will be required when such changes involve a net increase or decrease in the total amount of the original contract of more than 25 percent. For a net increase or decrease of less than 25 percent, the Contractor will accept payment according to contract prices for such items of work as appear in the original contract.

The work will be done in compliance with the Contract Documents and paid for under the Pay Items or Contract Items herein listed. The Contractor shall take no advantage of any apparent error or omission in the plans or specifications, and the Engineer shall be permitted to make such corrections and interpretations as may be deemed necessary for the fulfillment of the intent of the Contract.

### **7.02 SPECIFIC PAY ITEMS**

#### **1-19 GENERAL**

##### **1. Traffic Control**

- A. Description: The Contract Unit Price on this item includes labor, equipment, and material necessary to complete traffic control for this project in accordance with the Michigan Manual of Uniform Traffic Control Devices and, as applicable, Michigan Department of Transportation (MDOT) or Ingham County Road Department (ICRD) requirements.
- B. Method of Measurement & Basis of Payment: This item will be paid for at the Contract Unit Price on the following basis: after first use of traffic control measures, 25% will be paid; once 50% of the original contract price is completed, 50% will be paid; once 75% of the original contract price is completed, 75% will be paid; once the contract work is complete, 100% will be paid.

##### **2. Road Repair**

- A. Description: The Contract Unit Price on this item includes restoration of all public roads to at least their conditions as existed prior to the start of construction. Specific examples are furnishing and placing of subbase, gravel or asphalt base and gravel, asphalt or concrete surface plus all other miscellaneous work associated with the complete restoration of all public roads including shoulders. All work shall be done in accordance with the plans and specifications.
- B. Method of Measurement & Basis of Payment: This item will be paid for at the Contract Unit Price when all public roads have been restored to their original condition.

PAY ITEMS (DIVISION 7)

**7.02 SPECIFIC PAY ITEMS**

**1-19 GENERAL** (Cont'd.)

**3. Extra Sand Backfill** [Ref. Sec. 1.02 (E)]

- A. Description: When the Engineer deems the native backfill material above the pipe to be unsuitable (such as rocks, peat or landfill outside the right of way and clay within the right of way) the Engineer may order extra sand backfill. It includes the excavation and disposal of the unsuitable material. Fill material shall be Class II granular material and placed at the direction of and to the satisfaction of the Engineer.

Sand used under paved driveways, for pavement subbase at road crossings, or for pipe bedding and initial backfill is considered incidental to sewers or water main and will not be paid for under this item.

- B. Method of Measurement & Basis of Payment: This item will be paid for at the Contract Unit Price for the total volume actually furnished and placed. Volume will be determined compacted-in-place (CIP) by measurements obtained at the site unless otherwise stated.

**4. Extra Stone Bedding** [Ref. Sec. 1.02 (F)]

- A. Description: The Contract Unit Price on this item includes the furnishing and placing of crushed stone bedding material to replace unsuitable subgrade material under the pipe. This work shall be done at the direction of, and to the satisfaction of, the Engineer.

Stone used for dewatering purposes or to stabilize water sand is considered incidental to sewers or water main and will not be paid for under this item.

- B. Method of Measurement & Basis of Payment: This item will be paid for at the Contract Unit Price for the total volume actually furnished and placed. Volume will be determined in place by measurements obtained at the site unless otherwise stated.

**5. Road and Railroad Crossing**

- A. Description: The Contract Unit Price on this item includes all extra work over and above that described under Sewers, Site Restoration, and Road Repair herein. Specific work includes furnishing and installing the steel casing pipe (by methods other than open cut), placing crushed stone around the carrier pipe, sealing the casing ends plus all miscellaneous related work.

- B. Method of Measurement & Basis of Payment: This item will be paid for the Contract Unit Price after the work is completed. The lineal footage of pipe installed inside the casing will be paid for under the pay item sewer or water main in addition to this item.

**6. Abandonment**

- A. Description: The Contract Unit Price on this item includes everything necessary to abandon the structure or facility as described in the contract.

- B. Method of Measurement & Basis of Payment: This item will be paid for at the Contract Unit Price per pile set for the actual number placed and incorporated into the finished work.

**7. Dewatering** [Ref. Sec. 1.02 (4.D)]

- A. Description: The Contract Unit Price on this item includes the furnishing, installation, operation and removal of all materials and equipment to lower the groundwater level adjacent to the construction area to expedite the excavation for and installation of the work.

PAY ITEMS (DIVISION 7)

**7.02 SPECIFIC PAY ITEMS**

**1-19 GENERAL** (Cont'd.)

**7. Dewatering** (Cont'd.) [Ref. Sec. 1.02 (4.D)]

- B. Method of Measurement & Basis of Payment: This item will be paid for at the Contract Unit Price per lineal foot of excavation actually dewatered or as lump sum. Measurement will be along the centerline of the pipeline.

**8. Special Structure**

- A. Description: The Contract Unit Price on this item includes the furnishing and installation of labor and materials to complete the structure as shown on the plans, including excavation, backfilling, access openings and covers, floor drains and associated piping, pre-cast concrete sections, poured-in-place concrete, waterproofing, vent piping, removal of surplus excavated material and restoration of surface to within three inches of finished grade.
- B. Method of Measurement & Basis of Payment: This item will be paid for at the Contract Unit Price for each special structure as actually installed.

**9. Pavement Removal**

- A. Description: The Contract Unit Price on this item includes all labor, equipment, and material necessary to remove and dispose of existing concrete or asphalt as marked in the field by the Engineer and as described herein. The Contractor shall **SAWCUT** the existing pavement to the full depth to ensure clean and proper removal. Any additional sawcutting, removal, and replacement necessitated by damage caused by the Contractor shall be incidental.
- B. Method of Measurement & Basis of Payment: This item will be paid for at the Contract Unit Price as measured in the field.

**10. Miscellaneous Items**

- A. Description: This item includes the complete labor, equipment, and materials for constructing and/or placing in service a bid item not found elsewhere in this division.
- B. Method of Measurement & Basis of Payment: This item will be paid for at the Contract Unit Price.

**20-29 SANITARY**

**20. Sewer Mains**

- A. Description: The Contract Unit Price on this item includes clearing the work site of all trees, brush, structures and other objects which interfere with the placement of the sewer under construction, all excavation, the furnishing and placing of sewer pipe complete including wyes or tees, bedding material, backfilling, removal of surplus excavated material, testing, concrete work, protection and replacement or repair of existing utilities, and restoration of the surface to within three inches of original grade or to bottom of pavement base course. All work shall be done in accordance with the plans and specifications.

**20. Sewer Mains**

- B. Method of Measurement & Basis of Payment: The length of sewers to be paid for at the Contract Unit Price will be determined by measurement along the centerline of the various diameters, classes and depths of pipe as actually furnished and installed. Diameters, classes and depths shall be as shown on the proposal. Measurements shall be from center to center of adjacent manholes with no deduction for manhole diameter. Depth shall be determined by measuring the distance from sewer invert to existing grade at each manhole plus at a point midway between manholes; the average of the three measurements shall be the average depth of the sewer.

PAY ITEMS (DIVISION 7)

**7.02 SPECIFIC PAY ITEMS**

**20-29 SANITARY** (Cont'd.)

**21. Manholes**

- A. Description: The Contract Unit Price on this item includes all excavation, the furnishing and placing of precast sections and cast iron frame and cover, concrete work, drop pipes, connection of existing and new pipes, backfilling, removal of surplus excavated material, and restoration of surface to within three inches of original grade. All work shall be in accordance with the plans and specifications.
- B. Method of Measurement & Basis of Payment: This item will be paid for at the Contract Unit Price per manhole for the various depths as actually installed. The depth shall be determined by measuring the distance from sewer invert to top of casting.

**22. Sewer Services**

- A. Description: The Contract Unit Price on this item includes all the work and materials (~~excepting wyes and tees but~~ including necessary bends) as described in sewer main above.
- B. Method of Measurement & Basis of Payment: The length of sewers to be paid for at the Contract Unit Price will be determined by measurement along the centerline of the pipe including risers as actually furnished and installed. Measurement shall be from end of tee or wye to end of service.

**23. Bypass Pumping**

- A. Description: The Contract Unit Price on this item includes everything necessary to provide bypass pumping sufficient to complete the contract work.
- B. Method of Measurement & Basis of Payment: This item will be paid for at the Contract Unit Price.

**30-39 WATER**

**30. Ductile Iron Water Mains**

- A. Description: The Contract Unit Price on this item includes clearing the work site of all trees, brush, structures and other objects which interfere with the placement of the water main under construction, all excavation, the furnishing and placing of water main testing, concrete work, disinfecting, backfilling and the removal of surplus excavated material, protection and replacement or repair of existing utilities, and restoration of the surface to within three inches of original grade or to bottom of pavement base course. All work shall be done in accordance with the plans and/or specifications.
- B. Method of Measurement & Basis of Payment: The length of water mains will be paid for on a lineal foot basis for pipe measured along the centerline of the various diameters and classes of pipe actually furnished and installed. There will be no deductions for fitting lengths. Unit price includes all labor and materials and related work described above.

**31. Water Main Fittings**

- A. Description: The contract unit price includes the furnishing and installation of the fittings delineated in the proposal.
- B. Method of Measurement & Basis of Payment: Fittings will be paid for at the Contract Unit Price for each piece, complete with restraints, thrust block, and required appurtenances.

PAY ITEMS (DIVISION 7)

**7.02 SPECIFIC PAY ITEMS**

**30-39 WATER** (Cont'd.)

**32. Water Valves and Boxes**

- A. Description: The Contract Unit Price on this item includes the furnishing and installation of valves and valve boxes. All work shall be done in accordance with the Plans and/or Specifications and result in an operating valve.
- B. Method of Measurement & Basis of Payment: This work will be paid for at the Contract Unit Price per valve specified by size of valve on the proposal, which price includes all labor, materials, and related work as described above.

**33. Fire Hydrants**

- A. Description: The Contract Unit Price on this item will consist of furnishing and installing fire hydrants. It shall also include the furnishing and installation of the tee, auxiliary valve, valve box, connecting piping, thrust block, drainage pit, and miscellaneous appurtenances. All work shall be done in accordance with the plans and/or specifications and result in an operating hydrant.
- B. Method of Measurement & Basis of Payment: Fire hydrants will be paid for at the Contract Unit Price per complete Fire Hydrant assembly, which payment includes the furnishing and placing of all materials, the labor, and all related work necessary to complete the work as described above.

**34. Live Tap**

- A. Description: The Contract Unit Price on this item will consist of furnishing and installing tapping sleeves and valves on existing mains without loss of pressure in the existing main. It shall also include the installation of a valve box and a thrust block. All work shall be done in accordance with the plans and/or specifications.
- B. Method of Measurement & Basis of Payment: This work will be paid for at the Contract Unit Price per live tap as specified on the proposal, which price includes all labor, materials, and related work as described above.

**35. Water Services**

- A. Description: The Contract Unit Price on this item includes the furnishing and installation of corporation stops, curb stops, curb boxes and service pipe in accordance with the plans and or specifications. Work includes all excavation, backfill, furnishing and replacement of sand backfill, tapping of main, and removal of surplus excavated material. Long side service leads includes crossing of roads. Short side service leads are those which do not cross roads.
- B. Method of Measurement & Basis of Payment: This item will be paid for at the Contract Unit Price for each service lead completely installed.

**40-49 PAVEMENT**

**40. Concrete Sidewalk**

- A. Description: The Contract Unit Price on this item includes furnishing all labor, equipment, and materials required in connection with forming, placing, and curing of the concrete sidewalk to the lines and grade shown on the plans or as directed. All work shall be done in accordance with the plans and specifications.

PAY ITEMS (DIVISION 7)

**7.02 SPECIFIC PAY ITEMS**

**40-49 PAVEMENT**

**40. Concrete Sidewalk (Cont'd.)**

- B. Method of Measurement: Concrete sidewalk will be measured and paid for in square feet, determined by multiplying the actual length as measured along the centerline of the surface of the pathway, by the actual width. The area of fillets and odd shaped sidewalk will be computed separately. Deductions will be made for structures, crossroads, sidewalk ramps, and other discontinuities in the sidewalk. Sidewalk ramps and other appurtenances included in the contract as pay items will be paid for separately.

**41. Sidewalk Ramps**

- A. Description: Sidewalk Ramps consist of several different pay items, the combination of which include all labor, equipment, and material necessary to construct an ADA compliant curb ramp, in accordance with MDOT Special Detail R-28. The ramp pay items are depicted below in **7.04 RAMP PAY ITEMS**. All work shall be done in accordance with the plans and specifications.
- B. Method of Measurement & Basis of Payment: The ramp components will be measured and paid for at each Contract Unit Price.

**42. Bituminous Construction**

- A. Description: The Contract Unit Price on this item includes all labor, equipment, and material necessary for the construction of a bituminous surface, on a prepared foundation, at the specified application rate. If the bituminous mixture is not specified, the type used shall meet the approval of the Engineer. Construction methods shall conform to the latest edition of the MDOT Standard Specifications for Construction (SSC). All work shall be done in accordance with the plans and specifications.
- B. Method of Measurement & Basis of Payment: This item will be paid for at the Contract Unit Price as verified at the site through load tickets from the supplier or by field measurements.

**43. Embankment**

- A. Description: The Contract Unit Price on this item includes all labor, equipment, and materials required in connection with delivery and placement of granular embankment material. Embankment includes areas requiring fill as called for on the plans and the 3" of base for concrete sidewalk. All work shall be done in accordance with the plans and specifications. Granular material as noted shall mean Class II material per the MDOT 2012 SSC, Section 902.
- B. Method of Measurement & Basis of Payment: Embankment material shall be as measured in the vehicle transporting the material to the site. Load tickets from the supplier are required to verify the delivered amount.

**44. Aggregate Base or Surface Course**

- A. Description: The Contract Unit Price for this item includes all labor, equipment, and materials required in connection with the delivery and placement of the material. This work includes the required shaping, grading, and compacting of the material for the foundation of the asphalt ramps and driveway approaches.

The material shall be 21AA or 22A aggregate per the MDOT 2012 SSC, Section 902, unless otherwise specified. All work shall be done in accordance with the plans and specifications.

- B. Method of Measurement & Basis of Payment: Aggregate Surface Course shall be as measured in the vehicle transporting the material to the site. Load tickets from the supplier are required to verify the delivered amount.

PAY ITEMS (DIVISION 7)

**7.02 SPECIFIC PAY ITEMS**

**40-49 PAVEMENT** (Cont'd.)

**45. Curb and Gutter**

- A. Description: The Contract Unit Price on this item includes furnishing all labor, equipment, and materials required for forming, placing, and curing of the concrete curb and gutter to the line and grade as shown on the plans, including excavation, backfill, reinforcing steel, removal of existing curb and gutter, and all joints and joint materials. All work shall be done in accordance with the plans and specifications.
- B. Method of Measurement & Basis of Payment: The length of curb and gutter to be paid for at the Contract Unit Price will be determined by measurement along the face of the curb as actually installed, with no deductions in length for catch basins, inlet castings or gutters through concrete driveway openings.

**46. Subgrade Preparation**

- A. Description: The work of subgrade preparation includes furnishing all labor, equipment, and material necessary for clearing and grubbing, including all tree and bush removal, tree trimming, topsoil stripping, grading to shape the earth to develop the typical cross section shown on the plans, and any additional excavation required to construct the pavement to the grade shown on the plans.
- B. Method of Measurement & Basis of Payment: This item will be paid on a basis of lineal feet of pathway for work completed according to the specifications.

**50-59 LANDSCAPE**

**50. Retaining Wall**

- A. Description: The Contract Unit Price for this item includes all labor, equipment, and materials required in connection with the construction of a retaining wall, as shown on the plans. All work shall be done in accordance with the plans and specifications.
- B. Method of Measurement & Basis of Payment: Retaining walls will be measured by the square foot of the exposed face, above the pathway/sidewalk.

**51. Fence**

- A. Description: The Contract Unit Price for this item includes all labor, equipment, and materials required in connection with the construction of a fence, as shown on the plans. All work shall be done in accordance with the plans and specifications.
- B. Method of Measurement & Basis of Payment: The fence will be measured along the centerline of the fence, from centerline to centerline of the end posts.

**52. Ditching**

- A. Description: The Contract Unit Price on this item includes all excavation, and grading to develop the cross sections such that upon completion of site restoration the final grade shall be within plus or minus 0.1 foot of the required lines and grade. This item will also include clearing the work site of all trees, brush, structures and other objects which interfere with the performance of the work. All work shall be done in accordance with the plans and specifications. Final restoration will be paid for separately.
- B. Method of Measurement & Basis of Payment: This item will be paid for at the Contract Unit Price when the required cross section has been obtained. Measurement will be made along the centerline of the ditch. Payment for any final trimming of the subgrade required prior to site restoration is included in this pay item.

PAY ITEMS (DIVISION 7)

**7.02 SPECIFIC PAY ITEMS**

**50-59 LANDSCAPE** (Cont'd.)

**53. Erosion Control**

- A. Description: The Contract Unit Price on these items includes all labor, equipment, and material necessary to install and maintain the specified erosion control device(s).
- B. Method of Measurement & Basis of Payment: This item will be paid for at the Contract Unit Price for each erosion control item used.

**54. Site Restoration**

- A. Description: The Contract Unit Price on this item includes restoration of the ground surface to at least its preconstruction state. Specific examples are final grading of the top three inches of ground surface, furnishing and installation of seed and mulch, driveway and parking area repair, culvert replacement, sidewalk repair, replacement of signs, mailboxes, and fences, plus all other miscellaneous work associated with the complete restoration of the project site. The slope between new sidewalks and a lawn shall not exceed 1:3. All work shall be done in accordance with the plans and specifications.
- B. Method of Measurement & Basis of Payment: This item will be paid for at the Contract Unit Price when the complete project site has been restored to its original condition.

**55. Drainage Pipe**

- A. Description: The Contract Unit Price on these items includes all labor, equipment, and material necessary to install drainage pipe of the type and size specified, as shown on the plans.
- B. Method of Measurement & Basis of Payment: This item will be paid for at the Contract Unit Price for the length installed, as measured along the ground surface.



## COUNTY PARK WEST SEWER REPLACEMENT 2023

### SPECIAL PROVISIONS

*These Special Provisions are in addition to those in the General and Technical Specifications, and supersede the General and Technical Specifications in the event of a conflict.*

#### GENERAL

**NOTIFICATION** – The Contractor shall notify homeowners to mark private utilities seven (7) days prior to work in front of their property. If access to a resident's drive is to be disrupted as much notice as possible is to be given to the resident with a minimum of 24 hour notice being provided.

**TESTING** – The Contractor will be responsible for scheduling concrete and compaction testing. Testing will be done by Soil and Materials Engineers, Inc. (SME), (517) 887-9181. The cost will be paid by Meridian Township, except for any wait time. Concrete testing will be required for the first load of the job, and thereafter only at the direction of the Engineer.

**PROPERTY IRONS** – A licensed surveyor shall reestablish property irons in the proper location, if disturbed. Buried property irons shall be extended using ½" diameter rods. The Contractor shall pay for reestablishment.

**ROAD RIGHT-OF-WAY** – All work in the right-of-way is done under permit and approval of the Ingham County Road Department (ICRD). The Contractor shall secure the necessary permit(s).

**BARRICADING** – All excavation left open overnight shall be completely encircled with snow fence and include lighted barricades.

