



TIMBERLANE WATER MAIN REPLACEMENT 2023

MERIDIAN TOWNSHIP

DEPARTMENT OF PUBLIC WORKS

INGHAM COUNTY, MICHIGAN

TIMBERLANE WATER MAIN REPLACEMENT 2023

**FOR
CHARTER TOWNSHIP OF MERIDIAN**

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CHARTER TOWNSHIP OF MERIDIAN

TIMBERLANE WATER MAIN REPLACEMENT 2023

ADVERTISEMENT FOR BIDS

Sealed proposals will be received by the Charter Township of Meridian, 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 10:30 am, local time on Friday, July 28, 2023 for the replacement of 6-inch water mains in Meridian Township.

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

- Installation of approximately 1,200 feet of eight (8) inch D.I. water main by open-cut methods;
- Installation of approximately 1,400 feet of eight (8) inch D.I. water main by horizontal directional drilling;
- Including 13 gate valves (8"); and,
- Abandonment of approximately 3,600 feet of six (6) inch water main.

Work on the project may commence any time after the "Notice To Proceed" is issued. Open-cut construction shall be completed by October 1, 2023. Trenchless construction shall be completed by June 1, 2024. Completion is defined as being constructed, tested, placed in service, and the site restored.

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 Charter Township of Meridian, 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 G-2 and G-3 for those requirements. *Please note Owner/Contractors Protective Liability is required for all our contracts.*

The contract documents may be examined at the following locations:

- Meridian Charter Township, Dept of Public Works, 5151 Marsh Road, Okemos, MI 48864
- Builders Exchange of Lansing & Central MI, 1240 E. Saginaw St., Lansing, MI 48906-5522
- Builders Exchange of Michigan, 678 Front Ave. NW. Ste. 330, Grand Rapids, MI 49504
- Construction Assoc of MI, 43636 Woodward, Bloomfield Hills, MI 48302
- Dodge Data & Analytics, 2521 E. Michigan Avenue, Lansing, MI 48912-4010

To be added to the Township's list of prospective bidders, please make sure to contact the Engineering Office, as described below. PDF copies of the plans and contract documents may be downloaded from the Township here:

<https://www.meridian.mi.us/businesses/requests-for-proposals-bids>.

Hard 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.

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.

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.

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 – TIMBERLANE WATER MAIN 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.

PROPOSAL

TO: Charter Township of Meridian
5151 Marsh Road
Okemos, MI 48864

RE: TIMBERLANE WATER MAIN 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 \$1,000.00 per calendar day per project for each and every day thereafter until final acceptance.

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:

TIMBERLANE WATER MAIN REPLACEMENT 2023

PROPOSAL

<u>ITEM</u>	<u>DESCRIPTION</u>	<u>QTY</u>	<u>UNIT</u>	<u>UNIT PRICE</u>	<u>AMOUNT</u>
<u>GENERAL</u>					
1a.	Traffic Control	1	LSum	\$ _____	\$ _____
1b.	Mobilization	1	LSum	\$ _____	\$ _____
<u>TIMBERLANE STREET</u>					
6a.	Water, Main, 6 inch, Abandon, Timberlane	1	LSum	\$ _____	\$ _____
30a.	Water, Main, 8 inch, Open Cut	360	Ft	\$ _____	\$ _____
30b.	Water, Main, 8 inch, HDD	300	Ft	\$ _____	\$ _____
31b.	Water, Bend, 45°	12	Ea	\$ _____	\$ _____
31c.	Water, Bend, 22°	3	Ea	\$ _____	\$ _____
31d.	Water, Bend, 11°	2	Ea	\$ _____	\$ _____
31e.	Water, Union, 8 inch	6	Ea	\$ _____	\$ _____
31f.	Water, Red, 8 inch by 6 inch	3	Ea	\$ _____	\$ _____
31g.	Water, Tee, 8 inch	2	Ea	\$ _____	\$ _____
31h.	Water, Tee, 8 inch by 6 inch	2	Ea	\$ _____	\$ _____
32.	Water, Gate Valve, 8 inch	6	Ea	\$ _____	\$ _____
33.	Water, Hydrant Assembly	2	Ea	\$ _____	\$ _____
35a.	Water, Serv, 1 inch, Short	4	Ea	\$ _____	\$ _____
35b.	Water, Serv, 1 inch, Long	2	Ea	\$ _____	\$ _____
53.	Erosion Control, Inlet Protection, Fabric Drop	7	Ea	\$ _____	\$ _____
54a.	Site Restoration, Timberlane	1	LS	\$ _____	\$ _____

BLUE HAVEN DRIVE

6b.	Water, Main, 6 inch, Abandon, Blue Haven	1	LSum	\$ _____	\$ _____
30a.	Water, Main, 8 inch, Open Cut	840	Ft	\$ _____	\$ _____
30b.	Water, Main, 8 inch, HDD	1,120	Ft	\$ _____	\$ _____
31a.	Water, Bend, 90°	2	Ea	\$ _____	\$ _____
31b.	Water, Bend, 45°	28	Ea	\$ _____	\$ _____
31e.	Water, Union, 8 inch	11	Ea	\$ _____	\$ _____
31f.	Water, Red, 8 inch by 6 inch	10	Ea	\$ _____	\$ _____
31g.	Water, Tee, 8 inch	5	Ea	\$ _____	\$ _____
31h.	Water, Tee, 8 inch by 6 inch	2	Ea	\$ _____	\$ _____
32.	Water, Gate Valve, 8 inch	7	Ea	\$ _____	\$ _____
33.	Water, Hydrant Assembly	3	Ea	\$ _____	\$ _____
35a.	Water, Serv, 1 inch, Short	3	Ea	\$ _____	\$ _____
35b.	Water, Serv, 1 inch, Long	4	Ea	\$ _____	\$ _____
35c.	Water, Serv, 1 inch, Reconnect	24	Ea	\$ _____	\$ _____
53.	Erosion Control, Inlet Protection, Fabric Drop	7	Ea	\$ _____	\$ _____
54b.	Site Restoration, Blue Haven	1	LS	\$ _____	\$ _____

CORNELL & GRAND RIVER

30c.	Water, Main, 12 inch, Open Cut	20	Ft	\$ _____	\$ _____
31i.	Water, Bend, 45°, 12 inch	1	Ea	\$ _____	\$ _____
31j.	Water, Red, 12 inch by 6 inch	1	Ea	\$ _____	\$ _____
33.	Water, Hydrant Assembly	1	Ea	\$ _____	\$ _____
34.	Hydrant Extension	1	LSum	\$ _____	\$ _____
53.	Erosion Control, Inlet Protection, Fabric Drop	2	Ea	\$ _____	\$ _____

TOTAL: \$ _____

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 _____

Email _____

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.

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

TIMBERLANE WATER MAIN REPLACEMENT 2023

THIS CONTRACT, dated _____, 2023 by and between _____, hereinafter called the "**CONTRACTOR**", and **Meridian Charter Township, 5151 Marsh Road, Okemos, MI 48864-1198**, 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** within the number of calendar days or by the completion date 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 operation within the number of consecutive calendar days specified herein, 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 one thousand dollars (\$1,000.00) 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, 2) Instructions to Bidders, 3) Proposal, 4) Addenda, 5) Contract, 6) Bonds and Insurance, 7) General Conditions, 8) General Specifications, 9) Ingham County Department of Transportation and Roads Specifications, 10) Standard Specifications, 11) Special Provisions, 12) Plans, and 13) 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: _____

CHARTER TOWNSHIP OF MERIDIAN

OWNER

WITNESS:

By: _____

Dan Opsommer

Title: Deputy Township Manager
Director of Public Works & Engineering

Date: _____

NOTICE OF AWARD

Dated: _____, 2023

TO: _____

ADDRESS: _____

CONTRACT: **TIMBERLANE WATER MAIN REPLACEMENT 2023**

You are notified that your Bid dated _____, **2023**, for the above Contract has been considered. You are the apparent Successful Bidder and have been awarded a Contract for **TIMBERLANE WATER MAIN 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).
3. If not listed as the owner, president, or partner, we need a letter (on letterhead) stating the person signing contract, has permission to sign the contract.

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.

CHARTER TOWNSHIP OF MERIDIAN

By: _____
Dan Opsommer
Deputy Township Manager and
Director of Public Works & Engineering

NOTICE TO PROCEED

Dated: _____, 2023

TO: _____

ADDRESS: _____

CONTRACT: **TIMBERLANE WATER MAIN REPLACEMENT 2023**

You are notified that the Contract Times under the above Contract will commence to run on _____, **2023**. By that date, you are to start performing your obligations under the Contract Documents. In accordance with Article III of the Contract, the date of Completion is: **October 1, 2023**.

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

MERIDIAN TOWNSHIP

By: _____
Younes Ishraidi, P.E.
Chief Engineer

ACKNOWLEDGEMENT OF ACCEPTANCE OF NOTICE TO PROCEED

CONTRACTOR acknowledges acceptance of this Notice to Proceed this _____ day of _____, 2023.

