SCHULTZ PATHWAY AND BOARDWALK

MERIDIAN TOWNSHIP

DEPARTMENT OF PUBLIC WORKS

INGHAM COUNTY, MICHIGAN

SCHULTZ PATHWAY AND BOARDWALK

FOR
CHARTER TOWNSHIP OF MERIDIAN

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CHARTER TOWNSHIP OF MERIDIAN

SCHULTZ PATHWAY AND BOARDWALK
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 11:00 a.m., local time on Thursday, May 29, 2025 for the construction of a boardwalk and concrete pathway along Bennett Road between the driveway entrances to the Schultz Veterinary Clinic and Okemos Public Schools Bus Garage.

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

- Approximately 335 feet of 8' wide (railing to railing) Treated Timber Boardwalk
- Installation of Helical Piles to support the boardwalk
- Approximately 115 square yards of 7' wide concrete pathway;

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

Work on the project must start within ten (10) days of issuance of the "Notice To Proceed". Construction shall be completed by October 1, 2025. 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
- Builders Exchange of Michigan, 2007 Eastcastle Dr SE, Grand Rapids, MI 49508
- Construction Assoc of MI, 43636 Woodward, Bloomfield Hills, MI 48302

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.

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

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

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 – SCHULTZ PATHWAY AND BOARDWALK"** 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.

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: SCHULTZ PATHWAY AND BOARDWALK

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:

SCHULTZ PATHWAY AND BOARDWALK
PROPOSAL

Pay Item	Description	Qty	Units	Unit Price	Amount
1.	Traffic Control	1	LSUM	$	$
8a.	Concrete Abutment	2	EA	$	$
8b.	Treated Timber Boardwalk	335	FT	$	$
8c.	Boardwalk Structural Piles	1	LS	$	$
10a.	Mobilization, Max $50,000	1	LSUM	$	$
10d.	Sidewalk, Removal	85	SYD	$	$
10e.	Tree Removal	1	EA	$	$
40.	Shared Use Path, Concrete	115	SYD	$	$
43.	Embankment, LM	35	CY	$	$
44.	Shared Use Path, Aggregate	40	TON	$	$
46a.	Shared Use Path, Grading	140	FT	$	$
51.	Fence, Aluminum	50	FT	$	$
53a.	Erosion Control, Gravel Access Approach	1	EA	$	$
53c.	Erosion Control, Silt Fence	165	FT	$	$
53b.	Erosion Control, Filter Bag	2	EA	$	$
54a.	Site Restoration	1	LS	$	$

TOTAL BASE BID: $_____

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

NAME	DATE
_____	
_____	
_____	

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

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

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

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

Date _____ Company Name _____

By _____ Address _____
Signature

_____ _____
Printed Name

Title _____ Phone Number _____

Email _____

SCHULTZ PATHWAY AND BOARDWALK

THIS CONTRACT, dated _____, 2025 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:_____

TO: _____
_____
_____

ADDRESS: _____
_____

CONTRACT: **SCHULTZ PATHWAY AND BOARDWALK**

You are notified that your Bid dated_____, **2025**, for the above Contract has been considered. You are the apparent Successful Bidder and have been awarded a Contract for **SCHULTZ PATHWAY AND BOARDWALK.**

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: _____

TO: _____
_____
_____

ADDRESS: _____
_____

CONTRACT: **SCHULTZ PATHWAY AND BOARDWALK**

You are notified that the Contract Times under the above Contract will commence to run on _____, **2025**. 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, 2025.**

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

MERIDIAN TOWNSHIP

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

ACKNOWLEDGEMENT OF ACCEPTANCE OF NOTICE TO PROCEED

CONTRACTOR acknowledges acceptance of this Notice to Proceed this _____ day of _____, 2025.

By: _____
(CONTRACTOR)

GENERAL CONDITIONS

INDEX

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. **<u>Policies, Coverages and Endorsements</u>**

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

GC.2 CONTRACTORS' AND SUBCONTRACTORS' INSURANCE

A. **Policies, Coverages and Endorsements** (Cont'd.)

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

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 PREVAILING WAGE REQUIREMENT

Meridian Township policy requires vendors contracting with the Township over $50,000 to pay 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. Contractors shall furnish proof satisfactory to the Township that the Prevailing Wage provisions are being complied with as part of each progress payment submission.

GC.5 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, he 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.

GC.6 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.7 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.8 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. Contractors shall furnish proof satisfactory to the Township that the Prevailing Wage provisions are being complied with as part of each progress payment submission.

GC.8 PAYMENT TO CONTRACTOR (Cont'd.)

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.

GC.8 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.9 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. All sub-contracts entered into by the Contractor shall contain the provision with respect to the prevailing wage requirement. Which states all contractors and sub-contractors engaged in the performance of service or work for the Township to, at the request of the Township, furnish proof satisfactory to the Township that the prevailing wage provisions are being complied with.

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.10 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.11 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.12 CHANGES IN WORK/PAYMENT ADJUSTMENTS

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

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

A. Labor, including foremen (including fringe benefits);

B. Materials entering permanently into the work;

C. The ownership or rental cost of construction plant and equipment during the time of use on the extra work at a rate not to exceed AGC rates;

D. Power and consumable supplies for the operation of power equipment;

E. Insurance;

F. Social Security and unemployment contributions.

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

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

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

GC.13 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.14 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.15 TERMINATION FOR BREACH

In the event that any of the provisions of this Contract are violated by the Contractor or by any of his subcontractors, the Owner may serve written notice upon the Contractor and the Surety of its intention to terminate the Contract, such notice to contain the reasons for terminating the Contract, and unless within ten (10) days after the serving of such notice upon the Contractor, the violation shall cease and satisfactory arrangements for correction be made, the Contract shall cease and terminate. In the event of a termination of the Contract, the Owner shall immediately serve notice thereof upon the Surety and the Contractor, and the Surety shall have the right to take over and perform the Contract. However, if the Surety does not commence performance thereof within 30 days from the date of mailing said Notice of Termination to such Surety, the Owner may take over the work and prosecute the same to completion by contract for the account and at the expense of the Contractor. The Contractor and his Surety shall be liable to the Owner for any excess cost incurred by the Owner in completing the work, and Owner may take possession of and utilize in completing the work, all materials, appliances and plants as may be on the site of the work and necessary therefore.

GC.16 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.17 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.18 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.19 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.20 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.21 ROYALTIES AND PATENTS

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

GC.22 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.

GC.22 INSPECTIONS (Cont'd.)

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 his/her subcontractors, he/she shall defray all the expenses of examination and of 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.23 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.24 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.25 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.26 "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.27 PLANS AND SPECIFICATIONS

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

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

GC.28 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.29 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.30 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.31 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.

GC.32 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 Charter Township of Meridian, 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 Charter Township of Meridian or his authorized representative.

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.

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.

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

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

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

GS.4 CARE OF EXISTING STRUCTURES

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

GS.5 CARE OF NEW STRUCTURES

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

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

GS.6 EXISTING PUBLIC UTILITIES

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

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

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

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

GS.7 PROTECTION OF TREES AND SHRUBS

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

GS.8 SAFETY PRECAUTIONS

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

GS.9 SANITARY REQUIREMENTS

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

GS.10 UTILITIES

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

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

GS.11 PUMPING AND DRAINAGE

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

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

GS.12 WINTER CONSTRUCTION

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

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

GS.13 USE OF FACILITIES BEFORE FINAL COMPLETION

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

GS.14 TEST OF MATERIALS

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

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

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

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

GS.15 OTHER WORK

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

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

GS.16 LINES AND GRADES

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

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

GS.17 COMPLETE WORK REQUIRED

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

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 that 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 that 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.

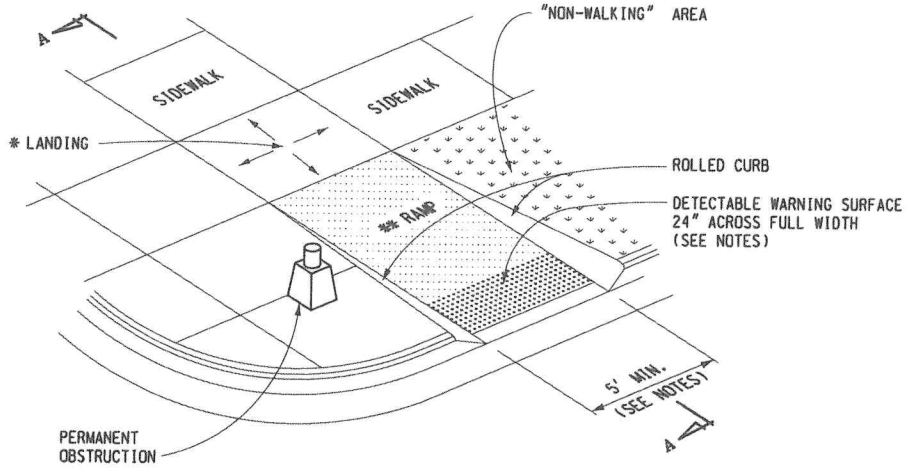
e. The Contractor shall store construction materials as far off the road so that the materials do not pose a hazard nor block the vision of the traveling public and those seeking egress and ingress to private property. Only materials to be installed immediately can be stored within the right-of-way. 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

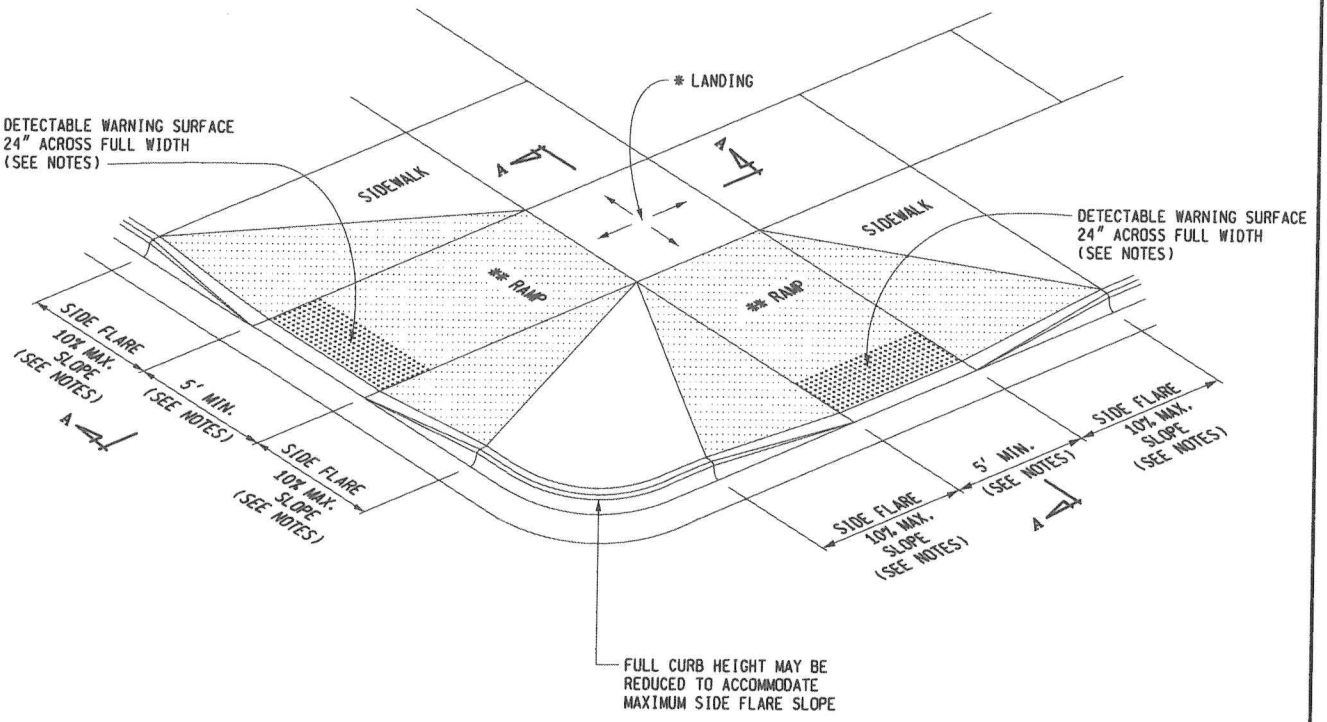
* MAXIMUM LANDING SLOPE IS 2.0% IN EACH DIRECTION OF TRAVEL. LANDING MINIMUM DIMENSIONS 5' x 5'. SEE NOTES.

** MAXIMUM RAMP CROSS SLOPE IS 2.0%. RUNNING SLOPE 5% - 7% (8.3% MAXIMUM). SEE NOTES.



CURB RAMP TYPE R

(ROLLED SIDES)



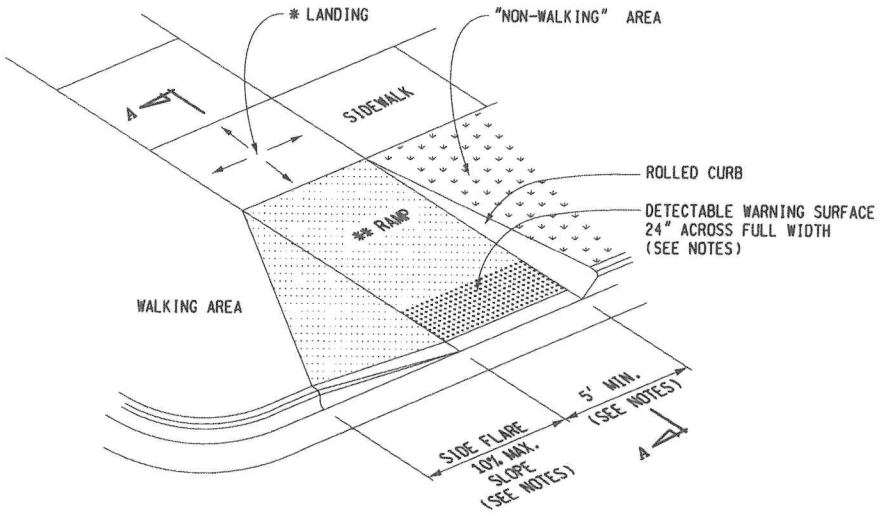
CURB RAMP TYPE F

(FLARED SIDES, TWO RAMPS SHOWN)

MDOT Michigan Department of Transportation PREPARED BY DESIGN DIVISION DRAWN BY: B.L.T. CHECKED BY: W.K.P.	DEPARTMENT DIRECTOR Paul C. Ajegba APPROVED BY: _____ DIRECTOR, BUREAU OF FIELD SERVICES APPROVED BY: _____ DIRECTOR, BUREAU OF DEVELOPMENT	M-1	MICHIGAN DEPARTMENT OF TRANSPORTATION BUREAU OF DEVELOPMENT STANDARD PLAN FOR CURB RAMP AND DETECTABLE WARNING DETAILS		
			F.H.W.A. APPROVAL	5-8-2020 PLAN DATE	R-28-J	SHEET 1 OF 7

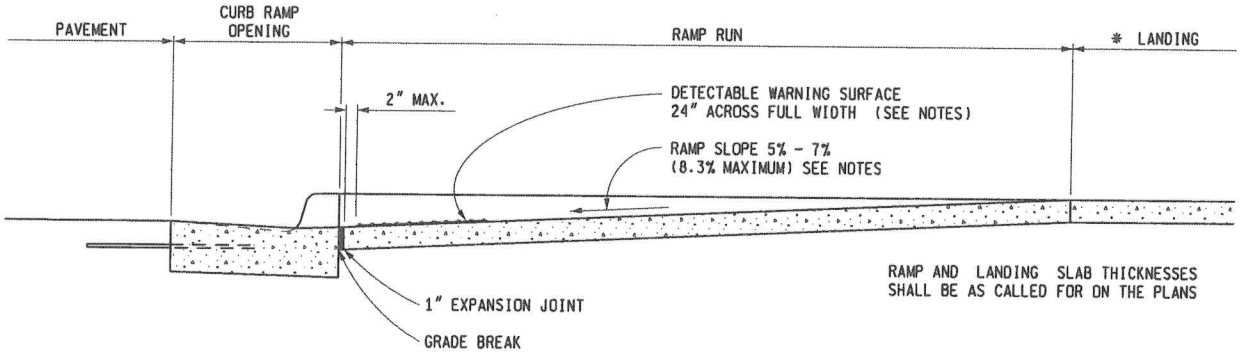
* MAXIMUM LANDING SLOPE IS 2.0% IN EACH DIRECTION OF TRAVEL. LANDING MINIMUM DIMENSIONS 5' x 5'. SEE NOTES.

** MAXIMUM RAMP CROSS SLOPE IS 2.0%, RUNNING SLOPE 5% - 7% (8.3% MAXIMUM). SEE NOTES.



CURB RAMP TYPE RF

(ROLLED / FLARED SIDES)

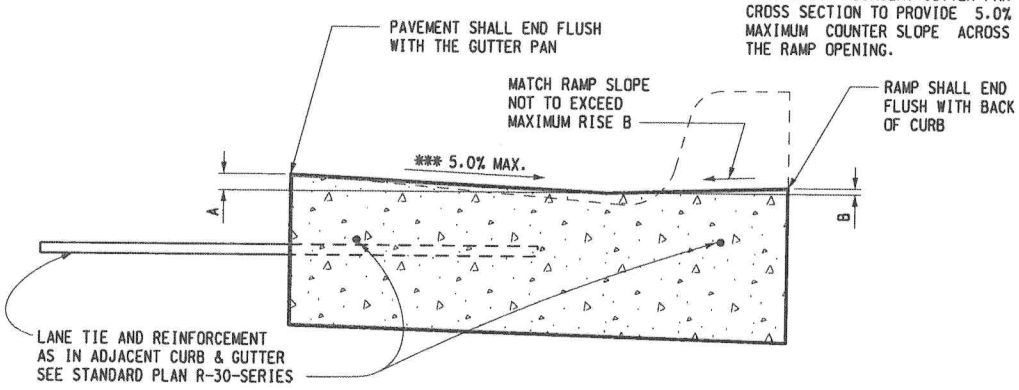


SECTION A-A

CURB TYPE	MAXIMUM RISE (INCHES)	
	A	B
B1	3/4	1
B2	3/4	1
B3	3/4	1
D1	3/4	1
D2	3/4	1
D3	3/4	1
C1	1/2	1/2
C2	1/2	1/2
C3	3/4	1/2
C4	3/4	1/2
C5	1	1/2
C6	1	1/2
F1	1/2	1/2
F2	1/2	1/2
F3	3/4	1/2
F4	3/4	1/2
F5	1	1/2
F6	1	1/2

FOR CURB TYPES SEE STANDARD PLAN R-30-SERIES

*** TRANSITION ADJACENT GUTTER PAN CROSS SECTION TO PROVIDE 5.0% MAXIMUM COUNTER SLOPE ACROSS THE RAMP OPENING.



SECTION THROUGH CURB RAMP OPENING

(TYPICAL ALL RAMP TYPES)

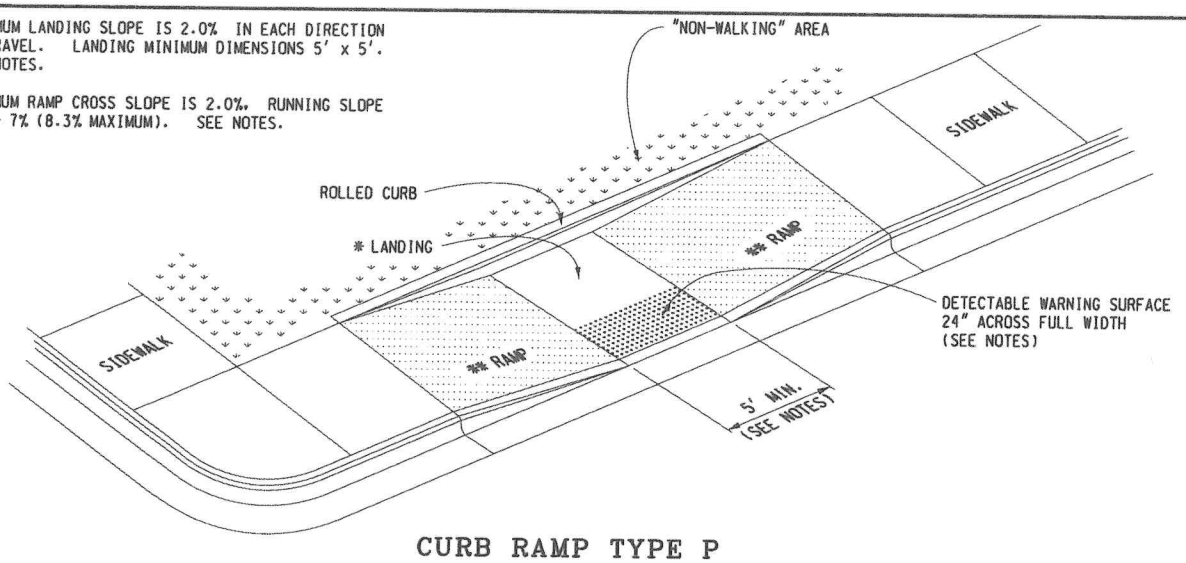
MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF DEVELOPMENT STANDARD PLAN FOR

CURB RAMP AND DETECTABLE WARNING DETAILS

M-2	F.H.W.A. APPROVAL	5-8-2020 PLAN DATE	R-28-J	SHEET 2 OF 7

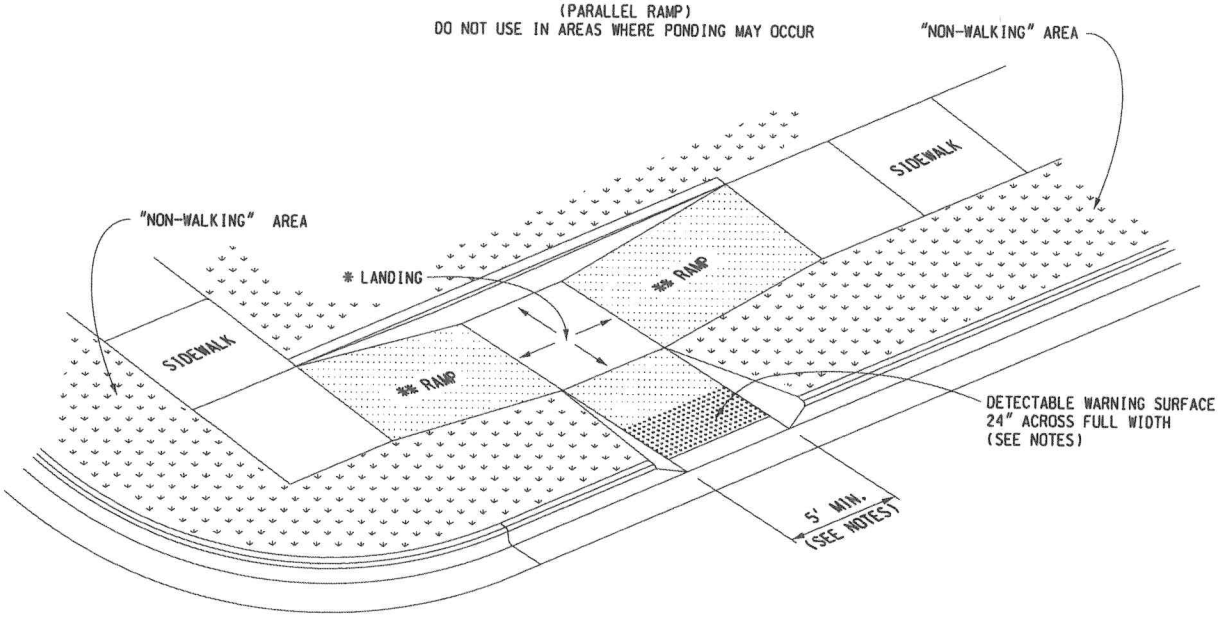
* MAXIMUM LANDING SLOPE IS 2.0% IN EACH DIRECTION OF TRAVEL. LANDING MINIMUM DIMENSIONS 5' x 5'. SEE NOTES.

** MAXIMUM RAMP CROSS SLOPE IS 2.0%. RUNNING SLOPE 5% - 7% (8.3% MAXIMUM). SEE NOTES.



CURB RAMP TYPE P

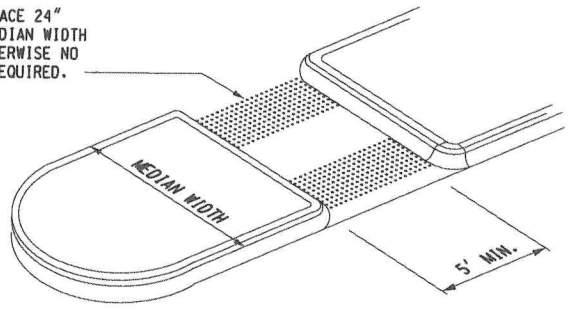
(PARALLEL RAMP)
DO NOT USE IN AREAS WHERE PONDING MAY OCCUR



CURB RAMP TYPE C

(COMBINATION RAMP)

DETECTABLE WARNING SURFACE 24" ACROSS FULL WIDTH IF MEDIAN WIDTH IS AT LEAST 6'-0". OTHERWISE NO DETECTABLE WARNING IS REQUIRED.



CURB RAMP TYPE M

(MEDIAN ISLAND)

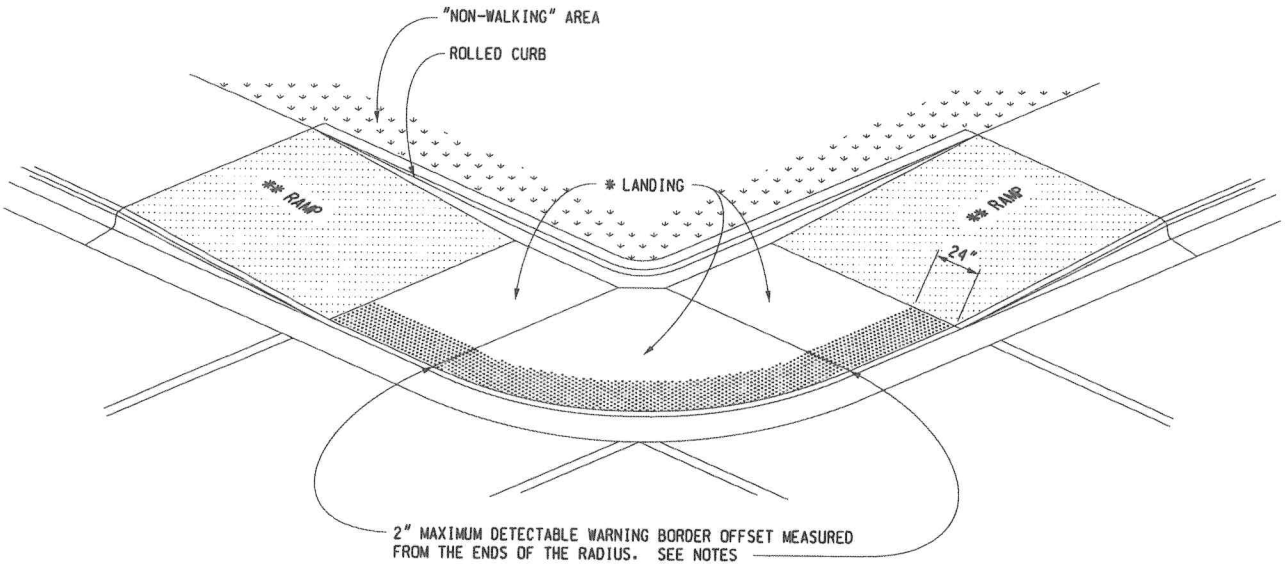
MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF DEVELOPMENT STANDARD PLAN FOR

CURB RAMP AND DETECTABLE WARNING DETAILS

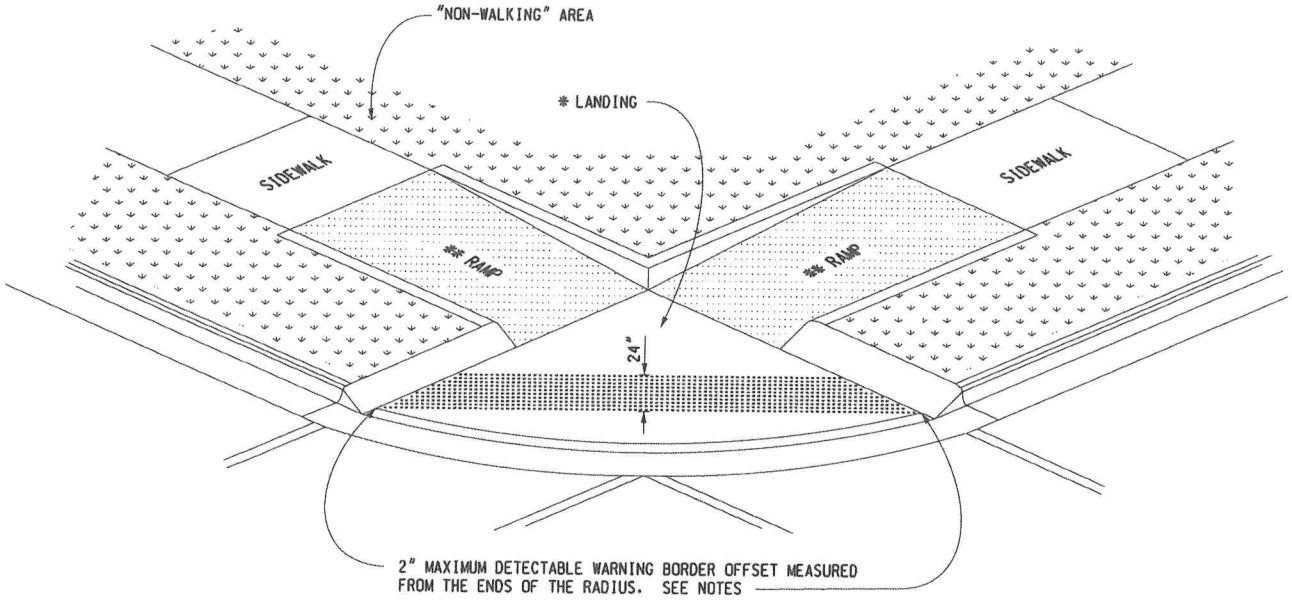
M-3	F.H.W.A. APPROVAL	5-8-2020 PLAN DATE	R-28-J	SHEET 3 OF 7

* MAXIMUM LANDING SLOPE IS 2.0% IN EACH DIRECTION OF TRAVEL. LANDING MINIMUM DIMENSIONS 5' x 5'. SEE NOTES.