**PAVEMENT REMOVAL** – Any pavement removal is incidental to the contract.

**MAINTAINING ACCESS** – Access must be maintained to residences at all times during construction, unless excavation is occurring immediately in front of the drive. This includes, at a minimum, a gravel-type road surface using either new aggregate or existing road material.

#### PAY ITEMS

**1a.b. TRAFFIC CONTROL** – These pay items include all labor, equipment, and material necessary to provide and maintain traffic control as described herein, in accordance with the Michigan Manual of Uniform Traffic Control Devices and ICRD permit requirements. All barrels remaining in the road overnight must be lighted. All traffic control must be accomplished under permit from ICRD. All necessary traffic control devices are included. See Appendix C for general traffic control details.

**Traffic Control** will be paid for at the Contract Unit Price on the following basis: after first use of traffic control measures 25% of **Traffic Control** will be paid; once 50% of the original contract price is completed, 50% of **Traffic Control** will be paid; once 75% of the original contract price is completed, 75% of **Traffic Control** will be paid; once the contract work is complete, 100% of **Traffic Control** will be paid.

**2a. PAVT, RESTORATION, QUAIL ST AND E REYNOLDS RD-** This pay item includes all labor, equipment, and material necessary to substitute all pavements disturbed or damaged as part of the contract work on E Reynolds Rd and Quail St. Do not replace asphalt pavement, as subject roads will be paved under a separate contract. Instead place 12" 21AA aggregate road base to a height of 2" above the existing pavement. Provide 5 feet transition to existing pavement at Milenz St and W Reynolds Rd. The contractor may draw millings from the Township's stockpile at 2100 Gaylord C. Smith, (East Lansing, 48823). The contractor is responsible for all loading and transportation of said millings.

After this project is completed, the Township will be responsible for maintaining the temporary road surface until the resurfacing project. The newly installed Manholes will be adjusted to proper height during the resurfacing project.

**2b. PAVT, RESTORATION, COUNTY PARK BOAT LAUNCH -** This pay item includes all labor, equipment, and material necessary to substitute all pavements disturbed or damaged as part of the contract work on the County Park Boat Launch Parking Lot. ~~Restore this pavement to its pre-construction state in accordance with the Ingham County Road Department Permit Specifications and Technical Specification 1, "Earthwork" Section 1.02.8.~~ After backfilling and compaction, Place 8" of 21AA aggregate road base or Millings to serve as the substitute Parking Lot surface. The contractor may draw millings from the Township's stockpile at 2100 Gaylord C. Smith, (East Lansing, 48823). The contractor is responsible for all loading and transportation of said millings.

**4. EXTRA STONE BEDDING -** The Contract Unit Price on this item includes the furnishing and placing of one inch crushed stone bedding material to replace unsuitable subgrade material under the pipe. In areas of poor organic soils, STA 2+25 → 6+00 and STA 12+00 → 15+20, this bedding layer will be centered under the new gravity sewer and installed 3 feet wide and 2~3 feet deep, contingent on soil conditions, and enclosed within a Non-woven Geotextile Stabilization Fabric as shown in Appendix A - "Special Trench Detail" and paid for under item 10d.

The extra stone bedding will be paid for at the Contract Unit Price for the total volume actually furnished and placed. Volume will be determined in place by measurements obtained at the site unless otherwise stated.

**6. DEEP FOUNDATION SETS -** The Contract Unit Price on this item includes all labor, equipment, and material necessary to install a set of supports to the manholes designated on the plans. They will be required on Manhole 2-46 [Prop] and are anticipated to be necessary for Manholes 2-47 [Prop] and 2-42 [Prop], however site conditions may affect this need. The supports must be deep enough to penetrate unsuitable organic soils and reach stable sand layers to prevent sinking of the manhole structure. They can be of either Wooden Pile or Helical Pier design.

Wooden Piles are to be configured as per the specifications shown in the "Details for Sanitary Sewer System" on Sheet 5 of the Plans and installed in accordance with MDOT 2020 SSC Section 705 pertaining to "Treated Timber Piles". The payment for wooden pile sets is described by Technical Specification 7, "Pay Items", under item number 6.

Helical Piles are to be designed by a qualified engineer for the required loads of the manhole structures at placements designated on the plans. The manhole structures are to rest upon a concrete platform 6' in diameter, 12" thick and laced with rebar. The Contractor performing the work described must be a company specializing in the installation of helical piles. Guidance for their construction was requested from a Geotechnical Firm and is found in Appendix B - "Geotechnical Report", page 9. The piles will be paid for at the Contract Unit Price for each set of pile supports actually placed and incorporated into the finished work.

It is the responsibility of the Contractor to select the appropriate type and design strength of helical plates, shaft connections, shafts, and all necessary hardware of the overall helical pile system to properly support the proposed structures. The contractor is to submit Shop Drawings consisting of drawings and calculations, signed by a qualified professional engineer, related to the design and installation of the helical pile system. The Contractor's submittal will indicate the proposed layout of the helical pile locations and helical pile type as well as ultimate bearing capacity and shaft buckling design calculations. It should also consider the potential for corrosion and buckling, and provide calculations supporting a minimum design life of 75 years or greater.

The manufacturer must be a company specializing in the manufacturing and distribution of Helical Piles. Manufacturer's qualifications are to be submitted to the Engineer and must include the following:

- (1) A product catalog and evidence showing the manufacturer has at least 10 years of experience in the design and manufacture of helical piles.
- (2) Current ICC-ES product evaluation report or complete description of product testing and engineering calculations used to assess product capacity.

Review the available soil boring logs from the subsurface investigations. If during construction, the Contractor determines the actual subsurface conditions differ substantially from those reported on the boring logs, notify the Engineer in writing within 48 hours of such determination. The data indicated on the available boring logs are not intended as representation or warranties of continuity of such conditions. It is expressly understood that the Owner will not be responsible for interpretations or conclusions drawn therefrom by the Contractor. Additional soil test borings and other exploratory procedures may be performed by the Contractor at no additional cost to the Owner.

**7.** **DEWATERING** – This pay item includes all labor, equipment, and material necessary to install, operate, and remove a dewatering system. The contractor shall provide all dewatering necessary to keep the construction and work areas dry. The contractor shall design, install, operate, and maintain an adequate system. The system shall be of sufficient size and capacity to maintain a dry condition without delays to construction operations. Dewatering system must include adequate filtration to prevent sediment from contaminating the nearby lake. The Contractor shall submit a detailed dewatering plan for review and approval prior to starting dewatering activities. See Sheet 6 of the Plans and Appendix B - "Geotechnical Report" for soil boring information and dewatering specifications.

A suggested discharge point is along the northern edge of the County Park Boat Launch property, pending consultation with a specialized Dewatering Contractor. If this approach is not feasible without adversely affecting the nearby wetland and lake, discharge shall be into the Gravity Sanitary Sewer at manhole 2-49.

**10a.** **MOBILIZATION** – The Contract Unit Price for this pay item includes all labor, equipment, and materials necessary for the Contractor to mobilize for the specified sewer replacements in accordance with the MDOT 2020 Standard Specifications for Construction (SSC), Section 110. Payment for this item will be made according to said Section 110.

**10b.c.** **BYPASS PUMPING, \_\_\_\_\_** – The Contract Unit Prices for these pay items include all labor, equipment, and material necessary to bypass pump sewage around the work area, as necessary. The bypass pumps and bypass lines shall be sufficiently sized for peak flow conditions. The Contractor shall have adequate standby equipment available and ready for immediate operation and use including an extra pump and generator. The maximum effluent level in the influent sewer cannot exceed the crown of the influent sewer. Generators used to provide the electrical service shall be housed in sound attenuating enclosures with critical-area-type silencers. An automatic call box is

required for all overnight bypass pumping. Additionally, a backup generator must be provided. The backup generator must be installed and ready for immediate use, including all cabling, disconnect panels, and switch gear. The Contractor shall submit a detailed bypass procedure for review and approval by the Township prior to construction. The following flows reflect measured or estimated flows and capacities:

**Force Main**, Bypass from the County Park Lift Station bypass valve to Manhole 2-49:

Recorded Peak Flow – 248 GPM. Design Flow – 250 GPM

The bulk of the new Force Main will be installed without disturbing the existing one. This flow only requires bypassing during the final stages of construction when both ends of the Proposed Force Main are ready to be attached, creating a conduit from the Lift Station Effluent to Manhole 2-49. The bypass hose is recommended to run along the north side of Quail St and E Reynolds Rd with ramps to protect it at driveways, the boat launch turn-around and Milenz St intersection.

If snow plowing needs to be performed during construction, the Bypass hose will instead need to be buried at these crossings.

**Gravity Main**, Bypass of E Reynolds Rd, Quail St and Milenz St:

Estimated Flow from 23 Residences at 100 gallons per capita per day – 8 GPM

This flow will be bypassed while coring the Lift Station Wetwell to install the first section of new Gravity Sewer. The bypass hose running from Manhole 2-42 into the Lift Station Wetwell should be secured below the working area for this process to ensure dry conditions. The existing 8" gravity sewer will need to be plugged to capture flows from two residential service connections unable to be bypassed. Resume normal gravity sewer operations at the end of each work day. The existing gravity sewer will be left intact and in service during construction of the proposed replacement until the following connection is made.

**Gravity Main**, Bypass of Milenz St:

Estimated Flow from 5 Residences at 100 gallons per capita per day – 2 GPM

This flow may instead be temporarily plugged during the sewer connection to Manhole 2-45 [Prop] at the Milenz St intersection. The existing 8" VCP sewer under Milenz St will be tied into the new gravity sewer system near the end of construction after the new sewer system is placed into service.

**10d. GEOTEXTILE, STABILIZATION, NON-WOVEN** – This pay item includes all labor, equipment, and material necessary to furnish and install a non-woven geotextile stabilization fabric in the areas designated by the plans and specification details. A fabric meeting MDOT Section 910 requirements, specifically Table 910-1, will be used to enclose the Extra Stone Bedding layer beneath the new gravity sewer in areas with poorly supportive organic soils, STA 2+25 → 6+00 and STA 12+00 → 15+20. Protect from UV degradation and lay the fabric in accordance with the manufacturer's installation guidelines. It will span the width of the trench and overlap atop the stones by two feet. Single-lap longitudinal joints by at least two feet or seam the joints as per the manufacturer's recommendations. If adequate dewatering cannot be accomplished to provide a dry trench, the geotextile fabric may be substituted for a geogrid meeting MDOT Section 910 requirements. This item will be paid for at the Contract Unit Price for the total square yardage actually furnished and placed. No allowance will be made for excess material cut off or wasted.

**20a. SANITARY SEWER, PVC, 8 INCH, GRAVITY, TYPICAL TRENCH DETAIL**

This pay item includes all labor, equipment, and material necessary to install 600 feet of gravity sewer, from STA 6+00 to STA 12+00, as shown on the plans, in accordance with Technical Specification 2, "Sanitary Sewer Collection System", and as described herein. It pertains to stations of suitably supportive soils not requiring additional undercutting. The pipes will be SDR 21 with Restrained Joints, not fused, such as Certa-Lok Yelomine or an approved equal.

The new gravity sewer will typically be installed ten feet south of the existing and 1½ feet lower than the existing inverts. Leave the existing sewer intact and in service during installation of the new main until it is cleaned, televised and tested.

This pay item also includes all labor, equipment, and material necessary to bed the pipe **and the labor, material and equipment necessary** to backfill the trench in accordance with the Typical Trench Detail as shown in the “Details for Sanitary Sewer System” on Sheet 5 of the Plans and all ICRD permit(s). ~~Replacement backfill material will be paid for separately as~~ **Extra Sand Backfill**. All material shall be compacted to 95% of maximum density. Where the backfill is not within the road zone-of-influence, native backfill may be used. If additional undercutting is necessary, as determined by on site conditions in the presence of unsuitable soils and with approval by the Engineer, item 20b will supersede this item. See item 2 for resurfacing information.

This pay item will be paid for at the Contract Unit Price as described by Technical Specification 7, “Pay Items” under item 20.

**20b. SANITARY SEWER, PVC, 8 INCH, GRAVITY, SPECIAL TRENCH DETAIL**

This pay item includes all labor, equipment, and material necessary to install 695 feet of gravity sewer, from STA 2+25 to 6+00 and from STA 12+00 to 15+20, as shown on the plans, in accordance with Technical Specification 2, “Sanitary Sewer Collection System”, and as described herein. It pertains to stations of unresponsive organic soils requiring additional undercutting and pipe bedding. This additional bedding will be paid for separately as **Extra Stone Bedding**. The pipes will be SDR 21 with Restrained Joints, not fused, such as Certa-Lok Yelomine or an approved equal.

The new gravity sewer will typically be installed ten feet south of the existing and 1½ feet lower than the existing inverts. Leave the existing sewer intact and in service during installation of the new main until it is cleaned, televised and tested.

This pay item also includes all labor, equipment, and material necessary to bed the pipe **and the labor, material and equipment necessary** to backfill the trench in accordance with the “Special Trench Detail” as shown in **Appendix A**, and the Ingham County Road Department Permit Specifications. ~~Replacement backfill material will be paid for separately as~~ **Extra Sand Backfill**. All material shall be compacted to 95% of maximum density. Where the backfill is not within the road zone-of-influence, native backfill may be used. See item 2 for resurfacing information.

This pay item will be paid for at the Contract Unit Price as described by Technical Specification 7, “Pay Items” under item 20.

**20c. SANITARY SEWER, 6 INCH, FORCE MAIN** - This pay item includes all labor, equipment, and material necessary to install 1,450 feet of pressure sewer as shown on the plans, in accordance with Technical Specification 2, “Sanitary Sewer Collection System”, relevant AWWA Standards, the “Locating Station Detail” on Sheet 6 of the Plans, and as described herein. The pipes will be 8” Fusible HDPE DR 11, 6” PVC SDR 21 with Restrained Joints such as Certa-Lok Yelomine, or an approved equal.

This will include the installation of tracer wire and locator stations as incidental to this item. Tracer wire will be ten gauge, single strand with locator stations placed every 500 feet for three (3) in total. The piping and its appurtenances shall be able to withstand the water hammer pressure and associated cyclical reversal of stresses associated with the operation of a wastewater lift station.

The Force main will typically be bedded within the same trench and run parallel with the new gravity sewer. It will be placed three feet north after firmly bedding the new gravity main. A six foot trench is recommended for this operation. The existing force main will remain in service during installation of the proposed force main until it is ready to be attached at the Lift Station and Manhole 2-48 [Prop]. The connection to the Lift Station will be paid for separately as item 20e. The connection to Manhole 2-48 [Prop] is included in the installation of that manhole. See item 10b for bypassing information.

The force main will be cleaned then tested before being placed into service. The test shall be made at 125 pounds per square inch hydrostatic pressure and shall be maintained for at least two (2) hours with the leakage not exceeding 0.50 gallons per 500 feet of pipe. The contractor shall furnish all labor and equipment to make the test. The Contractor shall run a preliminary test to determine that all air has been expelled and to check for any leakage. If any leakage should exist the Contractor shall make the necessary repairs and perform the preliminary testing until satisfactory results are obtained. The final test shall be made in the presence of the Engineer. The Contractor shall notify the Engineer in advance of the testing a minimum of 48 hours.

The Contractor shall provide the equipment necessary to add and measure the water necessary to maintain the hydrostatic pressure within 5 psi of the required test pressure for the duration of the test. When the testing period is complete the Contractor shall add and measure the water to bring the final pressure reading to the initial pressure reading. The total gallons added during the duration of the test shall not exceed the allowable leakage.

This pay item also includes all labor, equipment, and material necessary to bed the pipe **and the labor, material and equipment necessary** to backfill the trench in accordance with the Details shown on the "Details for Sanitary Sewer System" on Sheet 5 of the Plans and all ICRD permit(s). ~~Replacement backfill material will be paid for separately as **Extra Sand Backfill**.~~ All material shall be compacted to 95% of maximum density. Where the backfill is not within the road zone-of-influence, native backfill may be used. See item 2 for resurfacing information.

This item will be paid for at the Contract Unit Price for the total linear footage of pipeline actually furnished and placed.

**20d. SANITARY SEWER, PVC, 8 INCH, CONNECT TO LIFT STATION WETWELL** – The Contract Unit Price on this pay item includes all labor, equipment, and material necessary to core into the existing 72 inch diameter Lift Station Wetwell and begin laying the new gravity sewer, as shown on the plans, in accordance with Technical Specification 2, "Sanitary Sewer Collection System", and as described herein.

Expose the connection site while supporting the existing gravity sewer. Core into the Wetwell and install the new Gravity Sewer to the south of and 1½ feet lower than the existing invert. See item 10c for Bypass information. Aggregate and bituminous construction will be paid for separately as **Pavt, Restoration, County Park Boat Launch**. Under the current suggested procedure, this will be the first time the Lift Station plumbing is exposed then restored.

**20e. SANITARY SEWER, FORCE MAIN, CONNECT TO LIFT STATION EFFLUENT** – The Contract Unit Price on this pay item includes all labor, equipment, and material necessary to attach the new Force Main sewer to the effluent connection of the Lift Station as shown on the plans and in accordance with Technical Specification 2, "Sanitary Sewer Collection System". See item 10b for Bypass information. Aggregate and bituminous construction will be paid for separately as **Pavt, Restoration, County Park Boat Launch**. Under the current suggested procedure, this will be the second and final time the Lift Station plumbing is exposed then restored.

**20f. SANITARY SEWER, VCP, 8 INCH, ABANDON** – This pay item includes all labor, equipment, and material necessary to abandon 1295 feet of existing vitrified clay gravity sewer with flowable fill. It will be paid for at the Contract Unit Price per foot of pipe successfully abandoned. The length of pipe will be measured on the centerline between adjacent manholes with no deduction for manhole diameter.

**20g. SANITARY SEWER, CI, 6 INCH, ABANDON** – This pay item includes all labor, equipment, and material necessary to abandon 1450 feet of existing cast iron pressure sewer with flowable fill. It will be paid for at the Contract Unit Price per foot of pipe successfully abandoned.

**21a.** **SANITARY STRUCTURE, 48 INCH DIA** – This pay item includes all labor, equipment, and material necessary install five (5) new 48 inch diameter manholes as shown on the plans and in accordance with Technical Specification 2, “Sanitary Sewer Collection System” and as described by Technical Specification 7, “Pay Items”, under item number 21. It includes the labor, equipment, and material required for connecting new and existing pipes.

Manholes are to be installed without castings or chimneys, instead leaving a road plate on top of the cone section at 15” below the road grade. They shall be located, triangulated and staked before burial beneath a Road Surface described in ***2a. Pavt, Restoration, Quail St and E Reynolds Rd.***

Manhole 2-48 [Prop] will be connected to the existing 12” VCP gravity sewer on E Reynolds Rd with the addition of a wye for a service stub to House #6361. This stub and connection is paid for separately under item 22a.

**21b.** **SANITARY STRUCTURE, DROP MANHOLE, 48 INCH DIA** – This pay item includes all labor, equipment, and material necessary to install a new 48 inch diameter manhole to a depth of thirteen (13) feet as shown on the plans as Manhole 2-45 [Prop] and in accordance with Technical Specification 2, “Sanitary Sewer Collection System” and as described by Technical Specification 7, “Pay Items”, under item number 21. The external drop connection required to connect to the existing 8” VCP gravity sewer under Milenz St is included in this item, as is the process of and fittings required for tying in the existing system to the new gravity sewer. The drop manhole bottom section shall be delivered with the drop integrally pre-fabricated. See item 10c for Bypassing information.