By: _____

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GENERAL CONDITIONS

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

GENERAL CONDITIONS

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.

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.

GENERAL CONDITIONS

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.

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.

GENERAL CONDITIONS

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

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.

GENERAL CONDITIONS

GC.11 CHANGES IN WORK/PAYMENT ADJUSTMENTS (Cont'd.)

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.

GENERAL CONDITIONS

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.

GENERAL CONDITIONS

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 effect 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.

GENERAL CONDITIONS

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

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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.

GENERAL SPECIFICATIONS

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

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.

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 ensure that the structures remain undamaged prior to completion of the entire work.

In the event damage does occur to any portions of the work, 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 will 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.

GENERAL SPECIFICATIONS

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.

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.

GENERAL SPECIFICATIONS

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.

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

MERIDIAN CHARTER TOWNSHIP

TECHNICAL SPECIFICATION
FOR
WATER MAIN INSTALLATION

a. Description. This work shall consist of installing the specified type and size water main as depicted and described on the plans, in accordance with the 2020 Michigan Department of Transportation (MDOT) Standard Specifications for Construction, and as specified herein. Where the plans specify trenchless installation, the Contractor shall utilize Horizontal Directional Drilling (HDD). All other locations, where trenchless is not specified, may be open cut or utilize the above methods.

b. Materials. All water main pipe shall be CL 52 ductile iron. Pipe installed via trenchless methods shall be restrained-joint, designed for such a use (see the Technical Specification for Horizontal Directional Drilling). Pipe installed by open-cut method shall be a product such as US Pipe TYTON JOINT® or approved equal. Install pipe per the manufacturer specifications.

c. Construction Methods.

1. Open-Cut Installation

Install pipe according to Division 3 of the Technical Specifications.

2. Horizontal Directional Drilling

Install pipe according to the Horizontal Directional Drilling section of the Technical Specifications.

Maximum allowable deviation of the pipe location shall be 3' laterally and 1' vertically.

Throughout the construction process whenever it is necessary to open a live water main, minimum disinfection procedures shall be observed in accordance with AWWA standards. The minimum disinfection procedure shall consist of swabbing the new and existing pipe sections and fittings with a 5% hypochlorite solution before returning the existing water system to service.

After installation of the water main, hydrostatically pressure test the pipe at 150 PSI for two hours. The first hour shall be tested against the closed hydrants, the second hour shall be against the closed hydrant isolation valves with the hydrants open.

Backfill material placed within the road zone-of-influence (ZOI) shall be Class II granular material and shall be compacted to 95% of maximum density. Where the backfill is not within the road ZOI native backfill may be used.

d. Measurement and Payment. The complete work as measured will be paid for at the contract unit price for the following contract pay items:

<u>Pay Items</u>	<u>Pay Units</u>
Water, Main, __ inch, Open Cut	Foot
Water, Main, __ inch, HDD	Foot

The completed work for **Water, Main, __ inch, ___** will be measured by the horizontal length in feet of the new main along the ground surface. Payment includes all labor, equipment, and material necessary to furnish, install, and test the water main according to the plans and as specified herein. Water main fittings will be paid for separately.

These pay items also includes all labor, equipment, and material necessary to bed the pipe and backfill the trench in accordance with the Technical Specifications, all Ingham County Road Department (ICRD) permit(s), and all MDOT permit(s), as appropriate. Surface restoration will be paid for separately as either **Site Restoration** or **Pavement Repair**.

No additional compensation will be made for appurtenances or miscellaneous items not explicitly detailed, but necessary to complete the work as described herein and on the plans.

MERIDIAN CHARTER TOWNSHIP
TECHNICAL SPECIFICATION
FOR
HORIZONTAL DIRECTIONAL DRILLING

PART 1 – GENERAL

- 1.01 SCOPE
- 1.02 REFERENCES
- 1.03 SUBMITTALS

PART 2 – MATERIALS

- 2.01 PIPE AND FITTINGS
- 2.02 LININGS AND COATINGS
- 2.03 POLYETHYLENE ENCASEMENT
- 2.04 PROOF-OF-DESIGN TESTS

PART 3 – EQUIPMENT

- 3.01 EQUIPMENT AND EXPERTISE
- 3.02 DRILLING SYSTEMS
- 3.03 GUIDANCE SYSTEM
- 3.04 DRILLING FLUID (MUD) SYSTEM
- 3.05 OTHER EQUIPMENT
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PART 4 – EXECUTION

- 4.01 GENERAL
- 4.02 PERSONNEL REQUIREMENTS
- 4.03 BASIC ASSEMBLY/PULLING METHODS
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- 4.06 PIPE TESTING
- 4.07 SITE RESTORATION
- 4.08 RECORD KEEPING

1. GENERAL

1.01 SCOPE

This section contains guidelines and specifications applicable to the installation of pipelines using horizontal directional drilling (HDD). It includes minimum requirements for design, materials and equipment used for the horizontal directional drilling for the substantially trenchless construction of pipelines. The section also includes materials, dimensions and other pertinent properties of pipe and required accessories. These properties provide minimum performance requirements for various components including joints.

1.02 REFERENCES

The following standards contain provisions that, through reference in this text, constitute provisions of these guidelines. All standards are subject to revision, and users of these guidelines are cautioned to use the latest revisions. The following standards are from the American National Standards Institute (ANSI)/American Water Works Association (AWWA):

1. C150/A21.50 – Standard for the Thickness Design of Ductile-Iron Pipe
2. C151/A21.51 – Standard for Ductile-Iron Pipe, Centrifugally Cast, for Water
3. C111/A21.11 – Standard for Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings

4. C104/A21.4 – Standard for Cement-Mortar Lining for Ductile-Iron Pipe and Fittings for Water
5. C105-A21.5 – Standard for Polyethylene Encasement for Ductile-Iron Pipe Systems
6. C153/A21.53 – Standard for Ductile-Iron Compact Fittings, 3-inch through 24-inch and 54-inch through 64-inch, for Water Service
7. C600 – Standard for Installation of Ductile-Iron Water Mains and Their Appurtenances

1.03 SUBMITTALS

1. Prior to beginning work, the Contractor shall submit to the Engineer a work plan detailing the procedure and schedule to be used to execute the project. The work plan shall include a description of all equipment to be used, down-hole tools, a list of personnel and their qualifications and experience (including back-up personnel in the event that an individual is unavailable), list of subcontractors, a schedule of work activity, a safety plan (including MSDS of any potentially hazardous substances to be used), traffic control plan (if applicable), an environmental protection plan and contingency plans for possible problems. Work plan shall be comprehensive, realistic and based on actual working conditions for this particular project. Plan shall document the thoughtful planning required to successfully complete the project.
2. Specifications on material to be used shall be submitted to Engineer and material shall include the pipe, fittings, drilling mud, drilling additives and any other item which is to be an installed component of the project or used during construction.

2. MATERIALS

2.01 PIPE AND FITTINGS

Pipe and fittings shall meet the requirements of ANSI/AWWA C151/A21.51 and ANSI/AWWA C153/A21.53, respectively. Pipe used for directional drilling shall be CL 52 ductile iron pipe, or as specified by the engineer, with pipe manufacturer designed restrained flexible joints and smoothly contoured bells. Joints with bulky glands or flanges that may prevent the smooth flow of the drilling fluid/soil slurry over the joint will not be acceptable. Pipe shall be US Pipe TR FLEX® or approved equal.

2.02 LININGS AND COATINGS

Ductile iron pipe shall be lined with cement mortar per ANSI/AWWA C104.A21.4. Ductile iron piping shall be furnished with a standard asphalt external coating approximately one mil thick in accordance with ANSI/AWWA C151/A21.51.

2.03 POLYETHYLENE ENCASEMENT

The ductile iron pipe to be installed by horizontal directional drilling shall be installed with a single or double polyethylene encasement (PE) per ANSI/AWWA C105/A21.5. Any damage that occurs to the polyethylene wrap during pipe handling and throughout the construction process shall be repaired prior to pulling the pipe string into the bore path. PE encasement shall be secured to the greatest extent possible prior to pulling the pipe into place. The encasement shall be V-Bio® Enhanced Polyethylene Encasement installed per the manufacturer's instructions.

2.04 PROOF-OF-DESIGN TESTS

The Manufacturer shall have representative proof-of-design tests of flexible restrained pipe joints.

3. EQUIPMENT

3.01 EQUIPMENT AND EXPERTISE

The Contractor shall have equipment and expertise appropriate for horizontal directional drilling installations. This includes the preparation and maintenance of the bore path using drilling fluids appropriate for the geology of the soils. The Contractor shall also have experience in safety and dependability installing, in similar geology, similar size and length of piping involved.