** MAXIMUM RAMP CROSS SLOPE IS 2.0%, RUNNING SLOPE 5% - 7% (8.3% MAXIMUM). SEE NOTES.



(RADIAL DETECTABLE WARNING SHOWN)



(TANGENT DETECTABLE WARNING SHOWN)

CURB RAMP TYPE D

(DEPRESSED CORNER)

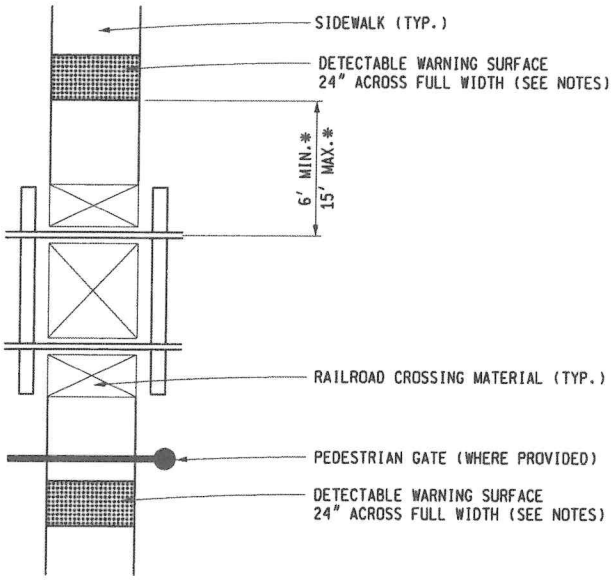
USE ONLY WHEN INDEPENDENT DIRECTIONAL RAMPS CAN NOT BE CONSTRUCTED FOR EACH CROSSING DIRECTION

MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF DEVELOPMENT STANDARD PLAN FOR

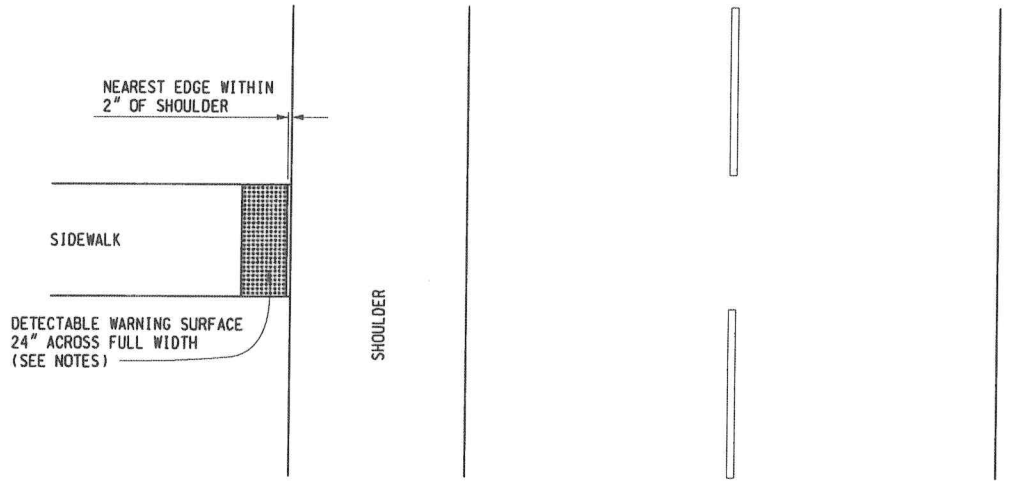
CURB RAMP AND DETECTABLE WARNING DETAILS

M-4	F.H.W.A. APPROVAL	5-8-2020 PLAN DATE	R-28-J	SHEET 4 OF 7

* THE DETECTABLE WARNING SURFACE SHALL BE LOCATED SO THAT THE EDGE NEAREST THE RAIL CROSSING IS 6' MINIMUM AND 15' MAXIMUM FROM THE CENTERLINE OF THE NEAREST RAIL. DO NOT PLACE DETECTABLE WARNING ON RAILROAD CROSSING MATERIAL.



DETECTABLE WARNING AT RAILROAD CROSSING

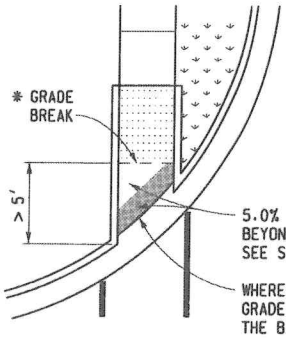


DETECTABLE WARNING AT FLUSH SHOULDER OR ROADWAY

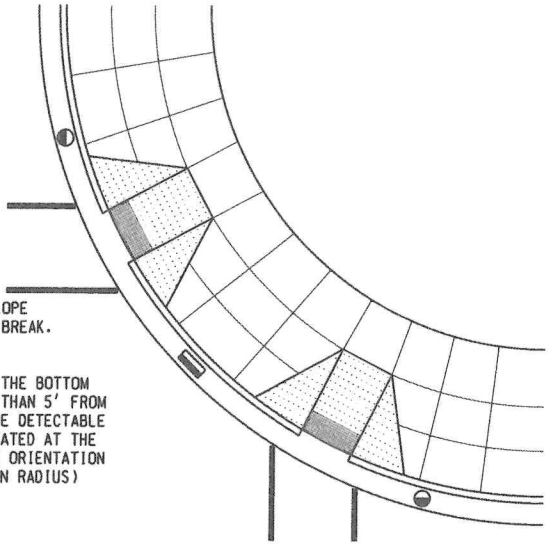
MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF DEVELOPMENT STANDARD PLAN FOR

CURB RAMP AND DETECTABLE WARNING DETAILS

F.H.W.A. APPROVAL	5-8-2020 PLAN DATE	R-28-J	SHEET 5 OF 7



CURB RAMP LOCATED IN RADIUS (TYPE R SHOWN)
(GRADE BREAK OFFSET GREATER THAN 5')

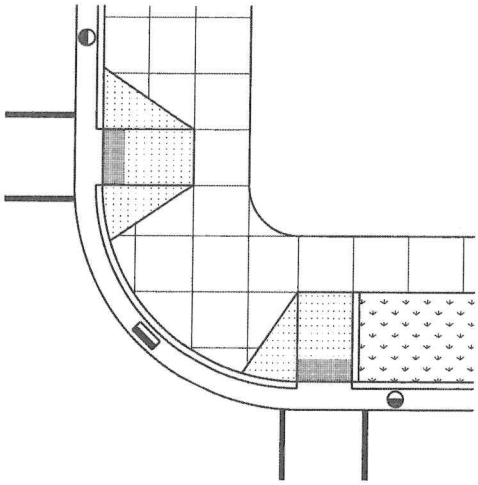


CURB RAMP PERPENDICULAR TO RADIAL CURB (TYPE F SHOWN)

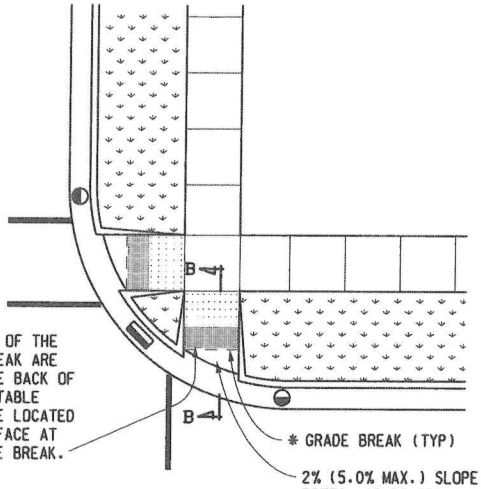
(USE WITH RADIAL CURB WHEN THE CROSSWALK AND CURB RAMP ARE NOT ALIGNED)

LEGEND

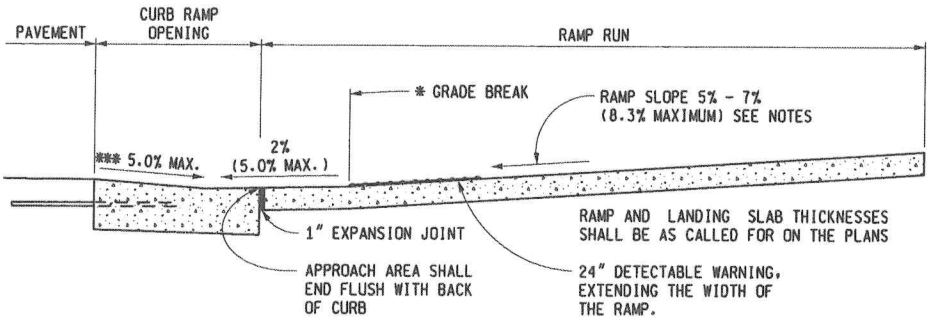
- SLOPED SURFACE
- DETECTABLE WARNING
- "NON-WALKING" AREA
- CROSSWALK MARKING
- PREFERRED LOCATION OF DRAINAGE INLET (TYP.)
- ALTERNATE LOCATION OF DRAINAGE INLET (TYP.)



CURB RAMP PERPENDICULAR TO TANGENT CURB
(TYPE F AND TYPE RF SHOWN)



CURB RAMP LOCATED IN RADIUS (TYPE R SHOWN)
(GRADE BREAK OFFSET LESS THAN 5')



* GRADE BREAKS AT THE TOP AND BOTTOM OF CURB RAMPS SHALL BE PERPENDICULAR TO THE DIRECTION OF TRAVEL.

*** TRANSITION ADJACENT GUTTER PAN CROSS SECTION TO PROVIDE 5.0% MAXIMUM COUNTER SLOPE ACROSS THE RAMP OPENING.

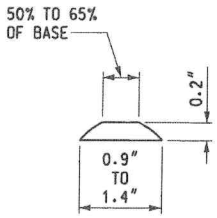
SEE SHEET 2 FOR CURB RAMP OPENING DETAILS.

SECTION B-B
CURB RAMP ORIENTATION

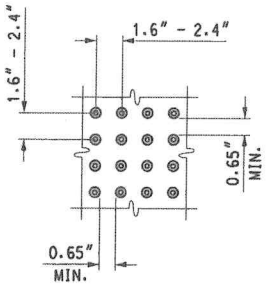
MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF DEVELOPMENT STANDARD PLAN FOR

CURB RAMP AND DETECTABLE WARNING DETAILS

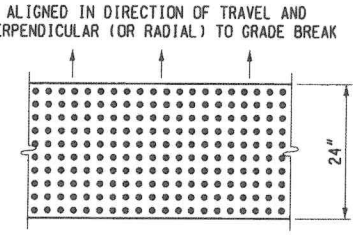
M-6	F.H.W.A. APPROVAL	5-8-2020 PLAN DATE	R-28-J	SHEET 6 OF 7



DOME SECTION



DOME SPACING



DOME ALIGNMENT

DETECTABLE WARNING DETAILS

NOTES:

DETAILS SPECIFIED ON THIS PLAN APPLY TO ALL CONSTRUCTION, RECONSTRUCTION, OR ALTERATION OF STREETS, CURBS, OR SIDEWALKS IN THE PUBLIC RIGHT OF WAY.

CURB RAMPS ARE TO BE LOCATED AS SPECIFIED ON THE PLANS OR AS DIRECTED BY THE ENGINEER.

RAMPS SHALL BE PROVIDED AT ALL CORNERS OF AN INTERSECTION WHERE THERE IS EXISTING OR PROPOSED SIDEWALK AND CURB. RAMPS SHALL ALSO BE PROVIDED AT MARKED AND/OR SIGNALIZED MID-BLOCK CROSSINGS.

SURFACE TEXTURE OF THE RAMP SHALL BE THAT OBTAINED BY A COARSE BROOMING, TRANSVERSE TO THE RUNNING SLOPE.

SIDEWALK SHALL BE RAMPED WHERE THE DRIVEWAY CURB IS EXTENDED ACROSS THE WALK.

CARE SHALL BE TAKEN TO ASSURE A UNIFORM GRADE ON THE RAMP. WHERE CONDITIONS PERMIT, IT IS DESIRABLE THAT THE SLOPE OF THE RAMP BE IN ONLY ONE DIRECTION, PARALLEL TO THE DIRECTION OF TRAVEL.

RAMP WIDTH SHALL BE INCREASED, IF NECESSARY, TO ACCOMMODATE SIDEWALK SNOW REMOVAL EQUIPMENT NORMALLY USED BY THE MUNICIPALITY.

WHEN 5' MINIMUM WIDTHS ARE NOT PRACTICABLE, RAMP WIDTH MAY BE REDUCED TO NOT LESS THAN 4' AND LANDINGS TO NOT LESS THAN 4' x 4'.

CURB RAMPS WITH A RUNNING SLOPE ≤5% DO NOT REQUIRE A TOP LANDING. HOWEVER, ANY CONTINUOUS SIDEWALK OR PEDESTRIAN ROUTE CROSSING THROUGH OR INTERSECTING THE CURB RAMP MUST INDEPENDENTLY MAINTAIN A CROSS SLOPE NOT GREATER THAN 2% PERPENDICULAR TO ITS OWN DIRECTION(S) OF TRAVEL.

DETECTABLE WARNING SURFACE COVERAGE IS 24" MINIMUM IN THE DIRECTION OF RAMP/PATH TRAVEL AND THE FULL WIDTH OF THE RAMP/PATH OPENING EXCLUDING CURBED OR FLARED CURB TRANSITION AREAS. A BORDER OFFSET NOT GREATER THAN 2" MEASURED ALONG THE EDGES OF THE DETECTABLE WARNING IS ALLOWABLE. FOR RADIAL CURB THE OFFSET IS MEASURED FROM THE ENDS OF THE RADIUS.

FOR NEW ROADWAY CONSTRUCTION, THE RAMP CROSS SLOPE MAY NOT EXCEED 2.0%. FOR ALTERATIONS TO EXISTING ROADWAYS, THE CROSS SLOPE MAY BE TRANSITIONED TO MEET AN EXISTING ROADWAY GRADE. THE CROSS SLOPE TRANSITION SHALL BE APPLIED UNIFORMLY OVER THE FULL LENGTH OF THE RAMP.

THE MAXIMUM RUNNING SLOPE OF 8.3% IS RELATIVE TO A FLAT (0%) REFERENCE. HOWEVER, IT SHALL NOT REQUIRE ANY RAMP OR SERIES OF RAMPS TO EXCEED 15 FEET IN LENGTH NOT INCLUDING LANDINGS OR TRANSITIONS.

DRAINAGE STRUCTURES SHOULD NOT BE PLACED IN LINE WITH RAMPS. THE LOCATION OF THE RAMP SHOULD TAKE PRECEDENCE OVER THE LOCATION OF THE DRAINAGE STRUCTURE. WHERE EXISTING DRAINAGE STRUCTURES ARE LOCATED IN THE RAMP PATH OF TRAVEL, USE A MANUFACTURER'S ADA COMPLIANT GRATE. OPENINGS SHALL NOT BE GREATER THAN $\frac{1}{2}$". ELONGATED OPENINGS SHALL BE PLACED SO THAT THE LONG DIMENSION IS PERPENDICULAR TO THE DOMINANT DIRECTION OF TRAVEL.

THE TOP OF THE JOINT FILLER FOR ALL RAMP TYPES SHALL BE FLUSH WITH THE ADJACENT CONCRETE.

CROSSWALK AND STOP LINE MARKINGS, IF USED, SHALL BE SO LOCATED AS TO STOP TRAFFIC SHORT OF RAMP CROSSINGS. SPECIFIC DETAILS FOR MARKING APPLICATIONS ARE GIVEN IN THE "MICHIGAN MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES".

FLARED SIDES WITH A SLOPE OF 10% MAXIMUM, MEASURED ALONG THE ROADSIDE CURB LINE, SHALL BE PROVIDED WHERE AN UNOBSTRUCTED CIRCULATION PATH LATERALLY CROSSES THE CURB RAMP. FLARED SIDES ARE NOT REQUIRED WHERE THE RAMP IS BORDERED BY LANDSCAPING, UNPAVED SURFACE OR PERMANENT FIXED OBJECTS. WHERE THEY ARE NOT REQUIRED, FLARED SIDES CAN BE CONSIDERED IN ORDER TO AVOID SHARP CURB RETURNS AT RAMP OPENINGS.

DETECTABLE WARNING PLATES MUST BE INSTALLED USING FABRICATED OR FIELD CUT UNITS CAST AND/OR ANCHORED IN THE PAVEMENT TO RESIST SHIFTING OR HEAVING.

MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF DEVELOPMENT STANDARD PLAN FOR

CURB RAMP AND DETECTABLE WARNING DETAILS

M-7	F.H.W.A. APPROVAL	5-8-2020 PLAN DATE	R-28-J	SHEET 7 OF 7

MERIDIAN TOWNSHIP TECHNICAL SPECIFICATIONS
DIVISION 1

EARTHWORK

INDEX

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.

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 2020 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.

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.

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.

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 4

CONCRETE WORK

INDEX

4.01 SCOPE

This work shall consist of furnishing all labor, materials and equipment necessary for the proper mixture and placement of concrete. The current MDOT Standard Specifications for Construction (SSC) shall be followed, unless otherwise specified.

4.02 MATERIALS

1. Supplier

The use of transit-mix concrete is required. The Contractor shall notify the Engineer who the supplier will be prior to beginning work. The Engineer must approve the concrete supplier and the mixer trucks used to transport the concrete.

2. Concrete Mixture

Batching and mixing operations shall conform to ASTM C94. Water shall not be added to the mix after the trucks leave the batching plant. The mix for sidewalk shall be MDOT P1 with approximated proportions of one part cement; two parts fine aggregate, and three parts coarse aggregate. The mix shall contain 6 sacks of cement per cubic yard, with a maximum allowable slump of 3½" (three and one-half inches).

Coarse aggregate shall conform to MDOT 6AA. Fine aggregate shall conform to MDOT 2NS. Cement shall be Type 1A air-entraining Portland cement conforming to ASTM Specification C150 or Type 1 with an air entrainment admixture. Air shall be 6% plus or minus 1%.

The compressive strength of Class A concrete shall not be less than 3,500 pounds per square inch (psi) after 28 days. The compressive strength of Class B concrete shall not be less than 3,000 psi after 28 days.

4.02 MATERIALS

2. Concrete Mixture (Cont'd.)

Water shall be clean and free from deleterious substances such as oil, alkali and organic matter. Potable water shall be used from sources approved by the Engineer.

No admixtures will be used unless approval is received from the Engineer, or is specified. Admixtures, if approved, shall be used in strict accordance with manufacturer's directions and shall conform with applicable ASTM Standards.

3. Reinforcing

Concrete slabs, walls and footings shall be reinforced with steel bars or mesh as shown on the plans. Bars shall be rust-free, new deformed billet-steel conforming to ASTM A615, Grade 60 and mesh shall conform to ASTM A1064.

The Contractor shall prepare and submit to the Engineer shop drawings showing bending and assembly diagrams, splicing, laps of bars, shapes, dimensions and details of bars. Scaled dimensions from drawings shall not be used in determining the lengths of reinforcing bars.

4.03 CONSTRUCTION METHODS

1. Subgrade Preparation

The earthgrade shall be prepared by removing the topsoil, vegetative cover and root mat. The base shall then be prepared by excavating and/or placing of embankment material to achieve the grade and cross-section required. All soft and yielding material shall be removed and replaced with acceptable material.

When a pathway is benched into cut or fill slopes, grading shall be done in accordance with the MDOT 2020 SSC, Section 205, Roadway Earthworks. Subgrade density shall be not less that 95% of Maximum Unit Weight in fills. In cuts, the Engineer will visually inspect the grade and may order additional compaction to achieve the desired subgrade density.

A minimum of three (3) inches of Class II granular material shall be used under all pathway construction. The base shall be smoothed, trimmed and compacted prior to placement of forms. The Engineer may order additional compaction to achieve the desired subgrade density after visual inspection.

2. Formwork

All concrete work shall be accurately formed to the lines and grade shown on the plans. Forms shall extend to the full depth and width of the specified concrete surface. Forms shall be shored and braced from the outside to maintain ¼" tolerance in thickness, line and grade. All formwork shall be oiled with an approved non-staining form oil before placing concrete. Formwork shall be left in place until the concrete is sufficiently hard so as to not be damaged upon removal.

Construct all formwork to provide continuous, straight, smooth surfaces and edges. Exposed edges to have ½" chamfer. Curved walks shall be formed on a radius with flexible forms.

4.03 CONSTRUCTION METHODS (Cont'd.)

3. Placement

All formwork and reinforcement placement shall be inspected by the Engineer prior to placement of concrete. The Contractor shall give ample notice and time so that such inspection can be made.

No concrete shall be deposited until the area has been dewatered and not until after the Contractor has made satisfactory provisions to eliminate all possibility of water entering or flowing through the concrete while it is being poured or is curing.

Subgrades shall be wetted and forms shall be oiled prior to concrete placement. All debris shall be removed from forms and reinforcement.

Time Between Charging Mixer and Placing Concrete (minutes)			
Type of Unit	Concrete Temperature (ASTM C1064)		
	<60 °F	60 °F – 85 °F	>85 °F
Truck Mixers	90	60	45
Truck Mixers with Concrete containing Water-Reducing Retarding Admixture	120	90	70

Exposed concrete shall not be poured when the atmospheric temperature is below 40 °F or when the concrete temperature is below 55 °F as placed. Concrete shall not be poured on frozen ground. Concrete shall not be cast if the temperature of the concrete is above 90 °F.

Tickets shall be prepared in accordance with the MDOT 2020 SSC, Section 601, Portland Cement Concrete For Pavements.

When placement of concrete is started, it shall be carried on as a continuous operation until the placement of the section is completed. Concrete in walls shall be placed in 24-inch lifts keeping surface of concrete level throughout. Concrete shall be deposited to the full depth of the forms in one pour. Drops of greater than 5' shall use tubes.

Reinforced concrete greater than six inches in finished thickness shall be compacted by high frequency internal vibrators. The concrete shall be thoroughly worked around the reinforcement and into the corners of the forms, using procedures which minimize air pockets and honeycombs. Care shall be taken in vibrating concrete so as not to move reinforcement out of place.

Concrete less than six inches in finished depth shall be compacted by spading along all edges and joints and by alternately tamping and striking off the surface until all voids are removed.

4. Finishing

Horizontal, exposed surfaces shall be floated and troweled just enough to produce a smooth, dense surface, free from irregularities. All joints and edges shall be rounded to a radius of one-quarter inch by the use of an approved edging tool. After completion of floating and finishing, a fine brush shall be drawn across the finished surface to remove tool marks, and provide a non-slip surface.

4.03 CONSTRUCTION METHODS

4. Finishing (Cont'd.)

Formwork panels are intended to provide a satisfactory finish for vertical, exposed surfaces. Finishing shall be limited to minor rubbing, removal of fins and patching of honeycombed areas. Unexposed surfaces need not be finished except for patching of honeycombed areas.

All concrete sidewalk and driveway approaches shall be legibly stamped with the name of the Contractor and the year, with figures 1½" to 2½" tall. The stamps shall be used at the ends of each segment, each truck load, and at intervals no greater than 100 feet in length.

5. Joints

1. Construction cold joints not indicated on the plans shall be so made and located so as to least impair the strength of the structure. The location of all construction joints shall be approved by the Engineer. Slabs shall have a cold joint at the end of each truck load.

2. Transverse expansion joints ½" thick shall be placed in sidewalk at approximately 100 foot intervals. ½" thick expansion joints shall be placed anywhere that the walk meets the back of curb, and where the walk meets the edge of concrete driveways or building walls.

Expansion joints material shall be pre-molded of bitumen filled fiber placed at right angles to the line of the walk, perpendicular to the surface and shall extend from ¼" below the surface of the walk to the subgrade.

3. Contraction (plane of weakness) joints shall be placed at a minimum distance equal to the width of the sidewalk. Contraction joints for bicycle pathways (7-foot width) shall be spaced approximately nine feet apart. The joint shall be sawed to a width of $^{1}/_{8}$" and to a depth of ¼ of the slab thickness.

Sawing must be accomplished as soon as the concrete has hardened such that no excess raveling or spalling occurs, but before any random cracks develop. Joints shall be at right angles to the line of the walk, and perpendicular to its surface. Tooled joints are not allowed.

6. Curing and Protection

Sidewalks and other slabs on grade shall be treated with a curing compound conforming to the requirements of ASTM C309. The compound shall be sprayed or rolled on to provide a continuous film over the entire surface of the walk after completion of finishing, and as soon as all free water has left the surface. Compound shall be applied at the rate of not less than one gallon per 200 square feet. Immediately upon removing sidewalk forms, the exposed concrete edge shall be sprayed with curing compounds or backfilled with earth. The final grading of topsoil will be such that the mature sod will be ½" below the concrete.

All concrete shall be protected from vehicles for the first 72 hours after placing. The period of protection will increase to 7 days as the temperature decreases to 40 degrees. Any concrete found to be defective or damaged due to weather, vandalism, or other causes shall be removed and replaced, at the Contractor's expense. Damaged sections of sidewalk and curb and gutter shall be removed back to the nearest joint or as indicated by the Engineer.

Freshly placed concrete shall be protected from rain by covering with polyethylene film.

4.03 CONSTRUCTION METHODS

6. Curing and Protection (Cont'd.)

Concrete shall not be allowed to freeze for 72 hours. Protection must be provided when there is a forecast for freezing.

Barricades shall be placed at the areas under repair from the time the damaged section is removed until it is ready for use. Lighted barricades will be required for intersection areas left under repair overnight.

4.04 TESTING

The Contractor shall make arrangements for and coordinate various concrete tests as ordered by the Engineer. The testing company will be selected by the Township and the Township will pay for the tests. The Contractor will be charged for any waiting time suffered by the testing company. All tests will be done according to ASTM standards.

MERIDIAN TOWNSHIP TECHNICAL SPECIFICATIONS
DIVISION 7

PAY ITEMS, METHOD OF MEASUREMENT & BASIS OF PAYMENT

INDEX

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.

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.

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.

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.

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.

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 2020 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 2020 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.

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.

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.

SCHULTZ PATHWAY AND BOARDWALK
SPECIAL PROVISIONS

These Special Provisions are in addition to the MDOT Standard Specifications for Construction (SSC), and the General and Technical Specifications, and supersede the others in the event of a conflict.

GENERAL

CONTINUITY OF WORK – Once construction has begun at any location, the work shall proceed without delay until that facility is substantially complete and back open to the public, barring delays due to inclement weather or acts of God that are outside of the Contractor's control. If the Contractor fails continuously to prosecute the work and causes an unnecessary delay, the Owner may apply liquidated damages to those calendar days when work should have been taking place.

TESTING – Compaction testing is required for all granular materials. Cylinder, slump, and air entrainment testing is required for concrete, but only for the first load of the project and for the concrete abutments. Additional testing will only be required if the Engineer observes a change in the concrete mix. The appropriate load testing is required for the helical piling system.

TREE TRIMMING – Trimming of all shrubs, foliage, and tree limbs up to six (6) inches in diameter which are closer than two (2) feet from the edge of or nine (9) feet above the trail is incidental to this contract. Cuts are to be made cleanly and at the trunk.

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 road right-of-way is done under permit and approval of the Ingham County Road Department (ICRD).The Contractor shall secure the necessary right-of-way permit(s) from ICRD.

PERMITS – Permits are also required from the Michigan Department of Environmental Quality and the Ingham County Drain Commissioner. Meridian Township will secure these permits.

SOIL REPORT – The attached soil report (Appendix C) is included to provide the Contractor and their designer information as to the soil conditions found, only at the locations indicated. Note that the suggestions contained within the report were based off of a different design that included placing sheet pile in the wetland instead of a boardwalk. The actual piling design must be performed and certified by the Contractor and their designer.