This manhole is to be installed without castings or a chimney, instead leaving a road plate on top of the cone section at 15” below the road grade. It shall be located, triangulated and staked before burial beneath a Road Surface described in ***2a. Pavt, Restoration, Quail St and E Reynolds Rd.***

**21c.** **SANITARY STRUCTURE, 48 INCH DIA, REMOVE** – This pay item includes all labor, equipment, and material necessary to remove two (2) Manholes, 2-45 and 2-48, in accordance with MDOT 2020 SSC Section 203 pertaining to Drainage Structures. It includes the cost of maintaining and reconnecting live sewers and of removing attached parts and connections. It will be paid for at the Contract Unit Price for each structure successfully removed.

**22a.** **SANITARY SEWER, SERVICE STUB, PVC, 6 INCH** – This pay item includes all labor, equipment, and material necessary to install twenty two (22) new six inch sanitary sewer stubs as shown on the plans, in accordance with Technical Specification 2, “Sanitary Sewer Collection System”, and as described herein. Connection of the existing house leads to these service stubs is included in this pay item. Existing capped and unused service stubs do not need to be remade.

When placing wyes and service stubs as the gravity sewer is installed, leave the service stubs capped outside of the boundaries of pavement, unless the connection takes place underneath a driveway. In this case leave the service stub capped within the pavement so it can be attached later without disturbing a residential driveway. The end of the stub shall be securely capped using a hard plastic cap and marked with a vertical wooden stake *and* a length of steel re-rod (18 inch length). After the new gravity sewer is laid and successfully tested, re-expose the stubs and attach to the existing house leads. Connection to the existing house leads will be made with a Fernco ® style flexible coupling or approved equal.

This item will be paid for at the Contract Unit Price for the total number of service stubs furnished, placed and connected.

**51.** **LANDSCAPING, FENCE, MOVING** – The Contract Unit Price for this item includes all labor, equipment, and materials required to relocate a portion of a fence. A section of black metal fencing will need to be temporarily disassembled to make way for a trench to install the Gravity and Force sewers. It will be restored to its previous condition following the conclusion of construction activities.

The fencing disassembled and restored will be measured along the centerline of the fence, from centerline to centerline of the fenceposts.

**53a. SOIL EROSION AND SEDIMENT CONTROL** – This pay item includes all labor, equipment, and material required to install, maintain, and remove the specified sedimentation control measures in accordance with the MDOT 2020 SSC, Section 208. Fabric Drops shall be specifically designed for use in the appropriate structure – curb inlet or yard basin.

Silt Fencing shall be installed along the dense treeline noted on the Plans west of Milenz St to protect the wetland from runoff. In this low area, STA 1+00 → 6+00, Silt Fencing shall be installed south of the roadway and around two storm drains shown on the Plans. Silt fencing shall also be installed at Stations 13+25 → 14+25 between Quail St and the County Park Boat Launch Parking Lot to the south of sewer installation to protect the lake from runoff. All soil erosion measures shall be removed prior to the release of the contract retainage.

**54. SITE RESTORATION** – This pay item includes all labor, equipment, and material necessary to restore disturbed areas in accordance with the MDOT 2020 Standard Specifications for Construction (SSC), Section 816, and as described herein. The disturbed areas shall be restored to grade with three (3) inches of screened topsoil. Seed and mulch shall be secured either through the use of mulch anchoring (including hydro-seeding) or mulch blankets. Use mulch anchoring on slopes less than 1:3; use mulch blankets on all slopes greater than 1:3.

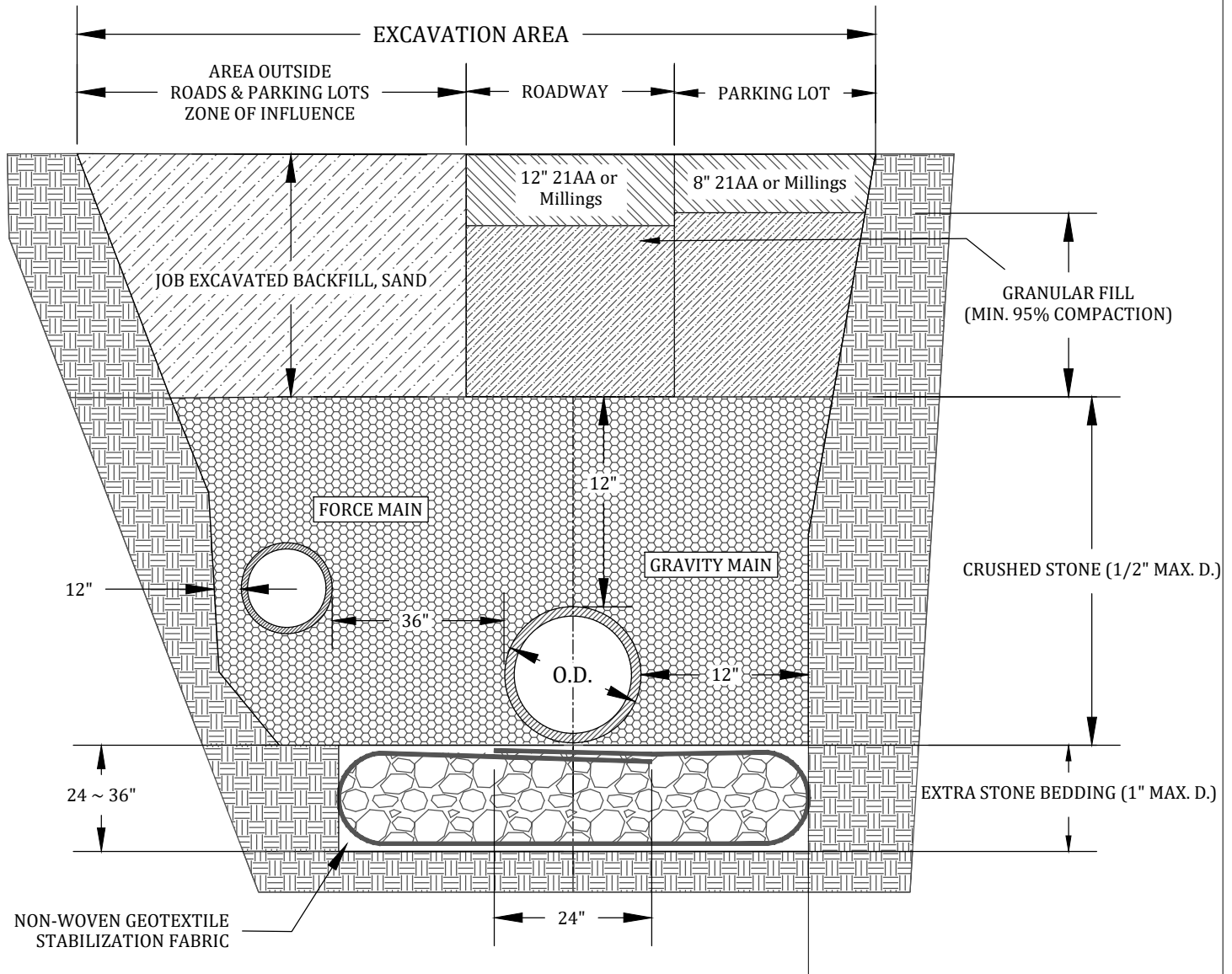
Any areas of settlement or washout shall be repaired promptly after discovery. Such spot repairs are incidental to this pay item. If the seeded turf is not well established at the end of the first growing season, the Contractor is responsible to re-seed until the turf is well established and approved by the Engineer.

**NOTE:** *The pay items detailed in this contract are intended to provide for the complete scope of work as depicted on the plans. Any and all work not covered under a specific pay item, but necessary to complete the project, is considered incidental.*



# SPECIAL TRENCH DETAIL

FOR USE AT STATIONS 2+25 → 6+00 AND 12+00 → 15+20



THE PVC PIPE MATERIAL SHALL CONFIRM TO ASTM D 2241.

PIPE INSTALLATION SHALL BE IN ACCORDANCE WITH ASTM D 2321. ALL PIPE SHALL BE MARKED TO PROVIDE ASTM DESIGNATIONS, SDR NUMBER, MANUFACTURERS NAME AND PIPE DIAMETER.

THE CONTRACTOR SHALL TEST THE MAIN FOR DEFLECTION BY PULLING A MANDREL THROUGH THE SEWER AFTER ALL BACKFILL HAS BEEN PLACED AND COMPACTED OVER THE PIPE. THE MAXIMUM ALLOWABLE DEFLECTION SHALL NOT EXCEED 5% OF THE PIPE'S INSIDE DIAMETER. THE OUTSIDE DIAMETER OF THE TEST MANDREL SHALL BE EQUAL TO THE TO THE INSIDE DIAMETER OF THE PIPE LESS 5%. THE INITIAL TEST SHALL BE PERFORMED AT LEAST 30 DAYS AFTER PIPE INSTALLATION. A SECOND TEST SHALL BE PERFORMED AFTER 10 MONTHS OF PIPE INSTALLATION.

DRAWING NOT TO SCALE. PIPE MATERIAL AS SHOWN ON PLANS.



**REPORT OF GEOTECHNICAL INVESTIGATION  
COUNTY PARK LIFT STATION AND SANITARY SEWER REPLACEMENT  
MERIDIAN TOWNSHIP, MICHIGAN**

**Prepared For:**

MERIDIAN TOWNSHIP  
Okemos, Michigan

**Prepared By:**

MATERIALS TESTING CONSULTANTS, INC.

June 2023  
MTC Project No. 231111



June 19, 2023  
Project No. 231111

Meridian Township  
5151 Marsh Road  
Okemos, Michigan 48864

Attention: Mr. Jack Hughes  
Project Engineer

Reference: Report of Geotechnical Investigation  
County Park Lift Station and Sanitary Sewer Replacement  
Meridian Township, Michigan

Dear Mr. Hughes:

We have completed a geotechnical investigation for the above-referenced project. The purpose of this investigation has been to identify the general subsurface soil conditions in the vicinity of the proposed construction, analyze the conditions relative to the planned construction and to provide recommendations for the design of a replacement lift station and adjacent sanitary sewer. This work has been performed as described in our proposal (No. 17016) dated February 5, 2023, with our geotechnical scope of study based on Request for Quotation received on February 3, 2023, including requested boring locations and depths.

Presented herein are descriptions of our understanding of the design considerations, the geotechnical investigation, encountered conditions and engineering recommendations. The Appendix contains the report limitations and data collected during this investigation. As noted herein, we feel that additional geotechnical investigation is warranted to optimize the design which could be completed by Meridian Township or the Contractor through a delegated design.

## DESIGN CONSIDERATIONS

### Available Information

We have been provided the following documents and information for use in this investigation:

- Sanitary gravity and pressure main as-builts, drawn by G. Evans, Ayres, Lewis Norris & May Consulting Engineers, November 1960, received as a part of the request for quotation from Meridian Township received on February 3, 2023 (2 pages).
- Quail Street Water System As-builts, drawn by George E. Snyder Associates, October 1971, received as a part of the request for quotation from Meridian Township received on February 3, 2023 (3 pages).



- Email correspondence with Jack Hughes of Meridian Township regarding the type of construction, bid schedule, and County Park North Lift Station Plans drawn by Meridian Township, 2007.
- Conference call occurring on March 30, 2023, with Jack Hughes of Meridian Township, Jon O’Brock, and Mark DeHoog regarding known issues, possible concerns with construction, and proposing a phase 2 investigation to further delineate the encountered organic materials discovered in the initial investigation.
- Conference call occurring on May 3, 2023, with Jack Hughes and Younes Ishraidi of Meridian Township, Jon O’Brock, and Mark DeHoog to discuss the draft report.
- Project plan and profile sheets for the gravity sanitary sewer and forcemain, dated June 1, 2023, received in an email from Mr. Jack Hughes with Meridian Township on June 2, 2023.

### Location and Type of construction

The proposed project consists of reconstructing an existing lift station (referred to as County Park North Lift Station) and replacement of approximately 1,500 ft of sanitary sewer and an adjacent forcemain along Quail Street and East Reynolds Road. The lift station is located at 6271 E Lake Dr, in Haslett, Michigan at the Lake Lansing Boat Launch. The project area is shown in Figure No. 1.

We understand the existing sanitary sewer in this area has progressively settled causing performance issues with the settlement believed to be the result of poor soils. Based on a conference call on March 30, we understand that the most pronounced settlement has been observed in the vicinity of Borings B-3 and B-5. The existing gravity sanitary sewer is primarily 8 inch and buried on the order of 5 to 10 ft below grade based on the provided plan and profile and as built sheets. Based on the provided as built plans, it appears that manhole 2-43 is supported on piling with the sewer between Milenz Street and the lift station and from address #6355 to approximately 300 ft east being bedded in stone (no details shown on piling or stone geometry). Outside of these areas, no remarks about pipe support are visible and it is assumed the pipe is supported on grade. The existing forcemain is a 6-inch diameter cast iron pipe based on the provided plans and is installed parallel to the existing gravity sewer, likely in the same trench.

Based on the most recent available drawings, the proposed gravity sewer and forcemain will be constructed to the south of the existing sewers with the proposed gravity sewer invert generally on the order of 1 to 2 ft below that of the existing gravity sewer. The proposed offset from the southern right of way line is variable with a minimum of approximately a 7 to 10 ft offset based on scaled dimensions from the provided drawings. The new forcemain will be installed in the same trench and with the same support procedures as the gravity sewer. The current design indicates the use of piling to support several manholes as well as a detail for pile support of the proposed sewers, although the details do not indicate pile type or installation depth. Based on our discussions, we understand the township intends to utilize a non-vibratory piling system, such as helical piers, considering the proximity to existing residences in some areas.



Based on the provided as built plans, the existing lift station is a cylindrical structure with a bottom of slab approximately 22 ft below the surface grade (approximate bottom elevation 831). The provided drawings do not indicate the size of the existing lift station but based on scaled measurements it appears to be on the order of 8 to 10 ft in diameter. Based on the geometry of the lift station and the buried pump chamber, it appears likely that the existing structure was constructed using a dewatered open excavation, potentially also using earth retention. The lift station also services a 12-inch gravity sewer entering from the north that is not being replaced and has not been included in our investigation. We understand that the proposed replacement lift station will be lowered by approximately 3 ft to accommodate modern submersible pumps.

We should be informed of any changes between the actual design conditions and those described herein as this information may affect our recommendations.

#### INVESTIGATION METHODOLOGY

Conventional soil test borings and sampling along with field engineering reconnaissance were used to investigate the subsurface conditions with boring depths selected by Meridian Township. Boring B-5 was drilled an additional 4 ft beyond the requested depth to penetrate encountered organic soils. Boring locations are shown in Figure No. 1. Investigation procedures, soil classification information and boring logs are provided in the Appendix.

Table 1 – Boring Depth Summary

Number of Borings	6
Boring Depth Range, ft.	16.5 to 30

Borings were drilled and other sampling was conducted solely to obtain indications of subsurface conditions as part of a geotechnical exploration program. No services were performed to evaluate subsurface environmental conditions.

#### Laboratory

Soil samples were reviewed by one of our engineers and technically classified according to the methods of ASTM D2488 "Standard Practice for Description and Identification of Soils (Visual-Manual Procedure)". Calibrated penetrometer tests were performed on cohesive samples to obtain an indication of unconfined compressive strength values.

Selected samples were subjected to various laboratory tests, including:

- ASTM D422 "Test Method for Particle-Size Analysis of Soils"
- ASTM D2216 "Test Methods for Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass"



- ASTM D1140 "Test Methods for Determining the Amount of Material Finer than 75- $\mu$ m (No. 200) Sieve in Soils by Washing"
- ASTM D2974 "Test Methods for Determining the Water (Moisture) Content, Ash Content, and Organic Material of Peat and Other Organic Soils"

The samples subjected to grain-size testing were reclassified according to ASTM D2487 procedures "Standard Test Method for Classifications of Soils for Engineering Purposes". The ASTM D2487 and D2488 classifications are included on the boring logs. Results of the laboratory tests are provided in the Appendix.

## INVESTIGATION RESULTS

### Regional Geology

The *Map of the Surface Formations of the Southern Peninsula of Michigan*, published by the State of Michigan, indicates the site is in an area of moraines and ground moraines (till plains). Soil conditions typically are found to consist of a mixture of silt, clay and sand in this type of geologic area. More locally, the site is located adjacent to Lake Lansing and associated marsh areas which are likely to present non uniform deposits of organic and other water deposited soils. It is anticipated that initial development consisted of the placement of fill directly over wetland deposits based on the encountered subsurface conditions and reports of historical utility settlement with little to no remediation of unsuitable subgrade performed below utility inverts. The *Map of Bedrock Topography of the Southern Peninsula of Michigan* indicates bedrock to be at approximately el 750-800 feet, on the order of 50-100 feet below the ground surface elevation within our investigation area.

### Site Conditions

At the time of our field study, the area under investigation was an existing parking lot near the current lift station at the county park. Additional areas included the existing sanitary gravity and pressure mains existing beneath the right of way of Quail Street and Reynolds Road and on the east side of the grassy area in the county park. The present shoreline of Lake Lansing is approximately 175 to 250 ft south, southwest of the study area. The surface water elevation of Lake Lansing was approximately 851 feet during the time of our investigation. A wetland area was present in the general area of Boring B-5 on the opposite side of the roadway from the lake. Figure 1 shows the roadway in the vicinity of Boring B-5.

The existing HMA pavement in these roadways was noted to be in poor condition exhibiting frequent areas of alligator cracking and potholes. The roadway pavement was noted to be around 17 to 20 ft wide with the limits of right of way and utility easements unknown to us. The majority of the existing residences appear to be around 30-40 ft from the edge of pavement at a minimum with a few exceptions for sheds, decks and garages that are located closer. Most residential lots appeared to be relatively level with the roadway although a few



exceptions were noted with retaining walls near the edge of pavement on the order of 1-2 ft high. In general, no obvious structural distress was observed on the residences as visible from the road in the vicinity of our investigation; however, distress may have been obscured by vinyl siding or otherwise not visible to us and could be present based on the subsurface soils.

Figure 1 – Roadway in the vicinity of B-5



#### Subsurface Conditions

In general, borings encountered 1 to 4 inches of HMA overlying 6 to 12 inches of gravel base within the pavement areas of Quail Street, Reynolds Road, and the County Park parking lot. Boring B-2, drilled in the grassy area at the County Park, encountered 8 inches of topsoil. Beneath the pavement section or the topsoil, borings encountered 5.5 to 8.0 feet of very loose to medium dense silty sand (SM) to sandy silt (ML) fill which exhibited SPT N values ranging from less than 1 to 20. Below the fill, Borings B-1, B-2, and B-5 encountered fibrous peat (PT) overlying very loose organic silt (OL) to 10.5 to 15.5 feet below the ground surface. Beneath the organic soils, Borings B-1, B-2, and B-5 generally encountered loose to medium dense variable granular material (SP, SP-SM, SM, ML) to the end of exploration based on uncorrected SPT N values ranging from 7 to 15. Borings B-3, B-4, and B-6 generally did not encounter organic soils, and beneath the fill encountered loose to medium dense variable granular material (SP, SP-SM, SM, ML) to the end of exploration which exhibited uncorrected SPT N values ranging from 5 to 19. The relative density of granular soil is based on recorded SPT N-values while the consistency of cohesive soil is based on both recorded SPT N-values and on estimates of the unconfined compressive strength obtained with a calibrated penetrometer.