3.02 DRILLING SYSTEMS

1. The directional drilling machine shall consist of a hydraulically powered system to rotate, push and pull hollow drill pipe into the ground at variable angles down to 8 degrees above horizontal while delivering a pressurized fluid mixture to a guidable drill (bore) head. The machine shall have a capacity to adequately complete the drilling and piping installation. The machine shall be anchored to the ground to withstand the pulling, pushing and rotating pressure required to complete the crossing. The hydraulic power system shall be self-contained with sufficient pressure and volume to power drilling operations. Hydraulic system shall be free of leaks. Rig shall have a system to monitor the maximum pull-back pressure during the pull-back operation. The rig shall be grounded during drilling and pull-back operations. There shall be a system to detect electrical current from the drill string and an audible alarm, which automatically sounds when an electrical current is detected.
2. The drill head shall be a steerable type and shall provide the necessary cutting surfaces and drilling fluid jets.
3. Mud motors shall be adequate power to turn the required drilling tools.

3.03 GUIDANCE SYSTEM

1. A conventional electromagnetic sound walkover system, Magnetic Guidance System (MGS) probe or proven gyroscopic probe and interface shall be used to provide a continuous and accurate determination of the location of the drill head during the drilling operation. The guidance shall be capable of tracking at the maximum depth required and in any soil condition, including hard rock. It shall enable the driller to guide the drill head by providing immediate information to the tool face, azimuth (horizontal direction), and inclination (vertical direction). The guidance system shall be accurate to $\pm 2\%$ of the vertical depth of the borehole at sensing position at depths up to one hundred feet and accurate within 5 feet horizontally.
2. The Guidance System shall be of a proven type and shall be setup and operated by personnel trained and experienced with this system. The Operator shall be aware of any geo-magnetic anomalies and shall consider such influences in the operation of the guidance system if using a magnetic system.

3.04 DRILLING FLUID (MUD) SYSTEM

1. A self-contained, closed, drilling fluid mixing system shall be of sufficient size to mix and deliver drilling fluid composed of bentonite clay, potable water and appropriate additives. Mixing system shall be able to molecularly shear individual bentonite particles from the dry powder to avoid clumping and ensure thorough mixing. The drilling fluid reservoir tank shall be a minimum of 500 gallons. Mixing system shall continually agitate the drilling fluid during drilling operations.
2. Additives to drilling fluid such as drill soap, polymers, etc. shall be "environmentally safe" and be approved for such usage. No diesel fuel shall be used.
3. The Contractor shall make every effort to keep bentonite from any adjacent sensitive areas. Escaped bentonite shall be collected immediately and stored in the mud tanks or removed from the site at the end of the workday.

4. Controlled access to Township water will be allowed for use in the mixing of the drilling fluid.

3.05 OTHER EQUIPMENT

1. Pipe rollers shall be of sufficient size to fully support the weight of the pipe while being hydro-tested and during pull-back operations. Sufficient number of rollers shall be used to prevent excess sagging of pipe. Rollers shall be used as necessary to assist in pull back operations and in layout/jointing of piping.
2. Hydraulic or pneumatic pipe rammers may only be used if necessary and with the authorization of Engineer.
3. Other devices or utility placement systems for providing horizontal thrust other than those previously defined in the preceding sections shall not be used unless approved by the Engineer prior to commencement of the work. Consideration for approval shall be made on an individual basis for each specified location. The proposed device or system shall be evaluated prior to approval or rejection on its potential ability to complete the utility placement satisfactorily without undue stoppage and to maintain line and grade within the tolerances prescribed by the particular conditions of the project.

3.06 JOINTS AND PULLING BELL

1. Joints used for directional drilling shall be boltless, flexible, restrained and shall be U. S. Pipe TR FLEX® or approved equal. Pipe and joint seals, when properly assembled and installed, shall be capable of dependably handling the specified internal pressure as well as vacuum and external pressures that can occur in pipeline operation. Joints shall exhibit such performance attributes in straight alignment or at maximum rated joint deflection. The pipe pulling head shall be made of ductile-iron and designed and furnished by the pipe manufacturer or an approved equal. The pulling head assembly shall have the same performance characteristics as the pipe to which it is connecting. It shall also be supplied with a filling/testing port of appropriate size for testing of the pipe after it is pulled through the bore path.
2. For pipe that is installed using the Assembly Line method or Ramp Method, described as follows, the pulling head may also be used as one of the two (2) bulkheads required for a low pressure air test of the pipe string prior to pull back, if required by the Engineer. After complete installation, the pulling head may also be helpful, with or without further connection of piping, in normal higher pressure hydrostatic testing of the installed piping.

4. EXECUTION

4.01 GENERAL

1. The bore path alignment and design for HDD shall be based on the Engineer's plans and other factors. Some of these factors are the pipe bell and barrel diameters, the optimum individual pipe length (18' nominal), bore path inside diameter and maximum deflection capabilities of the joint.
2. The Engineer must be notified 48 hours in advance of starting work. The Directional Bore shall not begin until the Engineer is present at the job site and agrees that proper preparations for the operation have been made. The Engineer approval for beginning the installation shall in no way relieve the Contractor of the ultimate responsibility for the satisfactory completion of the work as authorized under the Contract.

3. The drawings show existing utilities that are believed to be near the directional drill alignment. There is no guarantee that these utilities are located as shown or that the other utilities may not be present. Prior to the start of drilling, reaming and pipe placement operations, the Contractor shall properly locate and identify all existing utilities in proximity to the pipeline alignment. The Contractor shall confirm the alignment of all critical utilities, using vacuum excavation or other suitable excavation method, for further detailed confirmations as necessary.

4.02 GENERAL

All personnel shall be fully trained in their respective duties as part of the directional drilling crew and in safety. Contractor must show job history and reference list of equal or greater size and length of piping involved. The Supervisor must have at least two years directional drilling experience. A competent and experienced supervisor representing the Drilling Contractor shall be present at all times during the actual drilling operations. A responsible representative who is thoroughly familiar with the equipment and type work to be performed must be in direct charge and control of the operation at all times.

4.03 BASIC ASSEMBLY/PULLING METHODS

1. Cartridge Assembly (Option 1) Cartridge assembly option is defined as the assembling of individual sections of flexible restrained joint ductile iron pipe in a secured entry and assembly pit. The pipe sections are assembled individually and then progressively pulled into the bore path a distance equivalent to a single pipe section. This assembly-pull process is repeated for each pipe length until the entire line is pulled through the bore path to the exit point.
2. Assembly-Line or Ramp Method (Option 2) Assembly-line option is defined by the pre-assembly of multiple lengths of flexible restrained joint ductile iron pipe with subsequent pulling installation into the bore path as a long pipe string. With this option the Contractor shall provide an entry ramp to the entrance of the bore path. The ramp shall be of sufficient length and grade such that any one pipe joint does not exceed the allowable joint deflection at any point prior to the pipe string entering the bore path. The Contractor shall be responsible for providing the necessary equipment or ground surface preparation to allow the pipe to be pulled back along the surface prior to the entry ramp and bore path without damaging the PE encasement. The Contractor shall repair any damage to the wrap prior to the pipe section entering the bore path.

4.04 JOINT CLEANING/ASSEMBLIES IN HDD

The Contractor shall be responsible for the proper assembly of all pipe and appurtenances in accordance with the Manufacturers written installation procedure and as supplemented by these guidelines. Prior to joint assembly all joints and joint components shall be thoroughly cleaned and examined to ensure proper assembly and performance. In the event that the Contractor is not experienced with the assembly of the type of flexible restrained joint being used it shall be the responsibility of the Contractor to contact a factory-trained representative for recommendations on the proper and efficient installation of the joint.

4.05 DRILLING PROCEDURE

1. Work site as indicated on drawings, within right-of-way, shall be graded or filled to provide a level working area. No alterations beyond what is required for operations are to be made. Contractor shall confine all activities to designated work areas.
2. Entire drill path shall be accurately surveyed with entry and exit stakes placed in the appropriate locations within the areas indicated on drawings. If Contractor is using a magnetic guidance system drill path shall be surveyed for any surface geomagnetic variations or anomalies.

3. Contractor shall adhere to all applicable state, federal and local safety regulations and all operations shall be conducted in a safe manner.
4. If the Contractor wishes to proceed with the Assembly Line method then sufficient and appropriate space for staging must be approved in advance by the Engineer. If the Assembly Line method is utilized the pipe shall be placed on pipe rollers before pulling into bore hole with rollers spaced close enough to prevent excessive sagging of pipe.
5. Upon successful completion of pilot hole, Contractor shall ream bore hole to a minimum of 25% greater than outside diameter of pipe bell for straight pulls and 50% greater for curved or radius pulls using the appropriate tools. Contractor shall have the option to pre-ream or ream and pull back pipe in one operation if conditions allow. Contractor shall not attempt to ream at one time more than the drilling equipment and mud system are designed to safely handle.
6. After successfully reaming bore hole to the required diameter Contractor shall pull the pipe through the bore hole. In front of the pipe shall be a swivel. Once pull-back operations have commenced operations must continue without interruption until pipe is completely pulled into bore hole. During pull-back operations Contractor shall not apply more than the maximum safe pipe pull force at any time. In the event that pipe becomes stuck Contractor shall notify Engineer. Engineer, Contractor, and/or the maintaining agency shall discuss options and then work shall proceed accordingly.
7. Excess pipe shall be removed and the bore hole associated with this excess pipe shall be filled with flowable fill or grout unless the area of the excess pipe is excavated and backfilled as part of the tie-in operations. In the event that a drilling fluid fracture, inadvertent returns or returns loss occurs during pilot hole drilling operations Contractor shall cease operations and shall discuss corrective options with the Engineer and/or maintaining agency, then work shall proceed accordingly.
8. In the event that the Contractor must abandon the drill hole before completion, the drill hole shall be sealed to a density equal to the existing soil. The Contractor shall re-drill at no additional charge to the Owner.