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

PAY ITEMS

8a. CONCRETE ABUTMENT

These pay items include all labor, equipment, and material necessary to install a concrete abutment as shown on the plans and in the detail sheet. The bottom of the abutment must be a minimum of 35 inches below the adjacent grade. Install a steel toe-plate over the gap between the abutment and boardwalk. The compressive strength of the concrete used in the abutments shall not be less than 3,500 psi after 28 days.

8b. TREATED TIMBER BOARDWALK

These pay items include all labor, equipment, and material necessary to install a boardwalk as shown on the plans and as detailed herein. Install the superstructure of the boardwalk as specified on the plan detail sheets and in accordance with the Special Provision, Timber Boardwalk Construction (SP3).

8c. BOARDWALK STRUCTURAL PILES

These pay items include all labor, equipment, and material necessary to install the piling system for the timber boardwalk. **For bidding it shall be assumed that the piles will have a length up to 30 feet. If field conditions warrant additional length during construction then it will be handled with a change order**. The boardwalk superstructure shall be as detailed on the plans, but the Contractor is responsible for providing the specific piling design, certified by a Professional Engineer licensed in the State of Michigan. The boardwalk is designed for an H5 loading and the helical pilings must have a minimum of 10-foot spacing. See the soil report, including boring logs, in Appendix C to facilitate pile design.

Install helical piles in accordance with the Special Provision, Helical Piles (SP2).

10a. MOBILIZATION, MAX $10,000

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

10d. SIDEWALK, REMOVAL

This pay item includes all labor, equipment, and material necessary to remove and dispose of existing concrete as marked in the field by the Engineer. The Contractor shall SAWCUT whenever necessary to ensure clean and proper concrete removal. The concrete shall be sawcut to the full thickness of the slab. Sawcutting and contraction joints are incidental to the concrete removal and replacement process. Any additional sawcutting and removal necessitated by damage during removal shall be incidental.

10e. TREE REMOVAL, 19 TO 36 INCH

This pay item includes all labor, equipment, and material necessary to remove and dispose of existing trees as detailed on the plans. Tree removal shall conform to Section 208 of the 2020 MDOT Standard Specifications for Construction.

44 SHARED USE PATH, AGGREGATE

This pay item includes all labor, equipment, and material necessary to install aggregate material beneath the paved trail, as detailed on the plans, using 21AA material as defined in the MDOT 2020 SSC, Section 902. Compact all aggregate to a minimum of 98% of maximum density. Payment will be made based on delivery tickets. It is the responsibility of the Contractor to collect the tickets.

the site. The Township inspector must be present to verify loads. Any loads delivered without inspector verification will not be eligible for payment.

51 FENCE, ALUMINUM

This pay item includes all labor, equipment, and material necessary to install new black aluminum fencing as described herein and as detailed in Appendix C. The aluminum fence members shall meet the following criteria:

- 42" to 48" high;
- ¾" x ¾" x .050 wall aluminum pickets, spaced 3-¾";
- Aluminum pickets can be standard or flush bottom;
- 2-½" x 2-½" x 7' x .100 wall aluminum posts for dirt setting; or

MERIDIAN CHARTER TOWNSHIP

SPECIAL PROVISION
FOR
HELICAL PILES

MCT/NVN 12-12-2018

a. **Description.** This work consists of designing, furnishing, and installing helical piles and bracket assemblies in accordance with the project plans, industry standard design methodology, the standard specifications, and this special provision. Install each helical pile to the elevation, spacing, and load capacities shown on the plans.

The following definitions apply when used herein and on the plans:

Allowable Pile Capacity. Ultimate pile capacity divided by a factor of safety as designated on the plans. If the factor of safety is not designated on the plans, then the factor of safety will be 2.0.

Brackets. Cap plate or other termination device that is bolted, slipped over, or welded to the end of a helical pile after completion of installation to facilitate attachments to structures or embedment in cast-in-place structures.

Designer. A Professional Engineer, licensed in the State of Michigan, who is retained by the Contractor and is responsible for the design and working drawings required herein.

Extension Section. Helical pile section(s) which follow the lead section into the ground and extend the helical lead to the appropriate depth. Extension section(s) consist of a central shaft and may have helical bearing plates affixed to the shaft.

Helical Pile. Manufactured steel foundation element, with one or more helical bearing plates, that is rotated into the ground to support structures. The element consists of a lead or starter section, extension section(s), brackets, and a pile cap.

Installation Torque. The resistance generated by a helical pile when installed into soil. The installation resistance is a function of the soil type and the size and shape of the various components of the helical pile.

Lead Section. The first section of a helical pile to enter the ground, lead sections consist of a central shaft with a tapered end and one or more helical bearing plates affixed to the shaft.

Manufacturer. The individual or legal entity that performs part of the work required through a contract agreement with the Contractor. This includes an individual or legal entity that owns the patent, product trademark, product copyright, or product name for the approved helical pile system.

Shop Drawings. A submittal consisting of drawings and calculations related to the design and installation of the helical pile system by the Contractor.

Torque Strength Rating. The maximum torque energy that can be applied to the helical pile foundation during installation in soil, i.e., allowable or safe torque.

Unsupported Length. Unsupported shaft lengths shall include the length of the shaft in air, water, or in fluid soils.

b. Materials. Unless noted otherwise, it is the responsibility of the Contractor to select the appropriate type and design strength of helical plates, shaft connections, shafts, brackets, and the overall helical pile system to support the load capacities and criteria specified on the project plans. Materials used for helical piles must meet the requirements of ICC-ES AC358. In addition, all helical piles must be manufactured to the following criteria:

1. Central Steel Shaft. The central shaft must consist of high strength structural steel tube, pipe, or solid steel bars meeting the requirements of ASTM A 36, A 252 Grade 3, A 500 Grade C, or A 576 Grade 1045 or Grade 1530.

2. Helix Bearing Plate. The bearing plate material must conform to ASTM A 572 Grade 50 or A 1018 Grade 55.

3. Bolts, Nuts, and Washers. Must meet the material and hot-dip galvanizing requirements of subsection 906.07 of the MDOT 2020 Standard Specification for Construction.

4. Brackets. Bracket must conform to ASTM A 36, A 572 Grade 50, or A 958 Grade SC 1045.

5. Couplings. Couplings, if applicable, must conform to ASTM A 958.

6. Corrosion Protection. At minimum, all helical piles and hardware must have corrosion protection consisting of hot-dip galvanization in conformance with ASTM A 153 and A 123, as applicable.

c. Construction. Furnish, design, and install the helical piles in accordance with the project plans, this special provision, and the approved shop drawings.

1. Pile Design Load. Design load shall be 9 tons per pile. Ultimate Pile Capacity shall be two times the Pile Design Load.

2. Qualifications.

A. Manufacturer. The manufacturer must be a company specializing in the manufacturing and distribution of these products. Manufacturer's qualifications are to be submitted to the Engineer in accordance with subsection c.2.A of this special provision. The submittal must include:

(1) A product catalog and evidence showing the manufacturer has at least 10 years of experience in the design and manufacture of helical piles.

(2) Current ICC-ES product evaluation report or complete description of product testing and engineering calculations used to assess product capacity.

B. Contractor. The Contractor performing the work described in the contract must be a company specializing in the installation of helical piles. The submittal must include:

(1) Evidence the Contractor has completed training in the proper methods for installation of helical piles and brackets.

(2) Documentation that the Contractor's fulltime onsite supervisor and drillers performing the work have completed at least 10 projects and have 3 years of experience installing similar types of helical piles in similar subsurface conditions to this project. Documentation must, at minimum, include project name, description, dates, number and type of helical piles, project location, and client contact information.

(3) List of installation equipment and detailed description of proposed method of installation.

C. Designer. The design of the helical piles must be done by a licensed design professional specialized in the engineering and design of helical piles. The designer must have the following qualifications:

(1) A Professional Engineer licensed in the State of Michigan.

(2) Documentation indicating the designer has designed at least five projects utilizing helical piles. Documentation must, at minimum, include project name, description, dates, number and type of helical piles, project location, and client contact information.

3. Submittals.

A. Qualifications. Submit manufacturer, Contractor, and designer qualifications in accordance with subsections c.2.A, c.2.B, and c.2.C.

Submit to the Engineer three copies of the project reference list and a personnel list at least 30 calendar days before the planned start of helical pile construction. Provide a summary of each individual's experience in the personnel list and be complete enough for the Engineer to determine whether each individual satisfies the required qualifications. The Engineer will approve or reject the Contractor's and manufacturer's qualifications within 15 calendar days after receipt of a complete submission. Additional time required due to incomplete or unacceptable submittals will not be justification for time extension, impact, or delay claims. All such costs associated with incomplete or unacceptable submittals will be borne by the Contractor.

Work is not to be started, nor materials ordered, until the Engineer's written approval of the Contractor's, manufacturer's, and designer's experience and personnel qualifications is given. The Engineer may suspend the work if the Contactor uses non-approved personnel, manufacturer, or designer. If work is suspended, the Contractor is fully liable for all resulting costs, and no adjustment in contract time will accrue due to the suspension.

B. Shop Drawings. Prepare and submit to the Engineer shop drawings for the helical piles intended for use on the project at least 30 calendar days prior to start of installation. The shop drawings must include the following:

(1) Overall plan drawing showing helical pile location, number, and product identification number(s).

(2) Maximum allowable mechanical compression and tensile strength of the helical piles. Include the Torque Strength Rating.

(3) Helical piles respective design capacities from the drawings.

(4) Planned installation depth and cut-off elevation and the number and type of lead and extension sections.

(5) Designer's recommended allowable pile capacity to installation torque ratio and minimum final installation torque(s) for the helical piles.

(6) Product identification numbers and designations for all the brackets and number and size of connection bolts or couplers. Details illustrating helical pile attachment to structure relative to grade beam, column pad, pile cap, etc.

(7) Corrosion protection coating on helical piles and bracket assemblies.

C. Design Calculations. The designer is to prepare and submit detailed design calculations to the Engineer for the helical piles intended for use on the project. Design must be in accordance with the current AASHTO *LRFD Bridge Construction Specifications* and other published design methodologies as approved by the Engineer. All submittals must be sealed and stamped by the designer and submitted at least 30 calendar days prior to the start of installation. The analysis must take into account the notes and design details from the plans and must include, but is not limited to, the following items:

(1) Reduction in the dimensions of the structural elements based on anticipated corrosion loss over the design life for the subsurface and environmental conditions encountered at the project site.

(2) Ultimate and allowable pile capacities. Consider effects from down-drag, buckling, and expansive soils.

(3) Anticipated minimum installation depth to reach bearing stratum and to achieve pullout capacity, if applicable.

(4) One hand calculation for a typical helical anchor location, which illustrates conformance of the computer programs utilized to design the axial pile capacity.

(5) Lateral resistance of the shaft, if applicable.

(6) Estimated pile head movement at the allowable pile capacities.

(7) Design the helical pile attachment to distribute the loads to the substructure and/or superstructure does not exceed those in the current AASHTO *LRFD Bridge Construction Specifications.*

D. Calibration Reports. Submit to the Engineer calibration information certified by an independent testing agency for the torque measurement device. Calibration information must have been tested within 30 days of the start of helical pile installation. Calibration information must include, but is not limited to, the name of the testing agency, identification number or serial number of device calibrated, calibration data, and the date of calibration.

E. Installation Record. Submit to the Engineer a Daily Inspection Log during helical pile installation. This log must contain the following information for each helical pile:

(1) Name of project and Contractor.

(2) Name of Contractor's supervisor during installation.

(3) Date and time of installation.

(4) Name and model of installation equipment and type of torque indicator used.

(5) Location of helical pile by grid location or assigned identification number.

(6) Type and configuration of Lead Section with length of shaft and number and size of helical bearing plates.

(7) Type and configuration of extension sections, with length and number and size of helical bearing plates, if any.

(8) Installation duration and observations.

(9) Total length installed.

(10) Final elevation of top of shaft and cut-off length, if any.

(11) Final plumb-ness or inclination of shaft.

(12) Installation torque at minimum 3-foot depth intervals.

(13) Final installation torque.

(14) Comments pertaining to interruptions, obstructions, or other relevant information.

(15) Verified allowable pile axial load capacity.

4. Subsurface Data. Review the available soil boring logs from the subsurface investigation(s). If during construction, the Contractor determines the actual subsurface conditions differ substantially from those reported on the boring logs, notify the Engineer in writing within 48 hours of such determination.

The data indicated on the available boring logs are not intended as representation or warranties of continuity of such conditions. It is expressly understood that the Owner will not be responsible for interpretations or conclusions drawn therefrom by the Contractor. Additional soil test borings and other exploratory procedures may be performed by the Contractor at no additional cost to the Owner.

5. Installation Equipment. The equipment must be capable of applying adequate down pressure (crowd) and torque simultaneously to ensure normal advancement of the helical piles to the ultimate pile capacities as shown on the plans. The equipment must be capable of continuous position adjustment to maintain proper alignment and position.

A. Torque Motor. Helical piles are to be installed with high torque, low RPM torque motors, which allow the helical plates to advance with minimal soil disturbance. The torque motor must be hydraulically powered with clockwise and counter-clockwise rotation capability. The torque motor must be adjustable with respect to revolutions per minute during installation. Percussion drilling equipment is prohibited. The torque motor must have a minimum torque capacity 15% greater than the torsional strength rating of the central steel shaft to be installed for the project. The connection between the torque motor and the installation rig must have no more than two pivot hinges oriented 90° from each other.

B. Drive Tool. The connection between the torque motor and the helical pile must be in–line, straight, and rigid, and must consist of a hexagonal, square, or round Kelly bar adapter and helical shaft socket. To ensure proper fit, the drive tool must be manufactured by the helical pile manufacturer and used in accordance with the manufacturer's installation instructions.

C. Connection Pins. Attach the central shaft of the helical pile to the drive tool by smooth tapered pins matching the number and diameter of the specified shaft connection bolts. Maintain the connection pins in good condition allowing safe operations at all times. Inspect the pins regularly for wear and deformation. Replace pins with identical pins when worn or damaged.

D. Torque Indicator. Ensure the torque indicator is capable of providing continuous installation torque measurement during installation. Ensure the torque indicator is capable of torque measurements of 500 ft-lbs or less. Calibrate torque indicators that are mounted in-line with the installation tooling either on-site or at an appropriately equipped test facility. Re-calibrate indicators that measure torque as a function of hydraulic pressure following any maintenance performed on the torque motor. Re-calibrate torque indicators if, in the opinion of the Engineer, reasonable doubt exists as to the accuracy of the torque measurements. If recalibration is directed by the Engineer in writing and the calibration is off by less than 500 ft-lbs, the recalibration will be paid for as extra work. Otherwise, recalibrations will be paid for by the Contractor at no cost to the Owner.

6. Installation Procedures. The helical pile installation technique is to be determined by the Contractor such that it is consistent with the geotechnical, logistical, environmental, and load carrying conditions of the project.

A. Position the lead sections at the location depicted on the working drawings. Battered helical piles can be positioned perpendicular to the ground to assist in initial advancement into the soil before the required batter angle is established. The equipment must be capable of continuous position adjustment to maintain proper helical pile alignment. Apply constant axial force (crowd) while rotating helical piles into the ground. Apply sufficient crowd to ensure the helical pile advances into the ground a distance equal to at least 80% of the blade pitch per revolution during normal advancement.

B. Advance the helical pile sections into the soil in a smooth, continuous manner at a rate of rotation between 5 RPM's and 40 RPM's. Adjust the rate of rotation and magnitude of down pressure for different soil conditions and depths.

C. Provide extension sections to obtain the required installation torque as shown on the shop drawings. Use coupling bolt(s) and nuts torqued in accordance to the manufacturer's guidelines to connect sections together.

D. Do not exceed the manufacturer's Torque Strength Rating of the helical pile during installation.

E. The Contractor must adjust the elevation of the top end of the shaft to the elevation shown on the shop drawings or as required. This adjustment may consist of cutting off the top of the shaft and drilling new holes to facilitate installation of brackets to the orientation shown on the shop drawings. Alternatively, installation may continue until the final elevation and orientation of the pre-drilled bolt holes are in alignment. Do not reverse the direction of torque and back-out the helical pile to obtain the final elevation.

F. Install brackets in accordance with helical pile manufacturer's details or as shown on the shop drawings.

G. Ensure all helical pile components, including the shaft and bracket, are isolated from making a direct electrical contact with any concrete reinforcing bars or other non-galvanized metal objects since these contacts may alter corrosion rates.

H. Obstructions. Terminate the installation and remove the pile if the helical pile encounters refusal or is deflected by a subsurface obstruction. Install the helical pile at an adjacent location, subject to review and approval by the Engineer.

7. Production Helical Piles.

A. Advance production helical piles until the allowable pile capacity is verified by achieving the required Installation Torque. The required Installation Torque shall be as certified by the designer. The maximum rotational speed must not exceed 12 RPM when torque is monitored.

B. If the final Installation Torque is not achieved at the estimated length shown on the shop drawings, the Contractor has the following options:

(1) Install the helical pile deeper using additional extension sections until the required Installation Torque is obtained.

(2) Remove the helical pile and install a new one with additional and/or larger diameter helical bearing plates.

(3) Submit other options to the Engineer in writing for review and approval.

(4) Additional materials and work necessary to reach the required helical pile capacity, including engineering analysis and redesign, is to be furnished without cost to the Owner and without an extension of the completion dates for the project.

C. The helical pile must be sized to reach the allowable pile capacity. No additional compensation for changes in the helical pile will be allowed unless differing site conditions are determined by the Engineer.

8. Construction Tolerances.

A. Horizontal Alignment. Ensure the helical pile actual centerlines are within 2 inches of plan centerlines at the plan elevation for the top of the shaft. Tolerances for bracket assembly placement are ±1 inch in both directions perpendicular to the shaft and ±¼ inch in a direction parallel with the shaft, unless otherwise specified.

B. Plumb. Tolerances for departure from the design orientation angles is ±5°.

C. Top of Pile Elevation. Ensure helical pile is cut off at the design cut-off elevation.

D. Submit a plan for remedial action to the engineer for approval, for helical piles not constructed within the required tolerances which are considered unacceptable. The Contractor is responsible for correcting all unacceptable piles to the satisfaction of the Engineer. Materials and work necessary to complete corrections for out-of-tolerance helical piles, including engineering analysis and redesign, must be furnished without cost to the Owner and without extension of the completion dates for the project. Do not begin repair operations until receiving the Engineer's approval of the remedial action plan.

d. Measurement and Payment. The complete work as measured will be paid for at the contract unit price for the following contract pay item and includes all material, equipment, and labor to complete these items.

Pay Item	Pay Unit
Boardwalk Structural Piles	**Lump Sum**

Boardwalk Structural Piles, includes all labor, furnishing, operating, and removing the equipment for construction and installation of piles, designing, shop drawings, and materials to install the piles and associated brackets as shown on the plans and in this special provision.

MERIDIAN CHARTER TOWNSHIP

SPECIAL PROVISION
FOR
TIMBER BOARDWALK CONSTRUCTION

MCT/NVN 12-07-2018

a. Description. This work consists of furnishing all labor and material in order to install the boardwalk over the wetlands as shown on the plan and shall be in accordance with sections 705, 709, of the Michigan Department of Transportation 2020 Standard Specifications for Construction, except as modified herein.

b. Materials.

GENERAL

1. Submittals:

Product Data: Submit manufacturer's specifications and installation instructions for materials listed below:

- Framing members.
- Decking.

Material Certificates: Where dimensional lumber is provided to comply with minimum allowable unit stresses, submit listing of species and grade selected for each use, and submit evidence of compliance with specified requirements. Compliance may be in form of a signed copy of applicable portion of lumber producer's grading rules showing design values for selected species and grade. Design values shall be as approved by the Board of Review of American Lumber Standards Committee.

Wood Treatment Data: Submit chemical treatment manufacturer's instructions for handling, storing, installation and finishing of treated material.

Preservative Treatment: For each type specified, include certification by treating plant stating type of preservative solution and pressure process used, net amount of preservative retained and conformance with applicable standards.

For water-borne treatment: Include statement that moisture content of treated materials was reduced to levels indicated prior to shipment to project site.

2. Product Handling:

Delivery and Storage: Keep materials under cover and dry. Protect against exposure to weather and contact with damp or wet surfaces. Stack lumber; provide for air circulation within and around stacks and under temporary coverings including polyethylene and similar materials.

For lumber pressure treated with chemicals, sticker between each course to provide air circulation.

3. Project Conditions:

Coordination: Fit carpentry work to other work; scribe and cope as required for accurate fit. Correlate location of nailers, blocking, grounds, and similar supports to allow attachment of other work.

PRODUCTS

1. Lumber:

Lumber Standards: Manufacture lumber to comply with PS 20 "American Softwood Lumber Standard" and with applicable grading rules of inspection agencies certified by American Lumber Standards Committee's (ALSC) Board of Review.

Inspection Agencies: Inspection agencies and the abbreviations used to reference with lumber grades and species include the following:

- NLGA National Lumber Grades Authority (Canadian).
- SPIB -Southern Pine Inspection Bureau.
- WCLIB -West Coast Lumber Inspection Bureau.
- WWPA -Western Wood Products Association.

Grade Stamps: Factory-mark each piece of lumber with grade stamp of inspection agency evidencing compliance with grading rule requirements and identifying grading agency, grade, species, moisture content at time of surfacing, and mill.

For exposed lumber apply grade stamps to ends or back of each piece, or omit grade stamps entirely and issue certificate of grade compliance from inspection agency in lieu of grade stamp.

Nominal sizes are indicated, except as shown by detail dimensions. Provide actual sizes as required by PS 20, for moisture content specified for each use.

Provide dressed lumber, S4S unless otherwise indicated.

Provide seasoned lumber with 19 percent maximum moisture content at time of dressing and shipment for sizes 2" or less in nominal thickness, unless otherwise indicated.

2. Dimension Lumber:

Provide lumber according to the following table:

MEMBER	SIZE	GRADE	SURFACE
Beams	8x10	#1	S4S
Joists	6x12	#1	S4S
Decking	3x8	#1	S1S2E
Posts	4x6	#1	S4S
Railing	2x10	#2	S4S
Railing	2x8	#2	S4S
Blocking	2x12	#2	S4S
Pile Bracing	2x6	#1	S4S

Wood is to meet or exceed the following values:

- Fb (minimum extreme fiber stress is bending); 1,500 psi.
- E (minimum modulus of elasticity); 1,500,000 psi.

For water-borne treatment include statement that moisture content of treated materials was reduced to levels indicated prior to shipment to project site.

3. Decking:

Exposed Decking: Where decking will be exposed in the final work, provide the following; or as shown on drawings:

- Moisture content 19 percent maximum, "S-DRY".
- Douglas Fir or Douglas-Fir-Larch graded, respectively, under WCLIB or WWPA rules. Southern Pine

graded under SPIB rules.
- Lumber surfaced S1S2E, using the rough side for the deck surface.

4. Timbers:

For timbers (5" and thicker), provide material complying with the following requirements:
- Douglas Fir Select Structural Grade per WCLIB rules.
- Southern Pine No. 1 Dense per SPIB rules.

5. Miscellaneous Lumber:

Provide wood for blocking, furring, and similar members. Provide lumber of sizes indicated, worked into shapes shown, and as follows:
- Moisture content: 19 percent maximum for lumber items not specified to receive wood preservative treatment.
- Grade: Standard Grade light framing size lumber of above species; or as shown on drawings.

6. Miscellaneous Materials:

Fasteners and Anchorages: Provide size, type, material and finish as indicated and as recommended by applicable standards, complying with applicable Federal Specifications for nails, staples, screws, bolts, nuts, washers and anchoring devices. Provide metal hangers and framing anchors of the size and type recommended by the manufacturer for each use including recommended nails.

Where rough carpentry work is exposed to weather, in ground contact, or in area of high relative humidity, provide fasteners and anchorages with a hot-dip zinc coating (ASTM A 153). Coating must be compatible with the type of preservative used in the lumber.

7. Wood Treatment by Pressure Process:

Preservative Treatment: Where lumber or plywood is indicated as "Trt-Wd" or "Treated", or is specified herein to be treated, comply with applicable requirements of AWPA Standards U1 (Lumber). Mark each item with the AWPA Quality Mark Requirements.

Pressure-treat above-ground items with water-borne preservatives to comply with AWPA U1. After treatment, kiln-dry lumber to a maximum moisture content of 19 percent. Treat all lumber and timber.

Pressure-treat the following with water-borne preservatives for ground contact use complying with AWPA U1:
- Wood members in contact with ground.
- Wood members in contact with fresh water.

Complete fabrication of treated items prior to treatment, where possible. If cut after treatment, coat cut surfaces with heavy brush coat of same chemical used for treatment and to comply with AWPA M4. Inspect each piece of lumber or timber after drying and discard damaged or defective pieces.

c. Construction Methods.

1. General:

Discard units of material with defects which might impair quality of work, and units which are too small to use in fabricating work with minimum joints or optimum joint arrangement.

Set carpentry work to required levels and lines, with members plumb and true and out and fitted.

Securely attach carpentry work to substrate by anchoring and fastening as shown and as required by recognized standards.

Countersink nail heads on exposed carpentry work and fill holes.

Use common wire nails, except as otherwise indicated. Select fasteners of size that will not penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections between members. Install fasteners without splitting of wood; pre-drill as required.

2. Wood Blocking:

Countersink nail heads on exposed carpentry work and fill holes.

Provide wherever shown and where required for attachment of other work. Coordinate location with

other work involved.

Attach to substrates as required to support applied loading.

Countersink bolts and nuts flush with surfaces, unless otherwise indicated.

3. Floor Joist Framing:

Provide framing of sizes and spacing shown. Install with crown edge up and support ends of each member with not less than 3 inches of bearing on wood. Attach to wood bearing members by metal connectors; frame to wood supporting members as shown, or if not shown, with metal connectors. Do not notch in middle third of joists. Do not bore holes unless shown or as approved;

4. Wood Framing:

Provide framing members of sizes and on spacing's shown, and frame openings as shown, or if not shown, comply with recommendations from the *Wood Frame Construction Manual* published by the American Wood Council (AWC). Do not splice structural members between supports.

Anchor and nail as shown, and to comply with the *Wood Frame Construction Manual* "Nailing Schedule" and the *National Design Specification for Wood Construction* published by the AWC.

Provide solid blocking (2" thick by depth at ends unless nailed to header or bearing member).

4. Wood Framing: (Cont'd.)

Lap members framing from opposite sides of beams or girders not less than 4" or securely tie opposing members together. Provide solid blocking (2" thick by depth over supports).

Provide bridging between joists where nominal depth-to-thickness ratio exceeds 4, at intervals of 8' or less. Use solid wood bridging 2" thick by depth of joist, and nailed to joist.

5. Timber Framing:

Provide wood beams and girders of the size and spacing shown. Install with crown edge up and provide not less than 4" bearing on supports. Provide continuous members unless shown; tie together over supports if not continuous.

Provide wood posts of the sizes shown. Provide metal anchoring and attachment devices as shown.

6. Board Sheathing and Subflooring:

Install boards with end joints staggered over supports, and with each piece extending over at least 2 spaces between supports. Screw decking to supporting members with two screws.

e. Measurement and Payment. The completed work as measured will be paid for at the contract unit price for the following contract pay items and includes all material, equipment, and labor to complete these items.

Pay Item	Pay Unit
Treated Timber Boardwalk,	**Foot**

Treated Timber Boardwalk, includes all labor, furnishing, operating, and removing the equipment for construction and installation of the timber boardwalk structure as shown on the plans and described in this special provision.

Professional Service Industries, Inc.
3120 Sovereign Drive, Suite C
Lansing, Michigan 48911
Phone: (517) 394-5700

October 28, 2024

Ms. Caycee Hart, Project Engineer
Meridian Township - Department of Public Works
5151 Marsh Road
Okemos, MI 48864

RE: Geotechnical Exploration and Engineering Report
Proposed Schultz Pathway Retaining Wall
Near 2770 Bennett Road
Meridian Township, Ingham County, Michigan
PSI Report **No. 0406-1067**

Dear Ms. Hart:

As requested, **Professional Industry Services, Inc. (PSI), an Intertek Company**, has developed a geotechnical engineering report for the referenced Proposed Schultz Pathway Retaining Wall project planned in Meridian Township, Ingham County, Michigan. The results of this exploration, together with our recommendations, are presented in the accompanying report, a copy of which is being transmitted herewith.

After plans and specifications are complete, PSI should review the final design and specifications to verify that the earthwork and pavement recommendations are properly interpreted and implemented. **It is considered imperative that the geotechnical engineer and/or its representative be present during earthwork operations to observe the field conditions with respect to the design considerations and specifications.** PSI will not be responsible for interpretations and field quality control observations made by others. Scheduling for our nearest Construction Materials Testing and Inspection location in Lansing, Michigan is available at (517) 394-5700.