Groundwater was encountered near elevation 851 matching the adjacent lake and wetland water surface. Groundwater levels may fluctuate due to seasonal variations such as precipitation, snowmelt, nearby river or lake levels and other factors that may not be evident at the time of measurement. Groundwater levels may be different at the time of construction.



This section has provided a generalized description of the encountered subsurface soil conditions. The boring logs located in the Appendix should be reviewed for detailed soil descriptions. Some variation between boring locations may be expected.

## CONCLUSIONS AND RECOMMENDATIONS

Overall, this project is expected to present various challenges considering the encountered groundwater and organic soils along with the narrow right of way and nearby structures. We have addressed these challenges by providing recommendations for two options for construction of the sewers and lift station, respectively. As the design progresses, we remain open to providing additional design input, as requested.

### Sanitary Gravity and Pressure Mains

Considering the above referenced past performance issues as well as the presence of organic materials encountered in our soil borings, support of the proposed piping on grade in all areas will not be possible without significant risk of future settlement as has been experienced previously. Borings B-3, B-4 and B-6 encountered inorganic soils which may be suitable for support for piping on grade although the vicinity of Boring B-3 is also reported to be the area of most severe settlement which suggests that there is additional variability including the presence of buried organic soil that may not have been directly sampled due to the non-continuous sampling utilized. We have addressed two options for reconstructing these areas including overexcavation and deep foundation support.

Both of these options may be feasible in some areas and selecting the limits of support will be a key design objective. In general, the use of a properly designed deep foundation support system is expected to present a lower risk of long-term settlement than overexcavation and as a default could be used in all areas where the subgrade support is a concern. Considering the expected cost of deep foundation support, the use of overexcavation in select areas where it is feasible may still be beneficial.

### Overexcavation

Considering the encountered depth of organics in our soil borings, overexcavation to remove the organics and other unsuitable subgrade soils is expected to be feasible to achieve an acceptable utility support condition in some project areas to reduce the risk of future settlement. Also, based on our borings, it appears that some areas are present where significant over excavation below the pipe invert may not be needed to achieve an acceptable subgrade bearing condition.

Challenges relating to overexcavation will include, but not be limited to, dewatering and protection of surrounding structures, utilities, etc. Earth retention may be needed in some areas to complete the installation of sewers including any required overexcavation. The cost





of earth retention is expected to be a factor in determining feasibility of overexcavation. Where utilized, we recommend that non vibratory earth retention be specified due to the proximity to existing structures and utilities.

To perform overexcavation, the contractor should be prepared to temporarily lower groundwater to a minimum of 2 ft below the depth of excavation required for overexcavation and utility installation to account for subgrade preparation, subgrade inspection and engineered fill placement.

Overexcavation should encompass soil within the stress influence region of the utility, defined as a region bordered by 2V:1H planes extending down and away from the bottom edge of the utility trench to the approved bearing stratum. The subgrade should be inspected and tested by qualified geotechnical personnel familiar with the geotechnical recommendations. As part of the inspection and testing, the subgrade should be verified to be consistent with the conditions encountered in this investigation and be free of organic soil below the bearing elevation. Additional soil borings should be performed, as necessary, as part of this verification to confirm the limits of organic soil. This testing should include the verification of acceptable unconfined compressive strengths in cohesive soil and a dynamic cone penetrometer (ASTM STP 399) to verify minimum relative densities and equivalent N-values in granular soil. Care should be taken to maintain the natural moisture content of clayey subgrade soil which may become soft when saturated from rainfall, etc.

We understand that Meridian Township desires to explore the use of geotextile or geogrid to stabilize the subgrade beneath the pipe as an additional precaution. In this situation, considering the relatively widespread settlement, it appears that use of a geotextile or geogrid would provide little to no resistance to this type of settlement but could help to make settlement more gradual at soil transitions. In this case, we are not opposed to using these products for additional subgrade stabilization provided the subgrade is also addressed as recommended herein.

#### *Bedding and Backfill*

The following materials are recommended for the sanitary gravity and pressure mains upon confirmation of suitable and approved subgrade:

- Sand for backfilling – should meet the requirements for Granular Materials Class II as specified in the MDOT 2020 Standard Specifications for Construction Manual
- Sand for bedding – should meet the requirements for MDOT Class II except 100% shall pass a 3/8 inch sieve as specified in the MDOT 2020 Standards Specifications for Construction Manual

Much of the granular soil encountered in the upper 5.5 to 8 feet in our borings is expected to have excessive fines for use as sand bedding based upon visual classification. Provided the excavation spoils do not contain organics, debris or other deleterious materials, they may be



suitable for reuse as backfill but are likely to be difficult to compact efficiently and may lead to future settlement concerns. We suggest that the budget consider all bedding and backfill (fulfilling MDOT specifications) be imported, although it may be feasible to utilize existing material in the green space of the county park as long as moisture and density requirements are satisfied.

### Deep Foundation Support

As an alternative to removing the underlying organic soils and to control the risk of future settlement due to unsuitable organic subgrade soil, deep foundations could be utilized to support the proposed sanitary sewer and forcemain. Additionally, as the existing subgrade condition is expected to vary between our borings, use of deep foundations would reduce the risk of unidentified organic soil deposits impacting the constructed sewer.

We expect deep foundation support to include saddles or other suitable structural elements to be placed periodically along the sewer to sufficiently support the pipe and prevent settlement. Based on a provided detail, we understand that Meridian Township has experience working with saddle systems composed of treated timbers supported on driven timber piles. In this case, we understand that Meridian Township intends to use a non-vibratory system such as helical piers. We have provided recommendations related to helical piers but would be able to evaluate alternate foundations systems upon request, such as non-vibratory augercast piles. The structural design of the saddle system and permissible span distance along the pipeline is beyond the scope of our services and should be completed by a structural engineer.

A helical pier foundation system is a segmental deep foundation system consisting of steel bearing plates (helices) welded to a central steel shaft. The central steel shaft is typically manufactured in 5 ft lengths with a wide array of shapes and sizes. Specialized galvanized coatings or sacrificial anodes may be used to increase the corrosion resistance of the pier materials. After the helices are welded onto the shaft sections at predetermined locations, the pier is "screwed" into the ground by applying a torque and adding steel extensions until the desired ultimate capacity is reached. Helical piers can be installed with minimal ground disturbance using relatively lightweight equipment and construction machinery, such as excavators outfitted with specialized torque attachments.

Corrosion protection should be evaluated by the Helical Pier Contractor and submitted to the Engineer in a shop submittal. Corrosion protection of helical piers is commonly accomplished through specialized metal such as hot dip galvanizing, dielectric coatings, sacrificial steel or a bituminous coating. At a minimum hot dip galvanizing, or an approved equivalent, should be applied to all helical pier components considering the presence of buried organic material. We also recommend that consideration be given to accounting for an appropriate sacrificial steel thickness to account for corrosion loss in the even these coatings are compromised.



The work should be performed by a Contractor with at least 5 years of experience installing similar foundation systems. The lead section should be installed at least 3 ft or three helix diameters, whichever is greatest, into competent bearing soil while achieving the minimum required torque over the last 3 ft of installation. Helical piers should be installed such that the uppermost helix plate bears below any organic or fill materials which were found to extend to approximately elevation 835 in Boring B-5. This elevation is likely to vary throughout the project limits and may require additional investigation to confirm in other areas. Applicable downdrag loads should be considered in helical pier design.

The Contractor's installation equipment should be calibrated and calibration charts should be submitted to the Engineer before the start of work equating installation torque or pressure to pier ultimate capacity (in kips). The Contractor's submittal should indicate the proposed layout of the helical pier locations, helical pier type, typically pier-to-saddle connection details as well as ultimate bearing capacity and shaft buckling design calculations. The submittal should be prepared by a Professional Engineer licensed in the State of Michigan and submitted at least two weeks before construction. The Contractor's submittal should consider the potential corrosion, such as annual corrosion losses, buckling, and should provide calculations supporting a minimum design life of 50 years or greater as specified by the construction documents.

The pier capacity should be confirmed by the Contractor at the start of the work by a static load test to verify the Contractor's torque conversion relating applied torque to axial capacity. Before the installation of production piers, the Contractor should complete one successful static load test (ASTM D 1143). Standard loading procedures should be followed with the exception that the maximum load should be held at least 4 hours. The test pier should be installed by the Contractor with the same equipment, means, and methods as the production piers. Test reports for each installed pier should be provided by the Owner and should include pier number, pier length, installed torque, torque factor considered, observations of installation including difficult drilling and installation date. The contractor should be aware of the potential for buried obstructions which may require pre-excavation to install piers or, alternatively, installation of additional piers to accommodate the design intent.

The design of the overall support system would need to be performed by a structural engineer. We expect that helical pier foundations would gain capacity in the loose to medium dense soil strata based on Boring B-1 which was completed at the lift station considering appropriate downdrag (negative skin friction) loading from organic material and fill above. Additional soil borings would be beneficial to further quantify bearing conditions and to reduce risk which could either be completed by Meridian Township as the Owner or by the Contractor as a delegated design. In the absence of additional borings, the installation of selected test piers may be beneficial to help reduce risk and assist the Contractor with correctly ordering materials considering there may be some variability in installation depth, although care will still be needed to ensure that piers are installed to an approved bearing elevation below any organic soil layers.



### Lift Station Wet Well

We understand that the lift station will be constructed to approximately 25 feet below the existing ground surface (approximately elevation 830), extending roughly 3 ft deeper than the existing structure. Additional structure depth may be needed to provide ballast to resist uplift loading which would increase the overall depth. Should plans become available, we would be able to review and provide additional comments as warranted.

We expect the encountered medium dense silty sand and poorly graded sand encountered at the bearing elevation to be suitable for support of the proposed structure considering a net zero or negative stress increase due to the removal of soil as part of construction. Care should be taken to avoid disturbing the subgrade during construction through adequate groundwater management and construction procedures.

A minimum 12 inches of MDOT 21AA dense-graded aggregate is recommended below mat slab foundations constructed below groundwater to assist with limiting disturbance to underlying subgrade while also providing an ability to facilitate localized dewatering within the gravel. Depending on groundwater flow into excavations, it may be favorable to utilize an open-grade drainage aggregate in lieu of MDOT 21AA, such as MDOT 6A (80 percent crushed), MDOT 34R, MDOT 34G or approved equivalent. If open-graded aggregate is utilized, it should be fully wrapped in a non-woven geotextile fabric to minimize soil migration into the aggregate.

Based on the location within the boat launch and county park, we feel that construction via either a dewatered open cut with earth retention (as needed) or use of the sinking caisson method would be feasible. In this case, we feel that the sinking caisson likely presents the lowest risk of construction related issues although this may vary given the contractor experience and the final design of the lift station. We understand that the design team is currently considering the use of a Pro-Tec Equipment slide rail system utilizing a dewatered excavation although this has not been confirmed.

An open cut excavation with earth retention should consider protection of surrounding structures, which in this case, is expected to consist of the existing lift station (assumed to be left in place during construction) and the existing influent sewers and forcemain. The exact location of the proposed lift station has not been provided to us and we are unaware of the offset from these existing structures.

A sinking caisson installation involves constructing the wet well using precast concrete rings which are pushed into the ground while removing material from within the rings. Following advancement of the structure to the required depth, a base slab is placed using underwater concrete placement methods after which the interior of the structure can be pumped of water to allow construction to continue. Benefits of this method primarily center around being able to construct the deepest portion of the structure without dewatering. Dewatering would still be necessary to a lesser extent to perform overexcavation below and construct the adjacent sewer which would be cored through the lift station structure after installation.



The Contractor should have successfully completed other lift station excavation/construction with similar conditions. The contractor should submit an alternate method for review by the Engineer if deemed appropriate if in contrast to those discussed herein. The Contractor should determine the means and methods for constructing below grade structures. Additionally, we feel that the boring depth requested at the lift station may be inadequate for design of the proposed construction with respect to the structure depth and suggest additional soils information be obtained prior to bidding, particularly if significant additional structure depth is needed to provide ballast. Alternatively, the Contractor could be required to obtain additional soils information as part of their bid.

The Contractor shall employ a geotechnical/structural professional engineer licensed and insured in the State of Michigan to prepare the wet well construction work plan and to document conformance to the accepted work plan. The Contractor shall submit the work plan to the Owner's engineer in a timely manner for review, comment, and acceptance. As a minimum, the detailed work plan should include:

- Construction method for installation of the wet well and all structures to be located within the resulting area of disturbance.
- Construction schedule, sequence and staging for installation of the wet well, and all structures to be located in the resulting area of disturbance.
- Dewatering plan and groundwater level monitoring plan during all stages of the construction.
- Design calculations supporting all aspects of this work plan including temporary earth retention.
- Construction quality control monitoring plan, and
- All other details pertinent to the complete review of the submittal by the Owner and its engineer. The Contractor's professional engineer should document the critical quality control aspects of the work to be in conformance with the construction quality control in the submittal.

The contractor will be responsible for implementing a suitable dewatering system depending on the installation method chosen. Where temporary earth retention and excavation are utilized for lift station construction, groundwater shall be lowered to a minimum of 2 ft below the bottom of proposed excavation with suitable groundwater monitoring wells installed by the Contractor to verify function of the dewatering system. The excavation should provide an adequate excavation sidewall angle per OSHA standards while protecting all surrounding utilities and structures.

The design should provide a suitable factor of safety against uplift of the lift station, for either caisson or open-cut with earth retention construction methods, at the maximum design groundwater/flood elevation. The flotation concern should be addressed with an appropriate factor of safety by extending the footing horizontally at the base of the structure (if open-cut construction methods are used) or by providing sufficient ballast within the caisson. The base slab and walls of the lift station should also be designed to resist the maximum design



groundwater/flood elevation hydrostatic pressure. We recommend the design groundwater elevation for structural and buoyant uplift be set to the higher of the ground surface or appropriate design flood elevation considering the adjacent lake.

Based on the encountered organic soil in Boring B-1, support of adjacent structures on grade surrounding the lift station is not recommended unless significant settlement can be tolerated. Additionally, the existing influent sewers (particularly the second influent sewer not being replaced) may be supported within organic soil requiring special support considerations. While likely beyond the scope of the project in some areas, we recommend consideration be given to improving the support condition by overexcavating underlying organic soils in areas where existing sewers are exposed.

#### General Site and Subgrade Preparation

All topsoil, vegetation, roots, and any other miscellaneous debris should be removed from within the proposed construction areas. The limits of the proposed construction area, prior to the placement of any structures or engineered fill material, should be proofrolled and compacted in the upper 12 inches using suitable compaction equipment to at least 95 percent of the soil's maximum ASTM D1557 dry density by the Contractor. Proofrolling is defined as the passing of relatively heavy construction equipment over the soil subgrade under observation by the Geotechnical Engineer. The response of the soil, when subjected to the applied load, is subjectively evaluated by our staff with respect to its ability to support the overlying soil or structure. In areas where excessive deflection is observed, special subgrade preparation measures may be recommended to provide an acceptable subgrade condition. These measures may consist of compaction of the subgrade at moisture contents close to the optimum value, undercutting affected areas and replacing with engineered fill, use of a geotextile separation fabric or some combination of these measures.

Engineered fill is approved on-site or imported soil placed in uniform layers and compacted to a minimum required density. Generally, on-site soil with a group symbol of SP or SP-SM is expected to be suitable for engineered fill. Imported fill should meet the requirements for MDOT Class II granular material. MDOT Class II soil or approved on-site soil meeting the requirements of SP-SM should be used as backfill against below-grade walls and foundations.

Granular engineered fill and backfill should be compacted to at least 95 percent of the soil's maximum dry density as determined by the Modified Proctor test (ASTM D1557). Vibratory compaction methods are typically found to be most effective in granular soils; however, relatively light equipment should be used adjacent to utilities or sensitive structures to avoid damage. The fill should be placed and compacted in horizontal layers not exceeding 9 inches. Field density tests (ASTM D2922) should be taken on each lift, as the fill is being placed, to verify compliance with compaction specifications. If the earthwork takes place during winter months, fill must not be placed on frozen ground and fill with frozen conglomerations of soil must not be used.



### Pre-Construction Survey and Monitoring

The presence of surrounding structures, particularly high-end homes, presents a risk of claims to the project as a result of damage. Further, many of these structures potentially may be supported above organic soil which both places them at an elevated risk of damage and also increases the likelihood that existing structural distress could be incorrectly attributed to the project after the fact.

To protect against this, we recommend a pre-construction survey be performed at all structures within 100 ft of the proposed construction area. The pre-construction survey should be performed by the Contractor's professional videographer and include an assessment of the existing structural condition and photo or video-documentation of existing cracks and structural defects. Crack monitors capable of measuring crack displacement and rotation to the nearest 1 mm and settlement monitoring points should be set prior to construction and monitored throughout construction. Additional preconstruction monitoring may be warranted in some situations to document if existing movement is ongoing.

We recommend the bid documents include an allowance for a minimum of 15 crack monitors and 15 settlement markers to be set by the Contractor at locations agreed upon by the Engineer after the performance of the pre-construction survey. Crack monitor and settlement marker readings should be obtained at least one week before construction and every 2 hours during construction. Settlement readings shall be by optical or laser level having an accuracy of 0.01 ft. Results of the monitoring program shall be submitted to the Engineer daily for review. If crack or structural movement of the existing facilities is detected, the contractor shall immediately notify appropriate parties and develop a corrective action plan to prevent further damage and repair all damages.

### Groundwater and Dewatering

Groundwater was encountered near the surface water elevation of Lake Lansing (approximately elevation 851), with existing sanitary inverts on the order of 5 ft below the encountered depth of groundwater. Because groundwater was encountered at or above the anticipated excavation depth, the control of groundwater for construction is expected to be of concern on this project. Groundwater will be encountered during construction and suitable control of groundwater should be anticipated and planned for accordingly before the start of construction. Groundwater may or may not be higher at the time of construction based on adjacent lake levels, precipitation, etc. with piezometers recommended to evaluate over time and plan dewatering efforts appropriately.

The Contractor will be responsible for evaluating all dewatering requirements on the project. We have provided test boring logs with groundwater levels recorded while drilling for the Contractor's use in evaluating dewatering requirements. The contractor should be responsible for selecting and implementing an appropriate groundwater control system. The Contractor should take all necessary means to provide protection to existing structures during



dewatering. The Contractor should have previous dewatering experience on projects with similar conditions. Suitable silt and sediment traps should be incorporated into the dewatering system. We recommend the groundwater be temporarily lowered a minimum of 2 ft below the deepest excavation to allow for appropriate subgrade observation and testing as well as appropriate pipe bedding placement. It will be necessary for the Contractor to control storm water during rain events and to prevent the wash-out of excavation slopes and potential undermining of utilities or structures.

The Contractor should consider installation of piezometers to evaluate the groundwater elevations at the time of construction and to assist in selection of appropriate dewatering and groundwater control measures.

Dewatering systems may consist of well point, deep wells or other approved methods and should be designed and installed by a qualified dewatering Contractor with at least 5 years of experience successfully dewatering sites in similar subsurface conditions with a design submittal prepared and signed by a State of Michigan licensed Professional Engineer, submitted at least 2 weeks prior to mobilization for review by the Engineer. The design should take into account the potential for existing structure settlement due to lowered groundwater levels and an associated increase in vertical effective stress of existing foundation subgrade.