4.06 PIPE TESTING

Following successful pullback of pipe, the Contractor shall hydro-test pipe.

4.07 SITE RESTORATION

Following drilling operations the Contractor shall de-mobilize equipment and restore the work-site to original condition. Any noticeable surface defects, due to the drilling operation, shall be repaired by the Contractor.

4.08 RECORD KEEPING

Contractor shall maintain a daily record of the drilling operations and a guidance system log with a copy given to Engineer at completion of boring. As-built drawings shall be certified by the Contractor for accuracy.

EARTHWORK (DIVISION 1)

MERIDIAN TOWNSHIP TECHNICAL SPECIFICATIONS
DIVISION 1

EARTHWORK

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1.01 SCOPE

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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.

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.

EARTHWORK (DIVISION 1)

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

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.

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.

EARTHWORK (DIVISION 1)

1.02 **CONSTRUCTION METHODS**

4. **Excavation**

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

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.

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. Dewatering

The Engineer may direct the installation of a dewatering system 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. Only use this method 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.

EARTHWORK (DIVISION 1)

1.02 **CONSTRUCTION METHODS**

5. **Backfilling and Rough Grading** (Cont'd.)

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.

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.

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.

EARTHWORK (DIVISION 1)

1.02 CONSTRUCTION METHODS (Cont'd.)

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:

- i. 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.
- ii. 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.

**MERIDIAN TOWNSHIP TECHNICAL SPECIFICATIONS
DIVISION 3**

WATER DISTRIBUTION SYSTEM

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3.01 SCOPE

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

3.02 WATER MAIN MATERIALS

All pipes, piping fittings, plumbing fittings, and fixtures that are used for potable water must comply with the new lead-free requirement and must bear the mark NSF/ANSI Standard 61, Annex G or NSF 61-G.

WATER DISTRIBUTION SYSTEM (DIVISION 3)

3.02 **WATER MAIN MATERIALS** (Cont'd.)

1. **Pipe**

- A. **General:** All pipe used for main lines shall be ductile iron meeting the requirements of ANSI/AWWA C151/A21.51. Where the specifications herein differ with ANSI/AWWA C151/A21.51, these specifications will prevail.
- B. **Joints:** The bell of each length of pipe shall provide for the seating of a single rubber gasket meeting the requirements of ANSI/AWWA C111/A21.11 Standards. 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, shall impart no taste or odor to the water 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 hot or cold weather and shall adhere to either wet or dry pipe.
- C. **Cement Mortar Lining:** Cement Mortar lining of pipe shall conform to ANSI/AWWA C104/A21.4, except for the following items. Care shall be taken to ensure 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.
- D. **Polyethylene Encasement:** Polyethylene encasement of pipes will be required in all areas. The encasement shall be V-Bio® Enhanced Polyethylene Encasement installed per the manufacturer's instructions.
- E. **Length of Pipe:** The minimum nominal laying length of the pipe shall be 18 feet. A maximum of 20 percent of the total number of each size of an order may be furnished as much as 24 inches shorter than the nominal laying length; an additional 10 percent may be furnished as much as 6 inches shorter than nominal laying length.
- F. **Pipe Thickness:** Ductile iron pipe shall have a wall metal thickness as follows:

Pipe Size	Thickness Class	Thickness Class	Pressure Class
6-inch	0.31 inch (Class 52)	0.37 inch (Class 54)	0.25 inch (350)
8-inch	0.33 inch (Class 52)	0.39 inch (Class 54)	0.25 inch (350)
12-inch	0.37 inch (Class 52)	0.43 inch (Class 54)	0.28 inch (350)
16-inch	0.40 inch (Class 52)	0.46 inch (Class 54)	0.34 inch (350)
20-inch	0.42 inch (Class 52)	0.48 inch (Class 54)	0.38 inch (350)

Tolerances will be as allowed in ANSI/AWWA C151/A21.51. Pipe sizes not listed above will not be approved for use as main lines in the Township water system.

- G. **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, per ANSI/AWWA C151/A21.51.
- H. **Independent Tests:** The supplier shall furnish reports of all tests and inspections as required in ANSI/AWWA C151/A21.51.

2. **Fittings**

All fittings shall be mechanical joint ductile iron, shall be short bodied and conform to ANSI/AWWA C153/A21.53 or ANSI/AWWA C110/A21.10 Standards. Ductile Iron fittings shall be designed for a working pressure of 350 pounds per square inch (psi).

Seal coating with bituminous material of the fittings shall conform to ANSI/AWWA C153/A21.53 Standard. Fittings shall be bituminous coated inside and out.

All mechanical joint accessories including glands, rubber gaskets and bolts shall be furnished for each joint opening and shall conform with ANSI/AWWA C111/A21.11, except cast bolts are not permitted.

3.02 **WATER MAIN MATERIALS**

WATER DISTRIBUTION SYSTEM (DIVISION 3)

2. Fittings (Cont'd.)

Tapping sleeves shall be from the same manufacturer as the valve. They shall be ductile iron (ASTM A536 Grade 65-45-12), or stainless steel. The flange dimensions and drilling shall comply with ANSI B16.1 Class 125 with MSS SP-60. The mechanical joint shall comply with AWWA C111.

3. Restraints

Joints shall be restrained using Megalug® style restraints, or approved equal, meeting the specifications listed herein.

Gland body, wedges and wedge actuating components shall be cast from grade 65-45-12 ductile iron material in accordance with ASTM A536. Ductile iron gripping wedges shall be heat treated within a range of 370 to 470 BHN.

Restraint devices shall be Listed by Underwriters Laboratories (3" through 24" inch size) and Approved by Factory Mutual (3" through 12" inch size).

All wedge assemblies and related parts shall be processed through a phosphate wash, rinse and drying operation prior to coating application. The coating shall consist of a minimum of two coats of liquid thermoset epoxy coating with heat cure to follow each coat. All casting bodies shall be surface pretreated with a phosphate wash, rinse and sealer before drying. The coating shall be electrostatically applied and heat cured. The coating shall be a polyester based powder to provide corrosion, impact and UV resistance. **Shop coating is not accepted.**

4. Valves

Gate valves shall be EJIW FlowMaster® series with an EJIW screw-type valve box, or approved equal. The operating nut shall be a standard two-inch square with a left turn open.

5. Valve Boxes

All valves shall be fitted with a valve box. The valve boxes shall be cast iron, screw type, three piece, consisting of a base, center, and top section. The length shall be adjusted by means of threads cast into the top and center section. The center section shall lock into the base. The cover shall be marked "WATER".

The base shall be No. 6 Round and the shaft shall be 5-1/4 inch. The size shall provide for a range of extension of 55-75 inches from the top of pipe.

The valve boxes shall be EJIW 8550, or approved equal.

6. Fire Hydrants

All hydrants shall be EJIW 5BR (54915) Traffic Type with a breakaway flange, or approved equal.

The drain mechanism shall drain the hydrant barrel down to the level of the valve seat. The hydrant head shall be able to face in any of eight positions without digging up the hydrant. The hydrant head shall have two 2½-inch hose nozzles and one 4-inch pumper connection. Each nozzle cap shall be attached to the hydrant with a non-linking chain. The inlet connection shall be 6-inch mechanical joint.

The depth of trench shall be 5½ feet. Threads shall be Meridian Township Standards.

The hydrants shall open left with a standard 1½-inch pentagon nut, shall be painted OSHA red. The hose nozzle threads shall be #4 (2 ½" National Standard Thread). The pumper nozzle shall be fitted with the "Harrington Integral Hydrant Storz" nozzle.

7. Bolts

No cast iron bolts shall be used. All bolts shall meet approval of Engineer.

3.03 INSTALLATION METHODS

WATER DISTRIBUTION SYSTEM (DIVISION 3)

1. Pipe [Ref. Sec. 1.02]

The installation, handling, and storage of all pipe and appurtenances shall be in accordance with AWWA Standard C600 and manufacturer’s recommendations. Pipe shall at all times be protected against impact shocks and free fall. Stockpiling of pipe and appurtenances at the site shall be in such a location as to minimize handling and prevent collecting or submergence with water.