PSI appreciates the opportunity to provide geotechnical engineering and consulting services for your project and looks forward to working with you during the construction phase. PSI provides additional services, which include construction materials testing and observation services, environmental services, roof consulting and observation services, pavement and asphalt testing services and specialty engineering and testing. If you have any questions regarding this report, or if we may be of further service, please feel free to contact this office at your convenience.

Respectfully submitted,
PROFESSIONAL SERVICE INDUSTRIES, INC

Taha Khalaff, Ph.D., P.E.
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1 pc: Enc.
1 cc: via PDF

TK/JNG/tk

Professional Service Industries, Inc.
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Phone: (517) 394-5700

GEOTECHNICAL EXPLORATION AND ENGINEERING REPORT

FOR THE:

**PROPOSED SCHULTZ PATHWAY RETAINING WALL
NEAR 2770 BENNETT ROAD
MERIDIAN TOWNSHIP, INGHAM COUNTY, MICHIGAN**

PREPARED FOR:

**MERIDIAN TOWNSHIP
DEPARTMENT OF PUBLIC WORKS
5151 MARSH ROAD
OKEMOS, MI 48864**

PREPARED BY:

**PROFESSIONAL SERVICE INDUSTRIES, INC.
3120 SOVEREIGN DRIVE, SUITE C
LANSING, MICHIGAN 48911**

OCTOBER 28, 2024

PSI PROJECT NO. 0406-1067

Taha Khalaff, Ph.D., P.E.
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APPENDIX

PROJECT INFORMATION

Project Authorization

This engineering report presents the results of our geotechnical engineering exploration and evaluation performed relative to the proposed Schultz Pathway Retaining Wall that will be located Near 2770 Bennett Road in Meridian Township, Ingham County, Michigan. The following table provides Project Authorization information.

Table 1: Project Authorization

Project Name	Proposed Schultz Pathway Retaining Wall
Project Location	Near 2770 Bennett Road, Meridian Township, Ingham County, Michigan
Proposal (Contract) Signed By	Mr. Dan Opsommer, Deputy Township Manager
Authorization Company	Meridian Township - Department of Public Works
Authorization Date	September 16, 2024
PSI Proposal No.	0406-424318
PSI Proposal Contents	Scope of Service, Lump Sum Fee, and PSI's General Conditions

The geotechnical exploration was performed for Meridian Township - Department of Public Works in accordance with PSI Proposal No. 0406-434318 dated September 9, 2024. The authorization to perform this exploration and evaluation was in the form of acceptance of PSI's proposal by Mr. Dan Opsommer, Deputy Township Manager on September 16, 2024.

Project Description

Project information was provided by Ms. Caycee Hart, Project Engineer of Meridian Township, via email on September 3, 2024, PSI's review of a Request of Proposal and Schultz Pathway preliminary construction plans. The provided correspondence included the following documents:

- Request for Proposal titled "Charter Township of Meridian Request for Proposals".
- Proposed soil boring location drawing titled "Schultz Pathway – Soil Boring Location Exhibit" prepared by Meridian Charter Township.
- Proposed Schultz Pathway preliminary construction plans prepared by Meridian Charter Township.

Briefly, PSI understands that the proposed project consists of the construction of a new pathway in Meridian Township, Ingham County, Michigan. PSI also understands that the project includes the construction of pathways, sidewalks, and new retaining wall. PSI understands that the proposed Schultz Pathway Retaining Wall comprises a sheet pile wall which will be constructed at the north side of Bennett Road.

Based on information provided by Meridian Township, PSI's review a Request for Proposal and Schultz Pathway preliminary construction plans with proposed boring locations and quantities, and the approximate location of the sheet pile wall, a summary of our understanding of the proposed project is provided below in the following General Project Description table.

Table 2: General Project Description

Construction Types	Sheet pile retaining wall located at south end of existing wetland. 7-ft-wide concrete pathway.
Existing Grade Change within Project Site	± 5 Feet Estimate (Google Earth Pro)
Sheet Pile Section	SCZ - 18

The geotechnical recommendations presented in this report are based on the available project information and results of our geotechnical exploration and evaluations. If any of the noted information, including sheet pile sections are considered incorrect or are changed, please inform PSI in writing so that we may amend the recommendations presented in this report if appropriate and if desired by Meridian Township. PSI will not be responsible for the implementation of its recommendations when it is not notified of changes in the project. PSI should be consulted once the structure design has been finalized. Additional subsurface evaluation may need to be performed by PSI at that time.

Purpose and Scope of Services

The purpose of this field exploration and geotechnical evaluation was to determine the general subsurface conditions at the site and to develop geotechnical design criteria for sheet pile retaining wall of the planned Schultz Pathway project. The scope of the exploration and analysis included a reconnaissance of the project site, completion of three soil borings, field, and laboratory testing of representative portions of the recovered SPT split spoon samples, and corresponding engineering analysis and evaluation of the subsurface materials encountered.

The scope of services did not include any environmental assessment for determining the presence or absence of wetlands, hazardous or toxic materials in the soil, bedrock, surface water, groundwater, or air on, below or around this site. Any statement in this report or on the boring logs regarding odors, colors, and unusual or suspicious items or conditions are strictly for informational purposes. Prior to the development of any site an environmental assessment is advisable.

As directed by the scope of work/service provided by Meridian Township, PSI did not provide any service to evaluate or detect the presence of moisture, mold or other biological contaminates in or around any structure or any service that was designed or intended to prevent or lower the risk of the occurrence of the amplification of the same. Meridian Township acknowledge that mold is ubiquitous to the environment with mold amplification occurring when building materials are impacted by moisture. Meridian Township further acknowledges that site conditions are outside of PSI's control and that mold amplification will likely occur or continue to occur in the presence of moisture. As such, PSI cannot and shall not be held responsible for the occurrence or recurrence of mold amplification.

PSI also provides an array of complementary environmental and industrial hygiene services to assist you or your design team in successfully assessing and developing properties such as the one referenced in this report. PSI's environmental consultants apply their experience, local geologic knowledge and thorough understanding of **ASTM** standards, environmental risk, and regulatory knowledge to conduct due diligence assessments of a wide range or property types and proposed developments.

SITE AND SUBSURFACE CONDITIONS

Site Location and Description

The project site is located Near 2770 Bennett Road in Meridian Township, Ingham County, Michigan. The project site consists of green space, existing concrete path, and wetland as shown in **Figure No. 2** of the **Appendix**. The following table provides a generalized description of the existing site conditions based on visual observations during the field activities, as well as other available information.

Table 3: Site Description

Site Location	Latitude: 42.69746; Longitude: -84.45215; Okemos, MI
Site History	Existing wetland since April 1999 per Google Earth Pro (see **Figure No. 1** in the **Appendix** for location)
Existing Site Ground Cover	Green space, existing concrete path, and wetland.
Existing Site Features	Relatively flat
Existing Grade/Elevation Changes	± 5 Feet Estimate (Google Earth Pro)
Site Boundaries/Neighboring Development	North: Wetland East: Okemos schools bus garage driveway; Green space South: Bennett Road West: Schultz Veterinary Clinic driveway

The terrain across the project site is relatively flat, downwards from east to west, with grades varying on the order of approximately ± 6 feet, according to Google Earth Pro. The ground surface of the project site was firm enough at the time of the field services as indicated by the fact that the drilling rig didn't experienced difficulty in accessing the boring locations.

Field Exploration and Laboratory Testing

The site subsurface conditions were determined by completion of two Standard Penetration Test-SPT soil borings located within the proposed sheet pile retaining wall. The soil borings were advanced to depths of approximately 30 feet below the existing ground surface within or near the proposed sheet pile retaining wall. The boring design element, boring labels, approximate depths, and drilling footage are provided in the following table.

Table 4: Field Exploration Summary

Design Element	Number of Borings	Boring Depth (ft)	Drilling Footage (feet)
Proposed Sheet Pile Retaining Wall	2	30	60
TOTAL:	**2**	---	**60**

The boring locations and depths of the borings were established, located, and marked in the field by PSI in accordance with the project site locations and boring quantities provided by Meridian Township. The

approximate boring locations are depicted in the Boring Location Diagram, **Figure No. 2** included in the **Appendix.**

The soil borings were performed on October 2, 2024, by means of a CME-55 truck-mounted drilling rig equipped with a rotary head utilizing 3¼ inch hollow-stem augers to advance the boreholes. Representative soil samples were recovered employing split-barrel sampling procedures in general accordance with "Penetration Test and Split-Barrel Sampling of Soils" **(ASTM D1586)**. After completion of the test borings the holes were backfilled with the excavated soils. The pertinent field exploration description is provided in the table below.

Table 5: Field Exploration Description

Drilling Equipment	Truck Mounted Drilling Equipment
Drilling Method	Continuous Hollow-Stem Augers
Field Testing	Standard Penetration Test – SPT (**ASTM D1586**)
Sampling Procedure	Soils: **ASTM D1587/1586**
Sampling Frequency	2.5-foot intervals to a depth of 10 feet and at 5-foot intervals thereafter
Frequency of Groundwater Level Measurements	During and after drilling
Boring Backfill Procedures	Soil cuttings
Sample Preservation and Transportation Procedure	General Accordance with **ASTM D4220**

Determination of the ground surface elevations by survey at the test boring positions was not within the scope of PSI's services. The approximate ground surface elevations at the boring locations performed were obtained from Google Earth Pro and provided Schultz Pathway preliminary construction plans. Prior to final design and construction, field measurement at the boring locations should be made by a professional land surveyor registered in the State of Michigan. References to depths in this report and on the attached soil boring logs are from the existing ground surface unless otherwise noted.

In addition to the field exploration, a representative laboratory-testing program was conducted to evaluate engineering characteristics and geotechnical parameters of the subsurface materials. The laboratory-testing program included visual classification and moisture content tests on all the material recovered. The unconfined compression strength of the plastic/cohesive soils encountered was estimated utilizing a calibrated hand penetrometer. The results of these tests are indicated on the boring logs which are included in the **Appendix**. The laboratory testing program was conducted in general accordance with applicable **ASTM** specifications. The unused portion of the soil samples will be placed in storage at PSI's Lansing, Michigan facility. Unless otherwise requested in writing, the samples will be discarded after 60 days from the submission of the final report.

Surface/Subsurface Conditions

At the time of our field exploration conducted in October 2024, the surface and subsurface general conditions encountered at the project site can be described and summarized in the following table:

Table 6: Existing Surface/Subsurface Summary			
Soil Boring	**Approx. Elevation, feet**	**Surface Material and Thickness**	**Major Native Strata**
SB-01 (30ft)	854	12" Topsoil	Gray SANDY LEAN CLAY Gray fine to medium SAND
SB-02 (30ft)	856	7½" Topsoil	Brown to Grayish Brown/Gray SANDY LEAN CLAY Gray fine to coarse SAND

A generalized soil description encountered in the borings, beginning at the bottom of the existing topsoil sections, and proceeding downward, is as follows:

Stratum 1: Brown to Grayish Brown/Gray SANDY Lean Clay (CL). A stratum of brown to grayish brown/gray sandy lean clay with variable percentages of silt and gravel was encountered directly underneath topsoil layer at both soil boring locations. The brown to grayish brown/gray sandy lean clay extended to depths ranging from approximately six feet and through the maximum depth of exploration of approximately 30 feet beneath the existing ground surface. Un-corrected Standard Penetration Resistance (N-values) ranged from five to 23 blows per foot (bpf). Unconfined compressive strength values were estimated using a hand penetrometer with values ranging from ¾ to greater than 4.5 tsf, indicating consistencies of firm to hard. The moisture content of the tested soil samples from the brown to grayish brown/gray sandy lean clay ranged from ten to 19 percent. The recovered soil samples visually appeared to be in a moist to wet condition when examined in the laboratory. Atterberg limit tests performed on representative composite samples of the native brown to grayish brown/gray sandy lean clay stratum prepared from borings SB-01 and SB-02, indicates the soil to be low to moderately in plasticity with Liquid Limit (LL) ranging from 15 to 18 and Plastic Limits (PL) was 14; based on the moisture contents indicated in the boring logs, this stratum appears to be slightly overconsolidated.

Stratum 2: Grayish Brown/Gray fine to coarse Sand. Grayish brown/gray fine to coarse sand with variable amount of silt and gravel interbedded the sandy lean clay stratum at both soil borings SB-01 and SB-02 at a depth of approximately six feet below the existing ground surface and extended to a depth of approximately 28.5 feet below the existing ground surface. Un-corrected Standard Penetration Resistance (N-values) within the grayish brown/gray fine to coarse sand stratum ranged from five to 38 blows per foot, indicating relative densities of loose to dense. The moisture content of the tested soil sample from the gravelly sand stratum ranged from 16 to 21 percent. The samples visually appeared to be in moist to wet conditions when examined in the laboratory. Partial Sieves Analysis (Mechanical Gradation) tests were conducted in accordance with **ASTM C136** on selected samples from both SB-01 and SB-02. Results can be found in the **Appendix**.

The above subsurface description is of a generalized nature to highlight the major subsurface stratification features and material characteristics. The **Boring Logs** should be reviewed for specific information at individual boring locations. These records include soil descriptions, stratification, penetration resistance, location of the samples, and laboratory test data.

The stratification shown on the **Boring Logs** represent the conditions only at the actual boring locations. Variations may occur and should be expected between boring locations. The stratification represents the approximate boundary between subsurface materials; however, the actual transition may be gradual. Water level information obtained during field operations is also shown on the **Boring Logs**. The **Boring Logs** were prepared on the basis of the laboratory testing and supplemental visual engineering classification, as well as the field logs of the soil conditions encountered.

Groundwater Information

Free groundwater was encountered during drilling and observed upon completion of drilling operations at both soil borings at a depth of approximately 14 feet below the existing ground surface, during early of October 2024. Collapse of the soils below groundwater (i.e., "wet cave") was observed during drilling operations at both soil boring locations at depths ranged between 21 and 22 feet below the existing ground surface. The **Boring Logs** included in the **Appendix** should be reviewed for specific information as to depths of groundwater and dry caves.

It is possible for the groundwater table to vary within the depths explored during other times of the year depending upon climatic conditions (seasonal fluctuation). Groundwater monitoring wells are required to accurately define the position and fluctuation of the groundwater table, especially if a boring is drilled in cohesive soil, where several days or weeks may be required for the groundwater to reach a static level. The installation of such monitoring wells was not included in the scope of services for this project.

Site Seismic Classification

Ingham County in Michigan lies in the Central Stable Tectonic Region and in Seismic Zone Area 0 of probable seismic activity of the Building Officials Congress of America (**BOCA**), National Building Code, and the Uniform Building Code (UBC). This zone indicates that minor damage due to occasional earthquakes might be expected in this area.

In the 2015 Michigan Building Code (MBC), the State of Michigan has adopted the provisions of the International Building Code (IBC). The Site Class is based on a weighted average of known or estimated soil properties for the uppermost 100 feet of the subsurface profile. Soil borings at the project site extended to a maximum depth of approximately 30 feet below the existing ground surface. Based on the regional geologic mapping, as well as data available on the Water Well Record Retrieval System of the Department of Environmental Quality in the State of Michigan, PSI anticipates that the subsurface conditions below the explored depth when auger refusal was reached may consist of alternating deposits of competent sand, gravel, and clay with bedrock located at a depth of approximately 100 feet or more below the existing ground surface. Bedrock most likely is part of the Saginaw formation. Based on our review of the available data, knowledge of regional geology, the borings' Standard Penetration Test (SPT) N-values and auger refusals, and approximated soil shear strength PSI estimates that the seismic design for this project, based on the upper 100 feet of the subsurface soil profile would be **Site Class D.**

The 2015 International Building Code requires a site class for the calculation of earthquake design forces. This class is a function of soil type (i.e., depth of soil and stratum types). Based on the depth of the rock

(i.e., weathered rock) and the estimated shear strength of the soil at the boring locations, **Site Class "D"** is recommended.

The USGS-NEHRP probabilistic ground motion values near Latitude 42.69742881, and -84.45221540 are as follows:

Table 7: USGS-NEHRP Probabilistic Ground Motion Values

Period (seconds)	2% Probability of Event in 50 years (%g)	Site Coefficients	Max. Spectral Acceleration Parameters	Design Spectral Acceleration Parameters	
0.2 (S_s)	8.2	$F_a = 1.6$	$S_{ms} = 0.131$	$S_{Ds} = 0.087$	$T_0 = 0.165$
1.0 (S_1)	4.5	$F_v = 2.4$	$S_{m1} = 0.108$	$S_{D1} = 0.072$	$T_s = 0.827$

$S_{ms} = F_a S_s$ $S_{Ds} = 2/3 * S_{ms}$ $T_0 = 0.2 * S_{D1}/S_{Ds}$
$S_{m1} = F_v S_1$ $S_{D1} = 2/3 * S_{m1}$ $T_s = S_{D1}/S_{Ds}$

The Site Coefficients, F_a and F_v were interpolated from 2015 IBC Tables 1613.3.3(1) and 1613.3.3(2) as a function of the site classification and the mapped spectral response acceleration at the short (Ss) and 1 second (S1) periods. The development of shear strains tending to cause liquefaction of sand deposits is governed by the character of the ground motion (i.e., acceleration and frequency), soil type, groundwater level, and in-situ stress conditions. PSI believes the risk of liquefaction occurring at this site is low based on mostly fine grained soils and the site being in a low seismic activity area.

EVALUATION AND RECOMMENDATIONS

PSI has performed their analysis based on the information developed during this exploration, it is determinant to have a sheet pile retaining wall system for the proposed Schultz Pathway Sheet Pile Retaining Wall. The resulting recommendations are provided in the following sections. If our estimations or understandings of the project are considered incorrect or if conditions during construction are significantly different from those described in this report, please contact PSI immediately in writing so that we may amend our recommendations presented in this report if appropriate and if desired by Meridian Township.

Site Preparation

PSI anticipates that the site preparation and earthwork activities associated with the proposed Schultz Pathway Sheet Pile Retaining Wall construction will consist of the construction of new substructure and superstructure elements. PSI recommends that all earthwork operations be performed under current Ingham County specifications and be properly monitored in the field.

Construction of the proposed Schultz Pathway sheet pile retaining wall will take place above and below the elevation of the groundwater elevation and within the proximity of the Schultz Pathway wet land. Appropriate measures should be taken to control infiltration of water and allow construction to take place under relatively dry conditions. Water levels and flow within the waterway will vary with the season and recent precipitation events. PSI recommends that the earthwork/excavation/sheet pile contractor verify the actual groundwater seepage conditions at the time of the excavation and

construction activities and propose the groundwater control plan for the Ingham County resident engineer's approval.

Prior to site grading activities or excavation, existing underground utilities, and structures, should be identified and rerouted or properly abandoned in-place. Existing underground utilities that are not re-routed or abandoned should be adequately marked and protected to minimize the potential for damage during construction activities.

SCZ – 18 Sheet Pile Retaining Wall Recommendations

Earth pressures on sheet pile retaining walls are influenced by structural design of the walls, conditions of wall restraint, methods of construction and/or compaction, and the strength of the materials being restrained. The most common conditions for sheet pile retaining wall design are the active and passive conditions. Active conditions apply to relatively flexible earth retention structures, where some rotation may occur to mobilize soil shear strength. Passive state represents the maximum possible pressure when a structure is pushed against the soil and is used in sheet pile wall design to help resist active pressure. Because significant wall movements are required to develop the passive pressure, the total calculated passive pressure should be reduced by one-half to two-thirds for design purposes.

The adequacy of the proposed sheet pile geometry and SCZ-18 section was analyzed using the computer software SPW911 v2.4, , developed by Pile Buck, Inc. SPW911 is a design and analysis software for modeling the shoring of excavations and bulkheads in stratified soil using sheet pile walls. Calculation methods are based on the British Steel Piling Handbook and the US Steel Sheet Piling Design Manual. The sheet pile wall option for this project was for an unsupported wall at the top; the sheet pile wall works as a cantilever wall embedded in the ground with a free height of six feet.

Based on a review of the analysis outputs, the **Inputs/Outputs** included in the **Appendix** should be reviewed for specific information as soil subsurface stratum and sheet pile embedment (the total **SCZ-18** Sheet Pile Embedment is approximately 12.5 feet with a free height of six feet; the total length of the sheets is 18.5 feet). The resulting applied bending moment is less than the maximum resisting moment for the sheet pile section proposed. In addition, deflection of the top of the sheeting is anticipated to be 0.4 in. There, it appears that the permanent sheeting is adequate as currently designed.

The recommended earth pressure coefficients assume constantly functioning drainage systems are installed between walls and soil backfill to prevent the accidental buildup of hydrostatic pressures and lateral stresses in excess of those stated. If a functioning drainage system is not installed, lateral earth pressures should be determined using the buoyant weight of the soil (approximately 128 pcf). Hydrostatic pressures calculated with the unit weight of water (62.4 pcf) should be added to these earth pressures to obtain the total stresses for design.

The surcharge loadings anticipated to be located a short distance behind sheet pile retaining wall, they may also exert appreciable additional lateral pressures. If an imaginary line projected downward at a 26-degree angle from the bottom near edge of the surcharge load does not intersect the wall, the effect of the load on the wall may be negligible. Whenever this line intersects the wall, the effect of the surcharge loads should be added to the recommended earth pressures to determine total lateral stresses.

CONSTRUCTION CONSIDERATIONS

Drainage and Groundwater Considerations

Free groundwater was encountered during drilling and observed upon completion of drilling operations at both soil borings at a depth of approximately 14 feet below the existing ground surface, during early of October 2024. Therefore, difficulty with groundwater seepage and subgrade instability may not be anticipated during earthwork, excavation and construction associated with the proposed sheet pile retaining wall structure project. It is possible for the groundwater table to vary within the depths explored during other times of the year depending upon climatic conditions (seasonal fluctuation). PSI recommends that the Contractor verify the actual groundwater and seepage conditions at the time of the construction activities and propose the groundwater control methods for the Engineer's approval, including the disposal of discharge water.

Every effort should be made to keep the excavations and any other prepared subgrades dry if water is encountered or if rainfall or snowmelt occurs during construction. During wet weather periods, increases in the moisture content of the soil can cause significant reduction in the soil strength and support capabilities. In addition, soils that become wet may be slow to dry and thus significantly retard the progress of grading and compaction activities. It will, therefore, be advantageous to perform earthwork and foundation construction activities during dry weather.

Water should not be allowed to collect in foundation or subsurface level excavations or other prepared subgrades of the construction area, either during or after construction. Water accumulation should be removed from shallow excavations by pumping from sump pits placed around the perimeter of the excavation. Positive site surface drainage should be provided to reduce infiltration of surface water. The grades should be sloped away from the proposed structures and surface drainage should be collected and discharged.

Excavation Safety Considerations

Typically, soils penetrated by augers can be removed with conventional earthmoving equipment (backhoe and/or trencher). However, subsurface excavation equipment varies, and field refusal conditions may vary as well. Therefore, it is possible that difficult excavation conditions may be encountered at the proposed site location between the boring locations.

Excavation near any existing structure or utility must be performed with the utmost of care and under the supervision of the geotechnical engineer's representative. Locations of all underground utilities within the proposed site must be verified by the Contractor prior to carry out any excavation.

In Federal Register, Volume 54, No. 209 (October 1989), the United States Department of Labor, Occupational Safety and Health Administration (**OSHA**) amended its "Construction Standards for Excavations, 29 CFR, part 1926, Subpart P". This document was issued to better ensure the safety of workmen entering trenches or excavations. It is mandated by this federal regulation that excavations, whether they be utility trenches, basement excavation or footing excavations, be constructed in accordance with OSHA guidelines. It is our understanding that these regulations are being strictly enforced and if they are not closely followed, the Owner and the Contractor could be liable for substantial penalties.

The Contractor is solely responsible for designing and constructing stable, safe, temporary excavations and should shore, slope or bench the sides of the excavations as required to maintain stability of both the excavation sides and bottom. The Contractor's "responsible person", as defined in **29 CFR Part 1926**, must evaluate the soil exposed in the excavations as part of the Contractor's safety procedures.

The angle of the excavation side slopes must strictly be decided based on the soil type and unconfined compressive strength of the excavated soil per OSHA requirements. For Type A soils, such as clay above water table having unconfined compressive strength values equal to or more than 1½ ton per square foot (tsf), the maximum allowable slope for excavations up to 20 feet deep is ¾ (Horizontal) :1 (Vertical). For Type B soils, such as clay above water table having unconfined compressive strength values between ½ to 1½ ton per square foot (tsf), or angular gravel, the maximum allowable slope for excavations up to 20 feet deep is 1 (Horizontal) :1 (Vertical). For Type C soils, such as clay above water table having unconfined compressive strength values less than ½ ton per square foot (tsf), or granular soils such as gravel and sand, and all submerged soils, the maximum allowable slope for excavations up to 20 feet deep is 1½ (Horizontal) :1 (Vertical). The Contractor should be aware that slope height, slope inclination, and excavation depth should not exceed the specified local, state, and federal regulations.

Earthwork, subgrade preparation, and foundation construction operations must be conducted in strict accordance with the project specifications and under the supervision of the geotechnical engineer or his representative. PSI is providing this information solely as a service to Meridian Township. PSI does not assume responsibility for construction site safety or the contractor's or other parties' compliance with local, state, and federal safety or other regulation.

GEOTECHNICAL RISK

The concept of risk is an important aspect of the geotechnical evaluation. The primary reason for this is that the analytical methods used to develop geotechnical recommendations do not comprise an exact science. The analytical tools which geotechnical engineers use are generally empirical and must be used in conjunction with engineering judgment, experience, and regular observation during the construction activities. Therefore, the solutions and recommendations presented in the geotechnical evaluation should not be considered risk-free and, more importantly, are not a guarantee that the interaction between the soils and the proposed structure will perform as planned. The engineering recommendations presented in the preceding sections constitute PSI's professional estimate of those measures that are necessary for the proposed structure to perform according to the proposed design based on the information generated and referenced during this evaluation, and PSI's experience in working with these conditions.

REPORT LIMITATIONS

The recommendations submitted in this report are based on the available subsurface information obtained by PSI and the project information furnished by **Meridian Township.** If there are any revisions to the plans for this project, or if deviations from the subsurface conditions noted in this report are encountered during construction, PSI should be notified immediately to determine if changes in the earthwork, subgrade preparation and foundation design parameter recommendations are required. If PSI is not notified of such changes, PSI will not be responsible for the impact of those changes on the project.

The geotechnical engineer warrants that the findings, recommendations, specifications, or professional advice contained herein have been made in accordance with generally accepted professional engineering practices in the local area. No other warranties are implied or expressed.

This report has been prepared for the exclusive use of Meridian Township and their authorized representatives. This report is intended for the specific application to the proposed Schultz Pathway Retaining Wall (sheet pile retaining wall) that will be located Near 2770 Bennett Road in Meridian Township, Ingham County, Michigan.