#### Slopes and Temporary Excavations

The Owner and the Contractor should make themselves aware of and become familiar with applicable local, state, and federal safety regulations, including current OSHA excavation and trench safety standards. Construction site safety generally is the sole responsibility of the Contractor. The Contractor shall also be solely responsible for the means, methods, techniques, sequences and operations of construction operations. We are providing the following information solely as a service on this project and, under no circumstances, should our provision of the following information be construed to mean that we are assuming responsibility for construction site safety or the Contractor's activities; such responsibility is not implied and should not be inferred.

The Contractor should be aware that slope height, slope inclination, and excavation depths (including utility trench excavations) should in no case exceed those specified in local, state, or federal safety regulations; e.g., OSHA Health and Safety Standards for Excavations, 29 CFR Part 1926, or successor regulations. For this site, the overburden soil encountered in our exploratory program is a sandy silt to silty sand (saturated at or above the invert elevations). We anticipate that OSHA will classify these materials as Type C. OSHA recommends a maximum slope inclination of 1½H:1V for this type of soil under ideal conditions. If any excavation, including a utility trench, is extended to a depth of more than 20 ft, OSHA requires that the side slopes of such excavation be designed by a professional engineer registered in the State of Michigan. Temporary slopes in organic soils should be evaluated by the Contractor and their professional engineer registered in the State of Michigan for appropriate slope angles and need for lateral support.





Excavations ranging up to approximately 30 ft may be needed to complete installation of the proposed lift station with varying depths needed in areas of overexcavation, where this is performed. Earth retention will be needed at the lift station location and is also likely to be needed in areas along the sewer route due to proximity to the southern right of way line as well as other utilities.

The contractor or the specialty subcontractor should be responsible for the design of the temporary shoring in accordance with applicable regulatory requirements. We recommend the use of vibrationless systems to reduce the risk to surrounding structures.

MBC Seismic Considerations

The seismic design category can be determined with noted exceptions following Section 1613 of the 2015 Michigan Building Code. The Risk Category under Section 1613.3.5 shall be determined by a licensed structural engineer. Based on the subsurface conditions identified in the soil borings, our experience with the geological conditions in the site vicinity and the procedures outlined in Section 1613 of the 2015 Michigan Building Code and Chapter 20, Table 20.3-1 of ASCE 7, we recommend assigning a Site Class D to this site. A Site Class D designates a stiff soil profile in the upper 100 ft with average SPT uncorrected N-values between 15 and 50 in granular soil and average undrained shear strengths,  $s_u$ , between 1,000 and 2,000 psf in cohesive soil. Recommended seismic ground motion values are provided in the Table 2 below:

Table 2 - Recommended Seismic Ground Motion Values

2015 Michigan Building Code Values	Short Period (0.2 sec)	Long Period (1 sec)
Spectral Response Acceleration, Figure 1613.3.1(1 and 2), %g	$S_s = 8.7$	$S_l = 4.8$
Seismic Site Coefficient, Table 1613.3.3(1 and 2)	$F_a = 1.6$	$F_v = 2.4$
Maximum Considered Spectral Response Acceleration, Equations 16-37 and 16-38	$S_{MS} = 0.139g$	$S_{MI} = 0.115g$
5% Damped Spectral Response Acceleration, Equations 16-39 and 16-40	$S_{DS} = 0.093g$	$S_{DI} = 0.077g$

CLOSURE

In this report, descriptions of the geotechnical investigation, encountered conditions, and recommendations for the design of foundations and earth-related structures have been presented. The limitations of this study are described in the Appendix.

The recommendations presented in this report are based upon a limited number of subsurface samples obtained from various sampling locations. The samples may not fully indicate the nature and extent of the variations that actually exist between sampling locations. For that



reason, among others, we strongly recommend that a qualified geotechnical firm be retained to observe earthwork construction. If variations or other latent conditions become evident during construction, it will be necessary for us to review these conditions and our recommendations as appropriate.

We appreciate the opportunity to provide this service to you on this project. Should you have any questions or require further assistance, please contact our office.

Sincerely,

**MATERIALS TESTING CONSULTANTS, INC.**

Mark DeHoog, E.I.T.  
Senior Staff Engineer

Jonathan E. O'Brock, P.E.  
Project Manager

Attachments: Figure No. 1 - Boring Location Plan

Appendix

- Limitations
- Test Drilling and Sampling Procedures
- Boring Log Terminology and Classification Outline
- Boring Logs
- Laboratory Summary Table
- Laboratory Results

**LEGEND**

● BORING LOCATION (TYP)

NOTE: AERIAL IMAGE FROM GOOGLE EARTH



TITLE: BORING LOCATION PLAN

PROJECT: MERIDIAN TOWNSHIP – COUNTY PARK LIFT STATION AND SANITARY SEWER MAIN REPLACEMENT

SCALE: AS SHOWN

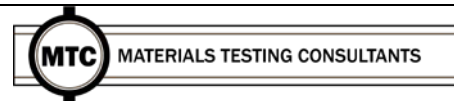
DATE: 3/24/2023

PROJECT NO.: 231111

FIG. NO.: 1

DR. BY: JM

REV. BY: JO





## *APPENDIX*

- Limitations
- Test Drilling and Sampling Procedures
- Boring Log Terminology and Classification Outline
- Boring Logs
- Laboratory Summary Table
- Laboratory Results



## LIMITATIONS

### Soil Variations

The recommendations in this report are based upon the data obtained from the soil borings. This report does not reflect variations which may occur between these borings, and which would not become evident until construction. If variations then become evident, it would be necessary for a re-evaluation of recommendations of this report, after performing on-site observations.

### Warranties

We have prepared this report in accordance with generally accepted soil and foundation engineering practices. We make no other warranties, either expressed or implied, as to the professional advice provided under the terms of our agreement and included in this report. This report is prepared exclusively for our client and may not be relied upon by other parties without written consent from our office.

### Boring Logs

In the process of obtaining and testing samples and preparing this report, we follow reasonable and accepted practice in the field of soil engineering. Field logs maintained during drilling describe field occurrences, sampling locations, and other information. The samples obtained in the field are subjected to additional testing in the laboratory and differences may exist between the field logs and the final logs. The engineer reviews the field logs and laboratory test data, and then prepares the final boring logs. Our recommendations are based on the contents of the final logs.

### Review of Design Plans and Specifications

In the event that any changes in the design of the building or the location, however slight, are planned, our recommendations shall not be considered valid unless modified or approved in writing by our office. We recommend that we be provided the opportunity to review the final design and specifications in order to determine whether changes in the original concept may have affected the validity of our recommendations, and whether our recommendations have, in fact, been implemented in the design and specifications.

Test Drilling Methods:

- Hollow stem auger, ASTM D6151
- Mud rotary, ASTM D5783
- Casing advancer, ASTM D5872
- Rock coring, ASTM D2113
- Hand Auger
- 4-inch Portable Pavement Core Drill

*Note: Cone penetration test data can be used to interpret subsurface stratigraphy and can provide data on engineering properties of soils. The ASTM procedure does not include a procedure for determining soil classification from CPT testing. Soil classifications shown on CPT logs are based on published procedures and are not based on physical ASTM soil classification tests.*

Sampling Methods:

- SPT, ASTM D1586, Auto hammer (140 lb., 30" drop, 2" OD split spoon sampler)
- Thin-walled tube sampler (Shelby), ASTM D1587

*Note: The number of hammer blows required to drive the SPT sampler 12 inches, after seating 6 inches, is termed the soil N-value and provides an indication of the soil's relative density and strength parameters at the sample location. SPT blow counts in 6 inch increments are recorded on the boring logs.*

Drill Rig:

- Acker Renegade (ATV)
- CME 55 (ATV)
- CME 45 Truck
- Geoprobe 7822
- Geoprobe Rotary Sonic

Boreholes Backfilled With:

- Excavated soil
- Cold patch at surface in HMA roadway/parking lot
- Cement bentonite grout
- Piezometer or Monitoring Well (see notes on logs)
- Concrete or asphalt patch where appropriate

Sample Handling and Disposition:

- Samples labeled, placed in sample bags, returned to MTC Laboratory
- Discard after 60 days



# LOG OF BORING

**Project No.:** 231111

**Boring No.:** B-1

**Sheet:** 1 of 1

**Project:** Meridian Township - County Park Lift Station and Sanitary Sewer Main Replacement

**Client:** Meridian Township

**Date Begin:** 03/15/2023

**Date End:** 03/15/2023

**Location:** Meridian Township, Michigan

**Drill Type:** Geoprobe 7822

**Crew Chief:** MS      **Field Eng.:** ES      **Rev. By:** JO

**Coordinates:** N=460717.9 E=13115938.7 (MI South 11ft)

**Elevation:** 854.5 ft      **Datum:** NAVD 88 (GPS Observation)

**Notes:**

**Plugging Record:** Backfilled borehole with bentonite hole plug, pavement sealed with asphalt coldpatch. Cave in at 17.0 ft.

**Depth Drilled:** 30.0 ft.

Tooling	Type	Dia.	Groundwater, ft.	
Casing	HSA	3 1/4"	During	3.5
Sampler	SPT	2"	End	4.0
Core			Seepage	
Tube	Shelby	3"	Date	Depth, ft.
SPT Hammer	Auto			

**Component Percentages:** Trace < 5%, Few 5-10%, Little 15-25%, Some 30-45%, Mostly 50-100%

**QP =** Calibrated Penetrometer (tons/sq. ft.)

Elev. FT.	Depth FT.	Sample Number	Recov. FT.	Penetration (Blows Per 6") ASTM D 1586	*USCS Group Symbol	*DESCRIPTION	QP tsf	MST %	P200 %	REMARKS
853.5	1					4" HMA, 6" Gravel Base	0.8			Fill: 0' to 5.5'
852.5	2	S-1	1.5	2-2-2 N=4	SM	Brown silty SAND; mostly coarse to fine sand, little silty fines, few fine gravel, moist with occasional sand partings and occasional clay lenses, occasional organic partings	3.0			
851.5	3									
850.5	4					Gray silty SAND; mostly coarse to fine sand, little silty fines, wet	5.5			
849.5	5	S-2	1.5	3-3-6 N=9	SM					
848.5	6					Black fibrous PEAT, wet				
847.5	7	S-3	1.5	1-2-4 N=6	PT					
846.5	8					Shelby				
845.5	9									
844.5	10	U-4	1.4						U-4: Poor recovery; possible coarse gravel / COBBLE	
843.5	11									
842.5	12					Gray poorly graded SAND; mostly coarse to fine sand, trace silty fines, wet	12.0			
841.5	13									
840.5	14					4-4-3 N=7	SP			
839.5	15	S-5	0.3							
838.5	16					Gray silty SAND; mostly coarse to fine sand, little silty fines, wet.				
837.5	17									
836.5	18					Grades with clayey sand with fibrous peat lens at 18.8' Grades with fine sand at 19.0'			14.8	
835.5	19									
834.5	20	S-6	1.5	5-5-5 N=10	SM				17.6	
833.5	21									
832.5	22					Brown poorly graded SAND with silt; mostly coarse to fine sand, few silty fines, few fine gravel, wet				
831.5	23									
830.5	24					6-7-7 N=14	SP-SM			
829.5	25	S-7	1.5							
828.5	26					Gray silty SAND; mostly fine sand, some silty fines, trace fine gravel, wet				
827.5	27									
826.5	28					SM				
825.5	29									
824.5	30	S-8	1.5	6-8-7 N=15		Grades with coarse to fine sand	30.0			
End of Boring										

\* Visual estimate following ASTM D 2488 unless laboratory testing has been performed. Stratification changes are approximated between samples.



# LOG OF BORING

**Project No.:** 231111

**Boring No.:** B-2

**Sheet:** 1 of 1

**Project:** Meridian Township - County Park Lift Station and Sanitary Sewer Main Replacement

**Client:** Meridian Township

**Date Begin:** 03/15/2023

**Date End:** 03/15/2023

**Location:** Meridian Township, Michigan

**Drill Type:** Geoprobe 7822

**Crew Chief:** MS      **Field Eng.:** ES      **Rev. By:** JO

**Coordinates:** N=460728.5 E=13115843.6 (MI South 11ft)

**Elevation:** 852.8 ft      **Datum:** NAVD 88 (GPS Observation)

**Notes:**

**Plugging Record:** Backfilled borehole with bentonite hole plug, pavement sealed with asphalt coldpatch. Cave in at 7.3 ft.

**Depth Drilled:** 16.5 ft.

Tooling	Type	Dia.	Groundwater, ft.	
Casing	HSA	3 1/4"	During	6.5
Sampler	SPT	2"	End	7.0
Core			Seepage	
Tube			Date	Depth, ft.
SPT Hammer	Auto			

**Component Percentages:** Trace < 5%, Few 5-10%, Little 15-25%, Some 30-45%, Mostly 50-100%

QP = Calibrated Penetrometer (tons/sq. ft.)

Elev. FT.	Depth FT.	Sample Number	Recov. FT.	Penetration (Blows Per 6") ASTM D 1586	*USCS Group Symbol	*DESCRIPTION	QP tsf	MST %	P200 %	REMARKS
851.8	1	S-1	1.5	3-6-6 N=12		8" Topsoil	0.7			Fill: 0' to 7.1' WOH: Weight of Hammer
850.8	2					Brown to gray silty SAND; mostly coarse to fine sand, little silty fines, few fine gravel, moist with occasional clay lenses				
849.8	3									
848.8	4	S-2	1.5	2-2-2 N=4	SM	Grades with occasional black peat lenses / partings				
847.8	5									
846.8	6	S-3	1.5	2-2-1 N=3		Grades wet	7.1			
845.8	7					Black fibrous PEAT, occasional woody fragments, wet				
844.8	8					PT	8.0			
843.8	9	S-4	0.5	WOH-1/12"	OL	Brown organic SILT, mostly silty fines, wood fragments common, wet	10.5			S-4: Poor recovery; possible coarse gravel / COBBLE
842.8	10									
841.8	11	S-5	1.5	3-4-5 N=9	SP	Gray poorly graded SAND; mostly fine sand, trace silty fines, wet				
840.8	12									
839.8	13	S-6	1.5	5-6-7 N=13						
838.8	14									
837.8	15	S-7	1.5	4-6-6 N=12						
836.8	16									
End of Boring										

End of Boring										
---------------	--	--	--	--	--	--	--	--	--	--

\* Visual estimate following ASTM D 2488 unless laboratory testing has been performed. Stratification changes are approximated between samples.





# LOG OF BORING

**Project No.:** 231111

**Boring No.:** B-3

**Sheet:** 1 of 1

**Project:** Meridian Township - County Park Lift Station and Sanitary Sewer Main Replacement

**Client:** Meridian Township

**Date Begin:** 03/15/2023

**Date End:** 03/15/2023

**Location:** Meridian Township, Michigan

**Drill Type:** Geoprobe 7822

**Crew Chief:** MS      **Field Eng.:** ES      **Rev. By:** JO

**Coordinates:** N=460732.6 E=13115574.6 (MI South 11ft)

**Elevation:** 853.4 ft      **Datum:** NAVD 88 (GPS Observation)

**Notes:**

**Plugging Record:** Backfilled borehole with bentonite hole plug, pavement sealed with asphalt coldpatch. Cave in at 8.3 ft.

**Depth Drilled:** 16.5 ft.

Tooling	Type	Dia.	Groundwater, ft.	
Casing	HSA	3 1/4"	During	6 ±
Sampler	SPT	2"	End	4.0
Core			Seepage	
Tube			Date	Depth, ft.
SPT Hammer	Auto			

**Component Percentages:** Trace < 5%, Few 5-10%, Little 15-25%, Some 30-45%, Mostly 50-100%

**QP =** Calibrated Penetrometer (tons/sq. ft.)

Elev. FT.	Depth FT.	Sample Number	Recov. FT.	Penetration (Blows Per 6") ASTMD 1586	*USCS Group Symbol	*DESCRIPTION	QP tsf	MST %	P200 %	REMARKS
852.4	1					2" HMA, 6" Gravel Base	0.7			Fill: 0' to 6.0'
851.4	2	S-1	1.5	12-10-9 N=19	SM	Brown silty SAND; mostly coarse to fine sand, little silty fines, few fine gravel, moist, Fill				S-2: Poor recovery; possible coarse gravel / COBBLE
850.4	3									
849.4	4				SM					
848.4	5	S-2	0.5	1-1/12"						
847.4	6				SP	Gray poorly graded SAND; mostly coarse to fine sand, trace silty fines, wet				Charged augers with water following S-4
846.4	7	S-3	1.5	2-3-3 N=6						
845.4	8				SP					
844.4	9	S-4	1.5	3-2-3 N=5						
843.4	10				ML	Gray sandy SILT; mostly silty fines, some fine sand, wet				
842.4	11	S-5	1.5	3-6-6 N=12						
841.4	12				ML					
840.4	13	S-6	1.5	3-4-4 N=8						
839.4	14				ML					
838.4	15	S-7	1.5	3-4-5 N=9						
837.4	16						16.5			

End of Boring

\* Visual estimate following ASTM D 2488 unless laboratory testing has been performed. Stratification changes are approximated between samples.



# LOG OF BORING

**Project No.:** 231111

**Boring No.:** B-4

**Sheet:** 1 of 1

**Project:** Meridian Township - County Park Lift Station and Sanitary Sewer Main Replacement

**Client:** Meridian Township

**Date Begin:** 03/16/2023

**Date End:** 03/16/2023

**Location:** Meridian Township, Michigan

**Drill Type:** Geoprobe 7822

**Crew Chief:** MS      **Field Eng.:** ES      **Rev. By:** JO

**Coordinates:** N=460825.6 E=13115279.4 (MI South 11ft)

**Elevation:** 859.6 ft      **Datum:** NAVD 88 (GPS Observation)

**Notes:**

**Plugging Record:** Backfilled borehole with compacted cuttings, patched pavement with cold patch. Cave in at 6.0 ft.

**Depth Drilled:** 16.5 ft.

Tooling	Type	Dia.	Groundwater, ft.	
Casing	HSA	3 1/4"	During	5.5 ±
Sampler	SPT	2"	End	NA
Core			Seepage	3 ±
Tube			Date	Depth, ft.
SPT Hammer	Auto			

**Component Percentages:** Trace < 5%, Few 5-10%, Little 15-25%, Some 30-45%, Mostly 50-100%

**QP =** Calibrated Penetrometer (tons/sq. ft.)

Elev. FT.	Depth FT.	Sample Number	Recov. FT.	Penetration (Blows Per 6") ASTM D 1586	*USCS Group Symbol	*DESCRIPTION	QP tsf	MST %	P200 %	REMARKS
858.6	1	S-1	1.5	5-6-6 N=12	ML	2" HMA, 6" Gravel Base	0.7	22.7	97.8	Charged augers with water following S-3
857.6	2						Brown sandy SILT; mostly silty fines, little fine sand, moist with occasional peat lenses / partings			
856.6	3									
855.6	4	S-2	1.5	3-4-4 N=8	ML	Grades with medium to fine sand lenses				
854.6	5									
853.6	6									
852.6	7	S-3	1.5	7-8-10 N=18	ML	Grades with trace sand and wet, without medium to fine sand lenses	8.0			
851.6	8									
850.6	9	S-4	1.5	6-6-6 N=12	ML	Gray SILT, mostly silty fines, few fine sand, wet				
849.6	10									
848.6	11									
847.6	12									
846.6	13									
845.6	14	S-5	1.5	5-6-6 N=12	ML					
844.6	15									
843.6	16	S-6	1.5	4-6-13 N=19			16.5			

End of Boring

\* Visual estimate following ASTM D 2488 unless laboratory testing has been performed. Stratification changes are approximated between samples.