A water main shall be separated vertically from a sanitary sewer by 18 inches at a crossing and horizontally by 10 feet when parallel. The trenching method for ductile iron shall be AWWA Type 1 – flat bottom (undisturbed earth), loose backfill. Backfill for a Type 1 trench requires no compaction. When under existing or future roadways or lawns, then specified density procedures shall prevail.

The depth of trench shall be such that the top of the pipe shall not be less than five feet below the proposed finish grade, unless otherwise shown on the plans or so ordered by the Engineer. The trench shall be of such width as will readily permit the laying, handling and assembling of the pipes in the trench and to allow a thorough filling and compacting of the earth refill adjacent to the lower half of the pipe. Holes, no larger than necessary, shall be provided for the bells at each joint and to ensure that the pipe barrel will lie flat on the trench bottom. Blocking of pipe will not be allowed.

After the trench has been excavated, the pipe, fittings, valves and hydrants shall, after first being inspected and the joints cleaned, be carefully placed into the trench in such a manner as to prevent damage to them. Under no circumstances shall water main materials be dropped or dumped into the trench. All lumps, blisters and excess tar coating shall be removed from the bell and spigot ends of each pipe and fittings. The outside of the spigot and the inside of the bell shall be wire brushed and wiped clean and dry before the pipe is laid. Any damage to the exterior coating of the pipe shall be repaired with an approved coating before the pipe is laid. After placing a length of pipe in the trench, the spigot end shall be lubricated and then entered in the bell and the pipe forced home and brought to correct line and grade. Lubricants recommended by the pipe manufacturer and approved for use on potable water systems shall be applied as recommended. Due care should be used to seat the gasket evenly in the bell at all points. A plug shall be used during any breaks in construction to prevent any possible contamination. If the trench contains any water, the open ends of the pipe shall be plugged with a watertight plug.

The plain end of the slip type joint is furnished with a slight taper to ease its sliding fit with the gasket when the joint is made up. When necessary to cut pipe in the field, the outside of the cut end should be tapered by filing or grinding back about 1/8" at an angle of about 30 degrees with the centerline of the pipe.

To form a long-radius curve or to avoid obstructions, the pipe may be deflected within the tolerances recommended by the manufacturer. Some common deflections from AWWA C600 are:

PUSH-ON JOINT PIPE:

Pipe Size	Deflection Angle (deg.)	Maximum Offset (in.)		Approx. Radius of Curve (ft.)	
		L = 18'	L = 20'	L = 18'	L = 20'
8-inch	5	19	21	205	230
12-inch	5	19	21	205	230
16-inch	3*	11*	12*	340*	380*
20-inch	3*	11*	12*	340*	380*

*Maximum deflection may be larger than listed in AWWA C600. Consult the manufacturer.

MECHANICAL JOINT PIPE:

Pipe Size	Deflection Angle (deg.)	Maximum Offset (in.)		Approx. Radius of Curve (ft.)	
		L = 18'	L = 20'	L = 18'	L = 20'
8-inch	5-21	20	22	195	220
12-inch	5-21	20	22	195	220
16-inch	3-35	13.5	15	285	320
20-inch	3-00	11	12	340	380

3.03 INSTALLATION METHODS (Cont'd.)

WATER DISTRIBUTION SYSTEM (DIVISION 3)

2. Setting Valves and Boxes

All valves shall be set with the stem in a vertical position and shall be plumb. Valve box shall be so set that it will not transmit shock or stress to the valve. It shall be centered over the stem nut of the valve and shall be true and plumb. The box shall be adjusted so that the cover is flush with the finished ground surface or as directed by the Engineer. Stone shall not be placed around the valves.

3. Setting Fire Hydrants

Fire hydrants shall be located as shown on the plans, or as directed by the Engineer. All hydrants shall be set to a grade that will place the 4" hose nozzle 21" above the ground surface, unless otherwise directed by the Engineer. Barrel extensions shall be furnished and installed as necessary.

Each hydrant shall be connected to the main by a 6-inch branch. A 6-inch gate valve shall be installed in each hydrant connection. As with all other mechanical joint connections, the hydrant and valve shall be secured to the mainline tee by Megalug® style restraints, or approved equal.

Excavation for each hydrant shall extend at least twelve inches (12") below the base of the hydrant and shall have an area of at least four square feet. Before setting the hydrant, the excavation shall be filled to the elevation of the hydrant, base with washed or broken stone. After the hydrant is set and securely blocked, additional washed or broken stone shall be placed around the base of the hydrant to an elevation of twelve inches (12") over the 6-inch branch connection.

4. Thrust Blocks

All bends, stub ends, plugs and any other portion of the system which may be subject to separation of joints because of water pressure shall be securely thrust blocked. Blocking shall be concrete poured in place or manhole block construction and shall be so placed as to prevent any movement of pipe or fitting joints due to water pressure. Size and shape of blocks shall be in accordance with the details shown on the plans.

3.04 WATER SERVICES

All pipes, piping fittings, plumbing fittings, and fixtures that are used for potable water must comply with the new lead-free requirement and must bear the mark NSF/ANSI Standard 61, Annex G or NSF 61-G.

1. Pipe Material

Allowable sizes are 1-inch, 1½-inch, 2-inch, 3-inch, 4-inch, or as specified for mains. Material for 3- and 4-inch shall be Class 54 ductile iron as specified for mains. Material for 1-inch, 1½-inch, and 2-inch shall be Type K, annealed, seamless copper tubing conforming to ASTM B88.

If the service line is longer than 150 feet from the curb stop to the house, the Township will allow the installation of HDPE pipe (DR9 or DR11) that meets ASTM D3350 PE cell classification of PE4710 designation. All HDPE pipe construction shall include the installation of single-strand tracer wire, with 10 gage minimum thickness, and the installation of locator stations at 150-foot maximum intervals. In such instances, the water meter(s) shall be installed in a meter pit at the right-of-way line.

2. Service Fittings

Corporation stops, curb stops, and unions shall be only Mueller 110 compression style, or Township approved Ford fittings. The inlet on the corporation stop shall have AWWA threads. Solder, band, and pack type couplings are not allowed.

Curb boxes shall be Minneapolis Pattern, telescoping, 4½-foot depth, cast iron.

Double strap service clamps shall be used with 1½-inch and 2-inch corporation stops.

3. Installation

WATER DISTRIBUTION SYSTEM (DIVISION 3)

All service pipe shall be buried five (5) feet below finished grade. Curb box locations under driveways and sidewalks are prohibited.

Water and sewer service lines may be installed in a common trench if a minimum horizontal separation of 3.0 feet is maintained.

4. Inspection

All service lines shall be inspected by Township personnel prior to being backfilled. The Contractor shall notify the Township a minimum of 6 hours prior to inspection. Any services backfilled prior to being inspected will not be approved, and the Contractor shall be responsible for all costs of exposing the services.

5. Guarantee

The Contractor and/or developer shall be responsible indefinitely for the correct elevation and measurements of house services and curb boxes. If a curb box or house service cannot be found, is not at the correct elevation, or has been installed improperly, the Contractor will be notified of the situation. They will then be required to pay for finding the curb box or house service, fixing the installation, or reinstallation, whichever the case may be.

3.05 TESTING AND STERILIZATION

1. Pressure Testing

The Contractor shall furnish equipment for the test, and the test shall be run by them in compliance with AWWA C600 and under the direction of the Engineer. Additionally, all corp stops for house services must be installed at the time of the pressure test. The test shall be made at 150 psi hydrostatic pressure and shall be maintained for at least (2) hours and the leakage shall not exceed 11.65 gallons per day, per mile of pipe, per inch of nominal diameter. The Contractor shall furnish all labor and equipment to make the test.

All valves shall be opened such that all air in the line can be removed upon filling with water. The Contractor shall install any corporation stops necessary to allow the air to be expelled.

Upon opening all valves, the test will begin. If the line is a dead end, the 1st hour of the test shall be against the last hydrant. After 1 hour of testing the dead end valves shall be closed and all bleeder lines (dead end hydrants) shall be opened. The test will continue for the remaining 1 hour. If the line is not dead end, the test will be a continuous 2 hours.

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 retest until satisfactory results are obtained. The final test shall be made in the presence of the Engineer, with a minimum of 48-hours advance notice provided to the Engineer. 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.

2. Sterilization and Bacteriological Testing

Disinfection and bacteriological testing shall be in accordance with the AWWA C651. Before the mains are chlorinated, they shall be thoroughly flushed. All mains shall be chlorinated for a period of at least twenty-four (24) hours. Chlorine shall be added in sufficient quantity to give a 50-ppm residual of free chlorine after a twenty-four (24) hour period. After completion of the chlorine procedure, the main shall be flushed. Then water samples shall be taken from the main for bacteriological tests. If the tests should result in unsafe conditions, the chlorinating shall be repeated by the Contractor. Two consecutive passing samples at least 24 hours apart must be obtained before the main can be connected to the existing water system.