APPENDIX

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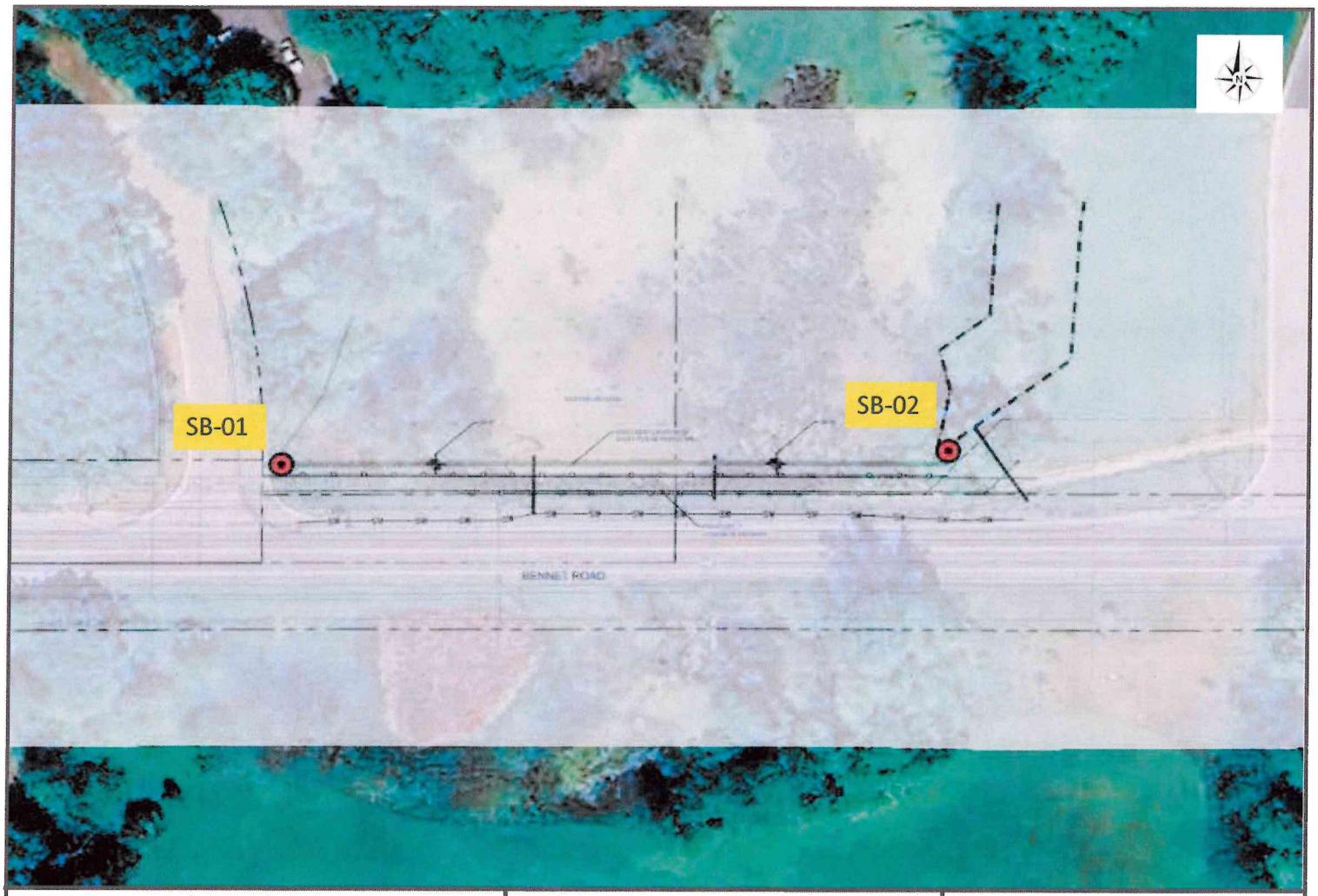
SITE LOCATION DIAGRAM
Schultz Pathway Retaining Wall
East of 2770 Bennett Road
Meridian Township, Ingham County, Michigan

FIGURE NO. 1
PSI Project No. 04061067
Prepared By: Jordan Most
Prepared On: September 19, 2024



intertek psi	**BORING LOCATION DIAGRAM** Schultz Pathway Retaining Wall East of 2770 Bennett Road Meridian Township, Ingham County, Michigan	**FIGURE NO. 2** PSI Project No. 04061067 Prepared By: Jordan Most Prepared On: September 19, 2024

BORING SB-01

DATE STARTED:	10/2/24
DATE COMPLETED:	10/2/24
COMPLETION DEPTH	30.0 ft
BENCHMARK:	N/A
ELEVATION:	854 ft
LATITUDE:	42.6975°
LONGITUDE:	-84.45276°
STATION:	N/A **OFFSET:** N/A
DRILL COMPANY:	PSI, Inc.
DRILLER:	D. Guajardo **LOGGED BY:** I. Al-Hemyari
DRILL RIG:	CME-55
DRILLING METHOD:	3 1/4" HSA
SAMPLING METHOD:	SS
HAMMER TYPE:	Automatic
EFFICIENCY	N/A%
REVIEWED BY:	Jordan Most

Water

While Drilling	14 feet
Upon Completion	N/A
Cave In Depth	21 feet

BORING LOCATION: See Boring Location Diagram

REMARKS: Borehole backfilled with auger cuttings

Elevation (feet)	Depth, (feet)	Sample No.	Recovery (inches)	MATERIAL DESCRIPTION	USCS Classification	SPT Blows per 6-inch (SS)	Moisture, %	Additional Remarks
	0			Approximately 12" of Brown SANDY TOPSOIL				
		1	16	Gray SANDY LEAN CLAY with Silt, trace Gravel, moist to wet,very stiff to firm		3-4-3 N=7	12	Qp = 3.0 tsf
850	5	2	16			3-5-4 N=9	19	LL = 18 PL = 14 Qp = 2.75 tsf
		3	18			3-3-2 N=5	12	Qp = 1.0 tsf
845	10	4	15		CL	3-4-4 N=8	15	Qp = 0.75 tsf
840	15	5	16			3-3-4 N=7	11	Qp = 2.75 tsf
835	20	6	18	Gray fine to medium SAND, trace Silt, trace Gravel, wet, dense	SP	10-14-24 N=38	16	
830	25	7	16	Gray SANDY LEAN CLAY with Silt, trace Gravel, wet, firm to stiff	CL	1-3-3 N=6	10	LL = 16 PL = 14 Qp = 1.5 tsf
825	30	8	13			6-5-8 N=13	13	Qp = 2.0 tsf
				Boring terminated approximately 30 feet beneath the existing ground surface				

STANDARD PENETRATION TEST DATA
N in blows/ft ◎
× Moisture ◪ PL ✚ LL
0 25 50
STRENGTH, tsf
▲ Qu ✳ Qp
0 2.0 4.0

intertek psi
Professional Service Industries, Inc.
3120 Sovereign Drive, Suite C
Lansing, MI 48911
Telephone: (517) 394-5700

PROJECT NO.: 0406-1067
PROJECT: Schultz Pathway Retaining Wall
LOCATION: Near 2770 Bennett Road
Meridian Township
Ingham County, Michigan

The stratification lines represent approximate boundaries. The transition may be gradual.

DATE STARTED:	10/2/24	**DRILL COMPANY:**	PSI, Inc.
DATE COMPLETED:	10/2/24	**DRILLER:** D. Guajardo	**LOGGED BY:** I. Al-Hemyari
COMPLETION DEPTH	30.0 ft	**DRILL RIG:**	CME-55
BENCHMARK:	N/A	**DRILLING METHOD:**	3 1/4" HSA
ELEVATION:	856 ft	**SAMPLING METHOD:**	SS
LATITUDE:	42.69749°	**HAMMER TYPE:**	Automatic
LONGITUDE:	-84.45158°	**EFFICIENCY**	N/A%
STATION: N/A	**OFFSET:** N/A	**REVIEWED BY:**	Jordan Most

REMARKS: Borehole backfilled with auger cuttings

BORING SB-02

Water		
	While Drilling	14 feet
	Upon Completion	N/A
	Cave In Depth	22 feet

BORING LOCATION:
See Boring Location Diagram

Elevation (feet)	Depth, (feet)	Sample No.	Recovery (inches)	MATERIAL DESCRIPTION	USCS Classification	SPT Blows per 6-inch (SS)	Moisture, %	Additional Remarks
855	0			Approximately 7.5" of Brown SANDY TOPSOIL				
		1	14	Brown and gray SANDY LEAN CLAY with Silt, trace Gravel, moist, very stiff	CL	4-6-15 N=21	10	>>>Qp = 4.5+ tsf
	5	2	16			8-9-8 N=17	13	>>>Qp = 4.5+ tsf
850		3	15	Grayish brown fine to medium SAND with Silt, moist to very moist, loose	SP-SM	4-2-3 N=5	20	
	10	4	16			2-2-5 N=7	21	
845		5	14	Gray fine to coarse SAND with Gravel and Silt, moist to wet, loose to medium dense		13-10-5 N=15	12	
840	15							
		6	16			5-4-4 N=8	12	
835	20				SP-SM			
		7	14			4-5-6 N=11	15	
830	25							
	30	8	15	Gray SILTY LEAN CLAY with fine Sand, trace Gravel, wet, very stiff	CL	7-11-12 N=23	11	LL = 15 >>>PL = 14 Qp = 4.5+ tsf
				Boring terminated approximately 30 feet beneath the existing ground surface				

STANDARD PENETRATION TEST DATA
N in blows/ft ◎
× Moisture ▨ PL ✚ LL
0 25 50
STRENGTH, tsf
▲ Qu ✳ Qp
0 2.0 4.0

intertek psi
Professional Service Industries, Inc.
3120 Sovereign Drive, Suite C
Lansing, MI 48911
Telephone: (517) 394-5700

PROJECT NO.:	0406-1067
PROJECT:	Schultz Pathway Retaining Wall
LOCATION:	Near 2770 Bennett Road
	Meridian Township
	Ingham County, Michigan

The stratification lines represent approximate boundaries. The transition may be gradual.

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GENERAL NOTES

SAMPLE IDENTIFICATION

The Unified Soil Classification System (USCS), AASHTO 1988 and ASTM designations D2487 and D-2488 are used to identify the encountered materials unless otherwise noted. Coarse-grained soils are defined as having more than 50% of their dry weight retained on a #200 sieve (0.075mm); they are described as: boulders, cobbles, gravel or sand. Fine-grained soils have less than 50% of their dry weight retained on a #200 sieve; they are defined as silts or clay depending on their Atterberg Limit attributes. Major constituents may be added as modifiers and minor constituents may be added according to the relative proportions based on grain size.

DRILLING AND SAMPLING SYMBOLS

SFA: Solid Flight Auger - typically 4" diameter flights, except where noted.
HSA: Hollow Stem Auger - typically 3¼" or 4¼ I.D. openings, except where noted.
M.R.: Mud Rotary - Uses a rotary head with Bentonite or Polymer Slurry
R.C.: Diamond Bit Core Sampler
H.A.: Hand Auger
P.A.: Power Auger - Handheld motorized auger

SS: Split-Spoon - 1 3/8" I.D., 2" O.D., except where noted.
ST: Shelby Tube - 3" O.D., except where noted.
RC: Rock Core
TC: Texas Cone
BS: Bulk Sample
PM: Pressuremeter
CPT-U: Cone Penetrometer Testing with Pore-Pressure Readings

SOIL PROPERTY SYMBOLS

N: Standard "N" penetration: Blows per foot of a 140 pound hammer falling 30 inches on a 2-inch O.D. Split-Spoon.
N_{60}: A "N" penetration value corrected to an equivalent 60% hammer energy transfer efficiency (ETR)
Q_u: Unconfined compressive strength, TSF
Q_p: Pocket penetrometer value, unconfined compressive strength, TSF
w%: Moisture/water content, %
LL: Liquid Limit, %
PL: Plastic Limit, %
PI: Plasticity Index = (LL-PL),%
DD: Dry unit weight, pcf
▼, ▽, ▼ Apparent groundwater level at time noted

RELATIVE DENSITY OF COARSE-GRAINED SOILS

Relative Density	N - Blows/foot
Very Loose	0 - 4
Loose	4 - 10
Medium Dense	10 - 30
Dense	30 - 50
Very Dense	50 - 80
Extremely Dense	80+

ANGULARITY OF COARSE-GRAINED PARTICLES

Description	Criteria
Angular:	Particles have sharp edges and relatively plane sides with unpolished surfaces
Subangular:	Particles are similar to angular description, but have rounded edges
Subrounded:	Particles have nearly plane sides, but have well-rounded corners and edges
Rounded:	Particles have smoothly curved sides and no edges

GRAIN-SIZE TERMINOLOGY

Component	Size Range
Boulders:	Over 300 mm (>12 in.)
Cobbles:	75 mm to 300 mm (3 in. to 12 in.)
Coarse-Grained Gravel:	19 mm to 75 mm (¾ in. to 3 in.)
Fine-Grained Gravel:	4.75 mm to 19 mm (No.4 to ¾ in.)
Coarse-Grained Sand:	2 mm to 4.75 mm (No.10 to No.4)
Medium-Grained Sand:	0.42 mm to 2 mm (No.40 to No.10)
Fine-Grained Sand:	0.075 mm to 0.42 mm (No. 200 to No.40)
Silt:	0.005 mm to 0.075 mm
Clay:	<0.005 mm

PARTICLE SHAPE

Description	Criteria
Flat:	Particles with width/thickness ratio > 3
Elongated:	Particles with length/width ratio > 3
Flat & Elongated:	Particles meet criteria for both flat and elongated

RELATIVE PROPORTIONS OF FINES

Descriptive Term	% Dry Weight
Trace:	< 5%
With:	5% to 12%
Modifier:	>12%

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GENERAL NOTES

(Continued)

CONSISTENCY OF FINE-GRAINED SOILS

Q_U - TSF	N - Blows/foot	Consistency
0 - 0.25	0 - 2	Very Soft
0.25 - 0.50	2 - 4	Soft
0.50 - 1.00	4 - 8	Firm (Medium Stiff)
1.00 - 2.00	8 - 15	Stiff
2.00 - 4.00	15 - 30	Very Stiff
4.00 - 8.00	30 - 50	Hard
8.00+	50+	Very Hard

MOISTURE CONDITION DESCRIPTION

Description	Criteria
Dry:	Absence of moisture, dusty, dry to the touch
Moist:	Damp but no visible water
Wet:	Visible free water, usually soil is below water table

RELATIVE PROPORTIONS OF SAND AND GRAVEL

Descriptive Term	% Dry Weight
Trace:	< 15%
With:	15% to 30%
Modifier:	>30%

STRUCTURE DESCRIPTION

Description	Criteria
Stratified:	Alternating layers of varying material or color with layers at least ¼-inch (6 mm) thick
Laminated:	Alternating layers of varying material or color with layers less than ¼-inch (6 mm) thick
Fissured:	Breaks along definite planes of fracture with little resistance to fracturing
Slickensided:	Fracture planes appear polished or glossy, sometimes striated
Blocky:	Cohesive soil that can be broken down into small angular lumps which resist further breakdown
Lensed:	Inclusion of small pockets of different soils
Layer:	Inclusion greater than 3 inches thick (75 mm)
Seam:	Inclusion 1/8-inch to 3 inches (3 to 75 mm) thick extending through the sample
Parting:	Inclusion less than 1/8-inch (3 mm) thick

SCALE OF RELATIVE ROCK HARDNESS

Q_U - TSF	Consistency
2.5 - 10	Extremely Soft
10 - 50	Very Soft
50 - 250	Soft
250 - 525	Medium Hard
525 - 1,050	Moderately Hard
1,050 - 2,600	Hard
>2,600	Very Hard

ROCK BEDDING THICKNESSES

Description	Criteria
Very Thick Bedded	Greater than 3-foot (>1.0 m)
Thick Bedded	1-foot to 3-foot (0.3 m to 1.0 m)
Medium Bedded	4-inch to 1-foot (0.1 m to 0.3 m)
Thin Bedded	1¼-inch to 4-inch (30 mm to 100 mm)
Very Thin Bedded	½-inch to 1¼-inch (10 mm to 30 mm)
Thickly Laminated	1/8-inch to ½-inch (3 mm to 10 mm)
Thinly Laminated	1/8-inch or less "paper thin" (<3 mm)

ROCK VOIDS

Voids	Void Diameter
Pit	<6 mm (<0.25 in)
Vug	6 mm to 50 mm (0.25 in to 2 in)
Cavity	50 mm to 600 mm (2 in to 24 in)
Cave	>600 mm (>24 in)

GRAIN-SIZED TERMINOLOGY

(Typically Sedimentary Rock)

Component	Size Range
Very Coarse Grained	>4.76 mm
Coarse Grained	2.0 mm - 4.76 mm
Medium Grained	0.42 mm - 2.0 mm
Fine Grained	0.075 mm - 0.42 mm
Very Fine Grained	<0.075 mm

ROCK QUALITY DESCRIPTION

Rock Mass Description	RQD Value
Excellent	90 -100
Good	75 - 90
Fair	50 - 75
Poor	25 -50
Very Poor	Less than 25

DEGREE OF WEATHERING

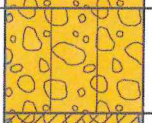
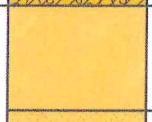
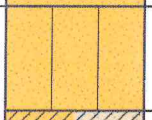
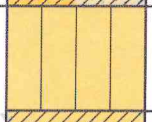
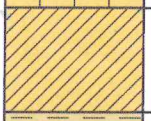
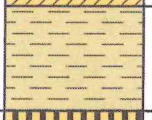
Slightly Weathered: Rock generally fresh, joints stained and discoloration extends into rock up to 25 mm (1 in), open joints may contain clay, core rings under hammer impact.

Weathered: Rock mass is decomposed 50% or less, significant portions of the rock show discoloration and weathering effects, cores cannot be broken by hand or scraped by knife.

Highly Weathered: Rock mass is more than 50% decomposed, complete discoloration of rock fabric, core may be extremely broken and gives clunk sound when struck by hammer, may be shaved with a knife.

SOIL CLASSIFICATION CHART

NOTE: DUAL SYMBOLS ARE USED TO INDICATE BORDERLINE SOIL CLASSIFICATIONS

MAJOR DIVISIONS			SYMBOLS		TYPICAL DESCRIPTIONS
			GRAPH	LETTER	
COARSE GRAINED SOILS MORE THAN 50% OF MATERIAL IS LARGER THAN NO. 200 SIEVE SIZE	GRAVEL AND GRAVELLY SOILS MORE THAN 50% OF COARSE FRACTION RETAINED ON NO. 4 SIEVE	CLEAN GRAVELS (LITTLE OR NO FINES)		GW	WELL-GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES
				GP	POORLY-GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES
		GRAVELS WITH FINES (APPRECIABLE AMOUNT OF FINES)		GM	SILTY GRAVELS, GRAVEL - SAND - SILT MIXTURES
				GC	CLAYEY GRAVELS, GRAVEL - SAND - CLAY MIXTURES
	SAND AND SANDY SOILS MORE THAN 50% OF COARSE FRACTION PASSING ON NO. 4 SIEVE	CLEAN SANDS (LITTLE OR NO FINES)		SW	WELL-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
				SP	POORLY-GRADED SANDS, GRAVELLY SAND, LITTLE OR NO FINES
		SANDS WITH FINES (APPRECIABLE AMOUNT OF FINES)		SM	SILTY SANDS, SAND - SILT MIXTURES
				SC	CLAYEY SANDS, SAND - CLAY MIXTURES
FINE GRAINED SOILS MORE THAN 50% OF MATERIAL IS SMALLER THAN NO. 200 SIEVE SIZE	SILTS AND CLAYS	LIQUID LIMIT LESS THAN 50		ML	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS WITH SLIGHT PLASTICITY
				CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
				OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
	SILTS AND CLAYS	LIQUID LIMIT GREATER THAN 50		MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SAND OR SILTY SOILS
				CH	INORGANIC CLAYS OF HIGH PLASTICITY
				OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS
HIGHLY ORGANIC SOILS				PT	PEAT, HUMUS, SWAMP SOILS WITH HIGH ORGANIC CONTENTS

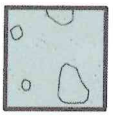
Graphic Symbols for Materials and Rock Deposits

CONCRETE
Portland Cement Concrete

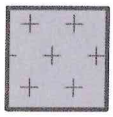
BITUMINOUS CONCRETE

CLAYSTONE

COAL
Coal, Anthracite Coal

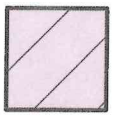


CONGLOMERATE/BRECCIA
Conglomerate, Breccia

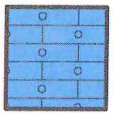


IGNEOUS ROCK
Anorthsite, Basalt, Metabasalt, Diabase (Gabbro), Gabbro, Granite/Granodionite, Homfels, Pegmatite, Rhyolite/Metarhyolite

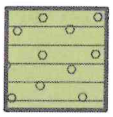
LIMESTONE
Limestone, Dolomite



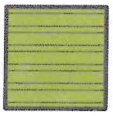
METAMORPHIC ROCK
Amphibolite, Gneiss, Marble, Phyllite, Quartzite, Schist, Serpentinite, Slate



CHERT

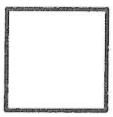


SANDSTONE
Sandstone, Orthoquarzite (Sandstone)

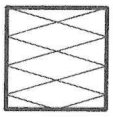


SHALE

SILTSTONE



NO RECOVERY



VOID

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ATTERBERG LIMITS (ASTM D4318)

Client: Meridian Township - Department of Public Works
Project Name: Proposed Schultz Pathway Retaining Wall
Project No.: 04061067
Location: Meridian Township, Ingham County, Michigan
Source: SB-01
Sample No.: SS2 to SS4
Sample Depth: 3.5' - 10.0'
Date: 10/7/2024
Tested by: LD
Checked by:
Estimated % Soil retained on No. 40: **Air-dried Sample** ☑

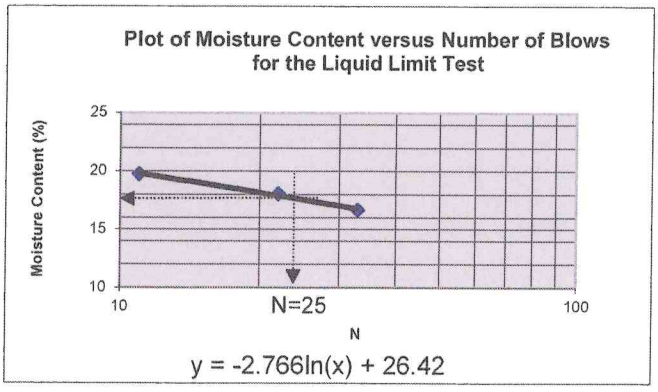
Sample Description: SANDY LEAN CLAY with Silt, trace Gravel, gray

LIQUID LIMIT TEST (Method A)

Can No.	Weight of Can W_1 (g)	Weight of Can + Wet Soil W_2 (g)	Weight of Can + Dry Soil W_3 (g)	Number of Blows (N)	Moisture Content w (%)
64	22.53	33.76	31.91	11	**19.7**
PP	22.55	35.37	33.41	22	**18.0**
3M	22.77	36.37	34.43	33	**16.6**

PLASTIC LIMIT TEST

Can No.	Weight of Can W_1 (g)	Weight of Can + Wet Soil W_2 (g)	Weight of Can + Dry Soil W_3 (g)	Plastic Limit w (%)
D	10.96	15.92	15.30	**14.3**
15	10.26	13.83	13.37	**14.8**



Liquid Limit (LL) = **18**
Plastic Limit (PL) = **14**
Plasticity Index (PI) = **4**
PI = LL - PL

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Materials in Solid Finer than the No. 200 Sieve
(ASTM D1140)

Project Name:	Proposed Schultz Pathway Retaining Wall	Boring Number:	SB-01
Project Number:	04061067	Sample Number:	SS2-SS4
Sample Date:	10/2/2024	Sample Depth:	3.5'-10.0'
Test Date:	10/7/2024	Tested By:	LD
		Checked By:	TK

Sample Description: **Gray SANDY LEAN CLAY with Silt, trace Gravel, moist, firm to stiff**

Tare Number / Tare Weight (g):	683.5
Dry Weight of Sample and Tare before Wash (g):	1022.90
Dry Weight of Sample and Tare after Wash (g):	861.8
Loss By Wash (g):	161.1
% Loss By Wash:	47.5%

The speciman was soaked for: 0.25 hrs.

Oven: 03-OV-408 ☑
Scale: 09-BAL-408 ☑
Sieve: 049-SV-408 ☑

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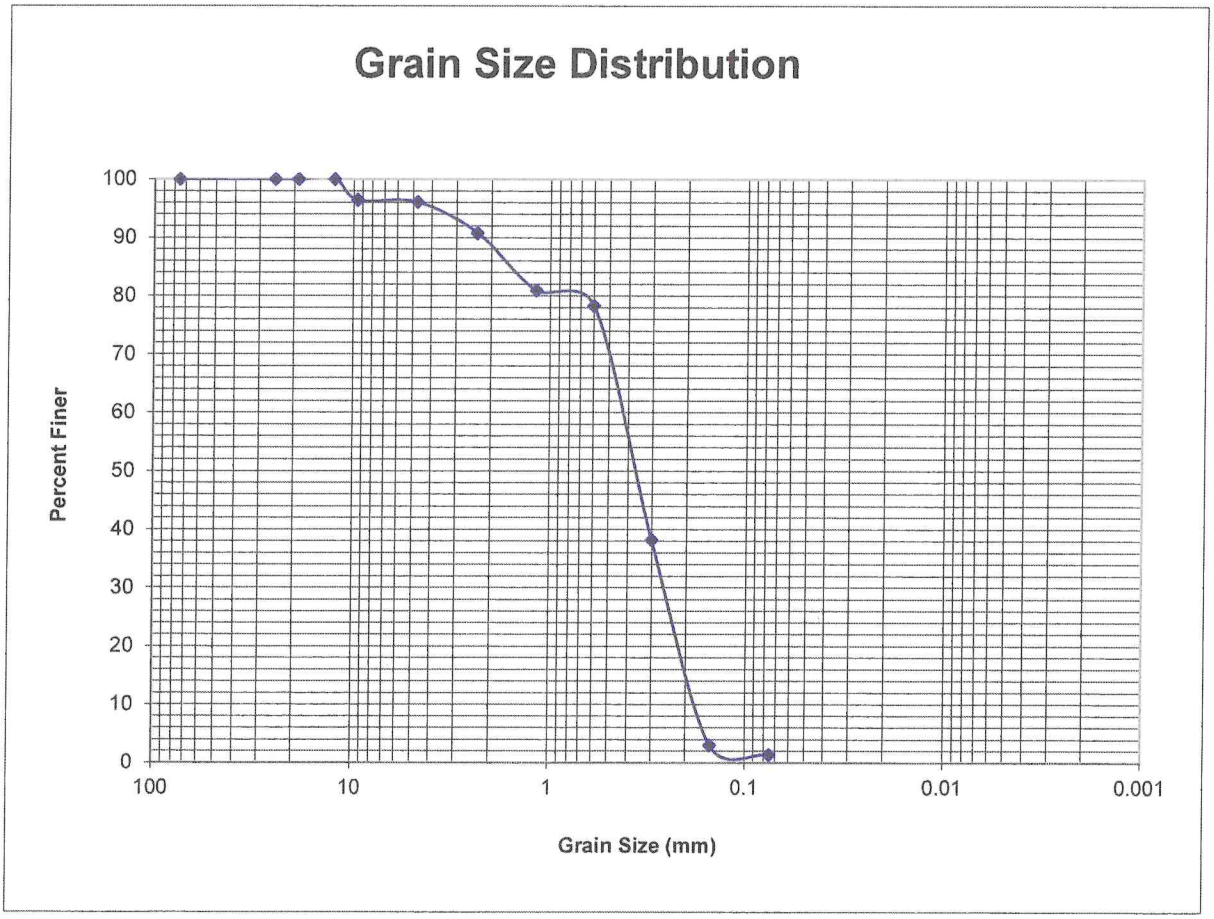
psi

Project: Proposed Schultz Pathway Retaining Wall	**Project #:** 04061067
Date Sampled: 10/2/2024	**Date Tested:** 10/7/2024
Sampled by: PSI - David & Ibrahim	**Source:** SB-01; SS6
Location: Meridian Township, Ingham County, Michigan	**Depth:** 18.5' - 20.0'

Soil Information:						
% >1.5 in.=	**0.0**		PI=	**n/a**	D_{10}=	0.18
% Gravel=	**3.9**		LL=	**n/a**	D_{30}=	0.28
% Sand=	**94.7**		PI=	**n/a**	D_{60}=	0.42
	Coarse	**5.3%**	USCS:	**SP**	Cu=	2.3
	Medium	**12.5%**	AASHTO:	**A-3**	Cc=	1.0
	Fine	**76.9%**	Description:			
% Fines=	**1.4**		**SAND, fine to coarse, trace silt and gravel, gray**			
	Silt	**n/a**				
	Clay	**n/a**				



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ATTERBERG LIMITS (ASTM D4318)

Client: Meridian Township - Department of Public Works
Project Name: Proposed Schultz Pathway Retaining Wall
Project No.: 04061067
Location: Meridian Township, Ingham County, Michigan
Source: SB-01
Sample No.: SS7 & SS8
Sample Depth: 23.5' - 30.0'
Date: 10/7/2024
Tested by: LD
Checked by:
Estimated % Soil retained on No. 40: **Air-dried Sample** ☑

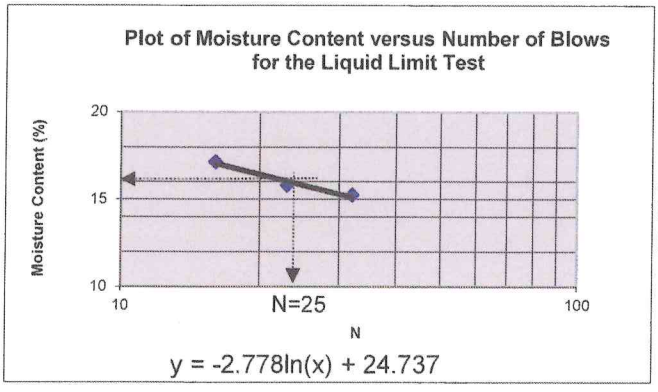
Sample Description: SANDY LEAN CLAY with Silt, trace Gravel, gray

LIQUID LIMIT TEST (Method A)

Can No.	Weight of Can W_1 (g)	Weight of Can + Wet Soil W_2 (g)	Weight of Can + Dry Soil W_3 (g)	Number of Blows (N)	Moisture Content w (%)
RV	22.37	31.66	30.3	16	**17.2**
777	24.52	30.68	29.84	23	**15.8**
VW	22.37	27.74	27.03	32	**15.2**

PLASTIC LIMIT TEST

Can No.	Weight of Can W_1 (g)	Weight of Can + Wet Soil W_2 (g)	Weight of Can + Dry Soil W_3 (g)	Plastic Limit w (%)
O18	13.11	17.76	17.16	**14.8**
O22	13.51	18.48	17.86	**14.3**



Liquid Limit (LL) = **16**
Plastic Limit (PL) = **14**
Plasticity Index (PI) = **2**
PI = LL - PL

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psi

Materials in Solid Finer than the No. 200 Sieve
(ASTM D1140)

Project Name:	Proposed Schultz Pathway Retaining Wall	Boring Number:	SB-01
Project Number:	04061067	Sample Number:	SS7-SS8
Sample Date:	10/2/2024	Sample Depth:	23.5'-30.0'
Test Date:	10/7/2024	Tested By:	LD
		Checked By:	TK

Sample Description: **Gray SANDY LEAN CLAY with Silt, trace Gravel, moist, firm to stiff**

Tare Number / Tare Weight (g):	413.6
Dry Weight of Sample and Tare before Wash (g):	733.70
Dry Weight of Sample and Tare after Wash (g):	582.4
Loss By Wash (g):	151.3
% Loss By Wash:	47.3%

The speciman was soaked for: 0.25 hrs.