# LOG OF BORING

**Project No.:** 231111

**Boring No.:** B-5

**Sheet:** 1 of 1

**Project:** Meridian Township - County Park Lift Station and Sanitary Sewer Main Replacement

**Client:** Meridian Township

**Date Begin:** 03/16/2023

**Date End:** 03/16/2023

**Location:** Meridian Township, Michigan

**Drill Type:** Geoprobe 7822

**Crew Chief:** MS      **Field Eng.:** ES      **Rev. By:** JO

**Coordinates:** N=461013.3 E=13114945.2 (MI South 1ft)

**Elevation:** 853.3 ft      **Datum:** NAVD 88 (GPS Observation)

**Notes:**

**Plugging Record:** Backfilled borehole with compacted cuttings, patched pavement with cold patch. Cave in at 4.5 ft.

**Depth Drilled:** 20.0 ft.

Tooling	Type	Dia.	Groundwater, ft.	
Casing	HSA	3 1/4"	During	5.5 ±
Sampler	SPT	2"	End	3.0
Core			Seepage	
Tube			Date	Depth, ft.
SPT Hammer	Auto			

**Component Percentages:** Trace < 5%, Few 5-10%, Little 15-25%, Some 30-45%, Mostly 50-100%

**QP =** Calibrated Penetrometer (tons/sq. ft.)

Elev. FT.	Depth FT.	Sample Number	Recov. FT.	Penetration (Blows Per 6") ASTM D 1586	*USCS Group Symbol	*DESCRIPTION	QP tsf	MST %	P200 %	REMARKS
852.3	1					1" HMA, 12" Gravel Base	1.1			Fill: 0' to 5.5'
851.3	2	S-1	1.5	11-11-9 N=20	SM	Brown silty SAND; mostly coarse to fine sand, some silty fines, moist with occasional black organic seams				
850.3	3									
849.3	4				SM	Grades with few fine gravel				S-2, S-4: Poor recovery; possible coarse gravel / COBBLE
848.3	5	S-2	1.2	9-5-4 N=9						
847.3	6				PT	Dark brown fibrous PEAT, with few coarse to fine sand, wet				Driller noted coarse gravel / COBBLE at 5.0'
846.3	7	S-3	1.5	WOH/18"						
845.3	8				SP	Brown poorly graded SAND; mostly coarse to fine sand, few coarse to fine gravel, wet				Charged augers with water following S-3
844.3	9									
843.3	10	S-4	0.1	WOH/18"	OL	Brown organic SILT, mostly silty fines, some fine sand, few fine gravel, with frequent organic seams and occasional roots, wet				S-5: Organic Content 3.2%
842.3	11									
841.3	12	S-5	1.5	WOH/18"	OL	Brown organic SILT, mostly silty fines, some fine sand, few fine gravel, with frequent organic seams and occasional roots, wet				
840.3	13									
839.3	14				SM	Gray silty SAND; mostly coarse to fine sand, some silty fines, wet				
838.3	15	S-6	1.5	1-1/12"						
837.3	16	S-7	1.5	WOH-2-6 N=8	SM	Gray silty SAND; mostly coarse to fine sand, some silty fines, wet				
836.3	17									
835.3	18				SP-SM	Gray poorly graded SAND with silt; mostly fine sand, few silty fines, wet				
834.3	19									
833.3	20	S-8	1.5	5-5-7 N=12			20.0			
End of Boring										

\* Visual estimate following ASTM D 2488 unless laboratory testing has been performed. Stratification changes are approximated between samples.



# LOG OF BORING

**Project No.:** 231111

**Boring No.:** B-6

**Sheet:** 1 of 1

**Project:** Meridian Township - County Park Lift Station and Sanitary Sewer Main Replacement

**Client:** Meridian Township

**Date Begin:** 03/16/2023

**Date End:** 03/16/2023

**Location:** Meridian Township, Michigan

**Drill Type:** Geoprobe 7822

**Crew Chief:** MS      **Field Eng.:** ES      **Rev. By:** JO

**Coordinates:** N=461184.3 E=13114589.2 (MI South 1ft)

**Elevation:** 859.0 ft      **Datum:** NAVD 88 (GPS Observation)

**Notes:**

**Plugging Record:** Backfilled borehole with compacted cuttings, patched pavement with cold patch. Cave in at 7.8 ft.

**Depth Drilled:** 16.5 ft.

Tooling	Type	Dia.	Groundwater, ft.	
Casing	HSA	3 1/4"	During	5.5 ±
Sampler	SPT	2"	End	6.2
Core			Seepage	
Tube			Date	Depth, ft.
SPT Hammer	Auto			

**Component Percentages:** Trace < 5%, Few 5-10%, Little 15-25%, Some 30-45%, Mostly 50-100%

QP = Calibrated Penetrometer (tons/sq. ft.)

Elev. FT.	Depth FT.	Sample Number	Recov. FT.	Penetration (Blows Per 6") ASTM D 1586	*USCS Group Symbol	*DESCRIPTION	QP tsf	MST %	P200 %	REMARKS
858.0	1					2" HMA, 8" Gravel Base	0.8			Fill: 0' to 6.5'
857.0	2	S-1	1.5	6-6-5 N=11		Brown poorly graded SAND with silt; mostly fine sand, few silty fines, moist, with black organic lenses / partings				
856.0	3									
855.0	4									
854.0	5	S-2	1.2	3-2-2 N=4	SP-SM	Grades with clayey sand lens, organic partings				S-2: Poor recovery; possible coarse gravel / COBBLE
853.0	6									
852.0	7	S-3	1.5	1-1-1 N=2	ML	Brown sandy SILT; mostly silty fines, some fine sand, wet	6.5			
851.0	8									
850.0	9									
849.0	10	S-4	1.5	1-3-4 N=7		Brown poorly graded SAND with silt; mostly coarse to fine sand, few silty fines, wet	9.4			
848.0	11									
847.0	12									
846.0	13									
845.0	14									
844.0	15	S-5	1.5	4-5-7 N=12	SP	Brown poorly graded SAND; mostly coarse to fine sand, trace silty fines, wet	12.0			
843.0	16	S-6	1.5	5-7-8 N=15			16.5			

End of Boring

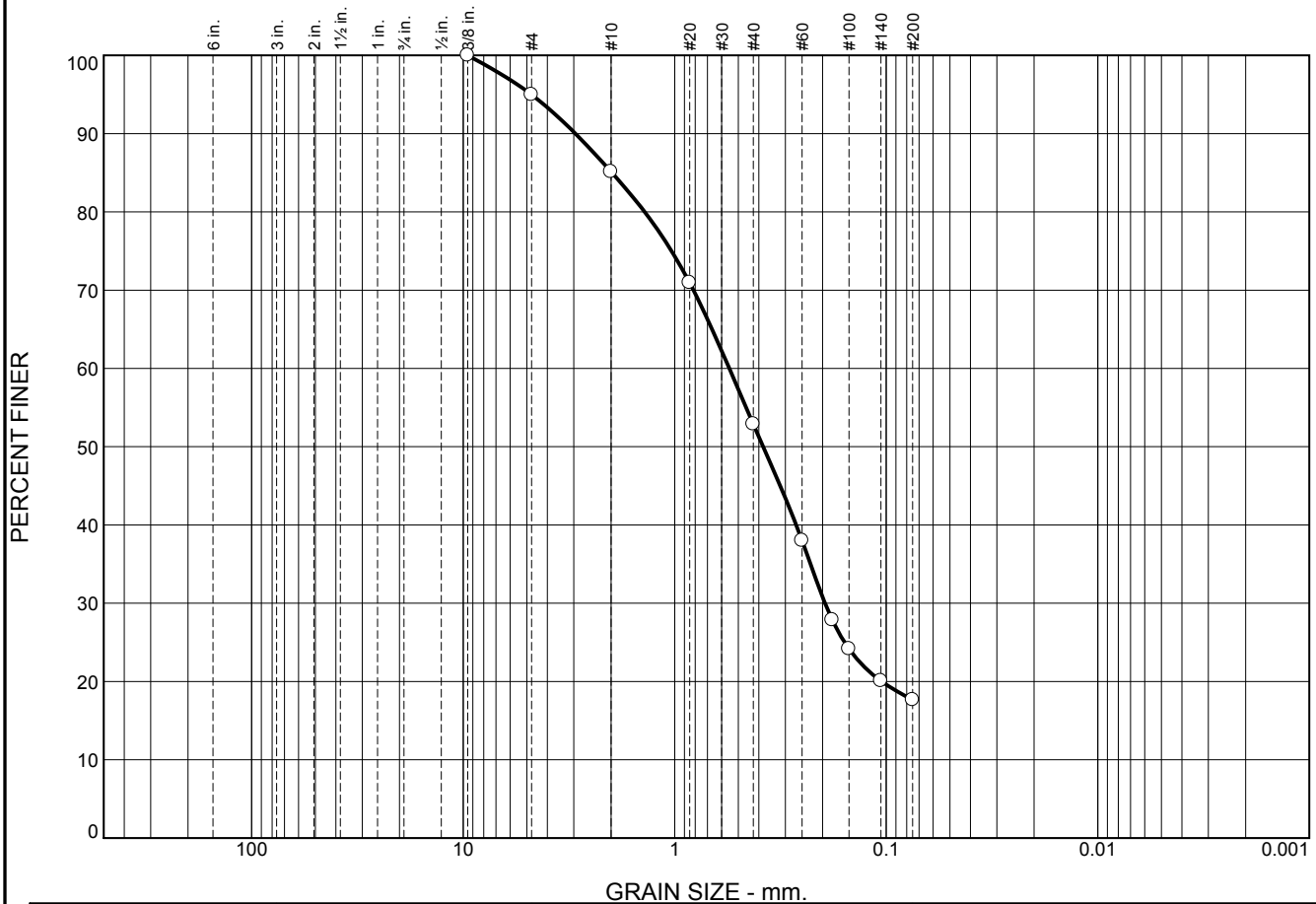
\* Visual estimate following ASTM D 2488 unless laboratory testing has been performed. Stratification changes are approximated between samples.



## SUMMARY OF LABORATORY TEST DATA

Boring Number	Sample Number	Depth (ft)	Sample Description and USCS Classification	Natural Moisture Content (ASTM D2216) (%)	Percent Passing No. 200 (ASTM D6913) (%)	Organic Content (ASTM D2974) (%)
B-1-S-6	161993	19.0-20.0	SC	14.8	17.6	
B-4-S-3	161994	6.0-7.5	ML	22.7	97.8	
B-5-S-5	161995	11.0-12.5	SM	37.8		3.2

# Particle Size Distribution Report



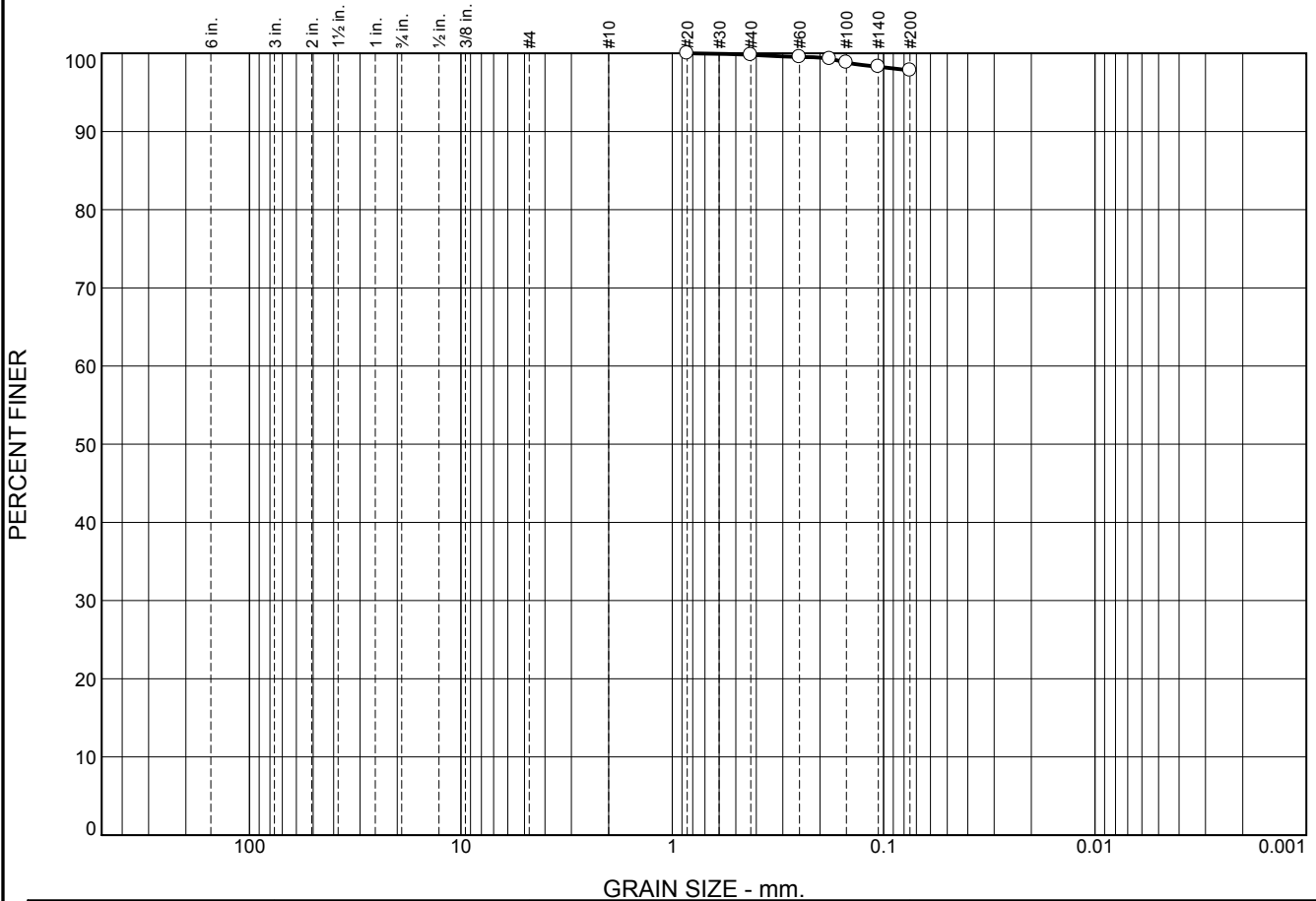
	% +3"	% Gravel		% Sand			% Fines			
		Coarse	Fine	Coarse	Medium	Fine	Silt	Clay		
<input type="radio"/>	0.0	0.0	5.0	9.9	32.2	35.3	17.6			
<input checked="" type="checkbox"/>	LL	PL	D <sub>85</sub>	D <sub>60</sub>	D <sub>50</sub>	D <sub>30</sub>	D <sub>15</sub>	D <sub>10</sub>	C <sub>c</sub>	C <sub>u</sub>
<input type="radio"/>			1.9796	0.5521	0.3817	0.1947				

Material Description	USCS	AASHTO
<input type="radio"/> Brown Silty Sand	SM	

<p><b>Project No.</b> 231111      <b>Client:</b> Meridian Township</p> <p><b>Project:</b> Meridian Township - County Park Lift Station and Sanitary Sewer Main Replacement</p> <p><input type="radio"/> <b>Location:</b> B-1 S-6      <b>Depth:</b> 19.0-20.0 ft      <b>Sample Number:</b> 161993</p>	<p><b>Remarks:</b></p>
<p><b>MATERIALS TESTING CONSULTANTS, INC.</b></p> <p><b>Grand Rapids, MI</b></p>	

Figure

# Particle Size Distribution Report



	% +3"	% Gravel		% Sand			% Fines			
		Coarse	Fine	Coarse	Medium	Fine	Silt	Clay		
○	0.0	0.0	0.0	0.0	0.2	2.0	97.8			
×	LL	PL	D <sub>85</sub>	D <sub>60</sub>	D <sub>50</sub>	D <sub>30</sub>	D <sub>15</sub>	D <sub>10</sub>	C <sub>c</sub>	C <sub>u</sub>
○										






















Material Description	USCS	AASHTO
○ Brown Silt	ML	

<p><b>Project No.</b> 231111      <b>Client:</b> Meridian Township</p> <p><b>Project:</b> Meridian Township - County Park Lift Station and Sanitary Sewer Main Replacement</p> <p>○ <b>Location:</b> B-4 S-3      <b>Depth:</b> 6.0-7.5 ft      <b>Sample Number:</b> 161994</p>	<p><b>Remarks:</b></p>
<p><b>MATERIALS TESTING CONSULTANTS, INC.</b></p> <p><b>Grand Rapids, MI</b></p>	

Figure

**Table 6H-2. Meaning of Symbols on Typical Application Diagrams (MI)**



	Arrow panel
	Arrow panel support or trailer (shown facing down)
	Changeable message sign or support trailer
	Channelizing device
	Crash Cushion
	Direction of temporary traffic detour
	Direction of traffic
	Traffic Regulator
	High level warning device (Flag tree)
	Luminaire
	Pavement markings that should be removed for a long term project
	Sign (shown facing left)
	Surveyor
	Temporary barrier
	Temporary barrier with warning lights
	Traffic or Pedestrian signal
	Truck mounted attenuator
	Type III Barricade
	Warning lights
	Work space
	Work vehicle



**Table 6H-3. Meaning of Letter Codes on Typical Application Diagrams**

Road Type	Distance Between Signs**		
	A	B	C
Urban (low speed)*	30 (100)	30 (100)	30 (100)
Urban (high speed)*	100 (350)	100 (350)	100 (350)
Rural	150 (500)	150 (500)	150 (500)
Expressway / Freeway	300 (1,000)	450 (1,500)	800 (2,640)

\* Speed category to be determined by highway agency

\*\* Distances are shown in meters (feet). The column headings A, B, and C are the dimensions shown in Figures 6H-1 through 6H-46. The A dimension is the distance from the transition or point of restriction to the first sign. The B dimension is the distance between the first and second signs. The C dimension is the distance between the second and third signs. (The third sign is the first one in a three-sign series encountered by a driver approaching a TTC zone.)

**Table 6H-4. Formulas for Determining Taper Lengths**

Speed Limit (S)	Taper Length (L) Meters	Speed Limit (S)	Taper Length (L) Feet
60 km/h or less	$L = \frac{WS^2}{155}$	40 mph or less	$L = \frac{WS^2}{60}$
70 km/h or more	$L = \frac{WS}{1.6}$	45 mph or more	$L = WS$

Where: L = taper length in meters (feet)

W = width of offset in meters (feet)

S = posted speed limit, or off-peak 85th-percentile speed prior to work starting, or the anticipated operating speed in km/h (mph)

**Notes for Figure 6H-18—Typical Application 18 (MI)**  
**Lane Closure on Minor Street**

**Standard:**

1. This TTC shall be used only for low-speed facilities having low traffic volumes.

Option:

2. Where the work space is short, where road users can see the roadway beyond, and where volume is low, vehicular traffic may be self-regulating.