**MERIDIAN TOWNSHIP TECHNICAL SPECIFICATIONS
DIVISION 7**

PAY ITEMS, METHOD OF MEASUREMENT & BASIS OF PAYMENT

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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

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

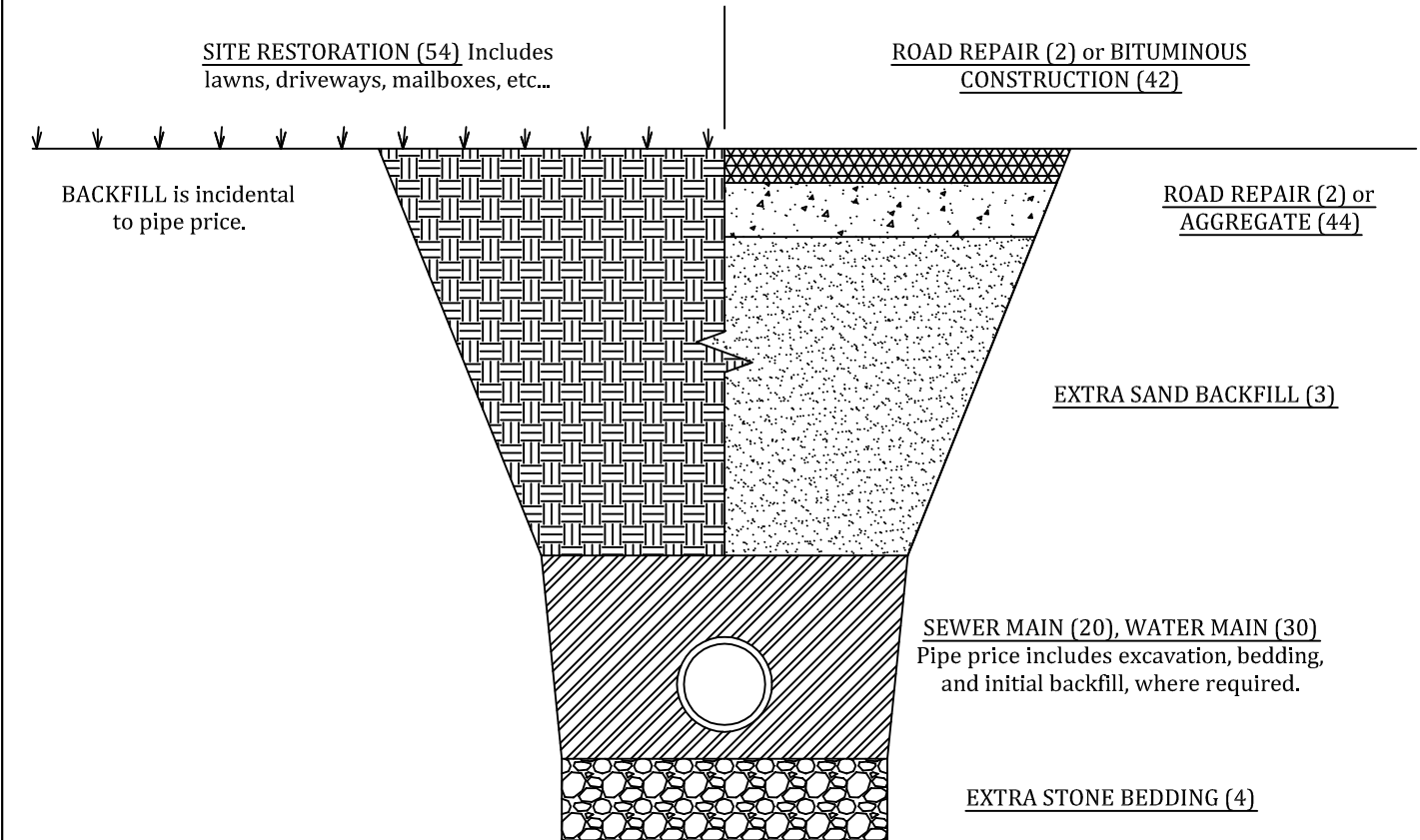
- A. Description: The Contract Unit Price on this item includes restoration of the ground surface to at least its preconstruction state. Specific examples are final grading of the top three inches of ground surface, furnishing and installation of seed and mulch, driveway and parking area repair, culvert 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

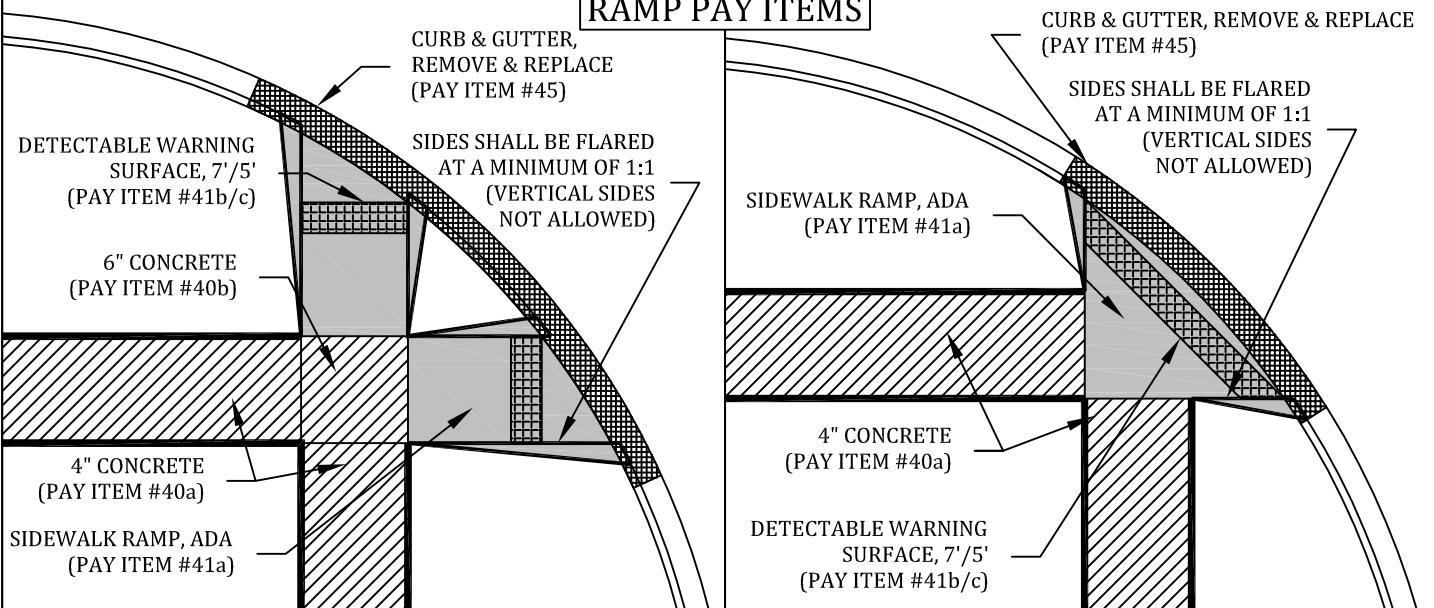
- A. Description: The Contract Unit Price on these items includes all labor, equipment, and material necessary to install drainage pipe of the type and size specified, as shown on the plans.
- B. Method of Measurement & Basis of Payment: This item will be paid for at the Contract Unit Price for the length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

PAY ITEM SCHEMATICS

TRENCH PAY ITEMS



RAMP PAY ITEMS



TIMBERLANE WATER MAIN 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

NOTICES – The Contractor shall notify adjacent homeowners to mark private utilities seven (7) days prior to work in front of the property. If access to a resident’s drive is to be impeded, as much notice as possible is to be given to the resident, with a minimum of 24-hour notice being provided. The Township will supply the Contractor with the appropriate door-hanger forms.

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. Compaction testing will be required for all backfill within the road zone-of-influence.

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 public right-of-way (ROW) is done under permit and approval of the Ingham County Road Department (ICRD) and MDOT, as appropriate. The Contractor shall secure the ICRD ROW permit(s). Meridian Township will secure any necessary MDOT permit(s).

PAVEMENT REMOVAL – Any necessary pavement removal is incidental. Sawcut all pavement prior to removal, including concrete and asphalt. Restore the surface with compacted gravel as a temporary surface. Concrete and asphalt replacement will be performed separately.

SHORING – Any shoring necessary for water main installation, or to protect existing utilities, structures, or other property is incidental.

SITE CLEANUP – At the end of each day the work site shall be rough graded. In the event that it is necessary to leave a point of excavation open overnight, the area shall be safely barricaded. At the end of each week, or as deemed necessary by the Township, the street surface shall be wetted and swept clean of all construction debris.

JOINT RESTRAINT – All mechanical fittings shall be restrained using MEGALUG® style restraints or approved equal.

SALVAGE – The Township reserves the right to salvage any old gate valves or hydrants in part, or in whole.

TREE REMOVAL – Tree removal will be performed by others.

COMPLETION DATES – The Timberlane subdivision streets are scheduled to be resurfaced in October of 2023. As such, all of the open-cut work shall be completed by **October 1, 2023**. All of the trenchless work shall be completed by **June 1, 2024**.