Oven: 03-OV-408 ☑
Scale: 09-BAL-408 ☑
Sieve: 049-SV-408 ☑

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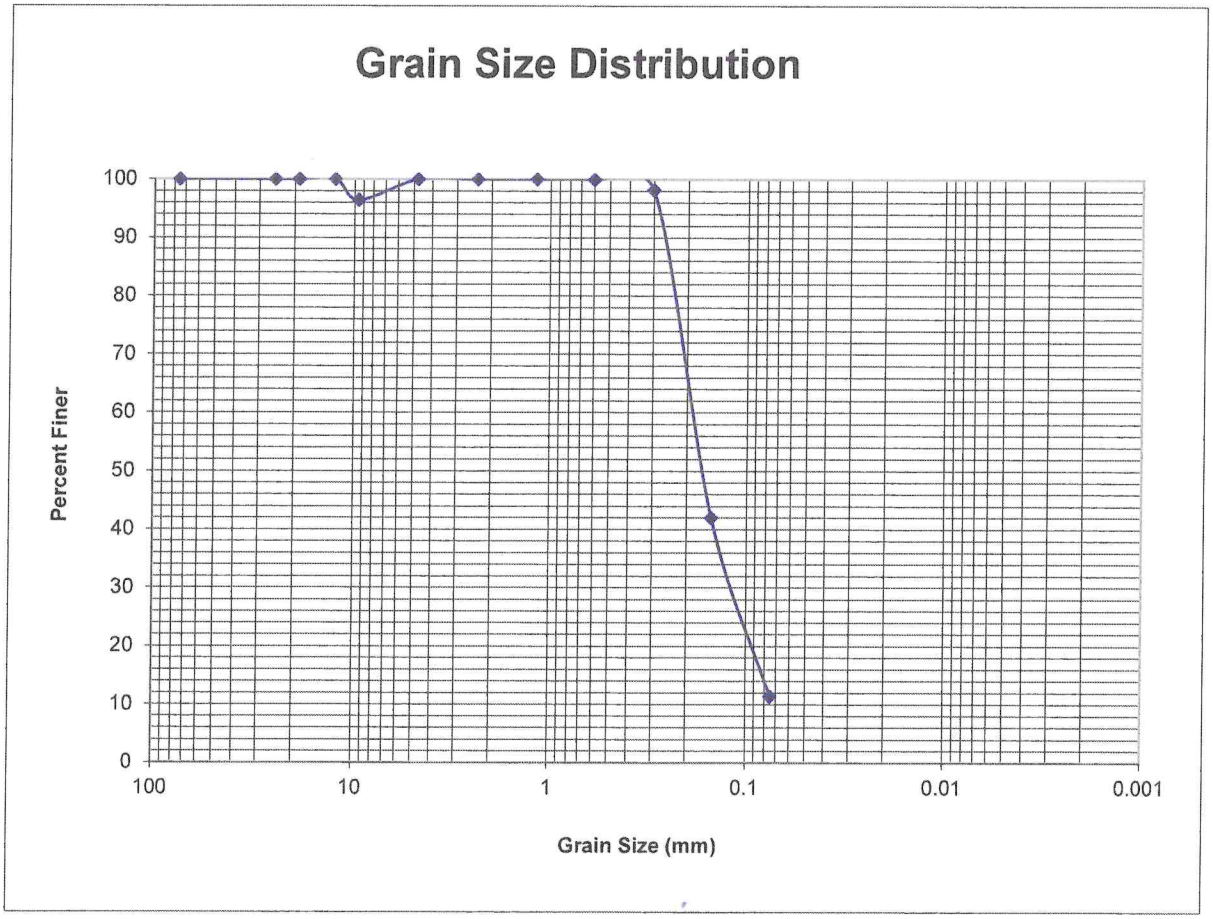
Project: Proposed Schultz Pathway Retaining Wall	**Project #:** 04061067
Date Sampled: 10/2/2024	**Date Tested:** 10/7/2024
Sampled by: PSI - David & Ibrahim	**Source:** SB-02; SS3&SS4
Location: Meridian Township, Ingham County, Michigan	**Depth:** 6.0' - 10.0'

Soil Information:						
% >1.5 in.=	**0.0**		PI=	**n/a**	D_{10}=	N/A
% Gravel=	**0.0**		LL=	**n/a**	D_{30}=	0.14
% Sand=	**88.6**		PI=	**n/a**	D_{60}=	0.19
	Coarse	**0.0%**	USCS:	**SP-SM**	Cu=	N/A
	Medium	**0.1%**	AASHTO:	**A-2-4**	Cc=	N/A
	Fine	**88.5%**	Description:			
% Fines=	**11.4**		**SAND, fine to medium with silt, grayish brown**			
	Silt	**n/a**				
	Clay	**n/a**				



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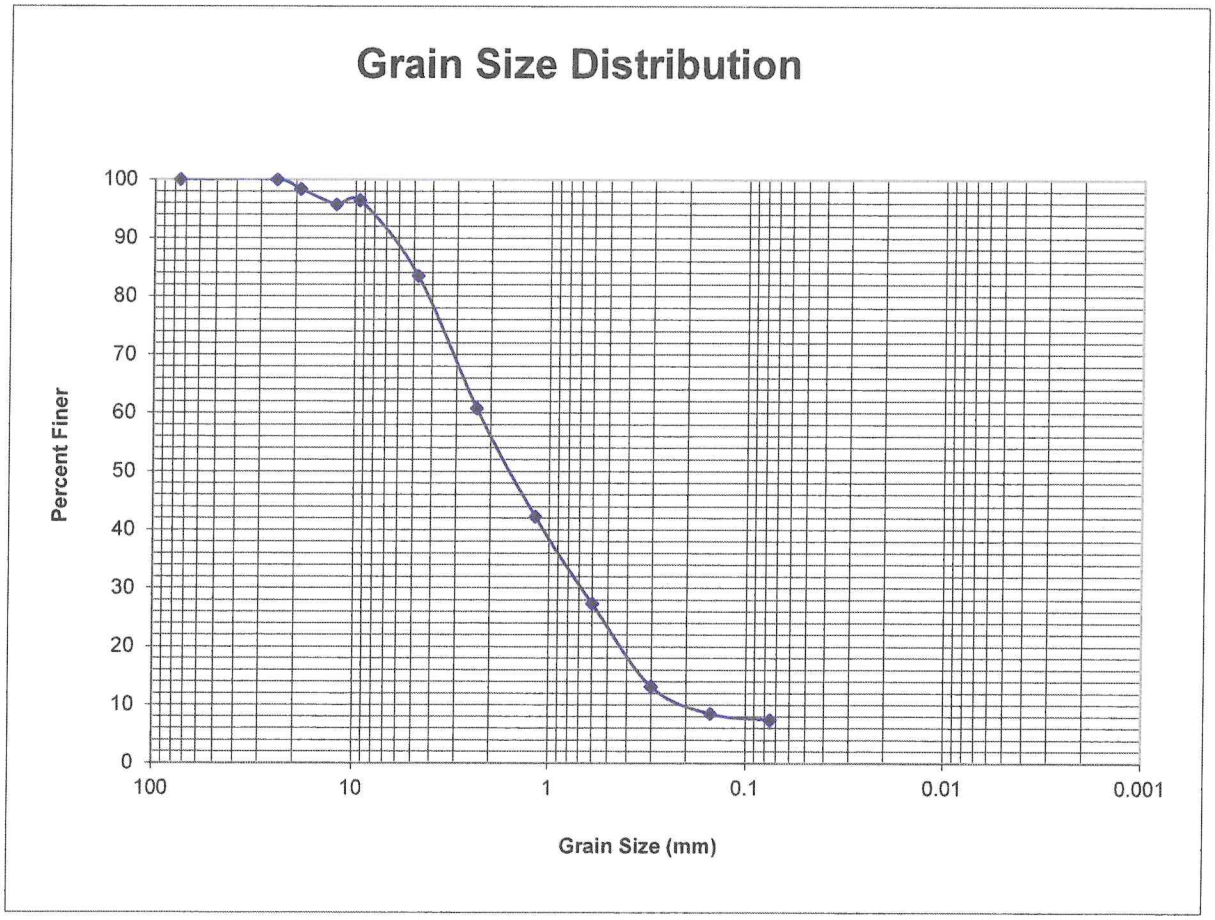
Project: Proposed Schultz Pathway Retaining Wall	**Project #:** 04061067
Date Sampled: 10/2/2024	**Date Tested:** 10/7/2024
Sampled by: PSI - David & Ibrahim	**Source:** SB-02; SS5&SS6
Location: Meridian Township, Ingham County, Michigan	**Depth:** 13.5' - 20.0'

Soil Information:						
% >1.5 in.=	**0.0**		PI=	**n/a**	D_{10}=	0.22
% Gravel=	**16.5**		LL=	**n/a**	D_{30}=	0.69
% Sand=	**76.1**		PI=	**n/a**	D_{60}=	2.30
	Coarse	**22.7%**	USCS:	**SP-SM**	Cu=	10.5
	Medium	**33.4%**	AASHTO:	**A-3**	Cc=	0.9
	Fine	**19.9%**	Description:			
% Fines=	**7.4**		**SAND, fine to coarse with silt and gravel, gray**			
	Silt	**n/a**				
	Clay	**n/a**				



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ATTERBERG LIMITS (ASTM D4318)

Client: Meridian Township - Department of Public Works
Project Name: Proposed Schultz Pathway Retaining Wall
Project No.: 04061067
Location: Meridian Township, Ingham County, Michigan
Source: SB-02
Sample No.: SS8
Sample Depth: 28.5' - 30.0'
Date: 10/7/2024
Tested by: LD
Checked by:
Estimated % Soil retained on No. 40: **Air-dried Sample** ☑

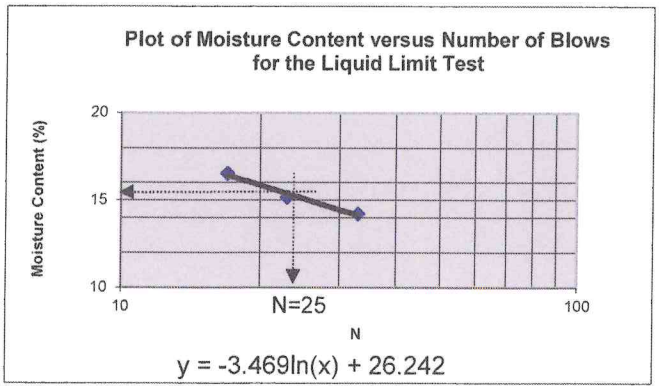
Sample Description: SILTY LEAN CLAY with fine Sand, trace Gravel, gray

LIQUID LIMIT TEST (Method A)

Can No.	Weight of Can W_1 (g)	Weight of Can + Wet Soil W_2 (g)	Weight of Can + Dry Soil W_3 (g)	Number of Blows (N)	Moisture Content w (%)
XT	22.77	35.25	33.48	17	**16.5**
OU812	22.23	33.70	32.19	23	**15.2**
CD	33.13	41.49	40.45	33	**14.2**

PLASTIC LIMIT TEST

Can No.	Weight of Can W_1 (g)	Weight of Can + Wet Soil W_2 (g)	Weight of Can + Dry Soil W_3 (g)	Plastic Limit w (%)
PQ	20.44	25.35	24.73	**14.5**
RSV	20.43	24.75	24.19	**14.9**



Liquid Limit (LL) = **15**
Plastic Limit (PL) = **14**
Plasticity Index (PI) = **1**
PI = LL - PL

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Materials in Solid Finer than the No. 200 Sieve
(ASTM D1140)

Project Name:	Proposed Schultz Pathway Retaining Wall	Boring Number:	SB-02
Project Number:	04061067	Sample Number:	SS8
Sample Date:	10/2/2024	Sample Depth:	28.5'-30.0'
Test Date:	10/7/2024	Tested By:	LD
		Checked By:	TK

Sample Description: **Gray SILTY LEAN CLAY with fine Sand, trace Gravel, wet, very stiff**

Tare Number / Tare Weight (g):	31.2
Dry Weight of Sample and Tare before Wash (g):	169.60
Dry Weight of Sample and Tare after Wash (g):	66.2
Loss By Wash (g):	103.4
% Loss By Wash:	74.7%

The speciman was soaked for: 0.25 hrs.

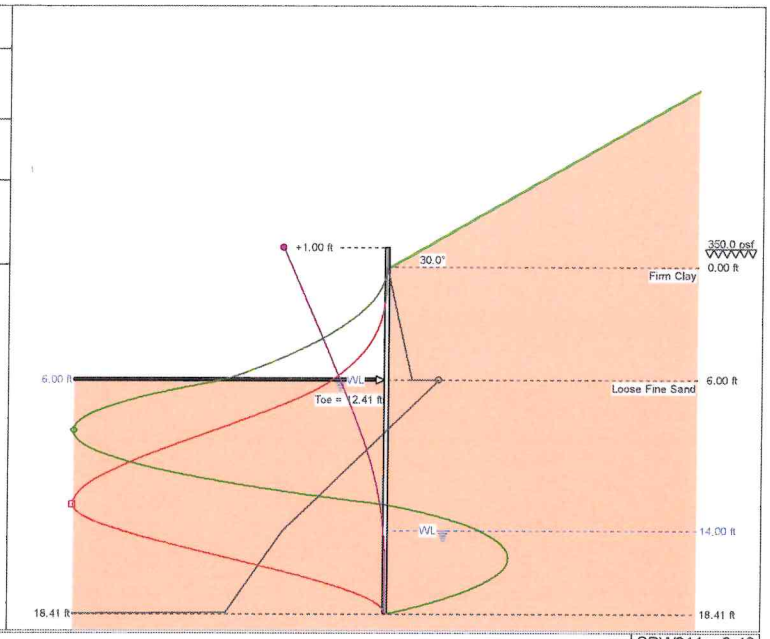
Oven: 03-OV-408 ☑
Scale: 09-BAL-408 ☑
Sieve: 049-SV-408 ☑

Client: Meridian Township
Site: Meridian Township, MI
Tel: (517) 853-4468

Title: Proposed Schultz Pathway Retaining Wall
Designer: T. Khalaff
Page: 1
Date: 10.27.24

Sheet: SCZ -18
Pressure: Rankine
FOS: 1.0 (K_p*1.5; C*1.5)
Toe: Cantilever

Maximum	a (ft)
392.3 psf	6.00
6540.8 ftlb/ft	12.62
1106.7 lb/ft	6.70
0.4 in	-1.00



Intertek - PSI

3120 Sovereign Drive, Suit C, Lansing, MI48911
Tel: (517) 394-5700

SPW911, v2.40

Client: Meridian Township
Site: Meridian Township, MI
Tel: (517) 853-4468

Title: Proposed Schultz Pathway Retaining Wall
Designer: T. Khalaff
Page: 2
Date: 10.27.24

Sheet: SCZ -16
Pressure: Rankine
FOS: 1.0 (K_p=1.5; C=1.5)
Toe: Cantilever

Input Data

Depth Of Excavation = 6.00 ft
Surcharge = 350.0 psf
Slope (active) = 30.0 degrees

Depth Of Active Water = 14.00 ft
Depth Of Passive Water = 6.00 ft

Water Density = 62.43 pcf
Minimum Fluid Density = 31.82 pcf

Soil Profile

Depth (ft)	Soil Name	γ (pcf)	γ' (pcf)	C (psf)	C_a (psf)	φ(°)	a(°)	K_a	K_{ac}	K_p	K_{pc}
0.00	Firm Clay	124.00	56.00	1250.0 (833.3)	0.0	0.0	0.0	0.99	1.99	1.01	2.01
6.00	Loose Fine Sand	105.00	65.55	0.0	0.0	28.0	0.0	0.36	0.00	2.77 (1.85)	0.00 (0.00)
28.50	Loose Coarse Sand	110.00	48.00	0.0	0.0	30.0	0.0	0.33	0.00	3.00 (2.00)	0.00 (0.00)
30.00	Stiff Clay	130.00	68.00	1750.0 (1166.7)	0.0	0.0	0.0	1.00	2.00	1.00	2.00

( ) indicates factored value used in calculations. Factor(s): K_p=1.5; C=1.5

Solution

Sheet

Sheet Name	I (in⁴/ft)	E (psi)	Z (in³/ft)	f (psi)	Maximum Bending Moment (ftlb/ft)	Upstand (ft)	Toe (ft)	Pile Length (ft)
SCZ -16	90.48	3.04E+07	18.10	24970.3	37663.5	1.00	12.41	19.41

Maxima

	Maximum	Depth
Bending Moment	6540.8 ftlb/ft	12.62 ft
Deflection	0.4 in	-1.00 ft
Pressure	392.3 psf	6.00 ft
Shear Force	1106.7 lb/ft	8.70 ft

Intertek - PSI

3120 Sovereign Drive, Suit C, Lansing, MI48911
Tel: (517) 394-5700

SPW911, v2.40

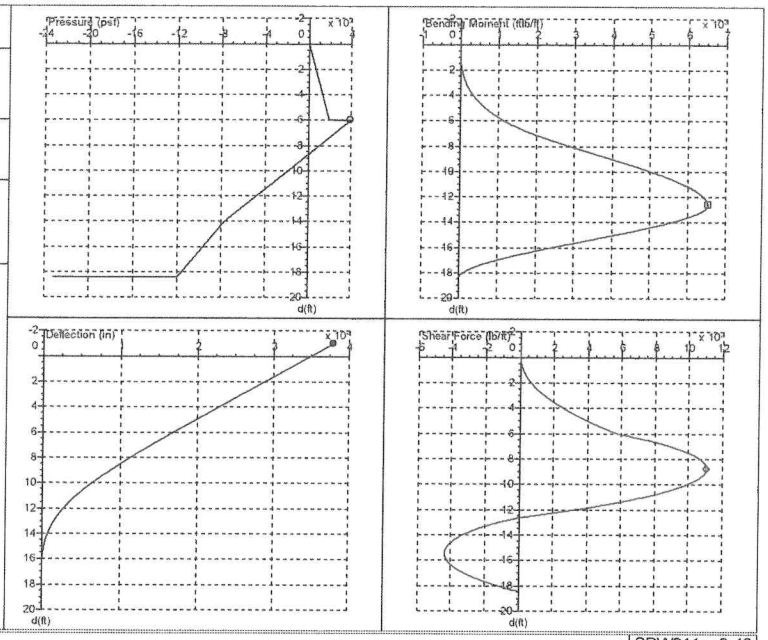
Email: pilebuck@pilebuck.com
Web: www.pilebuck.com

Client: Meridian Township
Site: Meridian Township, MI
Tel: (517) 853-4468

Title: Proposed Schultz Pathway Retaining Wall
Designer: T. Khalaff
Page: 3
Date: 10.27.24

Sheet: SCZ -18
Pressure: Rankine
FOS: 1.0 (K_p=1.5; C=1.5)
Toe: Cantilever

Maximum	d (ft)
392.3 psf	6.00
6540.8 ftlb/ft	12.62
1106.7 lb/ft	8.70
0.4 in	-1.00



Intertek - PSI

3120 Sovereign Drive, Suit C, Lansing, MI48911
Tel: (517) 394-5700

SPW911, v2.40

Client: Meridian Township
Site: Meridian Township, MI
Tel: (517) 853-4468

Title: Proposed Schultz Pathway Retaining Wall
Designer: T. Khalaff
Page: 4
Date: 10.27.24

Sheet: SCZ -18
Pressure: Rankine
FOS: 1.0 (K_p=1.5; C=1.5)
Toe: Cantilever

depth (ft)	P (psf)	M (ftlb/ft)	D (in)	F (lb/ft)	depth (ft)	P (psf)	M (ftlb/ft)	D (in)	F (lb/ft)	depth (ft)	P (psf)	M (ftlb/ft)	D (in)	F (lb/ft)
0.00	0.0	0.0	0.3	0.0	5.19	366.4	1261.9	0.2	648.6	12.38	-535.5	6525.4	0.0	126.3
0.16	5.2	0.0	0.3	0.5	5.35	342.9	1370.7	0.2	705.8	12.54	-559.0	6539.4	0.0	38.0
0.33	10.3	0.2	0.3	1.7	5.52	319.3	1488.5	0.2	759.2	12.71	-582.6	6535.8	0.0	-32.6
0.49	16.0	0.7	0.3	4.1	5.68	295.8	1614.6	0.1	808.7	12.87	-606.1	6501.5	0.0	-83.9
0.65	21.1	1.5	0.3	7.2	5.84	272.2	1748.4	0.1	854.5	13.03	-629.7	6436.8	0.0	-131.3
0.81	26.3	3.0	0.3	11.0	7.01	248.7	1889.3	0.1	896.4	13.20	-653.2	6344.0	0.0	-175.0
0.98	31.4	5.1	0.3	15.8	7.17	222.8	2051.8	0.1	938.1	13.36	-676.8	6225.6	0.0	-214.8
1.14	36.6	8.0	0.3	21.3	7.33	199.2	2205.7	0.1	972.1	13.52	-700.3	6083.7	0.0	-250.9
1.30	41.7	11.9	0.3	27.7	7.49	175.7	2364.7	0.1	1002.2	13.68	-723.9	5920.8	0.0	-283.1
1.47	46.9	16.9	0.3	34.9	7.66	152.1	2528.3	0.1	1028.5	13.85	-747.4	5739.3	0.0	-311.5
1.63	52.0	23.1	0.3	42.9	7.82	128.6	2695.9	0.1	1051.0	14.01	-772.7	5520.7	0.0	-338.4
1.79	57.2	30.6	0.3	51.8	7.98	105.0	2866.9	0.1	1069.7	14.17	-788.4	5307.2	0.0	-359.6
1.95	62.3	39.7	0.3	61.5	8.15	81.5	3040.6	0.1	1084.6	14.34	-804.1	5081.5	0.0	-378.3
2.12	67.5	50.4	0.3	72.0	8.31	57.9	3216.4	0.1	1095.7	14.50	-819.9	4845.0	0.0	-394.4
2.28	72.6	62.8	0.3	83.4	8.47	34.4	3393.7	0.1	1102.9	14.66	-835.6	4599.3	0.0	-408.0
2.44	77.8	77.1	0.3	95.6	8.63	10.8	3571.9	0.1	1106.4	14.82	-851.3	4345.9	0.0	-419.1
2.61	82.9	93.5	0.3	108.7	8.80	-12.7	3750.4	0.1	1106.3	14.99	-867.1	4086.5	0.0	-427.6
2.77	88.6	114.0	0.3	124.0	8.96	-36.3	3928.6	0.1	1102.5	15.15	-882.8	3822.6	0.0	-433.5
2.93	93.8	135.0	0.3	138.8	9.12	-59.8	4106.0	0.1	1094.9	15.31	-898.5	3555.8	0.0	-436.9
3.10	98.9	158.6	0.3	154.4	9.29	-83.4	4281.8	0.1	1083.5	15.48	-914.3	3287.5	0.0	-437.8
3.26	104.1	184.6	0.3	170.8	9.45	-109.3	4472.8	0.1	1066.6	15.64	-930.0	3019.4	0.0	-436.1
3.42	109.2	213.4	0.2	188.1	9.61	-132.8	4643.5	0.1	1047.2	15.80	-945.7	2753.1	0.0	-431.9
3.58	114.4	245.1	0.2	206.3	9.77	-156.4	4810.8	0.1	1024.0	15.97	-961.5	2490.1	0.0	-425.1
3.75	119.5	279.7	0.2	225.2	9.94	-179.9	4974.1	0.1	997.0	16.13	-977.2	2231.9	0.0	-415.8
3.91	124.7	317.5	0.2	245.0	10.10	-203.5	5132.7	0.1	966.2	16.29	-994.5	1955.3	0.0	-402.6
4.07	129.8	358.5	0.2	265.6	10.26	-227.0	5286.1	0.1	931.6	16.45	-1010.2	1712.4	0.0	-388.0
4.24	135.0	402.9	0.2	287.1	10.43	-250.6	5433.6	0.1	893.1	16.62	-1026.0	1479.1	0.0	-370.8
4.40	140.1	450.8	0.2	309.4	10.59	-274.1	5574.7	0.1	850.9	16.78	-1041.7	1257.1	0.0	-351.0
4.56	145.3	502.4	0.2	332.5	10.75	-297.7	5708.6	0.0	804.9	16.94	-1057.4	1047.9	0.0	-328.6
4.72	150.4	557.7	0.2	356.4	10.91	-321.2	5834.9	0.0	755.0	17.11	-1073.2	853.1	0.0	-303.9
4.89	155.6	617.0	0.2	381.2	11.08	-344.7	5952.9	0.0	701.3	17.27	-1088.9	674.2	0.0	-276.5
5.05	161.3	686.9	0.2	409.5	11.24	-368.3	6061.9	0.0	643.9	17.43	-1104.6	512.8	0.0	-246.6
5.21	166.4	754.9	0.2	436.0	11.40	-391.8	6161.3	0.0	582.6	17.59	-1120.4	370.4	0.0	-214.2
5.38	171.6	827.2	0.2	463.4	11.57	-415.4	6250.6	0.0	517.5	17.76	-1136.1	248.7	0.0	-179.1
5.54	176.7	904.0	0.2	491.6	11.73	-441.3	6336.4	0.0	441.5	17.92	-1151.8	149.1	0.0	-141.6
5.70	181.9	985.4	0.2	520.6	11.89	-464.8	6402.4	0.0	368.4	18.08	-1167.6	73.2	0.0	-101.5
5.86	187.0	1071.5	0.2	550.5	12.06	-488.4	6456.3	0.0	291.5	18.25	-1183.3	22.6	0.0	-58.8
6.03	392.1	1162.6	0.2	587.7	12.22	-511.9	6497.5	0.0	210.8	18.41	-2327.9	0.0	0.0	0.0

Intertek - PSI

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SPW911, v2.40

Important Information About Your

Geotechnical Engineering Report

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

The following information is provided to help you manage your risks.

Geotechnical Services Are Performed for Specific Purposes, Persons, and Projects

Geotechnical engineers structure their services to meet the specific needs of their clients. A geotechnical engineering study conducted for a civil engineer may not fulfill the needs of a construction contractor or even another civil engineer. Because each geotechnical engineering study is unique, each geotechnical engineering report is unique, prepared *solely* for the client. No one except you should rely on your geotechnical engineering report without first conferring with the geotechnical engineer who prepared it. *And no one — not even you* — should apply the report for any purpose or project except the one originally contemplated.

Read the Full Report

Serious problems have occurred because those relying on a geotechnical engineering report did not read it all. Do not rely on an executive summary. Do not read selected elements only.

A Geotechnical Engineering Report Is Based on A Unique Set of Project-Specific Factors

Geotechnical engineers consider a number of unique, project-specific factors when establishing the scope of a study. Typical factors include: the client's goals, objectives, and risk management preferences; the general nature of the structure involved, its size, and configuration; the location of the structure on the site; and other planned or existing site improvements, such as access roads, parking lots, and underground utilities. Unless the geotechnical engineer who conducted the study specifically indicates otherwise, do not rely on a geotechnical engineering report that was:

- not prepared for you,
- not prepared for your project,
- not prepared for the specific site explored, or
- completed before important project changes were made.

Typical changes that can erode the reliability of an existing geotechnical engineering report include those that affect:

- the function of the proposed structure, as when it's changed from a parking garage to an office building, or from a light industrial plant to a refrigerated warehouse,
- elevation, configuration, location, orientation, or weight of the proposed structure,
- composition of the design team, or
- project ownership.

As a general rule, *always* inform your geotechnical engineer of project changes—even minor ones—and request an assessment of their impact. *Geotechnical engineers cannot accept responsibility or liability for problems that occur because their reports do not consider developments of which they were not informed.*

Subsurface Conditions Can Change

A geotechnical engineering report is based on conditions that existed at the time the study was performed. *Do not rely on a geotechnical engineering report* whose adequacy may have been affected by: the passage of time; by man-made events, such as construction on or adjacent to the site; or by natural events, such as floods, earthquakes, or groundwater fluctuations. *Always* contact the geotechnical engineer before applying the report to determine if it is still reliable. A minor amount of additional testing or analysis could prevent major problems.