**Standard:**

3. Where vehicular traffic cannot effectively self-regulate, one or two traffic regulators shall be used as illustrated in Figure 6H-10.

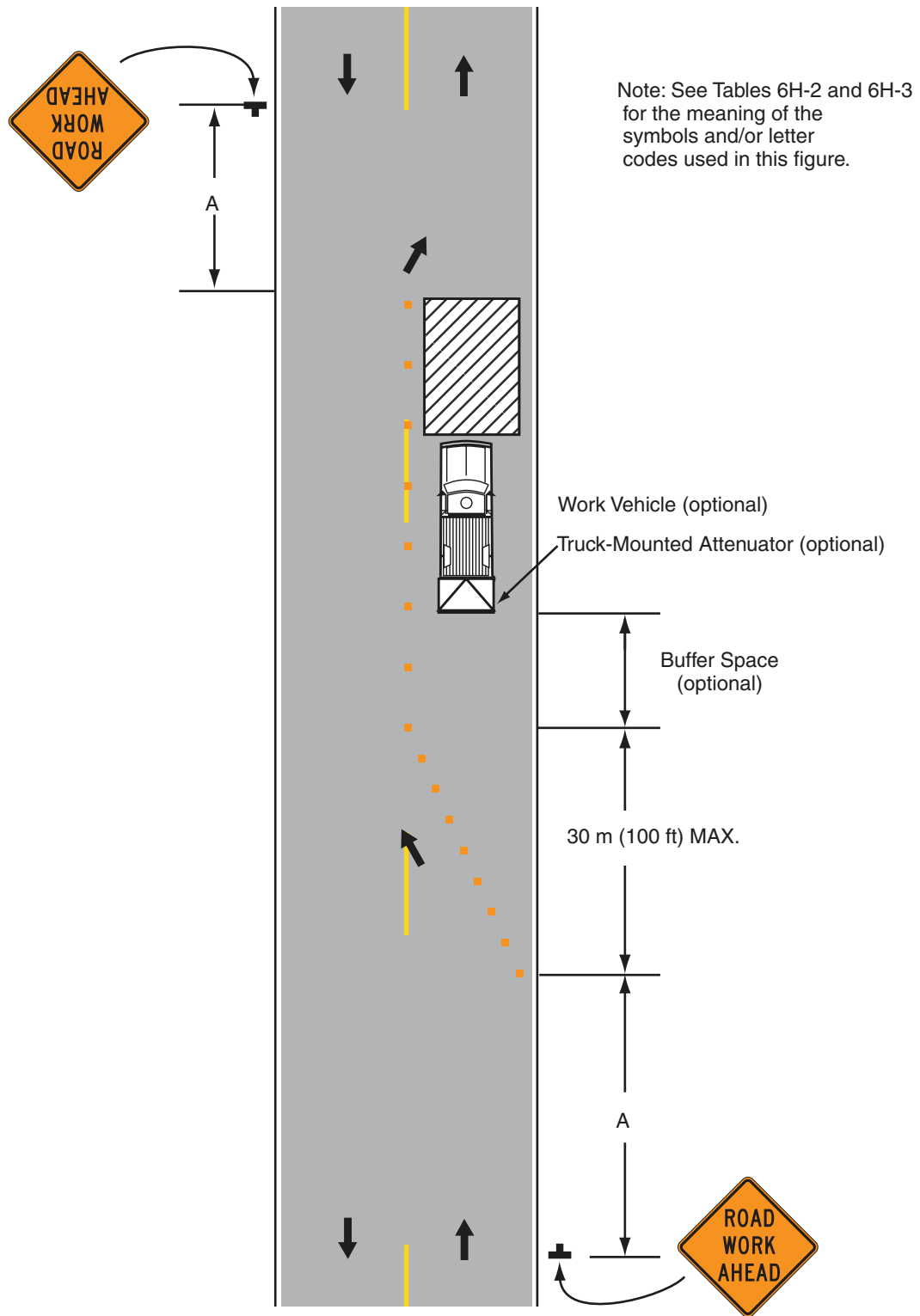


Option:

4. Flashing warning lights and/or flags may be used to call attention to the advance warning signs.
5. A truck-mounted attenuator may be used on the work vehicle and the shadow vehicle.



**Figure 6H-18. Lane Closure on Minor Street (MI) (TA-18)**



**Typical Application 18**

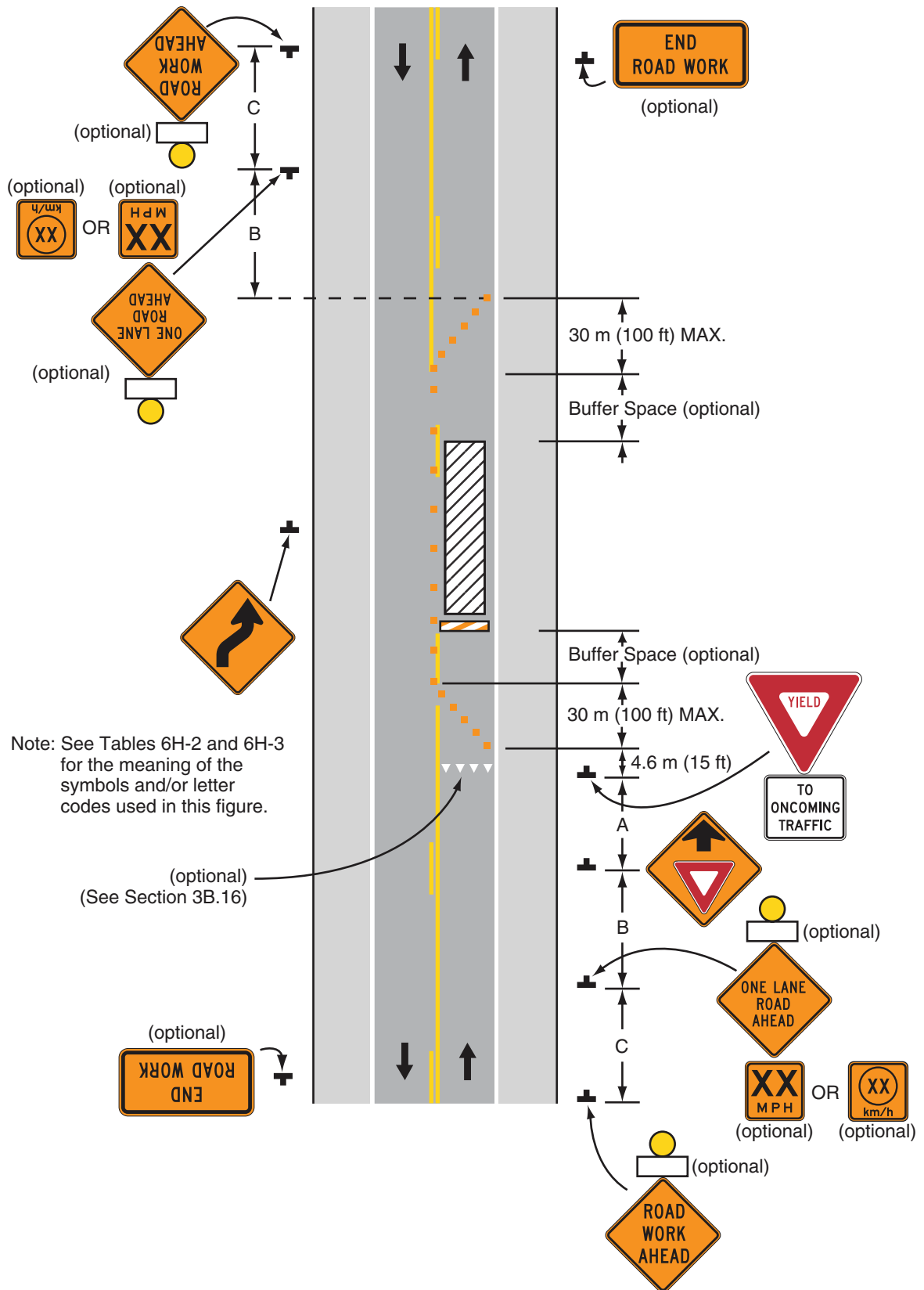
**Notes for Figure 6H-11—Typical Application 11 (MI)**  
**Lane Closure on Two-Lane Road with Low Traffic Volumes**

## Option:





1. This TTC zone application may be used as an alternate to the TTC application shown in Figure 6H-10 (using **traffic regulators**) when the following conditions exist:
  - a. Vehicular traffic volume is such that sufficient gaps exist for vehicular traffic that must yield.
  - b. Road users from both directions are able to see approaching vehicular traffic through and beyond the work site and have sufficient visibility of approaching vehicles.
2. The Type B flashing warning lights may be placed on the ROAD WORK AHEAD and the ONE LANE ROAD AHEAD signs whenever a night lane closure is necessary.

**Figure 6H-11. Lane Closure on Two-Lane Road with Low Traffic Volumes (MI)**

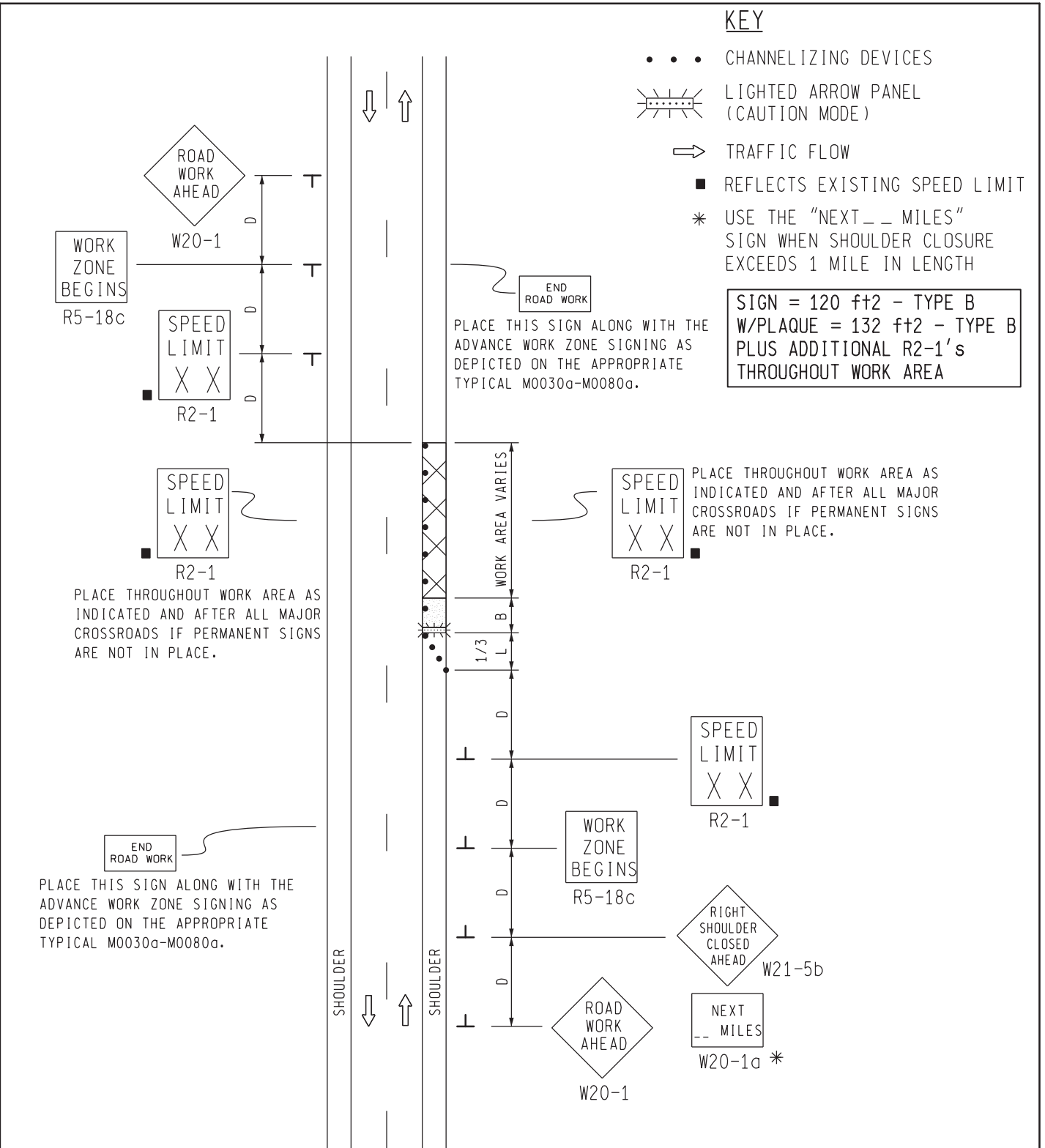



**Typical Application 11**

**KEY**

- • • CHANNELIZING DEVICES
-  LIGHTED ARROW PANEL (CAUTION MODE)
-  TRAFFIC FLOW
- REFLECTS EXISTING SPEED LIMIT
- \* USE THE "NEXT \_ \_ MILES" SIGN WHEN SHOULDER CLOSURE EXCEEDS 1 MILE IN LENGTH

SIGN = 120 ft± - TYPE B  
 W/PLAQUE = 132 ft± - TYPE B  
 PLUS ADDITIONAL R2-1's  
 THROUGHOUT WORK AREA



 Michigan Department of Transportation TRAFFIC AND SAFETY MAINTAINING TRAFFIC TYPICAL	TYPICAL TEMPORARY TRAFFIC CONTROL FOR A SHOULDER CLOSURE ON A TWO LANE TWO-WAY ROADWAY NO SPEED REDUCTION		
	DRAWN BY: CON:AE:djf CHECKED BY: BMM:CRB	OCTOBER 2011 PLAN DATE:	M0110a
FILE: PW RD/TS/Typicals/Signs/MT NON FWY/M0110a.dgn REV. 10/04/2011			

APX C - 7  
 NOT TO SCALE

## NOTES


1. D = DISTANCE BETWEEN TRAFFIC CONTROL DEVICES  
 $1/3 L$  = MINIMUM LENGTH OF TAPER  
 B = LENGTH OF LONGITUDINAL BUFFER  
 SEE M0020a FOR "D," "L," AND "B" VALUES
2. ALL NON-APPLICABLE SIGNING WITHIN THE CIA SHALL BE MODIFIED TO FIT CONDITIONS, COVERED OR REMOVED.
3. DISTANCES BETWEEN SIGNS, THE VALUES FOR WHICH ARE SHOWN IN TABLE D, ARE APPROXIMATE AND MAY NEED ADJUSTING AS DIRECTED BY THE ENGINEER.
- 3A. THE "WORK ZONE BEGINS" (R5-18c) SIGN SHALL BE USED ONLY IN THE INITIAL SIGNING SEQUENCE IN THE WORK ZONE. SUBSEQUENT SEQUENCES IN THE SAME WORK ZONE SHALL OMIT THIS SIGN AND THE QUANTITIES SHALL BE ADJUSTED APPROPRIATELY.
- 4E. THE MAXIMUM RECOMMENDED DISTANCE(S) BETWEEN CHANNELIZING DEVICES SHOULD BE EQUAL IN FEET TO THE POSTED SPEED IN MILES PER HOUR ON TAPER(S) AND TWICE THE POSTED SPEED IN THE PARALLEL AREA(S).
5. FOR OVERNIGHT CLOSURES, TYPE III BARRICADES SHALL BE LIGHTED.
6. WHEN CALLED FOR IN THE FHWA ACCEPTANCE LETTER FOR THE SIGN SYSTEM SELECTED, THE TYPE A WARNING FLASHER, SHOWN ON THE WARNING SIGNS, SHALL BE POSITIONED ON THE SIDE OF THE SIGN NEAREST THE ROADWAY.
7. ALL TEMPORARY SIGNS, TYPE III BARRICADES, THEIR SUPPORT SYSTEMS AND LIGHTING REQUIREMENTS SHALL MEET NCHRP 350 CRASHWORTHLY REQUIREMENTS STIPULATED IN THE CURRENT EDITION OF THE MICHIGAN MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES, THE CURRENT EDITION OF THE STANDARD SPECIFICATIONS FOR CONSTRUCTION, THE STANDARD PLANS AND APPLICABLE SPECIAL PROVISIONS. ONLY DESIGNS AND MATERIALS APPROVED BY MDOT WILL BE ALLOWED.
8. WHEN BUFFER AREAS ARE ESTABLISHED, THERE SHALL BE NO EQUIPMENT OR MATERIALS STORED OR WORK CONDUCTED IN THE BUFFER AREA.
- 29A. THE TYPE OF REFLECTIVE SHEETING USED FOR THE W20-1a PLAQUE SHALL BE THE SAME AS THE TYPE USED FOR THE PARENT SIGN.

### SIGN SIZES

DIAMOND WARNING	- 48" x 48"
W20-1a PLAQUE	- 48" x 36"
R2-1 REGULATORY	- 48" x 60"
R5-18c REGULATORY	- 48" x 48"

APX C - 8

NOT TO SCALE

 TRAFFIC AND SAFETY MAINTAINING TRAFFIC TYPICAL	TYPICAL TEMPORARY TRAFFIC CONTROL FOR A SHOULDER CLOSURE ON A TWO LANE TWO-WAY ROADWAY NO SPEED REDUCTION
DRAWN BY: CON:AE:djf CHECKED BY: BMM:CRB	OCTOBER 2011 PLAN DATE:
M0110a	
FILE: PW RD/TS/Typicals/Signs/MT NON FWY/M0110a.dgn REV. 10/04/2011	

SHEET  
2 OF 2






PLACE THROUGHOUT WORK AREA AS INDICATED AND AFTER ALL MAJOR CROSSROADS IF PERMANENT SIGNS ARE NOT IN PLACE.

PLACE THIS SIGN ALONG WITH THE ADVANCE WORK ZONE SIGNING AS DEPICTED ON THE APPROPRIATE TYPICAL M0030a-M0080a.