PAY ITEMS

1a. TRAFFIC CONTROL – This pay item includes 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 and MDOT permit requirements.

All necessary traffic control devices are included. All barrels remaining in the road overnight must be lighted. Generally, Typical Application 6, *Shoulder Work with Minor Encroachment* will be necessary (Appendix A).

TRAFFIC CONTROL shall 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.

1b. MOBILIZATION – This pay item includes all necessary preparatory work and operations in accordance with the MDOT Standard Specifications for Construction (SSC), Section 110.

6a,b. WATER, MAIN, 6 INCH, ABANDON, _____ – These pay items include all labor, equipment, and material necessary to completely remove from service and fill the existing water main with flowable fill, and to remove the existing gate valves and hydrants. The flowable fill shall be pre-approved for use by the Township. Bleeder lines shall be installed on all sections of main to be abandoned to ensure the complete and proper filling of the main.

30a-c. WATER, MAIN, _ INCH, ... – For these pay items, see the Water Main Installation Specifications (page WM-1 of the contract). **The encasement shall be V-Bio® Enhanced Polyethylene Encasement installed per the manufacturer's instructions.**

For **Horizontal Directional Drilling** specifications, see pages **HDD-1** through **HDD-6** of the contract.

31a-j. FITTINGS – These pay items include all labor, equipment, and material necessary to install the specified fittings as shown on the plans and as described in the Technical Specifications. Thrust blocks, joint restraints, and polyethylene encasement are incidental to this pay item.

32. WATER, GATE VALVE, 8 INCH – This pay item includes all labor, equipment, and material necessary to install an EJIW FlowMaster® series gate valve with an EJIW screw-type valve box.

33. WATER, HYDRANT ASSEMBLY – This pay item includes all labor, equipment, and material necessary to install a new EJIW fire hydrant as detailed in Division 3 of the Technical Specifications and as shown on the plans, including everything from the new water main to the hydrant, excluding the 8"x6" tee. This includes, but is not limited to, the 6" EJIW isolation gate valve, valve box, pipe, EJIW hydrant with STORZ nozzle, polyethylene encasement, thrust block, stone bedding, backfill, and, as necessary, ductile iron sleeves and bends.

34. HYDRANT EXTENSION – This pay item includes all labor, equipment, and material necessary to extend the dead-end line for a replacement hydrant, as shown on the plans. This includes, but is not limited to all traffic controls, excavation, backfilling, pavement and curb removal and replacement, water main connection, and grass restoration. The hydrant, pipe, and fittings will be paid for separately.

Traffic controls for this item are anticipated to include closing northbound traffic on Cornell, with a detour down Hatch Road to Dobie Road. Traffic control shall be in accordance with ICRD standards, and under ICRD permit.

35a-b. WATER, SERV, 1 INCH, (SHORT/LONG) – These pay items include all labor, equipment, and material necessary to connect each existing service to the new water main. Each service includes a new corp stop, copper service line, curb stop, and curb box as described in the Technical Specifications. The line shall be replaced with copper from the proposed water main to just beyond the new curb stop. Service lines crossing the street may be accomplished by Horizontal Directional Drilling, by pulling through the old service line, or by open cut – prior to road construction. **Open cut crossing of new roadways is not allowed.**

35c. WATER, SERV, 1 INCH, RECONNECT – This pay item includes all labor, equipment, and material necessary to connect an existing one (1) inch copper service to the new water main. The intent is to utilize as much of the existing copper service as possible, only installing new copper to make the connection between the new main and the existing service line. **This item does not include a new curb stop or box.**

If the existing service is discovered to be $\frac{3}{4}$ " , replace the entire service, from the main to the curb stop. The item will then be paid for as **Water, Serv, 1 inch, Short** or **Water, Serv, 1 inch, Long**, as appropriate.

53. EROSION CONTROL, INLET PROTECTION, FABRIC DROP – This pay item includes all labor, equipment, and material necessary to install and maintain a device which is designed and constructed for use in the specified structure. Catch basin sediment guards 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. Grass shall be growing before the sediment guards are removed and retainage will not be released until the sediment guards are fully removed.

54a-b. SITE RESTORATION, _____ – These pay items include all labor, equipment, and material necessary to restore disturbed grass areas in accordance with the MDOT SSC, Section 816, and as described herein. The disturbed areas shall be restored to grade with three (3) inches of screened topsoil. For slopes less than 1:4, restoration shall be made using only Bonded Fiber Matrix hydroseeding or hand-seeding with fertilizer, loose mulch, and a spray-applied tackifier. For slopes greater than 1:4, mulch blankets must be used.

NOTES:

- *All water main shutdowns shall be coordinated with Meridian Township personnel. All shutdowns shall be timed to minimize the impact to water customers, as determined by the Township. This includes utilizing overnight work. No additional payment will be made for such work.*
- *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.*

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-6—Typical Application 6 (MI)
Shoulder Work with Minor Encroachment

Guidance:

1. All lanes should be a minimum of 3 m (10 ft) in width as measured to the near face of the channelizing devices.
2. The treatment shown should be used on a minor road having low speeds. For higher-speed traffic conditions, a lane closure should be used.

Option:

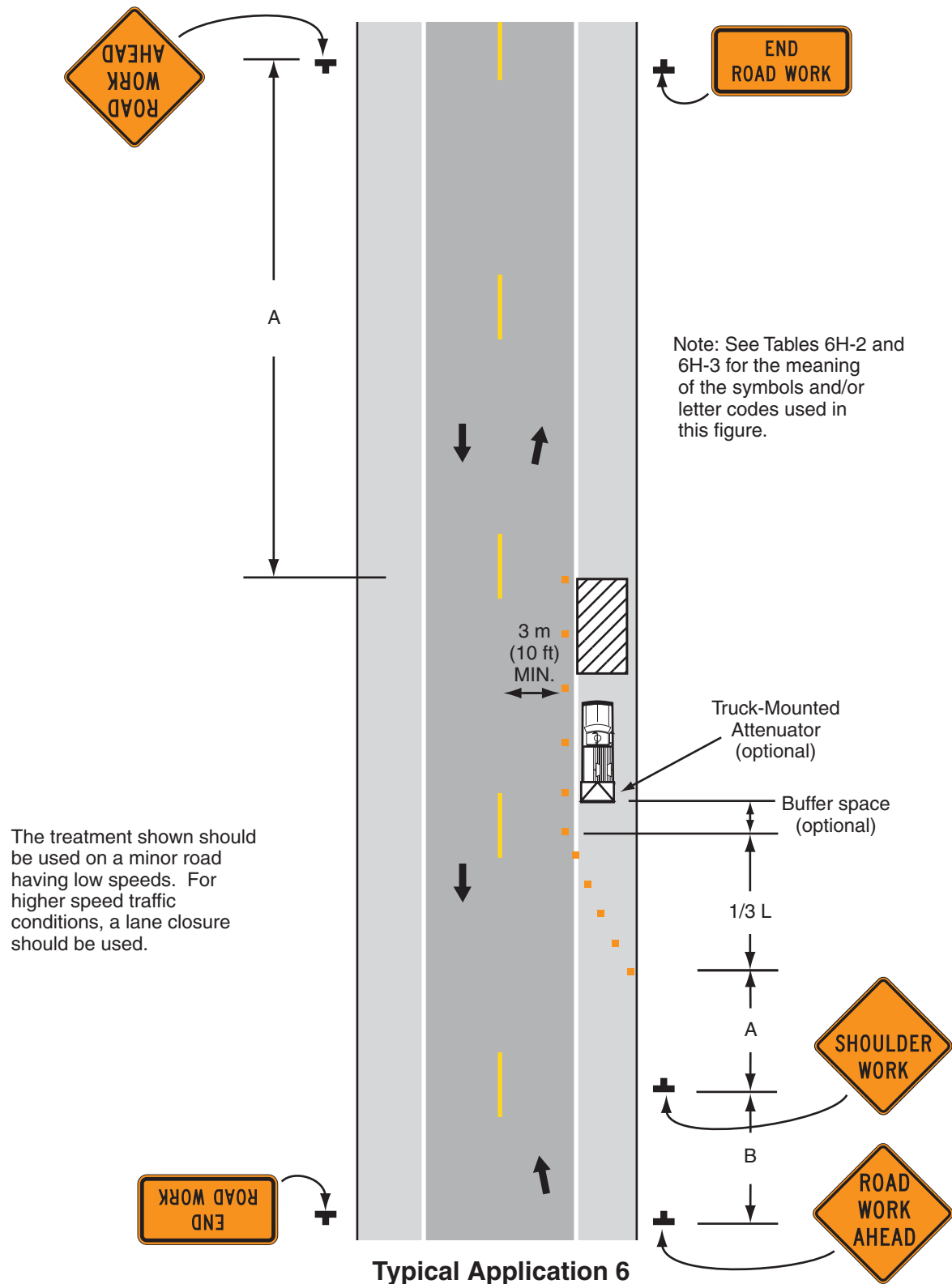
3. For short-term use on low-volume, low-speed roadways with vehicular traffic that does not include longer and wider heavy commercial vehicles, a minimum lane width of 2.7 m (9 ft) may be used.
4. Where the opposite shoulder is suitable for carrying vehicular traffic and of adequate width, lanes may be shifted by use of closely spaced channelizing devices, provided that the minimum lane width of 3 m (10 ft) is maintained.
5. Additional advance warning may be appropriate, such as a ROAD NARROWS sign.
6. Temporary traffic barriers may be used along the work space.
7. The shadow vehicle may be omitted if a taper and channelizing devices are used.
8. A truck-mounted attenuator may be used on the shadow vehicle.
9. For short-duration work, the taper and channelizing devices may be omitted if a shadow vehicle with activated high-intensity rotating, flashing, oscillating, or strobe lights is used.
10. Vehicle hazard warning signals may be used to supplement high-intensity rotating, flashing, oscillating, or strobe lights.