Most Geotechnical Findings Are Professional Opinions

Site exploration identifies subsurface conditions only at those points where subsurface tests are conducted or samples are taken. Geotechnical engineers review field and laboratory data and then apply their professional judgment to render an opinion about subsurface conditions throughout the site. Actual subsurface conditions may differ—sometimes significantly—from those indicated in your report. Retaining the geotechnical engineer who developed your report to provide construction observation is the most effective method of managing the risks associated with unanticipated conditions.

A Report's Recommendations Are *Not* Final

Do not overrely on the construction recommendations included in your report. *Those recommendations are not final,* because geotechnical engineers develop them principally from judgment and opinion. Geotechnical engineers can finalize their recommendations only by observing actual

subsurface conditions revealed during construction. *The geotechnical engineer who developed your report cannot assume responsibility or liability for the report's recommendations if that engineer does not perform construction observation.*

A Geotechnical Engineering Report Is Subject to Misinterpretation

Other design team members' misinterpretation of geotechnical engineering reports has resulted in costly problems. Lower that risk by having your geotechnical engineer confer with appropriate members of the design team after submitting the report. Also retain your geotechnical engineer to review pertinent elements of the design team's plans and specifications. Contractors can also misinterpret a geotechnical engineering report. Reduce that risk by having your geotechnical engineer participate in prebid and preconstruction conferences, and by providing construction observation.

Do Not Redraw the Engineer's Logs

Geotechnical engineers prepare final boring and testing logs based upon their interpretation of field logs and laboratory data. To prevent errors or omissions, the logs included in a geotechnical engineering report should *never* be redrawn for inclusion in architectural or other design drawings. Only photographic or electronic reproduction is acceptable, *but recognize that separating logs from the report can elevate risk.*

Give Contractors a Complete Report and Guidance

Some owners and design professionals mistakenly believe they can make contractors liable for unanticipated subsurface conditions by limiting what they provide for bid preparation. To help prevent costly problems, give contractors the complete geotechnical engineering report, *but* preface it with a clearly written letter of transmittal. In that letter, advise contractors that the report was not prepared for purposes of bid development and that the report's accuracy is limited; encourage them to confer with the geotechnical engineer who prepared the report (a modest fee may be required) and/or to conduct additional study to obtain the specific types of information they need or prefer. A prebid conference can also be valuable. *Be sure contractors have sufficient time* to perform additional study. Only then might you be in a position to give contractors the best information available to you, while requiring them to at least share some of the financial responsibilities stemming from unanticipated conditions.

Read Responsibility Provisions Closely

Some clients, design professionals, and contractors do not recognize that geotechnical engineering is far less exact than other engineering disciplines. This lack of understanding has created unrealistic expectations that have led to disappointments, claims, and disputes. To help reduce the risk of such outcomes, geotechnical engineers commonly include a variety of explanatory provisions in their reports. Sometimes labeled "limitations" many of these provisions indicate where geotechnical engineers' responsibilities begin and end, to help others recognize their own responsibilities and risks. *Read these provisions closely.* Ask questions. Your geotechnical engineer should respond fully and frankly.

Geoenvironmental Concerns Are Not Covered

The equipment, techniques, and personnel used to perform a *geoenvironmental* study differ significantly from those used to perform a *geotechnical* study. For that reason, a geotechnical engineering report does not usually relate any geoenvironmental findings, conclusions, or recommendations; e.g., about the likelihood of encountering underground storage tanks or regulated contaminants. *Unanticipated environmental problems have led to numerous project failures.* If you have not yet obtained your own geoenvironmental information, ask your geotechnical consultant for risk management guidance. *Do not rely on an environmental report prepared for someone else.*

Obtain Professional Assistance To Deal with Mold

Diverse strategies can be applied during building design, construction, operation, and maintenance to prevent significant amounts of mold from growing on indoor surfaces. To be effective, all such strategies should be devised for the *express purpose* of mold prevention, integrated into a comprehensive plan, and executed with diligent oversight by a professional mold prevention consultant. Because just a small amount of water or moisture can lead to the development of severe mold infestations, a number of mold prevention strategies focus on keeping building surfaces dry. While groundwater, water infiltration, and similar issues may have been addressed as part of the geotechnical engineering study whose findings are conveyed in this report, the geotechnical engineer in charge of this project is not a mold prevention consultant; ***none of the services performed in connection with the geotechnical engineer's study were designed or conducted for the purpose of mold prevention. Proper implementation of the recommendations conveyed in this report will not of itself be sufficient to prevent mold from growing in or on the structure involved.***

Rely, on Your ASFE-Member Geotechncial Engineer for Additional Assistance

Membership in ASFE/The Best People on Earth exposes geotechnical engineers to a wide array of risk management techniques that can be of genuine benefit for everyone involved with a construction project. Confer with you ASFE-member geotechnical engineer for more information.

ASFE
The Best People on Earth

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Intertek

For more than 135 years, companies around the world have depended on Intertek to help ensure the quality and safety of their products, processes and systems.

We go beyond testing, inspecting and certifying products; we are a Total Quality Assurance provider to industries worldwide. Through our global network of state-of-the-art facilities and industry-leading technical expertise we provide innovative and bespoke Assurance, Testing, Inspection and Certification services to customers. We provide a systemic approach to supporting our customers' Quality Assurance efforts in each of the areas of their operations including R&D, raw materials sourcing, components suppliers, manufacturing, transportation, distribution and retail channels, and consumer management.

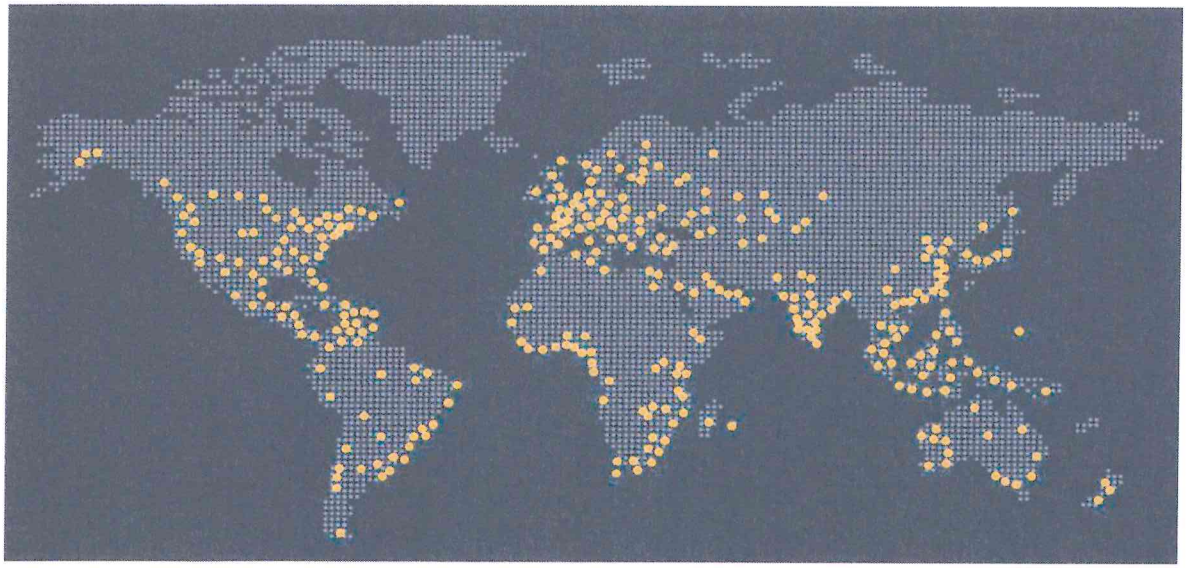
Intertek is an industry leader with more than 42,000 employees in 1,000 locations in over 100 countries. We deliver Quality Assurance expertise 24 hours a day, 7 days a week with our industry-winning processes and customer-centric culture. Whether your business is local or global, we can help to ensure that your products meet quality, health, environmental, safety, and social accountability standards for virtually any market around the world. We hold extensive global accreditations, recognitions, and agreements, and our knowledge of and expertise in overcoming regulatory, market, and supply chain hurdles is unrivaled.

Our Mission

To exceed our customers' expectations with innovative and bespoke Assurance, Testing, Inspection and Certification services for their operations and supply chain.
Globally. 24/7.

Intertek can sharpen your competitive edge

- With reliable testing and certification for faster regulatory approval
- Through rapid, efficient entry to virtually any market in the world
- With Total Quality Assurance across your supply chain
- Through innovative leadership in meeting social accountability standards
- By reducing cost and minimizing health, safety, and security risks
- By becoming a TRUSTED BRAND



PSI

Professional Service Industries, Inc. (PSI), an Intertek company, nationally recognized consulting engineering and testing firm providing integrated services in several disciplines, including environmental consulting, building envelope consulting and testing, geotechnical engineering, construction materials testing and engineering, asbestos management and facilities engineering and consulting. We are recognized as one of the largest engineering design consulting companies in the US. We have been providing engineering consulting services to Fortune 500 clients and governmental agencies for over 100 years. However, our proudest accomplishment is the large number of clients that we have serviced for many years that keep coming back because of our responsiveness, commitment to listening to our clients, and consistent quality of service.

PSI has been providing business and industry with objective, accurate and useful information for more than 100 years. Today, we employ approximately 2,300 skilled personnel in 100 offices nationwide.

Distinguished as both a local and a national leader in engineering and environmental services, PSI is recognized in several disciplines including the following:

- Geotechnical Engineering
- Construction Materials Testing and Special Inspection
- Environmental Consulting
- Industrial Hygiene
- Nondestructive Examination
- Pavement Evaluation Services
- Building Science Solutions
    - Building Envelope
    - Curtainwall
    - Acoustic
    - Fire/Life Safety
    - Technology
    - Roof Consulting

PSI can provide outstanding consulting engineering and testing services; however, most of all we desire to demonstrate our commitment to excellence.

PSI provides its clients with ***Information To Build On*** in making knowledgeable, cost-effective business decisions that help their clients reduce expenses, improve quality and decrease liabilities.

A Commitment To Excellence

PSI maintains the highest professional and ethical standards, which include an economic awareness to provide the highest quality of personnel and service at a reasonable cost to our clients. Our unique combination of local, independent offices and nationwide resources means our project managers have the full responsibility for managing your local projects, and also have the national resources to handle the most challenging and complex projects, regardless of size.

While PSI's growth has been notable, even more impressive has been our ability to grow without sacrificing our technical knowledge or personalized attention to our clients. Recognition of the importance of our clients and repeat business has been a key factor in PSI's success. PSI will not sacrifice quality, value, or service to our clients.

A Commitment To Excellence (continued)

Our staff of professionals consists of the following:

- Professional Engineers (PE/PEng)
- Registered Roof Consultants (RRC)
- Registered Architects (AIA)
- Certified Industrial Hygienists (CIH)
- Registered Soil Scientists
- Engineers-In-Training (EIT)
- Registered Geologists

Our field and laboratory technicians are trained in-house and at special schools and seminars. Our project managers and technicians are certified by associations such as the following and also work with other specialized organizations within each discipline.

- Roofing Industry Educational Institute (RIEI)
- Roof Consultants Institute (RCI)
- American Concrete Institute (ACI)
- National Institute for the Certification of Engineering Technicians (NICET)
- American Welding Society (AWS)
- International Code Council (ICC)
- International Fire Council (IFC)

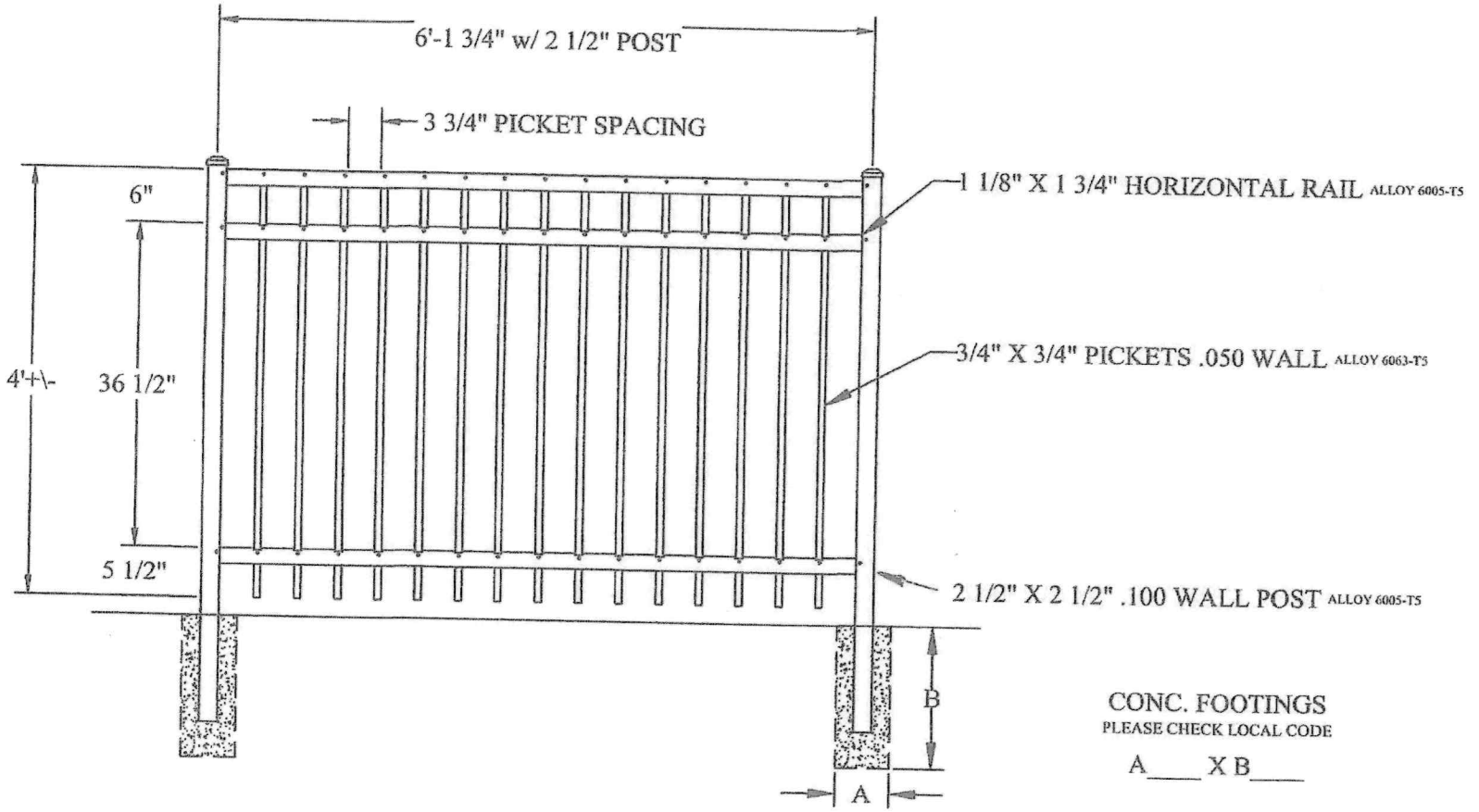
Since our founding, we have dedicated ourselves to excellence both in our technical expertise and in customer service. It is this principal upon which we have based our organization and established a national reputation as a leader in the field of professional engineering, testing and consulting services.

PSI's Vision... is to be the most trusted, integrated provider of "Information To Build On" for clients that buy, sell, design, construct, develop, finance and manage properties and infrastructure. By being safe 24/7/365, hiring and retaining the best employees, efficiently managing projects, and building close client relationships, we will be successful in growing PSI and in balancing the needs of our employees, clients and investors.

APX -B -1

ELITE FENCE PRODUCTS, INC.

STANDARD PICKET



CONC. FOOTINGS
PLEASE CHECK LOCAL CODE

A____ X B____

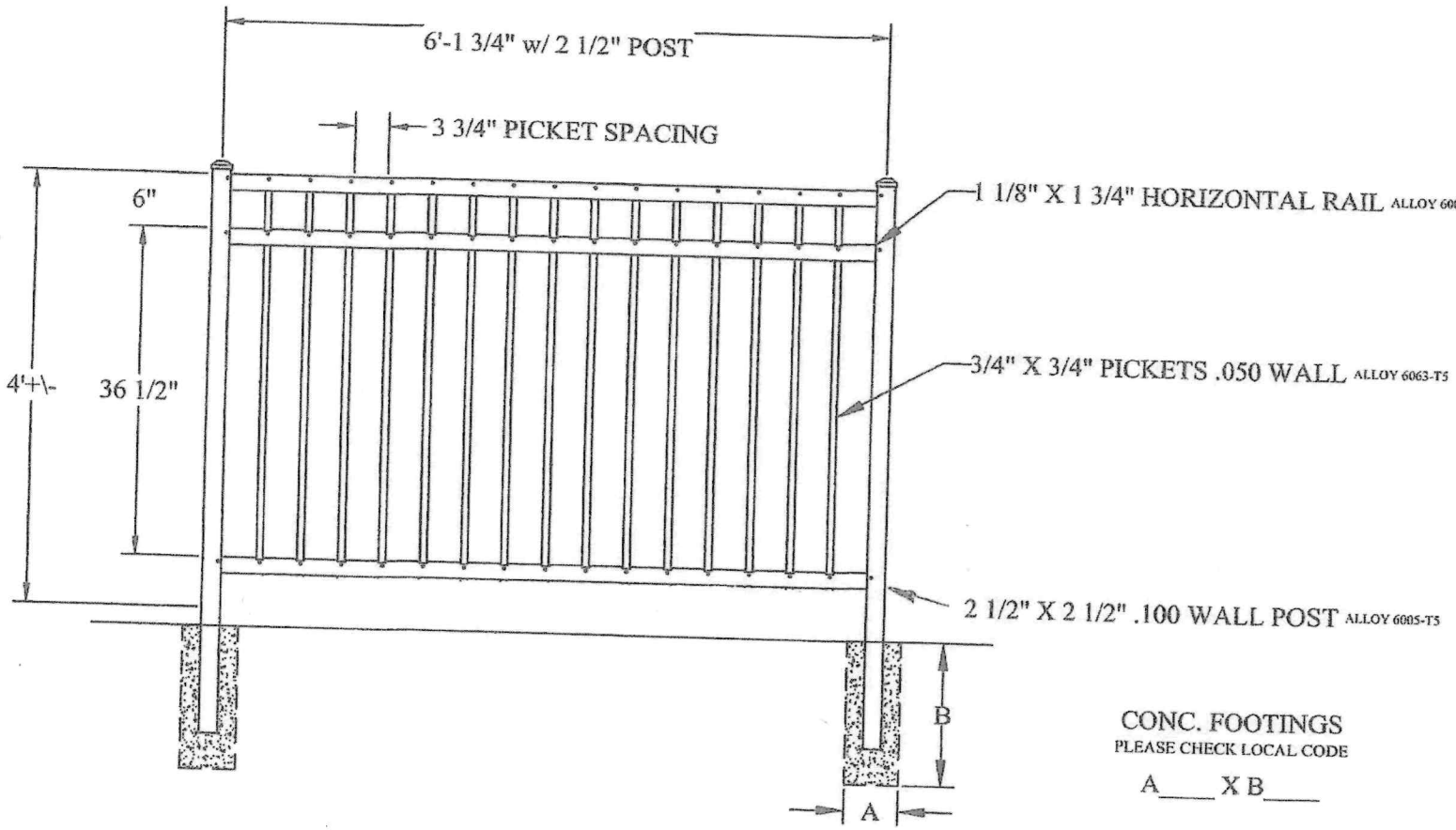
NOTE: DRAWING NOT TO SCALE. ALL SECTIONS COME FULLY ASSEMBLED.

EFF-20 COMMERCIAL	4' HIGH 3-RAIL ALUMINUM FENCE PANEL 1-1-16 V.1.0 I KS I KS I STD DRWING	CONTRACTOR / PROJECT:	COLOR: / DATE:	ELITE FENCE PRODUCTS, INC. 50925 RICHARD W. BLVD CHESTERFIELD TOWNSHIP, MI 48051 WWW.ELITEFENCE.COM 1-800-783-1331

APX -B-2

ELITE
FENCE PRODUCTS, INC.

FLUSH BOTTOM PICKET



CONC. FOOTINGS
PLEASE CHECK LOCAL CODE

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NOTE: DRAWING NOT TO SCALE. ALL SECTIONS COME FULLY ASSEMBLED.

EFF-20 COMMERCIAL	4' HIGH 3-RAIL ALUMINUM FENCE PANEL 1-1-16 V.1.0 | KS | KS | STD DRWING	CONTRACTOR: PROJECT:	COLOR: DATE:	ELITE 50925 RICHARD W. BLVD CHESTERFIELD TOWNSHIP, MI 48051 WWW.ELITEFENCE.COM 1-800-783-1331

Table 6H-2. Meaning of Symbols on Typical Application Diagrams (MI)

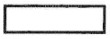
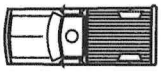
	Arrow panel
	Arrow panel support or trailer (shown facing down)
	Changeable message sign or support trailer
	Channelizing device
	Crash Cushion
	Direction of temporary traffic detour
	Direction of traffic
	Traffic Regulator
	High level warning device (Flag tree)
	Luminaire
	Pavement markings that should 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
60 km/h or less	$L = \frac{WS^2}{155}$
70 km/h or more	$L = \frac{WS}{1.6}$

Speed Limit (S)	Taper Length (L) Feet
40 mph or less	$L = \frac{WS^2}{60}$
45 mph or more	L = WS

Where: L = taper length in meters (feet)

W = width of offset in meters (feet)

S = posted speed limit, or off-peak 85th-percentile speed prior to work starting, or the anticipated operating speed in km/h (mph)

Notes for Figure 6H-18—Typical Application 18 (MI)
Lane Closure on Minor Street

Standard:

1. **This TTC shall be used only for low-speed facilities having low traffic volumes.**

Option:

2. Where the work space is short, where road users can see the roadway beyond, and where volume is low, vehicular traffic may be self-regulating.

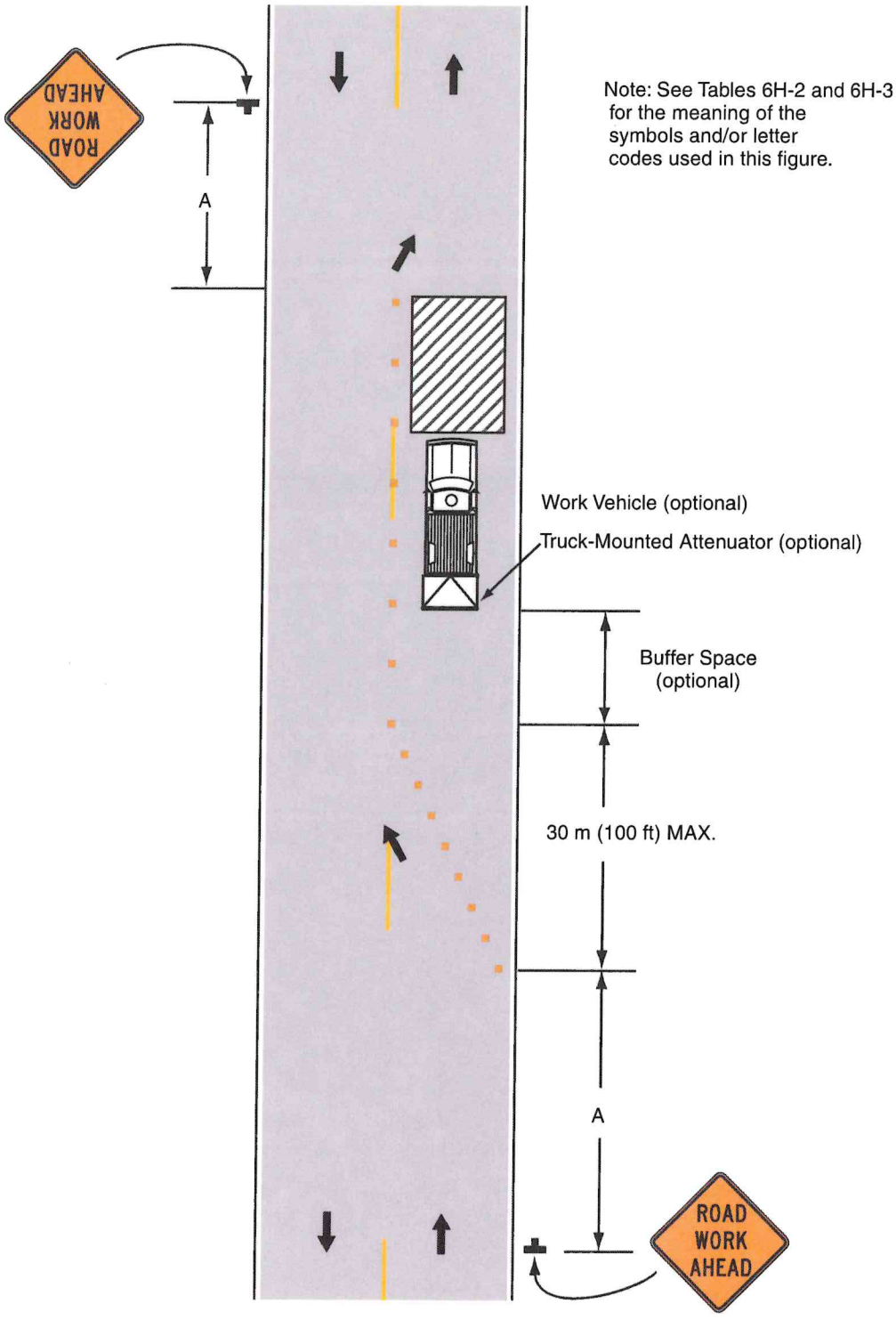
Standard:

3. **Where vehicular traffic cannot effectively self-regulate, one or two traffic regulators shall be used as illustrated in Figure 6H-10.**

Option:

4. Flashing warning lights and/or flags may be used to call attention to the advance warning signs.
5. A truck-mounted attenuator may be used on the work vehicle and the shadow vehicle.

Figure 6H-18. Lane Closure on Minor Street (MI) (TA-18)



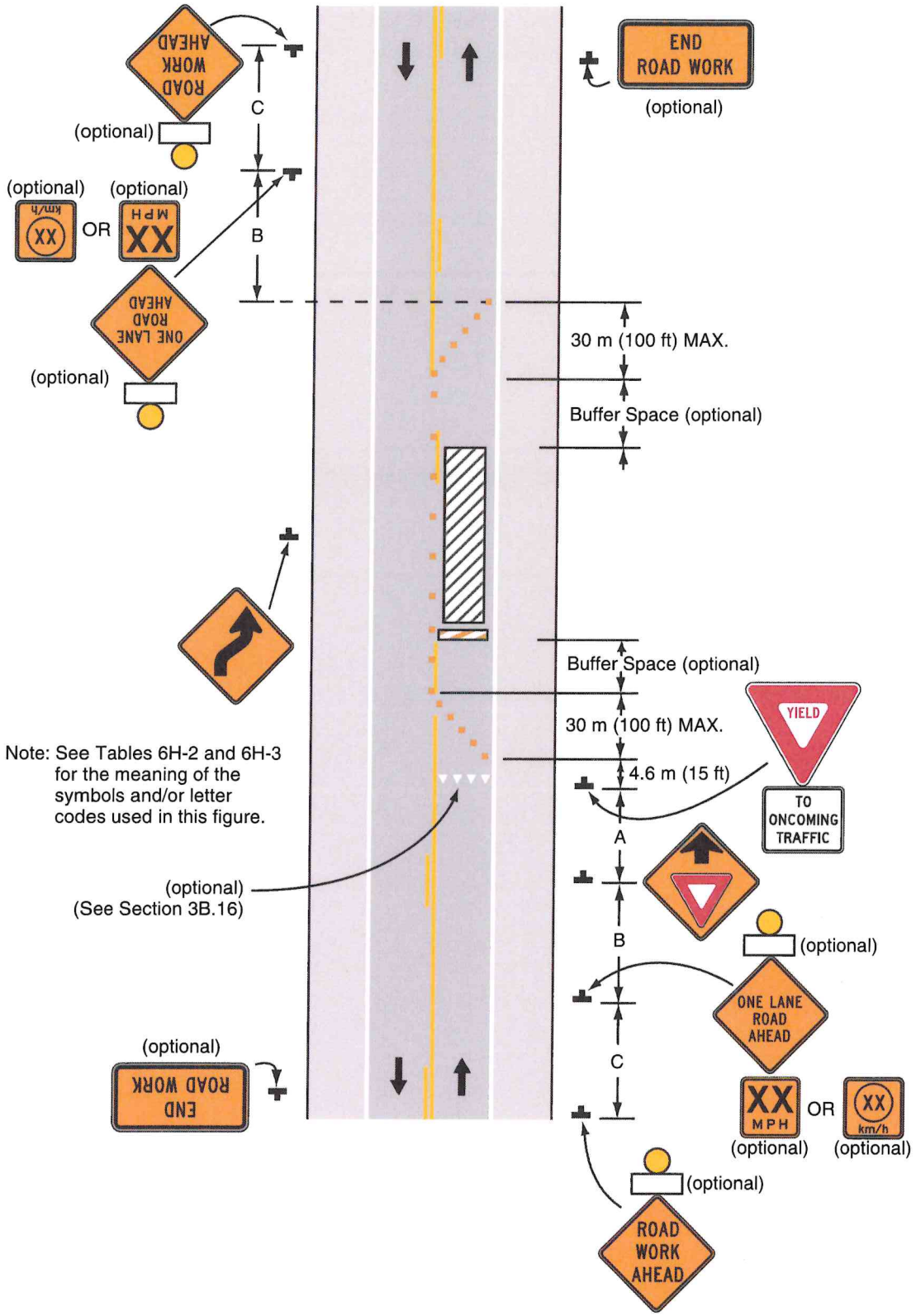
Typical Application 18

Notes for Figure 6H-11—Typical Application 11 (MI)
Lane Closure on Two-Lane Road with Low Traffic Volumes

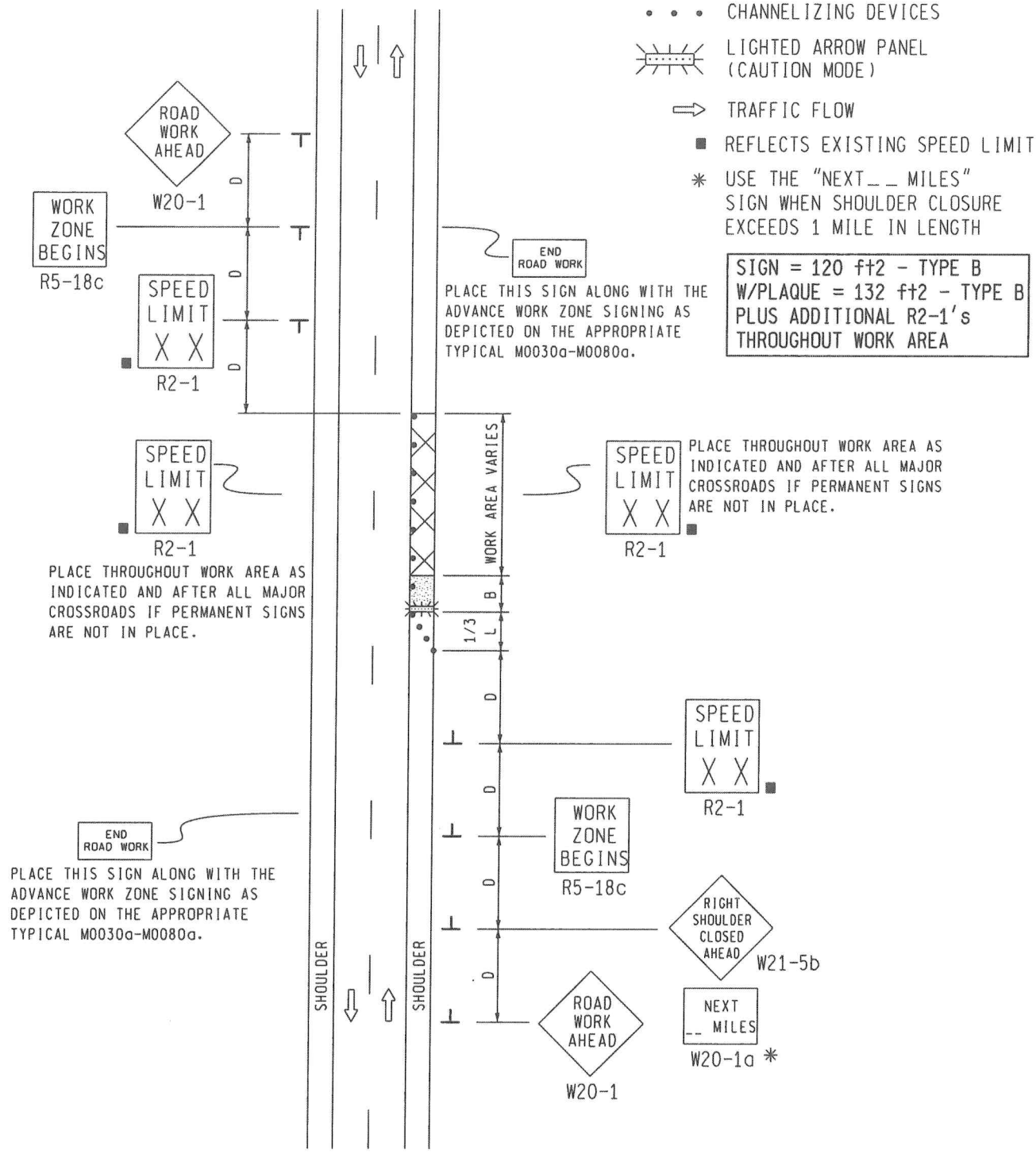
Option:

1. This TTC zone application may be used as an alternate to the TTC application shown in Figure 6H-10 (using traffic regulators) when the following conditions exist:
   a. Vehicular traffic volume is such that sufficient gaps exist for vehicular traffic that must yield.
   b. Road users from both directions are able to see approaching vehicular traffic through and beyond the work site and have sufficient visibility of approaching vehicles.
2. The Type B flashing warning lights may be placed on the ROAD WORK AHEAD and the ONE LANE ROAD AHEAD signs whenever a night lane closure is necessary.

Figure 6H-11. Lane Closure on Two-Lane Road with Low Traffic Volumes (MI)



Typical Application 11



MDOT Michigan Department of Transportation TRAFFIC AND SAFETY MAINTAINING TRAFFIC TYPICAL	TYPICAL TEMPORARY TRAFFIC CONTROL FOR A SHOULDER CLOSURE ON A TWO LANE TWO-WAY ROADWAY NO SPEED REDUCTION		
DRAWN BY: CON:AE:djf	OCTOBER 2011	M0110a	SHEET 1 OF 2
CHECKED BY: BMM:CRB	PLAN DATE:		
FILE: PW RD/TS/Typicals/Signs/MT NON FWY/M0110a.dgn REV. 10/04/2011			

NOT TO SCALE

NOTES

1. D = DISTANCE BETWEEN TRAFFIC CONTROL DEVICES
   1/3 L = MINIMUM LENGTH OF TAPER
   B = LENGTH OF LONGITUDINAL BUFFER
   SEE M0020a FOR "D," "L," AND "B" VALUES

2. ALL NON-APPLICABLE SIGNING WITHIN THE CIA SHALL BE MODIFIED TO FIT CONDITIONS, COVERED OR REMOVED.

3. DISTANCES BETWEEN SIGNS, THE VALUES FOR WHICH ARE SHOWN IN TABLE D, ARE APPROXIMATE AND MAY NEED ADJUSTING AS DIRECTED BY THE ENGINEER.

3A. THE "WORK ZONE BEGINS" (R5-18c) SIGN SHALL BE USED ONLY IN THE INITIAL SIGNING SEQUENCE IN THE WORK ZONE. SUBSEQUENT SEQUENCES IN THE SAME WORK ZONE SHALL OMIT THIS SIGN AND THE QUANTITIES SHALL BE ADJUSTED APPROPRIATELY.

4E. THE MAXIMUM RECOMMENDED DISTANCE(S) BETWEEN CHANNELIZING DEVICES SHOULD BE EQUAL IN FEET TO THE POSTED SPEED IN MILES PER HOUR ON TAPER(S) AND TWICE THE POSTED SPEED IN THE PARALLEL AREA(S).

5. FOR OVERNIGHT CLOSURES, TYPE III BARRICADES SHALL BE LIGHTED.

6. WHEN CALLED FOR IN THE FHWA ACCEPTANCE LETTER FOR THE SIGN SYSTEM SELECTED, THE TYPE A WARNING FLASHER, SHOWN ON THE WARNING SIGNS, SHALL BE POSITIONED ON THE SIDE OF THE SIGN NEAREST THE ROADWAY.

7. ALL TEMPORARY SIGNS, TYPE III BARRICADES, THEIR SUPPORT SYSTEMS AND LIGHTING REQUIREMENTS SHALL MEET NCHRP 350 CRASHWORTHLY REQUIREMENTS STIPULATED IN THE CURRENT EDITION OF THE MICHIGAN MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES, THE CURRENT EDITION OF THE STANDARD SPECIFICATIONS FOR CONSTRUCTION, THE STANDARD PLANS AND APPLICABLE SPECIAL PROVISIONS. ONLY DESIGNS AND MATERIALS APPROVED BY MDOT WILL BE ALLOWED.

8. WHEN BUFFER AREAS ARE ESTABLISHED, THERE SHALL BE NO EQUIPMENT OR MATERIALS STORED OR WORK CONDUCTED IN THE BUFFER AREA.

29A. THE TYPE OF REFLECTIVE SHEETING USED FOR THE W20-1a PLAQUE SHALL BE THE SAME AS THE TYPE USED FOR THE PARENT SIGN.

SIGN SIZES

DIAMOND WARNING	- 48" x 48"
W20-1a PLAQUE	- 48" x 36"
R2-1 REGULATORY	- 48" x 60"
R5-18c REGULATORY	- 48" x 48"

APX - C-8

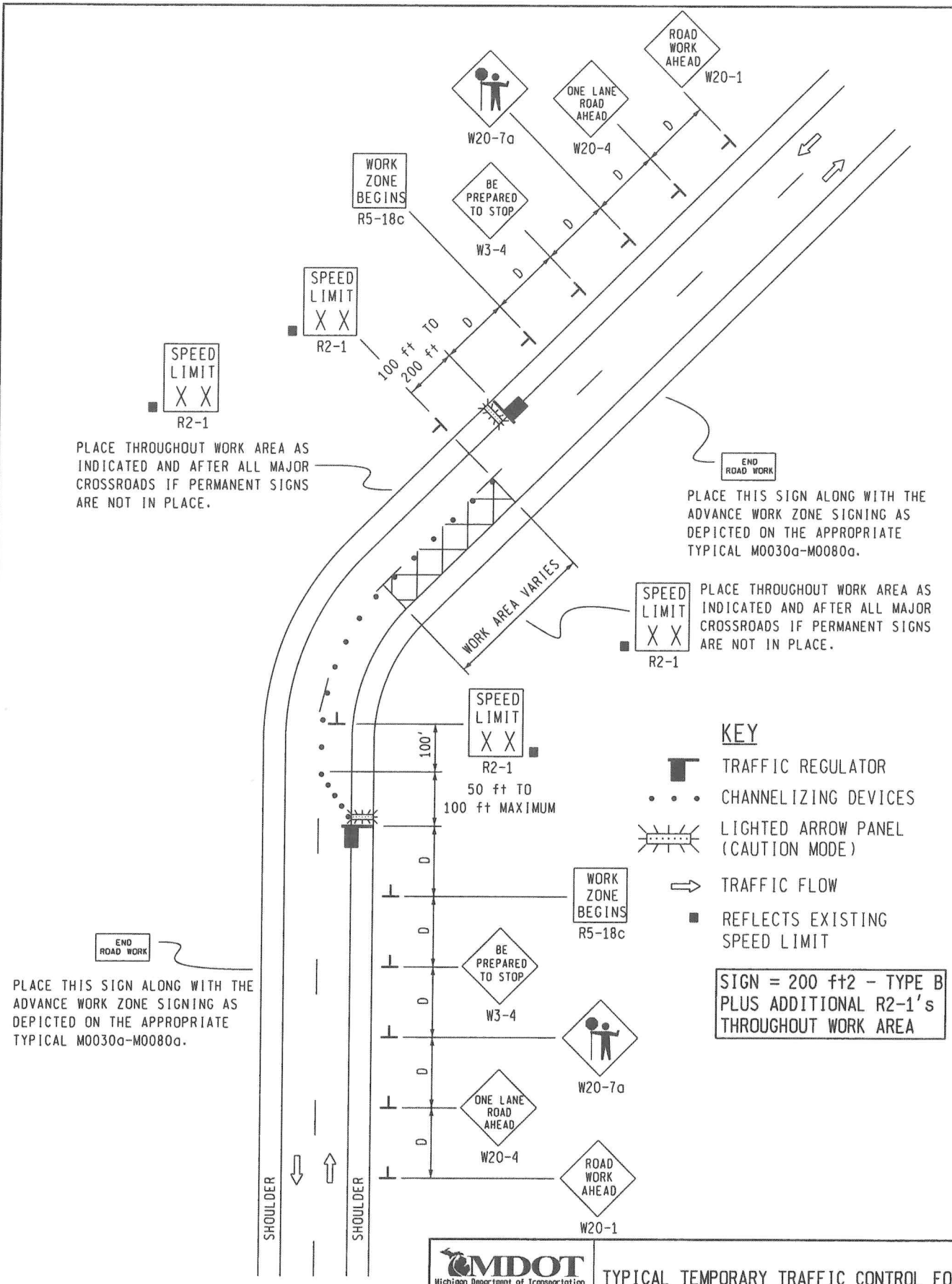
NOT TO SCALE

MDOT Michigan Department of Transportation
TRAFFIC AND SAFETY
MAINTAINING TRAFFIC TYPICAL

TYPICAL TEMPORARY TRAFFIC CONTROL FOR A SHOULDER CLOSURE ON A TWO LANE TWO-WAY ROADWAY NO SPEED REDUCTION

DRAWN BY: CON:AE:djf	OCTOBER 2011	M0110a	SHEET 2 OF 2
CHECKED BY: BMM:CRB	PLAN DATE:		

FILE: PW RD/TS/Typicals/Signs/MT NON FWY/M0110a.dgn REV. 10/04/2011



MDOT Michigan Department of Transportation

TRAFFIC AND SAFETY

MAINTAINING TRAFFIC TYPICAL

TYPICAL TEMPORARY TRAFFIC CONTROL FOR A TWO-LANE TWO-WAY ROADWAY WHERE ONE LANE IS CLOSED UTILIZING TRAFFIC REGULATORS, NO SPEED REDUCTION

DRAWN BY: CON:AE:djf	OCTOBER 2011	M0140a	SHEET 1 OF 2
CHECKED BY: BMM:CRB	PLAN DATE:		

FILE: PW RD/TS/Typicals/Signs/MT NON FWY/M0140a.dgn REV. 10/04/2011

NOT TO SCALE

NOTES

1H. D = DISTANCE BETWEEN TRAFFIC CONTROL DEVICES AND LENGTH OF LONGITUDINAL BUFFERS SEE **M0020a** FOR "D" VALUES.

2. ALL NON-APPLICABLE SIGNING WITHIN THE CIA SHALL BE MODIFIED TO FIT CONDITIONS, COVERED OR REMOVED.

3. DISTANCES BETWEEN SIGNS, THE VALUES FOR WHICH ARE SHOWN IN TABLE D, ARE APPROXIMATE AND MAY NEED ADJUSTING AS DIRECTED BY THE ENGINEER.

3A. THE "WORK ZONE BEGINS" (R5-18c) SIGN SHALL BE USED ONLY IN THE INITIAL SIGNING SEQUENCE IN THE WORK ZONE. SUBSEQUENT SEQUENCES IN THE SAME WORK ZONE SHALL OMIT THIS SIGN AND THE QUANTITIES SHALL BE ADJUSTED APPROPRIATELY.

4A. THE MAXIMUM RECOMMENDED DISTANCE(S) BETWEEN CHANNELIZING DEVICES IN THE TAPER AREA(S) SHOULD BE 15 FEET AND SHOULD BE EQUAL IN FEET TO TWICE THE POSTED SPEED IN MILES PER HOUR IN THE PARALLEL AREA(S).

5. FOR OVERNIGHT CLOSURES, TYPE III BARRICADES SHALL BE LIGHTED.

6. WHEN CALLED FOR IN THE FHWA ACCEPTANCE LETTER FOR THE SIGN SYSTEM SELECTED, THE TYPE A WARNING FLASHER, SHOWN ON THE WARNING SIGNS, SHALL BE POSITIONED ON THE SIDE OF THE SIGN NEAREST THE ROADWAY.

7. ALL TEMPORARY SIGNS, TYPE III BARRICADES, THEIR SUPPORT SYSTEMS AND LIGHTING REQUIREMENTS SHALL MEET NCHRP 350 CRASHWORTHLY REQUIREMENTS STIPULATED IN THE CURRENT EDITION OF THE MICHIGAN MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES, THE CURRENT EDITION OF THE STANDARD SPECIFICATIONS FOR CONSTRUCTION, THE STANDARD PLANS AND APPLICABLE SPECIAL PROVISIONS. ONLY DESIGNS AND MATERIALS APPROVED BY MDOT WILL BE ALLOWED.

9. ALL TRAFFIC REGULATORS SHALL BE PROPERLY TRAINED AND SUPERVISED.

9A. IN ANY OPERATION INVOLVING MORE THAN ONE TRAFFIC REGULATOR, ONE PERSON SHOULD BE DESIGNATED AS HEAD TRAFFIC REGULATOR.

10. ALL TRAFFIC REGULATORS' CONDUCT, THEIR EQUIPMENT, AND TRAFFIC REGULATING PROCEDURES SHALL CONFORM TO THE CURRENT EDITION OF THE MICHIGAN MANUAL OF UNIFORM TRAFFIC CONTROL DEVICES (MMUTCD) AND THE CURRENT EDITION OF THE MDOT HANDBOOK ENTITLED "TRAFFIC REGULATORS INSTRUCTION MANUAL."

11. WHEN TRAFFIC REGULATING IS ALLOWED DURING THE HOURS OF DARKNESS, APPROPRIATE LIGHTING SHALL BE PROVIDED TO SUFFICIENTLY ILLUMINATE THE TRAFFIC REGULATOR'S STATIONS.

12E. THE MAXIMUM DISTANCE BETWEEN THE TRAFFIC REGULATORS SHALL BE NO MORE THAN 2 MILES IN LENGTH UNLESS RESTRICTED FURTHER IN THE SPECIAL PROVISIONS FOR MAINTAINING TRAFFIC. ALL SEQUENCES OF MORE THAN 2 MILES IN LENGTH WILL REQUIRE WRITTEN PERMISSION FROM THE ENGINEER BEFORE PROCEEDING.

13. WHEN INTERSECTING ROADS OR SIGNIFICANT TRAFFIC GENERATORS (SHOPPING CENTERS, MOBILE HOME PARKS, ETC.) OCCUR WITHIN THE ONE-LANE TWO-WAY OPERATION, INTERMEDIATE TRAFFIC REGULATORS AND APPROPRIATE SIGNING SHALL BE PLACED AT THESE LOCATIONS.

14. ADDITIONAL SIGNING AND/OR ELONGATED SIGNING SEQUENCES SHOULD BE USED WHEN TRAFFIC VOLUMES ARE SIGNIFICANT ENOUGH TO CREATE BACKUPS BEYOND THE W3-4 SIGNS.

15. THE HAND HELD (PADDLE) SIGNS REQUIRED BY THE MMUTCD TO CONTROL TRAFFIC WILL BE PAID FOR AS PART OF FLAG CONTROL.

28E. THE TRAFFIC REGULATORS SHOULD BE POSITIONED AT OR NEAR THE SIDE OF THE ROAD SO THAT THEY ARE SEEN CLEARLY AT A MINIMUM DISTANCE OF 500 FEET. THIS MAY REQUIRE EXTENDING THE BEGINNING OF THE LANE CLOSURE TO OVERCOME VIEWING PROBLEMS CAUSED BY HILLS AND CURVES.

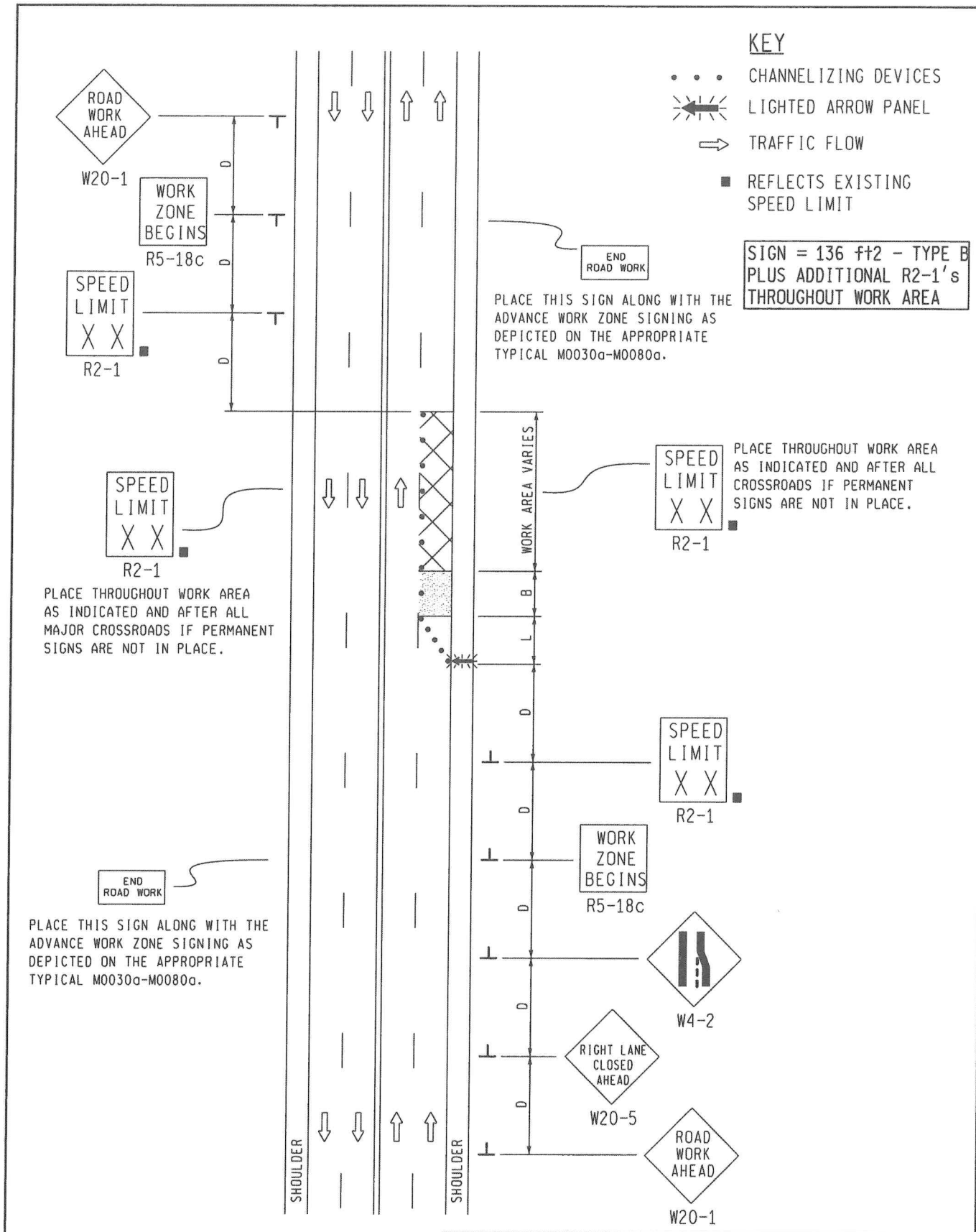
SIGN SIZES

DIAMOND WARNING - 48" x 48"
R2-1 REGULATORY - 48" x 60"
R5-18c REGULATORY - 48" x 48"

APX - C-10

NOT TO SCALE

MDOT Michigan Department of Transportation TRAFFIC AND SAFETY MAINTAINING TRAFFIC TYPICAL	TYPICAL TEMPORARY TRAFFIC CONTROL FOR A TWO-LANE TWO-WAY ROADWAY WHERE ONE LANE IS CLOSED UTILIZING TRAFFIC REGULATORS, NO SPEED REDUCTION		
DRAWN BY: CON:AE:djf CHECKED BY: BMM:CRB	OCTOBER 2011 PLAN DATE:	M0140a	SHEET 2 OF 2
FILE: PW RD/TS/Typicals/Signs/MT NON FWY/M0140a.dgn REV. 10/04/2011			



MDOT Michigan Department of Transportation TRAFFIC AND SAFETY MAINTAINING TRAFFIC TYPICAL	TYPICAL TEMPORARY TRAFFIC CONTROL FOR A ONE-LANE CLOSURE ON AN UNDIVIDED MULTI-LANE ROADWAY, NO SPEED REDUCTION		
DRAWN BY: CON:AE:djf	OCTOBER 2011	M0240a	SHEET 1 OF 2
CHECKED BY: BMM:CRB	PLAN DATE:		
FILE: PW RD/TS/Typicals/Signs/MT NON FWY/M0240a.dgn REV. 10/11/2011			

NOT TO SCALE

NOTES

1B. D = DISTANCE BETWEEN TRAFFIC CONTROL DEVICES
L = MINIMUM LENGTH OF TAPER
B = LENGTH OF LONGITUDINAL BUFFER
SEE **M0020a** FOR "D," "L," AND "B" VALUES

2. ALL NON-APPLICABLE SIGNING WITHIN THE CIA SHALL BE MODIFIED TO FIT CONDITIONS, COVERED OR REMOVED.

3. DISTANCES BETWEEN SIGNS, THE VALUES FOR WHICH ARE SHOWN IN TABLE D, ARE APPROXIMATE AND MAY NEED ADJUSTING AS DIRECTED BY THE ENGINEER.

3A. THE "WORK ZONE BEGINS" (R5-18c) SIGN SHALL BE USED ONLY IN THE INITIAL SIGNING SEQUENCE IN THE WORK ZONE. SUBSEQUENT SEQUENCES IN THE SAME WORK ZONE SHALL OMIT THIS SIGN AND THE QUANTITIES SHALL BE ADJUSTED APPROPRIATELY.

4E. THE MAXIMUM RECOMMENDED DISTANCE(S) BETWEEN CHANNELIZING DEVICES SHOULD BE EQUAL IN FEET TO THE POSTED SPEED IN MILES PER HOUR ON TAPER(S) AND TWICE THE POSTED SPEED IN THE PARALLEL AREA(S).

5. FOR OVERNIGHT CLOSURES, TYPE III BARRICADES SHALL BE LIGHTED.

6. WHEN CALLED FOR IN THE FHWA ACCEPTANCE LETTER FOR THE SIGN SYSTEM SELECTED, THE TYPE A WARNING FLASHER, SHOWN ON THE WARNING SIGNS, SHALL BE POSITIONED ON THE SIDE OF THE SIGN NEAREST THE ROADWAY.

7. ALL TEMPORARY SIGNS, TYPE III BARRICADES, THEIR SUPPORT SYSTEMS AND LIGHTING REQUIREMENTS SHALL MEET NCHRP 350 CRASHWORTHLY REQUIREMENTS STIPULATED IN THE CURRENT EDITION OF THE MICHIGAN MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES, THE CURRENT EDITION OF THE STANDARD SPECIFICATIONS FOR CONSTRUCTION, THE STANDARD PLANS AND APPLICABLE SPECIAL PROVISIONS. ONLY DESIGNS AND MATERIALS APPROVED BY MDOT WILL BE ALLOWED.

8. WHEN BUFFER AREAS ARE ESTABLISHED, THERE SHALL BE NO EQUIPMENT OR MATERIALS STORED OR WORK CONDUCTED IN THE BUFFER AREA.

21. ALL EXISTING PAVEMENT MARKINGS WHICH ARE IN CONFLICT WITH EITHER PROPOSED CHANGES IN TRAFFIC PATTERNS OR PROPOSED TEMPORARY TRAFFIC MARKINGS, SHALL BE REMOVED BEFORE ANY CHANGE IS MADE IN THE TRAFFIC PATTERN. EXCEPTION WILL BE MADE FOR DAYTIME-ONLY TRAFFIC PATTERNS THAT ARE ADEQUATELY DELINEATED BY OTHER TRAFFIC CONTROL DEVICES.

26. THE LIGHTED ARROW PANEL SHALL BE LOCATED AT THE BEGINNING OF THE TAPER AS SHOWN. WHEN PHYSICAL LIMITATIONS RESTRICT ITS PLACEMENT AS INDICATED, THEN IT SHALL BE PLACED AS CLOSE TO THE BEGINNING OF THE TAPER AS POSSIBLE.

SIGN SIZES

DIAMOND WARNING - 48" x 48"
R2-1 REGULATORY - 48" x 60"
R5-18c REGULATORY - 48" x 48"

NOT TO SCALE

MDOT Michigan Department of Transportation
TRAFFIC AND SAFETY
MAINTAINING TRAFFIC TYPICAL

TYPICAL TEMPORARY TRAFFIC CONTROL FOR A ONE-LANE CLOSURE ON AN UNDIVIDED MULTI-LANE ROADWAY, NO SPEED REDUCTION

DRAWN BY: CON:AE:djf	OCTOBER 2011	M0240a	SHEET 2 OF 2
CHECKED BY: BMM:CRB	PLAN DATE:		

FILE: PW RD/TS/Typicals/Signs/MT NON FWY/M0240a.dgn REV. 10/11/2011