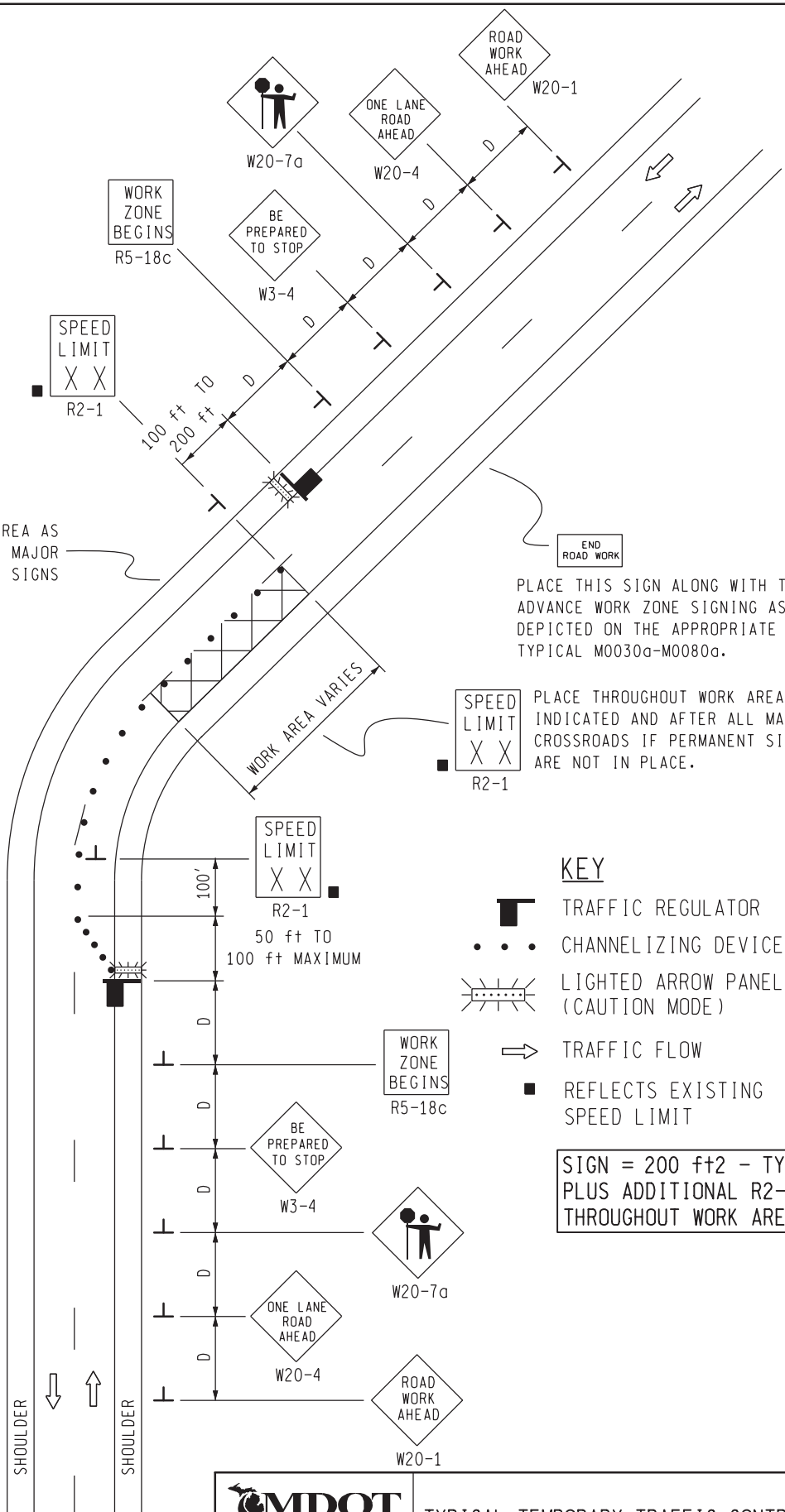
PLACE THROUGHOUT WORK AREA AS INDICATED AND AFTER ALL MAJOR CROSSROADS IF PERMANENT SIGNS ARE NOT IN PLACE.

PLACE THIS SIGN ALONG WITH THE ADVANCE WORK ZONE SIGNING AS DEPICTED ON THE APPROPRIATE TYPICAL M0030a-M0080a.

**KEY**

-  TRAFFIC REGULATOR
-  CHANNELIZING DEVICES
-  LIGHTED ARROW PANEL (CAUTION MODE)
-  TRAFFIC FLOW
-  REFLECTS EXISTING SPEED LIMIT

SIGN = 200 ft± - TYPE B PLUS ADDITIONAL R2-1's THROUGHOUT WORK AREA



**MDOT**  
Michigan Department of Transportation  
TRAFFIC AND SAFETY  
MAINTAINING TRAFFIC  
TYPICAL

TYPICAL TEMPORARY TRAFFIC CONTROL FOR A TWO-LANE TWO-WAY ROADWAY WHERE ONE LANE IS CLOSED UTILIZING TRAFFIC REGULATORS, NO SPEED REDUCTION

DRAWN BY: CON:AE:djf  
CHECKED BY: BMM:CRB

OCTOBER 2011  
PLAN DATE:

M0140a

SHEET 1 OF 2

APX C - 9  
NOT TO SCALE



## NOTES


- 1H. D = DISTANCE BETWEEN TRAFFIC CONTROL DEVICES AND LENGTH OF LONGITUDINAL BUFFERS  
SEE **M0020a** FOR "D" VALUES.
2. ALL NON-APPLICABLE SIGNING WITHIN THE CIA SHALL BE MODIFIED TO FIT CONDITIONS, COVERED OR REMOVED.
3. DISTANCES BETWEEN SIGNS, THE VALUES FOR WHICH ARE SHOWN IN TABLE D, ARE APPROXIMATE AND MAY NEED ADJUSTING AS DIRECTED BY THE ENGINEER.
- 3A. THE "WORK ZONE BEGINS" (R5-18c) SIGN SHALL BE USED ONLY IN THE INITIAL SIGNING SEQUENCE IN THE WORK ZONE. SUBSEQUENT SEQUENCES IN THE SAME WORK ZONE SHALL OMIT THIS SIGN AND THE QUANTITIES SHALL BE ADJUSTED APPROPRIATELY.
- 4A. THE MAXIMUM RECOMMENDED DISTANCE(S) BETWEEN CHANNELIZING DEVICES IN THE TAPER AREA(S) SHOULD BE 15 FEET AND SHOULD BE EQUAL IN FEET TO TWICE THE POSTED SPEED IN MILES PER HOUR IN THE PARALLEL AREA(S).
5. FOR OVERNIGHT CLOSURES, TYPE III BARRICADES SHALL BE LIGHTED.
6. WHEN CALLED FOR IN THE FHWA ACCEPTANCE LETTER FOR THE SIGN SYSTEM SELECTED, THE TYPE A WARNING FLASHER, SHOWN ON THE WARNING SIGNS, SHALL BE POSITIONED ON THE SIDE OF THE SIGN NEAREST THE ROADWAY.
7. ALL TEMPORARY SIGNS, TYPE III BARRICADES, THEIR SUPPORT SYSTEMS AND LIGHTING REQUIREMENTS SHALL MEET NCHRP 350 CRASHWORTHLY REQUIREMENTS STIPULATED IN THE CURRENT EDITION OF THE MICHIGAN MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES, THE CURRENT EDITION OF THE STANDARD SPECIFICATIONS FOR CONSTRUCTION, THE STANDARD PLANS AND APPLICABLE SPECIAL PROVISIONS. ONLY DESIGNS AND MATERIALS APPROVED BY MDOT WILL BE ALLOWED.
9. ALL TRAFFIC REGULATORS SHALL BE PROPERLY TRAINED AND SUPERVISED.
- 9A. IN ANY OPERATION INVOLVING MORE THAN ONE TRAFFIC REGULATOR, ONE PERSON SHOULD BE DESIGNATED AS HEAD TRAFFIC REGULATOR.
10. ALL TRAFFIC REGULATORS' CONDUCT, THEIR EQUIPMENT, AND TRAFFIC REGULATING PROCEDURES SHALL CONFORM TO THE CURRENT EDITION OF THE MICHIGAN MANUAL OF UNIFORM TRAFFIC CONTROL DEVICES (MMUTCD) AND THE CURRENT EDITION OF THE MDOT HANDBOOK ENTITLED "TRAFFIC REGULATORS INSTRUCTION MANUAL."
11. WHEN TRAFFIC REGULATING IS ALLOWED DURING THE HOURS OF DARKNESS, APPROPRIATE LIGHTING SHALL BE PROVIDED TO SUFFICIENTLY ILLUMINATE THE TRAFFIC REGULATOR'S STATIONS.
- 12E. THE MAXIMUM DISTANCE BETWEEN THE TRAFFIC REGULATORS SHALL BE NO MORE THAN 2 MILES IN LENGTH UNLESS RESTRICTED FURTHER IN THE SPECIAL PROVISIONS FOR MAINTAINING TRAFFIC. ALL SEQUENCES OF MORE THAN 2 MILES IN LENGTH WILL REQUIRE WRITTEN PERMISSION FROM THE ENGINEER BEFORE PROCEEDING.
13. WHEN INTERSECTING ROADS OR SIGNIFICANT TRAFFIC GENERATORS (SHOPPING CENTERS, MOBILE HOME PARKS, ETC.) OCCUR WITHIN THE ONE-LANE TWO-WAY OPERATION, INTERMEDIATE TRAFFIC REGULATORS AND APPROPRIATE SIGNING SHALL BE PLACED AT THESE LOCATIONS.
14. ADDITIONAL SIGNING AND/OR ELONGATED SIGNING SEQUENCES SHOULD BE USED WHEN TRAFFIC VOLUMES ARE SIGNIFICANT ENOUGH TO CREATE BACKUPS BEYOND THE W3-4 SIGNS.
15. THE HAND HELD (PADDLE) SIGNS REQUIRED BY THE MMUTCD TO CONTROL TRAFFIC WILL BE PAID FOR AS PART OF FLAG CONTROL.
- 28E. THE TRAFFIC REGULATORS SHOULD BE POSITIONED AT OR NEAR THE SIDE OF THE ROAD SO THAT THEY ARE SEEN CLEARLY AT A MINIMUM DISTANCE OF 500 FEET. THIS MAY REQUIRE EXTENDING THE BEGINNING OF THE LANE CLOSURE TO OVERCOME VIEWING PROBLEMS CAUSED BY HILLS AND CURVES.

### SIGN SIZES

DIAMOND WARNING - 48" x 48"  
 R2-1 REGULATORY - 48" x 60"  
 R5-18c REGULATORY - 48" x 48"

**APX C - 10**

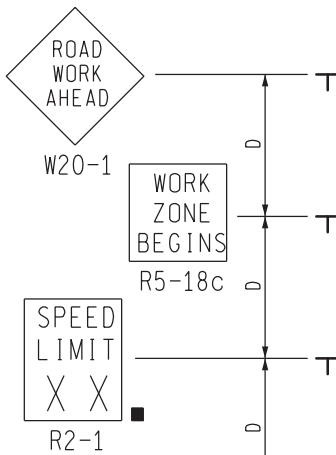
**NOT TO SCALE**

 <b>TRAFFIC AND SAFETY</b> <b>MAINTAINING TRAFFIC</b> <b>TYPICAL</b>	<b>TYPICAL TEMPORARY TRAFFIC CONTROL FOR          A TWO-LANE TWO-WAY ROADWAY WHERE ONE          LANE IS CLOSED UTILIZING TRAFFIC          REGULATORS, NO SPEED REDUCTION</b>		
DRAWN BY: CON:AE:djf	OCTOBER 2011	<b>M0140a</b>	
CHECKED BY: BMM:CRB	PLAN DATE:		
FILE: PW RD/TS/Typicals/Signs/MT NON FWY/M0140a.dgn REV. 10/04/2011			

**KEY**

- • • CHANNELIZING DEVICES
- ⚡ LIGHTED ARROW PANEL
- ➡ TRAFFIC FLOW
- REFLECTS EXISTING SPEED LIMIT

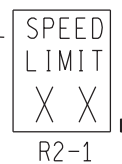
SIGN = 136 ft±2 - TYPE B PLUS ADDITIONAL R2-1's THROUGHOUT WORK AREA



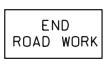
END ROAD WORK  
PLACE THIS SIGN ALONG WITH THE ADVANCE WORK ZONE SIGNING AS DEPICTED ON THE APPROPRIATE TYPICAL M0030a-M0080a.



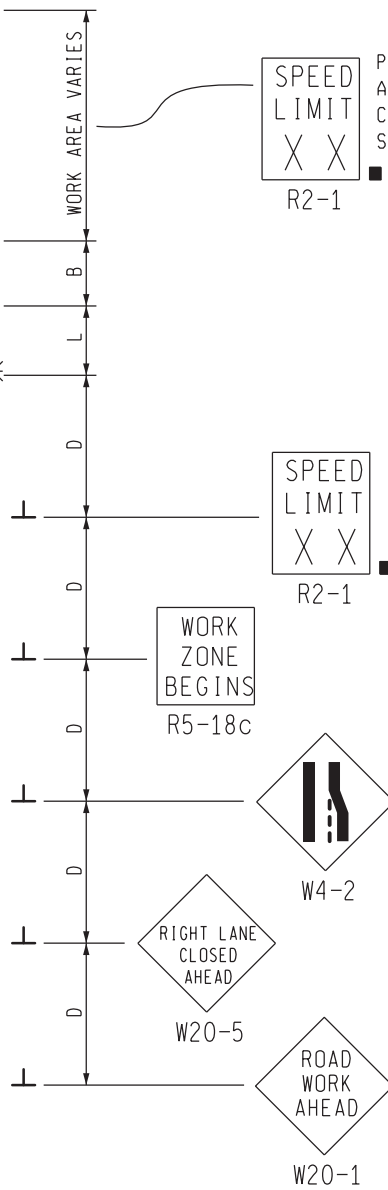
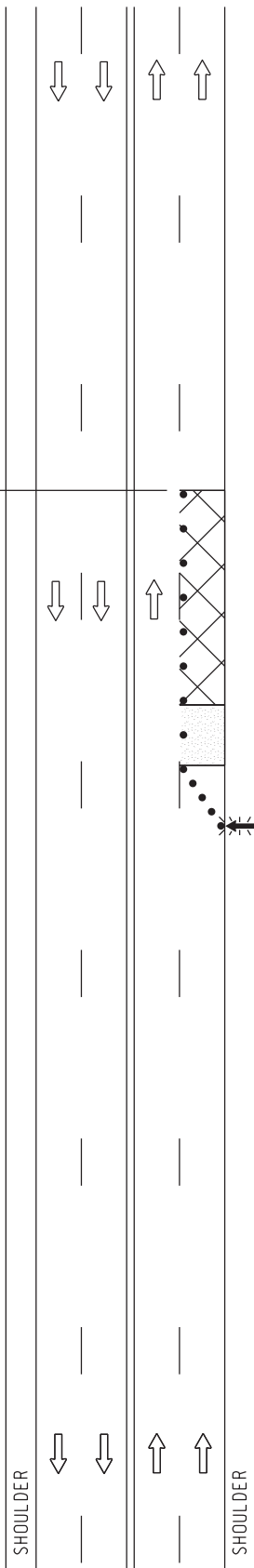
PLACE THROUGHOUT WORK AREA AS INDICATED AND AFTER ALL MAJOR CROSSROADS IF PERMANENT SIGNS ARE NOT IN PLACE.



PLACE THROUGHOUT WORK AREA AS INDICATED AND AFTER ALL CROSSROADS IF PERMANENT SIGNS ARE NOT IN PLACE.



PLACE THIS SIGN ALONG WITH THE ADVANCE WORK ZONE SIGNING AS DEPICTED ON THE APPROPRIATE TYPICAL M0030a-M0080a.



**MDOT**  
Michigan Department of Transportation  
TRAFFIC AND SAFETY  
MAINTAINING TRAFFIC  
TYPICAL

TYPICAL TEMPORARY TRAFFIC CONTROL  
FOR A ONE-LANE CLOSURE ON AN  
UNDIVIDED MULTI-LANE ROADWAY,  
NO SPEED REDUCTION

APX C - 11  
NOT TO SCALE

DRAWN BY: CON:AE:djf  
CHECKED BY: BMM:CRB

OCTOBER 2011  
PLAN DATE:

M0240a

SHEET  
1 OF 2

FILE: PW RD/TS/Typicals/Signs/MT NON FWY/M0240a.dgn REV. 10/11/2011

## NOTES


- 1B. D = DISTANCE BETWEEN TRAFFIC CONTROL DEVICES  
L = MINIMUM LENGTH OF TAPER  
B = LENGTH OF LONGITUDINAL BUFFER  
SEE M0020a FOR "D," "L," AND "B" VALUES
2. ALL NON-APPLICABLE SIGNING WITHIN THE CIA SHALL BE MODIFIED TO FIT CONDITIONS, COVERED OR REMOVED.
3. DISTANCES BETWEEN SIGNS, THE VALUES FOR WHICH ARE SHOWN IN TABLE D, ARE APPROXIMATE AND MAY NEED ADJUSTING AS DIRECTED BY THE ENGINEER.
- 3A. THE "WORK ZONE BEGINS" (R5-18c) SIGN SHALL BE USED ONLY IN THE INITIAL SIGNING SEQUENCE IN THE WORK ZONE. SUBSEQUENT SEQUENCES IN THE SAME WORK ZONE SHALL OMIT THIS SIGN AND THE QUANTITIES SHALL BE ADJUSTED APPROPRIATELY.
- 4E. THE MAXIMUM RECOMMENDED DISTANCE(S) BETWEEN CHANNELIZING DEVICES SHOULD BE EQUAL IN FEET TO THE POSTED SPEED IN MILES PER HOUR ON TAPER(S) AND TWICE THE POSTED SPEED IN THE PARALLEL AREA(S).
5. FOR OVERNIGHT CLOSURES, TYPE III BARRICADES SHALL BE LIGHTED.
6. WHEN CALLED FOR IN THE FHWA ACCEPTANCE LETTER FOR THE SIGN SYSTEM SELECTED, THE TYPE A WARNING FLASHER, SHOWN ON THE WARNING SIGNS, SHALL BE POSITIONED ON THE SIDE OF THE SIGN NEAREST THE ROADWAY.
7. ALL TEMPORARY SIGNS, TYPE III BARRICADES, THEIR SUPPORT SYSTEMS AND LIGHTING REQUIREMENTS SHALL MEET NCHRP 350 CRASHWORTHLY REQUIREMENTS STIPULATED IN THE CURRENT EDITION OF THE MICHIGAN MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES, THE CURRENT EDITION OF THE STANDARD SPECIFICATIONS FOR CONSTRUCTION, THE STANDARD PLANS AND APPLICABLE SPECIAL PROVISIONS. ONLY DESIGNS AND MATERIALS APPROVED BY MDOT WILL BE ALLOWED.
8. WHEN BUFFER AREAS ARE ESTABLISHED, THERE SHALL BE NO EQUIPMENT OR MATERIALS STORED OR WORK CONDUCTED IN THE BUFFER AREA.
21. ALL EXISTING PAVEMENT MARKINGS WHICH ARE IN CONFLICT WITH EITHER PROPOSED CHANGES IN TRAFFIC PATTERNS OR PROPOSED TEMPORARY TRAFFIC MARKINGS, SHALL BE REMOVED BEFORE ANY CHANGE IS MADE IN THE TRAFFIC PATTERN. EXCEPTION WILL BE MADE FOR DAYTIME-ONLY TRAFFIC PATTERNS THAT ARE ADEQUATELY DELINEATED BY OTHER TRAFFIC CONTROL DEVICES.
26. THE LIGHTED ARROW PANEL SHALL BE LOCATED AT THE BEGINNING OF THE TAPER AS SHOWN. WHEN PHYSICAL LIMITATIONS RESTRICT ITS PLACEMENT AS INDICATED, THEN IT SHALL BE PLACED AS CLOSE TO THE BEGINNING OF THE TAPER AS POSSIBLE.

### SIGN SIZES

DIAMOND WARNING - 48" x 48"  
R2-1 REGULATORY - 48" x 60"  
R5-18c REGULATORY - 48" x 48"

APX C - 12

NOT TO SCALE

 TRAFFIC AND SAFETY MAINTAINING TRAFFIC TYPICAL	TYPICAL TEMPORARY TRAFFIC CONTROL FOR A ONE-LANE CLOSURE ON AN UNDIVIDED MULTI-LANE ROADWAY, NO SPEED REDUCTION	
	DRAWN BY: CON:AE:djf	OCTOBER 2011
CHECKED BY: BMM:CRB	PLAN DATE:	
FILE: PW RD/TS/Typicals/Signs/MT NON FWY/M0240a.dgn REV. 10/11/2011		