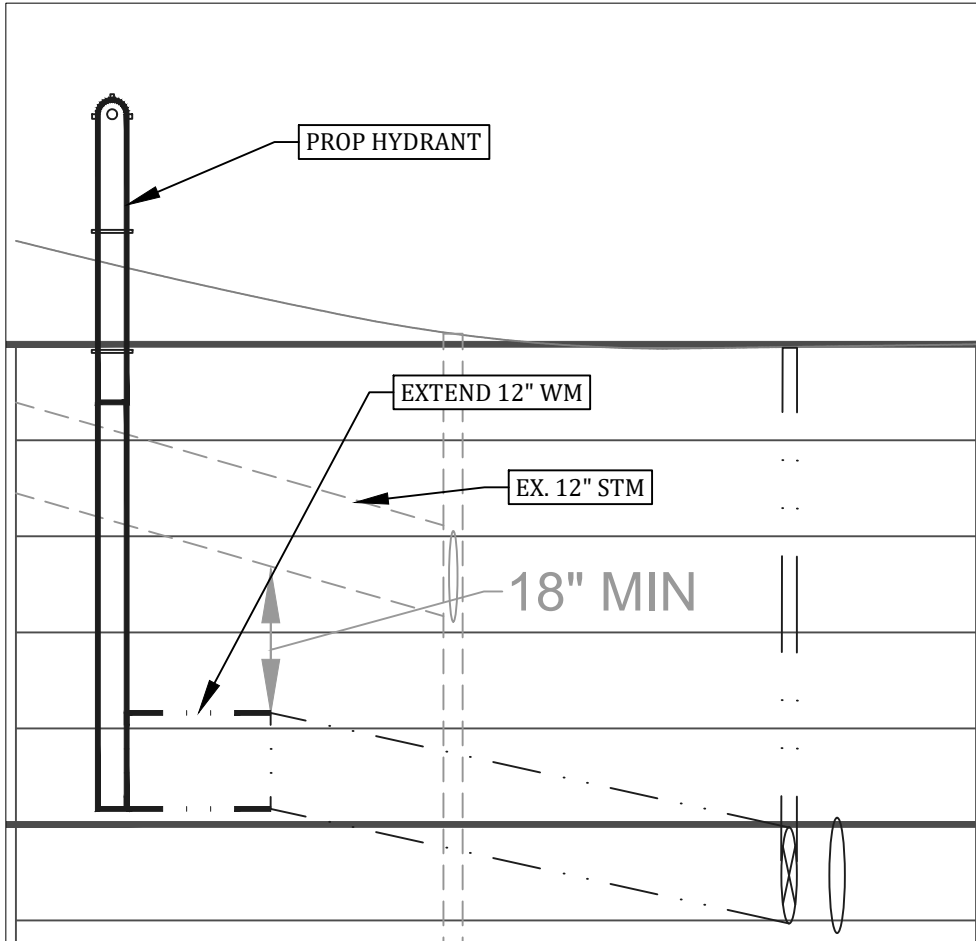
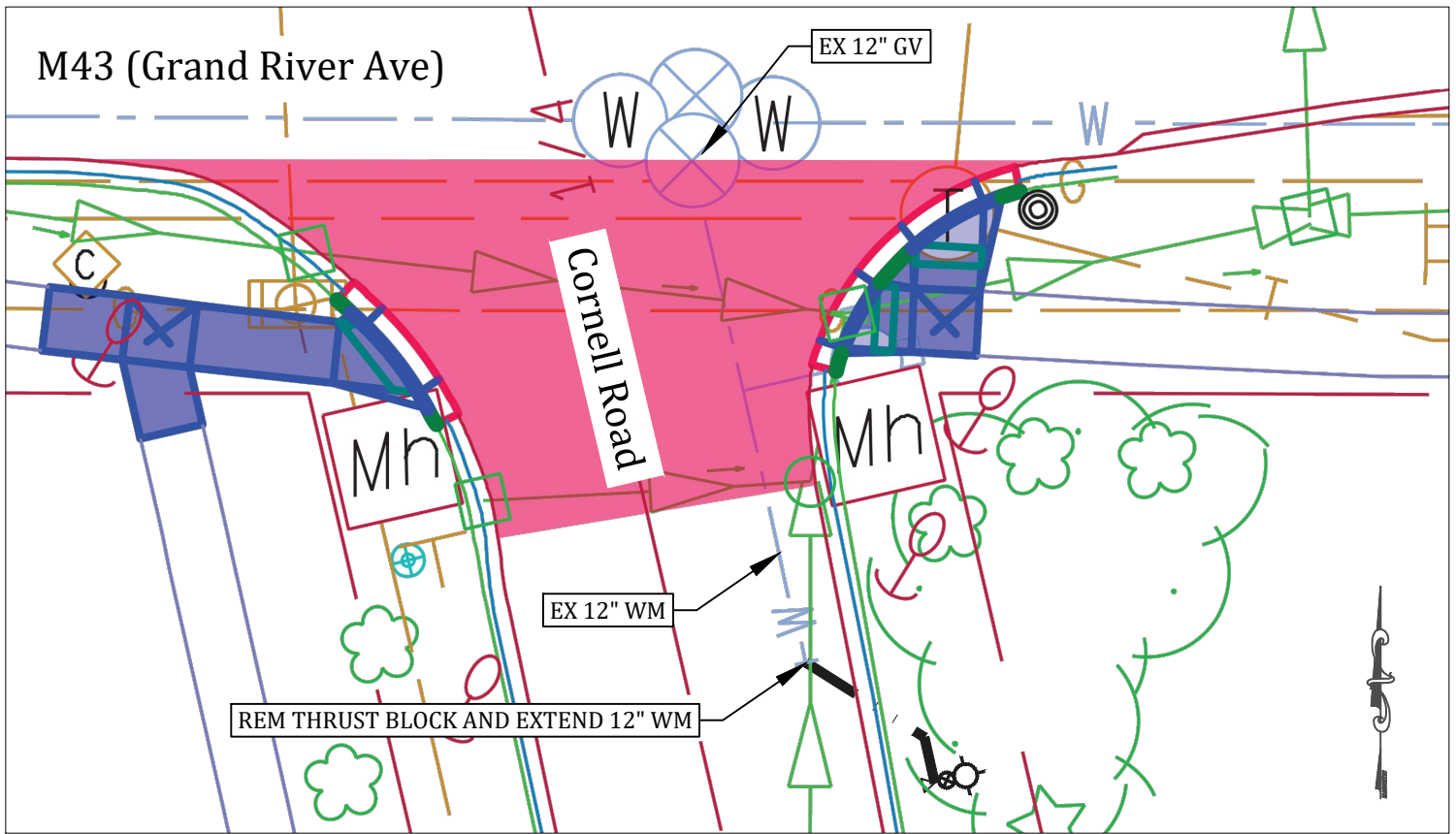
Standard:

- 11. Vehicle hazard warning signals shall not be used instead of the vehicle's high-intensity rotating, flashing, oscillating, or strobe lights.**



Figure 6H-6. Shoulder Work with Minor Encroachment (MI) (TA-6)





PAY ITEMS & QTS (THIS SHEET):

30c.	Water, Main, 12 inch	- 20	Ft
31i.	Water, Bend, 45°, 12 inch	- 2	Ea
31j.	Water, Red, 12 inch by 6 inch	- 1	Ea
33.	Water, Hydrant Assembly	- 1	Ea
34.	Hydrant Extension	- 1	LSum
53.	EC, Inlet Prot, Fabric Drop	- 2	Ea

Meridian Charter Township
 Ingham County, Michigan
 Water Main System

Cornell & M43
 (Grand River Ave)
 HYDRANT EXTENSION
 DRAWN BY: NN 07/13/23 CHECKED BY: YI 07/13/23

REVISIONS:		COMMENTS:
DATE:	BY:	Contract Plan
07/13/23	NN	
SCALE:		PAGE:
1" = 20' H 1" = 2' V		Apex - B
		FILE: