SECTION 00 01 00
CONTRACT DOCUMENTS

2025 INFRASTRUCTURE IMPROVEMENT PROJECT

City of Plymouth
201 S. Main Street
Plymouth, MI 48170

April 9, 2025

25251 Northline Road, Taylor MI. 48180

PLY-2130-01T

SECTION 00 01 07
SEALS PAGE

Civil Engineer Professional Certification:
I hereby certify that these documents were prepared or approved by me and that I am a duly registered Professional Engineer.

_____
(Print Consultant Name)

_____
License No.

_____
Expiration Date

(Seal and Signature)

END OF SECTION 00 01 07

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SECTION 00 11 13
ADVERTISEMENT FOR BIDS

Plymouth 2025 Infrastructure Improvement Project

City of Plymouth has implemented online project bidding using the **Quest Construction Data Network (QuestCDN)**. Only electronic bids submitted through www.questcdn.com will be accepted for this project.

Sealed Bids will be received by the City of Plymouth via an electronic submittal through QuestCDN until 11:00 am, EST, May 8, 2025 (05-8-2025). Shortly after the bid closing time a bid tabulation will be prepared and posted online.

Bids will be received for the following Work:

Infrastructure improvements on N. Holbrook. The project includes 3000 CY of Pavement Excavation, 2400 tons of bituminous paving, 3100 tons of aggregate base, 1700 sf of concrete pavement, 456 LF of sanitary sewer, and 1695 LF of ductile iron water main replacement. The plans also include the installation of a rectangular rapid flashing beacon (RRFB) and related concrete sidewalk improvements at the intersection of Ann Arbor Trail and Hamilton. The City of Plymouth anticipates the installation of the deep sanitary sewer MAY require the installation of a temporary earth retention system designed by the contractor.

Contract Documents may be examined at the following locations:

City of Plymouth, 201 S. Main Street

Wade Trim Associates, Inc., 25251 Northline Road, Taylor MI. 48180

Plans and specifications are also available for viewing (not to be used for bidding purposes) at no cost online at: www.wadetrim.com/resources/bid-tab/

A. Documents downloaded from our website will bear a watermark on various signature pages and will be considered unofficial copies for bidding purposes; copies obtained from anywhere other than Wade Trim will be considered unofficial copies and will not be considered a responsible bid.

Contract Documents for bidding purposes are only available from QuestCDN starting on Ready for Bidders date. Contract Documents can be viewed and downloaded by registering for free with QuestCDN online (www.questcdn.com) or by calling 952-233-1632. The QuestCDN Project Number for this project is 9633324 and may be used to look up the project.

A. There is a Twenty Two Dollars ($22.00) nonrefundable fee for downloading the Contract Documents in pdf format. Bidders must download the Documents from QuestCDN to be included on the Plan Holders List and to receive any Addenda posted for the project.

B. Bids will be received electronically through QuestCDN as outlined in Section 00 21 13 - Instructions to Bidders. There is a Forty Two Dollars ($42.00) non-refundable fee for submitting a Bid.Each Bid will be accompanied by a bid bond, in the amount of at least **five (5)** percent of the amount bid, drawn payable to City of Plymouth as security for the proper execution of the Agreement.

City of Plymouth reserves the right to accept or reject any or all bids and to waive any informality in any bids should it consider same to be in its best interest.

Bids may not be withdrawn for the period of 60 days after date of receiving bids.

Inquiries will be directed to Shawn Keough (313) 363-1434, Engineer at Phone: (313) 363-1434 or email: skeough@wadetrim.com.

Warren C. Evans

Wayne County Executive

March 31, 2025

SHAWN KEOUGH W PE
Wade Trim
25251 Northline Road
Taylor, MI 48180

RE: Plymouth Rd at N Holbrook
Sidewalk Upgrades -Plymouth 2025 Infrastructure Imp Project - PLY 2130-01T
City of PLYMOUTH
Wayne County DPS Plan Review: R25-0189

Dear SHAWN KEOUGH W PE,

The Wayne County Department of Public Services has reviewed and approved with corrections the plans submitted on March 21, 2025, for the above referenced project. If it becomes necessary to change these plans prior to permit issuance, you may resubmit revised plans for further review.
This approval expires one (1) year from the date of this letter. If a permit has not been issued within the year, or plans and scope of work have been revised, new plans and additional plan review costs will be required to reestablish an active review prior to permit issuance.
For information on permit issuance and to schedule an appointment with the permit coordinator, please direct the anticipated permit holder or project contractor to contact Mrs. Ingrid McCarney (734) 858-2774 or Email: imccarney@waynecountymi.gov and specify Review No. R25-0189. Contact Mr. Dilshad Jacksi at (313)727-6120 or Email: djacksi@waynecountymi.gov if you have any questions.

NOTE: THIS LETTER IS NEITHER A PERMIT NOR AN AUTHORIZATION TO PERFORM ANY WORK WITHIN ANY WAYNE COUNTY ROAD RIGHT-OF-WAY, PARK OR DRAIN EASEMENT.

Sincerely,
WAYNE COUNTY DEPARTMENT OF PUBLIC SERVICES

Dilshad Jacksi
Plan Review Engineer

Hikmat Kassem, P.E.
Assistant Division Permit Engineer

Enclosure
C: File

WAYNE COUNTY
DEPARTMENT OF PUBLIC SERVICES
PERMIT OFFICE
33809 Michigan Ave, Wayne, MI 48184
Phone (734) 858-2774 Fax (734) 595-6356

Plan Review No.
R25-0189

Date : 03/31/2025

Permit Requirements and Fee Sheet

Information regarding issuance of Construction Permit, including Fees, Inspection Deposit, Bonding and other requirements for Wayne County Plan Review Number : R25-0189

To schedule an appointment for your Construction Permit, please contact the Permit Coordinator, Hikmat Kassem, at (734) 858-2757. Email : hkassem@waynecounty.com.

Please schedule your appointment at least 24 hours in advance

Project Name : Sidewalk Upgrades -Plymouth 2025 Infrastructure Imp Project - PLY 2130-01T
Street : Plymouth rd at N Holbrook
City / Twp : City of PLYMOUTH

FEES	AMOUNT	
Bond Value	$5,000.00	Cash Bond
Permit Admin Fee - C-Permit	$125.00	
Park Fee	$0.00	
Deposit for Inspection	$3,000.00	
Other Charges 1 Fee	$0.00	
Other Charges 2 Fee	$0.00	
Plan Review Fee - Plan Review Charged	$270.00	
Total Permit Cost:	**$8,395.00**	

DEPOSITS	AMOUNT
Initial Deposit / Credit	$1,000.00
Total Deposit:	**$1,000.00**

Total Amount: $7,395.00 *(Total Check to be Submitted)*

Please bring One (1) Certified or Cashier's Check made payable to 'WAYNE COUNTY'.

Letter of Authorization :
If Contractor picks up the Permit, the Contractor must have a Letter of Authorization to act as agent for Owner.

Certificate of Insurance :
from the Contractor of Record, designating the Wayne County Department of Public Services as the Certificate Holder and naming Wayne County, Drainage District and its officers, agents and employees as additional insured parties with: a) General Liability in amounts not less than $1,000,000 for each occurrence and $2,000,000 aggregate; and b) Automobile Liability in amounts not less than $1,000,000 combined single limit for each accident, bodily injury and property damage per accident, and in the amount not less than $1,000,000 for bodily injury per person, each occurrence and property damage liability $1,000,000 for each occurrence. The Permit Office shall be notified of any renewal, cancellation or reduction of insurance.

The insurance certificate and any further correspondence associated with the policy shall reference the project number : R25-0189

Additional Requirements :

SENT TO :
SHAWN KEOUGH W PE
25251 Northline Road
Taylor, MI 48180

Contact :

Email : skeough@wadetrim.com

Work : (734) 947-9700
Fax :

SECTION 00 21 13
INSTRUCTIONS TO BIDDERS

PART 1 GENERAL

1.01 DEFINED TERMS

A. Terms used in these Instructions to Bidders have the meanings assigned to them in the General Conditions.

B. The term "Bidder" means one who submits a Bid to Owner as distinct from a subbidder who submits a Bid to a Bidder.

C. The term "Successful Bidder" means the lowest, qualified, responsible Bidder to whom the Owner makes an award.

D. The term "Owner" means City of Plymouth, 201 S. Main Street, a Municipal Corporation and being a party of the first part of this Contract.

E. The term “Engineer” means Wade Trim Associates, Inc., 25251 Northline Road, Taylor MI. 48180, or a duly authorized representative.

1.02 BIDDERS QUALIFICATIONS

A. No Bid will be considered from any Bidder unless known to be skilled and regularly engaged in work of a character similar to that covered by the Contract Documents. In order to aid the Owner in determining the responsibility of any Bidder, the Bidder, within 48 hours after being requested in writing by the Owner to do so, must furnish evidence, satisfactory to the Owner, of the Bidder's experience and familiarity with Work of the character specified, and Bidder's financial ability to properly prosecute the proposed Work to completion within the specified time. The evidence requested may include the following:

1. Address and description of the Bidder's plant or permanent place of business.

2. Bidder's performance records for all Work awarded to or started by Bidder within the past three years.

3. An itemized list of the Bidder's equipment available for use on the proposed Contract.

4. Bidder's financial statement, including statement of ownership of equipment necessary to be used in executing Work under Contract.

5. Evidence that the Bidder is authorized to do business in the state in which the project is located, in case of a corporation organized under the laws of any other state; and,

6. Such additional information as will satisfy the Owner that the Bidder is adequately prepared to fulfill the Contract.

1.03 EXAMINATION OF CONTRACT DOCUMENTS AND SITE

A. It is the responsibility of each Bidder before submitting a Bid, to:

1. Examine the Contract Documents thoroughly,

2. Visit the site to familiarize himself with local conditions that may in any manner affect cost, progress or performance of the Work,

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

4. Study and carefully correlate Bidder's knowledge and observations with the Contract Documents and such other related data; and

5. Promptly notify the Engineer in writing of conflicts, errors, ambiguities or discrepancies which Bidder has discovered in or between Contract Documents and such related documents.

6. Purchase official Procurement Documents from the Engineer in order to be included on the project Plan Holder List and be considered eligible for bidding.

B. Reference is made to the Supplementary Conditions for the identification of those reports of investigations and tests of subsurface and latent physical conditions at the site or otherwise affecting cost, progress or performance of the Work which have been relied upon by the Engineer in preparing the Contract Documents.

1. If such reports are not included as appendices to the Contract Documents, the Owner will make copies available to any Bidder requesting them. These reports are included for reference only and are not guaranteed as to accuracy or completeness, nor are they part of the Contract Documents.

2. Bidder may rely upon the general accuracy of the “technical data” contained in such reports but not upon other data, interpretations, opinions or information contained in such reports or otherwise relating to the subsurface conditions at the site, nor upon the completeness thereof for bidding or construction purposes.

3. Before submitting their Bid each Bidder will, at Bidder's own expense, make such additional investigations and tests as the Bidder may deem necessary to determine Bidder's Bid for performance of the Work in accordance with the time, price and other terms and conditions of the Contract Documents.

C. On request, the Owner will provide each Bidder access to the site to conduct such investigations and tests as each Bidder deems necessary for submission of their Bid. Bidder must fill all holes and clean up and restore the site to its former conditions upon completion of such investigations and tests.

D. The lands upon which the Work is to be performed, rights-of-way for access thereto and other lands designated for use by the Contractor in performing the Work are identified in Section 01 11 00 - Summary of Work, or on the Plans.

E. The locations of utilities as shown on the Plans are taken from sources believed to be reliable. Neither the Owner nor the Engineer will be responsible for any omissions of, or variations from, the indicated location of existing utilities which may be encountered in the Work.

1. The submission of a Bid will constitute an incontrovertible representation by the Bidder that the Bidder has complied with every requirement of this Article, that without exception the Bid is based upon performing and furnishing the Work required by the Contract Documents and applying the specific means, methods, techniques, sequences or procedures of construction (if any) that may be shown, indicated or required by the Contract Documents, that Bidder has given the Engineer written notice of all conflicts, errors, ambiguities and discrepancies that Bidder has discovered in Contract Documents and the resolution by the

Engineer is acceptable to Bidder, and that the Contract Documents are sufficient in scope and detail to indicate and convey understanding of all terms and conditions for performing and furnishing the Work, and that the time stated in the Proposal is sufficient to complete the project.

1.04 INTERPRETATIONS AND ADDENDA

A. Should any prospective bidder find discrepancies in, or omissions from the Plans, Specifications or other parts of the Contract Documents, the prospective bidder may submit a written request to the Engineer for an interpretation thereof. The person submitting the request will be held responsible for its prompt delivery at least seven (7) days prior to the date for opening of Bids. Questions received less than seven (7) days prior to the date for opening of bids will not be answered. Any interpretation of inquiry will be made by Addendum duly issued to all prospective bidders.

B. Any change in or addition to the Contract Documents deemed necessary by the Owner must be made in the form of an Addendum issued to all prospective bidders who have taken out Contract Documents and all such Addenda will become a part of the Contract Documents as though same were incorporated into same originally. Oral explanations and information do not constitute official notification and are not binding.

1.05 BID SECURITY

A. Bid Security must be made payable to the Owner, in an amount of _____ percent of the Bidder's maximum Bid price and in a form as indicated in Section 00 11 13 - Advertisement for Bids. Bid Bonds, if indicated as acceptable in Section 00 11 13, will be issued on the form included in the Contract Documents by a Surety meeting the requirements of paragraph 5.01 of Section 00 72 00 - General Conditions.

B. Bid Security of the Successful Bidder will be retained until such Bidder has executed Section 00 52 00 - Agreement and furnished the required Contract Security, whereupon it will be returned; if the Successful Bidder fails to execute and deliver the Agreement and furnish the required Contract Security within 15 days of the Notice of Award, the Owner may annul the Notice of Award and the Bid Security of that Bidder will be forfeited.

C. Bid Security of any Bidder whom the Owner believes to have a reasonable chance of receiving the award may be retained by the Owner until the earliest of the seventh day after the "Effective Date of Agreement" (which term is defined in the General Conditions) or the expiration of the hold period on the Bids. Bid Security of other Bidders will be returned within 14 days of the Bid opening, unless indicated otherwise in the Advertisement.

1.06 CONTRACT TIME

A. The number of days within which, or the date by which, the Work is to be Substantially Completed, if applicable, and also completed and ready for final payment (the Contract Time) are set forth in the Agreement.

1.07 SUBSTITUTE AND “OR-EQUAL” ITEMS

A. The Contract, if awarded, will be on the basis of materials and equipment described in the Plans or specified in the Specifications without consideration of possible substitute or “or-equal” items.

B. Whenever it is indicated in the Plans or specified in the Specifications that a substitute or an “or-equal” item of material or equipment may be furnished or used by the Contractor if acceptable to the Engineer, application for such acceptance will not be considered by the Engineer until after the effective date of the Agreement.

C. In addition, in no case will the Engineer’s denial of the Contractor’s application give rise to any claim for additional cost, it being understood by the Contractor that acceptance of substitute or an “or equal” item of material is at the sole discretion of the Engineer.

1.08 RECEIPT AND FORM OF BID

A. Bids must be submitted at the time and place indicated in the Advertisement for Bids and must be accompanied by the Bid Security and other required documents.

1. Bids must be submitted electronically as specified herein.

B. Bids received after the scheduled time and place indicated in the Advertisement for Bids will be returned unopened.

C. Owner invites bids on the Proposal and any other form(s) attached thereto.

D. The complete set of Contract Documents must be used in preparing Bids; neither the Owner nor the Engineer assumes any responsibility for errors or misinterpretations resulting from the use of incomplete sets of Contract Documents.

E. Bidder must acknowledge of receipt of Addenda as provided for in the electronic bidding platform. Failure to acknowledge Addenda will be cause for rejection of bid.

F. The Legal Status of Bidder Form, located in Section 00 43 45 - Legal Status of Bidder, must be submitted with each Bid and must clearly state the legal position of a Bidder. In the case of a corporation, the home address, name and title of all officers must be given. In the case of a partnership, show names and home addresses of all partners. If an individual, so state. Any individual bid not signed by the individual must have attached, thereto, a power of attorney evidencing authority to sign.

G. Other documents to be attached to the Proposal and made a condition thereof are identified in the Proposal.

H. A tabulation of the amounts of the base bids and any alternates will be made available after the opening of Bids.

I. To obtain Contract Documents and submit a Bid, Bidders:

1. Must proceed to the Wade Trim website at www.wadetrim.com/Resources and download the Contract Documents.

1.09 MODIFICATIONS AND WITHDRAWAL OF BIDS

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

B. If, within 24 hours after Bids are opened, any Bidder files a duly signed written notice with the Owner and promptly thereafter demonstrates to the reasonable satisfaction of the Owner that

there was a material and substantial mistake in the preparation of their Bid, that Bidder may withdraw their Bid and the Bid Security will be returned.

1. Thereafter, at the sole option of the Owner, that Bidder will be disqualified from further Bidding on the Work to be provided under the Contract Documents.

1.10 AWARD OF CONTRACT

A. Owner reserves the right to reject any and all Bids for any reason, to waive any and all informalities not involving price, time, or changes in the Work and to negotiate contract terms with the Successful Bidder, and the right to disregard all nonconforming, non-responsive, unbalanced, or conditional Bids.

B. Discrepancies between words and figures will be resolved in favor of words. Discrepancies in the multiplication of units of work and unit prices, will be resolved in favor of unit price.

C. Discrepancies between the indicated sum of any column of figures and the correct sum thereof will be resolved in favor of the correct sum.

D. In evaluating Bids, the Owner will consider the qualifications of the Bidders, whether or not the Bids comply with the prescribed requirements, and such alternates, unit prices and other data if requested in the Bid forms. It is the Owner's intent to accept alternates (if any are accepted) in the order in which they are listed in the Bid form but the Owner may accept them in any order or combination.

E. Subject to the approval of the Owner, the Contract will be awarded to the lowest responsive and responsible Bidder. Responsibility of Bidder will be determined on basis of past performance and Work of similar character, equipment and labor available to do the Work and financial status.

F. The Contract will be considered to have been awarded after the approval of the Owner has been duly obtained and a formal Notice of Award duly served on the Successful Bidder by the Owner.

G. If the Contract is to be awarded, the Owner will give the Successful Bidder a Notice of Award within 60 days after the day of the Bid opening, unless such other time is specified in the Advertisement for Bids.

H. The Contract will not be binding upon the Owner until the Agreement has been duly executed by the Bidder and the duly authorized officials of the Owner.

1.11 SIGNING OF AGREEMENT

A. Within fifteen (15) days after the Owner gives a Notice of Award to the Successful Bidder, the Contractor must sign and deliver the specified number of counterparts of the Agreement to the Owner with all other Contract Documents attached.

B. Within ten (10) thereafter, the Owner will deliver two (2) fully signed counterparts to the Contractor. Engineer will identify, date or correct those portions of the Contract Documents not fully signed, dated or executed by the Owner and the Contractor and such identification, dating or correction will be binding on all parties.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION 00 21 13

SECTION 00 22 13
SUPPLEMENTARY INSTRUCTIONS TO BIDDERS

PART 1 GENERAL

1.01 MODIFICATIONS

These Supplementary Instructions to Bidders amend or supplement the Instructions to Bidders as indicated below. All provisions which are not amended or supplemented remain in full force and effect.

The terms used in these Supplementary Instructions to Bidders have the meanings assigned to them in the Instructions to Bidders, General Conditions, and as follows:

A. OWNER -- City of Plymouth, 201 S. Main Street, Plymouth, MI 48170, a Municipal Corporation, and being a party of the first part of this Contract.

B. ENGINEER -- Wade Trim Associates, Inc., 25251 Northline Road, Taylor, Michigan 48180, or his duly authorized representative.

SIB-1.09 Receipt and Form of Bid

Delete Article 1.09 of the Instructions to Bidders and insert the following in its place:

1.09 RECEIPT AND FORM OF BID

A. Bids shall be submitted electronically only at the time and place indicated in the Advertisement for Bids and shall be accompanied by the Bid Security and other required documents.

B. The OWNER invites bids on the Proposal and any other form(s) attached thereto.

C. The complete set of Contract Documents must be used in preparing Bids; neither OWNER nor ENGINEER assumes any responsibility for errors or misinterpretations resulting from the use of incomplete sets of Contract Documents.

D. The quantities as shown in the Proposal are approximate only and will be used as a basis of comparison of Bids, and award of Contract(s). Payment will be made on basis of actual quantities of Work performed in accordance with the Contract Documents. The Unit Prices bid, shall include such amounts as the Bidder deems proper for overhead, profit, taxes, General Conditions and such other incidentals as noted in the Contact Documents.

E. The Bidder shall acknowledge of receipt of all Addenda as provided for in the electronic bidding platform. Failure to acknowledge Addenda shall be cause for rejection of bid.

F. The Legal Status of Bidder Form contained in the Contract Documents must be submitted with each Bid and must clearly state the legal position of a Bidder. In the case of a corporation, the home address, name and title of all officers must be given. In the case of a partnership, show names and home addresses of all partners. If an individual, so state. Any individual bid not signed by the individual must have attached, thereto, a power of attorney evidencing authority to sign.

G. Other documents to be attached to the Proposal and made a condition thereof are identified in the Proposal.

H. A tabulation of the amounts of the base bids and any alternates will be made available after the opening of Bids.

I. To obtain Contract Documents and submit a Bid:

1. Proceed to the Wade Trim website at: www.wadetrim.com/resources/bid-tab/.

2. Click on the QuestCDN link and you then will be re-directed to our QuestCDN electronic bidding project list.

3. Select the project as listed in the Advertisement for Bids from the list of projects. Prospective Bidders To submit a Bid, you must register for a free membership on QuestCDN and download the Contract Documents in digital form under “Download Bid Documents”. There is a non-refundable fee as stated in the Advertisement for Bids to download the documents and bid the project.

4. You will be asked to sign into your account or create a free QuestCDN account by clicking the “Join” link. Contact QuestCDN at (952) 233-1632 or info@questcdn.com for assistance in membership registration, downloading the project, and VBid online bid submittal.

5. The QUESTCDN Project Number for this project is listed in the Advertisement for Bids.

6. To access the Bid Form, click the online bidding button at the top of bid advertisement. The on-line bid button will be available when the project is published and open for bidding.

7. All addendums will be issued through the QuestCDN electronic bidding site. You must download the bid documents to be a plan holder to receive any addenda notices. It is the sole reasonability of the Bidder to obtain and review all addenda.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION 00 22 13

SECTION 00 42 43
PROPOSAL

Owner: City of Plymouth

Project: PLY 2130 01T - Plymouth 2025Infrastructure Improvement Project

Project Location: N Holbrook

BIDDER INFORMATION

Bidder Name: _____

By (Printed Name): _____

Signature: _____

Address: _____

Phone No: _____

Email: _____

Bidder proposes and agrees, if their Bid is accepted, to enter into an Agreement with the City of Plymouth in the form included in the Contract Documents to complete all Work as specified or indicated in the Contract Documents for the Contract Price and within the Contract Time indicated in the Agreement, and in accordance with the Contract Documents.

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

Bidder has examined copies of Contract Documents, (consisting of Plans dated Ready for Bidders date and Project Manual dated Ready for Bidders date) which Bidder understands and accepts as sufficient for the purpose, including any and all Addenda officially issued, the receipt of which has been acknowledged.

A. Addendum _____ Acknowledged by: _____ Date: _____

B. Addendum _____ Acknowledged by: _____Date: _____

C. Addendum _____ Acknowledged by: _____ Date: _____

Bidder has examined the surface and subsurface conditions where the Work is to be performed, the legal requirements and local conditions affecting cost, progress, furnishing or performance of the Work, and has made such independent investigations as Bidder deems necessary.

Bidder, by submitting a Bid, agrees that their Bid is genuine and not made in the interest of or on behalf of any undisclosed person, firm or corporation and is not submitted in conformity with any Agreement or rules of any group, association, organization or corporation; Bidder has not directly or indirectly induced or solicited any other Bidder to submit a false or sham Bid; Bidder has not solicited or induced any person, firm or a corporation to refrain from bidding; and Bidder has not sought by collusion to obtain for himself any advantage over any other Bidder or over the Owner.

Bidder agrees to complete the Work, in accordance with the Contract Documents, for the following Contract Price:

Item	Description	Quantity	Unit	Unit Price	Amount
	GENERAL				
1	Mobilization, Max 5%	1	LS	$_____	$_____
2	Traffic Maintenance and Control	1	LS	$_____	$_____
3	Audio/Video Route Survey	1	LS	$_____	$_____
4	Minor Traffic Devices	1	LS	$_____	$_____
5	Inspector Days		Day	$850.00	$_____
6	Sign Type B, Temp, Prismatic, Furn	285.25	SF	$_____	$_____
7	Sign Type B, Temp, Prismatic, Oper	285.25	SF	$_____	$_____
8	Sign Type B, Temp, Prismatic, Special, Furn	78.5	SF	$_____	$_____
9	Sign Type B, Temp, Prismatic, Special, Oper	78.5	SF	$_____	$_____
10	Barricade, Type III, High Intensity, Double Sided, Lighted, Furn	25	EA	$_____	$_____
11	Barricade, Type III, High Intensity, Double Sided, Lighted, Oper	25	EA	$_____	$_____
12	Plastic Drum, Fluorescent, Furn	100	EA	$_____	$_____
13	Plastic Drum, Fluorescent, Oper	100	EA	$_____	$_____
	GENERAL SUBTOTAL				$_____

	DEMO AND SESC				
14	Pavement Excavation	3000	CY	$_____	$_____
15	Remove Ex Sanitary Sewer	500	LF	$_____	$_____
16	Pavement for Butt Joint Remove	40	SY	$_____	$_____
17	Remove Ex Sanitary Sewer Manhole	3	EA	$_____	$_____
18	Concrete Drives and Sidewalks, remove	10,100	SF	$_____	$_____
19	Brick Paver Remove	150	SF	$_____	$_____
20	Storm Sewer, Remove	100	LF	$_____	$_____
21	Gate Valve and Well, Remove	5	EA	$_____	$_____
22	Fire Hydrant, Remove	4	EA	$_____	$_____
23	Inlet Filter	16	EA	$_____	$_____
	DEMO AND SESC SUBTOTAL			$_____	
	SANITARY SEWER				
24	Remove and Replace 12-Inch PVC SDR 23.5 Solid Wall Sanitary Sewer, Trench B	450	LF	$_____	$_____

25	Remove and Replace 10-Inch PVC SDR 23.5 Solid Wall Sanitary Sewer, trench B	50	LF	$_____	$_____
26	Standard 4-Foot Sanitary Manhole, 0 to 8 Feet Deep	3	EA	$_____	$_____
27	Additional Depth Sanitary Manhole, 48-Inch Diameter	26	VF	$_____	$_____
28	Sanitary Sewer Lead, 6-Inch	6	EA	$_____	$_____
	SANITARY SEWER SUBTOTAL			$_____	
	WATER MAIN				
29	Water Main, 8-Inch, D.I., Trench B	1700	LF	$_____	$_____
30	Water Main, Abandon with Flowable Fill	322	CY	$_____	$_____
31	Gate Valve and Well, 8-Inch	10	EA	$_____	$_____
32	Water Service, 1-Inch, Type K Copper, Long	13	EA	$_____	$_____
33	Water Service, 1-Inch, Type K Copper, Short	17	EA	$_____	$_____
34	Water Service, 1.5 Inch, Type K Copper, Short	1	EA	$_____	$_____
35	8”x6” Reducer	7	EA	$_____	$_____
36	8”x8”x8” Tee	3	EA	$_____	$_____

37	8” Cross	1	EA	$_____	$_____
38	Fire Hydrant Assembly	5	EA	$_____	$_____
39	Curb Stop and Box, 1-Inch	30	EA	$_____	$_____
40	Curb Stop and Box, 1.5-Inch	1	EA	$_____	$_____
40A	Connect to Existing 6-Inch Water Main W/ 8”x6” Reducer	7	EA	$_____	$_____
	WATER MAIN SUBTOTAL			$_____	
	STORM SEWER				
41	Adjust Structure	29	EA	$_____	$_____
42	Reconstruct Structure	58	VF	$_____	$_____
43	Remove and Replace Frame and Cover	9525	LB	$_____	$_____
44	Connect to Existing Storm Structure	5	EA	$_____	$_____
45	12-Inch Storm Sewer, C-76, CL IV RCP, Trench B	60	LF	$_____	$_____
46	24-Inch Storm Sewer, C-76, CL IV RCP, Trench B	30	LF	$_____	$_____
46A	24-Inch Storm Sewer, C-76, CL IV RCP, Trench B (PROVISIONAL)	400	LF	$_____	$_____

46B	Temporary Earth Retention System (provisional)	1	LS	$_____	$_____
47	Underdrain, 6-Inch W/ Geotextile Fabric Wrap	3400	LF	$_____	$_____
48	Standard Storm Catch Basin, 4'-Dia	1	EA	$_____	$_____
49	Build Standard CB Over Existing Sewer, 6'-Dia	1	EA	$_____	$_____
49A	Standard Storm, Catch Basin, 6'-Dia (PROVISIONAL)	2	EA	$_____	$_____
	STORM SEWER SUBTOTAL			$_____	
	PAVING AND RESTORATION				
50	Subgrade Undercut and 21AA Aggregate Backfill	100	CY	$_____	$_____
51	Aggregate Base Course, 21AA	3200	TON	$_____	$_____
52	Concrete Drives and Sidewalk, 6-Inch	7000	SF	$_____	$_____
53	Bituminous Pavement, Wearing Course, 1300T	710	TON	$_____	$_____
54	Bituminous Pavement, Leveling Course, 3C	1700	TON	$_____	$_____
55	7-Inch Plain Concrete Pavement with Integral Straight Curb	200	SY	$_____	$_____
56	Butt Joints	40	SY	$_____	$_____

57	Curb and Gutter, Concrete, Detail F4	3500	LF	$_____	$_____
58	Sidewalk, Concrete, 4-Inch	3000	SF	$_____	$_____
59	Sidewalk Ramp, Concrete, 6-Inch	1900	SF	$_____	$_____
60	Pavement Marking, Thermoplastic, 24-Inch Stopbar	50	LF	$_____	$_____
61	Pavement Marking, Thermoplastic, 12-Inch Crosswalk	400	LF	$_____	$_____
62	Pavement Marking, Thermoplastic, Railroad Crossing Symbol	1	EA	$_____	$_____
63	Restoration W/ 3-Inches Topsoil and Nursery Sod	5100	SY	$_____	$_____
64	Sprinkler Allowance	1	LS	$ 10,000	$_____
65	Pavement Marking, Thermoplastic, 4-Inch White	75	LF	$_____	$_____
66	Sign, Type IIIB	33	SFT	$_____	$_____
67	FLSH Beacon, Rectangular Rapid, Solar Power	2	EA	$_____	$_____
68	Pedestal, Alum	2	EA	$_____	$_____
69	Pedestal, Fdn	2	EA	$_____	$_____
70	Pushbutton and Sign	2	EA	$_____	$_____

71	HMA Hand Patch	2	TON	$_____	$_____
72	Bituminous Pavement, Remove	50	SY	$_____	$_____
73	Concrete Curb and Gutter, Remove	100	LF	$_____	$_____
PAVING AND RESTORATION SUBTOTAL				$_____	

Total Contract Price (Items 1 through 73) $_____

Bidder, by submitting a Bid, thereby certifies that Bidder or a qualified designated person in Bidder's employ has examined the Contract Documents provided by the Owner for bidding purposes. Further, they certify that Bidder or Bidder's qualified employee has reviewed the Bidder's proposed construction methods and finds them compatible with the conditions which Bidder anticipates from the information provided for Bidding.

Bidder, by submitting a Bid, agrees to complete the Work under any job circumstances or field conditions present and/or ascertainable prior to bidding. In addition, Bidder agrees to complete the Work under whatever conditions Bidder may create by Bidder's own sequence of construction, construction methods, or other conditions he may create, at no additional cost to the Owner.

Bidder, by submitting a Bid, declares that Bidder has familiarized them self with the location of the proposed Work and the conditions under which it must be constructed. Also, Bidder has carefully examined the Plans, the Specifications, and the Contract Documents, which Bidder understands and accepts as sufficient for the purpose, and agrees that Bidder will Contract with the Owner to furnish all labor, material, tools, and equipment necessary to do all Work specified and prescribed for the completion of the Project.

Bidder will provide a bid bond, in the amount of at least **five (5)** percent of the amount Bid, drawn payable to City of Plymouth as security for the proper execution of the Agreement.

Bidder, by submitting a Bid, agrees that if awarded Contract, to sign the Agreement and submit satisfactory bonds and certificates of insurance coverage and other evidence of insurance required by the Contract Documents within 15 days after the date of Owner's Notice of Award.

Bidder, by submitting a Bid, agrees that time is of the essence and, if awarded Contract, that the Work will be Completed on or before the dates/days as specified in the Agreement.

Liquidated damages, as specified in the General Conditions, Supplementary Conditions and Agreement, will also apply to the Substantial Completion date.

Engineering and inspection costs incurred after the final completion date will be paid by the Contractor to the Owner as specified in the Conditions of the Contract and Agreement.

Proposals may not be withdrawn for a period of 60 days after bid opening.

The following documents are made a condition of this Proposal:

A. Required Bid Security

B. Legal Status of Bidder

C. Non-Collusion Affidavit

SECTION 00 43 13
BID BOND FORM

KNOW ALL BY THESE PRESENT, that we, the undersigned, _____ as Principal, hereinafter called the Principal, a corporation duly organized under the laws of the State of _____, and duly authorized to transact business in the state of Michigan, as Surety, _____, hereinafter called the Surety, are held and firmly bound unto the Owner, hereinafter called Owner, in the sum of _____ Dollars ($_____) for the payment of which sum well and truly to be made, the said Principal and the said Surety, bind ourselves, our heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these presents.

WHEREAS, the Principal has submitted a Bid for PLY 2130 01T - Plymouth 2025Infrastructure Improvement Project.

NOW, THEREFORE, if the Owner accepts the Bid of the Principal and the Principal will enter into a Contract with the Owner in accordance with the terms of such Bid, and give such Bond or Bonds as may be specified in the Contract Documents with good and sufficient surety for the faithful performance of such Contract and for the prompt payment of labor and material furnished in the prosecution thereof, or in the event of the failure of the Principal to enter such Contract and give such Bond or Bonds, if the Principal pays to the Owner the difference not-to-exceed the penalty hereof between the amount specified in said Bid and such larger amount for which the Owner may in good faith contract with another party to perform the Work covered by said Bid, then this obligation will be null and void, otherwise to remain in full force and effect.

Signed and sealed this _____ day of _____, 20___.

_____	_____
(Witness)	(Principal)
	_____
	(Title)
_____	_____
(Witness)	(Surety)
	_____
	(Title)

SECTION 00 43 45
LEGAL STATUS OF BIDDER

(The Bidder should check the appropriate box and complete the information requested therein)

☐ A corporation, duly authorized and doing business under the laws of the State of Michigan, for whom _____ whose signature is affixed to this Bid, is duly authorized to execute contracts.

☐ A limited liability company, duly authorized and doing business under the laws of the State of Michigan, for whom _____, whose signature is affixed to this Bid, is duly authorized to execute contracts.

☐ A partnership, all partners with their addresses are:

_____ _____

_____ _____

_____ _____

☐ An individual, whose signature is affixed to this Bid.

_____ _____

SECTION 00 45 13
STATEMENT OF BIDDER'S QUALIFICATIONS

This Proposal is submitted in the name of:

(Print) _____

The undersigned hereby designates the following business address to which all notices, directions or other communications may be served or mailed:

Street: _____ City: _____

State: _____ Zip Code: _____

The undersigned hereby declares their legal status as checked below:

- ☐ Sole Proprietor
- ☐ Sole Proprietor doing business under an assumed name
- ☐ Co-partnership

The Assumed Name of the Co-Partnership is registered in the County of _____,

- ☐ Corporation incorporated under the laws of the State of _____.

The Corporation is:

- ☐ authorized to conduct business in the State of
- ☐ not now authorized to conduct business in the State of
- ☐ possess all required licenses for the work being bid
- ☐ limited liability corporation

The name, titles, and home addresses of all persons who are officers or partners in the organization are as follows:

Name: _____ Title: _____

Address: _____

Name: _____ Title: _____

Address: _____

Name: _____ Title: _____

Address: _____

Name: _____ Title: _____

Address: _____

Signed this _____ day of _____, 20_____

By: _____

Printed Name: _____

Title: _____

SECTION 00 45 19
NON-COLLUSION AFFIDAVIT OF PRIME BIDDER

State of _____)

) ss:

County of _____)

_____, being first duly sworn, deposes and says that:

They are the of _____ (Position) of _____ (Firm), the Bidder that has submitted the attached Bid;

They are fully informed with respect to the preparation and contents of the attached Bid and of all pertinent circumstances respecting such Bid;

Such Bid is genuine and is not a collusive or sham bid;

Neither the Bidder nor any of its officers, partners, members, managers, owners, agents, representatives, employees or parties in interest, including this affiant, has in any way colluded, conspired, connived or agreed, directly or indirectly, with any other Bidder, entity or person to submit a collusive or sham bid in connection with the Contract Documents for which the attached Bid has been submitted or to refrain from bidding in connection with the Contract Documents or has in any manner, directly or indirectly, sought by agreement, collusion, communication or conference with any other Bidder, entity or person to fix the price or prices in the attached Bid or that of any other Bidder or to fix any overhead, profit or cost element of the Bid price or the Bid price of any other Bidder or to secure through any collusion, conspiracy, connivance or unlawful agreement any advantage against City of Plymouth, or any person or other entity interested in the proposed Contract Documents; and

The price or prices quoted in the attached Bid are fair and proper and are not tainted by any collusion, conspiracy, connivance or unlawful agreement on the part of the Bidder or any of its agents, representatives, owners, employees or parties having interest, including this affiant.

Name of Bidder: _____

Signed By: _____

Title: _____

Subscribed and sworn to me this _____ day of _____, 20_____.

_____ Notary Public

_____ County, Michigan

Acting in the County of: _____

Notary Seal

My Commission Expires: _____

SECTION 00 51 00
NOTICE OF AWARD

Attention: _____ Date: _____

Project: PLY 2130 01T - Plymouth 2025Infrastructure Improvement Project

Pursuant to the provisions of Article 1.11 of the Instructions to Bidders (Section 00 21 13), you are hereby notified that the _____ (Owner) during a _____Meeting held on _____, _____, 20___ has directed the acceptance of your Bid for the above referenced Project in the amount of _____Dollars ($_____).

This Project consists of: Project Description as delineated in your Bid submitted to City of Plymouth on 04-24-2025.

Please comply with the following conditions within15 days of the date of this Notice of Award; that is by _____, 20_____.

Deliver to Engineer _____ (_____) fully executed counterparts of the Agreement (Section 00 52 00) including all the Contract Documents.

Deliver with the executed Agreement the Contract Security (Bonds), on the form included in the Contract Documents, as specified in the General Conditions (Article 5, Section 00 72 00).

Deliver with the executed Agreement the Insurance Certificates (and other evidence of insurance) as specified in the General Conditions (Article 5, Section 00 72 00).

Please do not date Agreement and Contract Security (Bonds), as these will be dated by the Owner when executed by them.

It is important to comply with these conditions and time limits as failure to comply with these conditions within the time specified will entitle Owner to consider your bid abandoned, to annul this Notice of Award and to declare your Bid Security forfeited.

Within10 days after you comply with those conditions, Owner will return to you 2 fully signed counterparts of the Agreement with the Contract Documents attached.

In accordance with paragraph 2.05 of the General Conditions (Section 00 72 00), please submit to Engineer the required schedules prior to the scheduling of a Pre-Construction Meeting.

Owner: _____

Authorized Signature: _____

Copy to Wade Trim Associates, Inc.

SECTION 00 52 00
AGREEMENT

This Agreement, made and entered into this _____ day of _____ in the year 20___, by and between City of Plymouth hereinafter called Owner, and _____ hereinafter called Contractor, in consideration of the mutual covenants hereinafter sent forth, agree as follows:

Contractor will complete the Work as specified or indicated in the Contract Documents. The Work is generally described as follows:

Project Description

The Work will be substantially completed on or before **10-31-2025**, and completed and ready for final payment in accordance with paragraph 14.11 of Section 00 72 00 - General Conditions on or before **November 15, 2025**.

Engineering and inspection costs incurred after the specified final completion date will be paid by the Contractor to the Owner prior to final payment authorization.

Charges will be made at such times and in such amounts as the Engineer will invoice the Owner, provided however said charges will be in accordance with the Engineer's current rate schedule at the time the costs are incurred.

The costs of the Engineer incurred after the specified final completion date will be deducted from the Contractor's progress payments.

Owner and Contractor recognize that time is of the essence of this Agreement and that the Owner will suffer financial loss if the Work is not Substantially Complete within the time specified in paragraph 1.03.A above, plus any extensions thereof allowed in accordance with Article 12 of Section 00 72 00. They also recognize the delays, expense and difficulties involved in proving in a legal or arbitration proceeding the actual loss suffered by the Owner if the Work is not Substantially Complete on time. Accordingly, instead of requiring any such proof, the Owner and the Contractor agree that as liquidated damages for delay (but not as penalty) the Contractor will pay the Owner Five Hundred Dollars ($500.00) for each day that expires after the time specified in paragraph 1.03.A above for Substantial Completion until the Work is Substantially Complete.

Liquidated damages charged will be deducted from the Contractor's progress payment.

Owner will pay Contractor as provided in the attached Proposal for performance of the Work in accordance with the Contract Documents.

Progress payments and retainage under this Contract are governed by the provisions of PA 1980, No. 524 (MCLA 125.1561 et seq.). That Act is incorporated herein by reference and made a part of this Contract. Without excluding any provisions of the Act from this Contract, but in order to comply therewith and summarize certain provisions, the following will apply:

Person representing the Contractor who will submit written requests for progress payments will be: _____

Person representing the Owner to whom requests for progress payments are to be submitted will be:

_____

Contractor's representative, listed above, will submit Applications for Payment on the form provided in the Contract Documents in accordance with Article 14 of Section 00 72 00. Applications for Payment will be processed as provided in Section 00 72 00.

In order to induce the Owner to enter into this Agreement, the Contractor makes the following representations:

Contractor has considered the nature and extent of the Contract Documents, Work, locality, and all local conditions and federal, state and local laws, and regulations that may affect cost, progress, performance, or furnishing of the Work.

Contractor has studied carefully all reports of investigations and tests of subsurface and latent physical conditions at the site or otherwise affecting cost, progress or performance of the Work which were relied upon in the preparation of the Plans and Specifications and which have been identified in the Supplementary Conditions (Section 00 73 00).

Contractor has made or caused to be made examinations, investigations and tests and studies of such reports and related data in addition to those referred to above as the Contractor deems necessary for the performance of the Work at the Contract Price, within the Contract Time and in accordance with the other terms and conditions of the Contract Documents; and no additional examinations, investigations, tests, reports or similar data are or will be required by the Contractor for such purposes.

Contractor has correlated the results of such observations, examinations, investigations, tests, reports and data with the terms and conditions of the Contract Documents.

Contractor has given Engineer written notice of conflicts, errors or discrepancies that Engineer has discovered in the Contract documents and the written resolution thereof by Engineer is acceptable to the Contractor.

The Contract Documents which comprise the entire Contract between the Owner and the Contractor are attached to this Agreement, made a part hereof, and consists of the following:

Procurement Requirements (including the Advertisement for Bids, Instructions to Bidders, Proposal, Legal Status of Bidder, and other Documents listed in the Table of Contents thereof).

This Agreement

Performance and other Bonds

Notice of Award

Notice to Proceed (if issued)

Conditions of the Contract (including Section 00 72 00 - General Conditions and Section 00 73 00 - Supplementary Conditions, if any)

Specifications contained within Division 01 through 49 of the Project Manual

Plans bearing the following general title: PLY 2130 01T - Plymouth 2025Infrastructure Improvement Project

Addenda numbers _____ to _____, inclusive

Documentation submitted by the Contractor prior to Notice of Award

Any Modification, including Change Orders, duly delivered after execution of Agreement.

Terms used in this Agreement which are defined in Article 1 of Section 00 72 00 will have the meanings indicated in Section 00 72 00.

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

Owner and Contractor each binds them self, partners, successors, assigns and legal representatives to the other party hereto, their partners, successors, assigns and legal representatives in respect to all covenants, agreements and obligations contained in the Contract Documents.

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

IN WITNESS WHEREOF, the parties hereto have signed this Agreement in three counterparts. One counterpart each has been delivered to Owner and Contractor, and one counterpart has been delivered to the Engineer. The Contract Documents have been signed or identified by Owner and Contractor.

This Agreement will be effective on _____, 20____.

Owner: City of Plymouth

By: _____

Authorized Signature: _____

Attest: _____

Address for giving notices:

_____

_____

_____

Contractor: _____

By: _____

Authorized Signature: _____

Attest: _____

Address for giving notices:

_____

_____

_____

License No. _____

Agent for service of process: _____

SECTION 00 55 00
NOTICE TO PROCEED

To: _____ Date: _____, 20_____

_____

Attention: _____

Project: PLY 2130 01T - Plymouth 2025Infrastructure Improvement Project

Please note that the Contract Time under the above Contract will commence to run on _____, 20___. Within **ten (10)** days of this date you are to start performing the Work. The dates of Substantial Completion and Final Completion are set forth in the Agreement: they are _____, and _____, respectively.

The following conditions must be met by Contractor:

In accordance with Article 2.05 of Section 00 72 00 - General Conditions, please submit to the Engineer the required Schedules prior to the scheduling of a Pre-Construction Meeting.

In accordance with Article 2.05 of Section 00 72 00 - General Conditions, please request a Pre-Construction Meeting from the Engineer prior to delivery of any materials or start of any construction.

Notify the Engineer a minimum of **three (3)** full working days' notice to schedule a Pre-Construction Meeting.

Work at the site must be started by _____, 20_____.

Owner: _____

Authorized Signature: _____

COPY TO Wade Trim Associates, Inc.

SECTION 00 60 00
PROJECT FORMS

PART 1 GENERAL

1.01 AVAILABLE FORMS

A. The following Project Forms are available for use by Owner, Contractor and/or Engineer for this project and are located in Exhibit 1of the Contract Documents:

1. Certificate of Substantial Completion
2. Construction Change Requisition / Work Change Directive
3. Field Order
4. Final Inspection Request
5. Non-Compliance Notice / Order to Remove Defective Work
6. Open Items List
7. Punch List Items
8. Request for Information
9. Warranty Data Sheet

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION 00 60 00

SECTION 00 61 12.13
LABOR AND MATERIAL PAYMENT BOND FORM

Bond No. _____

KNOW ALL BY THESE PRESENT, That we, _____, a corporation organized and existing under the laws of the State of, and duly authorized to transact business in the State of Michigan, hereinafter called the "Principal," and _____, a corporation organized and existing under the laws of the State of _____, and duly authorized to transact business in the State of Michigan, as Surety, hereinafter called "Surety", are held and firmly bound unto _____, as Obligee, and hereinafter called "Obligee," in the just and full sum of _____Dollars ($_____) lawful money of the United States of America, to be paid to the said Obligee, to which payment well and truly to be made, we bind ourselves, our heirs, administrators, executors, successors and assigns, jointly and severally, firmly by these presents.

THE CONDITIONS OF THIS OBLIGATION is such that, WHEREAS, the above Principal has entered into a contract with the said Obligee, dated the day of _____, 20_____, for _____

_____.

Herein referred to and made a part hereof as fully and to the same extent as if the same were entirely written herein, and

WHEREAS, it was one of the conditions of the award of the said Obligee, pursuant to which said contract was entered into, that these presents should be executed.

AND WHEREAS, this Bond is given in compliance with and subject to the provisions of Act No. 213 of the Public Acts of Michigan for the year 1963, as amended, including all notices, time limitation provisions and other requirements set forth therein, which are incorporated herein by reference.

AND THE SAID SURETY, for value received, hereby stipulates and agrees that no change, extension of time, or any other forbearance, alteration or addition to the terms of the contract or to the Work to be performed thereunder or the Contract Documents accompanying the same will in anywise affect its obligations on this bond, and it does hereby waive notice of any such change, extension of time, or any other forbearance, alteration or addition to the terms of the contract or to the Work or to the Contract Documents.

NOW, THEREFORE, the condition of this obligation is such that if all claimants as defined in Act No. 213 of the Public Acts of Michigan for the year 1963, as amended, are timely paid for all labor and material used or reasonably required for use in the performance of the contract, then this obligation will be void; otherwise, it will remain in full force and effect.

Signed and sealed this day of _____, 20_____.

Signed, sealed and delivered in the presence of:

Witness for Contractor: _____

_____ (Principal)

_____ (Title)

By: _____

Witness for Surety: _____

_____ (Surety)

_____ (Title)

By: _____

_____ (Attorney-in-Fact) Seal

Address of Surety: _____

Telephone: _____

SECTION 00 61 13.13
PERFORMANCE BOND FORM

Bond No. _____

KNOW ALL BY THESE PRESENT, That we, _____, a corporation organized and existing under the laws of the State of, and duly authorized to transact business in the State of Michigan, hereinafter called the “Principal,” and _____, a corporation organized and existing under the laws of the State of _____, and duly authorized to transact business in the State of Michigan, as Surety, hereinafter called “Surety”, are held and firmly bound unto _____, as Obligee, and hereinafter called “Obligee,” in the just and full sum of _____ Dollars ($_____) lawful money of the United States of America, to be paid to the said Obligee, to which payment well and truly to be made, we bind ourselves, our heirs, administrators, executors, successors and assigns, jointly and severally, firmly by these presents.

THE CONDITIONS OF THIS OBLIGATION is such that, WHEREAS, the above Principal has entered into a contract with the said Obligee, dated the day of _____, 20_____, for _____

_____.

Herein referred to and made a part hereof as fully and to the same extent as if the same were entirely written herein, and

WHEREAS, it was one of the conditions of the award of the said Obligee, pursuant to which said contract was entered into, that these presents should be executed.

AND THE SAID SURETY, for value received, hereby stipulates and agrees that no change, extension of time, or any other forbearance, alteration or addition to the terms of the contract or to the work to be performed thereunder or the Contract Documents accompanying the same will in anywise affect its obligations on this bond, and it does hereby waive notice of any such change, extension of time, or any other forbearance, alteration or addition to the terms of the contract or to the Work or to the Contract Documents.

NOW, THEREFORE, if the above Principal will in all respects comply with the terms and conditions of said contract, and their obligations thereunder, including the Contract Documents therein referred to and made a part thereof, and such alteration as may be made in such contract or Contract Documents, as herein or therein provided for, then this obligation will be void; otherwise, this bond and obligation will be and remain in full force and effect.

Signed and sealed this day of _____, 20_____.

Signed, sealed and delivered in the presence of:

Witness for Contractor: _____

_____ (Principal)

_____ (Title)

By: _____

Witness for Surety: _____

_____ (Surety)

_____ (Title)

By: _____

_____ (Attorney-in-Fact) Seal

Address of Surety: _____

Telephone: _____

SECTION 00 61 19.13
MAINTENANCE AND GUARANTEE BOND FORM

Bond No. _____

KNOW ALL BY THESE PRESENT, That we, _____, a corporation organized and existing under the laws of the State of, and duly authorized to transact business in the State of Michigan, hereinafter called the "Principal," and _____, a corporation organized and existing under the laws of the State of _____, and duly authorized to transact business in the State of Michigan, as Surety, hereinafter called "Surety", are held and firmly bound unto _____, as Obligee, and hereinafter called "Obligee," in the just and full sum of _____ Dollars ($_____) lawful money of the United States of America, to be paid to the said Obligee, to which payment well and truly to be made, we bind ourselves, our heirs, administrators, executors, successors and assigns, jointly and severally, firmly by these presents.

THE CONDITIONS OF THIS OBLIGATION is such that, WHEREAS, the above Principal has entered into a contract with the said Obligee, dated the day of _____, 20_____, for _____

_____

_____

Herein referred to and made part hereof as fully and to the same extent as if the same were entirely written herein, and

NOW THEREFORE, the condition of this obligation is that under the Contract Documents, Contractor has agreed with Owner that for a period of one (1) year from the date of payment of the Final Estimate, Contractor will keep in good order and repair any defect in the Work, either by Contractor or its Subcontractors that may develop or be discovered during said one (1) year period due to improper materials, defective equipment, workmanship, or arrangements and any other work affected in making good such imperfections. Contractor also agreed to promptly make such repairs as directed by Owner for replacement of the Work, without cost to Owner, except for such parts of the Work as may have been disturbed without the consent of Contractor after the final acceptance of the Work, whenever directed so to do by notice from Owner. If Contractor fails to make such repair within one (1) week from the date of receipt of such notice, then Owner will have the right to purchase such materials and employ such labor and equipment as may be necessary for the purpose and to undertake, to and make such repairs and charge the cost thereof to Contractor and receive payment for the same promptly from the Contractor or Surety.

If any repair is necessary to be immediately made to protect persons or property then, and in such event, Owner may, but will not be required to, take immediate steps to repair such defects without notice to Contractor. In such event, Owner will not be required to obtain the lowest bid for the performance of the Work or any part thereof, and all sums actually paid therefore will be charged to the Contractor or Surety. In this regard, the judgment of Owner will be final and conclusive. Contractor will, for a period of one (1) year from the date of payment of the Final Estimate, keep the Work in good order and repair, except for such parts of the Work which may have been disturbed without the consent of Contractor after the final acceptance of the Work. Contractor will further, whenever notice is given as hereinbefore specified, promptly proceed to make the repair as in said notice directed or reimburse Owner for any cost incurred by Owner in making such repairs.

If Contractor or Surety fail to do as hereinbefore specified, they will jointly and severally indemnity, defend, and hold harmless Owner from and against all and any losses, costs, suits, and actions for damages of every kind and description brought or claimed against Owner for or on account of any injury or damage to persons or property received or sustained by any party or parties by or from any of the acts of omissions or through the negligence of Contractor, its Subcontractors, Suppliers, servants, agents, or employees in connection with the Work and then from any and all claims arising under the Workmen's Compensation Act of the State of Michigan.

IN WITNESS WHEREOF, the parties hereto have caused this Maintenance and Guarantee Bond to be executed by their respective authorized officers this _____, 20_____.

Signed, sealed and delivered in the presence of:

Witness for Contractor: _____

_____ (Principal)

_____ (Title)

By: _____

Witness for Surety: _____

_____ (Surety)

_____ (Title)

By: _____

_____ (Attorney-in-Fact) Seal

Address of Surety: _____

Telephone: _____

SECTION 00 62 75
ENGINEER'S CERTIFICATE FOR PAYMENT

Job Number: _____ Certificate Number: _____ Date: _____

Owner: _____ Contractor: _____

Project: _____

Contract Date: _____

Substantial Completion: _____ Extended To: _____

Final Completion: _____ Extended To: _____

****

Original Contract Price: _____ Total Earned To Date: _____

Adjustments to Quantities: _____ Retention: _____

Extras: _____ Deductions: _____

Total Change Orders: _____ Total Withheld: _____

Amended Contract Price: _____ Total Net Due: _____

Less Total Net Due: _____ Less Previous Certificates: _____

Balance on Contract: _____ Balance Due This Certificate: _____

****

ENGINEER'S CERTIFICATE FOR PAYMENT

In accordance with the Contract Documents, based on the data comprising the above application, the Engineer to the best of Engineer's knowledge, information, and belief and subject to the limitations stated in the Contract Documents certifies to the Owner that: (1) Work has progressed to the point indicated, (2) that the quality of the Work is in accordance with the Contract Documents, and (3) Contractor is entitled to payment of the Balance Due This Certificate.

Certified By: _____ Date: _____

SECTION 00 62 76
CONTRACTOR'S APPLICATION FOR PAYMENT

Job Number: _____ Application No: _____ Date: _____

Owner: _____ Contractor: _____

Project: _____

Contract Date: _____

Period of this Application: _____ to _____

****

Total Earned To Date: _____ Less Total Earned to Due: _____

Previous Certificate: _____ Total Earned this Application: _____

CONTRACTOR'S CERTIFICATION

The undersigned Contractor certifies that to the best of Contractor's knowledge, information, and belief the Work covered by this Application for Payment has been completed in accordance with the Contract Documents, that all amounts have been paid by Contractor for Work for which previous Certificates for Payment were issued and payments received from Owner, and that current payment shows herein is now due.

By: _____ Title: _____

CONTRACTOR'S DECLARATION

I hereby declare that I have not, during the period covered by this Application, performed any work, furnished any material, sustained any loss, damage, or delay for any reason, including soil conditions encountered or created, or otherwise done anything for which I will ask, demand, sue for, or claim compensation from the Owner or its agents, and the Engineer or its agents, in addition to the regular items set forth in the Contract as dated above executed between myself and the Owner and in the Change Orders for Work issued by the Owner in writing as provided thereunder, except as I hereby make claim for additional compensation and/or extension of time, as set forth on the itemized statement attached hereto.

By: _____ Title: _____

SECTION 00 62 77
PAYMENT SCHEDULE

Application No.: _____ Date: _____ Period: _____

Item of Work	Unit	Original Estimated Quantity	Unit Price	Period Quantity	Period Amount	Total Quantity to Date	Total Amount to Date

SECTION 00 63 25
SUBSTITUTION REQUEST FORM

Specification Section: _____

Specified Product: _____

Proposed Substitution: _____

Does specified product exceed, in any respect proposed substitution?	___Y	___N
Does substitution affect dimensions shown on Plans?	___Y	___N
Does substitution affect other trades more than original product?	___Y	___N
Does warranty differ from that specified?	___Y	___N
Does substitution affect cost to Owner?	___Y	___N
Does substitution result in any license fee or royalty?	___Y	___N

If you indicated "Yes" to any of the items above, attach thorough explanation on your Company letterhead, as follows:

Explain any differences between proposed substitution and specified product.

Summarize experience with product and manufacturer in Project area.

Attach complete technical data and literature.

The undersigned states that the function, appearance, and quality of the proposed substitution is equivalent or superior to the specified item, and that all information above and attached is true and correct.

Submitted By: _____

Signature: _____ Date: _____

Position: _____ Company: _____

Address: _____

Telephone: _____ Email: _____

SECTION 00 63 70
CHANGE PROPOSAL FORM

Project: _____ Date: _____

Contractor: _____

Owner: _____

This Change Proposal is submitted in accordance with paragraph 10.06 of Section 00 72 00 - General Conditions. If this Change Proposal is accepted, either in whole or in part, a Change Order will be issued to modify the Contract Documents accordingly.

Detailed Description of Proposed Change	
____	
Attachments (List documents attached supporting requested change)	
____	
____	
____	
Change in Contract Price	**Change in Contract Time**
Original Contract Price:$____	Original Contract Time: Substantial Completion: MM-DD-YYYY Final Completion: MM-DD-YYYY
Increase or Decrease from previously approved Change Order(s): $_____	Increase or Decrease from previously approved Change Order(s): Substantial Completion: MM-DD-YYYY Final Completion: MM-DD-YYYY
Contract Price prior to this Change Proposal: $____	Contract Time prior to this Change Proposal: Substantial Completion: MM-DD-YYYY Final Completion: MM-DD-YYYY
Increase or Decrease of this Change Proposal: $____	Increase or Decrease of this Change Proposal: Substantial Completion: MM-DD-YYYY Final Completion (days): MM-DD-YYYY
Contract Price incorporating this Change Proposal: $____	Contract Time incorporating this Change Proposal: Substantial Completion: MM-DD-YYYY Final Completion: MM-DD-YYYY
Engineer's Decision on Change Proposal	
____	

Contractor:	Engineer:	Owner:
By: _____	By: _____	By: _____
Date: _____	Date: _____	Date: _____

SECTION 00 65 16
CERTIFICATE OF SUBSTANTIAL COMPLETION

Project: PLY 2130 01T - Plymouth 2025Infrastructure Improvement Project

Owner: City of Plymouth

Contractor: _____

Contract Date: _____ Project No.: _____

Date of Issuance: _____

Project or Designated Portion will include: _____

The Work performed under this Contract has been reviewed and found to be Substantially Complete. The _____ which is also the date of commencement of applicable warranties required by the Contract Documents except as stated below. date of Substantial Completion of the Project or portion thereof designated above is hereby established as: _____

DEFINITION OF DATE OF SUBSTANTIAL COMPLETION

The date of Substantial Completion of the Work or designated portion thereof, is the date certified by the Engineer when construction is sufficiently complete, in accordance with the Contract Documents, so the Owner can occupy or utilize the Work or designated portion thereof for the use for which it is intended, as expressed in the Contract Documents.

A list of items to be completed or corrected, prepared by the Engineer is attached hereto. The failure to include any items on such list does not alter the responsibility of the Contractor to complete all Work in accordance with the Contract Documents. The date of commencement of warranties for items on the attached list will be the date of final payment unless otherwise agreed to in writing.

The responsibilities of the Owner and the Contractor for security, maintenance, heat, utilities, damage to the Work and insurance will be as follows:

_____

Owner will have **45** calendar days after receipt of this certificate during which Owner may make written objection to Engineer and Contractor as to any provisions of the certificate or attached list. Such objection may be cause for this Certificate of Substantial Completion to be null and void.

Engineer: _____

By: _____

Date: _____

SECTION 00 65 20
SWORN STATEMENT

State of Michigan

County of _____}

being duly sworn, deposes and says:

That _____ is the (Contractor) (Subcontractor) for an improvement to the following described real property situated in _____ County, Michigan described as follows:

Insert Legal Description of Property

That the following is a statement of each Subcontractor and Supplier and laborer, for which the payment of wages or fringe benefits and withholdings is due but unpaid, with whom the (Contractor) (Subcontractor) has (contracted) (subcontracted) for performance under the contract with the Owner or lessee thereof, and that the amounts due to the persons as of the date hereof are correctly and fully set forth opposite their names, as follows:

Name of Subcontractor/ Supplier/ Laborer	Type of Improvement Furnished	Total Contract Price	Amount Already Paid	Amount Currently Owing	Balance to Complete (optional)	Amount of Laborer Wages Due but Unpaid	Amount of Laborer Fringe Benefits and Withholdings Due But Unpaid
TOTALS:							

(Some columns are not applicable to all persons listed)

Contractor has not procured material from, or subcontracted with, any person other than those set forth on the reverse side and owes no money for the improvement other than the sums set forth on the reverse side.

Deponent further says that they make the foregoing statement as the (Contractor) (Subcontractor) or as _____ of the (Contractor) (Subcontractor) for the purpose of representing to the Owner or lessee of the described on the reverse side premises and their agents that the property described on the reverse side is free from claims of construction liens, or the possibility of construction liens, except as specifically set forth on the reverse side and except for claims of construction liens by laborers which may be provided pursuant to Section 109 of the Construction Lien Act, Act No. 497 of the Public Acts of 1980, as amended, being section 570.1109 of the Michigan Compiled Laws.

Warning to Owner: Owner or Lessee of the property described herein may not relay on this Sworn Statement to avoid claim of a Subcontractor, supplier or laborer who has provided a Notice of Furnishing pursuant to Section 109 of the Construction Lien Act to the Designee or to the Owner or Lessee if the Designee is not named or has died.

Warning to Deponent: A person, who with intent to defraud, gives a false Sworn Statement, is subject to criminal penalties as provided in Section 110 of the Construction Lien Act, Act No. 497 of the Public Acts of 1980, as amended, being Section 570.1110 of the Michigan Complied Laws.

_____ day of _____, 20____.

Notary Public: _____

_____ County, Michigan

My Commission Expires: _____

INSTRUCTIONS

A Sworn Statement in the preceding form must be provided before any Contractor or Subcontractor can file a Complaint, Cross-Claim, or Counter-Claim to enforce a construction lien.

An Owner or lessee may withhold payment to a Contractor or Subcontractor who has not provided a Sworn Statement. Owner or lessee may withhold from a Contractor or Subcontractor who has provided a Sworn Statement the amount sufficient to pay all sums shown on the statement as owing Subcontractors, Suppliers, and laborers, or the amount shown to be due to lien claimants who have provided Notices of Furnishing pursuant to the Construction Lien Act of 1980.

Owner or lessee may rely on a Sworn Statement to avoid a lien claim unless the lien claimant has provided the Owner or lessee with a Notice of Furnishing pursuant to the Construction Lien Act of 1980.

If the contract provides for payments by the Owner to the Contractor, if any, in the normal course of construction, but the Owner elects to pay lien claimants directly, the first time the Owner elects to make payment directly to a lien claimant they will provide at least 5 business days' notice to the Contractor of the intention to make direct payment. Subsequent direct disbursements to lien claimants need not be preceded by the 5-day notice provided in this section unless the Owner first returns to the practice of paying all sums to the Contractor.

SECTION 00 72 00
GENERAL CONDITIONS

ARTICLE 1 DEFINITIONS

1.01 DEFINED TERMS

A. Wherever used in these General Conditions or in the other Contract Documents, the following terms have the meanings indicated which are applicable to both the singular and plural thereof:

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

2. Agreement -- The written Agreement between Owner and Contractor covering the Work to be performed; other Contract Documents are attached to the Agreement and made a part thereof as provided therein.

3. Application and Certificate for Payment -- The form included in the Contract Documents which is to be used by Contractor in requesting progress or final payment and which is to be accompanied by such supporting documentation as is required by the Contract Documents.

4. Bid -- The offer or proposal of the bidder submitted on the prescribed form setting forth the price(s) for the Work to be performed.

5. Bidding Requirements -- The Advertisement for Bids, Instructions to Bidders, Supplementary Instructions to Bidders, Proposal, Legal Status of Bidder, Bid Bond, and any other documents identified in the Proposal, to be submitted with the Bid.

6. Bonds -- Bid, Performance and Payment bonds and other instruments of security.

7. Change Order -- A written order to Contractor, reviewed by Engineer and signed by Owner, issued after execution of the Contract, authorizing a change in the Work or an adjustment in the Contract Price or the Contract Time. The Contract Price and Contract Time may be changed only by Change Order. A Change Order signed by Contractor indicates Contractor's agreement therewith, including that the Change Order constitutes a final adjustment in the Contract Price or Contract Time for all issues addressed or described in the Change Order.

8. Change Proposal -- A written request by Contractor, duly submitted in compliance with the procedural requirements set forth herein, seeking an adjustment in Contract Price or Contract Times; contesting an initial decision by Engineer concerning the requirements of the Contract Documents or the acceptability of Work under the Contract Documents; challenging a set-off against payments due; or seeking other relief with respect to the terms of the Contract.

9. Claims --

   a. A demand or assertion by Owner directly to Contractor, duly submitted in compliance with the procedural requirements set forth herein, seeking an adjustment of Contract Price or Contract Times; contesting an initial decision by Engineer concerning the requirements of the Contract Documents or the acceptability of Work under the Contract Documents; contesting Engineer’s decision regarding a Change Proposal;

seeking resolution of a contractual issue that Engineer has declined to address; or seeking other relief with respect to the terms of the Contract.

b. A demand or assertion by Contractor directly to Owner, duly submitted in compliance with the procedural requirements set forth herein, contesting Engineer's decision regarding a Change Proposal, or seeking resolution of a contractual issue that Engineer has declined to address.

c. A demand or assertion by Owner or Contractor, duly submitted in compliance with the procedural requirements set forth herein, arising after Engineer has issued a recommendation of final payment.

d. A demand for money or services by a third party is not a Claim.

10. Constituents of Concern -- Asbestos, petroleum, radioactive materials, polychlorinated biphenyls (PCBs), lead-based paint (as defined by the HUD/EPA standard), hazardous waste, and any substance, product, waste, or other material of any nature whatsoever that is or becomes listed, regulated, or addressed pursuant to Laws and Regulations regulating, relating to, or imposing liability or standards of conduct concerning, any hazardous, toxic, or dangerous waste, substance, or material.

11. Contract -- The entire and integrated written contract between Owner and Contractor concerning the Work.

12. Contract Documents -- Those items so designated in the Agreement, and which together comprise the Contract.

13. Contract Price -- The monies or other considerations payable by Owner to Contractor for completion of acceptable Work in accordance with the Contract Documents as stated in the Agreement.

14. Contract Time -- The number of days or the date stated in the Agreement:

    a. to achieve Substantial Completion of all or any specified portions of the Work, and;

    b. to complete the Work so that it is ready for final payment as evidenced by Engineer's written recommendation of final payment in accordance with paragraph 14.11.

15. Contractor -- The person, firm or corporation with whom Owner has entered into the Agreement.

16. Cost of the Work -- The term Cost of the Work means the sum of all costs necessary for the proper performance of the Work at issue, as further defined in paragraph 12.01.

17. Day -- A calendar day of 24 hours measured from midnight to the next midnight.

18. Defective -- An adjective which when modifying the word Work refers to Work that is unsatisfactory, faulty or deficient, in that it does not conform to the Contract Documents or does not meet the requirements of any inspection, reference standard, test or approval referred to in the Contract Documents, or has been damaged prior to Engineer's recommendation of final payment.

19. Drawings -- See Plans.

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

21. Electronic Document -- Any Project-related correspondence, attachments to correspondence, data, documents, drawings, information, or graphics, including but not limited to Shop Drawings and other Submittals, that are in an electronic or digital format.

22. Electronic Means -- Electronic mail (email), upload/download from a secure Project website, or other communications methods that allow:

    a. the transmission or communication of Electronic Documents;

    b. the documentation of transmissions, including sending and receipt;

    c. printing of the transmitted Electronic Document by the recipient;

    d. the storage and archiving of the Electronic Document by sender and recipient; and

    e. the use by recipient of the Electronic Document for purposes permitted by this Contract. Electronic Means does not include the use of text messaging, or of Facebook, Twitter, Instagram, or similar social media services for transmission of Electronic Documents.

23. Engineer -- The person, firm, or corporation identified in the Supplementary Instructions to Bidders hired by Owner to prepare Plans and Specifications for the Project and to assist Owner in interpreting Plans and Specifications during the performance of the Work. Engineer’s authority and responsibility are set forth in the Contract between Owner and Engineer. Contractor acknowledges and agrees that Engineer’s obligations and duties under Engineer’s contract with Owner are obligations and duties to Owner only, and Engineer has no independent obligation to Contractor of any kind, including but not limited to providing services, or to take any action or to refrain from taking action on behalf of Contractor or any Subcontractor, Sub-Subcontractor or Supplier.

24. Field Order -- A written order issued by Engineer which clarifies or interprets the Contract Documents or orders minor changes in the Work in accordance with paragraph 9.04 and paragraph 9.05 but which does not involve a change in the Contract Price or the Contract Time.

25. Hazardous Environmental Conditions -- The presence at the Site of Constituents of Concern in such quantities or circumstances that may present a danger to persons or property exposed thereto.

    a. The presence at the Site of materials that are necessary for the execution of the Work, or that are to be incorporated into the Work, and that are controlled and contained pursuant to industry practices, Laws and Regulations, and the requirements of the Contract, is not a Hazardous Environmental Condition.

    b. The presence of Constituents of Concern that are to be removed or remediated as part of the Work is not a Hazardous Environmental Condition.

    c. The presence of Constituents of Concern as part of the routine, anticipated, and obvious working conditions at the Site, is not a Hazardous Environmental Condition.

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

27. Lump Sum -- Construction Work where Owner pays a single stipulate price (Lump Sum) for the entire scope of Work; plus or minus alternates and/or allowances. However, unit prices may be required for individual items of Work for the purposes of changes, additions, or deletions.

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

29. Notice of Award -- The written notice by Owner to the apparent successful Bidder stating that, upon compliance by the apparent successful Bidder with the conditions precedent enumerated therein, within the time specified, Owner will sign and deliver the Agreement.

30. Notice to Proceed -- A written notice given by Owner to Contractor (with a copy to Engineer) fixing the date on which the Contract Time will commence to run and on which Contractor will start to perform Contractor's obligation under the Contract Documents.

31. Owner -- The public body or authority, corporation, limited liability company, association, partnership, or individual with whom Contractor has entered into the Agreement and for whom the Work is to be provided and as identified in the Supplementary Instructions to Bidders.

32. Partial Utilization -- Use by Owner of a substantially completed part of the Work for the purpose for which it is intended (or a related purpose) prior to Substantial Completion of all the Work.

33. Plans -- The part of the Contract Documents which graphically show the extent, character and Scope of the Work to be furnished and performed by Contractor and which have been prepared or approved by Engineer or Owner; sometimes also referred to as Drawings.

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

35. Project -- The total construction of which the Work to be provided under the Contract Documents may be the whole or a part as indicated elsewhere in the Contract Documents.

36. Project Manual -- The volume assembled for the Project which may include, among other parts, Procurement Requirements, Contracting Requirements and Specifications.

37. Proposal -- The offer or bid of the Bidder submitted on the prescribed form setting forth the prices for the Work to be performed.

38. Radioactive Material -- Source, special nuclear, or byproduct material as defined by the Atomic Energy Act of 1954 as amended.

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

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

41. Schedule of Submittals -- A schedule, prepared and maintained by Contractor, of required Submittals and the time requirements for Engineer's review of the Submittals.

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

43. Shop Drawings -- All drawings, diagrams, illustrations, schedules and other data or information required by the Contract Documents which are specifically prepared or assembled by or for Contractor and submitted by Contractor to illustrate material or equipment for some portion of the Work.

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

45. Specifications -- That part of the Contract Documents which consist of written technical descriptions of materials, equipment, construction systems, standards and workmanship as applied to the Work and certain administrative details applicable thereto.

    a. Project Specifications are those portions of the Contract Documents which have been prepared specifically for this Project and which are identified by the job number in the lower right-hand corner of each page.

    b. Standard Specifications are Specification sections that are the same from Project to Project as of the revision date shown in the lower left-hand corner of the page.

46. Subcontractor -- An individual, firm or corporation having a direct contract with Contractor or with any other Subcontractor for the performance of a part of the Work at the Site.

47. Submittal -- A written or graphic document, prepared by or for Contractor, which the Contract Documents require Contractor to submit to Engineer, or that is indicated as a Submittal in the Schedule of Submittals accepted by Engineer. Submittals may include Shop Drawings and Samples; schedules; product data; Owner-delegated designs; sustainable design information; information on special procedures; testing plans; results of tests and evaluations, source quality-control testing and inspections, and field or Site quality-control testing and inspections; warranties and certifications; Suppliers' instructions and reports; records of delivery of spare parts and tools; operations and maintenance data; Project photographic documentation; record documents; and other such documents required by the Contract Documents. Submittals, whether or not approved or accepted by Engineer, are not Contract Documents. Change Proposals, Change Orders, Claims, notices, Applications for Payment, and requests for interpretation or clarification are not Submittals.

48. Substantial Completion -- The Work (or a specified part thereof) has progressed to the point where, in the opinion of Engineer as evidenced by the Certificate of Substantial Completion, it is sufficiently complete, in accordance with the Contract Documents, so that the Work (or specified part) can be utilized for the purposes for which it was intended; or if no such certificate is issued, when the Work is complete and ready for final payment as

evidenced by Engineer's written recommendation of final payment in accordance with paragraph 14.11. The terms "substantially complete" and "substantially completed" as applied to all or part of the Work refer to Substantial Completion thereof.

49. Supplementary Conditions -- The part of the Contract Documents which amends or supplements these General Conditions.

50. Supplementary Instructions to Bidders -- The part of the Contract Documents which amends or supplements the Instructions to Bidders.

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

52. Unit Price -- Construction Work where Owner pays a fixed sum (Unit Price) per each completed unit of Work. Units are listed on the Proposal Form.

53. Utilities – Underground or above ground pipelines, conduits, ducts, cables, wires, manholes, vaults, tanks, tunnels or other such facilities or attachments, and any structures or encasements containing such facilities, which have been installed to furnish any of the following services or materials: electricity, gases, steam, liquid petroleum products, telephone or other communications, cable television, sewage and drainage removal, traffic or other control systems, water or other liquids or chemicals.

54. Work -- The entire completed construction or the various separately identifiable parts thereof required to be furnished under the Contract Documents. Work includes and is the result of performing or furnishing labor and furnishing and incorporating materials and equipment into the construction, and performing or furnishing services and furnishing documents, all as required by the Contract Documents.

55. Work Change Directive -- A written directive to Contractor, issued on or after the Effective Date of the Agreement and signed by Owner and reviewed by Engineer, ordering an addition, deletion or revision in the Work, or responding to differing or unforeseen physical conditions under which the Work is to be performed as provided in paragraph 4.03 or to emergencies under paragraph 6.18. A Work Change Directive will not change the Contract Price or Contract Time but is evidence that the parties expect that the change directed or documented by a Work Change Directive will be incorporated in a subsequently issued Change Order following negotiations by the parties as to its effect, if any, on the Contract Price or Contract Time as provided in paragraph 10.01.

1.02 TERMINOLOGY

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

1. Whenever in the Contract Documents the terms “as ordered,” “as directed,” “as required,” “as allowed,” “as approved” or terms of like effect or import are used; or the adjectives “reasonable,” “suitable,” “acceptable,” “proper” or “satisfactory” or adjectives of like effect or import are used to describe a requirement, direction, review or judgment of Engineer as to the Work, it is intended that such requirement, direction, review or judgment will be solely to evaluate, in general, the completed Work for compliance with the technical requirements of and information in the Contract Documents and conformance with the design concept of the completed Project as a functioning whole as shown or indicated in the Contract

Documents (unless there is a specific statement indicating otherwise). The use of any such term or adjective will not be effective to assign to Engineer any duty or authority to supervise or direct the furnishing or performance of the Work or any duty or authority to undertake responsibility contrary to the provisions of paragraph 9.10 or any other provision of the Contract Documents.

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

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

4. The words “perform” or “provide,” when used in connection with services, materials, or equipment, will mean to furnish and install said services, materials, or equipment complete and ready for intended use.

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

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

ARTICLE 2 PRELIMINARY MATTERS

2.01 DELIVERY OF BONDS AND INSURANCE

A. When Contractor delivers the executed Agreement to Owner, Contractor will also deliver to Owner such Bonds and Insurance Certificates and other evidence of Insurance requested as Contractor may be required to furnish in accordance with Article 5. No Work at the site may begin or progress payments made to Contractor until all Bonds and Insurance Certificates in the form and substance required in Article 5 have been submitted and approved by Owner.

2.02 COPIES OF DOCUMENTS

A. Owner will furnish to Contractor up to five (5) copies of the Contract Documents (including at least one fully signed counterpart of the Agreement) as are reasonably necessary for the execution of the Work. Additional copies will be furnished, upon request, at the cost of reproduction.

2.03 COMMENCEMENT OF CONTRACT TIME; NOTICE TO PROCEED

A. Time is of the essence in the performance of the Work. The Contract Time will commence to run on the 30th day after the effective date of the Agreement, or, if a Notice to Proceed is given, on the day indicated in the Notice to Proceed. A Notice to Proceed may be given at any time within 30 days after the effective date of the Agreement. In no event will the Contract Time commence to run later than the 30th day after the effective date of the Agreement. Time limits stated in the Contract Documents are of the essence of the Agreement.

2.04 STARTING THE PROJECT

A. Contractor will start to perform the Work within 10 days of when the Contract Time commences to run, but no Work will be done at the Site prior to the date on which the Contract Time commences to run. Contractor will notify Engineer at least 3 working days in advance of the time Contractor intends to start Work.

2.05 PRECONSTRUCTION MEETING

A. Within 10 days of the Effective Date of the Agreement and prior to the delivery of materials or the start of any construction, Contractor will request a Preconstruction Meeting from Engineer. A minimum of 3 full working days' notice will be required.

B. Prior to the scheduling of the Preconstruction Meeting, Contractor will submit to Engineer for review:

1. A preliminary Progress Schedule indicating the starting and completion dates of the various stages of the Work, including any Milestones specified in the Contract Documents;

2. A preliminary Schedule of Submittals which will list each required Submittal and the times for submitting, reviewing and processing such Submittal;

3. An estimated monthly payment schedule, and a preliminary Schedule of Values for all of the Work.

C. The Preconstruction Meeting will be held for review and acceptance of the schedules, to establish procedures for handling Shop Drawings and other Submittals, for processing Applications for Payment, and to establish a working understanding among the parties as to the Work.

2.06 ELECTRONIC TRANSMITTALS

A. Except as otherwise stated elsewhere in the Contract, Owner, Engineer, and Contractor may send, and will accept, Electronic Documents transmitted by Electronic Means.

B. If the Contract does not establish protocols for Electronic Means, then Owner, Engineer, and Contractor will jointly develop such protocols.

C. Subject to any governing protocols for Electronic Means, when transmitting Electronic Documents by Electronic Means, the transmitting party makes no representations as to long-term compatibility, usability, or readability of the Electronic Documents resulting from the recipient’s use of software application packages, operating systems, or computer hardware differing from those used in the drafting or transmittal of the Electronic Documents.

ARTICLE 3 CONTRACT DOCUMENTS INTENT AND REUSE

3.01 INTENT

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

B. It is the intent of the Contract Documents to describe a functionally complete Project (or part thereof) to be constructed in accordance with the Contract Documents.

C. Unless otherwise stated in the Contract Documents, if there is a discrepancy between the electronic versions of the Contract Documents (including any printed copies derived from such electronic versions) and the printed record version, the printed record version will govern.

D. The Contract supersedes prior negotiations, representations, and agreements, whether written or oral.

E. Engineer will issue clarifications and interpretations of the Contract Documents as provided herein.

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

G. Nothing in the Contract Documents creates:

1. any contractual relationship between Owner or Engineer and any Subcontractor, Supplier, or other individual or entity performing or furnishing any of the Work, for the benefit of such Subcontractor, Supplier, or other individual or entity; or

2. any obligation on the part of Owner or Engineer to pay or to see to the payment of any money due any such Subcontractor, Supplier, or other individual or entity, except as may otherwise be required by Laws and Regulations; or

3. any obligation on the part of Engineer to Contractor.

3.02 REFERENCE TO STANDARDS AND SPECIFICATIONS OF TECHNICAL SOCIETIES

A. Reference to standards, specifications, manuals or codes of any technical society, organization or association, or to the Laws or Regulations of any governmental authority, whether such reference be specific or by implication, will mean the latest standard, specification, manual, or Laws or Regulations in effect at the time of opening of Bids or, on the effective date of the Agreement if there were no Bids, except as may be otherwise specifically stated in the Contract Documents.

B. It is the intent of the Contract Documents to describe a functionally complete project (or part thereof) to be constructed in accordance with the Contract Documents. Any Work, materials, or equipment that may reasonably be inferred from the Contract Documents or from prevailing custom or trade usage as being required to produce the intended result will be furnished and performed whether or not it is specifically called for.

C. No provision of any standard, specification, manual, code or instruction will be effective to change the duties and responsibilities of Owner, Contractor or Engineer, or any of their Subcontractors, consultants, agents, or employees from those set forth in the Contract Documents, nor will it be effective to assign to Owner, Engineer or any of Engineer’s consultants, agents or employees, any duty or authority to supervise or direct the furnishing or performance of the Work or any duty or authority to undertake responsibility inconsistent with the provisions of paragraph 9.10 or any other provision of the Contract Documents.

3.03 REPORTING AND RESOLVING DISCREPANCIES

A. Before undertaking each part of the Work, Contractor will carefully study and compare the Contract Documents and check and verify pertinent figures therein and all applicable field measurements. Contractor has a duty to and will promptly report in writing to Engineer any conflict, error, ambiguity, or discrepancy which Contractor should reasonably have discovered and will obtain a written interpretation or clarification from Engineer before proceeding with any Work affected thereby.

B. If, during the performance of the Work, Contractor discovers any conflict, error, ambiguity or discrepancy within the Contract Documents or between the Contract Documents and any provision of any Law or Regulation applicable to the performance of the Work or of any standard, specification, manual or code, or of any instruction of any Supplier, Contractor will report it to Engineer in writing at once, and, Contractor will not proceed with the Work affected thereby (except in an emergency as authorized by paragraph 6.18) until receiving written instruction or clarification from Engineer or Owner. However, Contractor will not be liable to Owner or Engineer for failure to report any such conflict, error, ambiguity or discrepancy unless Contractor knew or reasonably should have known thereof.

C. Except as otherwise specifically stated in the Contract Documents or as may be provided by amendment or supplement issued by one of the methods indicated in paragraph 3.05, the provisions of the Contract Documents will take precedence in resolving any conflict, error, ambiguity or discrepancy between the provisions of the Contract Documents and;

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

2. the provisions of any Laws or Regulations applicable to the performance of the Work (unless such an interpretation of the provisions of the Contract Documents would result in violation of such Law or Regulation).

3.04 REQUIREMENTS OF CONTRACT DOCUMENTS

A. During the performance of the Work and until final payment, Contractor and Owner will submit to Engineer in writing all matters in question concerning the requirements of the Contract Documents (sometimes referred to as requests for information or interpretation - RFIs), or relating to the acceptability of the Work under the Contract Documents, as soon as possible after such matters arise. Engineer will be the initial interpreter of the requirements of the Contract Documents, and judge of the acceptability of the Work.

B. Engineer will, with reasonable promptness, render a written clarification, interpretation, or decision on the issue submitted, or initiate an amendment or supplement to the Contract Documents. Engineer’s written clarification, interpretation, or decision will be final and binding on Contractor, unless it appeals by submitting a Change Proposal, and on Owner, unless it appeals by filing a Claim.

C. If a submitted matter in question concerns terms and conditions of the Contract Documents that do not involve

1. the performance or acceptability of the Work under the Contract Documents,

2. the design (as set forth in the Drawings, Specifications, or otherwise), or

3. other engineering or technical matters, then Engineer will promptly notify Owner and Contractor in writing that Engineer is unable to provide a decision or interpretation. If Owner and Contractor are unable to agree on resolution of such a matter in question, either party may pursue resolution as provided in paragraph 11.01.

3.05 ORDER OF PRECEDENCE

A. In resolving conflicts, errors or discrepancies between Plans and Specifications,

1. Figured dimensions will govern over scaled dimensions;

2. Plans will govern over Standard Specifications;

3. Project Specifications will govern over Standard Specifications and Plans.

3.06 AMENDING AND SUPPLEMENTING CONTRACT DOCUMENTS

A. The Contract Documents may be amended to provide for additions, deletions and revisions in the Work or to modify the terms and conditions thereof in one or more of the following ways:

1. a Field Order (pursuant to paragraph 9.05), or,

2. a Change Order (pursuant to paragraph 10.01.A.1), or

3. a Work Change Directive Order (pursuant to paragraph 10.01.A.2)

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

1. a Field Order (pursuant to paragraph 9.05),

2. Engineer’s review of a Shop Drawing or Sample (pursuant to paragraph 6.21), or

3. Engineer’s written interpretation or clarification (pursuant to paragraph 9.04).

3.07 REUSE OF DOCUMENTS

A. Neither Contractor nor any Subcontractor, manufacturer, fabricator, Supplier, distributor, or other person or organization performing or furnishing any of the Work under a direct or indirect contract with Owner:

1. will have or acquire any title to or ownership rights in any of the Plans, Specifications, or other documents (or copies of any thereof) prepared by or bearing the seal of Engineer or Engineer’s Consultant, and

2. they will not reuse any of such Plans, Specification, other documents or copies on extensions of the Project or any other project without written consent of Owner and Engineer and specific written verification or adaptation by Engineer.

3.08 ELECTRONIC DATA

A. Except as otherwise stated elsewhere in the Contract Documents, Owner, Engineer and Contractor may transmit, and will accept, Project-related correspondence, text, data, documents, drawings, information and graphics, including but not limited to Shop Drawings and other Submittals, in electronic media or digital format, either directly or through access to a secure Project website.

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

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

4.01 AVAILABILITY OF LANDS

A. Owner will furnish, as indicated in the Contract Documents and not later than the established date for beginning Work on the Contract, the lands upon which the Work is to be performed, rights of way and easements for access thereto, and such other lands which are designated for the use of Contractor. Owner will identify any encumbrances or restrictions not of general application but specifically related to use of lands so furnished with which Contractor will have to comply in performing the Work. Easements for permanent structures or permanent changes in existing facilities will be obtained and paid for by Owner, unless otherwise provided in the Contract Documents. Contractor will provide for all additional lands and access thereto that may be required for temporary construction facilities or storage of materials and equipment unless otherwise provided in the Contract Documents.

4.02 SUBSURFACE AND PHYSICAL CONDITIONS; INVESTIGATIONS AND REPORTS

A. Reference is made to the Supplementary Conditions for identification of those reports of investigations and tests of subsurface and physical conditions at the Site or otherwise affecting cost, progress or performance of the Work which have been reviewed in preparation of the Contract Documents. Such reports are not guaranteed as to accuracy or completeness and are not part of the Contract Documents.

B. The locations of utilities or other physical conditions relating to existing surface or subsurface structures at or contiguous to the Site as shown on the Plans are taken from drawings from sources believed to be reliable. Neither Owner nor Engineer will be responsible for any omissions of, or variations from, the indicated location of existing utilities which may be encountered in the Work.

C. Contractor will draw its own conclusions as to the general accuracy of the "technical data" contained in such reports and drawings, and confirms such reports and drawings are not Contract Documents. Contractor may not rely upon or make any Claim against Owner, Engineer or any of Engineer's Consultants with respect to:

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

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

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

D. The cost of all the following will be included in the Contract Price and Contractor will have full responsibility for:

1. reviewing and checking all such information and data,
2. locating all Utilities during construction,
3. coordination of the Work with the owners of such Utilities, and
4. the safety and protection of all such Utilities as provided in paragraph 6.15 and repairing any damage thereto resulting from the Work.

4.03 UNFORESEEN PHYSICAL CONDITIONS

A. If Contractor discovers one or both of the following physical conditions of surface or subsurface at the Project or improvement Site, before disturbing the physical condition, Contractor will immediately notify Owner and Engineer of the physical condition; and follow up within 48 hours in writing:

1. A subsurface or a physical condition at the Site differing materially from those indicated in the Contract Documents, or
2. An unknown physical condition at the Site of a nature differing materially from those ordinarily encountered and generally recognized as inherent in work of the character provided for the improvement project.

B. Engineer's Review. After receipt of written notice as required by the preceding paragraph, Engineer will promptly review the subsurface or physical condition in question; determine the necessity of Owner's obtaining additional exploration or tests with respect to the condition; conclude whether the condition falls within any one or more of the differing site condition categories in paragraph 4.03.A above; obtain any pertinent cost or schedule information from Contractor; prepare recommendations to Owner regarding Contractor's resumption of Work in connection with the subsurface or physical condition in question and the need for any change in the Drawings or Specifications; and advise Owner in writing of Engineer's findings, conclusions, and recommendations.

C. Owner's Statement to Contractor Regarding Site Condition. After receipt of Engineer's written findings, conclusions, and recommendations, Owner will issue a written statement to Contractor (with a copy to Engineer) regarding the subsurface or physical condition in question, addressing the resumption of Work in connection with such condition, indicating whether any change in the Drawings or Specifications will be made, and adopting or rejecting Engineer's written findings, conclusions, and recommendations, in whole or in part.

D. Possible Price and Times Adjustments:

1. Contractor will be entitled to an equitable adjustment in Contract Price or Contract Times, or both, to the extent that the existence of a differing subsurface or physical condition, or any related delay, disruption, or interference, causes an increase or decrease in Contractor's cost of, or time required for, performance of the Work; subject, however, to the following:
    a. such condition must fall within any one or more of the categories described in paragraph 4.03.A;
    b. with respect to Work that is paid for on a Unit Price basis, any adjustment in Contract Price will be subject to the provisions of paragraph 12.03; and

c. Contractor's entitlement to an adjustment of the Contract Times is conditioned on such adjustment being essential to Contractor's ability to complete the Work within the Contract Times pursuant to paragraph 10.05.

2. Contractor will not be entitled to any adjustment in the Contract Price or Contract Times with respect to a subsurface or physical condition if:

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

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

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

3. If Owner and Contractor agree regarding Contractor's entitlement to and the amount or extent of any adjustment in the Contract Price or Contract Times, or both, then any such adjustment will be set forth in a Change Order or Work Change Directive.

4. Contractor may submit a Change Proposal regarding its entitlement to or the amount or extent of any adjustment in the Contract Price or Contract Times, or both, no later than 30 days after Owner's issuance of Owner's written statement to Contractor regarding the subsurface or physical condition in question.

4.04 UTILITIES

A. Contractor's Responsibilities. The information and data shown or indicated in the Contract Documents with respect to existing Utilities at or adjacent to the Site, if any, is based on information and data furnished to Owner or Engineer by the owners of such Utilities, including Owner, or by others.

1. Owner and Engineer do not warrant or guarantee the accuracy or completeness of any such information or data provided by others; and

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

a. reviewing and checking all information and data regarding existing Utilities at the Site;

b. locating all Utilities shown or indicated in the Contract Documents as being at the Site;

c. coordination of the Work with the owners (including Owner) of such Utilities, during construction; and

d. the safety and protection of all existing Utilities at the Site, and repairing any damage thereto resulting from the Work.

B. Notice by Contractor. If Contractor believes that an Utilities that is uncovered or revealed at the Site was not shown or indicated in the Contract Documents, or was not shown or indicated with reasonable accuracy, then Contractor will, promptly after becoming aware thereof and before further disturbing conditions affected thereby or performing any Work in connection therewith

(except in an emergency as required by paragraph 6.18), identify the owner of such Underground Facility and give written notice to that owner and to Owner and Engineer.

C. Engineer's Review. Engineer will:

1. promptly review the Utilities and conclude whether such Utilities was not shown or indicated in the Contract Documents,

2. or was not shown or indicated with reasonable accuracy;

3. obtain any pertinent cost or schedule information from Contractor;

4. prepare recommendations to Owner regarding Contractor's resumption of Work in connection with the Utilities in question;

5. determine the extent, if any, to which a change is required in the Drawings or Specifications to reflect and document the consequences of the existence or location of the Utilities;

6. and advise Owner in writing of Engineer's findings, conclusions, and recommendations.

D. During such time, Contractor will be responsible for the safety and protection of such Underground Facility.

E. Owner's Statement to Contractor Regarding Utilities. After receipt of Engineer's written findings, conclusions, and recommendations, Owner will issue a written statement to Contractor (with a copy to Engineer) regarding the Utilities in question, addressing the resumption of Work in connection with such Underground Facility, indicating whether any change in the Drawings or Specifications will be made, and adopting or rejecting Engineer's written findings, conclusions, and recommendations in whole or in part.

F. Possible Price and Times Adjustments:

1. Contractor will be entitled to an equitable adjustment in the Contract Price or Contract Times, or both, to the extent that any existing Utilities at the Site that was not shown or indicated in the Contract Documents, or was not shown or indicated with reasonable accuracy, or any related delay, disruption, or interference, causes an increase or decrease in Contractor's cost of, or time required for, performance of the Work; subject, however, to the following:

a. Contractor did not know of and could not reasonably have been expected to be aware of or to have anticipated the existence or actual location of the Utilities in question;

b. With respect to Work that is paid for on a Unit Price basis, any adjustment in Contract Price will be subject to the provisions of paragraph 12.03;

c. Contractor's entitlement to an adjustment of the Contract Times is conditioned on such adjustment being essential to Contractor's ability to complete the Work within the Contract Times; and

d. Contractor gave the notice required in paragraph 4.04.B.

2. If Owner and Contractor agree regarding Contractor's entitlement to and the amount or extent of any adjustment in the Contract Price or Contract Times, or both, then any such adjustment will be set forth in a Change Order.

3. Contractor may submit a Change Proposal regarding its entitlement to or the amount or extent of any adjustment in the Contract Price or Contract Times, or both, no later than 30 days after Owner's issuance of Owner's written statement to Contractor regarding the Underground Facility in question.

4.05 REFERENCE POINTS

A. Owner will provide engineering surveys for construction to establish property corners, monuments, bench marks and similar reference points which in Contractor's judgment are necessary to enable Contractor to proceed with the Work. Contractor will be responsible for the preservation of established reference points and will make no changes or relocations without the prior written approval of Owner. Contractor will report to Engineer whenever any reference point is lost or destroyed or requires relocation because of necessary changes in grades or locations. Reference points destroyed by negligence of Contractor will be replaced by Owner at the expense of Contractor. Construction Staking will be furnished by Owner as provided in Division 01 of the Specifications.

4.06 CONSTITUENTS OF CONCERN

A. Owner will be responsible for any Constituents of Concern uncovered or revealed at the Site which was not shown or indicated in Plans or Specifications or identified in the Contract Documents to be within the scope of the Work and which may present a substantial danger to persons or property exposed thereto in connection with the Work at the Site. Owner will not be responsible for any such materials brought to the Site by Contractor, Subcontractor, Suppliers or anyone else for whom Contractor is responsible.

B. Upon discovering any such material, Contractor will immediately:

1. stop all Work in connection with such Hazardous Environmental Condition and in any area affected thereby (except in emergency as required by paragraph 6.18), and

2. notify Owner and Engineer (and thereafter confirm such notice in writing). Owner will promptly consult with Engineer concerning the necessity for Owner to retain a qualified expert to evaluate such Hazardous Environmental Condition or take corrective action, if any.

C. Contractor will not be required to resume Work in connection with such Hazardous Environmental Condition or in any such affected areas until after Owner has obtained any required permits related thereto and delivered to Contractor special written notice:

1. specifying that such condition and any affected area is or has been rendered safe for the resumption of Work, or

2. specifying any special conditions under which such Work may be resumed safely.

D. If Owner and Contractor cannot agree as to entitlement to, or the amount, or extent of an adjustment, if any, in Contract Price or Contract Terms as a result of such Work stoppage or such special conditions under which Work is agreed by Contractor to be resumed, either party may make a Claim therefor as provided in paragraph 11.01.

E. If after receipt of such special written notice Contractor does not agree to resume such Work based on a reasonable belief it is unsafe, or does not agree to resume such Work under such special conditions, then Owner may order such portion of the Work that is in connection with

such condition, or in such affected area, to be deleted from the Work. If Owner and Contractor cannot agree as to entitlement to, or the amount, or extent of an adjustment, if any, in Contract Price or Contract Time as a result of deleting such portion of the Work, then either party may make a Claim therefor as provided in paragraph 11.01. Owner may have such deleted portion of the Work performed by Owner's own forces or others in accordance with paragraph 7.01.

F. To the fullest extent permitted by Laws and Regulations, Owner will indemnify and hold harmless Contractor, Subcontractors, Engineer, Engineer's Consultants and the officers, directors, employees, agents, other consultants and subcontractors of each and any of them from and against all claims, costs, losses, damages and expenses arising out of or resulting from such condition per this paragraph 4.06, provided that:

1. any such claim, cost, loss or damage is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property (other than the Work itself), including the loss of use resulting therefrom, and

2. nothing in this paragraph 4.06 will obligate Owner to indemnify any person or entity from and against the consequences of that person's or entity's own negligence.

G. The provisions of paragraph 4.03 are not intended to apply to the presence of Constituents of Concern or Hazardous Environmental Conditions uncovered or revealed at the Site.

ARTICLE 5 BONDS AND INSURANCE

5.01 PERFORMANCE AND OTHER BONDS

A. Contractor will furnish performance and payment Bonds, on the form included in the Contract Documents, each in an amount at least equal to the Contract Price, as security for the faithful performance and payment of all of Contractor's obligations under the Contract Documents. These Bonds will remain in effect at least until 1 year after the date when final payment becomes due, except as otherwise provided by Laws and Regulations or as specified in the Contract Documents or Bond. Contractor will also furnish such other Bonds as are required by the Supplementary Conditions.

B. All Bonds will be in the forms prescribed by the Contract Documents and be executed by such Sureties as

1. are licensed to conduct business in the state where the Project is located, and

2. are named in the current list of "Companies Holding Certificates of Authority as Acceptable Sureties on Federal Bonds and as Acceptable Reinsuring Companies" as published in Circular 570 (amended) by the U.S. Department of Treasury, Financial Management Service, Surety Bond Branch.

C. Bonds signed by an agent must be accompanied by a certified copy of such agent’s authority to act.

D. If Surety on any Bond furnished by Contractor is declared as bankrupt or becomes insolvent, or its right to do business is terminated in any state where any part of the Project is located, or it ceases to meet the requirements of clauses (1) and (2) of paragraph 5.01, Contractor will within 5 days thereafter substitute another Bond and Surety, both of which will be acceptable to Owner.

5.02 LICENSED INSURERS AND SURETIES

A. Bonds and insurance required by the Contract Documents to be purchased and maintained by Owner or Contractor will be obtained from surety or insurance companies that are duly licensed or authorized in the jurisdiction in which the Project is located to issue Bonds or insurance policies for the limits and coverages so required.

5.03 INSURANCE

A. Contractor will purchase and maintain during the term of the Project such insurance as will protect him, Owner(s) and Engineer(s) from Claims arising out of the Work described in this Contract and performed by Contractor, Subcontractor(s) or Sub subcontractor(s) consisting of:

1. Workers' Compensation Insurance including Employer's Liability to cover employee injuries or disease compensable under the Workers' Compensation Statutes of the states in which Work is conducted under this Contract; disability benefit laws, if any; or Federal compensation acts such as U.S. Longshoremen or Harbor Workers', Maritime Employment, or Railroad Compensation Act(s), if applicable. Self-insurance plans approved by the regulatory authorities in the state in which Work on this Project is performed are acceptable.

2. An occurrence form Commercial General Liability policy to cover bodily injury to persons other than employees and for damage to tangible property, including loss of use thereof, plus appropriate endorsements to protect Owner and Engineer against Claims, demands, and lawsuits from employees of Contractor and Subcontractors, including the following exposures:

    a. All premises and operations.

    b. Explosion, collapse and underground damage.

    c. Contractor's Protective coverage for independent contractors or Subcontractors employed by him.

    d. Broad form blanket, contractual liability for the obligation assumed in the Indemnification or Hold Harmless agreement found in the General Conditions or Supplementary Conditions of this Contract.

    e. Personal Injury Liability endorsement with no exclusions pertaining to employment.

    f. Products and Completed Operations coverage. Coverage will extend through the Contract guarantee period.

    g. Broad form property damage.

    h. Cross liability endorsement.

    i. For design professional additional insureds, ISO Endorsement CG 20 32 04 13, “Additional Insured-Engineers, Architects or Surveyors Not Engaged by the Named Insured” or its equivalent.

3. Comprehensive Automobile Liability policy to cover bodily injury and property damage arising out of the ownership, maintenance or use of any motor vehicle, including owned, non-owned and hired vehicles. Comprehensive General Liability and the Comprehensive

Auto Liability will be written by the same insurance carrier, though not necessarily in one policy.

4. Contractor will purchase for Owner an Owner's Protective Liability policy to protect Owner, Engineer, their consultants, agents, employees and such public corporations in whose jurisdiction the Work is located for their liability for Work performed by Contractor, the Subcontractor(s) or the Sub subcontractor(s) under this Contract.

5. When a limit of liability is identified in the Supplementary Conditions, Contractor will purchase a Builder's Risk Installation Floater in a form acceptable to Owner covering property of the Project for the full cost of replacement as of the time of any loss which will include, as named insureds,

    a. Contractor,

    b. all Subcontractors,

    c. all Sub subcontractors,

    d. Owner, and Engineer(s) or Architect(s), as their respective interests may prove to be at the time of loss, covering insurable property which is the subject of this Contract, whether in place, stored at the Site, stored elsewhere, or in transit at the risk of the insured(s).

    e. Coverage will be effected on an "All Risk" form including, but not limited to, the perils of fire, wind, vandalism, collapse, theft, flood and earthquake, with removal of passive design error exclusion. Except as may otherwise be required by Owner, Contractor may arrange for such deductibles as Contractor deems to be within Contractor’s ability to self-assume, but Contractor will be held solely responsible for the amount of such deductible and for any co-insurance penalties. Any insured loss will be adjusted with Owner and Contractor and paid to Owner and Contractor as Trustee for the other insureds.

6. Umbrella or Excess Liability:

    a. Contractor is granted the option of arranging coverage under a single policy for the full limit required or by a combination of underlying policies with the balance provided by an Excess or Umbrella Liability policy equal to the total limit(s) requested. Umbrella or Excess policy wording will be at least as broad as the primary or underlying policy(ies) and will apply both to Contractor's General Liability and Automobile Liability Insurance and will be written on an occurrence basis.

7. Railroad Protective Liability:

    a. Where any of the Work is within a railroad right-of-way or where a limit of liability is identified in the Supplementary Conditions, Contractor will provide coverage in the name of each railroad company having jurisdiction over rights of way across which Work under the Contract is to be performed. The form of policy and the limits of liability will be determined by the railroad company(ies) involved. See Section 00 73 00 - Supplementary Conditions for limits and coverage requested.

8. Contractor’s Professional Liability Insurance:

a. If Contractor will provide or furnish professional services under this Contract through a delegation of professional design services or otherwise, then Contractor will be responsible for purchasing and maintaining applicable professional liability insurance. This insurance will provide protection against Claims arising out of performance of professional design or related services caused by a negligent error, omission, or act for which the insured party is legally liable. It will be maintained throughout the duration of the Contract and for a minimum of two years after Substantial Completion. If such professional design services are performed by a Subcontractor, and not by Contractor itself, then the requirements of this paragraph may be satisfied through the purchasing and maintenance of such insurance by such Subcontractor.

B. Owner's responsibilities in respect of purchasing and maintaining insurance are set forth below:

1. Owner will assume responsibility for such boiler and machinery insurance as may be required or considered to be necessary by Owner in the course of construction, testing or after completion.

a. Owner will assume responsibility for such insurance as will protect Owner against any loss of use of Owner's property due to those perils insured pursuant to paragraph 1 above.

5.04 LIMITS OF LIABILITY

A. The required limits of liability for insurance coverages required in paragraphs 5.03 will be not less than those specified in Section 00 73 00 - Supplementary Conditions .

5.05 NOTICE OF CANCELLATION OR INTENT NOT TO RENEW

A. Policies will be endorsed to provide that at least 30 days written notice will be given to Owner and to Engineer of cancellation, intent not to renew, or material modification of the coverage.

5.06 EVIDENCE OF COVERAGE

A. Prior to commencement of the Work, Contractor will furnish to Owner and Engineer, Certificates of Insurance in force on current Accord® Certificate of Insurance form. Other forms of Certificate are acceptable only if;

1. they include all of the items prescribed in the current Accord® Certificate of Insurance form, including agreement to cancellation provisions outlined in paragraph 5.05 above; and

2. they have approval of Owner and Engineer.

B. Prior to the commencement of the Work, Contractor will furnish to Owner complete "originally signed" copies of the Owner's Protective Liability Policy. The number of copies will be the same as the number of counterparts of the Agreement. Owner reserves the right to request complete copies of other policies if deemed necessary to ascertain details of coverage not provided by the certificates. Such policy copies will be "Originally Signed Copies," and so designated.

5.07 QUALIFICATION OF INSURERS

A. In order to determine financial strength and reputation of insurance carriers, all companies providing the coverages required will be licensed or approved by the Insurance Bureau of the state in which the Project is located and will have a financial rating not lower than XI and a

policyholder's service rating no lower than B+ as listed in A.M. Best's Key Rating Guide, current edition. Companies with ratings lower than B+:XI will be acceptable only upon written consent of Owner.

5.08 DAMAGE CLAIMS - ACKNOWLEDGMENT AND REPORTS

A. Contractor will furnish to Owner an acknowledgment receipt from the insurance carrier for each damage claim against the Project. The receipt will include the insurance carrier's assigned claim number.

B. Upon request, Contractor or Contractor's insurance carrier will also furnish to Owner a status report on all damage claims. This report will include inspections made, the disposition of claims, and what action has been taken towards settlement of each claim.

C. Failure of Contractor to comply with this paragraph 5.08 may result in the amount of such damage claims being withheld from Contractor's monthly pay estimate. Such withholding will be reimbursed in the monthly pay estimate following compliance with this paragraph.

5.09 COST OF INSURANCE

A. The unit cost of the insurance herein specified will not be a specific bid item, but the cost of such insurance will be included by Contractor in the various prices bid.

5.10 WAIVER OF RIGHTS

A. Owner and Contractor intend that all policies purchased in accordance with paragraph 5.03 will protect Owner, Contractor, Subcontractors, Engineer, Engineer's Consultants (and all other persons or entities identified in the Supplementary General Conditions to be listed as insureds or additional insureds in such policies) and will provide primary coverage for all losses and damages caused by the perils covered thereby. Such policies will contain provisions to

B. the effect that in the event of payment of any loss or damage the insurers will have no rights of recovery against any of the insureds or additional insureds thereunder.

C. Owner and Contractor waive all rights against each other and their respective officers, directors, employees and agents for all losses and damages caused by, arising out of or resulting from any of the perils covered by such policies and any other property insurance applicable to the Work; and in addition, waive all such rights against Subcontractors, Engineer, Engineer's Consultants and any other persons or entities identified in the Supplementary General Conditions to be listed as insureds or additional insureds under such policies for loss and damages so caused. None of the above waivers will extend to the rights that any party making such waiver may have to the proceeds of insurance held by Owner as trustee or otherwise payable under any policy so issued.

5.11 RECEIPT AND APPLICATION OF INSURANCE PROCEEDS

A. Any insured loss under the policies of insurance required by paragraph 5.03.A.5 will be adjusted with Owner and made payable to Owner as fiduciary for the insureds, as their interests may appear, subject to the requirements of any applicable mortgage clause. If no other special agreement is reached the damaged Work will be repaired or replaced, the monies so received applied on account thereof, and the Work and the cost thereof covered by an appropriate Change Order, Field Oder or Work Change Directive.

B. Owner as fiduciary will have power to adjust and settle any loss under the policies required by paragraph 5.03.A.5 with the insurers unless one of the parties in interest will object in writing within fifteen days after the occurrence of loss to Owner's exercise of this power. If such objection be made, Owner as fiduciary will make settlement with the insurers in accordance with such agreement as the parties in interest may reach. If no such agreement among the parties in interest is reached, Owner as fiduciary will adjust and settle the loss with the insurers.

ARTICLE 6 CONTRACTOR'S RESPONSIBILITIES

6.01 SUPERVISION AND SUPERINTENDENCE

A. Contractor will supervise and direct the Work competently and efficiently, devoting such attention thereto and applying such skills and expertise as may be necessary to perform the Work in accordance with the Contract Documents. Contractor will be solely responsible for the means, methods, techniques, sequences and procedures of construction. Contractor will be responsible to see that the finished Work complies with the Contract Documents. However, if specific means, methods, techniques, sequences and procedures of construction are prescribed in the Plans or Specifications, Contractor will be responsible to comply therewith, but may implement such prescribed Work in a manner of Contractor's choosing so long as the Work complies with the requirements of the Plans and Specifications.

B. At all times during the progress of the Work, Contractor will assign and maintain a competent superintendent who will not be replaced without written notice to Owner and Engineer except under extraordinary circumstances. Any superintendent or foreman who neglects to have Work done in accordance with the Plans and Specifications will be removed from the Project. The superintendent will be Contractor's representative at the Site and will have authority to act on behalf of Contractor. All communications given to the superintendent will be as binding as if given to Contractor.

6.02 LABOR AND WORKING HOURS

A. Contractor will provide competent, suitably qualified personnel in their various duties. Contractor will at all times maintain good discipline and order at the Site. Except as otherwise required for the safety or protection of persons, the Work, property at the Site or adjacent thereto, and except as otherwise indicated in the Contract Documents, all Work at the Site will be performed during regular working hours (7:00 a.m. to 7:00 p.m.), and Contractor will not permit the performance of Work on Sunday or any legal holiday without Owner's written consent given after prior written notice to Engineer.

6.03 SERVICES, MATERIALS AND EQUIPMENT

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

B. All materials and equipment will be of good quality and new, except as otherwise provided in the Contract Documents. All warranties and guarantees specifically called for by the Contract Documents will expressly run to the benefit of Owner. If required by Engineer, Contractor will furnish satisfactory evidence, (including reports of required tests) as to the kind and quality of

materials and equipment to be incorporated in the Work. Contractor will not use material in the Work until Shop Drawing or Submittals have been reviewed by Engineer. All materials which do not meet the requirements of the Specifications at the time they are to be used will be rejected, and unless otherwise permitted by Engineer, will be plainly marked and removed immediately from the Work.

C. All materials and equipment will be applied, installed, connected, erected, used, cleaned and conditioned in accordance with the instructions of the applicable manufacturer, fabricator, Supplier or distributor, except as otherwise provided in the Contract Documents.

6.04 SUBSTITUTES AND "OR-EQUALS"

A. Whenever an item of materials or equipment is specified or described in the Contract Documents for installation in the Work by using the name of a proprietary item or the name of a particular manufacturer, fabricator, supplier or distributor; or means, methods, techniques, sequences and procedures of construction are prescribed in the Plans or Specifications; the specification or description is intended to establish the type, function and quality required or the means, methods, techniques, sequences and procedures of construction required. Unless the specification or description contains or is followed by words indicating that no like, equivalent or "or-equal" item or no substitution is permitted, other items of material or equipment or materials or equipment of other manufacturers, fabricators, suppliers or distributors; or other means, methods, techniques, sequences and procedures of construction may be accepted by Engineer under the following circumstances:

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

2. Substitute Items: If in Engineer's sole discretion an item of material or equipment proposed by Contractor does not qualify as an "or-equal" item under paragraph 6.04.A; or a proposed means, methods, techniques, sequences and procedures of construction are different from what is prescribed in the Plans or Specifications, it will be considered a proposed substitute item.

B. Contractor will submit sufficient information as provided below to allow Engineer to determine that the item of material or equipment or means, methods, techniques, sequences and/or procedures proposed is essentially equivalent to that named and an acceptable substitute therefor. The procedure for review by Engineer will include the following, as supplemented in the Specifications, and as Engineer may decide is appropriate under the circumstances. Requests for review of substitute items of material and equipment will not be accepted by Engineer from anyone other than Contractor.

C. If Contractor wishes to furnish or use a substitute, Contractor will make written application to Engineer on the Substitution Request Form provided for acceptance thereof, certifying that the proposed substitute will:

1. perform adequately the functions and achieve the results called for by the general design,

2. be similar in substance to that specified,

3. and be suited to the same use and capable of performing the same function as that specified.

4. The application will state the extent, if any, to which the evaluation and acceptance of the proposed substitute will prejudice Contractor's achievement of Substantial Completion on time, whether or not acceptance of the proposed substitute for use in the Work will require a change in the Contract Documents (or in the provisions of any other direct contract with Owner for work on the Project) to adapt the design to the proposed substitute, and whether or not incorporation or use of the substitute in connection with the Work is subject to payment of any license fee or royalty.

D. All variations of the proposed substitute from that specified will be identified in the application and available maintenance, repair and replacement service will be indicated. The application will also contain an itemized estimate of all costs or credits that will result directly or indirectly from acceptance of such substitute, including costs of redesign and claims of other contractors affected by the resulting change, all of which will be considered by Engineer in evaluating the proposed substitute. Engineer may require Contractor to furnish additional data about the proposed substitute.

E. All data to be provided by Contractor in support of any proposed "or-equal" or substitute item will be at Contractor's expense. Engineer will be the sole judge of acceptability, and Engineer's determination will be final and binding, may not be reversed through an appeal under any provisions of the Contract Documents, and no "or-equal" or substitute will be ordered, installed or utilized without Engineer's prior written acceptance. Owner may require Contractor to furnish at Contractor's expense a special performance guarantee or other surety with respect to any "or-equal" or substitute which has been approved by Engineer.

F. Engineer will record time required by Engineer and Engineer's consultants in evaluating substitutions proposed by Contractor and in making changes in the Contract Documents occasioned thereby. Whether or not Engineer accepts a proposed substitute, Contractor will reimburse Owner for the charges of Engineer and Engineer's consultants for evaluating any proposed substitute and in making any changes in the Contract Documents resulting therefrom.

6.05 CONCERNING SUBCONTRACTORS

A. Contractor will not employ any Subcontractor, Supplier or other person or organizations, including those who are to furnish the principal items of materials or equipment, whether initially or as a substitute, against whom Owner or Engineer may have reasonable objection. Contractor will furnish Engineer a complete list of any Subcontractor, Supplier or other person or organization furnishing principal items of material or equipment within 4 days of request. Failure to object to any Subcontractor, Supplier, other person or organization by Owner or Engineer will not constitute a waiver of any right of Owner or Engineer to reject defective Work.

B. If Owner or Engineer, after due investigation, has reasonable objection to any Subcontractor, Supplier, other person or organization proposed by Contractor after the Notice of Award, Contractor will submit an acceptable substitute and the Contract Price will be increased or decreased by the difference in cost occasioned by such substitution, and an appropriate Change Order will be issued. Contractor will not be required to employ any Subcontractor, Supplier, other person or organization against whom Contractor has reasonable objection.

C. Contractor will not award Work to Subcontractor(s), in excess of 50% of the Contract Price, without prior written approval of Owner.

D. Contractor will be fully responsible for all acts and omissions of Contractor's Subcontractors, Suppliers and of persons and organizations performing or furnishing any of the Work under a direct or indirect contract with Contractor just as Contractor is responsible for Contractor's own acts and omissions. Nothing in the Contract Documents will create for the benefit of any such Subcontractor, Supplier of other person or organization any contractual relationship between Owner or Engineer and any such Subcontractor, Supplier or other person or organization, nor will it create any obligation on the part of Owner or Engineer to pay or to see to the payment of any moneys due any Subcontractor, Supplier or other person or organization. Owner or Engineer may furnish to any Subcontractor, Supplier or other person or organization, to the extent practicable, evidence of amounts paid to Contractor on account of specific Work done.

E. Contractor will be solely responsible for scheduling and coordinating the Work of Subcontractors, Suppliers and other persons and organizations performing or furnishing any of the Work under a direct or indirect contract with Contractor. Contractor will require all Subcontractors, Suppliers and such other persons and organizations performing or furnishing any of the Work to communicate with Engineer through Contractor.

F. If the amount of the subcontract or the nature of the Work to be performed thereunder warrants, Owner may require Subcontractor to furnish, for the benefit of Owner and Contractor jointly, Bonds in an amount proportioned to the amount of Subcontractor's subcontract, and for the same purpose and under the same specifications as those of the general Contract. The Surety on the general Contract will not be eligible to furnish such Subcontract Bonds.

G. All Work performed for Contractor by a Subcontractor or Supplier will be pursuant to an appropriate agreement between Contractor and the Subcontractor or Supplier which specifically binds the Subcontractor or Supplier to the applicable terms and conditions of the Contract Documents for the benefit of Owner and Engineer. Whenever any such agreement is with a Subcontractor or Supplier who is listed as and additional insured on the property insurance provided in paragraph 5.03.A.5, the agreement between Contractor and the Subcontractor or Supplier will contain provisions whereby the Subcontractor or Supplier waives all rights against Owner, Contractor, Engineer, Engineer's Consultants and all other additional insureds for all losses and damages caused by, arising out of or resulting from any of the perils covered by such policies and any other property insurance applicable to the Work. If the insurers on any such policies require separate waiver forms to be signed by any Subcontractor or Supplier, Contractor will obtain the same. Contractor will file a true copy of such agreement with Owner.

6.06 PATENT FEES AND ROYALTIES

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

B. To the fullest extent permitted by Laws and Regulations, Contractor will defend, indemnify and hold harmless Owner and Engineer and anyone directly or indirectly employed by either of them from and against all claims, costs, losses, damages and expenses arising out of or resulting from any infringement of patent rights or copyrights incident to the use in the performance of the Work or resulting from the incorporation in the Work of any invention, design, process, product or device not specified in the Contract Documents, and will defend all such claims in connection with any alleged infringement of such rights.

6.07 PERMITS AND LICENSES

A. Contractor will obtain and pay for all construction permits and licenses. Owner will assist Contractor, when necessary, in obtaining such permits and licenses. Contractor will pay all governmental charges, permit, review, and inspection fees necessary for the prosecution of the Work, which are applicable at the time of opening of Bids, or, if there are no Bids, on the Effective Date of the Agreement. Contractor will pay all charges of utility owners for connections to the Work.

6.08 LAWS AND REGULATIONS

A. Contractor will give all notices and comply with all laws, ordinances, rules, and regulations applicable to furnishing and performance of the Work. Neither Owner nor Engineer will be responsible for monitoring Contractor’s compliance with any Laws, ordinances, rules, and Regulations.

B. If Contractor performs any Work that is contrary to such laws, ordinances, rules and regulations, Contractor will bear all claims, costs, losses, damages and expenses caused by, arising out of, or resulting therefrom. However, it will not be Contractor's primary responsibility to make certain that the Specifications and Plans are in accordance with such laws, ordinances, rules, and regulations, but this will not relieve Contractor of Contractor’s obligations under paragraph 3.03.

C. Owner or Contractor may give notice to the other party of any changes after the submission of Contractor’s Bid (or after the date when Contractor became bound under a negotiated Contract) in Laws or Regulations having an effect on the cost or time of performance of the Work, including but not limited to changes in Laws or Regulations having an effect on procuring permits and on sales, use, value-added, consumption, and other similar taxes. If Owner and Contractor are unable to agree on entitlement to, or on the amount, or extent, if any, of any adjustment in Contract Price or Contract Times resulting from such changes, then within 30 days of such notice Contractor may submit a Change Proposal, or Owner may initiate a Claim.

6.09 TAXES

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

6.10 USE OF PREMISES

A. Contractor will confine construction equipment, the storage of materials and equipment and the operations of workers to the Project Site and land and areas identified in and permitted by the Contract Documents and other land and areas permitted by Laws and Regulations, rights of way, permits and easements, and will not unreasonably encumber the premises with construction equipment or other materials or equipment. Contractor will assume full

responsibility for any damage to any such land or area or to the owner or occupant thereof or of any adjacent land or areas resulting from the performance of the Work. Should any claim be made by any such owner or occupant because of the performance of the Work, Contractor will promptly settle with any such other party by negotiation or otherwise resolve the claim by arbitration or other dispute resolution proceeding or at law. Contractor's continuing obligations under paragraph 6.24 will be applicable to any claim hereunder.

6.11 REMOVAL OF DEBRIS AND CLEANING

A. During the progress of the Work, Contractor will keep the premises free from accumulations of waste materials, rubbish and other debris resulting from the Work. At the completion of the Work Contractor will remove all waste materials, rubbish and debris from and about the premises as well as all tools, appliances, construction equipment and machinery, and surplus materials, and will leave the Site clean and ready for occupancy by Owner at Substantial Completion of the Work. Contractor will restore to their original condition all property not designated for alteration by the Contract Documents. If Contractor will fail to keep the above noted areas cleaned of dust or debris resulting from Contractor's operations, Contractor will be so notified in writing by Engineer. If within 24 hours after receipt of such notice Contractor will fail to clean such areas satisfactorily, Owner may have such other agency as Ownerhe will designate, perform the work and all costs of such cleaning will be paid for by Contractor.

6.12 LOADING STRUCTURES

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

6.13 PROTECTION OF UTILITIES

A. When it is possible for construction operations to endanger any public or private utility, conduit, or structure, Contractor will notify the utility owner of this possibility, and safeguard and support such utilities, conduits, or structures. Where it is the policy of any utility owner to make its own repairs to damaged conduit or other structures, Contractor will cooperate to the fullest extent with the utility, and Contractor will see that Contractor's operations interfere as little as possible with these operations, and Contractor will assume the cost of any charge against Owner therefor. In cases where existing Utilities or Utility service connections are encountered, Contractor will perform Contractor's operations in such a manner that service will be uninterrupted, and the cost thereof will be at Contractor's expense, unless otherwise provided.

6.14 RECORD DOCUMENTS

A. Contractor will maintain in a safe place at the Site 1 record copy of all Specifications, Plans, Addenda, Change Orders, Work Change Directives, and Field Orders, in good order and annotated to show all changes made during construction. These record documents together with all Samples and all Shop Drawings will be available to Engineer for examination and will be delivered to Engineer for Owner upon completion of the Work.

6.15 SAFETY AND PROTECTION

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

1. all persons on the Work Site or who may be affected by the Work,
2. all the Work and materials or equipment to be incorporated therein, whether in storage on or off the Site, and
3. other property at the Site or adjacent thereto, including trees, shrubs, lawns, walks, pavements, roadways, structures, and Utilities and not designated for removal, relocation or replacement in the course of construction.

B. Contractor will comply with all applicable Laws and Regulations and orders of any public body having jurisdiction for the safety of persons or property or to protect them from damage, injury or loss; and will erect and maintain all necessary safeguards for such safety and protection. Contractor will notify owners of adjacent property, Utilities, and utility owners when prosecution of the Work may affect them.

C. Contractor will restore, at Contractor's own expense, any public or private property damaged or injured in consequence of any act or omission on Contractor's part, or on the part of Contractor 's employees or agents, to a condition equal or better than that existing before such injury or damage was done. If Contractor neglects to restore or make good such damages or injury, Owner may, upon 48 hours' notice, proceed to restore or make good such damage or injury and to order the cost thereof deducted from any monies that are due, or may become due, to Contractor for this Work.

D. Contractor's duties and responsibilities for the safety and protection of the Work will continue until such time as all the Work is completed and Engineer has issued a notice to Owner and Contractor in accordance with paragraph 14.11 that the Work is Acceptable.

E. Contractor will comply with the applicable requirements of Owner’s safety programs, if any. Any Owner’s safety programs that are applicable to the Work are identified or included in the Supplementary Conditions or Specifications.

F. Contractor will inform Owner and Engineer of the specific requirements of Contractor’s safety program with which Owner’s and Engineer’s employees and representatives must comply while at the Site.

G. Contractor’s duties and responsibilities for safety and protection will continue until all the Work is completed, Engineer has issued a written notice to Owner and Contractor in accordance with paragraph 14.11 that the Work is acceptable, and Contractor has left the Site (except as otherwise expressly provided in connection with Substantial Completion).

H. Contractor’s duties and responsibilities for safety and protection will resume whenever Contractor or any Subcontractor or Supplier returns to the Site to fulfill warranty or correction obligations, or to conduct other tasks arising from the Contract Documents.

6.16 SAFETY REPRESENTATIVE

A. Contractor will be responsible to designate for itself and its employees, and its Subcontractors a qualified and experienced safety representative at the Site whose duties and responsibilities will be the prevention of accidents and the maintaining and supervising of safety precautions and programs.

6.17 HAZARD COMMUNICATION PROGRAM

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

6.18 EMERGENCIES

A. In emergencies affecting the safety or protection of persons or the Work or property at the Site or adjacent thereto, Contractor, without special instruction or authorization from Owner or Engineer, is obligated to act to prevent threatened damage, injury or loss. Contractor will give Engineer prompt written notice if Contractor believes that any significant changes in the Work or variations from the Contract Documents have been caused thereby. If Engineer determines that a change in the Contract Documents is required because of the action taken by Contractor in response to such an emergency, a Work Change Directive or Change Order will be issued to document the consequences of such action.

6.19 SHOP DRAWINGS AND SAMPLES

A. Contractor will submit Shop Drawings required by the Contract Documents to Engineer for review, in accordance with an accepted schedule. All Submittals will be identified as Engineer may require and in the number of copies specified in the Specifications. The data shown on the Shop Drawings will be complete with respect to quantities, dimensions, specified performance and design criteria, materials and similar data to show Engineer the materials and equipment Contractor proposes to provide and to enable Engineer to review the information for the limited purposes required by paragraph 6.21.

B. Contractor will also submit all samples required by the Contract Documents to Engineer for review in accordance with an accepted schedule. Each Sample will be identified clearly as to material, Supplier, pertinent data such as catalog numbers, the use for which intended, and other data as Engineer may require to enable Engineer to review the Submittal for the limited purposes required by paragraph 6.21. The number of each sample to be submitted will be as specified in the Specifications.

6.20 SUBMITTAL PROCEDURES

A. Before submitting each Shop Drawing or Sample, Contractor will have determined and verified:

1. all field measurements, quantities, dimension, specified performance criteria, installation requirements, manufacturer’s recommendations, material, catalog numbers and similar information with respect thereto,

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

3. all information relative to Contractor’s responsibilities in respect of means, methods, techniques, sequences and procedures of construction and safety precautions and programs incident thereto.

B. Contractor will have reviewed and coordinated each Shop Drawing or Sample with other Shop Drawings and Samples and with the requirements of the Work and the Contract Documents.

C. Each Submittal will bear a stamp or specific written indication that Contractor has satisfied Contractor's obligations under the Contract Documents with respect to review and approval of that Submittal.

D. At the time of each submission, Contractor will in writing call Engineer's attention to any deviations that the Shop Drawings or Samples may have from the requirements of the Contract Documents. This notice will be both a written communication separate from the Shop Drawing's or Sample submittal; and, in addition, by a specific notation made on each Shop Drawing or Sample submitted to Engineer for review of each such variation.

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

F. Contractor will furnish required Submittals with sufficient information and accuracy to obtain required approval of an item with no more than three submittals. Engineer will record Engineer 's time for reviewing a fourth or subsequent submittal of Shop Drawings, sample, or other item requiring approval, and Contractor will be responsible for Engineer's charges to Owner for such time. Owner may impose a set-off against payments due to Contractor to secure reimbursement for such charges.

G. If Contractor requests a change of a previously approved Submittal item, Contractor will be responsible for Engineer's charges to Owner for its review time, and Owner may impose a set-off against payments due to Contractor to secure reimbursement for such charges, unless the need for such change is beyond the control of Contractor.

6.21 ENGINEER'S REVIEW

A. Engineer will review Shop Drawings and Samples in accordance with the Schedule of Submittals accepted by Engineer as required by paragraph 2.05. Engineer's review will be only for conformance with the design concept of the Project and for compliance with the information given in the Contract Documents and will not extend to means, methods, sequences, techniques or procedures of construction or to safety precautions or programs incident thereto. The review of a separate item as such will not indicate review of the assembly in which the item functions.

B. Engineer's review of Shop Drawings or samples will not relieve Contractor from responsibility for any variations from the Contract Documents unless Contractor has in writing called Engineer's attention to such variation at the time of submission and Engineer has given written concurrence to the specific variation, nor will any concurrence by Engineer relieve Contractor from responsibility for errors or omissions in the Shop Drawings. Engineer's review will not relieve Contractor from responsibility for complying with the requirements of paragraph 6.20.

C. Where a Shop Drawing or sample is required by the Contract Documents or the Schedule of Submittals accepted by Engineer per paragraph 2.05, no related Work will be commenced until the Submittal has been reviewed by Engineer.

6.22 CONTINUING THE WORK

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

6.23 CONTRACTOR'S GENERAL WARRANTY AND GUARANTEE

A. Contractor warrants and guarantees to Owner, Engineer, and Engineer's Consultants that all work will be in accordance with the Contract Documents and will not be defective. Contractor's warranty and guarantee excludes defects or damage caused by:

1. abuse, modification, or improper maintenance or operation by persons other than Contractor, Subcontractors, Suppliers, or their employees, agents, or representatives, or any person or entity for whom Contractor is responsible; or

2. normal wear and tear under normal usage.

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

1. observations by Engineer;

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

3. the issuance of a certificate of Substantial Completion or any payment by Owner to Contractor under the Contract Documents;

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

5. any acceptance by Owner or failure to do so;

6. any review or approval of a Shop Drawing or Sample Submittal or the issuance of a notice of acceptability by Engineer per paragraph 14.11;

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

8. any correction of defective Work by Owner.

C. If Contract requires Contractor to accept the assignment of a contract entered into by Owner, then the specific warranties, guarantees, and correction obligations contained in the assigned contract will govern with respect to Contractor's performance obligations to Owner for the Work described in the assigned Contract.

D. Contractor will assign to Owner all warranties extended to Contractor by material Suppliers and Subcontractors. If an assignment of warranty requires the material Supplier or Subcontractor to consent to same, then Contractor will secure the material Supplier's or Subcontractor's consent to assign said warranties to Owner.

E. The warranties provided in this section will be in addition to, and not in limitation of, any other warranty or remedy required by law.

6.24 INDEMNIFICATION

A. To the fullest extent permitted by law, Contractor will indemnify, defend (with counsel acceptable to Owner) and hold harmless Owner, Engineer and any additional indemnitees identified in the Supplementary Conditions and their respective directors, officers, members, partners, affiliates, employees, agents and successors, from and against any and all liabilities, claims, causes of action, lawsuits, liens, injuries, damages, losses and expenses (collectively

"Demands") to the extent caused by, arising out of, resulting from or occurring in connection with:

1. Contractor's breach of, or failure to comply with, the Agreement, the Contract Documents, or any other contract that it enters into regarding the Work, including any default in performance; or

2. Personal injury or death to any person (including, but not limited to, Contractor, Contractor's employees, Subcontractors, Subcontractors' employees, and material Suppliers) or injury to or destruction of property (including claims for loss of use) caused by, arising out of, resulting from, or in any way connected with

   a. the Work,

   b. any activity associated with the Work, or

   c. the operations or acts of commission or omission of Contractor, Contractor's employees, Subcontractors, Subcontractors' employees, material suppliers, or anyone for whom Contractor is legally liable in the performance of Work, whether arising before or after completion of the Work.

B. To the extent caused by, arising out of, resulting from, or occurring in connection with the provisions of the above paragraph 6.24.A, Contractor's indemnity obligations under this Agreement will include, but are not limited to:

   1. Indemnity for all damages and judgment interest, all costs and fees, including, but not limited to, all defense costs, expenses and actual attorneys' fees, and all settlement payments relating to, arising out of, resulting from or in any way connected with any demand requiring indemnity by this Agreement;

   2. All expenses, including but not limited to, costs, expenses and actual attorneys' fees, incurred in securing and enforcing indemnity from Contractor if Contractor fails or refuses promptly to fulfill any of the indemnity obligations under this Agreement;

   3. All indemnification obligations imposed upon Owner or Engineer, or both, arising out of or in connection with the Work; and

   4. Indemnification for any penalties and/or fines arising or resulting from Contractor's or any Subcontractor's failure to comply with laws and/or regulations applicable to its/their Work.

C. Contractor's duty to indemnify under subpart A.2. of paragraph 6.24 is limited to the negligence of Contractor, Contractor's employees, Subcontractors, Subcontractor's employees, material Suppliers, or anyone for whom Contractor is legally liable in the performance of the Work, whether arising before or after the completion of the Work.

D. The indemnification rights under this Agreement will not be construed to negate, abridge, or otherwise reduce any other right or obligations of indemnity which would otherwise exist.

E. Owner, at its option, may select counsel to defend any demand brought against it without impairing any obligation of Contractor to provide indemnification.

F. The indemnification provisions under this Agreement will survive the completion or termination of this Agreement.

G. In the case of claims by any employee of Contractor, anyone directly or indirectly employed by Contractor, or anyone for whose acts Contractor may be liable, the indemnification obligations under this Agreement will not be limited in any way by any limitation on the amount or type of damages, compensation or benefits payable by or for Contractor under workers' compensation acts. Such obligations will not be construed to negate, abridge or reduce other rights or obligations of indemnity that would otherwise exist as to a party or person described in this Agreement.

H. Indemnification, additional insured and hold harmless obligations of Contractor and Subcontractor under the Contract Documents will survive the termination of this Agreement.

I. Contractor and Subcontractors will compel their insurance company to waive subrogation against Owner, Engineer and Contractor and Subcontractors identified as additional insureds in the Contract Documents, including any municipal entity now existing or newly created during the term of the Contract Documents.

6.25 DELEGATION OF PROFESSIONAL DESIGN SERVICES

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

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

C. Owner and Engineer will be entitled to rely upon the adequacy, accuracy, and completeness of the services, certifications, or approvals performed by such design professionals.

D. Pursuant to this paragraph 6.25, Engineer's review or approval of design calculations and design drawings will be only for the limited purpose of checking for conformance with performance and design criteria given and the design concept expressed in the Contract Documents. Engineer's review or approval of Shop Drawings and other Submittals (except design calculations and design drawings) will be only for the purpose stated in paragraph 6.21.

E. Contractor will not be responsible for the adequacy of the performance or design criteria specified by Owner or Engineer.

ARTICLE 7 WORK BY OTHERS

7.01 RELATED WORK AT SITE

A. In addition to and apart from the Work under the Contract Documents, Owner may perform other work at or adjacent to the Site. Such other work may be performed by Owner's

employees, or through contracts between Owner and third parties. Owner may also arrange to have third-party utility owners perform work on their utilities and facilities at or adjacent to the Site.

B. If any part of Contractor's Work depends on proper execution or results upon the work of any such other contractor or utility owner, Contractor will inspect and promptly report to Engineer in writing any delays, defects or deficiencies in such other work that render it unavailable, or unsuitable for such proper execution and results of Contractor's Work. Contractor's failure to so report will constitute an acceptance of the other work as fit and proper for integration with Contractor's Work except for latent or non-apparent defects and deficiencies in the other work.

C. Contractor will afford each contractor who is party to such a direct contract, and each utility owner, (and Owner, if Owner is performing the additional work with Owner's employees), proper and safe access to the Site and a reasonable opportunity for the introduction and storage of materials and equipment and the execution of such other work and will properly connect and coordinate the Work with theirs. Unless otherwise provided in the Contract Documents, Contractor will do all cutting, fitting and patching of Contractor's Work that may be required to make its several parts come together properly and integrate with such other work. Contractor will not endanger any work of others by cutting, excavating or otherwise altering their work and will only cut or alter their work with the written consent of Engineer and the others whose work will be affected.

D. If the performance of additional work by other contractors, utility owner, or Owner was not noted in the Contract Documents, written notice thereof will be given to Contractor prior to starting any such additional work. If Contractor believes that the performance of such additional work by Owner or others involves additional expense to Contractor, or requires an extension of the Contract Time, Contractor may make a Claim therefor as provided in paragraph 11.01. Claims for delay or inconveniences due to operations of such other parties for work noted in the Contract Documents will not be allowed.

ARTICLE 8 OWNER'S RESPONSIBILITIES

8.01 COMMUNICATION TO CONTRACTOR

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

8.02 REPLACEMENT OF ENGINEER

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

8.03 FURNISHING DATA

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

8.04 PAY WHEN DUE

A. Owner will make payments to Contractor promptly after they are due as provided in paragraphs 14.05 and 14.11.

8.05 LANDS AND EASEMENTS; REPORTS AND TESTS

A. Owner's duties in respect to providing lands and easements and providing engineering surveys to establish reference points are set forth in paragraphs 4.01 and 4.05. Paragraph 4.02 refers to Owner's identifying and making available to Contractor copies of reports of investigations and tests of subsurface and latent physical conditions at the Site.

8.06 CHANGE ORDERS

A. In connection with Owner's rights to request changes in the Work in accordance with Article 10, Owner (especially in certain instances as provided in paragraph 10.01) is obligated to execute Change Orders.

8.07 INSPECTIONS, TESTS, AND APPROVALS

A. Owner's responsibility in respect to certain inspections, tests and approvals is set forth in paragraph 13.02.

8.08 LIMITATION ON OWNER’S RESPONSIBILITY

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

8.09 UNDISCLOSED HAZARDOUS MATERIALS

A. Owner’s responsibility in respect of undisclosed Constituents of Concern uncovered or revealed at the Site is set forth in Paragraph 4.06.

8.10 OWNER’S DESIGNATED REPRESENTATIVE

A. Owner will designate a person to act as its representatives during the performance of the Work. Owner’s designated representative will attend meetings and perform on behalf of Owner all obligations required of Owner under the provisions of the Contract Documents.

ARTICLE 9 ENGINEER'S STATUS DURING CONSTRUCTION

9.01 OWNER'S REPRESENTATIVE

A. Engineer will be Owner's representative during the construction period. The duties and responsibilities and the limitations of authority of Engineer as Owner's representative during construction will be as set forth in the Contract Documents.

9.02 VISITS TO SITE

A. Engineer may make visits to the Site at intervals appropriate to the various stages of construction to observe the progress and quality of the executed Work, and to determine solely for the benefit of Owner, in general, if the Work is proceeding in accordance with the technical requirements of the Contract Documents. It will not be the responsibility of Engineer to make exhaustive or continuous on Site inspections to check the quality or quantity of the Work.

9.03 RESIDENT PROJECT REPRESENTATIVE

A. If Owner and Engineer agree, Engineer will furnish a Resident Project Representative to assist Engineer in providing more continuous observation of the Work. A Resident Project Representative will act as directed by and under the supervision of Engineer. Resident Project Representative's dealings in matters pertaining to the on Site Work will in general be only with Engineer and Contractor, and dealings with Subcontractors will only be through or with the full knowledge of Contractor. The Resident Project Representative's duties and responsibilities include:

1. Schedules:

    a. Review the Progress Schedule, Schedule of Submittals and Schedule of Values prepared by Contractor.

2. Conferences:

    a. Arrange a schedule of progress meetings and other job conferences as required in consultation with Engineer and Owner, and notify those expected to attend in advance.

3. Liaison:

    a. Serve as Engineer's liaison with Contractor, working principally through Contractor's superintendent and assist him in understanding the intent of the technical aspects of the Contract Documents. Assist Engineer in serving as Owner's liaison with Contractor when Contractor's operations affect Owner's on Site operations.

4. Shop Drawings and Samples:

    a. Advise Engineer and Contractor, or Contractor’s superintendent, immediately of the commencement of any Work requiring a Shop Drawing or Sample submission if the submission was identified on the schedule and has not been reviewed by Engineer.

5. Review of Work, Rejection of Defective Work, Inspections, and Tests:

    a. Conduct on Site observations of the Work and report to Engineer whenever Resident Project Representative believes that technical aspects of any executed Work is unsatisfactory, faulty or defective or does not meet the requirements of any inspections, tests or approval required to be made or has been damaged prior to final payment; and advise Engineer when Resident Project Representative believes that any partially completed portion of the Work should be corrected or rejected or should be uncovered for observation, or requires special testing, inspection or approval.

    b. Observe, record and report to Engineer appropriate details relative to test procedures and startups.

    c. Accompany visiting inspectors representing public or other agencies having jurisdiction over the Project, record the outcome of these inspections and report to Engineer.

6. Modifications:

    a. Consider Contractor's suggestions for modifications in Plans or Specifications and report them to Engineer.

7. Reports:

a. Prepare periodic reports as required of progress of the Work and Contractor's compliance with the approved Progress Schedule and Schedule of Submittals.

8. Completion:

a. Verify that all items on final list of items requiring completion or correction have been completed or corrected and make recommendations to Engineer concerning acceptance.

9. Exceptions:

a. Resident Project Representative:

1) Shall not authorize any deviation from the Contract Documents or approve any substitute materials or equipment.

2) Shall not approve or accept any portion of the completed Work.

3) Shall not undertake any of the responsibilities of Contractor, Subcontractors or Contractor's superintendent, or expedite the Work.

4) Shall not advise on or issue directions relative to any aspect of the means, methods, techniques, sequences or procedures of construction unless such is specifically called for in the Contract Documents.

5) Shall not advise on or issue directions as to safety precautions and programs in connection with the Work.

6) Shall not advise on or issue directions regarding Contractor’s failure to comply with Laws and Regulations applicable to the furnishing or performance of the Work.

9.04 CLARIFICATIONS AND INTERPRETATIONS

A. Engineer will issue with reasonable promptness such written clarifications or interpretations of the Contract Documents as Engineer may determine necessary, which will be consistent with or reasonably inferable from the overall intent of the Contract Documents.

9.05 AUTHORIZED VARIATIONS IN WORK - FIELD ORDER

A. Engineer may authorize minor adjustments in the Work to avoid obstructions or interferences which do not involve an adjustment in the Contract Price or the Contract Time, and which are consistent with the overall intent of the Contract Documents. These may be accomplished by a Field Order and will be binding on Owner, and also on Contractor who will perform the change promptly. If Owner or Contractor believes that a Field Order justifies an adjustment in the Contract Price or Contract Times, or both, and the parties are unable to agree on entitlement to or on the amount or extent, if any, of any such adjustment, a request for a Change Proposal may be made therefore as provided in paragraph 10.06 or a Claim may be submitted as set forth in paragraph 11.01.

9.06 REJECTING DEFECTIVE WORK

A. Engineer will have authority to disapprove or reject completed portions of the Work which Engineer believes to be defective and will also have authority to require special inspection or testing of the Work as provided in paragraph 13.04, whether or not the Work is fabricated, installed or completed.

9.07 SHOP DRAWINGS, CHANGE ORDERS, AND PAYMENTS

A. Engineer's responsibility for Shop Drawings and samples are set forth in paragraphs 6.19 through 6.21 inclusive.

B. Engineer's responsibilities as to Change Orders are set forth in Articles 10, 11, and 12.

C. Engineer's responsibilities in respect of Applications for Payment are set forth in Article 14.

9.08 DETERMINATIONS FOR UNIT PRICE WORK

A. Engineer will determine the actual quantities and classifications of Unit Price Work performed by Contractor. Engineer will review Engineer’s preliminary determinations with Contractor on such matters before rendering a written decision thereon (by recommendation of an Application for Payment or otherwise). Engineer’s written decision thereon will be final and binding (except as modified by Engineer to reflect changed factual conditions or more accurate data) upon Owner and Contractor, subject to the provisions of paragraph 10.06.

9.09 DECISIONS ON DISAGREEMENTS, CLAIMS

A. Engineer will be the initial interpreter of the requirements of the Contract Documents and judge of the acceptability of the Work performed thereunder. Claims, disputes and other matters relating to the acceptability of the Work, or the interpretation of the requirements of the Contract Documents pertaining to the execution and progress of the Work, will be referred initially to Engineer in writing with a request for a formal decision in accordance with this paragraph 9.09.

B. Engineer will, with reasonable promptness, render a written decision on the issue referred. If Owner or Contractor believe that any such decision entitles them to an adjustment in the Contract Price, or Contract Times, or both, a Claim may be made under paragraph 11.01.

C. Engineer’s written decision on the issue referred will be final and binding on Owner and Contractor, subject to the provisions of paragraph 11.01.

D. In this capacity Engineer will not show partiality to Owner or Contractor and will not be liable in connection with any interpretation or decision rendered in good faith in such capacity.

9.10 LIMITATIONS ON ENGINEERS RESPONSIBILITIES

A. Neither Engineer's authority to act under this Article 9 or elsewhere in the Contract Documents, nor any decision made by Engineer in good faith either to exercise or not exercise such authority, will give rise to any duty or responsibility of Engineer to Owner or Contractor, any Subcontractor, any manufacturer, fabricator, Supplier, distributor, surety, or any other person, employee, or agent of any of them.

B. Engineer will not supervise, direct, control or have authority over, or be responsible for Contractor's means, methods, techniques, sequences or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of Contractor to comply with Laws and Regulations applicable to the furnishing or performance of the Work. Engineer will not be responsible for Contractor's failure to perform the Work in accordance with the Contract Documents. These limitations on authority and responsibility will also apply to Engineer’s Consultant’s, Resident Project Representative and assistants.

C. Engineer will not be responsible for the acts or omissions of Contractor or of any Subcontractor, Supplier, or of any other individual or entity performing any of the Work.

D. Engineer will not be responsible to Contractor or any Subcontractor, or Supplier, or to their agents or employees for injuries, damages, claims, losses, or expenses (including attorney's fees) of whatsoever kind resulting from or caused by any act or omission of Engineer in preparation for, arising from, relating to, or concerning the Project. Such acts or omissions include, but are not limited to, Engineer's negligence, tortuous conduct, errors, omissions, strict liability, breach of contract, or breach of warranty. Engineer makes no representations to Contractor, Subcontractors, Suppliers or their agents or employees regarding or respecting any work performed by Engineer in preparation for, arising from, relating to, or concerning the Project.

E. Neither Contractor, its agents or employees, nor any Subcontractors or Suppliers or their agents or employees, are intended beneficiaries of Engineer's agreement with Owner, nor are such parties intended beneficiaries of Engineer's duties or responsibilities arising therefrom. Engineer disclaims all duties to Contractor, Subcontractors, Suppliers or their agents or employees arising from, relating to, or concerning Engineer's involvement in the Project. Owner and Contractor further agree to notify all Contractor’s, Subcontractors or Suppliers of this disclaimer of Engineer's liability and require them to abide by this disclaimer.

ARTICLE 10 AMENDING THE CONTRACT DOCUMENTS; CHANGES IN THE WORK

10.01 AMENDING AND SUPPLEMENTING CONTRACT DOCUMENTS

A. The Contract Documents may be amended or supplemented by a Change Order, a Work Change Directive, or a Field Order.

1. Change Orders:

a. If an amendment or supplement to the Contract Documents includes a change in the Contract Price or the Contract Times, such amendment or supplement must be set forth in a Change Order. A Change Order also may be used to establish amendments and supplements of the Contract Documents that do not affect the Contract Price or Contract Times.

b. Owner and Contractor may amend those terms and conditions of the Contract Documents that do not involve;

1) the performance or acceptability of the Work,

2) the design (as set forth in the Drawings, Specifications, or otherwise), or

3) other engineering or technical matters, without the recommendation of Engineer. Such an amendment will be set forth in a Change Order.

2. Work Change Directives:

a. A Work Change Directive will not change the Contract Price or the Contract Times but is evidence that the parties expect that the modification ordered or documented by a Work Change Directive will be incorporated in a subsequently issued Change Order, following negotiations by the parties as to the Work Change Directive’s effect, if any, on the Contract Price and Contract Times; or, if negotiations are unsuccessful, by a

determination under the terms of the Contract Documents governing adjustments, expressly including paragraph 10.04 regarding change of Contract Price.

b. Contractor must submit any Change Proposal seeking an adjustment of the Contract Price or the Contract Times, or both, no later than 30 days after the issuance of the Work Change Directive.

c. Owner must submit any Claim seeking an adjustment of the Contract Price or the Contract Times, or both, no later than 60 days after issuance of the Work Change Directive.

3. Field Orders:

a. Engineer may authorize minor changes in the Work if the changes do not involve an adjustment in the Contract Price or the Contract Times and are compatible with the design concept of the completed Project as a functioning whole as indicated by the Contract Documents. Such changes will be accomplished by a Field Order and will be binding on Owner and Contractor, which will perform the Work involved promptly.

b. If Contractor believes that a Field Order justifies an adjustment in the Contract Price or Contract Times, or both, then before proceeding with the Work at issue, Contractor will submit a Change Proposal as provided herein.

10.02 OWNER-AUTHORIZED CHANGES IN THE WORK

A. Without invalidating the Contract and without notice to any surety, Owner may, at any time or from time to time, order additions, deletions, or revisions in the Work. Such changes will be supported by Engineer's recommendation, to the extent the change involves the design (as set forth in the Drawings, Specifications, or otherwise), or other engineering or technical matters. Such changes may be accomplished by a Change Order, if Owner and Contractor have agreed as to the effect, if any, of the changes on Contract Times or Contract Price; or by a Work Change Directive.

B. Upon receipt of any such document, Contractor will promptly proceed with the Work involved; or, in the case of a deletion in the Work, promptly cease construction activities with respect to such deleted Work. Added or revised Work will be performed under the applicable conditions of the Contract Documents. Nothing in this paragraph 10.02 will obligate Contractor to undertake work that Contractor reasonably concludes cannot be performed in a manner consistent with Contractor's safety obligations under the Contract Documents or Laws and Regulations.

10.03 UNAUTHORIZED CHANGES IN THE WORK

A. Contractor will not be entitled to an increase in the Contract Price or an extension of the Contract Times with respect to any work performed that is not required by the Contract Documents, as amended, modified, or supplemented, except in the case of an emergency as provided in paragraph 6.18 or in the case of uncovering Work as provided in paragraph 13.03.

10.04 CHANGE OF CONTRACT PRICE

A. The Contract Price may only be changed by a Change Order. Any Change Proposal for an adjustment in the Contract Price will comply with the provisions of paragraph 10.06. Any Claim for an adjustment of Contract Price will comply with the provisions of paragraph 11.01.

B. An adjustment in the Contract Price will be determined as follows:

1. where the Work involved is covered by Unit Prices contained in the Contract Documents, then by application of such Unit Prices to the quantities of the items involved (subject to the provisions of paragraph 12.03); or

2. where the Work involved is not covered by Unit Prices contained in the Contract Documents, then by a mutually agreed lump sum (which may include an allowance for overhead and profit not necessarily in accordance with paragraph 10.04.C.2); or

3. where the Work involved is not covered by Unit Prices contained in the Contract Documents and the parties do not reach mutual agreement to a lump sum, then on the basis of the Cost of the Work (determined as provided in paragraph 12.01) plus a Contractor's fee for overhead and profit (determined as provided in paragraph 10.04.C).

C. Contractor's Fee: When applicable, Contractor's fee for overhead and profit will be determined as follows:

1. a mutually acceptable fixed fee; or

2. if a fixed fee is not agreed upon, then a fee based on the following percentages of the various portions of the Cost of the Work:

a. for costs incurred under paragraph 12.01.B.1 and 12.01.B.2, Contractor's fee will be 15 percent;

b. for costs incurred under paragraph 12.01.B.3, Contractor's fee will be five percent;

c. where one or more tiers of subcontracts are on the basis of Cost of the Work plus a fee and no fixed fee is agreed upon, the intent of paragraphs 10.04.C.2.a and 10.04.C.2.b is that Contractor's fee will be based on:

1) a fee of 15 percent of the costs incurred under paragraphs 12.01.B.1 and 12.01.B.2 by the Subcontractor that actually performs the Work, at whatever tier, and

2) with respect to Contractor itself and to any Subcontractors of a tier higher than that of the Subcontractor that actually performs the Work, a fee of 5 percent of the amount (fee plus underlying costs incurred) attributable to the next lower tier Subcontractor;

3) provided, however, that for any such subcontracted work the maximum total fee to be paid by Owner will be no greater than 27 percent of the costs incurred by the Subcontractor that actually performs the Work;

d. no fee will be payable on the basis of costs itemized under paragraphs 12.01.B.4, 12.01.B.5, and 12.01.C;

e. the amount of credit to be allowed by Contractor to Owner for any change which results in a net decrease in cost will be the amount of the actual net decrease in cost plus a deduction in Contractor's fee by an amount equal to 5 percent of such net decrease; and

f. when both additions and credits are involved in any one change, the adjustment in Contractor's fee will be computed on the basis of the net change in accordance with paragraphs 10.04.C.2.a through 10.04.C.2.e, inclusive.

10.05 CHANGE OF CONTRACT TIMES

A. The Contract Times may only be changed by a Change Order. Any Change Proposal for an adjustment in the Contract Times will comply with the provisions of paragraph 10.06. Any Claim for an adjustment in the Contract Times will comply with the provisions of paragraph 11.01.

B. An adjustment of the Contract Times will be subject to the limitations set forth in paragraph 12.04, concerning delays in Contractor's progress.

10.06 CHANGE PROPOSALS

A. Contractor will submit a Change Proposal to Engineer to request an adjustment in the Contract Times or Contract Price; appeal an initial decision by Engineer concerning the requirements of the Contract Documents or relating to the acceptability of the Work under the Contract Documents; contest a set-off against payment due; or seeking other relief under the Contract. The Change Proposal will specify any proposed change in Contract Times or Contract Price, or both, or other proposed relief, and explain the reason for the proposed change, with citations to any governing or applicable provisions of the Contract Documents. Each Change Proposal will address only one issue, or a set of closely related issues.

1. Procedures: Contractor will submit each Change Proposal to Engineer promptly (but in no event later than 5 days) after the start of the event giving rise thereto, or after such initial decision. Contractor will submit supporting data, including the proposed change in Contract Price or Contract Time (if any) to Engineer and Owner within 15 days after the submittal of the Change Proposal. The supporting data will be accompanied by a written statement that the supporting data are accurate and complete, and that any requested time or price adjustment is the entire adjustment to which Contractor believes it is entitled as a result of said event. Engineer will advise Owner regarding the Change Proposal and consider any comments or response from Owner regarding the Change Proposal.

2. Engineer's Action: Engineer will review each Change Proposal and, within 30 days after receipt of Contractor's supporting data, either deny the Change Proposal in whole, approve it in whole, or deny it in part and approve it in part. Such actions will be in writing, with a copy provided to Owner and Contractor. If Engineer does not take action on the Change Proposal within 30 days, then either Owner or Contractor may at any time thereafter submit a letter to the other party indicating that as a result of Engineer's inaction the Change Proposal is deemed denied, thereby commencing the time for appeal of the denial under paragraph 11.01.

3. Binding Decision: Engineer's decision will be final and binding upon Owner and Contractor, unless Owner or Contractor appeals the decision by filing a Claim under paragraph 11.01.

B. Resolution of Certain Change Proposals: If the Change Proposal does not involve the design (as set forth in the Drawings, Specifications, or otherwise), the acceptability of the Work, or other engineering or technical matters, then Engineer will notify the parties that Engineer is unable to resolve the Change Proposal. For purposes of further resolution of such a Change Proposal, such notice will be deemed a denial, and Contractor may choose to seek resolution under the terms of paragraph 11.01.

10.07 EXECUTION OF CHANGE ORDERS

A. Owner and Contractor will execute appropriate Change Orders covering:

1. changes in the Contract Price or Contract Times which are agreed to by the Parties, including any undisputed sum or amount of time for Work actually performed in accordance with a Work Change Directive;

2. changes in Contract Price resulting from an Owner set-off, unless Contractor has duly contested such set-off;

3. changes in the Work which are:

   a. ordered by Owner pursuant to paragraph 10.02,

   b. required because of Owner's acceptance of defective Work under paragraph 13.08 or Owner's correction of defective Work under paragraph 13.09, or

   c. agreed to by the parties, subject to the need for Engineer's recommendation if the change in the Work involves the design (as set forth in the Drawings, Specifications, or otherwise), or other engineering or technical matters; and

4. changes in the Contract Price or Contract Times, or other changes, which embody the substance of any final and binding results under paragraph 10.06, or Article 16.

B. If Owner or Contractor refuses to execute a Change Order that is required to be executed under the terms of this paragraph 10.07, it will be deemed to be of full force and effect, as if fully executed.

10.08 NOTIFICATION TO SURETY

A. If the provisions of any bond require notice to be given to a surety of any change affecting the general scope of the Work or the provisions of the Contract Documents (including, but not limited to, Contract Price or Contract Times), the giving of any such notice will be Contractor's responsibility. The amount of each applicable bond will be adjusted to reflect the effect of any such change.

ARTICLE 11 CLAIMS

11.01 CLAIMS

A. Claims Process: The following disputes between Owner and Contractor will be submitted to the Claims process set forth in this Article:

   1. Appeals by Owner or Contractor of Engineer's decisions regarding Change Proposals;

   2. Owner demands for adjustments in the Contract Price or Contract Times, or other relief under the Contract Documents; and

   3. Disputes that Engineer has been unable to address because they do not involve the design (as set forth in the Drawings, Specifications, or otherwise), the acceptability of the Work, or other engineering or technical matters.

B. Submittal of Claim: The party submitting a Claim will deliver it directly to the other party to the Contract promptly (but in no event later than 10 days) after the start of the event giving rise thereto; in the case of appeals regarding Change Proposals within 30 days of the decision under appeal. The party submitting the Claim will also furnish a copy to Engineer, for its information only. The responsibility to substantiate a Claim will rest with the party making the Claim. In the case of a Claim by Contractor seeking an increase in the Contract Times or

Contract Price, or both, Contractor will certify that the Claim is made in good faith, that the supporting data are accurate and complete, and that to the best of Contractor's knowledge and belief the amount of time or money requested accurately reflects the full amount to which Contractor is entitled.

C. Review and Resolution: The party receiving a Claim will review it thoroughly, giving full consideration to its merits. The two parties will seek to resolve the Claim through the exchange of information and direct negotiations. The parties may extend the time for resolving the Claim by mutual agreement. All actions taken on a Claim will be stated in writing and submitted to the other party, with a copy to Engineer.

D. Mediation:

1. At any time after initiation of a Claim, Owner and Contractor may mutually agree to mediation of the underlying dispute. The agreement to mediate will stay the Claim submittal and response process.

2. If Owner and Contractor agree to mediation, then after 60 days from such agreement, either Owner or Contractor may unilaterally terminate the mediation process, and the Claim submittal and decision process will resume as of the date of the termination. If the mediation proceeds but is unsuccessful in resolving the dispute, the Claim submittal and decision process will resume as of the date of the conclusion of the mediation, as determined by the mediator.

3. Owner and Contractor will each pay one-half of the mediator's fees and costs.

E. Partial Approval: If the party receiving a Claim approves the Claim in part and denies it in part, such action will be final and binding unless within 30 days of such action the other party invokes the procedure set forth in Article 16 for final resolution of disputes.

F. Denial of Claim: If efforts to resolve a Claim are not successful, the party receiving the Claim may deny it by giving written notice of denial to the other party. If the receiving party does not take action on the Claim within 90 days, then either Owner or Contractor may at any time thereafter submit a letter to the other party indicating that as a result of the inaction, the Claim is deemed denied, thereby commencing the time for appeal of the denial. A denial of the Claim will be final and binding unless within 30 days of the denial the other party invokes the procedure set forth in Article 16 for final resolution of disputes.

G. Final and Binding Results: If the parties reach a mutual agreement regarding a Claim, whether through approval of the Claim, direct negotiations, mediation, or otherwise; or if a Claim is approved in part and denied in part, or denied in full, and such actions become final and binding; then the results of the agreement or action on the Claim will be incorporated in a Change Order to the extent they affect the Contract, including the Work, the Contract Times, or the Contract Price.

ARTICLE 12 COST OF THE WORK; ALLOWANCES; UNIT PRICE WORK

12.01 COST OF WORK

A. Purposes for Determination of Cost of the Work: The term Cost of the Work means the sum of all costs necessary for the proper performance of the Work at issue, as further defined below. The provisions of this paragraph 12.01 are used to determine the value of a Change Order, Change Proposal, Claim, set-off, or other adjustment in Contract Price. When the value of any

such adjustment is determined on the basis of Cost of the Work, Contractor is entitled only to those additional or incremental costs required because of the change in the Work or because of the event giving rise to the adjustment.

B. Costs Included: Except as otherwise may be agreed to in writing by Owner, costs included in the Cost of the Work will be in amounts no higher than those prevailing in the locality of the Project, will not include any of the costs itemized in paragraph 12.01.C, and will include only the following items:

1. Payroll costs for employees in the direct employ of Contractor in the performance of the Work under schedules of job classifications agreed upon by Owner and Contractor. Such employees will include, without limitation, superintendents, foremen, and other personnel employed full time on the Work. Payroll costs for employees not employed full time on the Work will be apportioned on the basis of their time spent on the Work. Payroll costs will include, but not be limited to, salaries and wages plus the cost of fringe benefits, which will include social security contributions, unemployment, excise, and payroll taxes, workers' compensation, health and retirement benefits, bonuses, sick leave, and vacation and holiday pay applicable thereto. The expenses of performing Work outside of regular working hours, on Saturday, Sunday, or legal holidays, will be included in the above to the extent authorized by Owner.

2. Costs of all materials and equipment furnished and incorporated in the Work, including costs of transportation and storage thereof, and Suppliers' field services required in connection therewith. All cash discounts will accrue to Contractor unless Owner deposits funds with Contractor with which to make payments, in which case the cash discounts will accrue to Owner. All trade discounts, rebates, and refunds and returns from sale of surplus materials and equipment will accrue to Owner, and Contractor will make provisions so that they may be obtained.

3. Payments made by Contractor to Subcontractors for Work performed by Subcontractors. If required by Owner, Contractor will obtain competitive bids from Subcontractors acceptable to Owner and Contractor and will deliver such bids to Owner, who will then determine, with the advice of Engineer, which bids, if any, will be acceptable. If any subcontract provides that the Subcontractor is to be paid on the basis of Cost of the Work plus a fee, the Subcontractor's Cost of the Work and fee will be determined in the same manner as Contractor's Cost of the Work and fee as provided in this paragraph 12.01.

4. Costs of special consultants (including but not limited to engineers, architects, testing laboratories, surveyors, attorneys, and accountants) employed for services specifically related to the Work.

5. Supplemental costs including the following:

a. Cost, including transportation and maintenance, of all materials, supplies, equipment, machinery, appliances, office, and temporary facilities at the Site, and hand tools not owned by the workers, which are consumed in the performance of the Work, and cost, less market value, of such items used but not consumed which remain the property of Contractor.

b. Rentals of all construction equipment and machinery, and the parts thereof, whether rented from Contractor or others in accordance with rental agreements approved by Owner with the advice of Engineer, and the costs of transportation, loading, unloading,

assembly, dismantling, and removal thereof. All such costs will be in accordance with the terms of said rental agreements. The rental of any such equipment, machinery, or parts will cease when the use thereof is no longer necessary for the Work.

1) The rental rate established for each piece of Contractor owned equipment, including appurtenances and attachments to the equipment, used will be determined by use of the Rental Rate Blue Book for Construction Equipment, Volume 1, 2 or 3, as applicable; the edition which is current at the time the Work was started will apply. The established rental rate will be equal to the "Monthly" rate divided by 176; modified by the rate adjustment factor and the applicable map adjustment factor, plus the "Estimated Operating Costs per Hour."

2) For equipment not listed in the Rental Rate Blue Book, Volume 1, 2 or 3, the rental rate will be determined by using the rate listed for a similar piece of equipment or by proportioning a rate listed so that the capacity, size, horsepower, and age are properly considered.

3) For equipment for which there are no comparables in the Rental Rate Blue Book, Volume 1, 2 or 3, the monthly rate will be reasonable, but not more than 5 percent of the current list price, or invoice, of the equipment. The base hourly rate will then be determined by dividing the monthly rate by 176 to which 20 percent will be added to the sum which will account for adjustments and operating costs.

c. Sales, consumer, use, and other similar taxes related to the Work, and for which Contractor is liable, as imposed by laws and regulations.

d. Deposits lost for causes other than negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable, and royalty payments and fees for permits and licenses.

e. Losses and damages (and related expenses) caused by damage to the Work, not compensated by insurance or otherwise, sustained by Contractor in connection with the performance of the Work (except losses and damages within the deductible amounts of property insurance established in accordance with paragraph 5.03), provided such losses and damages have resulted from causes other than the negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable. Such losses will include settlements made with the written consent and approval of Owner. No such losses, damages, and expenses will be included in the Cost of the Work for the purpose of determining:

1) The cost of utilities, fuel, and sanitary facilities at the Site.

2) The costs of premiums for all bonds and insurance that Contractor is required by the Contract Documents to purchase and maintain.

C. Costs Excluded: The term Cost of the Work will not include any of the following items:

1. Payroll costs and other compensation of Contractor's officers, executives, principals (of partnerships and sole proprietorships), general managers, safety managers, engineers, architects, estimators, attorneys, auditors, accountants, purchasing and contracting agents, expediters, timekeepers, clerks, and other personnel employed by Contractor, whether at the Site or in Contractor's principal or branch office for general administration of the Work

and not specifically included in the agreed upon schedule of job classifications referred to in paragraph 12.01.B.1 or specifically covered by paragraph 12.01.B.4. The payroll costs and other compensation excluded here are to be considered administrative costs covered by Contractor's fee.

2. Expenses of Contractor's principal and branch offices other than Contractor's office at the Site.

3. Any part of Contractor's capital expenses, including interest on Contractor's capital employed for the Work and charges against Contractor for delinquent payments.

4. Costs due to the negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable, including but not limited to, the correction of defective Work, disposal of materials or equipment wrongly supplied, and making good any damage to property.

5. Other overhead or general expense costs of any kind and the costs of any item not specifically and expressly included in paragraph 12.01.B.

D. Contractor's Fee: When the value of any Work covered by a Change Order, Change Proposal, Claim, set-off, or other adjustment in Contract Price is determined on the basis of Cost of the Work, Contractor's fee will be determined as set forth in paragraph 10.04.C.

E. Documentation: Whenever the Cost of the Work for any purpose is to be determined pursuant to this Article 12, Contractor will establish and maintain records thereof in accordance with generally accepted accounting practices and submit in a form acceptable to Engineer on a daily basis, an itemized cost breakdown together with supporting data.

12.02 ALLOWANCES

A. It is understood that Contractor has included in the Contract Price all allowances so named in the Contract Documents and will cause the Work so covered to be performed for such sums and by such persons or entities as may be acceptable to Owner and Engineer.

B. Cash Allowances: Contractor agrees that:

1. the cash allowances include the cost to Contractor (less any applicable trade discounts) of materials and equipment required by the allowances to be delivered at the Site, and all applicable taxes; and

2. Contractor's costs for unloading and handling of the Site, labor, installation, overhead, profit, and other expenses contemplated for the cash allowances have been included in the Contract Price and not in the allowances, and no demand for additional payment on account of any of the foregoing will be valid.

C. Contingency Allowance: Contractor agrees that a contingency allowance, if any, is for the sole use of Owner to cover unanticipated costs.

D. Prior to final payment, an appropriate Change Order will be issued as recommended by Engineer to reflect actual amounts due Contractor on account of Work covered by allowances, and the Contract Price will be correspondingly adjusted.

12.03 UNIT PRICE WORK

A. Where the Contract Documents provide that all or part of the Work is to be Unit Price Work, initially the Contract Price will be deemed to include for all Unit Price Work an amount equal to the sum of the unit price for each separately identified item of Unit Price Work times the estimated quantity of each item as indicated in the Proposal.

B. The estimated quantities of items of Unit Price Work are not guaranteed and are solely for the purpose of comparison of Bids and determining an initial Contract Price. Payments to Contractor for Unit Price Work will be based on actual quantities.

C. Each Unit Price will be deemed to include an amount considered by Contractor to be adequate to cover Contractor's overhead and profit for each separately identified item.

D. Engineer will determine the actual quantities and classifications of Unit Price Work performed by Contractor. Engineer will review Engineer's preliminary determinations with Contractor on such matters before rendering a written decision thereon (by recommendation of an Application for Payment or otherwise). Engineer's written decision thereon will be final and binding (except as modified by Engineer to reflect changed factual conditions or more accurate data) upon Owner and Contractor, subject to the provisions of the following paragraph 12.03.E.

E. Within 30 days of Engineer's written decision under the preceding paragraph 12.03.D, Contractor may submit a Change Proposal, or Owner may file a Claim, seeking and adjustment in the Contract Price if:

1. the quantity of any item of Unit Price Work performed by Contractor differs materially and significantly from the estimate quantity of such item indicated in the Proposal (in no event will any change in quantities of less than 25% be considered a material or significant change from the estimated quantities); and

2. there is no corresponding adjustment with respect to any other item of Work.

12.04 DELAYS IN CONTRACTOR'S PROGRESS

A. If Owner, Engineer, or anyone for whom Owner is responsible, delays, disrupts, or interferes with the performance or progress of the Work, then Contractor will be entitled to request an equitable adjustment in the Contract Times and Contract Price. However, Contractor's entitlement to an adjustment of the Contract Times or Contract Price is expressly conditioned on such adjustment being essential to Contractor's ability to complete the Work within the Contract Times.

B. Contractor will not be entitled to an adjustment in Contract Price or Contract Times for delay, disruption, or interference caused by or within the control of Contractor. Delay, disruption, and interference attributable to and within the control of a Subcontractor or Supplier will be deemed to be within the control of Contractor.

C. If Contractor's performance or progress is delayed, disrupted, or interfered with by unanticipated causes not the fault and beyond the control of Owner, Contractor, and those for which they are responsible, then Contractor will be entitled to an equitable adjustment in Contract Times. Contractor's entitlement to an adjustment of the Contract Times is conditioned on such adjustment being essential to Contractor's ability to complete the Work within the Contract Times. Such an adjustment will be Contractor's sole and exclusive remedy for the delays, disruption, and interference described in this paragraph. Causes of delay, disruption, or

interference that may give rise to an adjustment in Contract Times under this paragraph include only the following:

1. severe and unavoidable natural catastrophes such as fires, floods, epidemics, and earthquakes;

2. acts or failures to act of utility owners (other than those performing other works at or adjacent to the Site by arrangement with Owner, as specified in paragraph 7.01); and

3. acts of war or terrorism.

D. Contractor's entitlement to an adjustment of Contract Times or Contract Price is limited as follows:

1. Contractor's entitlement to an adjustment of the Contract Times is conditioned on the delay, disruption, or interference adversely affecting an activity on the critical path to completion of the Work, as of the time of the delay, disruption, or interference.

2. Contractor will not be entitled to an adjustment in Contract Price for any delay, disruption, or interference if such delay is concurrent with a delay, disruption, or interference caused by or within the control of Contractor. Such a concurrent delay by Contractor will not preclude an adjustment of Contract Times to which Contractor is otherwise entitled.

3. Adjustments of Contract Times or Contract Price are subject to the provisions of Article 10.

E. Each Contractor request or Change Proposal seeking an increase in Contract Times or Contract Price must be supplemented by supporting data that sets forth in detail the following:

1. The circumstances that form the basis for the requested adjustment;

2. The date upon which each cause of delay, disruption, or interference began to affect the progress of the Work;

3. The date upon which each cause of delay, disruption, or interference ceased to affect the progress of the Work;

4. The number of days' increase in Contract Times claimed as a consequence of each such cause of delay, disruption, or interference; and

5. The impact on Contract Price, in accordance with the provisions of paragraph 10.04.

F. Contractor will also furnish such additional supporting documentation as Owner or Engineer may require including, where appropriate, a revised Progress Schedule indicating all the activities affected by the delay, disruption, or interference, and an explanation of the effect of the delay, disruption, or interference on the critical path to completion of the Work.

G. Delays, disruption, and interference to the performance or progress of the Work resulting from the existence of a differing subsurface or physical condition, an Underground Facility that was not shown or indicated by the Contract Documents, or not shown or indicated with reasonable accuracy, and those resulting from Hazardous Environmental Conditions, are governed by paragraphs 4.03 and 4.06.

H. Paragraph 7.01 governs delays, disruption, and interference to the performance or progress of the Work resulting from the performance of certain other work at or adjacent to the Site.

I. Contractor will not be entitled to any adjustment in Contract Price or Contract Times for any delay, disruption, or interference if such delay is concurrent with a delay, disruption, or interference caused by or within the control of Contractor.

J. Contractor must submit any Change Proposal seeking an adjustment in Contract Price or Contract Times under this paragraph within 5 days of the commencement of the delaying, disrupting, or interfering event.

K. Where Contractor is prevented from completing any part of the Work within the Contract Time (or Milestones) due to delay beyond the control of both Owner and Contractor, an extension of the Contract Times (or Milestones) in an amount equal to the time lost due to such delay will be Contractor's sole and exclusive remedy for such delay. In no event will Owner or Engineer be liable to Contractor, any Subcontractor, any Supplier, or any other person or organization, or to any surety or employee or any agent of them, for damages, including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs, arising out of or resulting from:

1. delays caused by or within the control of Contractor (or Subcontractor or Supplier);

2. delays beyond the control of both Owner and Contractor, including but not limited to fires, floods, epidemics, abnormal weather conditions, acts of God, or acts of neglect by utility owners or other contractors performing other work;

L. Nor will Owner or Engineer or each of them be liable to Contractor for any claims, costs, losses or damages sustained by Contractor on or in connection with any other project or anticipated project.

M. Nothing in this paragraph 12.04 bars a change in Contract Price to compensate Contractor due to delay, interference, or disruption directly attributable to actions or inactions of Owner or anyone for whom Owner is responsible. Except for an adjustment to the Contract Times and Contract Price, Contractor will not be entitled to and hereby waives any and all damages that it may suffer by reason of such delay or for any Act of God, including but not limited lost profits, overhead, and other consequential damages.

ARTICLE 13 TESTS AND INSPECTION; CORRECTION, REMOVAL OR ACCEPTANCE OF DEFECTIVE WORK

13.01 ACCESS TO WORK

A. Owner, Engineer and Engineer's representatives, other representatives of Owner, testing agencies and governmental agencies with jurisdictional interests will have access to the Work at reasonable times for their observation, inspection and testing. Contractor will provide proper and safe conditions for such access and advise Owner and Engineer of Contractor's Site safety procedures and programs so that Owner and Engineer may comply therewith as applicable.

13.02 TESTS AND INSPECTIONS

A. Contractor will give Engineer and testing agency at least 24-hour notice, unless otherwise specified, of readiness of the Work for all required inspections, tests or approvals, and will cooperate with inspection and testing personnel to facilitate required inspections or tests.

B. If any Law and Regulation, code, or order of any public body having jurisdiction requires any Work or part thereof to specifically be inspected, tested or approved, Contractor will assume full responsibility therefor, pay all costs in connection therewith and furnish Engineer the required certificates of inspection, testing or approval.

C. Contractor will also be responsible for and will pay all costs in connection with any inspection or testing required in connection with Owner's or Engineer's acceptance of a manufacturer, fabricator, Supplier or distributor of materials or equipment proposed to be incorporated in the Work, or of materials or equipment submitted for approval prior to Contractor's purchase thereof for incorporation in the Work.

D. The cost of all other inspections, tests and approvals required by the Contract Documents will be paid by Owner unless otherwise specified.

E. All inspections, tests or approvals other than those required by law, ordinance, rule, regulation, code or order of any public body having jurisdiction will be performed by organizations acceptable to Owner and Contractor or by Engineer if so specified.

F. Cost of materials to be used in inspection and transportation costs will be paid for by Contractor.

G. Neither observations by Engineer nor inspections, tests or approvals by others will relieve Contractor from Contractor's obligations to perform the Work in accordance with the Contract Documents.

13.03 UNCOVERING WORK

A. If any Work that is to be tested, inspected or approved is covered without written concurrence of Engineer, or contrary to the written request of Engineer, it will, if requested by Engineer, be uncovered by Contractor for Engineer's observation. Such uncovering will be at Contractor's expense unless Contractor has given Engineer timely written notice of Contractor's intention to cover such Work and Engineer has not acted with reasonable promptness in response to such notice.

B. If Engineer considers it necessary or advisable that covered Work be observed by Engineer or inspected or tested by others, Contractor, at Engineer's request, will uncover, expose or otherwise make available for observation, inspection or testing as Engineer may require, that portion of the Work in question, furnishing all necessary labor, material, and equipment. Except as otherwise specified in paragraph 13.04, the cost of Work will be paid for as follows:

1. If it is found that such Work is defective, Contractor will bear all the expenses of such uncovering, exposure, observation, inspection and testing, and of satisfactory reconstruction, (including, but not limited to, fees and charges of engineers, architects, attorneys, and other professionals) and an appropriate deductive Change Order will be issued. If the parties are unable to agree as to the amount or extent of any change in Contract Price or Contract Time, Owner may make a Claim as provided in paragraph 11.01.

2. If, however, such Work is not found to be defective, Contractor will be allowed an increase in the Contract Price or an extension of the Contract Time or both, directly attributable to such uncovering, exposure, observation, inspection, testing, and reconstruction. If the parties are unable to agree as to the amount or extent of any change in Contract Price or Contract Time, Contractor may make a Claim as provided in paragraph 11.01.

13.04 DEFECTIVE WORK

A. Contractor's Obligation: It is Contractor's obligation to assure that the Work is not defective.

B. Engineer's Authority: Engineer has the authority to determine whether Work is defective, and to reject defective Work.

13.05 OWNER MAY STOP THE WORK

A. If the Work is defective, or Contractor fails to supply sufficient skilled workers or suitable materials or equipment, or fails to furnish or perform the Work in such a way that the completed Work will conform to the Contract Documents, Owner may order Contractor to stop the Work, or any portion thereof, until the cause for such order has been eliminated; however, this right of Owner to stop the Work will not give rise to any duty on the part of Owner to exercise this right for the benefit of Contractor, any Subcontractor, Supplier, any other individual or entity, or any surety for, or employee or agent of any of them.

13.06 CORRECTION OR REMOVAL OF DEFECTIVE WORK

A. If required by Engineer or Owner, Contractor will promptly either correct all defective Work, whether or not fabricated, installed or completed, or if the Work has been rejected by Engineer, remove it from the Site and replace it with non-defective Work. Contractor will pay all claims, costs, losses, damages and expenses caused by or resulting from such correction or removal (including, but not limited to all costs of repair or replacement of work of others) and will take no action that would void or otherwise impair Owner's special warranty or guarantee, if any, on such Work.

13.07 GUARANTEE PERIOD

A. If within 1 year after the date of Substantial Completion (or such longer period of time as may be prescribed by Laws or Regulations or by the terms of any applicable special guarantee required by the Contract Documents), or by any specific provision of the Contract Documents, any Work is found to be defective, Contractor will promptly, without cost to Owner and in accordance with Owner's written instructions:

1. repair defective land or areas;

2. correct such defective Work;

3. if the defective Work has been rejected by Owner, remove it from the Site and replace it with Work that is not defective, and

4. satisfactorily correct or repair or remove and replace any damage to other Work or the work of others or other land or areas resulting therefrom.

B. If Contractor does not promptly comply with the terms of such instructions, or in an emergency where delay would cause serious risk of loss or damage, Owner may have the defective Work corrected or the rejected Work removed and replaced, and all claims, costs, losses, damages and expenses caused by or resulting from such removal and replacement (including but not limited to all costs of repair or replacement or work of others) will be paid by Contractor.

C. Repair or replacements made under the guarantee will bear an additional 1 year guarantee dated from the acceptance of repair or replacement.

13.08 ACCEPTANCE OF DEFECTIVE WORK

A. If, instead of requiring correction or removal and replacement of defective Work, Owner (and, prior to Engineer's recommendation of final payment, also Engineer) prefers to accept it, Owner may do so. Contractor will pay all claims, costs, losses, damages and expenses attributable to Owner’s evaluation of and determination to accept such defective Work (such costs to be approved by Engineer as to reasonableness). In such case, if acceptance occurs prior to Engineer's recommendation of final payment, a Change Order will be issued incorporating the necessary revisions in the Contract Documents with respect to the Work; and Owner will be entitled to an appropriate reduction in the Contract Price. If the acceptance occurs after such recommendation, an appropriate amount will be paid by Contractor to Owner.

13.09 OWNER MAY CORRECT DEFECTIVE WORK

A. If Contractor fails within a reasonable time after written notice from Engineer to correct defective Work, or to remove and replace rejected Work as required by Engineer in accordance with paragraph 13.06, or if Contractor fails to perform the Work in accordance with the Contract Documents (including any requirements of the Progress Schedule), Owner may, after 48 hours' written notice to Contractor and Contractor's Surety without prejudice to any other remedy Owner may have, correct and remedy any such deficiency.

B. In exercising Owner's rights and remedies under this paragraph 13.09, Owner will proceed expeditiously. To the extent necessary to complete corrective and remedial action, Owner may exclude Contractor from all or part of the Site, take possession of all or part of the Work, and suspend Contractor's services related thereto, take possession of Contractor's tools, appliances, construction equipment and machinery at the Site and incorporate in the Work all materials and equipment stored at the Site or for which Owner has paid Contractor but which are stored elsewhere. Contractor will allow Owner, Owner's representatives, agents and employees, Owner’s other contractors, and Engineer’s consultants such access to the Site as may be necessary to enable Owner to exercise Owner's rights and remedies under this paragraph 13.09.

C. All claims, costs, losses, damages and expenses incurred or sustained by Owner in exercising such rights and remedies will be charged against Contractor and a Change Order will be issued incorporating the necessary revisions in the Contract Documents with respect to the Work. Owner will be entitled to an appropriate reduction in the Contract Price equivalent to such claims, costs, losses, damages and expenses including but not be limited to all costs of repair or replacement of work of others destroyed or damaged by correction, removal or replacement of Contractor’s defective Work.

D. Contractor will not be allowed an extension of the Contract Time because of any delay in performance of the Work attributable to the exercise by Owner of Owner's rights under this Article 13.

ARTICLE 14 PAYMENTS TO CONTRACTOR AND COMPLETION

14.01 SCHEDULES

A. At least 10 days prior to submitting the first Application for Payment, Contractor will submit to Engineer a final Schedule of Submittals, and, where applicable, a Schedule of Values for the Work. These schedules will be satisfactory in form and substance to Engineer as provided in Article 2.

B. The Schedule of Values will include quantities and unit prices aggregating the Contract Price and will subdivide the Work into component parts. Each unit cost so established will include its proportionate share of Contractor's general operating charges such as profit, overhead, supervision, insurance, bond premiums, interest, equipment cost, depreciation and rental, contingencies, expendable tools, equipment and supplies. The total cost of the items and quantities Contractor lists in the Schedule of Values will equal the total Contract Price established in the Proposal.

C. The Schedule of Values will include a complete set of detailed work sheets on bid take off and bid summary covering estimated general conditions expense (field overhead), general overhead, profit mark ups and revisions leading to the final bid amount.

D. When the Schedule of Values is approved by Engineer, it will become part of the Agreement and will be used as the basis for Contractor progress payments.

E. Progress payments based upon Unit Price Work will be based upon the number of units completed.

14.02 APPLICATION FOR PROGRESS PAYMENT

A. At least 20 days before each Application for Payment falls due (but not more often than once a month), Contractor will submit to Engineer for review an Application for Payment, Contractor's Declaration, Payment Schedule, and updated Progress Schedules indicating the anticipated completion dates of the various stages of the Work and estimated payments during the next 3 months. Contractor's Application for Payment will be filled out on the form provided in the Contract Documents and signed by Contractor covering the Work completed as of the date of the Application for Payment and accompanied by such supporting documentation as is required by the Contract Documents and as Engineer or Owner may reasonably require. The Payment Schedule will be on the form provided in the Contract Documents or in a format acceptable to Engineer or Owner. On the second and all subsequent payments, partial Waivers of Lien and Sworn Statement will be required for all Work completed and paid for on previous certificates.

B. If payment is requested on the basis of materials and equipment not incorporated in the Work but delivered and suitably stored at the Site or at another location agreed to in writing, the Application for Payment will also be accompanied by such data, satisfactory to Owner, as will establish Owner's title to the material and equipment and protect Owner's interest therein, including applicable insurance. A receipted vendor's invoice showing the quantities of materials and the amounts paid will be required and will accompany the Application for Payment.

C. Retainage with respect to progress payments will be in accordance with paragraph 14.03, and it will be retained until after completion of the entire Work and its final acceptance. When the amount to be retained is reduced to less than 10 percent, Contractor will file with Owner the written consent of the Surety to such reduction and will furnish an affidavit that all Contractor’s indebtedness by reason of the Contract has been paid.

14.03 RETAINAGE

A. On Contracts with a dollar value of $30,000 and greater or on Contracts that provide for more than 3 progress payments, progress payments and retainage will be governed by the provisions of any statutes, rules or regulations regarding retention and these are incorporated herein by reference and made a part of this Contract.

B. If there are no statutes, rules, or regulations applicable to retention, retainage will be 10%, or such an amount as Owner deems necessary.

14.04 REVIEW OF APPLICATIONS FOR PROGRESS PAYMENT

A. Engineer will, within 10 days after receipt of each Contractor's Application for Payment and Payment Schedule, including each resubmittal, either indicate in writing a recommendation of payment and present an Engineer's Certificate for Payment to Owner, or may return the Application to Contractor indicating in writing Engineer's reasons for refusing to recommend payment. In the latter case, Contractor may make the necessary corrections and resubmit the Application.

B. Engineer's recommendation of any payment requested in Contractor’s Application for Payment will constitute a representation by Engineer to Owner, based on Engineer's review of the Contractor’s Application for Payment and Certificate for Payment and the accompanying data and schedules, as an experienced and qualified design professional that to the best of Engineer's knowledge, information and belief;

1. the Work has progressed to the point indicated;

2. the quality of the Work is in accordance with the technical aspects of the Contract Documents subject to an evaluation of the Work as a functioning Project upon Substantial Completion, to the results of any subsequent tests called for in the Contract Documents, a final determination of quantities and classifications for any Unit Price Work under paragraph 12.03, and any qualifications stated in the recommendation; and

3. the conditions precedent to Contractor’s being entitled to such payment appear to have been fulfilled in so far as it is Engineer’s responsibility to observe the Work.

C. However, by recommending any such payment Engineer will not thereby be deemed to have represented that:

1. exhaustive or continuous on-Site inspections have been made to check the quality or the quantity of the Work; or

2. involved detailed inspections of the Work beyond the responsibilities specifically assigned to Engineer in the Contract; or

3. there may not be other matters or issues between the parties that might entitle Contractor to be paid additionally by Owner or entitle Owner to withhold payment to Contractor.

D. Neither Engineer's review of Contractor’s Work for the purpose of recommending payments nor Engineer’s recommendation of any payment, including final payment, will impose responsibility on Engineer:

1. to supervise, direct or control the Work;

2. for the means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto;

3. for the failure of Contractor to comply with Laws and Regulations applicable to the furnishing or performance of Work;

4. for any failure of Contractor to perform or furnish Work in accordance with the Contract Documents;

5. to make any examination to ascertain how or for what purposes Contractor has used the moneys paid on account of the Contract Price;

6. to determine that title to any Work, materials, or equipment has passed to Owner free and clear of Liens.

E. Engineer may refuse to recommend the whole or any part of any payment if, in Engineer's opinion, it would be incorrect to make such representations as stated above to Owner. Engineer may also refuse to recommend any such payment, or, because of subsequently discovered evidence or the results of subsequent inspections or tests, nullify any such payment previously recommended to such extent as may be necessary in Engineer's opinion to protect Owner from loss because:

1. the Work is defective, or completed Work has been damaged requiring correction or replacement;

2. the Contract Price has been reduced because of Change Orders;

3. Owner has been required to correct defective Work in accordance with paragraph 1309, or has accepted defective Work in accordance with paragraph 13.08;

4. Owner has been required to remove or remediate a Hazardous Environmental Condition for which Contractor is responsible;

5. Engineer has actual knowledge of the occurrence of any of the events enumerated in paragraph 15.02.

14.05 PAYMENT BECOMES DUE

A. Thirty (30) days after presentation of the Application for Payment to Owner with Engineer's recommendation, the amount recommended will (subject to the provisions of paragraph 14.05.B) become due, (or only if Owner is a public agency, within 15 days after Owner receives the funds which are to be provided by a department or agency of the federal or state government, whichever is later, or in accordance with any time periods required by any applicable statute, rule or regulation) and when due will be paid by Owner to Contractor.

B. Owner may refuse to make payment of the full amount recommended by Engineer because:

1. Claims have been made against Owner based on Contractor's conduct in the performance or furnishing of the Work, or Owner has incurred costs, losses, or damages resulting from Contractor's conduct in the performance or furnishing of the Work, including but not limited to claims, costs, losses, or damages from workplace injuries,

2. adjacent property damage, non-compliance with Laws and Regulations, and patent infringement;

3. Contractor has failed to take reasonable and customary measures to avoid damage, delay, disruption, and interference with other work at or adjacent to the Site;

4. Contractor has failed to provide and maintain required bonds or insurance;

5. Owner has been required to remove or remediate a Hazardous Environmental Condition for which Contractor is responsible;

6. Owner has incurred extra charges or engineering costs related to Submittal reviews, evaluations of proposed substitutes, tests and inspections, or return visits to manufacturing or assembly facilities;

7. The Work is defective, requiring correction or replacement;

8. Owner has been required to correct defective Work in accordance with paragraph 13.09, or has accepted defective Work pursuant to paragraph 13.08;

9. The Contract Price has been reduced by Change Orders;

10. An event has occurred that would constitute a default by Contractor and therefore justify a termination for cause;

11. Liquidated or other damages have accrued as a result of Contractor's failure to achieve Milestones, Substantial Completion, or final completion of the Work;

12. Liens have been filed in connection with the Work, except where Contractor has delivered a specific bond satisfactory to Owner to secure the satisfaction and discharge of such Liens;

13. there are other items as set forth in the Contract Documents entitling Owner to a set off against the amount recommended; or

14. Owner has actual knowledge of the occurrence of any of the events enumerated in paragraphs 14.04.E.1 through 14.04.E.5.

C. If Owner refuses to make payment of the full amount recommended by Engineer, Owner will give Contractor immediate written notice (with a copy to Engineer) stating the reasons for such action and promptly pay Contractor any amount remaining after deduction of the amount so withheld. Owner will promptly pay Contractor the amount so withheld, or any adjustment thereto agreed to by Owner and Contractor, when Contractor corrects, to Owner's satisfaction, the reasons for such action. The reduction imposed will be binding on Contractor unless Contractor duly submits a Change Proposal contesting the reduction.

D. If it is subsequently determined that Owner's refusal of payment was not justified, the amount wrongfully withheld will be treated as an amount due as determined by paragraph 14.05.

14.06 CONTRACTOR'S WARRANTY OF TITLE

A. Contractor warrants and guarantees that title to all Work, materials and equipment covered by any Application for Payment, whether incorporated in the Project or not, will pass to Owner at the time of payment free and clear of all Liens, claims, security interests and encumbrances (hereafter in these General Conditions referred to as "Liens").

14.07 SUBSTANTIAL COMPLETION

A. When Contractor considers the entire Work ready for its intended use Contractor will notify Owner and Engineer in writing that the entire Work is substantially complete and request that Engineer issue a Certificate of Substantial Completion. Contractor will at the same time submit to Owner and Engineer an initial draft of punch list items to be completed or corrected before final payment.

B. Promptly after Contractor's notification, Owner, Contractor, and Engineer will make an inspection of the Work to determine the status of completion. If Engineer does not consider the

Work substantially complete, Engineer will notify Contractor in writing giving the reasons therefor.

C. Once Engineer considers the Work substantially complete, Engineer will deliver to Owner a preliminary Certificate of Substantial Completion which will fix the date of Substantial Completion. Engineer will attach to the certificate a punch list of items to be completed or corrected before final payment. Owner will have 7 days after receipt of the preliminary certificate during which to make written objection to Engineer as to any provisions of the certificate or attached punch list. If, after considering the objections to the provisions of the preliminary certificate, Engineer concludes that the Work is not substantially complete, Engineer will, within 14 days after submission of the preliminary certificate to Owner, notify Contractor in writing that the Work is not substantially complete, stating the reasons therefore. If Owner does not object to the provisions of the certificate, or if despite consideration of Owner's objections Engineer concludes that the Work is substantially complete, then Engineer will, within said 14 days, execute and deliver to Owner and Contractor a final Certificate of Substantial Completion (with a revised punch list of items to be completed or corrected) reflecting such changes from the preliminary certificate as Engineer believes justified after consideration of any objections from Owner.

D. At the time of receipt of the preliminary Certificate of Substantial Completion, Owner and Contractor will confer regarding Owner's use or occupancy of the Work following Substantial Completion, review the builder's risk insurance policy with respect to the end of the builder's risk coverage, and confirm the transition to coverage of the Work under a permanent property insurance policy held by Owner. Unless Owner and Contractor agree otherwise in writing, Owner will bear responsibility for security, operation, protection of the Work, property insurance, maintenance, heat, and utilities upon Owner's use or occupancy of the Work.

E. After Substantial Completion Contractor will promptly begin work on the punch list of items to be completed or corrected prior to final payment. In appropriate cases Contractor may submit monthly Applications for Payment for completed punch list items, following the progress payment procedures set forth above.

F. Owner will have the right to exclude Contractor from the Site after the date of Substantial Completion subject to allowing Contractor reasonable access to remove its property and complete or correct items on the punch list.

14.08 PARTIAL UTILIZATION

A. Use by Owner of completed portions of the Work may be accomplished prior to Substantial Completion of all the Work subject to the following:

1. Owner at any time may request Contractor in writing to permit Owner to use any part of the Work which Owner believes to be substantially complete and which may be so used without significant interference with construction of the other parts of the Work. If Contractor agrees, Contractor will certify to Owner and Engineer that said part of the Work is substantially complete and request Engineer to issue a certificate of Substantial Completion for that part of the Work. Within a reasonable time thereafter Owner, Contractor and Engineer will make an inspection of that part of the Work to determine its status of completion.

    a. If Engineer does not consider that part of the Work to be substantially complete, Engineer will notify Owner and Contractor in writing giving reasons therefor.

b. If Engineer considers that part of the Work to be substantially complete, Engineer will execute and deliver to Owner and Contractor a certificate to that effect, fixing the date of Substantial Completion for that part of the Work, attaching thereto a punch list of items to be completed or corrected before final payment.

2. Prior to issuing a certificate of Substantial Completion for that part of the Work, Engineer will deliver to Owner and Contractor a written recommendation as to the division of responsibilities pending final payment between Owner and Contractor with respect to security, operation, safety, maintenance, utilities and insurance for that part of the Work, which will become binding upon Owner and Contractor at the time of issuing the definitive certificate of Substantial Completion for that part of the Work unless Owner and Contractor will have otherwise agreed in writing and so informed Engineer.

3. Owner will have the right to exclude Contractor from any part of the Work which Engineer has so certified to be substantially complete, but Owner will allow Contractor reasonable access to complete or correct items on the punch list.

4. In lieu of the issuance of a certificate of Substantial Completion as to part of the Work, Owner may take over operation of a facility constituting part of the Work whether or not it is Substantially Complete if such facility is functionally and separately usable; provided that prior to any such takeover, Owner and Contractor have agreed as to the division of responsibilities between Owner and Contractor for security, operation, safety, maintenance, correction period, heat, utilities and insurance with respect to such facility.

14.09 FINAL INSPECTION

A. Upon written notice from Contractor that the Work is complete, Engineer will make a final inspection with Owner and Contractor and will notify Contractor in writing of all particulars in which this inspection reveals that the Work is incomplete or defective. Contractor will immediately take such measures as are necessary to complete such Work or remedy such deficiencies.

14.10 FINAL APPLICATION FOR PAYMENT

A. After Contractor has completed all corrections to the satisfaction of Engineer and delivered all maintenance and operating instructions, schedules, guarantees, Bonds, certificates of inspection, marked up record documents and other documents (all as required by the Contract Documents), and after Engineer has indicated that the Work is acceptable, subject to the provisions of paragraph 14.13, Contractor may make application for final payment following the procedure for progress payments.

B. The final Application for Payment will be accompanied by all documentation called for in the Contract Documents and such other data and schedules as Engineer may reasonably require, consent of Surety, if any, to final payment, together with complete and legally effective releases or waivers, satisfactory to Owner, of all Liens arising out of or filed in connection with the Work.

C. In lieu of the releases or waivers of Lien, if approved by Owner, Contractor may furnish receipts or releases in full; an affidavit of Contractor that the releases and receipts include all labor, services, material and equipment for which a Lien could be filed, and that all payrolls, material and equipment bills, and other indebtedness connected with the Work for which Owner or Owner's property might in any way be responsible, have been paid or otherwise satisfied.

D. If any Subcontractor, manufacturer, fabricator, Supplier or distributor fails to furnish a release or receipt in full, Contractor may furnish a Bond or other collateral satisfactory to Owner to indemnify Owner against any Claim or Lien.

14.11 FINAL PAYMENT AND ACCEPTANCE

A. If, on the basis of Engineer's observation of the Work during construction and final inspection, and Engineer's review of the final Application for Payment and accompanying documentation (all as required by the Contract Documents), Engineer is satisfied that to the best of Engineer's knowledge, information and belief as a design professional that the Work has been completed and Contractor has fulfilled all of Contractor's obligations under the Contract Documents, Engineer will, within 10 days after receipt of the final Application for Payment, indicate in writing Engineer's Certificate for Payment and present the application to Owner for payment. At that time Engineer will give written notice to Owner and Contractor that the Work is acceptable subject to the provisions of paragraph 14.13.

B. Otherwise, Engineer will return the Application to Contractor, indicating in writing the reasons for refusing to recommend final payment, in which case Contractor will make the necessary corrections and resubmit the Application.

C. If the Application and accompanying documentation are appropriate as to form and substance, Owner will, within 45 days (or within the time period required by any applicable statute, rule or regulation) after receipt thereof pay Contractor the amount recommended by Engineer less any amounts of Owner claimed set-offs allowed under the Contract Documents, including but not limited to any applicable liquidated damages as determined by Owner. If Owner rejects the Application, Owner will do so in writing stating the appropriate sections of the Contract Documents upon which the rejection is based. Contractor may take the necessary remedial actions and resubmit the Application.

14.12 FINAL COMPLETION DELAYED

A. If, through no fault of Contractor, final completion of the Work is significantly delayed, and if Engineer so confirms, Owner will, upon receipt of Contractor's final Application for Payment and recommendation of Engineer, and without terminating the Agreement, make payment of the balance due for that portion of the Work fully completed and accepted. If the remaining balance to be held by Owner for Work not fully completed or corrected is less than the retainage stipulated in the Agreement, and if Bonds have been furnished as required in paragraph 5.01, the written consent of the Surety to the payment of the balance due for that portion of the Work fully completed and accepted will be submitted by Contractor to Engineer with the Application for such payment. Such payment will be made under the terms and conditions governing final payment, except that it will not constitute a waiver of Claims.

14.13 WAIVER OF CLAIMS

A. The making and acceptance of final payment will constitute:

1. a waiver of all Claims by Owner against Contractor, except Claims arising from unsettled Liens, from defective Work appearing after final inspection pursuant to paragraph 14.09, or from failure to comply with the Contract Documents or the terms of any special guarantees specified therein; and will not constitute a waiver by Owner of any rights in respect of Contractor's existing or continuing obligations under the Contract Documents; and,

2. a waiver of all Claims by Contractor against Owner other than those previously made in writing and still pending in accordance with Article 16.

14.14 LATE PAYMENTS

A. Monies not paid when due hereunder, except monies involving Federal and/or State Loans, Grants, or other sources which are delinquent because of no fault of Owner, will bear interest at the maximum rate allowed by law at the time and place of the Project.

ARTICLE 15 SUSPENSION OF WORK AND TERMINATION

15.01 OWNER MAY SUSPEND WORK

A. Owner may, at any time and without cause, suspend the Work or any portion thereof for a period as Owner may deem necessary by notice in writing to Contractor and Engineer. If it should become necessary to stop work for an indefinite period, Contractor will store all materials in such manner that they will not become an obstruction, nor become damaged in any way, and Contractor will take every precaution to prevent damage or deterioration of the Work performed; provide suitable drainage by opening ditches and drains, and erect temporary structures where necessary. Contractor may request an increase in the Contract Price or an extension of the Contract Time, or both, directly attributable to any suspension if Contractor makes a Claim therefor as provided in paragraph 11.01.

15.02 OWNER MAY TERMINATE FOR CAUSE

A. The occurrence of any one or more of the following events will constitute a default by Contractor and justify termination for cause:

1. Contractor commences a voluntary case under any chapter of the Bankruptcy Code (Title 11, United States Code), as now or hereafter in effect, or if Contractor takes any equivalent or similar action by filing a petition or otherwise under any other federal or state law in effect at such time;

2. a petition is filed against Contractor under any chapter of the Bankruptcy Code as now or hereinafter in effect at the time of filing, or if a petition is filed seeking any such equivalent or similar relief against Contractor under any other federal or state law in effect at the time relating to bankruptcy or insolvency;

3. Contractor makes a general assignment for the benefit of creditors;

4. a trustee, receiver, custodian or agent of Contractor is appointed under applicable law or under contract, whose appointment or authority to take charge of property of Contractor is for the purpose of enforcing a Lien against such property or for the purpose of general administration of such property for the benefit of Contractor's creditors;

5. Contractor admits in writing an inability to pay its debts generally as they become due;

6. Contractor persistently fails to perform the Work in accordance with the Contract Documents (including, but not limited to, failure to supply sufficient skilled workers or suitable materials or equipment or failure to adhere to the Progress Schedule established under paragraph 2.05 as revised from time to time);

7. Contractor disregards Laws and Regulations of any public body having jurisdiction;

8. Contractor disregards the authority of Engineer or Owner; or,

9. Contractor otherwise violates any provisions of the Contract Documents.

B. Owner may, after giving Contractor (and the Surety, if there be one) 7 days' written notice, and to the extent permitted by Laws and Regulations, terminate the services of Contractor, exclude Contractor from the Site, take possession of the Work and of all Contractor's tools, appliances, construction equipment, and machinery at the site and use the same to the full extent they could be used by Contractor (without liability to Contractor for trespass or conversion), incorporate in the Work all materials and equipment stored at the Site or for which Owner has paid Contractor but which are stored elsewhere, finish the Work as Owner may deem expedient, and/or enforce the rights available to Owner under any applicable Performance Bond.

C. In such case, Contractor will not be entitled to receive any further payment until the Work is finished. If the unpaid balance of the Contract Price exceeds all claims, costs, losses, damages and expenses sustained by Owner arising out of or resulting from completing the Work, such excess will be paid to Contractor. If such claims, costs, losses, damages and expenses exceed such unpaid balance, Contractor will pay the difference to Owner. Such claims, costs, losses, damages and expenses incurred by Owner will be reviewed as to reasonableness by Engineer and when so approved, incorporated in a Change Order, but when exercising any rights or remedies under this paragraph, Owner will not be required to obtain the lowest price for the Work performed.

D. Where Contractor's services have been so terminated by Owner, the termination will not affect any rights or remedies of Owner against Contractor or its Surety then existing or which may thereafter accrue. Any retention or payment of monies due Contractor by Owner will not release Contractor from liability.

15.03 TERMINATION FOR CONVENIENCE

A. Upon 7 days' written notice to Contractor and Engineer, Owner may, without cause and without prejudice to any other right or remedy, elect to terminate the Agreement. In such case, Contractor will be paid (without duplication of any items):

1. for completed and acceptable Work executed in accordance with the Contract Documents prior to the effective date of termination;

2. for actual expenses sustained prior to the effective date of termination in performing services and furnishing labor, materials or equipment as required by the Contract Documents in connection with uncompleted Work; and

3. for reasonable expenses directly attributable to protecting work as a result of termination.

B. Contractor will not be paid on account of loss of anticipated profits or revenue or other economic loss arising out of or resulting from such termination.

C. Upon such termination, Contractor will:

1. Immediately discontinue Work on the date and to the extent specified in the notice except to the extent necessary to protect Work in place;

2. Place no further orders for materials, services, or facilities, other than as may be necessary or required for completion of such portion of Work under the Contract that is not terminated;

3. Promptly make every reasonable effort to obtain cancellation upon terms reasonably satisfactory to Owner of all purchase orders and subcontracts to the extent they relate to the performance of Work terminated or assign to Owner those orders and subcontracts and revoke agreements specified in such notice;

4. Reasonably assist Owner, as specifically requested in writing, in the maintenance, protection and disposition of property acquired by Owner under the Contract Documents, as may be necessary;

5. Complete performance of any Work which is not terminated; and

6. Deliver to Owner an affidavit regarding the identity of potential unpaid Subcontractors or Suppliers and the amounts due to each.

15.04 CONTRACTOR MAY STOP WORK OR TERMINATE

A. If Owner has failed to pay Contractor any sum finally determined to be due in accordance with the time limits specified in paragraph 14.05, Contractor may upon 7 days' written notice to Owner and Engineer, stop the Work until payment of all amounts then due.

B. If through no act or fault of Contractor, the Work is suspended for a period of more than 90 days by Owner, or under an order of court or other public authority, then Contractor may, upon 7 days written notice to Owner and Engineer and provided Owner or Engineer does not remedy such suspension or failure within that time, terminate the Agreement and recover from Owner payment on the same terms as provided in paragraph 15.03.

C. The provisions of this paragraph 15.04 will not relieve Contractor of Contractor's obligations under paragraph 6.22 to carry on the Work in accordance with the Progress Schedule and without delay during disputes and disagreements with Owner.

ARTICLE 16 FINAL RESOLUTION OF DISPUTES

16.01 METHODS AND PROCEDURES

A. Disputes Subject to Final Resolution: The following disputed matters are subject to final resolution under the provisions of this Article:

1. A timely appeal of an approval in part and denial in part of a Claim, or of a denial in full; and

2. Disputes between Owner and Contractor concerning the Work or obligations under the Contract Documents and arising after final payment has been made.

B. Final Resolution of Disputes: For any dispute subject to resolution under this Article, Owner or Contractor may:

1. elect in writing to invoke the dispute resolution process provided for in the Supplementary Conditions; or

2. agree with the other party to submit the dispute to another dispute resolution process; or

3. if no dispute resolution process is provided for in the Supplementary Conditions or mutually agreed to, the following dispute resolution process will be followed:

a. The parties will submit the dispute to mediation under the mediation procedures outlined in the Construction Industry Arbitration Rules and Mediation Procedures of the American Arbitration Rules.

b. If the dispute is not resolved by mediation, the parties will proceed to resolve the dispute by arbitration in accordance with the Construction Industry Arbitration Rules and Mediation Procedures of the American Arbitration Association. The decision of the arbitrator(s) will be final and binding and is enforceable in a court of competent jurisdiction.

ARTICLE 17 MISCELLANEOUS

17.01 GIVING NOTICE

A. Whenever any provision of the Contract Documents requires the giving of written notice to Owner, Engineer, or Contractor, it will be deemed to have been validly given only if delivered:

1. in person to the individual or to a member of the firm or to an officer of the corporation for whom it is intended;

2. by registered or certified mail postage prepaid to, the last business address known to the giver of the notice;

3. or delivered in person to such person by a commercial courier service or otherwise to the recipient’s place of business; or

4. by secure file transfer with receipt documentation or other document control software.

17.02 COMPUTATION OF TIME

A. When any period of time is referred to in the Contract Documents by days, it will be computed to exclude the first and include the last day of such period. If the last day of any such period falls on a Saturday or Sunday, or on a day made a legal holiday by the Law of the applicable jurisdiction, such day will be omitted from the computation.

17.03 GENERAL

A. The duties and obligations imposed by these General Conditions and the rights and remedies available hereunder to the parties hereto are in addition to, and will not be construed in any way as a limitation of, any rights and remedies available to any or all of them which are otherwise imposed or available by Law or Regulation, by special warranty or guarantee, or by other provisions of the Contract Documents. The provisions of this paragraph will be as effective as if repeated specifically in the Contract Documents in connection with each particular duty, obligation, right and remedy to which they apply.

B. All representations, warranties and guarantees made in the Contract Documents will survive final payment and termination or completion of this Agreement.

17.04 PROFESSIONAL FEES AND COURT COSTS INCLUDED

A. Whenever reference is made to “claims, costs, losses, damages and expenses,” it will include in each case, but not be limited to, all fees and charges of engineers, architects, attorneys and other professionals and all court or arbitration or other dispute resolution costs.

17.05 NONDISCRIMINATION OF EMPLOYMENT

A. Contractor will agree not to discriminate against any employee or applicant for employment, to be employed in the performance of this Contract, with respect to Contractor's hire, tenure, terms, conditions or privileges of employment, or any matter directly or indirectly related to employment, because of race, color, sex, age, religion, national origin or ancestry, height, weight, or marital status, or any other classification protected by law, and to require a similar covenant on the part of any Subcontractor employed in the performance of the Contract.

17.06 POST COMPLETION DATE ENGINEERING AND INSPECTION COSTS

A. All engineering and inspection costs incurred after the specified completion date will be paid by Contractor to Owner prior to final payment authorization. However, Contractor will not be charged with any post completion date engineering and inspection costs when the delay in completion of the Work is due to the following and Contractor has promptly given written notice of such delay to Owner or Engineer:

1. to any preference, priority or allocation order duly issued by Owner;

2. to unforeseeable causes beyond the control and without the fault or negligence of Contractor, including but not restricted to, acts of God, or of the public enemy, acts of Owner, acts of another contractor in the performance of a Contract with Owner, fires, floods, epidemics, quarantine restrictions, strikes, freight embargoes, and abnormal and unforeseeable weather; and,

3. to any delays of Subcontractors or Suppliers occasioned by any of the causes specified in this Article.

B. Charges after the specified completion date will be made at such times and in such amounts as Engineer will invoice Owner, provided, however said charges will be in accordance with Engineer's current rate schedule at the time the costs are incurred. Engineering and inspection costs so incurred will be deducted from Contractor's progress payments.

17.07 WAIVER OF CONSEQUENTIAL DAMAGES

A. Contractor and Owner waive Claims against each other for consequential damages arising out of or relating to this Contract or the Work. This mutual waiver includes but is not limited to:

1. damages incurred by Owner for rental expenses, for losses of use, income, profit, financing, business and reputation, and for loss of management or employee productivity or of the services of such persons; and

2. damages incurred by Contractor for principal office expenses including the compensation of personnel stationed there, for losses of financing, business and reputation, and for loss of profit in connection with any other project or anticipated project.

B. This mutual waiver is applicable, without limitation, to all consequential damages due to either party’s termination or default. Nothing contained in this Section will be deemed to preclude an award of liquidated damages, when applicable, in accordance with the requirements of the Contract Documents. Contractor also waives any Claim for consequential damages against Engineer where such Claims arise out of or relate in any way to the Project or the Contract Documents.

17.08 NO WAIVER

A. A party's non-enforcement of any provision will not constitute a waiver of that provision, nor will it affect the enforceability of that provision or of the remainder of this Contract.

17.09 CONTROLLING LAW

A. This Contract is to be governed by the Law of the state in which the Project is located.

17.10 HEADINGS

A. Article and paragraph headings are inserted for convenience only and do not constitute parts of these General Conditions.

END OF SECTION 00 72 00

SECTION 00 73 00
SUPPLEMENTARY CONDITIONS

PART 1 GENERAL

1.01 SUMMARY

A. These Supplementary Conditions amend and supplement Section 00 72 00 - General Conditions and other provisions of Contract Documents as indicated below. Provisions that are not so amended or supplemented remain in full force and effect.

B. The terms used in these Supplementary Conditions that are defined and have the meanings assigned to them in Section 00 72 00 - General Conditions.

1.02 MODIFICATIONS TO GENERAL CONDITIONS

A. **SGC-1.01 Defined Terms**

1. The definition for “Substantial Completion” in Section 00 72 00 - General Conditions will be revised as follows:

   Substantial Completion -- The Work (or a specified part thereof) has progressed to the point where, in the opinion of the Engineer as evidenced by the Certificate of Substantial Completion, it is sufficiently complete, in accordance with the Contract Documents, so that the Work (or specified part) can be utilized for the purposes for which it was intended; or if no such certificate is issued, when the Work is complete and ready for final payment as evidenced by the Engineer’s written recommendation of final payment in accordance with Article 14.11 of Section 00 72 00 - General Conditions. The terms "substantially complete" and "substantially completed" as applied to all or part of the Work refer to Substantial Completion thereof.

B. **SGC-4.02 Subsurface and Physical Conditions; Investigations and Reports**

1. In the preparation of Plans and Specifications, the Engineer has relied upon the following reports and tests of subsurface and latent physical conditions at the site or otherwise affecting cost, progress or performance of the Work: Soil Borings

2. Copies of the following reports and/or tests are attached as Exhibits: Geotechnical Engineering Report (Prepared by SME) City of Plymouth - 2025 Infrastructure Program SME Project Number: 098742.00 February 5, 2025

C. **SGC-5.03 Additional Insured**

1. Add the following language as a new Article 5.03.A.9 of Section 00 72 00 - General Conditions:

   Wade Trim Associates, Inc., and any other person or entity required to be named as an additional insured under the Contract Documents, including each of the aforementioned’s respective parent companies, affiliates, subsidiaries, officers, directors, employees, and agents, are required to be designated as additional insureds on all policies of insurance required by Article 5.03 of the Section 00 72 00 - General Conditions and elsewhere in the Contract Documents (except for Worker’s

Compensation insurance and Professional Liability insurance, unless otherwise specifically required by the Contract Documents).

D. **SGC-5.04 Limits of Liability**

1. The required limits of liability for insurance coverages requested in Article 5.03 of Section 00 72 00 - General Conditions will be not less than the following:

SGC-5.04.A Worker's Compensation

Coverage A – Compensation: Statutory

Coverage B – Employer's Liability

Each Accident: $500,000

Disease – Policy Limit: $500,000

Disease – Each Employee: $500,000

SGC-5.04.B Comprehensive General Liability

General Aggregate: $3,000,000 CONTRACTOR is granted the option of arranging coverage under a single policy for the full limits required or by a combination of underlying policies with the balance provided by an Excess Liability of umbrella liability policy, with he Each Occurrence and the Aggregate limits equal to the total limits requested.

Products – Com/Ops Aggregate: $1,000,000

Personal and Advertising Injury: $1,000,000

Each Occurrence: $1,000,000

Fire Damage (any one fire): $50,000

Medical Expense (any one person): $5,000

SGC-5.04.C Comprehensive Automobile Liability

Bodily Injury: $500,000

Property Damage: $200,000

or combined single limit: $3,000,000 CONTRACTOR is granted the option of arranging coverage under a single policy for the full limits required or by a combination of underlying policies with the balance provided by an Excess Liability of umbrella liability policy, with he Each Occurrence and the Aggregate limits equal to the total limits requested

SGC-5.04.D Owner's Protective - Coverage shall be Occurrence Form Policy to be written with the City of Plymouth as the insured

General Aggregate:$3,000,000

Each Occurrence: $3,000,000

SGC-5.04.E Builder's Risk-Installation Floater

Cost to Replace at Time of Loss

SGC-5.04.F Umbrella or Excess Liability: $2,000,000

E. **SGC- 12.04 Lump Sum Work**

1. Add the following new paragraph after Article 12.03 of Section 00 72 00 - General Conditions, which is to read as follows:

12.04 LUMP SUM WORK

a. When additional work or deletion of work, which is covered by a lump sum item, is required due to a modification, not a normal overrun or underrun in estimated quantities, payment or credit for the work will be based upon apparent unit prices which will be derived by dividing the lump sum price by the estimated plan quantities.

b. Renumber subsequent paragraphs accordingly.

F. **SGC-18 Liquidated Damages**

1. Liquidated damages, if applicable, are referenced in the Proposal and Agreement. The requirements for liquidated damages should be included herein.

ARTICLE 18 LIQUIDATED DAMAGES

a. If the Contractor fails to Substantially Complete the Work within the Contract Time, or extension of time granted by the Owner, then the Contractor will pay to the Owner the amount for liquidated damages as specified in the Agreement for each calendar day that the Contractor will be in default after the time stipulated in the Contract Documents. The liquidated damages charged will be deducted from the Contractor's progress payments.

b. Contractor will not be charged with liquidated damages or any excess cost when the delay in Substantial Completion of the Work is due to the following and the Contractor has given written notice of such delay within seven (7) calendar days to Owner or Engineer.

c. To any preference, priority or allocation order duly issued by the Owner.

d. To unforeseeable causes beyond the 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, acts of another Contractor in the performance of a Contract with the Owner, fires, floods, epidemics, quarantine restrictions, strikes, freight embargoes, and abnormal and unforeseeable weather; and

e. To any delays of subcontractors occasioned by any of the causes specified in paragraph "a" and "b" of this Article.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION 00 73 00

SECTION 00 91 13
ADDENDUM

To all prospective Bidders and others concerned, YOU ARE HEREBY ADVISED THAT the Contract Documents for the above referenced Project are revised in accordance with the following:

Section	Description of Change
Sheet	**Description of Change**

Attachments to this Addendum:

_____

This Addendum is hereby incorporated into the original Contract Documents for the bidding referred to above and is considered as binding as though originally appearing therein. Receipt of this Addendum must be noted in the place provided in Section 00 42 43 - Proposal, dated _____, 20_____.

SECTION 00 91 20
STANDARD SPECIFICATION SECTION REVISIONS

PART 1 GENERAL

The following paragraphs amend or supplement the Standard Specification Sections as indicated below. All Standard Specification provisions which are not amended or supplemented remain in full force and effect.

Section 33 1100: "WATER UTILTIY DISTRIBUTION PIPING"

Amend the first sentence of paragraph one, Article 2.07.B, "Gate Valves," to read as follows:

> Gate valves, sizes four inches through 16 inches, shall be Mueller 2360 Series; American Cast Iron Pipe Company, Waterous Series 2500; or Clow, F-6104, Resilient Wedge type, conforming to AWWA C509. Valves shall be designed for 200 psi working pressure and 400 psi test pressure. Valve body shall be cast iron, with a smooth, unobstructed waterway. Valve body, bonnet, and thrust collar shall be coated inside and out with fusion bonded epoxy. Valves shall have a 2-inch square-operating nut with cast-in directional arrow, and shall open clockwise. Gate valve shall have a cast bronze, non-rising stem with double "O" ring seals. Two low torque thrust bearings shall be located above and below the thrust collar to reduce friction and minimize operating torques. The stem nut shall be solid bronze and independent of the wedge. The wedge shall be cast iron, replaceable and completely encapsulated in permanently bonded urethane rubber per ASTM D429. Valve inlet and outlet connections shall be mechanical joint.

Section 33 1100: "WATER UTILTIY DISTRIBUTION PIPING"

Amend the first sentence of paragraph one, Article 2.07.C, "Fire Hydrants," to read as follows:

> Hydrants shall be East Jordan Iron Works 5BR250 Traffic Model, dry barrel compression type conforming to AWWA C502. Unit shall have a seat valve and double operating stem "O" ring seals. Hydrant shall have a 5-1/4 inch diameter valve opening and 6-inch Mechanical Joint connection. Two, 4-inch diameter pumper nozzles shall be provided. Nozzle threads shall be to City of Detroit Fire Department standards. Hydrant shall have a 1-1/8-inch pentagon operating nut and be designed to open in a counterclockwise direction with an arrow cast into the top of the hydrant in a clearly visible location indicating the opening direction. The unit shall be designed for 250 pound working pressure and 500 pound test pressure when tested in accordance with approved AWWA methods. Hydrants shall have nozzles on a removable head or upper section so nozzles may be rotated without removing the lower barrel section.
>
> The bonnet, nozzle housing, lower barrel, and elbow must all be made of the same material (cast iron or ductile). The traffic safety device of the hydrant must consist of a two piece frangible section and a cast iron break coupling. The lower barrel must be flanged at both ends and have a reinforced traffic flange area. The lower barrel must also be designed to accept a one piece flanged spool extension at the traffic area of the hydrant.
>
> The hydrant must be designed for removal of the stem, main valve, drain valve, and seat ring through the top of the hydrant without removing the nozzle housing. A short design wrench is required which does not place excessive force on the stem traffic coupling.
>
> Hydrants shall be suitable for a bury of 6-feet from bottom of hub to grade line unless otherwise indicated on the Plans. Hydrants' exterior surfaces shall be painted using suitably approved weatherproof paint. Hydrant shall be painted black below grade line and red above the grade line.

Section 33 1100: “WATER UTILTIY DISTRIBUTION PIPING”
Delete Article 2.10, Corporation Stops, of Section 33 1100 and insert the following in its place.

2.10 Corporation Stops

Corporation stops shall be Mueller 300, ball type corporation stops, 1-inch minimum size, AWWA taper thread inlet and Copper Flare outlet.

Section 33 1100: “WATER UTILTIY DISTRIBUTION PIPING”
Delete Article 2.12, Curb Stops, of Section 33 1100 and insert the following in its place.

2.12 Curb Stops and Curb Box

Curb boxes shall be Mueller Company, extension type with arch pattern base, model
H-10334, 1-inch inside diameter, combination lid with pentagon plug.

Section 33 1100: “WATER UTILTIY DISTRIBUTION PIPING”
Delete Article 2.22.D., Acceptable Manufacturers-Corporation Stops, and 2.22.F., Acceptable Manufacturers-Curb Stops, in their entirety.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION 00 91 20

SECTION 01 11 00
SUMMARY OF WORK

PART 1 GENERAL

1.01 WORK COVERED BY CONTRACT DOCUMENTS

A. This project includes the reconstruction of N Holbrook from Plymouth Rd to just south of the Rail Road tracks. The project also includes new water main, new water services, sanitary sewer spot repairs, some storm sewer improvements, and ADA ramp improvements.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Section 01 33 00 - Submittal Procedures

B. Section 01 50 00 - Temporary Facilities and Controls

1.03 WORK BY OTHERS

A. There is no other work in the Project area, known to the Owner, which would affect this Contract.

1.04 RIGHT-OF-WAY JURISDICTION/PERMITS

A. Plymouth Road Road(s) is under the jurisdiction of the Wayne County Department of Public Services.

B. Other roads and streets in the vicinity of the Project are under the jurisdiction of the City of Plymouth.

C. Work in the Wayne County Department of Public Services right-of-way requires a permit from the Wayne County Department of Public Services. Contractor will obtain the permit and pay all fees in connection with obtaining the permit. The fees for the permit are based upon a permit fee, plan review fee, and an inspection deposit. The Wayne County Permit has been submitted and assigned review number R25-0189. The contractor shall reference this number when obtaining the permit.

1. Cost of all inspection including any necessary soil compaction tests and concrete testing performed by Wayne County Department of Public Services on this Project will be deducted from the inspection deposit. A cash inspection deposit (along with the permit fee and the plan review fee) will be required to be paid by the Contractor prior to obtaining the permit.

2. Contractor is cautioned that the deposit is based upon the estimated cost. The actual cost of the inspection fee will be the actual costs incurred by Wayne County Department of Public Services for inspection on the Project. Contractor will be responsible for any additional costs over and above the fee calculated above and will be refunded any excess amounts.

The Estimated fees are as follows:

Fees	**Amount**	
Bond Value	$5,000.00	Cash Bond
Permit Admin Fee - C - Permit	$125.00	
Deposit for Inspection	$3,000.00	
Plan Review Fee - Plan Review Charged	$270.00	
Total Permit Cost:	$8,395.00	

Deposits	**Amount**	
Initial Deposit/Credit	$1,000.00	
Total Permit Cost:	$1,000.00	
Total Amount:	**$7,395.00**	(Total Check to be Submitted)

Please Bring One (1) Certified or Cashier's Check made payable to 'Wayne County'

D. Soil erosion and sedimentation control is under the jurisdiction of the Wayne County Department of Environment, Land Resource Management Division.

E. Contractor will secure any permits required by the agency having jurisdiction, will abide by all rules and regulations of each, and will pay all costs in connection with the permits. Contractor will pay for all permit and inspection fees as the agencies may charge to ensure compliance with their requirements.

1.05 COORDINATION

A. A shutoff notice will be delivered by the Contractor to all affected residences and businesses a minimum of two days before any water main is shut off for construction.

B. Whenever an existing gate valve must be opened or closed, the City of Plymouth Water Department will be notified. Valves will be opened or closed only by the City of Plymouth Water Department.

C. While both existing and new fire hydrants are in place, the Contractor will clearly mark those hydrants not in service and notify the City of Plymouth Fire Department of hydrants not in service.

D. It will be the responsibility of the Contractor to coordinate Contractor's operations and those of the Contractor's subcontractors in such a manner so as to avoid interference and delays in the areas of common construction activities.

1.06 CONTRACTOR'S USE OF PREMISES

A. Contractor will maintain construction operations within the presently existing road rights-of-way and easements throughout the Project area. In the event that the Contractor deems it necessary or advisable to operate beyond the limits of the existing rights-of-way or easements, Contractor will be responsible for making special written agreements with the property owners and will furnish such copies of agreement to the Owner.

1.07 PHOTOGRAPHS

A. Photographs as specified in Section 01 33 00 - Submittal Procedures will be required for this Project.

1.08 AUDIO/VIDEO ROUTE SURVEY

A. An audio/video route survey as specified in Section01 33 00 - Submittal Procedures will be required for this Project. Complete coverage will include the project area and 50 feet beyond the project limits shown on the plans _____.

B. The audio/video route survey will be delivered on a USB Flash Drive.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION 01 11 00

SECTION 01 12 13
WORK SEQUENCE

PART 1 GENERAL

1.01 SCOPE OF WORK

A. This Section includes a suggested sequence of construction for the Work specified in the Contract Documents. Contractor is not obligated to follow the sequence described herein; Contractor is responsible for means and methods in order to complete the specified Work.

1.02 PROJECT CONSTRAINTS

1.03 WORK SEQUENCE DESCRIPTION

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION 01 12 13

SECTION 01 21 00
ALLOWANCES

PART 1 GENERAL

1.01 GENERAL INFORMATION

A. Contractor will include Allowance(s) listed in the Bid Proposal that will cover work, manufactured equipment or services that will be provided either by Contractor or by others who may be selected by Owner.

B. Work performed under Allowances will be subject to Owner approval and under special terms described herein. Contractor will coordinate and cause the work covered by these Allowances.

C. It is understood that Contractor has included in the Contract Price Allowances so named in the Contract Documents and will cause the work so covered to be performed for such sums and by such persons or entities as may be acceptable to Owner.

1.02 REQUIREMENTS

A. Allowances will be administered in accordance with the provisions of the General Conditions of the Contract. Contractor will be required to coordinate this work with the agency involved and pay costs the agency may charge in connection with this work.

B. Thereafter, if the actual price for this work is more or less than the allowance, the Contract Price will be adjusted accordingly by Change Order. The adjustment in Contract Price will be made on the basis of the actual invoice price without additional charge or markups for overhead, insurances, bonds, or any other incidental expenses.

C. Contractor will be responsible for all coordination with the agency involved and for the timely completion of the Work to fit his schedule. Contractor will not be allowed any additional compensation for the failure of the agency involved to meet any schedule.

1.03 RELATED REQUIREMENTS

A. The requirements of Section _____ and all Division 01 sections will also apply to this work.

1.04 DEFINITIONS

A. Lump Sum Allowance: A monetary sum that includes, as part of the Contract Price, the associated costs and requirements to complete the specified Allowance.

1.05 SUBMITTALS

A. Submit invoices or delivery slips to indicate actual quantities of materials delivered to the Site for use in fulfillment of each Allowance.

1.06 INSTRUCTIONS

A. At the earliest feasible date after Contract Award, Contractor will advise Engineer of the date when the final selection and purchase of each product or system described by an Allowance must be completed in order to avoid delay in performance of the work.

B. When requested by Engineer, Contractor will obtain Bids for each Allowance for use in making final selections; include recommendations that are relevant to performance of the Work.

C. Contractor will purchase products and systems as selected by Engineer from the designated Supplier.

D. Allowances will be used only as directed for Owner's purposes, and only by Change Orders which designate amounts to be charged to the Allowance.

E. If the actual price for the specified Allowance is more or less than the stated Allowance, the Contract Price will be adjusted accordingly by Change Order. The adjustment in Contract Price will be made in accordance with the General Conditions.

F. At Project closeout, any amounts remaining in Allowances will be credited to Owner by Change Order.

1.07 SPECIFIC ALLOWANCES

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

SECTION 01 22 00
UNIT PRICES

PART 1 GENERAL

1.01 SCOPE OF WORK

A. This Section describes the method of measurement and basis of payment for items of Work included in the Contract and specified in Section 00 42 43 - Proposal. Contractor will provide labor, material, tools, equipment and services required to complete the Work specified herein and indicated on the Plans.

B. Owner will make no allowances for items not included in Section 00 42 43 - Proposal.

1.02 ITEMS OF THE PROPOSAL

Item 1

Mobilization will be paid for at the Contract Unit Price on a Lump Sum basis. Price paid will be payment in full for labor, material, and equipment necessary for preparatory work and operations, including, but not limited to, those necessary for the movement of personnel, equipment, supplies, and incidentals to the project site; for the establishment of Contractor's, Engineer's, and Owner's field offices, and other facilities necessary to undertake the work on the project; and for other work and operations which must be performed, or for expenses incurred, prior to beginning work on the various contract items on the project site. It will also include preconstruction costs, including insurance and bonds, exclusive of bidding costs, which are necessary direct costs to the project and are of a general nature rather than directly attributable to other pay items under the contract. Payment for mobilization will be based upon the following schedule:

Partial Payment Schedule	
Percentage of Original Contract Amount Earned	Percentage of Bid Price for Mobilization Allowed
5	50
10	75
25	100

Item 2

Traffic Maintenance and Control will be paid for at the Contract Unit Price on a Lump Sum basis. Price paid will be payment in full for labor, material, and equipment required for maintaining traffic, and will include, but is not limited to, furnishing, installing, operating, and maintaining barricades, lighted arrow boards, drums, traffic control devices, signs, channeling devices, cones, flagmen, flag control, pavement markings, warning flashers, concrete barriers, minor traffic devices, and other items necessary to complete the job, whether specifically mentioned or implied.

Item 3

Audio-Video Route Survey will be paid for at the Contract Unit Price on a Lump Sum basis. Price paid will be payment in full for labor, material, equipment, and supplies

necessary for furnishing an audio-video route survey in accordance with Section 01 33 00 - Submittal Procedures and Section 01 11 00 - Summary of Work.

Item 4

Minor Traffic Devices and Flag Control will be paid for at the Contract Unit Price on a Lump Sum basis. Price paid will be payment in full for labor, material and equipment necessary for furnishing and installing minor traffic devices and flag control, and will include, but is not limited to, portable signs, paddles, cones, channeling devices, flagmen, removing and replacing damaged devices, installing and removing temporary pavement markings, and other items necessary to complete the Work, whether specifically mentioned or implied.

Item 5

Inspector Days will be paid for at the Contract unit price per Day as specified in the Proposal. Measurement for Inspector Days will be as follows:

a. An Inspector Day will be construed to mean any day when an operation by the Contractor's work crew (as determined by the Engineer), such as but not limited to construction of the project, restoration, cleanup and Project follow-up; will require the presence of a Resident Project Representative. An Inspector Day will also include any time when the presence of a Resident Project Representative is required to determine the status of completion of items identified on the project punch list, involvement with project complaints or other items related to closeout of the construction contract.

b. An Inspector Day will be computed by adding the total actual hours that each Resident Project Representative spent on the Project and dividing such total number of hours by eight (8) provided that the minimum show-up time when a Work crew elects to not Work will be four (4) hours. Show-up time will not be included when 12 hours notice of intent to not Work has been given by the Contractor to the Engineer. Cost of Inspector Days will be deducted from the monthly payments to the Contractor and paid to Engineer by the Owner. Should the credited amount (number of days indicated by the Contractor in the Proposal) become depleted, the cost of Inspector Days will be deducted from the monthly payments to the Contractor. Upon completion of the Project, any surplus remaining in the Inspector Day bid item will be given to the Contractor.

Item 6, 7, 8, 9

2. **Sign, Temporary** of the type and size specified will be paid for at the Contract Unit Price on a Square Foot (SFT) basis. Price paid will be payment in full for furnishing and installing temporary signs, and will include, but is not limited to, furnishing and installing signs and posts, replacing damaged signs, removing signs at completion of project, and other items necessary to complete the Work, whether specifically mentioned or implied.

Item 10, 11, 12, 13

Traffice will be paid for at the Contract Unit Price on a Eachbasis. Price paid will be payment in full for labor, material, and equipment required for furnishing, installing, operating, and maintaining traffic control devices, and shall include, but is not limited to, all barricades, drums, warning flashers, repositioning devices, removing and replacing

damaged devices, maintenaning lights and flashers, and all other items necessary to complete the job, whether specifically mentioned or implied..

Item 14

1. **Pavement Excavation** will be paid for at the Contract Unit Price per Cubic Yard (CYD). Price paid will be payment in full for labor, material, and equipment necessary for pavement excavation to the lines and grades shown on the plans, and will include, but is not limited to, stripping and stockpiling topsoil, excavation and disposal of unsuitable material including but not limited to asphalt pavement, deep strength asphalt, asphalt approaches and asphalt drives, aggregate surfaces, sidewalks, concrete end headers, concrete pavement, concrete curbs, concrete approaches and concrete drives, stumps, trees, rocks, earth, large stones, culverts, abandoned utilities, sewers or structures, protecting existing improvements, filling holes and voids with compacted granular backfill, the excavation and disposal of other items exposed in excavating to the subgrade, fine grading and compacting subgrade, sawcutting, barricading, and for other items necessary to complete the work, whether specifically mentioned or implied.
2. Measurement for pavement excavation will be determined by one of the following methods:
    a. For full width pavement: By a neat rectangle, the width equal to the proposed pavement plus two (2) feet on each side, and the height of the rectangle determined by the difference in elevation, from the elevation of the existing right-of-way centerline down to the average subgrade elevation or the average bottom of the proposed pavement, whichever is lower. The average subgrade or bottom of pavement elevation being determined by averaging the elevation of each as measured at the back of curbs or edges of pavement and the centerline of the pavement.
    b. For pavement widening: By a neat rectangle, the width equal to the proposed pavement widening plus two (2) feet, and the height of the rectangle determined by the difference in elevation from the surface or gutter of the existing pavement down to the subgrade elevation or the bottom of the proposed pavement, whichever is lower. The average subgrade or bottom of pavement elevation being determined by averaging the elevation of each, as measured at the back of curb and the edge of pavement. Unless otherwise specified in the Proposal, the subbase material required to fill the void between the subgrade and the bottom of proposed pavement will be provided and compacted in place and will be considered incidental to the price paid for pavement excavation.
3. Payment for pavement excavation will be per cubic yard with the quantity of pavement excavation calculated from existing and proposed grades. The quantity paid will be based on plan quantity unless there is a field change which affects plan quantity. No field measurement for payment of pavement excavation will be done at the time of construction.

Item 15, 24, 25

a. **Sanitary Sewer, Remove and Replace** of the type and diameter will be paid for at the Contract Unit Price per Linear Foot (LFT). Price paid will be payment in full for labor, material, and equipment required for removal and replacement of existing sanitary sewer and will include, but is not limited to, excavation, disposal of excess excavated material,

sheeting, shoring, bracing and dewatering, protection of existing improvements, removal and disposal of existing sewer, maintaining flow, connections to existing sewer, connection to structure, sand backfill, stone pipe bedding, placing and removing stoppers and bulkheads, cleanout of structure, final inspection which includes cleaning, barricading, restoration, and other items necessary to complete the job, whether specifically mentioned or implied.

b. Measurement for removing and replacing storm sewer will be in linear feet determined by field measure.

Item 16, 56

Butt Joints will be paid for at the Contract Unit Price per Square Yard (SYD). Price paid will be payment in full for labor, material, and equipment required for constructing butt joint and will include, but is not limited to, construction, sawcutting, milling grinding and removal and disposal of existing pavement; protection of existing improvements, dust control, and other items necessary to complete the job, whether specifically mentioned or implied.

Measurement for butt joints will be determined by field measure.

Item 17

Removing structures, of the type specified, will be paid for at the Contract Unit Price on a per each unit basis. Price paid shall be payment in full for all labor, material, and equipment required for removal of existing structure, and shall include, but is not limited to, all excavation, sheeting, shoring, bracing, and dewatering; protection of existing improvements; removal of the existing structures; removing and disposing of all unsuitable material; also backfill, backfilling, rebuilding and reconnecting live sewers or mains; providing and maintaining a satisfactory sewer bypass service; bulkheading of abandoned sewers; maintaining drainage; and all items necessary to complete the job, whether specifically mentioned or implied. Removing structures will be measured on an each unit basis for each structure removed.

Item 18

Removal of concrete sidewalks or driveways, six (6) inches or less in thickness, will be paid for at the Contract Unit Price per square foot unit basis. Price paid shall be payment in full for all labor, material, and equipment necessary for the removal of concrete sidewalks or driveways six (6) inches or less in thickness; as shown on the Plans or as determined by the ENGINEER; and shall include, but is not limited to, saw cutting, removal and disposal of unsuitable materials; also furnishing, placing and compacting backfill; protection of existing improvements; barricading; and for all items necessary to complete the job, whether specifically mentioned or implied. Measurement for removal of concrete sidewalks or driveways six (6) inches or less in thickness will be in square feet, determined by field measurement.

Item 19

Removal of Brick Paver, will be paid for at the Contract Unit Price per square foot unit basis. Price paid shall be payment in full for all labor, material, and equipment necessary for the removal of brick pavers as shown on the Plans or as determined by the ENGINEER; and shall include, but is not limited to, saw cutting, removal and disposal of unsuitable materials; also furnishing, placing and compacting backfill; protection of existing improvements;

barricading; and for all items necessary to complete the job, whether specifically mentioned or implied. Measurement for removal of brick paver will be in square feet, determined by field measurement.

Item 20

Storm Sewer and Culvert, Remove of the size and type specified will be paid for at the Contract Unit Price on a per Linear Foot (LFT) basis. Price paid will be payment in full for labor, material and equipment necessary for removal of storm sewers and culverts, and will include, but is not limited to, excavation, sheeting, shoring, bracing and dewatering, protection of existing improvements, removal and disposal of unsuitable material and debris, removal and disposal of end sections and headwalls, backfill, backfilling, rebuilding and reconnecting live sewers, providing and maintaining a satisfactory sewer bypass service, maintaining drainage, and other items necessary to complete the job, whether specifically mentioned or implied.

Removing storm sewers and culverts will be determined by field measure of storm sewer and culverts removed.

Item 21

Gate Valve and Well, Remove, _____ Inches will be paid for at the Contract Unit Price per Each. Price paid will be payment in full for labor, materials, and equipment required for removing existing gate valve and well, and will include, but is not limited to, excavation, removing the structure, removing and salvaging gate valve, salvaging well frame and cover, capping water main, backfilling with specified materials, cleanup, restoration, and other items necessary to complete the job, whether specifically mentioned or implied.

Valve and well removal will be measured as units removed.

Item 22

Fire Hydrant, Remove will be paid for at the Contract Unit Price per Each. Price paid will be payment in full for labor, material, and equipment necessary for removing fire hydrant, and will include, but is not limited to, necessary excavation, sheeting, bracing, shoring, and dewatering, protection of existing improvements, removal of fire hydrant, valve, valve boxes, connecting piping, disconnection from existing water main, capping of existing water main, backfill, backfilling, disposal of excess excavated material, restoration, delivering hydrant, gate valve and valve box to Owner, cleanup, restoration, and other items necessary to complete the job, whether specifically mentioned or implied.

Fire hydrant removal will be measured as units removed.

Item 23

Inlet Filter will be paid for at the Contract Unit Price per Each. Price paid will be payment in full for labor, material, and equipment required for _____, and other items necessary to complete the Work, whether specifically mentioned or implied.

Item 24, 25

Sanitary sewer Remove and Replace, of the type and diameter indicated in open cut trench, will be paid for at the Contract Unit Price per linear foot. Price paid shall be payment

in full for all labor, material, and equipment necessary for sanitary sewer pipe in open cut trench, and shall include, but is not limited to, all excavation, sheeting, bracing, shoring, dewatering, and backfilling; disposal of excess excavated material; protection of existing improvements; furnishing and installing pipe bedding, and wye and tee branches; placing and removing of stoppers and bulkheads; final inspection which includes cleaning closed circuit television inspection; testing; stubs in manholes; connections to manholes and sewers; barricading; restoration; and all other items necessary to complete the job, whether specifically mentioned or implied.

Measurement for sanitary sewers in open cut trench will be in place by length, in linear feet, from center-to-center of standard manholes, with no deduction in length for intermediate standard structures, and the depth of the sewer between any two (2) manholes will be determined by averaging the depths of the two manholes. However, where tee manholes or where special bid items, as indicated in the Plans and Specifications having a basis of payment of lump sum are involved, the measurement will be from the end of the tee manhole or from the end of the special bid item, and the nearest adjacent standard sanitary manhole.

Item 26, 27

Manhole, Standard of the type and diameter indicated, for depths up to eight (8) feet and for the first eight (8) feet of deeper manholes will be paid for at the Contract Unit Price per Each. Price paid will be payment in full for labor, material, and equipment necessary for a complete manhole, and will include, but is not limited to, frame and cover, adjusting rings, cone section, bottom section, flexible joint connections, excavation, sheeting, shoring and bracing, dewatering, sand backfill and other items necessary to complete the job, whether specifically mentioned or implied.

In addition, a Vertical Foot (VFT) unit price, as set forth in the bid schedule, will be paid for each foot or tenth thereof of manhole depth in excess of eight (8) feet from the invert of the outlet pipe to the top of the cover.

Item 28

Sanitary Sewer, Remove and Replace Service Lead of the type and diameter specified be paid for at the Contract Unit Price per Each. Price paid will be payment in full for labor, material, and equipment required for removal and replacement of existing sanitary service lead and will include, but is not limited to, excavation, disposal of excess excavated material, sheeting, shoring, bracing and dewatering, protection of existing improvements, removal and disposal of existing service lead, maintaining flow, re-establishing service lead, connection to existing piping, furnishing and installing rubber adapters, sand backfill, pipe bedding, placing and removing stoppers and bulkheads, barricading, restoration, final inspection which includes cleaning, closed circuit television inspection and testing, and other items necessary to complete the job, whether specifically mentioned or implied.

This item will be used at the discretion and direction of Engineer.

Item 29, 35, 36, 37

Water Main, Open Cut of the type, diameter, and class specified, will be paid for at the Contract Unit Price per Linear Foot (LFT). Price paid will be payment in full for labor, material, and equipment necessary for furnishing and installing water main and will include, but is not limited to, specials and fittings, excavation, sheeting and bracing,

shoring, draining, dewatering, laying, jointing, bedding, testing, disinfecting, backfilling (including backfill with special materials where specified), disposal of excess excavated material, temporary blow-offs, thrust blocks, encasement, barricading, restoration, final cleanup, connections to existing mains and other items necessary to complete the job, whether specifically mentioned or implied.

a. Measurement for water main will be in linear feet along the centerline of the pipe taken from end-to-end with no reduction for fittings and valves except for special structures, sections or connections for which either Lump Sum or Unit Prices have been taken will be deducted from the total length of water main and will be paid for at the prices bid therefore.

Item 30

Water Main, Abandon with Flowable Fill, _____ Inches, of the type specified will be paid for at the Contract Unit Price per Cubic Yard (CYD) of flowable fill pumped. Price paid will be payment in full for labor, material, and equipment necessary for abandoning water main, and will include, but is not limited to, specials and fittings, necessary excavation, capping ends of existing water main, sheeting, bracing, shoring, draining, dewatering, backfilling (including backfilling with special materials where specified), thrust blocks, filling with flowable fill, cleanup, restoration, and other items necessary to complete the job, whether specifically mentioned or implied.

Measurement for abandoning water main will be by certified batch plant delivery tickets of flowable fill submitted to Engineer at time of placement.

Item 31

a. **Gate Valve and Well, _____ Inches**, will be paid for at the Contract Unit Price per Each. Price paid will be payment in full for labor, material, and equipment necessary for furnishing and installing valve and well, and will include, but is not limited to, valve, valve well foundation, steel reinforcing, bricks, blocks, valve well sections, adjusting rings, well frame and cover, cement mortar plaster coat, necessary excavation, sheeting and bracing, shoring, dewatering, connection to water main, backfilling, restraints, disposal of excess excavated material, thrust blocks, restoration, cleanup, and other items necessary to complete the job, whether specifically mentioned or implied.

   Valve and well will be measured as units installed.

Item 32, 33, 34

Water Service, Open Cut, of the size, type and length specified, will be paid for at the Contract Unit Price per Each. Price paid will be payment in full for labor, material, and equipment necessary for furnishing and installing water service lines and will include, but is not limited to, water service pipe, curb stops, curb box, special fittings, necessary excavation, sheeting and bracing, shoring, draining, dewatering, laying, jointing, bedding, testing, disinfecting, backfilling, disposal of excess backfill and fill material (including backfill with special materials where specified), connection to new water main (including service clamps where specified); restoration, cleanup and other items necessary to complete the job, whether specifically mentioned or implied.

Water service lines will be measured as units installed.

Item 38

a. **Fire Hydrant Assemblies** will be paid for at the Contract Unit Price per Each. Price paid will be payment in full for labor, material, and equipment necessary for furnishing and installing fire hydrant assemblies, and will include, but is not limited to, valves, valve boxes, connecting piping and fittings, necessary excavation, sheeting and bracing, shoring, dewatering, backfilling, disposal of excess excavated material, miscellaneous pipe connecting hydrant to water main, valves and fittings, thrust blocks, restoration, cleanup, and other items necessary to complete the job, whether specifically mentioned or implied.

b. Hydrants will be measured as units installed.

Item 39, 40

Curb Stop and Box, of the size and type specified, will be paid for at the Contract Unit Price per Each. Price paid will be payment in full for labor, material, and equipment required for installation of new curb stop and new curb box on existing and/or new water service line and will include, but is not limited to, excavation, sheeting shoring and bracing, fittings, water service line, connection to existing water service line, protection of existing improvements, backfilling, restoration, and other items necessary to complete the job, whether specifically mentioned or implied.

This item will be used at the discretion of Engineer when an existing water service line cannot be connected to the existing curb stop or whenever determined by Engineer.

Item 40A

Connection to existing water main, of the size and types specified, will be paid for at the Contract Unit Price per each. Price paid shall be payment in full for all labor, material, and equipment necessary for connecting new water main to existing water main, and shall include, but is not limited to, all excavation, sheeting, bracing, shoring, dewatering, and backfilling; disposal of excess excavated material; protection of existing improvements; furnishing and installing miscellaneous water main pipe, fittings, thrust blocks, restraints, and adapters; connection to new water main; capping old water main; restoration; cleanup; and all other items necessary to complete the job, whether specifically mentioned or implied. Connection to existing water main will be measured per each connection made. Connection to existing water main is not paid for separately where a tapping sleeve, valve and well/valve box is being paid for.

Item 41

1. **Structure, Adjust** of the size, type, and material specified will be paid for at the Contract Unit Price per Each. Price paid will be payment in full for labor, material, and equipment required to raise the frame and cover on an otherwise sound structure. This work will include, but is not limited to, sawcutting, removal and disposal of pavement, excavation, construction, bricks, blocks, precast adjustment rings, PVC pipe, or other materials necessary to adjust the designated structure, masonry plaster coat, backfill, disposal of unsuitable or excess material, concrete, installation of frame and cover, cleanout of structure, restoration, and other items necessary to complete the job, whether specifically mentioned or implied.

Item 42

1. **Structure, Reconstruct** of the size, type, and material specified will be paid for at the Contract Unit Price on a Vertical Foot (VFT) basis. Price paid will be payment in full for labor, material, and equipment required to either raise the frame and cover in excess of 12 inches, lower them in excess of six (6) inches, or to rebuild portions of the existing structure which need to be reconstructed due to deterioration; and will include, but is not limited to, sawcutting, excavation, removal and disposal of pavement, construction, bricks, blocks, precast cone section, riser sections, top section, adjustment rings, joints, masonry plaster coat, steps, sand backfill, concrete pavement, installation of frame and cover, cleanout of structure, and other items necessary to complete the job, whether specifically mentioned or implied.

2. Measurement for reconstruction of structures will be in vertical feet, measured from the new elevation of the masonry below the casting down to the point where the structure has been reconstructed. A structure which has been paid for as "Structure, Reconstruct" will not be paid for as "Structure, Adjust".

Item 43

1. **Structure Frame and Cover, Remove and Replace** will be paid for at the Contract Unit Price per Pound (lb). Price paid will be payment in full for labor, material and equipment necessary for removing the existing frame and cover and replacing with a new frame and cover, and will include, but is not limited to, excavation, removal of existing frame and cover, installation of new frame and cover, sand backfill, cleanout of structure, removal and disposal of unsuitable or excess material, and other items necessary to complete the Work, whether specifically mentioned or implied.

2. Measurement for remove and replace structure cover will be in pounds determined by the scale weight of the new frame and cover.

Item 44

Storm Sewer, Connection to Existing Storm Manhole of the type and diameter will be paid for at the Contract Unit Price per Each. Price paid will be payment in full for labor, material, and equipment required for connecting the new sewer to an existing manhole, and will include, but is not limited to, excavation, sheeting, shoring, bracing and dewatering, disposal of excess excavated material, tapping existing structure, connection to structure, sand backfill, removal and disposal of unsuitable material, removal of existing flow channel and construction of new flow channel, cleanout of structure, protection of existing improvements, placing and removing stoppers, bulkheads and flumes, pumping and bypassing flow, removal and disposal of debris, and other items necessary to complete the job, whether specifically mentioned or implied.

Measurement for connection to existing manhole will be per each.

Item 45, 46, 46A

Storm Sewers and Culverts, Open-Cut of the type and diameter specified on the Plans, in open cut trench will be paid for at the Contract Unit Price per Linear Foot (LFT). Price paid will be payment in full for labor, material, and equipment necessary for storm sewer pipe and culvert pipe in open cut trench and will include but is not limited to, excavation, sheeting, shoring, bracing, and dewatering, construction, protection of existing improvements, sand backfill, sand, stone or concrete pipe bedding, placing and removing

of stoppers and bulkheads, final inspection which includes cleaning, stubs in drainage structures, connection to drainage structures and sewers, end sections, barricading, restoration, cleanup and other items necessary to complete the job, whether specifically mentioned or implied.

Measurement for storm sewers and culverts in open cut trench, will be in place, by length in linear feet, from center to center of end standard manholes, standard catch basins, standard inlets, headwalls, or other standard drainage structures, with no deduction in length for intermediate standard structures. However, where tee manholes or where special bid items, as indicated in Plans and Specifications, having a basis of payment of lump sum, are involved, the measurement will be from the end of the tee manhole or from the end of the special bid item nearest the adjoining drainage structure and the adjoining drainage structure.

Item 46B

Temp Earth Retention System shall be paid as lump sum. Price paid will be payment in full for all labor, materials, and equipment required for the construction of the temporary earth retention system and may include, but is not limited to sheeting shoring bracing excavation and all materials necessary to provide a safe working trench, and all items necessary to complete the job, whether specifically mentioned or implied.

Item 47

Edge Drain of the type and diameter specified, will be paid for at the Contract Unit Price per Linear Foot (LFT). Price paid will be payment in full for labor, material, and equipment required for furnishing and installing the edge drain and will include but is not limited to, excavation, sheeting, shoring, bracing, dewatering, construction, protection of existing improvements, sand backfill, stone bedding, geotextile fabric wrap, placing of stoppers or bulkheads, final inspection which includes cleaning, connection to drainage structures and other items necessary to complete the job, whether specifically mentioned or implied.

Measurement for edge drain will be in linear feet, determined by field measurement of edge drain in place.

Item 48, 49A

Storm Sewer, Standard Drainage Structures of the type and diameter specified, for depths up to eight (8) feet and for the first eight (8) feet of deeper structures, will be paid for at the Contract Unit Price per Each. Price paid will be payment in full for labor, material, and equipment necessary for a complete standard storm drainage structure, and will include but is not limited to, excavation, dewatering, construction, frame, cover, bricks, blocks, cone section, riser sections, top section, bottom section, masonry plaster coat, steps, sand backfill, barricading, restoration, and other items necessary to complete the job, whether specifically mentioned or implied.

Additional depth of drainage structures, more than eight (8) feet of the type and diameter specified will be measured by Vertical Foot (VFT), to the nearest tenth, for that portion of drainage structures more than eight (8) feetin depth from the top of the base to the top of the cover.

Item 49

a. **Manhole, Construct Over Existing Storm Sewer** of the type and diameter specified, for depths up to eight (8) feet and for the first eight (8) feet of deeper structures, will be paid for at the Contract Unit Price per Each. Price paid will be payment in full for labor, material, and equipment required for furnishing and installing a complete, new manhole over the existing sewer and will include, but is not limited to, excavation, sheeting, shoring and bracing, dewatering, frame and cover, adjusting rings, cone section, bottom section, flexible joint connections, sand backfill, disposal of excess excavated material, tapping existing sewer, connection to sewer, construction of flow channel, cleanout of structure, protection of existing improvements, placing and removing stoppers, bulkheads and flumes, pumping and bypassing flow, removal and disposal of debris, and other items necessary to complete the job, whether specifically mentioned or implied.

In addition, a Vertical Foot (VFT) unit price, as set forth in the bid schedule, will be paid for each foot or tenth thereof of manhole depth in excess of eight (8) feet from the top of the base to the top of the cover.

Item 50

Subgrade Undercut Excavation and Backfill will be paid for at the Contract Unit Price per Cubic Yard (CYD). In cut areas, the price paid will be payment in full for labor, material, and equipment necessary for undercut excavation and disposal of unsuitable material, as determined by Engineer, below the proposed subgrade elevation, and will include, but is not limited to, providing, placing and compacting the undercut backfill material. In fill areas, the price paid will be payment in full for labor, material, and equipment necessary for undercut excavation and disposal of unsuitable material, as determined by Engineer, below the existing ground elevation and will include, but is not limited to, the placement and compaction of the undercut backfill material to existing grade, and other items necessary to complete the Work, whether specifically mentioned or implied.

Measurement for subgrade undercut excavation and backfill will be determined by field measure.

Item 51

a. **Aggregate Base Course**, of the type and thickness specified on the Plans, will be paid for at the Contract Unit Price per Ton. Price paid will be payment in full for labor, material, and equipment necessary for the aggregate base course, compacted in place, and will include, but is not limited to, excavation, construction, protection of existing improvements, furnishing, placing, and compacting backfill and subbase, also compacting and fine grading subgrade, also furnishing and applying chemical additives and water, also for barricading, and for other items necessary to complete the job, whether specifically mentioned or implied.

b. Measurement for aggregate base course will be in tons, with the installed tonnage determined by certified delivery tickets submitted to Engineer or his duly authorized representative. Delivery tickets will indicate the scale weight of the material, including chemical additives and moisture content. For material having a moisture content in excess of six (6) percent, the excess over six (6) percent will be deducted from the scale weight of the material when the moisture content is six (6) percent. Material placed to conform to the

cross section and width specified on the Plans or as determined by Engineer will be paid for at the tonnage basis. If the width of the base course is increased to accommodate Contractor in placing forms, etc., the additional material installed beyond the width specified on the Plans or as determined by Engineer, will be at Contractor's expense.

Item 52, 58, 59

Sidewalk, Sidewalk Ramp, and Drive Approach, Concrete, Remove and Replace of the type and thickness specified on the Plans, will be paid for at the Contract Unit Price per Square Foot (SFT). Price paid will be payment in full for labor, material, and equipment necessary for the removal and replacement of the sidewalk, sidewalk ramps, and driveway approaches and will include, but is not limited to, sawcutting, removal and disposal of unsuitable material, compacting and fine grading subgrade, furnishing, placing, and compacting backfill and subbase, construction of expansion joints, also forming, placing, jointing, finishing and curing the concrete, providing protection against rain and cold weather, backfilling, protection of existing improvements, barricading, restoration, and other items necessary to complete the job, whether specifically mentioned or implied.

Measurement for removal and replacement of sidewalks, sidewalk ramps, and driveway approaches will be determined by field measure of sidewalks, sidewalk ramps and driveway approaches in place.

Item 53, 54

Bituminous Pavement, of the type and thickness specified will be paid for at the Contract Unit Price per Ton. Price paid will be payment in full for labor, material, and equipment necessary for the bituminous pavement and will include, but is not limited to, excavation, protection of existing improvements, also compacting and fine grading subgrade, also furnishing, placing and compacting backfill and subbase, also the furnishing, placing, rolling and compacting the various bituminous lifts or courses, also the furnishing and applying of prime and bond coats, barricading, restoration, and for items necessary to complete the job, whether specifically mentioned or implied.

Measurement for bituminous pavement will be in tons, with the installed tonnage determined by certified batch plant delivery tickets submitted to Engineer or his duly authorized representative, at the time of placement.

Item 55

Pavement, Concrete with Integral Curb of the type and thickness specified will be paid for at the Contract Unit Price per Square Yard (SYD). Price paid will be payment in full for labor, material, and equipment necessary for construction of concrete pavement; and shall include, but is not limited to, all excavation, construction, and protection of existing improvements; also furnishing, placing and compacting backfill and subbase; also compacting and fine grading subgrade; also the furnishing and installing of hook bolt assemblies, tie bar assemblies, dowel bar assemblies, contraction joint basket assemblies, expansion joint basket assemblies, polyethylene planks, fillers, hot-poured elastic joint compound, mesh reinforcement, and bar mat reinforcement; also forming, placing, jointing, finishing, texturing and curing the concrete; also providing protection against rain and cold weather; barricading; pavement gapping; part width construction; miscellaneous restoration, and other items necessary to complete the job, whether specifically mentioned or implied.

Item 57

Curb and Gutter, Concrete of the type and width specified will be paid for at the Contract Unit Price per Linear Foot (LFT). Price paid will be payment in full for labor, material, and equipment necessary for the concrete curb and gutter section and will include, but is not limited to, excavation, construction, protection of existing improvements, furnishing, placing, and compacting backfill and subbase, compacting and fine grading subgrade, providing and installing hook bolt assemblies, tie bar assemblies, reinforcing steel, also forming, placing, jointing, finishing, texturing and curing the concrete, providing protection against rain and cold weather, backfilling, barricading, restoration, gapping, and other items necessary to complete the job, whether specifically mentioned or implied.

Measurement for concrete curb and gutter will be determined by field measure of curb and gutter in place.

Item 60, 61, 65

Pavement Markings of the type, width, and color specified will be paid for at the Contract Unit Price per Linear Foot (LFT). Price paid will be payment in full for labor, material, and equipment necessary for pavement markings, actually placed, and will include, but is not limited to, preparation of surface, layout, removing old markings, applying proposed pavement markings, glass beads, providing temporary barricading, cleanup, and other items necessary to complete the job, whether specifically mentioned r implied.

Measurement for pavement markings will be by linear feet, determined by field measurement of the full length with no deduction for the skipped portion of the line length.

Item 62

Pavement Markings of the type, width, and color specified will be paid for at the Contract Unit Price per Each. Price paid will be payment in full for labor, material, and equipment necessary for pavement word and/or symbol markings and will include, but not be limited to, preparation of surface, layout, removing old markings, applying proposed pavement markings, pavement word and/or symbol markings, glass beads, providing temporary barricading, cleanup, and other items necessary to complete the job, whether specifically mentioned or implied.

Item 63

a. **Restoration with Topsoil and Sod** will be paid for at the Contract Unit Price per Square Yard (SYD). Price paid will be payment in full for labor, material, and equipment necessary to construct the right-of-way to the cross section shown on the Plans or as determined by Engineer, and will include, but is not limited to excavation, subgrade preparation, filling, shaping, grading, plowing, discing, raking, disposing of unsuitable material and excess material, furnishing fill and topsoil, placing sod, pegging, rolling, tamping, mowing, maintenance and care, and items necessary to complete the job, whether specifically mentioned or implied. Contractor will restore areas disturbed by Contractor's operations.

Measurement for restoration with topsoil and sod will be determined by taking the length along the property line, field measured in linear feet, on each side of the proposed pavement, less the driveway width or the pavement width at the intersections. The limits of right-of-way restoration will be as follows:

1) For rights-of-way with ditches, the limits of right-of-way restoration will be between a line located 1-foot from the top of ditch back slope nearest the right-of-way line, to the right-of-way line.

2) For rights-of-way without ditches, the limits of right-of-way restoration will be between the back of curb and the right-of-way line.

Areas disturbed outside of the limits indicated will be restored at Contractor's expense

Item 64

Irrigation System, Remove and Reinstall Existing will be paid for at the Contract Unit Price on a per Lump Sum basis. Price paid will be payment in full for labor, material, and equipment required for removal of existing irrigation system and replacing it in as good as or better condition and will include, but is not limited to, excavation, protection of remaining system, reinstalling valves, piping, connections, fittings, heads, boxes, and controllers; furnishing and installing new material for material that could not be salvaged; removal and disposal of unsuitable materials, furnishing, placing and compacting backfill, protection of existing improvements; restoration, and other items necessary to complete the job, whether specifically mentioned or implied.

Item 66

Signs of the type, size, and area specified on the plans will be paid for at the Contract Unit Price per square foot. Price paid shall be payment in full for all labor, material, and equipment required for furnishing and installing signs, and shall include but is not limited to, all signs, sign post, supports, attaching devices, hardware, layout, removing old post and supports, and all items necessary to complete the job, whether specifically mentioned or implied.

Item 67

FLSH Beacon, Rectangular Rapid, Solar Power of the type, size, and material specified will be paid for at the Contract Unit Price per EACH (EA). Price paid will be payment in full based on Special Provision Solar Rectangular Rapid Flashing Beacon included in these specifications.

Item 68

Pedestal, Alum of the type, material, and height specified will be paid for at the Contract Unit Price per EACH (EA). Price paid will be payment in full based on Section 820 of the 2020 MDOT Standard Specifications for Construction.

Item 69

Pedestal, Fdn of the type specified will be paid for at the Contract Unit Price per EACH (EA). Price paid will be payment in full based on section 820 of the 2020 MDOT Standard Specifications for Construction.

Item 70

Pushbutton and Sign of the type specified will be paid for at the Contract Unit Price per EACH (EA). Price paid will be payment in full based on Section 820 of the 2020 MDOT Standard Specifications for Construction.

Item 71

Patching with bituminous materials, of the type specified, will be paid for at the Contract Unit price per ton. Price paid shall be payment in full for all labor, material, and equipment necessary for the bituminous patching, and shall include, but is not limited to, all construction; saw cutting; chipping, removing and disposing of unsuitable materials; also furnishing and applying of prime and bond coats; preparation of existing pavement base; also the furnishing, placing, rolling, tamping, and compacting of the bituminous patching material; also for protection of existing improvements; barricading; restoration; and for all items necessary to complete the job, whether specifically mentioned or implied.

Measurement for patching with bituminous materials, of the type specified, will be in tons, with the installed tonnage determined by certified batch plant delivery tickets submitted to the ENGINEER or his duly authorized representative, at the time of placement.

Item 72

Removal of bituminous pavement, regardless of thickness, will be paid for at the Contract Unit Price per square yard. Price paid shall be payment in full for all labor, material and equipment necessary for removing bituminous pavement, and shall include, but is not limited to, all sawcutting, excavation, protection of existing improvements, removal and disposal of unsuitable material, barricading, miscellaneous restoration or cleanup, and all other items necessary to complete the Work, whether specifically mentioned or implied. Measurement for removal of bituminous pavement will be by field measure of removed pavement is square yards.

Item 73

Removal of concrete curb will be paid for at the Contract Unit Price per linear foot unit basis. Price paid shall be payment in full for all labor, material, and equipment necessary for the removal of the concrete curb as shown on the Plans or as determined by the ENGINEER, and shall include, but is not limited to, saw cutting, removal and disposal of unsuitable materials; also furnishing, placing and compacting backfill; protection of existing improvements; barricading; and for all items necessary to complete the job, whether specifically mentioned or implied. Measurement for removal of concrete curb will be in linear feet, as determined by field measurement.

.Products (Not Used)

PART 3 EXECUTION (NOT USED)

END OF SECTION 01 22 00

SECTION 01 31 19
PROJECT MEETINGS

PART 1 GENERAL

1.01 PRECONSTRUCTION MEETING

A. Prior to the delivery of materials or the start of any construction, the Contractor will request a Preconstruction Meeting from the Engineer. A minimum three (3) working days' notification to meeting participants will be required.

B. Schedule:

1. Engineer will establish the meeting place, time and date, distribute agenda, notify participants, and administer the meeting. Contractor will notify major Subcontractors.

C. Attendance:

1. Owner
2. Engineer
3. Contractor
    a. Major Subcontractors
4. Utility Companies
5. Safety Representatives
6. Governmental Agencies

D. Agenda:

1. Distribution by the Contractor and discussion, review and acceptance of:
    a. List of names and telephone numbers for superintendent, foreman and other key personnel.
    b. List of major Subcontractors and Suppliers.
    c. Projected construction preliminary progress schedules.
    d. Preliminary schedule of Shop Drawings and Sample submittals.
    e. Estimated monthly payment schedule and schedule of values
2. Critical Work sequencing.
3. Major equipment deliveries and priorities.
4. Project coordination.
5. Responsibilities of Owner, Engineer, Contractor and other agencies.
6. Procedures and processing of:
    a. Field decisions.

b. Proposal requests.

c. Submittals.

d. Change Orders.

e. Applications for Payment.

7. Adequacy of distribution of Contract Documents.
8. Procedures for maintaining Record Documents.
9. Use of premises.
10. Construction facilities, controls and construction aids.
11. Temporary utilities.
12. Safety and first aid procedures.
13. Security procedures.
14. Housekeeping procedures.
15. Testing

E. Minutes:

1. Engineer will prepare and distribute copies to participants within seven (7) days of meeting. Participants will report corrections and comments within ten (10) days of receipt of minutes.

1.02 PROGRESS MEETINGS

A. Periodic Progress Meetings will be held as required by the progress of the Work.

B. Schedule:

1. Engineer will establish the meeting place, time and date, distribute agenda, notify participants and administer the meeting. Contractor will notify major Subcontractors.

C. Attendance:

1. Engineer
2. Contractor
3. Subcontractor as appropriate to the agenda.
4. Suppliers as appropriate to the agenda.
5. Others

D. Agenda:

1. Review minutes of previous meeting.
2. Review of work progress since previous meeting.
3. Review field observations, problems, conflicts.

4. Review problems which impede Construction Schedules.
5. Review of off-site fabrication, delivery schedules.
6. Review corrective measures and procedures to regain projected schedule.
7. Review revisions to Construction Schedules.
8. Review plan progress, schedule, during succeeding Work period.
9. Review coordination of schedules.
10. Review submittal schedules; expedite as required.
11. Review maintenance of quality standards.
12. Review proposed changes for:
    a. Effect on Construction Schedule and on completion date.
    b. Effect on other Contracts of the Project.
13. Other business.

E. Minutes:

1. Engineer will prepare and distribute copies to participants and the Owner within seven (7) days of meeting for review at the next meeting.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION 01 31 19

SECTION 01 32 16
CONSTRUCTION PROJECT SCHEDULE

PART 1 GENERAL

1.01 SCOPE OF WORK

A. Contractor will be responsible for the Project construction schedule for the full Contract Time, including without limitation the following:

1. Contractor's construction schedule updates will be submitted on a monthly basis, or as requested by Owner.

2. Contractor's short-term look-ahead schedule submitted at each progress meeting and as required by the Owner.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Section 01 33 00 - Submittal Procedures

1.03 DEFINITIONS

A. Activity: A discrete part of a project that is identified in the Contractor's planning, scheduling, executing, monitoring, and controlling of the construction Project. Activities included in a construction schedule consume time and resources.

B. Critical Activity: An activity on the critical path of the construction schedule.

C. Predecessor Activity: An activity that precedes another activity in the network.

D. Successor Activity: An activity that follows another activity in the network.

E. Cost Loading: The allocation to each activity within the Critical Path Method (CPM) Schedule of the portion of the Contract Price reflecting the Contractor's anticipated costs to perform that portion of the Work, including a proportional share of overheads and profit. The sum of costs for all activities must equal the total Contract Sum. The cost loaded CPM Schedule will be referenced to the contract, purchase order line item, and bid breakdown item.

F. Critical Path Method (CPM): Scheduling method of planning and scheduling a construction project where activities are arranged based on activity relationships. Network calculations determine when activities can be performed and the critical path to complete the Work of the Project within the specified Contract Times and interim completion milestones.

G. Critical Path: The longest connected chain of interdependent activities through the network schedule that establishes the minimum overall Project duration and contains no float.

H. Event: The starting or ending point of an activity.

I. Free Float: is the amount of time an activity can be delayed without adversely affecting the early start of the successor activity.

J. Total Float: is the measure of leeway in starting or completing an activity without adversely affecting the planned Project completion date. Float time is not for the exclusive use or benefit of either Owner or Contractor, but is a jointly owned, expiring Project resource available to both parties as needed to meet schedule milestones and Contract completion date.

K. Contract Float: is the measure, in calendar days, of leeway between the Contractor's anticipated date for completion of all or any part of the Work and the corresponding specified Contract Time regardless of the float values calculated by the software used to produce the CPM Schedule.

L. Resource Loading: The allocation of labor and equipment necessary for completing an activity as scheduled.

M. Work Breakdown Structure (WBS): A deliverable-oriented breakdown of a project into smaller components. A work breakdown structure is a key project deliverable that organizes the team's work into manageable sections.

N. Detailed Cost Breakdown (DCB): An itemized breakdown of the Work and Contract Amount detailing quantities and dollar amounts for each pay item, developed by summarizing the cost-loaded CPM schedule to a level of detail appropriate for use in progress payment estimates. The sum of all pay items will equal the Contract Price.

O. Milestone: The date of a significant event, used to monitor schedule performance and define Contract deadlines.

P. Data Date: The reporting cut-off date through which progress is incorporated into a schedule.

Q. The term “day” as used in these Contract Documents will mean calendar day unless otherwise specifically designated. Contract Time computations will be made in Days. Total Float and Contract Float values computed in Working Days will be converted to Days when such computations are made for the purpose of calculating changes in Contract Time.

1.04 CPM SCHEDULE

A. Contractor's approach to prosecution of the Work will be disclosed by submission of computerized, cost-and-resource loaded CPM Schedules as required herein. These requirements are in addition to, and not in limitation of, those imposed elsewhere in the Specifications.

B. CPM Schedule Submittals are intended to show:

1. the priority and sequencing by which the Contractor intends to execute the Work (or Work remaining) to comply with the Contract Times, those sequences of Work indicated in or required by the Contract Documents and any other requirements of the Contract Documents;

2. how the Contractor anticipates foreseeable events, site conditions and all other general, local and prevailing conditions that may in any manner affect cost, progress, schedule, performance and furnishing of the Work;

3. how the Means and Methods chosen by the Contractor translate into Activities and sequencing;

4. the actual timing and sequencing of completed Work; and

5. the allocation of the Contract Price and construction craft labor hours to the Activities.

C. CPM Schedule will clearly define the prosecution of the Work from Date of Commencement of the Contract Time to Final Completion by using separate CPM Activities for, but not limited to: Notice to Proceed, submittal, resubmittal, review and approval of basis of design, preliminary

design and final design (applicable for design/build contracts); construction/installation; permitting (by the Contractor and Owner); workshops (instrumentation, software, and controls), submittal preparation; submittal review and return, resubmission and re-review; mechanical, electrical, controls systems and information systems layout drawings; procurement and fabrication; deliveries to the site or storage; Owner-furnished items or _____; interfaces with other work (other contractors, public utilities, etc.); planned shutdowns or other impacts to Owner's operating equipment or facilities; start-up and testing of the equipment/system; Field Acceptance Test (FAT); Site Acceptance Test (SAT) for controls; Substantial Completion, final inspection; Owner training; O&M and Training Manuals; punch list; final clean-up; submittal of as-built drawings and other record documents; close-out; and Final Completion.

D. The CPM Schedule will detail CPM Activities and logic ties as required to demonstrate the Contractor's approach to all the Work. CPM Activity durations will equate to the days required to complete the associated Work. Activities will not combine:

1. separate items of Unit Price or lump sum Work;
2. distinct classes of Work (e.g., CSI Divisions or equivalent);
3. Work in separate areas, structures or facilities and, if requested by Engineer, Work in separate locations or elevations within an area, structure or facility; or
4. rough-in and finish Work.

E. Start-to-finish relationships and negative lags will not be utilized unless approved in advance by the Engineer. Activities will be cost and resource loaded.

F. The activities will form a complete network wherein all activities (except for the start and completion milestones) will have at least one predecessor and one successor. Each activity will have as many predecessor or successor activities as is necessary to accurately reflect the requirements to complete the work. The number of activities and level of detail in the schedule will be subject to the Engineer's review.

G. Schedule calendars must be developed to accurately reflect the working times for each activity based on the specific requirements of the project. If not specified, assume 5 calendar days and 40 hours per week. Observed federal, state and non-work holidays should be included, as appropriate.

H. Installation CPM Activities will last from 15 to 45 days unless a shorter or longer duration is required to properly depict the Work. The schedule will provide not less than 30 days for each submittal review or re-review activity and for each submittal will include separate activities for review, re-submittal, and re-review. Submittal, delivery and start-up CPM Activities may combine materials and equipment in the same class of Work, based on the detail of related installation CPM Activities. Furnish, install, and test will be separate activities. Contractor will include weather contingencies and other anticipated/foreseeable events/conditions in the schedule and the schedule narrative.

I. Contractor will refrain from constraining activity dates in the schedule other than Contract milestones. If the Contractor feels constraints are necessary, the Contractor will detail the reasons for the constraints to the Engineer and in the schedule narrative and will require approval of their use.

J. Activities will be assigned consistent descriptions, activity identification, Work Breakdown Structure, and activity codes consistent with schemes provided by the Engineer or, if none is provided, with the Engineer's approval. For each activity, separate activity codes will be provided for work location, phase of work, responsible firm (Contractor, a Subcontractor or a Supplier), system, specification section, and DCB item. Constraint dates/basis will be explained.

K. Owner maintains an Integrated Master Schedule (IMS) that includes all activities in the Capital Improvement Plan (CIP). Contractor's construction schedules are a key component to maintaining the IMS. In order to create uniformity in the data presented, the following fields must be standardized for all schedules: WBS (location, division, and specification section), Activity IDs, Activity Names, Calendars, Activity Codes, Resource Naming Convention, Data Dates, Monthly Reporting Requirements, and Approved cost loading). The standardization approach for these items will be provided in Appendix A or provided by the Engineer.

L. The CPM Schedule will be prepared using the latest version of Oracle Corporation Primavera P6 Project Management Software unless the Engineer determines that integration with the IMS is not required, in which case Microsoft Project may be used for Contracts valued at less than $1,000,000 provided that CPM schedule integrity is maintained as specified herein, or graphical Microsoft Excel schedules may be utilized for Contracts valued at less than $500,000. Unless otherwise approved by the Engineer CPM schedule calculations will be performed:

1. utilizing retained logic in lieu of progress override;
2. using expected finish dates;
3. with critical activities defined as the longest path;
4. with total float defined as the smallest of start float or finish float; and
5. with the predecessor calendar used for lags.

M. In preparing CPM Schedules, it is the Contractor's responsibility to:

1. request interpretations from the Engineer, as warranted
2. point out to the Engineer, by specific, separate notation, any aspects of the CPM Schedule that may reflect variations from the Contract Documents
3. work with Subcontractors and Suppliers in finalizing Activities and logic ties.

N. Early Dates in the CPM Schedule will be based on proceeding with all or part of the Work exactly on the date when the corresponding Contract Time commences to run. Late Dates will be based on completing all or part of the Work exactly on the corresponding Contract Time, regardless of whether the Contractor anticipates early completion or not. If sequences of Work are indicated in or required by the Contract Documents, the CPM Schedule will show in detail the Contractor's approach to conforming with those sequences.

O. A narrative will accompany all CPM Schedule submittals which will:

1. Discuss the Contractor's planning and approach to the Project and any changes therein;
2. Identify planned staffing, resources, and work hours;

3. Identify the basis for any constraints incorporated into the CPM schedule;
4. Itemize shifts, non-Working Days and any multiple calendars applied to the CPM Activities;
5. Compare current activity dates and the Contract Times;
6. Recap progress and days gained or lost vs. the As-Planned Schedule;
7. Provide activity reporting based on the CPM Schedule discussing progress by CPM Activity;
8. Detail Contractor's Site Management Plan, Construction Equipment Usage, Labor Buildup over first three months and de-staffing plans (when applicable);
9. Describe all changes in resources to be used on remaining Work;
10. Identify delays and causes and any actions taken to mitigate impact;
11. Explain the basis for any logic ties other than finish-to-start (FS), and for each lag incorporated into the schedule;
12. Define abbreviations used in the schedule;
13. Itemize any revisions made in the activities or Work sequences, and
14. Identify all approved logic changes.

P. The narrative will include monthly and cumulative plots of planned and actual manpower and payments, in a form acceptable to the Engineer, comparing the Contractor’s anticipated rate of progress in the most current CPM Schedule Submittal and that anticipated in the As-Planned Schedule.

Q. CPM Schedule submittals will include:

1. Electronic copies of the Contractor's native P6 schedule files (.xer);
2. A narrative;
3. Activity report/Gantt charts including CPM Activity code, description, duration, calendar, Early and Late Dates (calendar dates), Total Float, labor man-hours, cost, and sort codes. The Late Finish Date (or the Early Start Date) of any CPM Activity highlighting a Contract Time (or commencement of all or any part of the Work) will equal the corresponding Contract Time (or Contract date). Provide PDF file (11-inch x 17-inch printable, with headers and footers).
4. S-curves showing projected early and late earnings and earnings to date;
5. Total contract earnings report detailing contract value to date, total contract earnings to date and current period earnings by activity, sorted and subtotaled by responsibility, with actual, early start, early finish, late start and late finish dates;
6. Total Float report
7. Critical path
8. Other reports and Gantt charts as designated by the Engineer

9. Three (3) color copies and an electronic pdf copy of all of the above items.

10. Critical paths with zero or negative Total Float will be shown in red. If the Contractor plans to finish the work earlier than the Substantial Completion Date and Final Completion Date, then the activities with minimum Total Float will be identified in red color as the near critical path.

11. Schedule update reports will include the prior update baseline.

R. Each CPM Schedule Submittal will bear the Contractor's stamp or written indication of approval as representation to the Owner that the Contractor has determined or verified all data on that CPM Schedule, and that the Contractor and the Subcontractors and Suppliers have reviewed and coordinated the sequences in that CPM Schedule with the requirements of the Work. CPM Schedule Submittals are not Contract Documents.

S. Owner’s review of CPM Schedule Submittals may result in comments relating to conformance with:

1. the Contract Times,

2. those sequences of Work indicated in or required by the Contract Documents

3. any other Contract Document requirements that may have a significant bearing on the use of CPM Schedule Submittals to resolve issues affecting Contract Price and/or Contract Time. The review of CPM Schedule Updates may, in addition result in comments as to whether the Contractor’s scheduling of Work remaining continues to conform with the Contract Times and those sequences of Work indicated in or required by the Contract Documents. Review comments may also respond to Contractor’s proposed schedule recovery plans, when and as appropriate, and to Contractor requests for extensions in Contract Time. CPM Schedule review comments may also result in the selection of Targets and recording of Target Times.

T. The review of CPM Schedule Updates may, in addition result in comments as to whether the Contractor’s scheduling of Work remaining continues to conform with the Contract Times and those sequences of Work indicated in or required by the Contract Documents. Review comments may also respond to Contractor’s proposed schedule recovery plans, when and as appropriate, and to Contractor requests for extensions in Contract Time. CPM Schedule review comments may also result in the selection of Targets and recording of Target Times.

U. No CPM Schedule review by the Engineer will relieve the Contractor from the responsibility to:

1. comply with the Contract Times and any sequences of Work indicated in or required by the Contract Documents

2. complete omitted Work within the Contract Times.

Nor will any such CPM Schedule review by the Engineer lead to approval of, or consent to, any variation from the Contract Documents.

V. CPM Schedule reviews will not impose on the Owner any responsibility for:

1. the means, methods, sequences or techniques by which the Contractor plans and executes the Work;

2. verifying whether Work is omitted;

3. Activity durations are reasonable;

4. the adequacy of the level of labor, materials and construction equipment;

5. the reasonableness of the Contractor's chosen Means and Methods; or

6. whether Work sequences and Activity timing are practicable.

Even if any comments or objections are noted from the reviews of CPM Schedule Submittals, no such reviews or objections noted will be effective or construed to create or impose on the Owner or Engineer any responsibility for the timing, planning, scheduling or execution of the Work or for the correctness of any such CPM Schedule details. The correctness of the CPM Schedule will remain the sole responsibility of the Contractor.

W. The initial CPM Schedule is known as Revision 0 (Rev. 0) and, once approved by the Engineer, becomes the As-Planned Schedule and the initial Record Baseline Schedule. Within 30 days following the Contract Start Work Date, Contractor will provide the Rev. 0 cost-loaded CPM Schedule Submittal and a list of all project submittals for Engineer's review and approval.

1. The Rev. 0 Submittal will reflect Contractor's plan for the Work as awarded in full accordance with the Contract, and will not include any delays, changes, Change Orders, Construction Change Directives or substitutions, or "or-equals". Activity durations and Work sequences in the CPM Schedule Rev. 0 Submittal will be based on furnishing named or specified materials/equipment nominated in the Contract and the means and methods indicated in or required by the Contract Documents. No activity durations or Work sequences in the Rev. 0 CPM Schedule will be based on or-equals or substitutions even if the Contractor intends to pursue such under the provisions of the Specifications. Any additional modifications to the contract dates, scope, or costs are managed through approval of subsequent CPM Schedule Submittals.

2. Contractor will cause Work covered by Allowances as well as specified Unit Price Work and contingent Unit Price Work to be done within the Contract Times. Contractor will be responsible for completing, within the Contract Time for Substantial Completion, up to one hundred twenty-five percent (125%) of the estimated quantities for each specified item of Unit Price Work. The CPM Schedule will incorporate within the limits of the Contract Times:

   a. Contractor's best estimate of the activities and logic ties required by Cash Allowances and Work to be authorized under any Provisionary Allowances and under any contingent Unit Price Work; and,

   b. Activities relating to requisite tasks of Owner, and to interfaces with other work, based on the information given in the Contract Documents, and if not given, as indicated by the Engineer. Provisionary Allowance activity will be for the entire duration of the Contract. In any case, Contractor will allow not less than the times indicated in the Contract, or if no times are indicated, 15 days or such greater time as is reasonable under the circumstances for each required action by Engineer, Owner or other contractors.

   c. The Rev. 0 schedule will allow sufficient time to accommodate Owner activities as well as time for facility operational constraints that may affect the ability to obtain equipment shutdowns. Required durations for Owner submittal review will be not less than those referenced in Section 01 33 00 - Submittal Procedures.

d. Planned durations for weather-exposed activities will include sufficient time allowances to accommodate without delay the loss, within each calendar month, of not less than the number of work-days specified below due solely to adverse weather.

Monthly Required Allowance for Workdays Lost Due to Adverse Weather											
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
5	5	5	6	6	6	8	5	8	4	5	4

No extension in Contract Time will be justified due to adverse weather except to the extent that the number of work days lost in a calendar month due solely to adverse weather exceeds the number of days specified in the table above.

3. Contractor will cost and resource load the activities within the CPM schedule by allocating to each activity the applicable portion of the Contract Price proportionate to the Work required to perform the activity. The cost-loaded CPM Schedule will tabulate schedule activity number, quantities (for Unit Price Items), required craft labor hours, and activity cost value for each activity. Contractor may add non-work activities to the CPM schedule as necessary to account for all elements within the total Contract price. Activities for submittals and other non-construction activities (excluding mobilization and design deliverables under design/build delivery) will not be cost-loaded within the CPM Schedule. Activities for bonds, builders risk insurance and stored materials will be cost loaded at invoiced cost (excluding any general conditions, overheads or profit). The cost-loaded schedule will include activities and costs for specific deliverables within the following categories:

   a. CPM schedules; (b) testing, start-up, commissioning; (c) operation and maintenance manuals; (d) training; (e) delivery of updated as-built record documents; (f) clean-up, and (g) punch list work for each trade or subcontractor in an amount not less than 1% of the total Work of that trade or subcontractor. The aggregate total of all activity costs within the cost-loaded schedule will equal the Contract Price. Delivery activities will be cost loaded if the Contractor intends to request payment for materials properly stored on-site. Costs shown for each activity in the cost-loaded CPM Schedule will reflect a share of the Contract Price that is proportionate to the estimated costs to perform the associated Work, including a proportional share of Contractor's and subcontractor’s mark-ups, and will be an accurate and correct allocation of the Contract Price.

   b. testing, start-up, commissioning;

   c. operation and maintenance manuals;

   d. training;

   e. delivery of updated as-built record documents;

   f. clean-up, and

   g. punch list work for each trade or subcontractor in an amount not less than 1% of the total Work of that trade or subcontractor.

4. The aggregate total of all activity costs within the cost-loaded schedule will equal the Contract Price. Delivery activities will be cost loaded if the Contractor intends to request payment for materials properly stored on-site. Costs shown for each activity in the cost-loaded CPM Schedule will reflect a share of the Contract Price that is proportionate to the

estimated costs to perform the associated Work, including a proportional share of Contractor's and subcontractor’s mark-ups, and will be an accurate and correct allocation of the Contract Price.

5. Unless otherwise approved by the Engineer activity cost amounts within the cost-loaded schedule will be summarized into payment items comprising a Detailed Cost Breakdown (DCB) to be used to prepare Progress Payment Estimates. In such case each schedule activity will be cross-referenced to one and only one summary payment item through assignment of a payment item code. A single DCB payment item may include one or more schedule activities. The aggregate total of all DCB payment items will equal the Contract Price. Separate DCB items and cost-loaded schedule activities will be provided for furnishing, installing and testing of equipment.

6. The cost-loaded CPM Schedule and DCB will be submitted for Engineer’s review and approval in accordance with the requirements of the General Conditions and will:

    a. show the allocation of the Contract Price among activities representing the various components of the Work, in sufficient detail as the Engineer may require;

    b. divide the Work into activities by significant Sections of the Specifications within areas, structures and Facilities, or Work Breakdowns, or vice versa;

    c. identify total amounts for each Work activity;

    d. segregate work by the various subcontractors and identify the subcontractor performing each element of the work; and

    e. for Unit Price Items only, tabulate quantities and unit prices.

7. Contractor will hold a baseline schedule presentation meeting for the Owner and Engineer. This meeting is meant for the Contractor to present, in detail, the schedule plan.

    a. Examples of items for presentation include but are not limited to work breakdown structure, a description of each activity name, basis for durations, general work sequence, the critical path, and weather assumptions. This meeting could also take place during schedule updates, if requested.

8. **The first Progress Payment will not be finalized until the Engineer returns to the Contractor the Rev. 0 CPM Schedule Submittal (including the DCB) as "Approved" or "Approved As Noted."** Once the Rev. 0, or Rev. 0A, etc. CPM Schedule Submittal is returned by the Engineer as "Approved" or "Approved As Noted", it will represent the As-Planned Schedule, and will be used for Payment Submittals until revisions to the CPM Schedule are approved by the Engineer. If Engineer does not approve the cost-loaded CPM Schedule or the DCB, Contractor will address Engineer’s comments, revise and resubmit until approved by the Engineer. The cost-loaded CPM Schedule report and the DCB will include spaces for signatures of Engineer and Contractor to confirm the approval of each party. Once the Rev. 0 cost-loaded CPM Schedule and DCB are approved, the Contractor will not modify any activity value or pay item, unless otherwise authorized by the Engineer in writing. Engineer may require reallocation of costs for uninstalled material, amounts not expended for bonds or insurances, or to properly reflect authorized Change Directives or Change Orders. Contractor represents and warrants to Owner that the final cost-loaded CPM Schedule and DCB provide an accurate and correct allocation of the Contract Price.

9. CPM Schedule Updates. After approval of the Rev. 0 CPM Schedule Contractor will update the CPM Schedule monthly (or at shorter intervals if deemed necessary by the Engineer) using as a data date the first day of each calendar month. Each CPM Schedule Update will show the actual status of the Project as of the date of the updated CPM Schedule. CPM Schedule Updates will progress the Record Schedule, and will be due five (5) days after the closing of each Progress Payment period, whether the As-Planned Schedule has been established or not. Each CPM Schedule Update submittal will be accompanied by the following power point slides in a format acceptable to the Engineer: (1) Project milestone date trending; (2) Summary schedule; (3) Project activity progress (number of activities earlier or later than scheduled last month); (4) Project total float (mean and median total float trend each month); (5) Labor hour resources planned loading each month; and Actual Labor Count weekly history (from daily reports).

    a. Each update will include the actual dates each activity is commenced and the date that the activity is completed sufficiently to allow subsequent activities to commence, delays and other significant events occurring since the previous Payment Submittal.

    b. Contractor may revise schedule logic in each CPM Schedule Update provided that such revisions comply with Contract requirements, are identified in the accompanying narrative, and are acceptable to Engineer. Schedule logic and/or activities will be revised as necessary to accurately address out-of-sequence progress (e.g., successor activities started before completion of predecessor).

    c. Subject to review and approval of Engineer, Contractor will update the physical percent complete for each activity started or in progress, based on realistic assessment of earned value and work remaining. Contractor will revise percent complete as required by Engineer. Activities which are complete but for remaining minor punch list work and which do not restrain the initiation of successor activities may be declared 100 percent complete. Punch list activities may be declared 100 percent complete upon completion and correction of punch list work identified during Owner’s pre-final inspection.

    d. Contractor will include the CPM Schedule Update with its monthly Payment Submittal, which will also include Contractor’s certification that it has not been delayed or adversely impacted, as of the cut-off date, by any acts or omissions of Owner or Engineer, except as otherwise specifically stated.

    e. The most recent CPM Schedule “Approved” or “Approved as Noted” by the Engineer will be the current Record Schedule and will be used by the Owner and Contractor to monitor progress against Contract Times and resolve issues affecting Contract Prices and Contract Times and the assessment of liquidated damages.

    f. If the Early Dates in any CPM Schedule update submittal forecast any slippage in the Contract Times, the Contractor will indicate such overrun(s) by reporting negative Total Floats. Owner reserves the right not to approve schedules that do not reflect completion within the Contract Time.

10. Short-term look-ahead Schedules will subdivide CPM Activities into detailed tasks and cover the prior two (2) weeks and the next four (4) weeks. Each installation task will be cross- referenced to a CPM Activity and will not combine the Work for more than one crew.

11. Submittals will segregate preparation from review and will not combine items furnished by separate Suppliers.

1.05 CONTRACTOR'S SCHEDULER

A. Contractor will appoint a project scheduler with the following minimum qualifications (unless otherwise modified by the Owner or Engineer): At least 5 years of experience using a recent version of Primavera P6 Professional Project Management software, and scheduling for at least three construction projects with cost and responsibility loaded CPM schedules. If the appointed project scheduler fails to perform to an adequate professional and technical standard or if Engineer, in the reasonable exercise of its discretion, objects to the appointed project scheduler, the Contractor will use a replacement project scheduler having the required qualifications, at no increase in Contract Price and/or Contract Time. Submit the scheduler qualifications and experience for Engineer review and approval.

B. Contractor's scheduler will prepare the Baseline schedule, all schedule updates, look ahead schedules, time impact analysis, and recovery schedules required by the Contract Documents. Contractor's scheduler will attend all project meetings where scheduling input is necessary, as well as attend the meetings and perform the duties set out in the other Contract Documents. Owner and Engineer will be invited to all Contractor Scheduling meetings.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.01 PROGRESS AND COMPLETION

A. Time limits stated in the Contract Documents are of the essence of the Agreement. Contractor will begin the Work on the date of commencement indicated in the Notice to Proceed. It will carry the Work forward expeditiously with adequate resources, will at all times adhere to the CPM Schedule, and will achieve Substantial Completion and Final Completion within the time limits set forth in Project Calendar stated in the Contract Documents, as extended by change orders.

B. The construction and completion of the Project will be undertaken and completed in accordance with the cost loaded CPM Schedule described in the Contract Documents. The parties will use the CPM Schedule for planning and monitoring the progress of the Work. If the Contractor will fail to adhere to the CPM Schedule, as revised pursuant to the Contract, it must promptly request Engineer's approval to work outside of normal working hours and will work such additional time over regular hours, including Saturdays, Sundays and holidays and/or supply such additional workmen as may be required to bring the Work on schedule, without additional cost or expense to Owner, including claims for inefficiency due to the use of overtime. In the event of such failure of Contractor to adhere to the CPM Schedule, Contractor may alternatively propose revisions to the CPM schedule to recover the delay for Engineer 's review and approval. If Engineer agrees that such revisions are feasible and likely to recover the delay, Contractor will promptly implement the measures necessary to recover the delay.

C. If Contractor is late in achieving Substantial Completion, Final Completion, or if Contractor fails to adhere to the approved CPM Schedule or submits a CPM Schedule update which forecasts delay in achieving any of the Contract Times, or if Engineer reasonably determines based on an evaluation of Contractor's rate of progress that there is a substantial probability of delay in achieving any of the Contract Times, Engineer may provide Contractor a notice to cure, request that Contractor submit a schedule recovery plan, and withhold liquidated damages in accordance with the applicable provisions of the Agreement.

D. Upon receipt of a request for a schedule recovery plan:

1. To the extent that Contractor believes that it is entitled to an increase in Contract Time under the terms of the Contract, Contractor will comply with paragraphs 3.02 and 3.03 in providing notice, demonstration of entitlement, delay analysis, and supporting documentation demonstrating the number of days of Contract Time extension to which Contractor believes it is entitled.

2. To the extent that delay exceeds any time extension to which Contractor is entitled, Contractor will submit a schedule recovery plan and immediately take measures necessary to recover delay. Contractor's schedule recovery plan will describe the cause of schedule slippage or delayed progress and the actions proposed and taken by the Contractor to recover schedule. Contractor will meet with the Engineer and present the Contractor's written schedule recovery plan. If, upon evaluation of the Contractor's schedule recovery plan, the Engineer determines that there is sufficient cause to withhold liquidated damages, the Owner may deduct from Requests for Payment the Owner's estimate of the liquidated damages then due using the Engineer's estimate of late completion of the Work.

E. Contractor will carry on the Work with due diligence during all disputes or disagreements with the Owner. No Work will be delayed or postponed pending resolution of any disputes or disagreements. Contractor will exercise reasonable precautions, efforts and measures to avoid or mitigate situations that would cause Delays.

3.02 SUSPENSIONS AND DELAYS

A. In accordance with the General Conditions the Engineer may order the Contractor in writing to suspend, defer, stop, delay, interrupt, slow down, or extend all or any part of the Work for such period as it may determine to be appropriate for the convenience of Owner.

1. To the extent practical, the Contractor will consult with Engineer and will mitigate the cost of suspensions and delays by reducing the size of its Project staff and demobilizing equipment to the extent practicable upon notice from the Engineer of any Owner caused delay or interruption which is likely to exceed seven (7) days. Upon the termination of the delay or as otherwise directed by Owner, the Contractor will restore the Project staff to the appropriate size.

B. Contractor will provide Owner the opportunity to prevent or mitigate delays by Contractor's promptly furnishing of written notice of potential delay to Engineer before Contractor incurs actual delay or additional costs, and in any case not later than three (3) days after the occurrence of any of the following that Contractor believes: (a) to be within the responsibility of the Owner, and (b) may result in critical path delay to any of the Contract Times required by the Project Calendar included in the Contract Documents:

1. (i) Construction Change Directives or Change Orders issued by Owner; (ii) the Contractor receives a notice of a change in the Agreement or extra work to be performed; (iii) the Engineer provides a clarification or notice of a no-cost change or minor change as provided in the General Conditions; or (iv) Owner or Engineer directs a change in the Work in accordance with the changes provisions of the General Conditions that Contractor believes will result in critical path delay to any Contract Time;

2. Contractor encounters concealed conditions in accordance with the provisions of the General Conditions that it believes will result in critical path delay to any Contract Time;

3. Contractor believes that any act or failure to act by Owner or Engineer or any of Owner's other contractors or consultants, or any variation in quantities for unit price work, will cause performance of all or any part of the Work to be delayed, deferred, stopped, slowed down, suspended or interrupted beyond the reasonable time for such actions as allowed under the Contract Documents and the CPM schedule, resulting in potential critical path delay to any Contract Time.

C. Contractor will promptly provide written notice to Engineer before Contractor incurs actual delay or additional costs, and in any case not later than three (3) days after the occurrence of any event that (a) is not within the responsibility of either the Owner or the Contractor, and (b) may result in critical path delay to any Contract Time including without limitation:

1. Uncontrollable Circumstance as provided in the General Conditions

2. Adverse weather within a calendar month that causes the loss of more work-days than specified herein.

3. Conditions affecting Owner's facilities, that result in constraints to Contractor's work or impede shutdowns of Owner's systems at the times requested by Contractor, including without limitation operational effects of weather, plant conditions, ongoing maintenance, other work affecting available facilities, equipment failures or outages, requirements to maintain sufficient processing capacity, or other regulatory or operational issues affecting Owner's facilities, provided that such conditions are outside the reasonable control and reasonable advance planning of both Owner and Contractor.

4. Delays caused by regulatory authorities, governmental agencies, public utilities, and other third parties.

D. Contractor will promptly provide written notice to Engineer, in any case not later than three (3) days, after the start of any delay that is within the responsibility of the Contractor and will immediately take such action as is necessary to mitigate and recover the delay.

1. Contractor will provide notice and promptly take appropriate action to recover schedule whenever the Contractor anticipates, or any CPM Schedule Submittal demonstrates, that the scheduled early completion date for any required CPM Activity has slipped, due to acts or omissions within the control of the Contractor, beyond any Contract Time. If the Contractor is not responsible for such schedule slippage, the Contractor will give prompt written notice of a delay justifying a Contract Time extension in accordance with paragraph 3.02.B or 3.02.C.

2. If schedule recovery is required, the Contractor will enclose with the next Schedule Update Submittal a schedule recovery plan consisting of (a) a narrative describing the cause of schedule slippage and the actions taken to recover schedule within the shortest reasonable time, and (b) a Recovery Schedule with the corresponding revisions in Activities and logic ties and other adjustments intended to recover the schedule. Appropriate schedule recovery actions may include: assignment of additional labor, Subcontractors or construction equipment; Work during other than normal working hours; resequencing of the Work; increasing the concurrency of sequential Work activities; expediting of Submittals and deliveries; and any combination of any of these or other similar actions. Activity shortening and overlapping will be explained as to their basis (and be supported by increases in resources).

3. Contractor's failure, refusal or neglect to take appropriate schedule recovery action or, in the alternative, give written notice of a delay with a timely and properly supported Time extension request, and, in either case, to follow up with a timely CPM Schedule will be reasonable evidence that the Contractor is not prosecuting the Work with due diligence. Any such Contractor failure, refusal or neglect will give sufficient basis to the Owner, to elect any of the following:

    a. demand adequate, written assurance of due performance, as provided in the General Conditions,

    b. withhold liquidated damages, and

    c. in the Owner's sole discretion, direct alternate schedule recovery actions.

E. Each Subcontractor will be bound by the foregoing provisions.

3.03 DELAYS AND EXTENSIONS OF TIME

A. Extensions of the Contract Time will not be granted except as expressly provided for in the General Conditions and this Specification Section.

B. If the Contractor determines that critical path delay will occur to any Contract Time due to the events identified in paragraphs 3.02.A, 3.02.B or 3.02.C, Contractor may request a commensurate adjustment in the affected Contract Times (but only to the minimum extent reasonably forced on the parties by the event) by submitting to the Engineer a properly supported written request for extension of Time no more than three (3) days after Contractor provides notice of a concealed condition as provided in the General Conditions, or the extent of the delay becomes known, or the Engineer requests such submittal, whichever is sooner, or if the delay continues for more than 30 days, submit requests for Time extension at 30 day intervals until the delay has ended. Requests for Time extension in connection with weather delays will be made on a monthly basis within three (3) days from the end of each month. Claims for adjustment in any of the Contract Times or Contract Price will be waived if not properly submitted in accordance with all requirements of the General Conditions and this Specification Section within the time limit required or if timely notice of delay was not submitted in accordance with paragraphs 3.02.A, 3.02.B or 3.02.C.

C. No extension in Contract Time will be justified unless the Contractor demonstrates, through a detailed analysis of the CPM Schedule using the procedures specified in this paragraph 3.03, the occurrence of Delay which (a) is not reasonably foreseeable under the circumstances, (b) arises from unforeseeable causes, (c) is not caused in whole or in part by any act or omission within the control of the Contractor, and (d) necessarily extends the Work beyond the overall Contract Time (or a portion of the Work beyond a pertinent Contract Time).

D. Properly supported requests for extension of Time will include:

1. Explanation of the cause and duration of the delay together with identification of which schedule activities were affected.

2. Justification for entitlement to a time extension under the Contract Documents.

3. Identification of all concurrent delays with an explanation of their causes and which party is responsible for each.

4. Critical path analysis, using the latest Record Schedule approved by the Engineer before the start of the delay, demonstrating the number of calendar days by which each of the Contract Times has been delayed due to each cause. Analysis will be accompanied by native electronic XER files and will be verifiable by an independent, objective evaluation by the Engineer, using the electronic files and data furnished by the Contractor. Unless otherwise required by the Engineer, prospective analysis will be prepared in accordance with AACEI Recommended Protocol RP-29, method implementation protocol MIP-3.6 (“Modeled / Additive / Single Base”) and as specified herein, by using the most recent Engineer approved Record Schedule prior to the date that the delay commenced, incorporating any schedule review comments provided by Engineer, then updating the schedule with actual progress to the start of the delay and noting the updated dates calculated for achievement of each of the Contract Times before commencement of the delay.

    a. Modeling of each delay will be accomplished by inserting into the updated pre- delay Record Schedule appropriate activities for each delay, with duration, constraints and logic accurately reflecting the actual delay and its impact on other activities.

    b. If more than one delay is concurrently in progress at any time after the start of the delay the analysis will be conducted in the following sequential steps:

        1) Delays under paragraph 3.02.C will be incorporated into the schedule that also includes the delays under paragraph 3.02.D, a copy of the schedule preserved, and resulting dates calculated for achievement of each of the Contract Times will be noted to determine the extent of delays that are not within the responsibility of the Owner.

        2) Using the same schedule containing all delays that are not within the responsibility of the Owner, all delays under paragraphs 3.02.A and 3.02.B will then be incorporated into the schedule, a copy of the schedule preserved, and the resulting further extension evaluated based on the dates calculated for achievement of each of the Contract Times.

    c. Reasonable delay mitigation to the extent commercially practicable will be incorporated into the schedule containing all delays by revising or deleting non- mandatory schedule logic, and increasing activity concurrency where practicable, and noting the resulting dates calculated for achievement of each of the Contract Times reflecting the effects of all schedule delays and commercially practicable mitigation.

    d. Extensions for each of the Contract Times will not exceed the difference in time between the dates calculated under paragraph 3.03.D.4.c and those calculated under paragraph 3.03.D.4.b.1.

    e. Unless otherwise required by the Engineer, retrospective delay analysis will be prepared in accordance with AACEI Recommended Protocol RP-29, method implementation protocol MIP-3.9 (“Modeled / Subtractive / Multiple Base”)

E. Engineer may perform or obtain an independent evaluation of delays. Engineer will review timely submitted, properly supported, requests for extension of Time and will determine the extent to which each of the Contract Times is to be revised by Change Order.

F. Minor Delays: No adjustment in any of the Contract Times will be justified as a result of (a) any delay of less than twenty-four (24) hours duration, or (b) delays to activities that are not on the critical path controlling the calculated date for achievement of any of the Contract Times, or (c) Contractor's failure to allow sufficient time in schedules in accordance with contract requirements.

G. No adjustments to the Contract Price or Contract Time will be made under the provisions of the General Conditions or this paragraph 3.03 for any suspension, delay or interruption (i) to the extent that performance would have been so suspended, delayed or interrupted by any other cause, including the fault or negligence of the Contractor; or (ii) for which an equitable adjustment is provided or excluded under any other provision of the Agreement. Further, no suspension of Work or delay will justify an increase in Contract Price or Contract Time unless the resulting Delay exceeds the time allowed in the Contract Documents for the act or failure to act.

H. To the extent that compensation for delays is permitted under the General Conditions, for critical path delays to any of the Contract Times due solely to the causes specified under paragraph 3.02.A or 3.02.B, and to the extent that the Work would not have been delayed due to any cause not within the responsibility of the Owner, Contractor may include in its timely properly supported requests for extension of time a Request for Change Order in accordance with the applicable provisions of the Contract General Conditions requesting compensation for additional costs incurred solely due to such critical path delays. However, no request or claim by the Contractor under this paragraph 3.03.H for an adjustment in Contract Time or for compensation for additional costs will be allowed (a) for any Delay or costs incurred more than three (3) Days before the Contractor gives written notice (except for Engineer's written orders to Contractor provided under the provisions of the General Conditions), or (b) if made after final payment. Delay for which compensation may be requested will be calculated as the difference between the dates for achievement of the Contract Times for Substantial Completion and for Final Completion calculated under paragraph 3.03.D.4.c and those calculated under paragraph 3.03.D.4.b.2. Compensation for such delays will be calculated in accordance with the General Conditions and applicable Specification Sections.

I. Owner's exercise of any of its rights under the Agreement and its Contract Documents, including requirement of correction or re-execution of the Work, regardless of the extent, number or frequency of Owner's exercise of such rights or remedies, will not under any circumstances be construed as interference with the Contractor's performance of the Work or as providing grounds for the Contractor to seek extensions of Contract Time or damages for delay of the Project.

J. Extension of the Contract Time will be the Contractor's sole remedy for any delay due to any of the causes identified under paragraph 3.02.C. In no event will the Contractor be entitled to any compensation or recovery of any damages in connection with any delay under paragraph 3.02.C, including, without limitation, extended overheads, extended general conditions, consequential damages, lost opportunity costs, impact damages or other similar remuneration.

K. For delays due to any of the causes identified under paragraph 3.02.D, or for acceleration to overcome such delays, Contractor will not be entitled to any increase in Contract Price and/or Contract Time, and the Contractor will assume all resulting direct, indirect and consequential costs, of both the Owner and Contractor.

L. If Contractor fails to complete the Work within any of the Contract Times due to delays within the responsibility of the Contractor, Owner may in its sole discretion (a) proceed to terminate the Contract for cause in accordance with the provisions of the General Conditions or (b) unilaterally issue a Change Order that both increases the Contract Time to the extent that Engineer determines necessary for completion of the Work, and provides a commensurate reduction in the Contract Price calculated as the cumulative total of the product of the number of days by which each Contract Time is extended due to delay within the responsibility of the Contractor times the daily liquidated damage rate that would have been applicable under the Contract had the Contract Time not been extended; or (c) execute a bilateral Change Order mutually agreed upon between Owner and the Contractor, to extend the Contract Time and compensate Owner for its damages; or (d) exercise any other rights available to the Owner under the Contract or by law or equity. If a Change Order or Construction Change Directive results in reduction of the Contract Price to an amount less than the cumulative total paid by Owner, Contractor will provide to the Owner a cash refund of the excess amount paid.

M. To the extent that the Owner authorizes (a) changes in the Work or (b) agrees to changes in Contract-required constraints or sequences, or (c) takes other actions that result in critical path reductions in the Time required to perform the Work, Owner will be entitled to commensurate reductions in the Contract Time and the Contract Price, or alternatively, if so directed by the Engineer, a period of Owner's float may be incorporated into the CPM Schedule for the Owner's exclusive use to mitigate delays within the responsibility of the Owner. Owner will provide notice to Contractor together with a critical path schedule analysis demonstrating the extent of reduction in any of the Contract Times, or the quantum of Owner's float created.

N. Notwithstanding anything contained herein to the contrary, Contractor acknowledges that no extensions of the Contract Time or increase to the Contract Price will be permitted except as approved in advance by Owner's execution of a Change Order in accordance with the executed Contract.

O. Each Subcontractor and supplier/vendor will be bound by the foregoing provisions.

3.04 ACCELERATION OF PERFORMANCE

A. Owner may direct acceleration of performance in accordance with the provisions of the General Conditions. Upon receipt of a written order from the Engineer directing acceleration of performance for the Owner's convenience, Contractor will consult with the Engineer regarding measures available to accelerate the work and will take such measures as the Engineer will direct, including for example resequencing of the CPM schedule, increasing concurrency of activities, increasing staff, accelerating submittals and material deliveries, and employing overtime work as so ordered.

B. If Contractor believes that schedule recovery is necessary due to delays that are not within the responsibility of the Contractor, the Contractor will provide prompt notice and a request for Time extension in accordance with paragraphs 3.02 and 3.03. Before acting to accelerate the work, Contractor will furnish to Engineer a written notice of planned acceleration specifying the actions that Contractor intends to take and the reasons therefor. Owner will bear no responsibility for costs incurred by the Contractor for schedule recovery efforts:

1. before providing such notice to the Engineer; or

2. to the extent of delays that are within the responsibility of the Contractor.

In any case, when performing efforts to recover delays that Contractor believes are the responsibility of the Owner, Contractor will maintain cost records in accordance with applicable requirements of the General Conditions and will submit for Engineer's signature daily time sheets showing overtime premiums paid. To the extent that Contractor demonstrates to Engineer's satisfaction that

1. Contractor had timely submitted a request for Contract Time extension justifying an extension of Time;
2. an extension of Time was justified under the Contract but not granted by Owner;
3. that the cause of the delay was not mitigated;
4. Contractor provided notice as specified before undertaking acceleration; and
5. that Contractor incurred additional overtime costs to accelerate its Work solely to recover such delay, Owner will reimburse as additional compensation only the premium cost of such overtime work, as shown on the time slips checked and approved each day by the Engineer, and no overhead, profits, costs, commissions, claims for inefficiencies or otherwise, or other costs or claims will be charged or due with respect to use of overtime work or the acceleration of performance.

C. Each Subcontractor will be bound by the foregoing provisions.

3.05 USE OF FLOAT

A. Total Float and Contract Float, whether expressly disclosed or implied by the use of float suppression techniques, are not for the exclusive benefit of the Contractor or Owner and will be available to both the Contractor and Owner.

B. The amount of Total Float available for sharing by the Owner will not be artificially reduced through the Contractor's unreasonable use of float suppression techniques. Total Float hidden using such techniques as preferential sequencing, late starts of follow-up trades, small crews, extended durations, imposed dates, scheduling Work not required for a Contract Time as if it were required Work, and so forth will be Total Float otherwise available for sharing with the Owner.

C. If the Engineer determines that the Contractor is utilizing unreasonable float suppression techniques and preferential sequencing (including, but not limited to late starts of follow-on trades, unreasonably small crews, extended durations, imposed dates, or scheduling Work not required) in violation of the float sharing provisions of the Contract Documents, the Contractor will not be entitled to any changes in Contract Price or Contract Time.

D. Early Completion Schedules: Contractor's bid and the Contract Price will be premised upon completion exactly on the Contract Time, without any contemplation of early completion. Contractor will not have a right to finish early. Submittal of a CPM Schedule having an early completion date for any Contract Milestone that is before the corresponding Contract Time will constitute Contractor's agreement that all days between the scheduled early completion date and the Contract Time constitute contract float available to both parties to absorb delays that occur due to any cause. Delays that do not extend the Work beyond the Contract Time will not justify an extension of Contract Time nor will the Owner have any liability under any circumstances for any delay from a planned early completion date.

END OF SECTION 01 32 16

SECTION 01 33 00
SUBMITTAL PROCEDURES

PART 1 GENERAL

1.01 GENERAL REQUIREMENTS

A. Contractor will submit Shop Drawings, product data, and samples, as required by the individual Specification sections, to the Engineer for review in accordance with the provisions of Section 00 72 00 - General Conditions.

1.02 PROGRESS SCHEDULES

A. Contractor will submit one (1) electronic copy in PDF format of Progress Schedules indicating the starting and completion dates of the various stages of the Work and estimated payments to the Engineer.

1. Submit proposed Progress Schedules to the Engineer prior to the Pre-Construction Meeting.

2. Distribute hard copies of the Progress Schedules to attendees during the Pre-Construction Meeting for discussion.

3. Update the Progress Schedule submit electronically (in PDF format) to the Engineer as a part of applications for progress payments, through completion of the Work. Failure to update Progress Schedule may be the basis for rejection of Applications for Progress Payments.

1.03 SHOP DRAWING SCHEDULE

A. Submit one (1) electronic copy in PDF format of the Shop Drawing Schedule indicating the individual items and submission dates to the Engineer.

1. Submit a preliminary Shop Drawing Schedule in accordance with the requirements in Section 00 72 00 prior to the Pre-Construction Meeting.

2. Distribute hard copies of the Shop Drawing Schedule during the Pre-Construction Meeting for discussion.

3. Submit a final electronic copy of the Shop Drawing Schedule (in PDF format) at least 10 calendar days prior to submitting the first Application for a Payment.

1.04 SCHEDULE OF VALUES

A. Submit one (1) electronic copy in PDF format Schedule of Values of the Work to the Engineer.

1. Submit a preliminary Schedule of Values prior to the Pre-Construction Meeting.

2. Distribute hard copies of the Schedule of Values during the Pre-Construction Meeting or discussion.

3. Prepare a final Schedule of Values (in PDF format) in accordance with the Section 00 72 00 in sufficient detail to serve as the basis for payments during construction. Submit the Schedule of Values to the Engineer for review at least 10 calendar days prior to submitting the first Application for Payment.

1.05 APPLICATIONS FOR PAYMENT

A. Submit one (1) electronic copy in PDF format Applications for Payment to the Engineer in accordance with the provisions of Article 14 of Section 00 72 00.

B. Applications for Payment will be made on forms provided by or approved by the Engineer.

1. Samples of the Contractor's Application for Payment, Payment Schedule and Engineer's Certificate for Payment forms are included in the Contract Documents and can be obtained in digital format from the Engineer.

2. Copies of these forms, with Project specific information completed by the Engineer, will be given to the Contractor at the preconstruction meeting or, if applicable, after approval of the final Schedule of Values.

C. Submit a completed Payment Schedule with an executed Contractor's Application for Payment and Contractor's Declaration to the Engineer not more than once per month.

D. Engineer will certify payments with the use of Engineer's Certificate for Payment.

1.06 SHOP DRAWINGS

A. Shop Drawings will be presented in a clear and thorough manner. Details will be identified by reference to plan sheet number, detail number if applicable, and specification Section number, and article number.

1.07 PRODUCT DATA

A. Present Product Data in a clear and thorough manner identified the same as the Shop Drawings. Included with the information will be performance characteristics and capacities depicting dimensions and clearances required.

B. Manufacturer's standard schematic drawings and diagrams will be modified to delete information which is not applicable to the Work. Manufacturer's standard information will be supplemented to provide information specifically applicable to the Work.

1.08 SAMPLES

A. Samples will be of sufficient size and quantity to clearly illustrate functional characteristics of the product with integrally related parts and attachment devices depicting full range of color, texture and pattern.

1.09 SUBMISSION REQUIREMENTS

A. Make Submittals in accordance with the approved Submittal Schedule, and in such sequence as to cause no delay in the Work or in the work of any other contractor. No damages will be awarded, or extension of time granted, due to the Shop Drawing and product data review process.

B. Submit an entire package of Shop Drawings and Product Data information for major items of Work so that the Engineer can review the package as a unit.

C. Submit one (1) electronic copy in PDF format of Shop Drawings and Product Data information containing the following information at a minimum:

1. Field dimensions clearly identified as such.

2. Relation to adjacent or critical features of the Work or materials.
3. Applicable standards, such as ASTM or Federal Specification Numbers.
4. Identification of deviations from Contract Documents.
5. Identification of revisions on resubmittals.
6. Project Title, Date of Submission, Date of Previous Submission, and Specification Section number.

D. Contractor must initial or sign Shop Drawings and Product Data submittals, certifying the Contractor's review and approval of Submittal per Section 00 72 00; verification of products, field measurements, field construction criteria, and coordination of the information within the submittal with requirements of the Work and of Contract Documents.

E. Engineer will initial or sign Shop Drawings and Product Data submittal and will indicate the status of the Submittal, or requirements for resubmittal. Engineer will return to the Contractor one (1) electronic copy of the Shop Drawing and/or Product Data submittal (in PDF format) for distribution or for resubmission.

1.10 ENGINEER'S REVIEW

A. Upon receipt of any Submittal defined above, the Engineer will:

1. Check each for completeness, clarity, correctness, cohesiveness, legibility, and reproducibility.
2. Review each only for general conformity with the Contract Documents as specified in Section 00 72 00.

B. After review of any Submittal, the Engineer will appropriately affix a stamp, electronic notation box or other means, signifying the Submittal as having received full consideration and review.

C. The "status" of any such Submittal or portion thereof, as appropriate, will be evidenced by any one or more of the following notations clearly signified by a "X" or other similar mark placed in the box adjacent to the notation:

1. Notations for Engineer's Review:
    a. Approved
    b. Approved as Noted
    c. Revise and Resubmit
    d. Rejected - See Remarks
    e. For Record Only
2. Notations for Response Required by Contractor:
    a. None
    b. Confirm
    c. Resubmit

D. Notation Meanings:

1. Elements marked "Approved” indicate that the Contractor may commence with construction, fabrication or purchase of such items.

2. Elements marked "Approved as Noted" may require further action by the Contractor before commencing with construction, fabrication or purchase:

   a. Contractor proceeds in strict accordance with the Engineer’s notes and/or required corrections/deletions/additions indicated thereon;

   b. Contractor provides an appropriate response as may be noted by the Engineer.

3. Elements marked “Revise and Resubmit” indicate that further comments or explanations have been affixed to the Submittal, which may require action(s) by the Contractor before Engineer will mark the Submittal "Approved" or "Approved as Noted."

4. Elements marked "Rejected - See Remarks" indicate that the Contractor must make the required corrections as shown or noted and resubmit such items to the Engineer for further review.

5. Elements marked "For Record Only" indicate that the Engineer has not reviewed the Submittal and will maintain the information submitted as part of the project record.

6. Elements marked “None” indicate that the Submittal requires no further action by the Contractor.

7. Elements marked “Confirm” requires the Contractor to provide affirmation to the Engineer regarding comments, notes, markings, etc. made by the Engineer, and to affirm that the Contractor will comply with the comments, notes, markings, etc.

8. Elements marked “Resubmit” indicate that the Contractor may not commence with construction, fabrication or purchase of such items, and that the Contractor must resubmit items for review that comply with the Contract Documents in the event that those originally submitted do not, or with any comments, notes, markings, etc. made by the Engineer.

1.11 RESUBMISSION REQUIREMENTS

A. Contractor will make corrections or changes in the Submittals required by Engineer and resubmit. Contractor will indicate any changes which have been made other than those requested by the Engineer.

1.12 MANUFACTURER'S OPERATION AND MAINTENANCE DATA

A. Submit one (1) electronic copy in PDF format and one (1) bound copy of all operation and maintenance data required per the various Specification sections.

1. Prior to 50% completion of the Project, Contractor will have submitted one (1) acceptable copy to the Engineer for review.

B. Final copies of the operation and maintenance data will be bound in a suitable number of 3-inch or 4-inch, 3-ring hard cover binders. Permanently imprinted on the cover will be the words "Manufacturer's Operation and Maintenance Data", Project title, location of the Project, and the date. A table of contents will be provided in the front of each binder to list the various sections in the manual.

C. The information to be provided in each section of the manual, for each piece of equipment and project component will include, but not be limited to, detailed equipment drawings; sections cut through all of the major equipment and sub-assemblies; installation and operational procedures; complete wiring and piping schematics; lubrication materials and procedures; maintenance procedures; and parts lists complete enough to permit identification of parts by nomenclature, manufacturer's part number and use.

D. At the front of each section a maintenance schedule will be provided for each piece of equipment in the section.

1. The schedule will display the daily, weekly, monthly, semi-annual, annual or fraction thereof, lubrication and preventative maintenance required in order to meet warranty conditions and the manufacturer's recommendations for optimum performance and life of the unit.

2. A common schedule format is to be developed and used for all of the sections. Photocopies or reproductions of the manufacturer's literature will not be accepted.

1.13 AUDIO/VIDEO ROUTE SURVEY

A. When required in Section 00 42 43 - Proposal or Section 01 11 00 - Summary of Work, furnish the Engineer with an "Audio/Video Route Survey" record of the existing conditions prior to the start of construction. Contractor must enlist the services of a firm having a minimum of one (1) year experience in audio/video recording of construction projects.

B. Prior to beginning the audio/video recording, review with Engineer the Project requirements to ensure that the audio/video is adequate for its intended purpose. Owner will have the authority to designate areas for which coverage may be added or omitted. The audio/video recording will be done prior to placement of materials or equipment on the construction area and furnished one (1) week prior to the pre-construction meeting.

C. Format:

1. Audio/Video route survey will be submitted in the format(s) as specified in Section 01 11 00.

a. Audio/video route survey submission will be on USB media

b. Format: USB – Video

c. Video Encoding: Highest available bit rate (6-9 Megabit), 60 fields per second interlaced video

d. Audio Encoding: Uncompressed stereo wave or stereo Dolby Digital (256 kilobit or better)

e. Aspect Ratio: 4x3 (720x480 pixels)

f. No Macrovision or other copy protection encoding. No region code or region code 1.

D. Complete coverage will include surface features located within the public right-of-way, easement areas and adjacent private properties up to building line when such properties lie within the zone of influence of construction and will be supported by appropriate audio description made simultaneously with video coverage. Such coverage will include, but not be limited to, existing driveways, sidewalks, curbs, ditches, roadways, landscaping, trees, culvert,

headwalls, retaining walls, and buildings located within such zone of influence. Video coverage will be clear enough to identify cracks, depressions, holes and other defects in existing surfaces.

E. Houses and buildings will be identified visually by house number, when visible, in such a manner that structures of the proposed system can be located by reference. In all instances, however, location will be identified by audio or visual means at intervals not-to-exceed 100 linear feet (30 m) in the general direction of travel.

F. When conventional wheeled vehicles are used, the distance from the camera lens to the ground will be not less than 12 feet (3.5 m) to ensure proper perspective. The rate of speed in the general direction of travel of the conveyance used during recording will not exceed 30 feet/minute (10 m/min). Panning rates and zoom-in, zoom-out rates will be controlled sufficiently such that stop action during play-back will produce clarity of detail of the object viewed.

G. Video recordings must, by electronic means, display continuously and simultaneously generated transparent digital information in the upper left hand third of the screen to include the date and time of recording, as well as the corresponding engineering stationing numbers as shown on the Contract Drawings.

1. The date information will contain the month, day, and year. For example, mm/dd/yy, and be placed directly below the time information.

2. The time information will consist of hours, minutes, and seconds, separated by colons. For example, hh:mm:ss.

H. Engineering stationing numbers must be continuous, accurate and correspond to the Project stationing and must include the standard engineering symbols. For example, Station 14+84.

I. Recording will be done during times of good visibility. No recording will be done during periods of visible precipitation, or when more than ten (10) percent of the ground area is covered with snow or standing water, unless otherwise authorized by the Owner.

J. In some instances, audio/video coverage may not be suitable for recording necessary details. In such instances, the Owner may specify still photographs to provide coverage. One (1) color photograph will be provided in accordance with this Section with a suitable description of the photograph’s location.

K. Any portion of the Audio/Video Route Survey of insufficient quality as determined by the Engineer will be redone by the Contractor at no additional cost to the Owner.

L. Each USB will be properly identified with the Project Title, location, time, and date in a manner acceptable to the Owner.

1.14 PHOTOGRAPHS

A. When required in Section 00 42 43 - Proposal or Section 01 11 00 - Summary of Work, furnish the Engineer with a total of 6 to 10 digital color photographs each month during construction of the Project, unless some other number and times is specified in Section 01 11 00 - Summary of Work.

B. Photos will be in digital format (i.e., JPEG, TIFF, GIF, PNG or PDF) and will have a minimum resolution of 300 dpi.

C. The following information will be placed on the photo itself or embedded in the digital file:

1. Project Title
2. Contract Number
3. Description of photo's content
4. Date and Time of photo

D. Submit photographs monthly along with the Application for Payment as described in Article 14 of Section 00 72 00.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION 01 33 00

SECTION 01 45 00
QUALITY CONTROL

PART 1 GENERAL

1.01 GENERAL REQUIREMENTS

A. Sampling of materials will be made by the Engineer in accordance with the methods designated by the Specifications. Contractor will furnish such facilities as the Engineer may require for collecting, storing, and forwarding samples to the Laboratory. Contractor will furnish the required samples to the Owner without charge.

1.02 TESTS OF MATERIALS

A. Materials in the Work will meet the requirements of the Contract Documents.

B. Tests of materials will be made as specified herein. Engineer will at all times have access to materials intended for use in the Work as well as to the plants where such materials are produced. Plant inspection may be made if the quantities are sufficient to warrant such inspection and if it is to the best interest of the Owner. In any case materials may be either inspected or tested when received on the Project.

C. Materials will not be used until approval has been received from the Engineer. Approval of materials at the producing plant does not constitute a waiver of the Engineer's right for re-examination at the Project site.

D. The standards for testing materials unless otherwise specified, will be as established by the American Society for Testing and Materials (ASTM). Tests of materials will be made in accordance with the methods described or designated in the Specifications.

E. The sampling and testing of all materials not specifically mentioned will be done by generally accepted methods, unless otherwise specified by the Engineer.

1.03 CERTIFICATION OF MATERIALS

A. At the request of the Engineer, the Contractor will provide the Engineer with certification that the various materials to be used conform to the standards referred to in the Contract Documents.

1.04 SOURCE QUALITY CONTROL

A. Testing identified in the Contract Documents for quality control, which is required to establish quality of materials, equipment or fabricated items, will be paid for by the Contractor unless otherwise noted.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION 01 45 00

SECTION 01 50 00
TEMPORARY FACILITIES AND CONTROLS

PART 1 GENERAL

1.01 SITE ACCESS AND PARKING

A. Contractor will locate roads, drives, walks and parking facilities to provide uninterrupted access to construction offices, mobilization, Work, storage areas, and other areas required for execution of the Contract. Access drives and parking areas will be hard surfaced unless otherwise approved by the Engineer.

B. Contractor will maintain driveways a minimum of 15 feet (5 meters) wide between and around combustible materials in storage and mobilization areas.

C. Contractor will maintain traffic areas as free as possible of excavated materials, construction equipment, products, snow, ice, and debris.

D. Contractor will not utilize existing parking facilities for construction personnel or for Contractor's vehicles or equipment, unless written permission from owner of parking facility is obtained.

1.02 TRUCKING ROUTE AND PUBLIC ROAD MAINTENANCE

A. Prior to the start of construction, the Contractor will submit for review a schedule and list indicating the streets and roads within the municipality that Contractor's equipment will use off the Project site.

B. Contractor will comply with safety requirements, weight restrictions and speed limits.

C. Gravel and dirt roads or streets used will be maintained by grading, placing dust palliatives and maintenance gravel in sufficient quantities to eliminate dust and maintain traffic.

D. Paved streets will be maintained in a reasonable state of cleanliness and the Contractor will remove accumulations of debris, dirt or mud caused by Contractor's operations. Removal will be done in such a manner as to prevent the release of dust. This will be done at least every day at the close of each day's operation or additionally when requested by the Engineer.

E. Roads or streets damaged by the Contractor’s operations, will be repaired or removed and replaced to satisfactions of the agency having jurisdiction at no additional cost to the Project.

F. In order to ensure adequate street maintenance and restoration as outlined above, the Contractor may be required to deposit with the agency having jurisdictiona cash Road Protection Bond. This Bond, if required, will be held in escrow until final release is given by the agency having jurisdiction.

1. In the event the Contractor fails or neglects to maintain or restore the streets to the satisfaction of the agency having jurisdiction, the agency having jurisdiction will have the required maintenance or restoration work done and the cost incurred will be deducted from the Road Protection Bond.

2. At the completion of the Project, the agency having jurisdiction will return the Road Protection Bond less any monies expended by the agency having jurisdiction and will render to the Contractor an accounting of all monies so expended.

G. Contractor will not store any equipment, supplies, construction material or excess excavated material on any roads or streets unless otherwise approved by the Engineer.

1.03 EMERGENCY ACCESS

A. Contractor will at all times provide emergency access to property in the vicinity of the construction for police vehicles, fire equipment, ambulances or other emergency vehicles to protect life, health and property. Areas damaged by emergency vehicles will be restored by the Contractor at no additional cost to the Owner.

1.04 PRIVATE OR PUBLIC ROADS, SIDEWALKS, AND PARKING AREAS

A. Where public roads, driveways, parking areas and sidewalks are encountered throughout the community, the Contractor will maintain those portions affected by the construction operations in a passable condition until such time as final restoration of these improvements can be made as specified.

1. If, in the opinion of the Engineer, the public safety is in danger or the necessity exists for maintaining traffic, the Engineer may direct that backfilling be completed immediately.

2. In the event that the necessary backfill material and equipment are not available when direction is given for immediate backfill, the trench will be backfilled with native material to provide for the necessary maintenance of traffic and safety; however, the native material will be removed within 48 hours and the trench properly backfilled as specified.

B. Contractor will provide written notice to residences and businesses of driveway access interruption 72 hours in advance of interruptions.

1. Written notices require approval for distribution from the Engineer.

2. Contractor will provide the Engineer with copies of notices at least five (5) working days in advance of their distribution for review and approval.

C. Where private roads are encountered throughout the community, the Contractor will maintain those portions affected by its construction operations in a passable condition. These roads will be maintained by the use of 21A road maintenance gravel, stone or slag.

1. In the event the original subbase has been destroyed, the Contractor will furnish and install1-inch to 2-inch aggregate to stabilize the existing subbase.

D. Upon completion of the construction activities, the Contractor will shape and regrade these roads leaving them in a condition as good as or better then original, and adequate for normal travel.

1.05 WORK WITHIN RAILROAD COMPANY RIGHT-OF-WAY

A. Contractor will be responsible for complying with the requirements of the Railroad Company for all Work of the Project and/or temporary crossings for trucking routes. Unless otherwise provided by an item of these Specifications, the Contractor will bear costs and expenses incidental thereto, including, but not limited to, protection, flagmen, construction engineering inspection by the railroad, and incidental work such as drainage facilities and removal, alteration and replacement of railroad fences.

1.06 ROAD CLOSING

A. No street, road or section thereof will be closed to through traffic unless otherwise provided for on the Plans, Specifications, or authorized by the agency with jurisdiction over the roads. Prior to closing a street, road, or section thereof, the Contractor will provide the Engineer with a copy of a detour plan approved by the agency having jurisdiction over the roads.

B. In the event roads or streets are to be closed, the Contractor will notify the local fire department, police department, local road authority, ambulance and emergency services, Department of Public Works, public transit authority and public school system daily as to what streets will be partly blocked or closed, the length of time the streets will be blocked or closed and when the streets will be reopened to traffic. Contractor will designate one responsible employee to carry out the requirements of this condition.

C. During the time that the road is closed, the Contractor will make provision for trash, leaf, and rubbish (garbage) pickup.

1.07 MAINTAINING TRAFFIC

A. Contractor will provide access for local traffic to property along the Project by means of temporary roads, drives, culverts or other means approved by the Engineer. Contractor will grade, add surfacing materials, and dust palliatives to such temporary roads and drives as necessary for the proper maintenance of traffic.

B. Where the shoulder is used to maintain traffic, the shoulder will be graded, surfaced, treated for dust, constructed, or reconstructed, as specified herein or as shown on the Plans.

C. If the construction work is suspended due to weather conditions, winter shut down or for any other reason, sufficient labor, materials and equipment will be ready for immediate use at all times for the proper maintenance of traffic. Surfacing materials and dust palliatives will be applied at such times and locations and in such amounts as necessary to safely maintain traffic and as determined by the Engineer.

D. Where shoulders are low, high, soft or rough, adequate provisions will be taken to inform and protect the traveling public by means such as construction warning signs, barricades, lighted devices, etc. Such shoulder hazards will be eliminated as soon as practicable.

E. Contractor will furnish, erect and maintain all signs, barricades, lights, and traffic regulators, in accordance with the requirements of the current "Michigan Manual of Uniform Traffic Control Devices".

1. Furnish all flagmen and watchmen as are necessary to maintain and safeguard traffic along the entire Project. Failure to comply with these requirements may be cause for the Owner to issue a stop Work order, which will remain in effect until all necessary devices are in place and operational. The issuance of a stop Work order will not be reason for granting additional compensation or an extension to the Contract Time.

2. Furnishing, installing, and maintaining traffic control devices will be incidental to the Project unless otherwise provided for in the Proposal.

1.08 EXISTING SIGNS

A. No stop sign, traffic control or warning device or sign will be taken down until the agency having jurisdiction over the roads has been notified and arrangements for the immediate

reinstallation has been made. Contractor will provide temporary signs, traffic control devices, warning devices, or watchmen continuously from the time the item is removed until it is reinstalled. Signs removed will be replaced with signs meeting requirements of the agency having jurisdiction over the roads.

1.09 TEMPORARY ELECTRICITY AND LIGHTING

A. Contractor will be responsible for and pay all costs for the installation and removal of circuit and branch wiring, with area distribution boxes located so that power and lighting is available throughout the construction by the use of construction-type power cords and will pay all costs of electrical power used.

B. Electrical wiring and distribution will conform to the National Electrical Code as adopted by the State of Michigan.

1.10 TELEPHONE

A. Contractor is required by MIOSHA regulations to provide telephone service for contacting emergency services. Such emergency telephone service will also be available for the use of the Owner and Engineer whether or not a field office is required for the Project. Emergency phone numbers are required to be posted per MIOSHA regulations

B. Contractor will pay all costs for installation, maintenance and removal, and service charges for local calls to provide service for Contractor's construction site office as well as for the Engineer's field office. Toll charges for calls relating to Project business will be at the Contractor's expense.

1.11 USE OF WATER

A. Contractor will acquire permits, post bonds and pay fees required by the local agency having jurisdiction prior to using any hydrant or any other source of water.

B. Contractor will reimburse the local community for all water consumed during course of the Project at the current rate as set by the agency having jurisdiction.

1.12 SANITARY PROVISIONS

A. Contractor will be responsible for installation, maintenance and removal of temporary sanitary facilities per MIOSHA regulations for use of construction personnel including the Owner and Engineer. Rules and regulations of the State and local health officials will be observed, with precautions taken to avoid creating unsanitary conditions.

1.13 POTABLE WATER

A. Contractor will furnish a supply of potable water per MIOSHA requirements, available for use of construction personnel including the Owner and Engineer.

1.14 MEDICAL SERVICES AND FIRST AID

A. Contractor will furnish first aid supplies and a person trained in first aid with a valid first aid certificate, per MIOSHA requirements, available for use of construction personnel including the Owner and Engineer. Contractor will also furnish a communication system for contacting emergency services. The telephone numbers of the physician, hospital, or emergency services will be conspicuously posted at the job site.

1.15 POSTAL SERVICE

A. Residents in this Project area may receive their mail at roadside mailboxes. Since the postal service will not deliver mail to a resident without a mailbox or a mailbox that is not in its proper position, the Contractor will relocate, replace and repair all mailboxes and posts in a condition and height acceptable to the post office within 24 hours of the removal.

B. If required, the Contractor will furnish new posts for the mailboxes if the existing posts are broken or rotted to the extent that they cannot be reused.

C. Any mailbox damaged by the Contractor's operations or by anyone else while the box is down due to the Contractor's operation, will be replaced by the Contractor with a new mailbox meeting the postal officials' specifications and the resident's name and address neatly lettered with paint or other acceptable means to the satisfaction of the resident and postal authorities.

D. The cost for relocating mailboxes will be incidental to the Project unless otherwise specified in Section 00 42 43 - Proposal.

1.16 NEWSPAPER DELIVERY

A. Residents in this Project area may receive their newspapers at roadside tubes. Since the resident arranges for newspaper delivery, the Contractor will notify the resident 24 hours prior to removal of any newspaper tube.

B. Newspaper tubes damaged by the Contractor while carrying out Contractor's operations or by anyone else while the tube is down due to the Contractor's operation, will be replaced as agreed between the Contractor and the newspaper who owns the damaged tube. The cost will be incidental to the Project.

1.17 BUS STOPS AND SHELTERS

A. Prior to the start of any construction, the Contractor will notify the transit authority that has bus stops within the area of the Work. Removal, relocation and/or replacement of signs and/or benches will be the responsibility of the Contractor in accordance with any requirements of the transit authority. The cost will be incidental to the Project.

1.18 ENGINEER'S FIELD OFFICE

A. When called for in the Summary of Work, Section 01 11 00 - Summary of Work, the Contractor will furnish and maintain, for the exclusive use of the Engineer, an approved weatherproof building as a field office. The building will be located as directed by the Engineer, in full view of the Work and with at least one (1) window facing construction operations.

B. Engineer’s field office will meet the following minimum requirements:

1. securely fixed to foundation
2. structurally sound and watertight
3. stairs and landings for doors as necessary
4. three hundred (300) square feet (28 m2)
5. three operable and locking windows with screens and storms.
6. two locking, standard sized, entrance/exit doors

7. two telephone lines
8. two telephone jacks for each line
9. one telephone
10. one facsimile machine
11. 120 volt electrical service per NEC, complete
12. one 36" x 42" (1m x 1.1m) drafting table
13. one drafting stool
14. one 30" x 60" (.75m x 1.5m) desk
15. one four drawer locking file cabinet
16. two desk chairs
17. one plan rack (minimum capacity eight plan sets)
18. one first aid kit
19. one 10A:80-B:C fire extinguisher
20. automatically controlled heating, ventilating, air conditioning system to maintain temperature between 68 and 76 degrees Fahrenheit, year round.

C. Contractor will furnish and maintain bottled water and sanitary facilities for the field office. Contractor will clean the office at least once per week. Contractor will provide and pay for all utility service throughout the duration of the Project, including telephone service and long distance telephone service.

D. A trailer having equal facilities and floor space may be used in place of the above described field office if so desired.

E. The field office will be furnished with a minimum of an aggregate surfaced driveway and parking area, for the exclusive use of the Engineer, for at least three (3) vehicles. Contractor will maintain parking area including snow removal.

F. The cost for furnishing and installing the field office, for furnishing utilities and utility service, and for maintenance of the field office and facilities, unless otherwise specified in the Proposal, will not be paid for separately but will be included in the price bid for various items of Work under the Contract. The building will be removed by the Contractor upon completion of the Contract and will become Contractor's property.

1.19 BY-PASS PUMPING

A. Contractor will maintain flow in existing sanitary and storm sewers by pumping, bypassing, or fluming, as necessary. During wet weather events, the flow in the sewer will rise rapidly and may become surcharged. Contractor will maintain flow in such a manner as the existing flow can be adequately transported including wet weather flow. Contractor will furnish, install, operate, and maintain temporary pumping facilities to service the upstream area including piping, temporary channels, pumps, sumps, controls, temporary plugs, and bulkheads.

B. For sanitary sewerage, by-pass piping will be PVC Schedule 80, ABS truss pipe, equivalent with solvent welded joints, HDPE with butt fused joints, or _____. Flexible hoses of whatever types are not acceptable. Bypassed flow will be discharged to a sanitary sewer of acceptable size to handle the bypassed and existing flows. Contractor will plan construction operations such that there will be no backups, leaks, or discharges of pollutants.

C. Contractor will furnish and have available on-site, redundant pumping facilities in case of any failure of the pumping system including pumps, piping, electrical, connections, etc. Redundant pumping facilities also include having a backup power generator in case the primary power source fails. Contractor will provide an adequate labor force to oversee the by-pass pumping including providing labor to maintain 24 hour per day operation and emergency backup service.

D. Costs for pumping and by-passing flow will be included in the unit price bid for other items of Work unless otherwise specified in the Proposal.

E. Contractor will submit a by-pass pumping/diversion scheme to the Engineer for approval not less than 15 calendar days prior to any anticipated by-pass pumping/diversion. The by-pass pumping plan will include pumping capacity and expected flow rates.

PART 2 PRODUCTS

2.01 BARRICADES, ARROW BOARDS, TEMPORARY PAVEMENT MARKINGS, AND TEMPORARY SIGNS

A. Barricades, arrow boards, temporary pavement markings, temporary signs, and other traffic control devices will be in accordance with the current edition of the MDOT Standard Specifications for Construction, and the current edition of the "Michigan Manual of Uniform Traffic Control Devices".

PART 3 EXECUTION (NOT USED)

END OF SECTION 01 50 00

SECTION 01 51 18
TEMPORARY WATER MAIN

PART 1 GENERAL

1.01 SCOPE OF WORK

A. This Section includes construction of temporary water main and water service connections to existing homes to supply water while the existing water main is out of service.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Section 01 89 00 - Site Construction Performance Requirements

B. Section 31 23 33 - Trenching and Backfilling

C. Section 33 14 00 - Water Utility Distribution Piping

1.03 REFERENCE STANDARDS

A. ASTM B88 - Standard Specification for Seamless Copper Water Tube

B. ASTM D2241 - Standard Specification for Poly(Vinyl Chloride) (PVC) Pressure-Rated Pipe (SDR Series)

C. ASTM D3261 - Standard Specification for Butt Heat Fusion Polyethylene (PE) Plastic Fittings for Polyethylene (PE) Plastic Pipe and Tubing

D. ASTM F477 - Standard Specification For Elastomeric Seals (Gaskets) For Joining Plastic Pipe

E. ASTM F1055 - Standard Specification for Electrofusion Type Polyethylene Fittings for Outside Diameter Controlled Polyethylene and Crosslinked Polyethylene (PEX) Pipe and Tubing

F. AWWA C651 - Disinfecting Water Mains

G. AWWA C900 - Polyvinyl Chloride (PVC) Pressure Pipe and Fabricated Fittings, 4 In. Through 60 In. (100 mm Through 1,500 mm)

H. AWWA C901 - Polyethylene (PE) Pressure Pipe and Tubing, 3/4 In. (19 mm) Through 3 In. (76 mm), for Water Service

I. AWWA C906 - Polyethylene (PE) Pressure Pipe and Fittings, 4 In. through 65 In. (100 mm through 1650 mm), for Waterworks

J. NSF/ANSI 14 - Certification of Plastic Piping Products

K. NSF 61 - Drinking Water System Components - Health Effects

1.04 SUBMITTALS

A. Submit shop drawings, catalog data, and manufacturer’s technical data showing complete information on the materials, specifications, composition, physical properties, and dimensions of pipe and fittings.

B. Submit detailed drawings showing detail and written descriptions of methods of connections of temporary water main to fire hydrants and connection temporary water services to houses.

Include entire construction process, disinfecting, testing, protection of piping, timing sequence, and related Work.

1.05 QUALITY ASSURANCE

A. Polyethylene pipe jointing will be performed by personnel trained in the use of butt-fusion or electro-fusion equipment and recommended methods for new pipe connections.

1.06 COORDINATION

A. Owner will locate and mark water service curb stops along the route of the temporary water main.

B. Verify operation of each curb stop prior to beginning work. When authorized by Engineer, remove and replace, or repair, existing curb stops and/or curb boxes as necessary to complete the Work. This work will be paid for as specified in the Proposal.

1. If curb boxes are plugged with dirt, broken, or misaligned in such away that the curb stop cannot be accessed and turned, remove curb box and reset.

2. If curb stops are inoperable, remove and replace existing curb stop with a new curb stop.

C. Coordinate with Owner, Engineer, and local Fire Department at least 24 hours prior to shutting down existing water main.

1.07 DESIGN REQUIREMENTS

A. Temporary water main will be PVC or Polyethylene pipe unless otherwise approved by Engineer.

B. Temporary water main will be of the minimum diameter as specified below:

1. 2-inch diameter for systems with 10 or less residential connections (3/4-inch).

2. 4-inch diameter for systems with 50 or less residential connections (3/4-inch).

3. 6-inch diameter for systems with 51 or more residential connections (3/4-inch) but not more than 80 connections.

4. Minimum size of the temporary water main will be upsized as appropriate for services larger than 3/4-inch or more than the maximum allowed number of connections.

1.08 NOTIFICATION

A. Notify Owner and water users affected by the work a minimum of seven days prior to beginning work. Notification will be by means of a written notice on Owner letterhead, delivered to each user by Contractor, and will advise user as to when water service will be interrupted and to minimize water usage during this period. Ensure that every user is so notified. Notification will include telephone number(s) for contacting Contractor at any time, day or night.

B. A second written notice to the water users affected will be provided by Contractor one working day prior to the actual switch over from the existing water main to the temporary water main.

C. Provide a completion notice to each user within 12 hours of restoring water service to the re-lined water main.

PART 2 PRODUCTS

2.01 POLYETHYLENE PIPE

A. Polyethylene pipe will be AWWA C906 high-density polyethylene pipe, minimum Pressure Class 160 (SDR 11). Pipe will be clean and approved for potable water, and meet the requirements of NSF/ANSI 14 and NSF 61.

1. Fittings: Tees, crosses, bends, plugs and corporation stops will be Butt Heat Fusion Type, SDR 11, per ASTM D3261 or Electrofusion Type, per ASTM F1055. Fittings for joining HDPE pipe to Ductile Iron pipe or PVC C900 pipe will be fully restrained, Mechanical Joint Adapters.

2. Pipe Joints: Butt Fusion Welded or Electrofusion Welded. Joints will meet the leakage test requirements of Section 33 14 00 - Water Utility Distribution Piping.

3. Water Service Taps: Electrofusion corporation saddles with 1-inch brass outlet threads and brass corporation stop.

2.02 PVC PIPE

A. PVC pipe will be AWWA C900, restrained joint, PVC plastic, minimum Class 200 (DR 14) or ASTM D2241, SDR 17, restrained joint PVC meeting the requirements of NSF/ANSI 14 and NSF 61. Pipe will be clean and approved for potable water.

B. Pipe Joints: Non-Metallic, restrained joint couplings with high-strength, flexible, thermoplastic spline retainers. Retainers will be inserted into mating precision machined grooves in the pipe and coupling to provide full 360-degree restraint. Couplings will be designed for use at the rated pressures of the pipe and will incorporate twin elastomeric sealing gaskets meeting the requirements of ASTM F477. Joints will meet the leakage test requirements of Section 33 14 00 - Water Utility Distribution Piping.

C. Fittings: PVC, AWWA C900, Pressure Class 200 (DR 14).

D. Water Service Taps: Bronze corporation stops with AWWA corporation stop inlet thread and thread outlet compatible with the water service pipe used.

2.03 WATER SERVICE PIPE

A. Water service pipe connecting houses to the temporary water main will be minimum 3/4-inch diameter.

B. Polyethylene, AWWA C901, Pressure Class 125, minimum 1-inch diameter with mechanical restrained fitting.

C. Soft Copper, ASTM B88, Type K, with flared fittings.

D. 1-inch NSF 61 approved hose with brass couplings.

2.04 CURB STOPS AND CURB BOXES

A. Curb stops and curb boxes will be as specified in Section 33 14 00 - Water Utility Distribution Piping.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install temporary water main either above grade or below grade except as outlined below. Above grade pipe including services will be appropriately protected from abuse, damage, vandalism, etc.

B. Temporary water main and services will be covered with a minimum of 6-inches of compacted aggregate at driveways and sidewalks.

C. Temporary water main at road crossings and commercial driveways will be buried.

3.02 CLEANING, FLUSHING AND CHLORINATING

A. After installation and prior to connection to any water supply, temporary water main thoroughly clean and flush until the water runs clear. This includes water service piping.

B. After flushing, provide necessary disinfection of the temporary water main using the slug method:

1. Slowly add chlorine at a concentration of at least 100 mg/L so that mains and appurtenances are exposed to the highly chlorinated water for at least 3 hours.

2. Residual is to be measured at regular intervals at a point no more than 10-feet downstream from the injection point to assure 100 mg/L of free Cl_2 is being fed.

3. Free residual chlorine must be measured as the slug moves throughout the piping and the residual should not drop below 50 mg/L at any time.

C. After the acceptable contact time (3 hours for the slug method) flush out the highly chlorinated until the residual is no higher than that is normally detected within the general distribution system.

D. After two consecutive bacteriological samples are drawn, 24 hours apart, with negative results as outlined above, the water main will be allowed to be put into service.

E. Contractor is responsible for paying fees for bacteriological testing until satisfactory bacteriological sampling and testing is completed.

1. Draw samples of the water from the water main, with Engineer as a witness. Transport the samples for testing, and provide written confirmation of the sample results to Engineer.

2. Sampling will be in accordance with Section 5.1 of AWWA C651.

3.03 CONNECTION TO WATER SUPPLY

A. After successfully chlorinating the water main, connect the water main to the water supply. The temporary water main will be connected to the water supply with a double check backflow preventer.

B. Water service piping will be connected to the existing houses either at the existing curb stop or to a hose bibb. Contractor will be completely responsible for work required to ensure that each water service has satisfactory water service from the temporary water main prior to removing the existing water main from service.

3.04 SYSTEM MONITORING AND MAINTENANCE

A. Monitor the temporary water main and services and will ensure that the system is functioning as intended and will remedy any defects in water delivery within 3 hours of being notified.

B. Monitor system pressure and ensure that pressure is not lowered due to defects in temporary water main system.

3.05 PROJECT COMPLETION

A. At project completion, after the new water main has been installed, tested, accepted and connected to the water supply and after water services have been connected/reconnected to the new main, the temporary water main and appurtenances will be removed and become the property of Contractor.

END OF SECTION 01 51 18

SECTION 01 57 13
TEMPORARY EROSION AND SEDIMENT CONTROL

PART 1 GENERAL

1.01 SCOPE OF WORK

A. This Section includes furnishing, installing, maintaining, and removing at project completion, soil erosion and sedimentation control devices. Devices include silt fence, straw bales, turbidity barriers, temporary gravel construction entrance/exits, inlet filters, ditch sediment traps, etc.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Section 01 22 00 - Unit Prices

B. Section 01 89 00 - Site Construction Performance Requirements

C. Section 31 22 00 - Grading

D. Section 31 23 13 - Subgrade Preparation

E. Section 31 23 19 - Dewatering

F. Section 31 23 33 - Trenching and Backfilling

G. Section 31 35 00 - Slope Protection

H. Section 32 92 19 - Seeding

I. Section 32 92 23 - Sodding

1.03 REFERENCE STANDARDS

A. ASTM D4355/D4355M - Standard Test Method for Deterioration of Geotextiles by Exposure to Light, Moisture, and Heat in a Xenon Arc-Type Apparatus

B. ASTM D4491/D4491M - Standard Test Methods for Water Permeability of Geotextiles by Permittivity

C. ASTM D4533/D4533M - Standard Test Method for Trapezoid Tearing Strength of Geotextiles

D. ASTM D4632/D4632M - Standard Test Method for Grab Breaking Load and Elongation of Geotextiles

E. ASTM D4751 - Standard Test Methods for Determining Apparent Opening Size of a Geotextile

F. ASTM D6241 - Standard Test Method for Static Puncture Strength of Geotextiles and Geotextile- Related Products Using a 50-mm Probe

1.04 REQUIREMENTS OF REGULATORY AGENCIES

A. Contractor will secure permits, and post bonds or deposits required to comply with the "Soil Erosion and Sedimentation Control," requirements, being Part 91 of PA 451 of 1994 as amended and the National Pollution Discharge Elimination System (NPDES) Rules for storm water discharges from construction activity.

B. Comply with requirements of the agency having jurisdiction. Owner may withhold payment to Contractor equivalent to any fines resulting from non-compliance with applicable regulations.

1.05 PERFORMANCE REQUIREMENTS

A. Employ Best Management Practices as defined by standard EPA 832-R-92-005.

B. Put preventative measures in place as soon as possible after disturbance of surface cover and before precipitation occurs.

C. Control increased storm water runoff due to disturbance of surface cover due to construction activities for this Project.

D. Minimize wind, water, and vehicular erosion of soil on project site due to construction activities for this Project.

E. Prevent runoff into storm and sanitary sewer systems, including open drainage channels, in excess of actual capacity or amount allowed by authorities having jurisdiction, whichever is less. Anticipate runoff volume due to the most extreme short term and 24-hour rainfall event that might occur in 10 years.

F. Prevent erosion of soil and deposition of sediment on other properties caused by water leaving the project site due to construction activities for this Project. Prevent windblown soil from leaving the project site. Comply with fugitive dust ordinances of agencies having jurisdiction. Prevent tracking or flowing of mud and sediment onto public or private roads, sidewalks or pavements outside of the site.

G. Prevent sedimentation of waterways on or off the project site, including rivers, streams, lakes, ponds, open drainage ditches, storm sewers, and sanitary sewers. If sedimentation occurs, install or correct preventative measures immediately at no cost to Owner. Comply with requirements of agencies having jurisdiction.

H. Maintain temporary preventative measures until permanent measures have been established. Remove temporary measures when permanent measures have been established.

I. If erosion or sedimentation occurs due to non-compliance with these requirements, remove deposited sediment or restore eroded areas at no cost to Owner.

1.06 SUBMITTALS

A. Submit schedule of Soil Erosion and Sedimentation Control activities to agency having jurisdiction. Include events (with days and/or dates of the various activities) for review and approval prior to obtaining a permit.

B. Contractor must provide evidence of Storm Water Operator license.

PART 2 PRODUCTS

2.01 SILT FENCE

A. Polypropylene geotextile fabric, resistant to common soil chemicals, mildew, and insects; non-biodegradable; in longest lengths possible; meeting the following requirements:

1. Average Opening Size: 30 US std Sieve , maximum; ASTM D4751.

2. Permittivity: 0.05 sec-1, minimum; ASTM D4491/D4491M.

3. Ultraviolet Resistance: Retaining at least 70% of tensile strength; ASTM D4355/D4355M after 500 hours exposure.
4. Tensile Strength: 100 lb - f minimum, in cross-machine direction;124 lb - f minimum in machine direction; ASTM D4632/D4632M.
5. Elongation: 15 to 30%; ASTM D4632/D4632M.
6. Tear Strength: 55 lb - f minimum; ASTM D4533/D4533M.

B. Posts will be 2 inch cross section hardwood stakes, minimum 3 feet long.

2.02 TURBIDITY BARRIER

A. Geotextile fabric curtain suspended from flotation devices at the water surface and held in a vertical position by a ballast chain in the lower hem. Turbidity barrier curtain must meet the following minimum requirements unless otherwise specified on the plans.

1. Consist of vinyl laminate on 1000 denier polyester fabric weighing 18 oz per sq yard, minimum.
2. Tensile strength of fabric will be 220 lb - f, minimum.
3. Edges of fabric to be reinforced with minimum 5/8 inch diameter polypropylene rope.
4. Ballast chain minimum 5/16 inch galvanized steel.
5. Buoyancy blocks providing buoyancy of 18 lb - f.
6. Length of curtain (water depth) 5 feet.

2.03 DEWATERING DISCHARGE FILTER BAG

A. UV-stabilized, non-woven geotextile bag to filter sediment from water prior to discharging. Geotextile fabric must meet the following minimum average roll requirements:

1. Tensile Strength: 180 lb - f minimum; ASTM D4632/D4632M
2. Elongation: 50 percent minimum; ASTM D4632/D4632M
3. CBR Puncture Strength: 300 lb f; ASTM D6241
4. Trapezoidal Tear: 70 lb - f; ASTM D4533/D4533M
5. Flow Rate: 80 gal/min/sft Minimum; ASTM D4491/D4491M
6. Permittivity: 1.4 sec -1 minimum; ASTM D4491/D4491M
7. Apparent Opening Size: 80 US std Sieve; ASTM D4751
8. UV-Stability: 70% retained strength; ASTM D4355 after 500 hours.

2.04 EROSION CONTROL BLANKETS

A. Erosion control blankets will not be used on this project. In lieu of these blankets, the Contractor will stabilize the seeded areas using straw crimped into the ground using a mulch anchoring tool (disc with vertical coulters) or by hydroseeding with a cellulose or wood fiber mulch.

2.05 BONDED FIBER MATRIX

A. Bonded fiber matrix (BFM) will consist of long strand, residual, softwood fibers joined together by a high-strength, nontoxic adhesive. BFM will be 100% biodegradable, and be non-toxic to fish, wildlife, and humans. Upon drying the matrix will form a high strength, porous and erosion resistant mat that will not inhibit the germination and growth of plants. BFM will retain its form despite re-wetting.

B. Bonded fiber matrix will consist of:

1. Seed and Fertilizer per Section 32 92 19.

2. Wood Fiber Mulch: Thermo-mechanically defibrated long, softwood fibers manufactured from select northern softwood wood chips.

3. Polyacrylamide Binder: Site specific, fully biodegradable, polyacrylamides (PAM's) binders, with cross-linking long organic jute fibers

C. Materials will be mixed at the rate of 80 lbs per acre of PAM binder and 2500 lbs per acre of wood fiber mulch.

2.06 INLET FILTER FABRIC

A. Filter fabric will be constructed of 100% continuous polyester needle-punched non-woven engineering fabric. Filter fabric will be fabricated to provide a direct fit with the drainage structure cover. Filter fabric will have the following minimum physical properties.

B. Tensile Strength:80 lb - f minimum; ASTM D4632/D4632M

C. Elongation: 50 percent minimum; ASTM D4632/D4632M

D. CBR Puncture Strength: 300 lb - f minimum; ASTM D6241

E. Trapezoidal Tear: 70 lb - f minimum; ASTM D4533/D4533M

F. Flow Rate: 80 gal/min/sft minimum; ASTM D4491/D4491M

G. Permittivity: 1.4 sec -1 minimum; ASTM D4491/D4491M

H. Apparent Opening Size: 100 US std Sieve maximum; ASTM D4751

I. UV-Stability: 70% retained strength; ASTM D4355/D4355M after 500 hours.

2.07 ACCEPTABLE MANUFACTURERS

A. Acceptable manufacturers include the following:

1. Turbidity Barrier: Tough Guy Type II by Aer-flo Canvas Products, Inc.

2. Wood Fiber Mulch: EcoFibre by Canfor Corporation.

3. Polyacrylamide Binder: HydroTurboNet by Straw Net, Inc.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examine site and identify existing features that contribute to erosion resistance; maintain such existing features to the greatest extent possible.

B. Except in areas to be cleared, do not remove, cut, deface, injure or destroy trees or shrubs without Engineer's approval. Protect existing trees or shrubs that are to remain and which may be injured, bruised, defaced, or otherwise damaged by construction operations, with suitable fences or other means as approved by Engineer.

3.02 PREPARATION

A. Review the drawings and Storm Water Pollution Prevention Plan (SWPPP).

B. Revise SWPPP as necessary to address potential pollution from site identified after issuance of the SWPPP at no additional cost to Owner.

C. Conduct storm water pre-construction meeting with Site Contractor, all ground-disturbing Subcontractors, site Engineer of record or someone from their office familiar with the site and SWPPP, and state or local agency personnel in accordance with requirements of the special conditions.

D. Schedule work so that the soil surfaces are left exposed for the minimum amount of time. Place permanent soil and sedimentation control measures as soon as practical.

3.03 GENERAL

A. Do not discharge excavation ground water to the sanitary sewer, storm sewer, or to rivers, streams, etc. without authorization from the agency having jurisdiction. Construction site runoff will be prevented from entering any storm drain, river, stream, etc. directly by the use of silt fences or other suitable methods. Contractor will provide erosion protection of surrounding soils.

B. Sedimentation control devices will be installed prior to Contractor beginning Work. Soil erosion and sedimentation control devices must be maintained in an effective functioning condition at all times during the course of the Work.

C. Immediately bring earthwork to final grade and protect side slopes and backslopes from erosion. Plan and conduct earthwork to minimize duration of exposure of unprotected soils.

3.04 INSTALLATION - GENERAL

A. Install silt fences, ditch sediment traps, check dams, inlet filters, temporary gravel construction entrance/exits, turbidity barriers, erosion control blankets and other soil erosion control devices in accordance with the drawings and Storm Water Pollution Prevention Plan, or as may be dictated by site conditions in order to maintain the intent of the specifications and permits.

B. Deficiencies or changes on the drawings or SWPP must be corrected or implemented as site conditions change. Changes during construction must be noted in the SWPP and posted on the drawings.

C. Owner has authority to limit surface area of erodible earth material exposed by clearing and grubbing, excavation, borrow and embankment operations and to direct Contractor to provide immediate permanent or temporary pollution control measures.

D. Remove temporary control devices after permanent measure are established. Remove and replace temporary control devices if they become ineffective at no additional cost to Owner.

E. Contractor will incorporate permanent erosion control features, paving, permanent slope stabilization, and vegetation into project at earliest practical time to minimize need for temporary controls.

F. Contractor will permanently seed and mulch cut slopes as excavation proceeds to extent considered desirable and practical.

3.05 DUST CONTROL

A. Keep dust down at all times, including during non-working periods. Sprinkle or treat, with dust suppressants, the soil at the site, haul roads, and other areas disturbed by operations. Dry power brooming is not permitted.

3.06 APPLICATION OF BONDED FIBER MATRIX

A. The slope will be prepared and graded prior to application of Bonded Fiber Matrix (BFM). Mixture of wood fiber mulch and polyacrylamide binder will be blended, with the appropriate amount of seed and fertilizer per Section 32 92 19, according to manufacturer's recommendations.

B. BFM will be hydraulically applied to the soil as a viscous mixture, creating a continuous, three-dimensional blanket that adheres to the soil surface. BFM will be mixed and applied at the rate as specified in this Section unless otherwise indicated on the Plans.

C. The resulting coverage must be at least 1/8 inch thick over the entire surface area. BFM will be applied in two applications from alternate directions to eliminate shadowing and will be applied when no rain is expected for 12 hours.

3.07 DEWATERING DISCHARGE

A. Should it be necessary for Contractor to do any dewatering during the course of construction, Contractor will filter discharge through a discharge filter bag or other sediment control device that will filter all discharge water.

B. No dewatering discharge will be allowed to flow unfiltered from the construction site.

3.08 MAINTENANCE

A. Maintain temporary erosion and sedimentation control systems as dictated by site conditions, indicated in the construction documents, or as directed by governing authorities or Owner to control sediment until final stabilization.

B. Contractor must respond to maintenance or additional work ordered by Owner or governing authorities immediately, but in no case, within not more than 48 hours if required at no additional cost to Owner.

3.09 INSPECTION

A. General:

1. Contractor is responsible to obtain and/or serve as the Certified Operator.

    a. Weekly inspections are to be conducted by Contractor as a minimum, and after every rainfall event. A copy of the inspection report will be submitted to the agency having jurisdiction, as well as Owner and Engineer.

2. Inspections will be performed by a person familiar with the site, the nature of the major construction activities, and qualified to evaluate both overall system performance and individual component performance.

3. Inspector must either be someone empowered to implement BMPs in order to increase effectiveness to an acceptable level or someone with the authority to cause such things to happen.

4. Inspector must be certified as a “Storm Water Professional” through the EGLE storm water training program. Additionally, the inspector will be properly authorized in accordance with the applicable General Permit to conduct the certified site storm water inspections.

B. Inspection Frequency Reduction:

1. Inspection frequency may be reduced under the following conditions:

    a. No active onsite construction activities.

    b. Temporary cover has been provided across the entire site and no BMPs remain.

        1) Situation: waiting for grass to grow, but grass is dormant.

    c. Ground is frozen and/or snow covered.

C. Weekly Storm Water Meeting:

1. A weekly storm water meeting will be held by Contractor with those involved in ground-disturbing activities to review the requirements of the permits, the SWPPP, and address any problems that have arisen in implementing the SWPPP or maintaining the BMPs.

2. Contractor will maintain a log of weekly meetings and document the issues addressed in the meetings on site.

D. Agency Storm Water Inspections:

1. A log of inspections by federal, state, or local storm water or other environmental agencies will be kept in Contractor’s SWPPP.

2. The log form should include the date and time of visit and whether a report was issued or will be issued as a result of the inspection.

3. Any reports issued will be sent to Engineer within 24 hours.

3.10 PROJECT COMPLETION

A. Remove temporary soil erosion and sedimentation control devices as soon as permanent measures have been established.

END OF SECTION 01 57 13

SECTION 01 58 13
TEMPORARY PROJECT SIGNAGE

PART 1 GENERAL

1.01 SCOPE OF WORK

A. This Section includes the requirements for the provision of temporary project signage to be provided at the site by the Contractor.

B. Contractor will provide labor, equipment, materials, and incidentals necessary to provide temporary project signage at the project site.

C. Contractor will maintain the temporary project signage throughout the duration of the Contract through Final Completion.

D. Contractor will remove the temporary project signage from the project site prior to final payment.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Section 01 11 00 - Summary of Work

B. Section 01 33 00 - Submittal Procedures

1.03 REFERENCE STANDARDS

A. FHWA (SHS) - Standard Highway Signs and Markings; 2004, with Supplement (2012).

1.04 ADMINISTRATIVE REQUIREMENTS

A. Contractor will coordinate with the Owner to determine the location(s) of project signage at the project site.

1.05 QUALITY ASSURANCE

A. Design sign and supports to withstand 50 miles/hr wind velocity.

B. Sign Painter: Experienced as a professional sign painter for minimum three years.

C. Finishes, Painting: Adequate to withstand weathering, fading, and chipping for duration of construction activities.

1.06 REQUIRED SIGNAGE

A. Contractor will furnish, install and maintain the following signs throughout the duration of this Contract:

1. Project identification sign.

2. Traffic routings signs that show the Contractor’s personnel, including but not limited to the subcontractors, suppliers, and delivery companies the Owner-approved routes for construction traffic at the facility.

3. Parking areas for the Contractor’s personnel, including but not limited to its subcontractors, suppliers, and delivery companies at the Owner-approved areas for Contractor parking.

4. Contractor and subcontractors field trailers.
5. Owner’s field trailer.
6. Safety signs as required by federal and State of Michigan OSHA and local laws, regulations, codes, standards, rules, and requirements.

1.07 SUBMITTALS

A. Submit shop drawings of the required project signs specified in this Section to show the following:

1. Materials of construction and installation details.
2. Removal details and restoration methods to demonstrate to Owner that areas affected by signage will be restored to original conditions or better.
3. Drawing of sign to show content of sign along with the text font type, font size, line spacing.
4. Proposed locations for each sign type.

PART 2 PRODUCTS

2.01 PERFORMANCE

A. Project Identification Sign:

1. Contractor is responsible for furnishing high-quality project signs. Materials of construction must be durable and designed and installed suited for the environment they are installed. The sign will be in color and bear the following information:
    a. Project number, title and name of the Owner as shown on the Contract Documents.
    b. Owner’s logo.
    c. Names and titles of Owner's key staff or designated personnel.
    d. Names of Engineer.
    e. Name of Contractor.

2.02 SIGN MATERIALS

A. Structure and Framing: New, wood, structurally adequate.

B. Sign Surfaces: Exterior grade plywood with medium density overlay, minimum 3/4 inch thick, standard large sizes to minimize joints.

C. Project sign will be 3/4 inch exterior grade medium density overlay (MDO) board with digitally printed graphics.

D. Post and braces will be exterior grade pressure treated lumber.

E. Signs will be installed and secured to withstand heavy winds so that signage does not become loose or otherwise unsafe.

F. Signs will be fabricated and installed so that there are no sharp edges or otherwise pose harm to personnel health and safety.

G. Outdoor signs will be reflective an installed at a lighted location of high public visibility, adjacent to main entrance.

H. Indoor signs will be installed in a lighted location.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install project identification sign within 30 days after date fixed by Notice to Proceed.

B. Install sign surface plumb and level, with butt joints. Anchor securely.

C. Paint exposed surfaces of sign, supports, and framing and surface material; one coat of primer and one coat of exterior paint.

3.02 MAINTENANCE

A. Maintain signs and supports in a neat, clean condition; repair damages to structure, framing or sign.

B. Signage that becomes deteriorated or otherwise unsatisfactory to the Owner will be replaced with new at the Contractor’s expense.

3.03 REMOVAL

A. Remove signs, framing, supports, and foundations at completion of Project and restore the area.

END OF SECTION 01 58 13

SECTION 01 60 00
PRODUCT REQUIREMENTS

PART 1 GENERAL

1.01 TRANSPORTATION AND HANDLING

A. Contractor will provide for expeditious transportation and delivery of materials and equipment to the Project site in an undamaged condition and on a schedule to avoid delay of the Work. Materials and equipment will be delivered in original containers or packaging with identifying labels intact and legible.

B. Contractor will provide equipment and personnel at the site to unload and handle materials and equipment in a manner to avoid damage. Materials and equipment must be handled only at designated lifting points by methods to prevent bending or overstressing.

1.02 STORAGE AND PROTECTION

A. Store materials and equipment immediately on delivery, and protect it until installed in the Work.

B. Store products subject to damage by elements in weather-tight enclosures with temperature and humidity ranges as required by manufacturer's instructions.

C. Store loose granular materials on solid surfaces to prevent mixing with foreign matter.

D. Locate the place of storage so as to minimize interference with traffic and to provide easy access for inspection. Do not store materials closer than 5 feet (1.5 meters) to the edge of pavement or traveled way open to the public.

E. Materials that have been stored are subject to retest and must meet the requirements of their respective specifications at the time they are to be used in the Work.

F. Provide protection of stored or installed materials and equipment as necessary to prevent damage from traffic and subsequent operations.

1.03 MANUFACTURER'S INSTRUCTIONS

A. Obtain and distribute copies of manufacturer's instructions when the Contract Documents require that installation of Work to comply with manufacturer's instructions. Distribute copies of such instructions to parties involved in the installation, as well as at least 1 copy to the Engineer.

B. Handle, install, connect, clean, condition and adjust products in strict accord with such instructions and in conformity with specified requirements. Should project conditions or specified requirements conflict with manufacturer's instructions, consult with Engineer for further instructions.

1.04 PRODUCTS LIST

A. Submit a complete list of major products to be used within 4 days, if requested by Engineer. The list will include the name of the manufacturer and the installing subcontractor, if applicable.

1.05 CONTRACTOR'S PRODUCT OPTIONS

A. Select any product meeting the standard for products specified only by reference standard.

B. For products specified by naming several products or manufacturer's, select any one of the products or manufacturers named, which complies with the specifications.

C. For products specified by naming one or more products or manufacturers and "or equal," submit a Substitution Request Form for any product or manufacturer not specifically named, in accordance with Section 00 72 00 - General Conditions.

D. For products specified by naming only one product and manufacturer, there is no option.

1.06 EQUIPMENT STARTUP AND TESTING

A. Perform a comprehensive startup and demonstration of equipment performance and compliance with the design requirements. When there is more than one mode of operation, the equipment will be operated in every mode to verify proper operation.

B. When equipment is to operate in conjunction with other equipment as a system, each piece of equipment will be operated both by itself and automatically as a system to verify its proper operation.

C. Contractor is to provide to the Engineer, in advance of startup, a schedule and listing of startup and testing procedures for review by the Engineer. Checklists and diagrams may be required to ensure adequate startup and testing. Engineer may recommend changes to the startup procedure as necessary.

D. Equipment is to be inspected prior to operation for debris or other obstructions. Equipment is to be properly lubricated and calibrated prior to operation. Contractor will make adjustments necessary to ensure correct operation. When required, equipment installation and operation is to be witnessed and checked by manufacturer.

E. When required, the Contractor will train the Owner’s operation and maintenance personnel in the proper operation and maintenance of each piece of equipment and the system as a whole.

F. Equipment startup is to be witnessed by the Owner and the Engineer.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION 01 60 00

SECTION 01 77 00
CLOSEOUT PROCEDURES

PART 1 GENERAL

1.01 CLEANING

A. Contractor will perform periodic cleaning to keep the Work, the site and adjacent properties free from accumulations of waste materials, rubbish and wind-blown debris, resulting from construction operations.

B. Waste material, debris and rubbish will be periodically removed from the site and disposed of at legal disposal areas away from the site.

C. Prior to Owner acceptance, Contractor will conduct an inspection of sight-exposed interior and exterior surfaces, and Work areas, to verify that the entire Work is clean.

D. Contractor will broom clean exterior paved surfaces and rake clean other exterior surfaces of the site.

1.02 PROJECT RECORD DOCUMENTS

A. Contractor will deliver one (1) copy of all Specifications, Plans, Addenda, Shop Drawings and Samples, annotated to show changes made during the construction process, to Engineer upon completion of the Work as record documents. Submittal of the record documents will be made with a transmittal letter containing:

1. Date
2. Project Title and Number
3. Contractors Name and Address
4. Title and Number of each Record Document
5. Certification that each Document as submitted is complete and accurate

B. Record Documents will include:

1. Annotations, including changes during the execution of the work resulting from Requests of Information, Field Orders, Change Directives, and the as-built conditions which differ from the proposed plans.

    a. Annotations will include dimensional changes from the proposed plans. Where different from the proposed plans, strike through the proposed dimension and provide the as-built dimension. Changes will be clouded.

    b. Annotations may also be accompanied by sketches, photos, etc., as appropriate, to demonstrate as-built information or conditions.

2. Underground utilities installed as part of the Project and utilities exposed during execution of the Work. Underground utilities will be surveyed to record their location and elevation. Utility locations will be based upon available Project data (i.e., coordinate system, benchmarks, etc.).

    a. The utility information will include:

1) Straight run data every 100-feet.

2) Bends, valves, fittings, wyes/tees, hydrants, etc.

3) Crossings of other utilities.

C. Record documents will be in Portable Document Format (pdf), full size (i.e., 22" x 34"), in good order and in a legible condition.

D. Prior to delivery of the project record documents, Contractor will submit draft updates on a monthly basis to Engineer for review.

1.03 OPERATION AND MAINTENANCE DATA

A. Prior to final inspection or acceptance, Contractor will fully instruct Owner's designated operating and maintenance personnel in the operation, adjustment and maintenance of products, equipment and systems specified in the Contract Documents.

B. Operation and maintenance data required by the individual Specification sections and the manufacturer's operation and maintenance data required in Section 01 33 00 - Submittal Procedures, will constitute the basis of such instruction.

1.04 START UP

A. Contractor will coordinate efforts between Owner, Engineer, any equipment manufacturers, subcontractors and governing agencies in the startup of applicable portions of the Work.

1.05 WARRANTIES

A. Provide written warranties from the manufacturer for major equipment supplied under this Contract. The manufacturer’s warranty period will be concurrent with the Contractor’s warranty period. The warranty from the manufacturer will not relieve the Contractor of the one-year warranty starting at the time of Project Substantial Completion. Owner can request written warranties for equipment not classified as major.

1.06 SUBSTANTIAL COMPLETION

A. Certification that the Work is substantially complete will be in accordance with the General Conditions.

1.07 FINAL PAYMENT AND ACCEPTANCE

A. The final inspection, final application for payment and acceptance will be in accordance with the General Conditions.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION 01 77 00

SECTION 01 89 00
SITE CONSTRUCTION PERFORMANCE REQUIREMENTS

PART 1 GENERAL

1.01 SCOPE OF WORK

A. This Section includes general performance requirements for earthwork complete with, removal and disposal of structures and obstructions, protection of existing sewers, tiles and mains; protection of existing building and improvements, protection of trees and other types of vegetation, protection of utility lines, requirements for pavement replacement, restoration of driveways and parking areas, restoration of sidewalks, restoration of lawns and disturbed areas, transportation and disposal of excess excavation.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Section 01 57 13 - Temporary Erosion and Sediment Control

B. Section 31 23 13 - Subgrade Preparation

C. Section 31 23 16 - Structural Excavation and Backfill

D. Section 31 23 19 - Dewatering

E. Section 31 23 33 - Trenching and Backfilling

F. Section 32 12 16 - Bituminous Paving

G. Section 32 13 13 - Concrete Paving

H. Section 32 13 15 - Sidewalks and Driveways

I. Section 32 92 19 - Seeding

J. Section 32 92 23 - Sodding

1.03 REFERENCE STANDARDS

A. Unless otherwise specified, the Work for this Section will conform to the applicable portions of the following Standard Specifications:

1. MDOT - Michigan Department of Transportation Standard Specifications for Construction, latest edition.

2. ASTM D698 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort

1.04 REQUIREMENTS OF REGULATORY AGENCIES

A. Comply with Section 01 57 13 - Temporary Erosion and Sediment Control. Contractor, at Contractor's expense, will secure all permits, and post all bonds or deposits required to comply with the Soil Erosion and Sedimentation Control, requirements, being Part 91 of PA 451 of 1994 as amended.

B. Comply with all requirements of the National Pollutant Discharge Elimination System (NPDES) Storm Water Program for Construction Activities, Part 31 of PA 451 of 1994 as amended.

C. Provide, maintain and remove such temporary and/or permanent Soil Erosion and Sedimentation Control (SESC) measures as specified on the Plans or as determined by the Engineer.

1. Measures will prevent surface runoff from carrying excavated materials into the waterways, reduce erosion of the slopes, and prevent silting in of waterways downstream of the Work.

2. Measures should include provisions to reduce erosion by the wind of areas stripped of vegetation, including material stockpiles.

1.05 SUBMITTALS

A. Written permission for the use of disposal and borrow sites must be obtained and copies will be furnished to the Engineer.

1.06 PROTECTION OF PLANT LIFE

A. Trees, shrubs, and other types of vegetation not within the limits of the Work or not designated on the Plans or by the Engineer to be removed, will be carefully protected from damage or injury during the various construction operations.

B. Trees, shrubs or other types of vegetation not designated to be removed but which is damaged by the Contractor's operation will be repaired or replaced by the Contractor, at Contractor's expense, as determined by the Engineer.

1.07 PROTECTION OF EXISTING STRUCTURES AND IMPROVEMENTS

A. Carefully protect existing culverts, sewers, drainage structures, manholes, water gate wells, hydrants, water mains, utility poles, overhead lines, underground conduits, underground cables, pavement, or other types of improvements within the construction limits, not designated on the Plans to be removed from damage during the construction operations.

B. Repair or replace existing structure or improvement not designated to be removed that are damaged by the Contractor's operations to the satisfaction of the structure owner, at Contractor's expense.

C. Deposits of dirt or debris in sewers, culverts, tiles, drainage structures, manholes, gate wells, etc. caused by the Contractor at the Contractor’s expense.

1.08 MAINTAINING DRAINAGE

A. Maintain existing open drains, field and roadway ditches, drainage tile, sewers, enclosed drains, natural and artificial watercourses, surface drainage or any other types of drainage within the limits of the Work to for continued free discharge during construction. Costs incurred will be incidental to the excavating, backfilling and compacting or grading operations.

B. Repair or replace drainage facilities not designated to be abandoned, but which are damaged, or interrupted by the Contractor's operation immediately at Contractor's expense.

PART 2 PRODUCTS

2.01 GRANULAR MATERIAL

A. Bank run sand must meet the requirements of MDOT, Granular Material Class II.

2.02 AGGREGATE FOR SHOULDERS, PARKING AREAS, DRIVEWAYS OR ROADS

A. Crushed limestone, natural aggregate or slag must meet the requirements MDOT Section 902.

PART 3 EXECUTION

3.01 DEWATERING

A. Dewater the area within the vicinity of the new Work prior to commencing any construction activities. The depth of the dewatering will be sufficient to allow the Work area to remain in a dry condition during the various construction operations.

B. The costs incurred for furnishing, installing, maintaining and removing the dewatering equipment will be at the Contractor's expense unless otherwise specified.

C. Refer to Section 31 23 19 - Dewatering for additional requirements.

3.02 GENERAL

A. Construction operations will be restricted to the existing right-of-way or the areas indicated on the Plans. If the Contractor requires additional area, the Contractor must furnish the Engineer with written permission obtained from the property owner for any part of the operation the Contractor plans to conduct outside of the right-of-way or limits indicated.

1. Permission must be granted by the property owner prior to commencing any construction activities or operations outside of the existing right-of-way or designated areas.

3.03 EXISTING IMPROVEMENTS

A. Expose existing sewers and structures to which the new Work is to be connected and notify the Engineer once exposed. Engineer will verify the vertical and horizontal locations of the existing system and will inform the Contractor as to the necessary adjustments required to align the new Work with the existing system.

3.04 EXISTING UTILITIES

A. When existing utilities are shown on the Plans, their locations are approximate only, as secured in the field investigation and/or from available public records. Contractor, prior to the start of construction, must contact 811 and the public agency or utility having jurisdiction to request the verification of all utilities within the construction area.

B. When existing utility lines, structures or utility poles are encountered during the performance of the Work, the Contractor, at Contractor's expense, will perform construction operations in such a manner that the service will be uninterrupted.

C. Expose all existing utility lines prior to any excavation operation, to determine any conflict with the proposed improvement. Contractor is responsible for any relocation required as a result of any conflict of existing utilities shown on the Plans, with the proposed improvement.

D. Should it become necessary to move any utility structure, line or pole shown on the Plans or otherwise found necessary to be moved, the Contractor will make all arrangements with the owner of the utility for the moving. Costs incurred for such moving will be at the Contractor's expense unless indicated otherwise.

1. Before disturbing a utility line, structure or pole, furnish the Engineer with satisfactory evidence, in writing, that proper arrangements have been made with the owner of the utility.

3.05 UTILITY POLES

A. Contractor is responsible for removal or relocation of existing utility poles (including street light poles, guy poles, telephone poles, etc.) required as a result of any conflict with proposed improvements.

B. Arrangements for removing or relocating utility poles with the owner of the utility pole will be the Contractor's responsibility.

C. Prior to disturbing any utility pole, the Contractor will provide the Engineer with written evidence that proper arrangements have been made with the owner of the utility pole.

D. When required by the Work, Contractor will temporarily support poles in the vicinity of the Work, or make arrangement for the utility power owner to temporary support the poles, at no additional cost to the Owner.

1. Support provided by the Contractor will be in accordance with and to the satisfaction of the utility company.

3.06 EXISTING SEWERS, TILE, AND MAINS

A. Restore existing sanitary sewers, storm sewers, drain tile, septic tank bed tiles, water mains or building services or leads, that are encountered during the performance of the Work that require relocation or are damaged with new materials equal in quality and type to the materials encountered.

B. Installation of new materials will be as specified in the Contract Documents or in accordance with the agency having jurisdiction. Bedding and backfill material, unless otherwise specified, will be Class II granular material, compacted to 95% of its maximum unit weight, and approved by the Engineer.

C. Seepage bed tile and water mains will be replaced in accordance with the requirement of the agency having jurisdiction.

D. The relocation or protection of existing sewers, tiles, tile field, water mains or building services and leads will be at the Contractor's expense, unless otherwise indicated in the Contract Documents.

3.07 EXISTING STRUCTURES

A. Existing surface and subsurface structures may be shown on the Plans, in locations considered most probable from information secured in the field investigation or from available public records.

B. Neither the correctness nor completeness of such information is guaranteed or implied.

C. Structures will be protected, preserved or restored by the Contractor, to the satisfaction of the structure owner, at no additional cost to the Project.

3.08 EXISTING BUILDINGS

A. Existing buildings or structures may be encountered throughout the Project within limits of the presently established right-of-way or easement. Good construction methods and procedures will be employed by the Contractor, at Contractor's expense, to protect the structures.

B. When it becomes necessary for the Contractor to move one of these buildings or structures in order to proceed with construction, the Contractor, at Contractor's expense, will exercise all due care in moving the building or structure to prevent undue damage.

C. Prior to moving an existing building or structure, the Contractor will furnish the Engineer with satisfactory evidence, in writing, that proper arrangements have been made with the owner.

D. Unless otherwise specified in the Contract Documents, the length of the move will be maintained to a minimum which will allow for construction of the improvement.

3.09 REMOVAL OF SEWERS AND CULVERTS

A. Unless otherwise specified in the Contract Documents, the Contractor, at Contractor's expense, will remove abandoned culvert, pipe, sewer, structure or part of a structure which is to be replaced or rendered useless by the new construction.

B. When a sewer or culvert is removed at a structure, the Contractor will install a masonry bulkhead in the structure.

C. Removal of a culvert or sewer also includes the removal and disposal of any end treatments or headwalls.

3.10 REMOVAL OF STRUCTURES

A. The removal of existing structures will consist of removing and salvaging the existing frame and cover by the Contractor. The ends of the existing pipe will be plugged and braced. The complete structure will be removed entirely and disposed of. The excavation will be backfilled with sand and compacted to 95% of its maximum unit weight. Maximum unit weight will be determined by ASTM D698, Method B.

B. If a structure is to be removed from a system that is to remain in service, a bypass system, approved by the Engineer, will be installed and maintained by the Contractor, during the rebuilding period.

3.11 ABANDONING STRUCTURES

A. Demolish Break the structure down to at least 30 inches below the subgrade.

B. Pipes connected to the structure will be plugged with a brick, masonry or concrete bulkhead approved by the Engineer.

C. Backfill the structure with flowable fill to 12 inches above the pipes and the remainder of the structure backfilled with sand-cement mixture at a 10 to 1 ratio to subgrade elevation or to 12 inches below finished grade.

D. Backfill the remainder of the excavation with a granular material, compacted to 95% of its unit weight, and will meet with the approval of the Engineer. Maximum unit weight will be determined by ASTM D698, Method B.

3.12 SALVAGED MATERIAL

A. Salvaged materials will become the property of the Contractor unless otherwise specified in the Contract Documents, and will be disposed of by the Contractor, at Contractor's expense.

3.13 CROP DAMAGE

A. In areas where crops are encountered along the route of the construction, the Contractor will prepare a written agreement between the Contractor and the crop owner as to the type and nature of the crop that may be damaged during construction activities prior to the start of any construction activities within the area.

B. Contractor will be responsible for making full reimbursement to the owner of the crop damage on the basis of the following procedure:

1. The area of the crop damage will be determined by measurements taken by the Engineer, and this area will include those portions of the crop which may extend into the public right-of-way.

2. The County Office of the U.S. Agricultural Extension Service will establish the average yield of the crop.

3. The cost of the crop will be determined by using the prevailing price at the time of harvest as furnished by the U.S. Agricultural Extension Service.

C. Contractor will furnish the Engineer with satisfactory evidence that payment for crop damage was made, prior to receiving final payment on the Project.

3.14 REMOVE AND REPLACE TREE

A. Tree removal and replacement may be accomplished in two ways.

1. Contractor may completely remove and dispose of the existing trees, and after the new improvement has been completed, tested, accepted and rough grading has been completed, the Contractor will plant new trees, in approximately the same location as the existing trees, of size and species per the landscaping plans included in the Plans.

2. Contractor may remove and preserve the existing trees.

a. Trees will be properly cared for and maintained in a healthy condition.

b. After the new improvement has been installed, tested, accepted and rough grading completed, the trees will be replanted in approximately the same location.

c. Any trees damaged, destroyed or which die, will be replaced at no additional cost.

B. Trees, whether replanted or planted new, will be guaranteed for a period of one year(s) from the date of Substantial Completion.

3.15 REMOVING PAVEMENT

A. Removal of concrete and bituminous pavement, as called for on the Plans, consists of removing and disposing of pavement and will include base courses, surface courses, integral and separate curbs, integral and separate curb and gutters, sidewalks and end headers.

B. Remove pavement to an existing joint or cut parallel to existing pavement joints.

C. Use a power-driven concrete saw, approved by the Engineer, to make cuts. The depth of the saw cut will be a minimum of 6 inches to ensure that the removal of the old pavement will not disturb or damage the section of pavement remaining in place.

D. Residual concrete pavement will not be less than 5 feet measured transversely, nor less than 6 feet longitudinally measured from a joint.

E. In removing a concrete base course, where part of the existing bituminous surface is to remain in place, cut the full depth of the bituminous surface with a power-driven saw, approved by the Engineer, along a line parallel to and at least 12 inches from either side of the base course removal.

F. Old pavement with a concrete cap will be considered as only one (1) pavement, whether or not there is a separation layer of earth, aggregate, or bituminous material between the old material and the concrete cap.

G. Removal of Curb for Curb Drop:

1. Where curb is to be removed for a curb drop, the operation will be performed either by saw cutting or by cold milling that has been approved by the Engineer, so as to leave a neat surface with a maximum 1 inch lip, without damage to the underlying pavement.

H. Removal of Curb and Gutter:

1. Where curb and gutter are to be removed, the operation will be performed by saw cutting. The limits of the removal will be as shown on the Plans or as approved by the Engineer. However, in no case will the width of removal be less than 18 inches for sections with rolled or straight curb or less than 24 inches for mountable curbs.

I. If during the pavement removal operation any concrete or bituminous pavement or surfacing is damaged beyond the removal limits designated, the damaged pavement or surfacing will be removed and replaced at the Contractor's expense.

J. Earth removed during the pavement removal operation will be replaced by backfilling to the proposed subgrade with a suitable material, approved by the Engineer, at the Contractor's expense.

3.16 GUARDRAIL

A. Relocate or remove beam guardrail as specified on the Plans or as determined by the Engineer. If the existing material is damaged or destroyed, the Contractor will replace the material at Contractor's expense.

B. Where guardrail is encountered during construction and is removed by the Contractor when its removal was not called for on the Plans, the guardrail will be replaced or restored, at the Contractor's expense, to a condition comparable to that prior to construction.

C. After the guardrail removal or relocation operations are complete, surplus material will be removed and disposed of by the Contractor, at Contractor's expense, unless otherwise called for in the Contract Documents.

D. Backfill holes or voids resulting from the guardrail removal operation with a Class II granular material that has been approved by the Engineer.

3.17 FENCES

A. Remove and replace fences as indicated on the Plans. If any of the existing material is damaged or destroyed during the Contractor's activities, the Contractor will replace the damaged material at Contractor's expense.

B. Where fencing is encountered during construction and removed by the Contractor when its removal was not called for on the Plans, the fencing will be replaced or restored, at the Contractor's expense, to a condition comparable to that prior to construction.

C. After the fence removal or relocation operations are complete, surplus material will be removed and disposed of by the Contractor, at Contractor's expense, unless otherwise called for in the Contract Documents.

D. Backfill holes or voids resulting from the fence removal operation with a suitable material that has been approved by the Engineer.

E. Where fences are encountered that are being used to confine livestock or to provide security, the fence must be immediately replaced following construction. During construction, the Contractor, at Contractor's expense, must provide, install and maintain a temporary fence that has been approved by the Engineer.

3.18 HOLES

A. Earth removed during any phase of the excavation or removal operations, resulting in a hole or void, will be replaced by backfilling to the proposed subgrade with a suitable granular material. The material will be placed by the controlled density method or other effective means having the approval of the Engineer and will be compacted to 95% of maximum unit weight.

B. Furnishing, placing and compacting of the backfill material will be at the Contractor's expense.

3.19 RESTORATION IN RIGHT-OF-WAY AND YARD AREAS

A. Restore right-of-way and yard areas not paved or aggregate surfaced in accordance with the type and location specified herein, unless indicated otherwise on the Plans. Disturbed areas may be shaped by "Machine Grading" or another method approved by the Engineer to achieve the cross section, line and grade shown on the Plans. Areas where slopes are 1 on 4 or flatter will be restored with topsoil, seed and mulch. Slopes steeper than 1 on 4 will be restored with sod.

B. Excess material from the restoration operation will be disposed of by the Contractor at Contractor's expense.

C. Grade disturbed areas to receive either topsoil and seed or topsoil and sod. Topsoil, seed, sod, fertilizer and mulch must conform to the requirements specified on the Plans and in Section 32 92 19 or 32 92 23.

D. Contractor, at Contractor's expense, will furnish, place, and compact any additional fill, meeting the approval of the Engineer, needed to restore the disturbed areas to the cross sections called for on the Plans or as determined by the Engineer.

3.20 RESTORATION OF AGGREGATE SURFACES

A. Shoulders:

1. Shoulders will be regarded as the area between the edge of pavement and the ditch, or the area within 10 feet of the pavement, whichever is the lesser.

2. Backfilling of trenches in the shoulder area will be carried to within 5 inches of the existing surface as specified under Trench “A" or Trench "B" of Section 31 23 33. Backfill the remaining depth with a minimum of 5 inches of compacted 22A or 23A aggregate with calcium chloride applied, at the rate of 6 pounds per ton of aggregate.

3. Contractor, at Contractor's expense, will furnish, place and compact materials necessary to complete the backfilling and restoration operation within the shoulder area.

B. Driveways and Parking Areas:

1. Aggregate driveway areas will be regarded as the area from the right-of-way line to the edge of the traveled roadway and will include the shoulder area.

2. Backfilling of trenches crossing aggregate surfaced driveways and parking areas will be carried to the bottom of the proposed base course as specified under Trench “B”. Backfill the remaining depth with a minimum of 6 inches of compacted 22A or 23A aggregate, with calcium chloride applied at the rate of 6 pounds per ton of aggregate.

3. Aggregate surfaced areas beyond the limits of the actual excavation which are disturbed, as determined by the Engineer, by such operations as temporary storage of materials or passage of equipment, will be resurfaced, at the Contractor's expense.

   a. The upper three 3 inches of disturbed areas will be removed as necessary to allow the final elevation of the resurfacing course to be at the elevation of the drive or parking area which existed prior to excavation.

   b. Disturbed area will be resurfaced with a minimum of 3 inches of 22A or 23A compacted aggregate, with calcium chloride applied at the rate of of aggregate.

4. Contractor, at Contractor's expense, will furnish, place, and compact all materials necessary to complete the backfilling and restoration operations within the driveway and parking area.

C. Roads and Streets:

1. Backfilling of trenches crossing aggregate surfaced roads or streets will be carried to within 12 inches of the existing surface as specified under Trench "B" of Section 31 23 33 - Trenching and Backfilling. The remaining depth will be backfilled with two 6 inches layers of compacted 22A or 23A aggregate, with calcium chloride applied at the rate of 6 pounds per ton of aggregate.

2. Contractor, at Contractor's expense, will furnish, place, and compact materials necessary to complete the backfilling and restoration operations within the roadway or street area.

3. Settlement of the aggregate surface will be restored by placing additional aggregate, up to the original grade, and will be at the Contractor's expense.

D. Compaction

1. Compaction of aggregate will be performed by a pneumatic-tired roller or a vibratory compactor until the material forms a stable surface.

3.21 RESTORATION OF PAVED SURFACES

A. Contractor will furnish and provide the materials necessary to complete the backfilling and restoration operations, which includes furnishing, compacting, forming, placing, rolling, floating, jointing, finishing, curing and providing protection against elements.

B. Restoration of roadways that are partially damaged will include a minimum replacement of one (1), full width lane of roadway. The length of replacement will be at least equal to the width.

C. Concrete:

1. The backfilling of trenches crossing concrete driveways, sidewalks, roads, streets or parking areas will be carried to the bottom of the proposed pavement as specified under Trench "B" of Section 31 23 33 - Trenching and Backfilling.

2. Unless otherwise specified on the Plans or as determined by the Engineer, concrete removed will be replaced with 3500 psi concrete of the thickness removed and will include reinforcing equal to the existing, if the existing pavement was reinforced.

3. Construction of concrete pavements will be in accordance with Section 31 23 33 - Trenching and Backfilling.

4. Restoration of sidewalks includes the construction of sidewalk ramps at the intersection of the curb and must conform to the current rules and regulations of the state of Michigan, and Section 32 13 15 - Sidewalks and Driveways. Unless otherwise indicated in the Proposal, this Work will be considered incidental to the Project.

D. Bituminous

1. The backfilling of trenches crossing bituminous driveways, sidewalks, roads, streets or parking areas will be carried to the bottom of the base course as specified under Trench "B" of Section 31 23 33 - Trenching and Backfilling.

2. Bituminous pavement or bituminous surface course with an aggregate base will be replaced in accordance with Section 32 12 16 - Bituminous Paving.

3. Bituminous surfaced areas beyond the limits of the actual excavation which are disturbed by such operations, as temporary storage of materials or passage of equipment, will be resurfaced with an approved bituminous mixture the same thickness as removed, but in no case less than 2 inches in thickness. Replacement material will extend to smooth-cut edges, be uniform in direction and at an elevation which provides a uniform surface between the undisturbed abutting surfaces.

4. Restoration of any bituminous chip seal shoulders that are damaged or partially damaged, as determined by the Engineer, will include complete replacement full width and length (extending a minimum of 25 feet beyond the damaged area both ways). Existing bituminous chip seal shoulders will be brought to proper grade with compacted 22A or 23A aggregate and resurfaced with a double chip seal per Section 32 12 16 - Bituminous Paving.

3.22 SOIL EROSION AND SEDIMENTATION CONTROL

A. Contractor will comply with the requirements of Section 01 57 13. Prior to commencing any type of earthwork, the Contractor will obtain a Soil Erosion and Sedimentation Control permit from the local enforcing agency.

B. Contractor will obtain approvals, secure permits and post bonds and deposits required to comply with the Soil Erosion and Sedimentation Control Act, Part 91 of PA 451 of 1994, as amended, and those of the enforcing agency.

C. Contractor will provide the Engineer with a copy of the soil erosion permit issued by the local enforcing agency for the Project, prior to commencing any type of earthwork on the Project.

3.23 EXCESS EXCAVATION

A. Excess excavation will be defined as surplus earth material realized from the construction that is free of brush, roots, stumps, broken concrete, pipe, debris, and other extraneous material.

B. Contractor, when requested by the Owner, will transport excess excavation to a site(s) designated by the Owner.

1. Excess excavation will be graded by the Contractor to provide positive surface drainage of the site(s).

2. Grading will be done such that adjacent properties are not damaged or affected. The grading will include removal of all surface irregularities to provide a smooth surface ±3 inches.

C. When the excess excavation has not been requested by the Owner, the Contractor will remove and properly dispose of the material at no additional cost to the Owner.

D. Proper disposal of all excess excavation, including transportation, grading, and protection of adjacent properties will be considered as a final cleanup item. No additional payment will be made for this item.

E. Brush, roots, stumps, broken concrete, pipe, debris, and other extraneous material from the construction will become the property of the Contractor, and will be disposed of per all applicable Laws, rules or regulations. Removal and disposal of this material will be considered as part of final cleanup. No additional payment will be made for this item.

F. Owner approval of the final site(s) condition in writing will be required prior to final payment authorization.

END OF SECTION 01 89 00

SECTION 02 08 02
REMOVAL AND DISPOSAL OF MATERIAL CONTAINING LEAD

PART 1 GENERAL

1.01 SCOPE OF WORK

A. Provide labor, materials, equipment, services, and incidentals necessary for the removal of LBP and/or LCPs (LBP) and lead-containing paints (LCP) as required to permit the safe and lawful demolition, removal and disposal of the equipment, piping, conduit, and other items scheduled for demolition as shown on the Drawings or as specified. This will include all containment, environmental monitoring, laboratory testing, medical monitoring, and other measures necessary to perform the Work in accordance with all applicable Federal, State, and local regulations.

B. In the absence of testing results, assume the presence of LBP and/or LCP on surfaces, equipment, piping, etc. that are scheduled for demolition as a part of this Work. Removal of LBP and/or LCP will be, at a minimum, 6 inches on all sides of the location proposed for cutting, burning, power tool use and/or other work which will disturb, affect, or demolish the paint.

C. Work related to this Section, including but not limited to, environmental protection, worker protection, and Hazardous Waste disposal, will be in strict compliance with all applicable Federal, State, and local laws, codes, rules, and regulations.

D. This Section presents minimum acceptable requirements for construction activities affecting materials, equipment, and structures coated with LBP and/or LCP. This includes:

1. Perform the Work using methods commonly accepted, recognized by OSHA (OSHA (pursuant to 29 CFR 1926.62), and demonstrated to prevent emissions of lead outside of the lead control area when used in accordance with manufacturer's recommendations.

2. Perform the Work to minimize creation of airborne dust and vapors, particularly relative to LBP and/or LCP.

3. Minimize the quantity of hazardous waste generated.

4. Protect the health and safety of personnel at the Site.

5. Avoid adverse environmental impacts.

1.02 COORDINATION

A. Coordinate and review subsequent demolition work specified under other Sections and coordinate such work with the Work under this Section.

1.03 REFERENCE STANDARDS

A. Except as modified by governing codes and by this Section, comply with the applicable provisions and recommendations of latest editions of the below listed references. Where the language in any of the documents referred to herein is in the form of a recommendation or suggestion, such recommendations or suggestions will be mandatory under this Contract unless otherwise directed by the Engineer.

B. Conflicts: Conform to requirements of cited standard unless specified otherwise. In case of apparent conflict between standards, or between standards and the specifications herein, the more stringent will apply unless otherwise directed by the Engineer.

C. Comply with all applicable Federal, State and Local regulations, standards, codes, and guidelines concerning the removal and disposal of material containing lead, including, but limited to the following:

1. ANSI Z88.2, Respiratory Protection.

2. Method E1553-93 – Standard Practice for Collection of Airborne Particulate Lead during Abatement and Construction Activities

3. ASTM D3335, Test Method for Low Concentrations of Lead, Cadmium, and Cobalt in Paint by Atomic Absorption Spectroscopy.

4. National Institute of Building Sciences (NIBS), Guideline Specifications for Reducing LBP and/or LCP Hazards.

5. SSPC Guide 6, Guide for Containing Debris Generated During Paint Removal Operations.

6. SSPC Guide 7, Guide for the Disposal of Lead-Contaminated Surface Preparation Debris.

7. UL 586, High-Efficiency, Particulate, Air Filter Units.

8. Occupational Safety and Health Administration (OSHA):

   a. Lead Exposure in Construction: Interim Final Rule 29 CFR 1926.62.

9. United States Environmental Protection Agency (EPA):

   a. Resource Conversation and Recovery Act (RCRA) Section 3004 Hazardous and Solid Waste Amendments.

   b. Toxicity Characteristics Leaching Procedure, EPA Method 1311.

   c. USEPA SW-846, Method 3050, Acid Digestion of Sediments, Sludge, and Soils.

   d. USEPA Method 7082, Test Methods for Evaluating Solid Wastes.

1.04 TERMINOLOGY

A. The following words or terms are not defined but, when used in this Section, have the following meaning:

1. “Abatement” indicates abatement of LBP and/or LCP, which involves removing LBP and/or LCP or replacing surfaces containing LBP and/or LCP or demolishing lead painted or lead-containing structures and materials.

2. “Action level” is as defined in OSHA 29 CFR 1926.62, employee exposure without regard to use of respirators, to airborne concentrations of lead of "30 micrograms per cubic meter of air" refers to the action level.

3. “Amended water” is water containing at least one ounce of five percent trisodium phosphate per gallon of water.

4. “Area monitoring” is sampling of lead concentrations within and outside the lead control area and inside the physical boundaries which is representative of the airborne lead concentrations which may reach the breathing zone of personnel potentially exposed to lead.

5. “Atomic absorption spectroscopy” is an analytical method of determining the lead content of a given sample.

6. “Certified industrial hygienist” or “CIH”: As used in this Section, refers to an industrial hygienist employed by CONTRACTOR or Subcontractor and certified by the American Board of Industrial Hygiene (ABIH) in comprehensive practice.

7. “Change rooms” are rooms within the designated physical boundary around the lead control area set up to prevent cross-contamination and equipped with separate storage facilities for clean protective work clothing and equipment and for street clothes prevent cross contamination.

8. “Competent person” means a person capable of identifying existing and predictable lead hazards in the surrounding or working condition and who has authorization to take prompt corrective action to eliminate such hazards.

9. “Decontamination area” is an area for removal of contaminated personal protective equipment (PPE).

10. “High-efficiency particulate air filter equipment” or “HEPA filter equipment” means vacuuming equipment containing a UL 586 HEPA filter system capable of preventing passage of lead- contaminated paint dust with an efficiency of 99.97 percent of particles greater than 0.3 micron size.

11. “Inductively-coupled plasma atomic emission spectrometry” means an analytical laboratory method of determining the lead content of a given sample.

12. “Industrial hygiene technician” is a person trained and experienced in the use of environmental sampling equipment as applicable to this Project and who is under the direct supervision of the CIH.

13. “Lead” means metallic lead, inorganic lead compounds, and organic lead soaps. Excluded from this term are other organic lead compounds.

14. “Lead control area” is an emission control area to prevent the spread of lead dust, paint chips, and debris from lead-containing paint removal operations. Lead control area is isolated by physical boundaries to prevent unauthorized entry of personnel.

15. “Lead-based paint”: Paint is considered to be lead-based when it contains detectable quantity of lead to the limit of detection using USEPA Method SW 846 Method 6010.

16. “Lead-containing paint”: Any and all components, paints or surface coating material containing detectable concentrations of lead by weight in the dry solid (16 CFR 1303).

17. “Lead waste”: Miscellaneous waste, dust or debris generated during removal of lead-containing materials, cleanup of a lead control area, or decontamination activities.

18. “Permissible exposure limit” or “PEL” is 50 micrograms per cubic meter of air as an eight-hour TWA as determined by OSHA 29 CFR 1926.62. If a person is exposed for more than

eight hours in a workday, determine the PEL by the following formula: PEL = 400 micrograms per cubic meter of air/hours worked per day.

19. “Personal monitoring” means independent sampling by a qualified laboratory of lead concentrations within the breathing zone of a person to determine the eight-hour TWA concentration in accordance with 29 CFR 1926.62. Samples must be representative of the person’s work tasks. Breathing zones will be considered an area in a hemisphere, forward of the shoulders, with a radius of six to nine inches and the center at the nose or mouth of the person.

20. “Physical boundary” is an area physically roped or partitioned off around a lead control area to limit unauthorized entry of personnel. As used in this Section, "outside boundary" means the same as "outside lead control area."

21. “Time-weighted average” or “TWA” is the airborne concentration of lead averaged over an eight-hour workday to which a person is exposed.

22. “Trigger activities”: Activities that involve the disturbance of lead- containing materials will trigger requirements under the OSHA Lead In Construction standard for conducting personnel exposure assessment sampling, training, medical monitoring, respiratory protection and other requirements as specified in 29 CFR 1926.62. Examples of trigger activities include abrasive blasting, welding, cutting, torch burning, manual demolition of structures, manual scraping, manual sanding, heat gun application, rivet busting, and power tool cleaning.

23. “Wipe sampling” means clearance testing procedures used for determining the amount of existing LBP and/or LCP surface dust by atomic absorption spectroscopy analysis, or inductively coupled plasma emission spectrometry expressed in micrograms of lead. Whatman filters and deionized water must be used to sample a one square foot area.

1.05 SUBMITTALS

A. Within sixty (60) days of the Notice to Proceed, submit a site and location-specific Work Plan indicating how Contractor will satisfy all applicable laws, codes, rules and regulations and the requirements of this Section including:

1.06 PAINT REMOVAL, CONTAINMENT, VISIBLE EMISSIONS MONITORING, AND CLEAN-UP

A. At a minimum include drawings indicating the location, size, and details of lead dust control work areas, location and details of containment, decontamination facilities, sequencing of lead removal, work procedures, types of equipment, crew size, and emergency procedures for fire and medical emergencies in the Work Plan.

1.07 WASTE HANDLING, TESTING, STORAGE, TRANSPORTATION, AND DISPOSAL

A. Worker protection, including but not limited to a Lead (Heavy Metal) Health and Safety Compliance Program, which at a minimum must address respirator protection that is in full compliance with 29 CFR 1910.134, OSHA personal exposure assessment, including regulated area monitoring, signs to be posted in work areas, protective clothing, engineering and administrative controls, hygiene facilities and practices, decontamination, housekeeping, medical surveillance (including biological monitoring), respiratory fit tests, training certifications, waste disposal and other items to satisfy OSHA standards.

B. Submit copies of laboratory test results on wipe samples obtained for the work.

C. Submit copies of waste shipment records and disposal site receipts documenting that any materials classified as hazardous materials were properly disposed of.

D. Meeting minutes from Pre-Remediation Conference.

1.08 QUALITY ASSURANCE

A. The persons performing lead abatement and their supervisor must be personally experienced in lead abatement work and have been regularly employed by a company performing lead abatement work for a minimum of 3 years. Submit evidence documenting worker training and experience to the Engineer. Obtain the services of a qualified Subcontractor, if necessary, to comply with the requirements of this Section.

B. If a subcontractor is utilized to perform any of the work of this Section, the requirements of this Section will apply to the subcontractor as if specifically referred to herein and subcontractor must comply. Contractor's use of a subcontractor(s) will not relieve the Contractor of full responsibility for the work to be performed.

1.09 PRE-REMEDIATION CONFERENCE

A. Contractor and Subcontractor must meet with Engineer and Owner to discuss in detail the lead-paint remediation Work Plan including work procedures.

B. Minimum Attendance: Conference must be attended by Contractor’s and Subcontractor’s project managers, site supervisors, safety supervisor; and by Engineer and Owner.

C. Prepare and distribute minutes of the conference to all attendees, Engineer, and Owner within 7 calendar days of the conference.

PART 2 PRODUCTS

2.01 EQUIPMENT

A. General:

1. Use only non-toxic, non-hazardous materials, and tools. Materials or equipment containing lead or Asbestos or other toxic or hazardous materials must not be brought to the Site.

B. Waste Containers:

1. Provide and use containers for storing and transporting Hazardous Waste, including LBP and/or LCP residue, that are approved by the state department of transportation or other applicable authority having jurisdiction.

C. Respirators:

1. Select and use respirators approved by NIOSH and the United States Department of Health and Human Services for use in areas containing LBP and/or LCP dust.

2. Provide personnel engaged in the removal of LBP and/or LCP at a minimum with half-mask HEPA cartridge filter respirators or full face PAPR, until the CIH establishes the TWA.

3. After the TWA has been determined, Contractor may modify respiratory protection as outlined in 29 CFR 1926.62, but the use of half-mask, HEPA cartridge filter respirators, full face PAPR, or equivalent must be maintained at a minimum throughout all abatement and other operations involving lead-containing materials.

D. Special Protective Clothing:

1. Furnish personnel who have potential of being exposed to lead-contaminated dust with appropriate disposable protective whole body clothing, head covering, gloves, and foot coverings.

2. Tape sleeves at the wrist and secure foot coverings at the ankles.

3. Furnish appropriate disposable plastic or rubber gloves to protect hands.

4. Ear muffs or other protection must be provided and used during all removal operations with power tools unless it is demonstrated that noise levels are within OSHA/NIOSH standards.

5. Eye protection must be worn and used throughout operations involving clean up and removal of lead-containing material. The level of protection may be adjusted upon completion of initial employee exposure assessment with approval of CIH but must be maintained at levels not less than those stated in this paragraph.

E. Rental Equipment Notification:

1. When rental equipment will be used during demolition, removals, handling, and disposal materials containing lead or coated with LBP and/or LCP, notify rental entity in writing concerning the intended use of rented equipment.

F. Filter Certifications:

1. HEPA Filters used in filtered vacuuming equipment m comply with UL 586 requirements and cutting tools manufacturers specifications and recommendations.

G. Polyethylene Sheeting:

1. Provide polyethylene film in the largest size possible to minimize seams, and six (6) mil thick. Frosted, clear or black film may be used. Reinforced sheeting may be required when a contained area is exposed to the outside. Poly sheeting must be fire retardant.

2.02 LEAD PAINT REMOVAL EQUIPMENT

A. Use only products and tools complying with requirements presented below:

1. Use vacuum-assisted power tool system with demonstrated suitability and efficiency in preparing metal surfaces in accordance with SSPC SP-11 and with demonstrated effectiveness in maintaining lead emissions below 30 µg/m3 during abatement operations. Such systems may include dustless needle guns, dustless automatically recirculating wheel blast (rotopeens), and right angle grinders which capture all dust and debris at the cutting tool edge and transport the material under vacuum conditions to an airtight disposal container. Dustless needle guns may be utilized on metal surfaces only.

a. System must removal and replacement of collection containers under negative pressure to prevent release of dust during removal and replacement operations.

b. System must be equipped with feature to automatically shut off in the event of vacuum failure.

2. Monitor recovery/abrasive action tool at all times using a device capable of determining recovery at the face of each tool and automatically disabling the tool in the event recovery levels are insufficient.

3. As a minimum, monitor must have the following features: remote warning light, adjustable recovery set point, automatic equipment disabling capabilities, sensing range of zero to five psi, solid-state photohelic instrumentation, and remote sensing at the tool face.

4. Calibrate safe recovery point each day before startup, and each time a new tool or vacuum source is used.

5. Comply with manufacturers' recommendations relative to set-up and use of monitor.

6. Maintain a daily log identifying all calibrations of recovery levels and down time as a result of insufficient recovery levels.

7. Maintain manufacturer's operations and maintenance manual at the Site.

8. Do not use products containing crystalline silica, and do not introduce non-recoverable materials, and do not use cutting material, that introduces toxic or hazardous materials.

9. Cutting head for use on flat surfaces must be capable of cutting to within 1.5 inches of inside corners, molding, and edges and may include rotopeen scalers, and dustless needle guns. Tools for corners and moldings must be specifically designed for such purpose and must conform to all inside corners, outside corners, curved, flat, and angled surfaces to be abated under this Contract while maintaining vacuum control at the work surface/cutting head interface. Shrouded HEPA vacuum fitted needle guns may be used for non-flat surfaces in accordance with manufacturer recommendations. Vacuum-assisted finishing tools, such as right angle grinders, may be used to achieve SSPC SP-11 compliance but are not acceptable for primary removal.

10. Vacuum-assisted power tool systems complying with performance standards indicated in this Section may be used; upon request of Engineer submit performance documentation evidencing suitability for intended use.

2.03 LBP AND/OR LCP REMOVAL CHEMICAL STRIPPER SYSTEM

A. Use an environmentally safe chemical paint stripping system with demonstrated suitability and efficiency in preparing cast-in-place concrete, metals, cement, and plaster surfaces to achieve surfaces which are free of any visible residues of LBP and/or LCP and with demonstrated effectiveness in maintaining lead emissions below 30 µg/m3 during abatement operations. Such systems may include non- alkaline or alkaline strippers which do not contain methylene chloride, and which provide the lowest possible level of toxicity consistent with the type of lead based paint to be removed. Neutralization procedures and products must be provided for alkaline stripping systems.

B. More than one product may be required to strip LBP and/or LCP. Use of multiple products must be in accordance with acceptable use as recommended by the individual chemical paint stripping compounds.

C. Provide all chemical paint stripping compounds in the manufacturer's unopened and original containers bearing accurate information on the product contained therein with all labels intact and completely legible. Materials that do not comply with requirements will immediately be removed from the Site and will not be used in the Work.

2.04 TEMPORARY FACILITIES

A. Coordinate use of Owner provided facilities with the Owner.

B. Hook-ups to the Owner’s existing utilities are the responsibility of the Contractor unless otherwise directed by Owner. Contractor will be responsible for utilizing licensed tradesman for installation of any electrical or water hook-ups required. Such hook-ups must not interfere, in any way, with the Owner's operations for occupied areas of the building and their associated utilities and facilities.

C. Remove all temporary facilities and utilities after the Work is complete and return such facilities and utilities to their original condition.

PART 3 EXECUTION

3.01 COORDINATION WITH THE OWNER’S OPERATION

A. Provide written notice to the Engineer and Owner prior to the start of any paint removal work.

B. Make every effort to establish the containment areas such that access is maintained for Owner's personnel to operating equipment.

3.02 MONITORING, TESTING AND SAMPLING EQUIPMENT

A. Calibrate and supply the instrumentation needed for the monitoring of workers, including all equipment needed for its operation (e.g., generators, batteries, power cords, fuel, etc.) as required by OSHA.

B. Use equipment that is free of loose dust and debris when brought onto each Work Site, and upon removal. Vacuum using HEPA (High Efficiency Particulate Air) filtered vacuum shrouds and/or wet wipe the equipment with an approved cleaning solution to assure that it is clean prior to removal from the work site.

3.03 WASTE CONTAINERS

A. Hazardous Waste:

1. Provide USDOT-approved containers in accordance with 49 CFR 178 (e.g., 17H containers in the case of 55 gallon drums) of the appropriate size and type for the Hazardous Waste generated on the project. Use containers that are resistant to rust or corrosion (painted, if constructed of steel), that have tight fitting lids or covers, and which are water-resistant and leak proof.

2. Provide the Engineer with a signed statement that the containers are labeled as required by applicable Federal, State and Local regulatory requirements.

B. Non-Hazardous Waste:

1. Provide containers for non-hazardous waste. Use containers that are free of loose debris when brought on-site. Containers must be watertight and corrosion resistant.

C. Spent Solvents:

1. Provide containers for spent solvents, whether the solvent is designated for reuse, or for disposal as hazardous waste, and do not mix spent solvents with spent abrasives, paint debris, water, or other waste. Containers must be watertight and corrosion resistant.

D. Container Maintenance:

1. Maintain containers in good operating condition with lids and closing mechanisms intact and operational to prevent the escape of debris, spilling of the contents, or access by unauthorized personnel. Observe all labeling requirements.

3.04 CONTAINMENT

A. Provide proper containment measures in all areas where LBP and/or LCP is to be removed. LBP must be removed without damage or contamination to adjacent areas, buildings, waterways, or the environment in any fashion. This includes any water runoff from wet removal methods. Water runoff from wet removal methods will not be discharged to plant drains.

B. Prevent dust, paint chips, spent removal media, solvents, and other debris from entering any plant drain and immediately contain and clean up any materials which become deposited near or in any plant drain or come into contact with any standing or flowing water within the plant.

C. Supply equipment and materials needed to contain emissions, releases, waste and/or debris in accordance with OSHA standards.

D. Establish emergency and fire exits from the containment area. Provide first aid kits and two full sets of protective clothing and respirators for use by qualified emergency personnel outside of the work area.

E. Provide a logbook throughout the entire term of the project. Persons who enter or leave the containment area must sign the logbook. Document any intrusion into the work area or other incident in the logbook.

3.05 REMOVAL OF LBP AND/OR LCP

A. Perform removal of LBP and/or LCPs in accordance with the approved LBP and/or LCP removal Work Plan.

B. Use procedures and equipment as required to limit occupational and environmental exposure to lead when LBP and/or LCP is removed in accordance with referenced standards.

C. Limit the production and dissemination of dust as much as possible.

D. LBP and/or LCP must be removed to the extent required to perform the safe and lawful removal and disposal of the equipment or piping scheduled for demolition.

E. Torch cutting, open flame burning, power tool use and/or other work which will disturb, affect, or demolish LBP and/or LCP will be permitted only after all visible paint has been removed from the substrate surface for a minimum distance of six (6) inches on all sides of the location proposed for cutting, burning, power tool use and/or other work which will disturb, affect, or demolish the paint.

3.06 WORK AREA CLEAN-UP AND MAINTENANCE

A. Visually inspect, at the end of each work day, the entire work area for dust, paint chips, spent paint removal media, solvents, and other debris that have been deposited within the work area or surrounding surfaces, water or soil. If debris from the Contractor's operations is observed outside the initial inspection limits, the limits may be expanded to include additional areas as directed by the Engineer upon written request by the Contractor.

B. Clean up visible dust, paint chips, spent paint removal media, solvents, and other debris at the end of each work day, or more frequently as directed by the Engineer.

C. Clean all surfaces within the work area and surrounding areas at the end of each work day by wet vacuuming and/or wet wiping or washing, as directed by the Engineer.

1. When wet vacuuming, use only vacuums that are equipped with HEPA filters. Conduct wipe sampling to verify that lead levels are below the required clearance criteria.

2. If lead levels exceed this clearance criteria, repeat clean-up procedures as necessary until wipe sampling verifies that lead levels are below the clearance criteria.

3.07 HEALTH AND SAFETY

A. Where in the performance of the work, workers, supervisory personnel or sub-contractors may encounter, disturb, or otherwise function in the immediate vicinity of contaminated items and materials, personnel will take appropriate continuous measures as necessary to protect all ancillary building occupants from the potential lead exposure.

1. Such measures will include the procedures and methods described herein and must be in compliance with applicable regulations of Federal, State and Local agencies.

B. Provide all necessary Personal Protective Equipment (PPE) and emergency response equipment needed for the Work as required by OSHA and the Michigan State Labor Law.

C. Workers must wear protective suits, protective gloves, eye protection and a minimum of half-face respirator with HEPA filter cartridge for all projects. Respiratory protection must be in accordance with OSHA regulation 1910.134 and ANSI Z88.2.

D. Workers must be trained as per OSHA and DOL requirements, have medical clearance and must have recently received pulmonary function test (PFT) and respirator fit tested by a trained professional.

E. A personal air sampling program must be in place as required by OSHA.

F. Use of respirators must follow a complete respiratory protection program as specified by OSHA.

G. Provide medical monitoring necessary to comply with OSHA regulations.

3.08 CERTIFICATION

A. At the completion of LBP and/or LCP removal operations, provide the services of a qualified laboratory to perform post-cleaning testing of surfaces within the work area and areas adjacent to the containment area to verify that lead-based dust and other debris generated by the Contractor's operations have been properly cleaned from the area. Engineer must be present during all wipe testing.

B. Submit a letter to the Engineer certifying that the work areas have been properly cleaned.

3.09 PRE-DISPOSAL TESTING

A. Prior to disposal, test the removed materials for toxicity in accordance with EPA Method 1311, Toxicity Characteristic Leaching Procedure (TCLP).

1. Test results indicating a value greater than 5 ppm lead classifies the removed material as "Hazardous Waste."

2. Removed material must be classified according to the requirements of the receiving site and the agencies having jurisdiction.

3.10 DISPOSAL OF LBP AND/OR LCPS AND RELATED DEBRIS

A. Transport and dispose of LBP and/or LCPs and related debris classified as Hazardous Waste in accordance with the standards referenced in Part 1 of this Section.

B. All generated waste removed from the site must be documented, accounted for, and disposed of in compliance with Federal, State, and local regulations.

C. In addition to any requirements of the State of Michigan, comply with transportation and disposal requirements of the jurisdiction of the disposal site.

3.11 RESTORATION

A. Remove temporary decontamination facilities and restore the work area to its original condition or better.

B. Restore any areas outside the work area damaged or contaminated by the Contractor’s operations to their original condition or better.

3.12 RECORD KEEPING REQUIREMENTS

A. Comply with Federal, State, and local regulations regarding record keeping requirements concerning the handling and disposal of LBP and/or LCPs and related debris.

B. Document the transportation and disposal of LBP and/or LCPs and related debris using four (4) copy manifests. Each manifest must be numbered and will document the contents of each waste container and chain of custody from the time the materials are removed from the site to the time of proper disposal.

C. Provide one (1) copy of each to the Engineer immediately upon removal of any waste container from the site.

D. Maintain One (1) copy of each manifest at the site that can be presented to any agency having jurisdiction upon demand. Manifests must be turned over to the Owner at the completion of the project.

E. Submit a Certificate of Disposal within 30 days of the completion of disposal of lead-containing waste to the Engineer. The certificate will include:

1. The identity of the recycling or disposal facility, by name, address, and EPA identification number.

2. The identity of the lead waste affected by the Certificate of Disposal including reference to the manifest number for the shipment.
3. A statement certifying the fact of disposal of the identified lead waste, including the date(s) of disposal, and identifying the disposal process used.
4. A copy of the relevant shipment manifest(s).

END OF SECTION 02 08 02

SECTION 31 23 33
TRENCHING AND BACKFILLING

PART 1 GENERAL

1.01 SCOPE OF WORK

A. This Section includes open trench construction for utility installation, complete with trenching, sheeting, bracing, bedding, bedding materials, backfilling, backfill materials, and compaction.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Section 01 57 13 - Temporary Erosion and Sediment Control

B. Section 01 89 00 - Site Construction Performance Requirements

C. Section 31 11 00 - Clearing and Grubbing

D. Section 31 22 00 - Grading

E. Section 31 23 16 - Structural Excavation and Backfill

F. Section 31 23 19 - Dewatering

G. Section 32 92 19 - Seeding

H. Section 32 92 23 - Sodding

I. Section 33 14 00 - Water Utility Distribution Piping

J. Section 33 30 00 - Sanitary Utility Sewerage Piping

K. Section 33 34 00 - Sanitary Utility Force Mains

L. Section 33 41 00 - Storm Utility Drainage Piping

1.03 REFERENCE STANDARDS

A. Unless otherwise specified, the Work for this Section shall conform to the applicable portions of the following Standard Specifications:

1. ASTM C94/C94M - Standard Specification for Ready-Mixed Concrete
2. ASTM C150/C150M - Standard Specification for Portland Cement
3. ASTM C595/C595M - Standard Specification for Blended Hydraulic Cements
4. ASTM C618 - Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete
5. ASTM C1479/C1479M - Standard Practice for Installation of Precast Concrete Sewer, Storm Drain, and Culvert Pipe Using Standard Installations
6. ASTM D1557 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft3 (2,700 kN-m/m3))
7. ASTM D2321 - Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications

8. American Association of State Highway Transportation Officials
9. Michigan Department of Transportation (MDOT), Standard Specifications for Construction, latest edition

1.04 TEST REPORTS

A. Testing laboratory shall provide the Engineer with two (2) certified copies of the test results of the compaction of the backfill.

B. Testing for compaction and the certification of the test results shall be performed by a testing laboratory approved by the Engineer.

1.05 MIX DESIGN

A. Submit mix designs for any concrete or flowable fill mixtures to be used on the Project. Include certified test results for seven day and 28 day strengths, together with any technical information for admixtures.

1.06 SOIL EROSION AND SEDIMENTATION CONTROL

A. Contractor, at Contractor's expense, shall provide, maintain and remove such temporary and/or permanent soil erosion and sedimentation control measures as specified on the Plans or as determined by the Engineer.

B. Measures shall prevent surface runoff from carrying excavated materials into the drain, to reduce erosion of the slopes, and to prevent silting in of drain downstream of the Work.

C. Measures should include provisions to reduce erosions by the wind of all areas stripped of vegetation, including material stockpiles.

D. Comply with requirements of Section 01 57 13.

PART 2 PRODUCTS

2.01 GRANULAR MATERIALS CLASS II

A. Granular Material Class II shall conform to the requirements for granular material Class II, as specified in MDOT Section 902 except as follows. The granular material shall be natural bank run sand with a maximum size of 1-1/2 inches.

2.02 CRUSHED STONE BEDDING

A. Crushed, angular, natural stone material, meeting the requirements of 21AA coarse aggregate as specified in MDOT Section 902. Crushed concrete and slag are not allowed.

2.03 CONCRETE

A. Concrete shall conform to MDOT Section 1004 ; use 3,000 psi strength; Type IA cement; MDOT 6A coarse aggregate; MDOT 2NS fine aggregate; 3 inch maximum slump; no admixtures without Engineer's approval.

2.04 FLOWABLE FILL FOR BACKFILLING

A. Materials

1. Fly Ash shall have a maximum loss on ignition of 12% and meet the other requirements of ASTM C618 (Class F).
2. Water shall meet the requirements of ASTM C94/C94M.
3. ASTM C150/C150M or ASTM C595/C595M, Type I or Type IA.

B. Mixture (Strength 100 to 120 psi)

1. Fly Ash: 2,000 lbs per cyd min
2. Cement: 70 lbs per cyd min
3. Water: Sufficient water to produce desired flowability 700 lbs per cyd

C. The temperature of the flowable fill mix as manufactured and delivered shall be at least 50 degrees Fahrenheit.

D. The flowable fill can be mixed by pugmill, central concrete mixer, ready mix truck, turbine mixer, or other acceptable equipment or method.

PART 3 EXECUTION

3.01 DEWATERING

A. The area within the vicinity of the trenching operation shall be dewatered in accordance with Section 31 23 19 prior to the trenching operation.

B. Depth of the dewatering shall be sufficient to allow the trench excavating operation including backfilling and compacting to proceed in a dry condition.

3.02 TRENCH EXCAVATION

A. Open cut trench excavation shall include the site clearing and grubbing, the excavating of all materials encountered, the supporting and protecting of all structures and/or utilities encountered above and below the ground surface, and the removal of water from the construction site.

B. The trenching operation shall commence at the downstream or outlet end of the new Work and proceed upstream, unless otherwise specified on the Plans or directed by the Engineer.

C. The trench shall be excavated in reasonably close conformity with the lines and grades specified on the Plans or as established by the Engineer.

D. The excavated materials shall be temporarily stored along the trench in a manner that will not cause damage to trees, shrubs, fences, improvements, utilities, private property, public property or traffic. The excavated materials shall not be placed at such locations that will endanger the trench banks by imposing loads thereon.

E. For rigid pipe, the trench shall be of sufficient width to provide adequate working space to permit the installation of the pipe and the compaction of the bedding material under and around the pipe. However, for rigid pipe, the width of the trench from below the pipe bedding to 12 inches above the top of the pipe shall not exceed the following dimensions:

Diameter of Pipe	Width of Trench
6 thru 12 inch pipe	30 inches wide
15 thru 36 inch pipe	outside diameter plus 16 inches
42 thru 60 inch pipe	outside diameter plus 20 inches
over 60 inch pipe	outside diameter plus 24 inches

1. To support the additional load of the backfill when the maximum trench width as specified for rigid pipe is exceeded, the Contractor shall install, at Contractor's expense, concrete encasement which shall completely surround the pipe and shall have a minimum thickness at any point of 1/4 of the outside diameter of the pipe or 4 inches whichever is greater; or at Contractor's expense, install another type bedding, approved by the Engineer. The concrete encasement shall consist of 3,000 psi strength concrete.

F. For flexible pipe, the minimum width shall be not less than the greater of either the pipe outside diameter plus 16 inches or the pipe outside diameter times 1.25, plus 12 inches. The maximum trench width for flexible pipe shall not exceed the minimum width by more than 6 inches.

1. To support the additional load of the backfill when the maximum trench width as specified for flexible or semi-rigid pipe is exceeded, the Contractor shall install, at Contractor's expense, crushed stone bedding material to the full width between undisturbed trench walls or at least 2.5 pipe diameters on each side of the pipe.

G. When, through the Contractor's construction procedure or because of unsuitable existing ground conditions, it becomes impossible to maintain alignment and grade properly, the Contractor, at Contractor's expense, shall excavate below the normal trench bottom grade and shall fill the void with a large size aggregate or 3,000 psi (21 MPa) concrete as approved by the Engineer to ensure that the pipe when laid in the proper bedding will maintain correct alignment and proper grade.

H. Trench excavations, including those for shafts and structures, shall be adequately braced and/or sheeted where necessary to prevent caving or squeezing of the soil.

3.03 SHEETING, SHORING, AND BRACING

A. Contractor shall furnish, place and maintain sheeting, shoring, and bracing of the trench and/or shaft as may be required for safety of the workmen and for protection of the new Work or adjacent structures, including pavement, curbs, sidewalks, pipe lines, and conduits next to or crossing the trench; and for the protection and safety of pedestrian and vehicular traffic.

B. Contractor shall be responsible for the complete design of all sheeting, shoring and bracing Work. The design shall be appropriate for the soil conditions; and shall be of such strength, quality, dimension and spacing as to prevent caving or loss of ground or squeezing within the neat lines of the excavation; and shall effectively restrain movement of the adjacent soil.

C. Prior to installing the sheeting, shoring or bracing, the Contractor shall submit plans for this Work to the Engineer for informational purposes only.

D. Sheeting, shoring, bracing, and excavation shall conform to the current federal or state regulations for safety.

E. Where indicated on the Plans and where necessary in the Work, install and leave sheeting, shoring, and bracing in place. No additional compensation shall be paid to Contractor for sheeting, shoring or bracing left in place.

F. Supports for pipes, conduits, etc. crossing the trench shall conform to the requirements of the owners of such facilities and if necessary, shall be left in place.

G. Furnishing, placing, bracing, maintaining, and removing of sheeting, shoring, and trenching materials shall be at the Contractor's expense.

H. Contractor shall not remove the trench sheeting, shoring and bracing until the pipe has been properly bedded, and the trench backfilled to sufficiently support the external loads.

I. Sheeting, shoring, and bracing material shall not come in contact with the pipe, but shall be installed so that no concentrated loads or horizontal thrusts are transmitted to the pipe.

3.04 PIPE BEDDING

A. Install and compact in 6 inch layers. Particular care shall be taken to assure filling and tamping all spaces under, around, and above the top of the pipe. Work in and around pipe by hand to provide uniform support.

B. Rigid Pipe Bedding:

1. Rigid pipe bedding shall conform to ASTM C1479, except as noted.

2. Class R-A:

a. Pipe shall be bedded in crushed stone bedding material placed on the trench bottom. Bedding shall have a minimum thickness beneath the pipe of 4 inches or 1/4 of the outside diameter of the pipe, whichever is greater; and shall extend up the sides of the pipe to the horizontal centerline.

b. The top half of the pipe shall be covered with a monolithic plain concrete arch having a thickness of at least 4 inches or 1/4 of the inside diameter of the pipe, whichever is greater, at the pipe crown; and a minimum width equal to the outside diameter of the pipe plus 8 inches or 1-1/4 of the diameter of the pipe, whichever is greater.

3. Class R-B:

a. Pipe shall be bedded in crushed stone bedding material placed on the trench bottom. Bedding shall have a minimum thickness beneath the pipe of 4 inches or 1/8 of the outside diameter of the pipe, whichever is greater, and shall extend up the sides of the pipe to the horizontal centerline.

b. Backfill from pipe horizontal centerline to a level not less than 12 inches above the top of the pipe shall be granular material Class II. This material shall be placed in 6 inch layers with each layer thoroughly compacted by mechanical means with the finished compacted material a minimum of 12 inches above the top of pipe.

4. Class R-C:

a. Pipe shall be bedded in granular material Class II placed on the trench bottom. Bedding shall have a minimum thickness beneath the pipe of 4 inches or 1/8 of the outside diameter of the pipe, whichever is greater, and the bedding shall extend to a level not less than 12 inches above the top of the pipe.

b. This material shall be placed in 6 inch layers with each layer thoroughly compacted by mechanical means with the finished compacted material a minimum of 12 inches above the top of pipe.

C. Flexible Pipe Bedding:

1. Flexible pipe bedding shall conform to ASTM D2321, except as noted. A continuous and uniform bedding shall be provided in the trench for all buried pipe.

2. Class F-I:

a. Pipe shall be bedded in crushed stone bedding material placed on the trench bottom. The bedding shall have a minimum thickness beneath the pipe of 4 inches and shall extend up the sides of the pipe until the top of pipe is covered by a minimum thickness of 12 inches.

b. Where allowable trench widths are exceeded, bedding shall be used to the full width between undisturbed trench walls. Concrete cradle bedding shall not be used.

3. Class F-II:

a. Pipe shall be bedded in crushed stone bedding material placed on the trench bottom. Bedding shall have a minimum thickness beneath the pipe of 4 inches or 1/8 of the outside diameter of the pipe, whichever is greater; and shall extend up the sides of the pipe to the horizontal centerline.

b. Backfill from pipe horizontal centerline to a level not less than 12 inches above the top of the pipe shall be granular material Class II. This material shall be placed in 6 inch layers with each layer thoroughly compacted by mechanical means with the finished compacted material a minimum of 12 inches above the top of pipe.

c. Where allowable trench widths are exceeded, bedding shall be used to the full width between undisturbed trench walls. Concrete cradle bedding shall not be used.

4. Class F-III:

a. Pipe shall be bedded in granular material Class II placed on the trench bottom. Bedding shall have a minimum thickness beneath the pipe of four 4 inches or 1/8 of the outside diameter of the pipe, whichever is greater, and the bedding shall extend to a level not less than 12 inches above the top of the pipe. This material shall be placed in 6 inch layers with each layer thoroughly compacted by mechanical means with the finished compacted material a minimum of 12 inches above the top of the pipe.

b. Where allowable trench widths are exceeded, bedding shall be used to the full width between undisturbed trench walls. Concrete cradle bedding shall not be used.

3.05 BACKFILLING TRENCHES

A. Backfill material shall be placed on sections of bedded pipes only after such pipe bedding and backfill materials have been approved by the Engineer.

B. The trench backfilling shall follow the pipe laying as closely as possible. However, at no time shall the pipe laying in any trench precede backfilling of that trench by more than 100 feet, unless otherwise directed by the Engineer.

C. Backfilling shall not be done in freezing weather except by permission of the Engineer. Frozen materials shall not be used in trench backfilling.

D. The following trench backfill specifications are for use in that portion of the trench beyond the scope of the pipe bedding requirements which normally stops at a point 12 inches above the top of pipe. Backfill material to be placed above pipe bedding shall be free of cinders, ashes, refuse, boulders, roots, stumps, trees, timbers, brush, debris, or other extraneous materials which in the opinion of the Engineer, are unsuitable. Rocks or stones having a dimension larger than 6 inches shall not be placed within three 3 feet of the top of the pipe. Large stones may be placed in the remainder of the trench backfill only if well separated and arranged so that no interference with backfill settlement will result.

E. The type and method of backfilling is dependent on its location and function and shall conform to the following requirements:

1. Trench B:

    a. Trenches under road surfaces, pavement, curb, driveway, sidewalk and where the trench edge is within three 3 feet of the pavement and as noted on the plans shall be backfilled with natural bank run sand meeting the requirements of granular material Class II, unless otherwise indicated on the Plans.

    b. Trenches under pavement to be constructed in the near future, as noted or shown on the Plans, shall be backfilled with natural bank run sand, meeting the requirements of granular material Class II, unless otherwise indicated on the Plans.

    c. Where a pipe is installed under an existing or proposed utility, the backfill between the two shall be natural bank run sand meeting the requirements of granular material Class II, unless otherwise indicated on the Plans, constructed as herein specified.

    d. The material shall be placed in uniform layers that can be adequately compacted and tested from the surface of that layer and shall be compacted to 95% of the materials maximum unit weight, unless otherwise specified on the Plans or by the Engineer.

2. Trench A;

    a. Trenches shall be backfilled with suitable excavated material placed in uniform layers that can be adequately compacted and tested from the surface of that layer.

    b. Each layer shall be thoroughly compacted by approved mechanical methods to a density equivalent to the undisturbed adjacent soil or 90% of its maximum unit weight, whichever is less.

3. Unless otherwise specified on the Plans or as directed by the Engineer, the trench backfill shall be carried to the adjacent existing ground or proposed grade whichever is higher.

4. Where any backfill or bedding as shown on the plans or specified is to be flowable fill, care shall be used to avoid displacing any pipes or structures due to fluid pressure. Pipes in backfill areas may need to be secured to avoid the buoyancy effect.

3.06 COMPACTING BACKFILL

A. Compaction of the backfill will not be paid for separately, but shall be considered incidental to the Work of installation of the pipe and backfilling and shall include all the Work of manipulating

the soil to obtain the specified densities. No additional compensation will be allowed for any delay required to obtain the specified moisture content or the specified density.

3.07 CLEANUP

A. Immediately following the placing and compacting of the backfill, the excess material shall be removed and disposed of by the Contractor, at Contractor's expense, as specified in Section 01 89 00. The construction area shall be leveled and left in a neat workmanlike condition.

B. At a seasonally correct time, approved by the Engineer, the disturbed area shall be raked, having topsoil placed thereon and restored.

1. Restoration with seed, fertilizer and mulch shall be the requirements of Section 32 92 19 .

2. Restoration with sod shall be in accordance with Section 32 92 23.

3.08 FIELD TESTING

A. During the course of the Work, the Engineer may require testing for compaction or density of the backfill. The taking of samples and the testing required shall be performed by a testing laboratory suitable to the Owner and approved by the Engineer.

B. The maximum unit weight, when used as a measure of compaction or density of soils, shall be understood to mean the maximum unit weight per cubic foot or per cubic meter as determined by ASTM D1557, Method C.

3.09 DEFECTIVE WORK

A. Any portion of the trench backfill which is deficient in the specified density shall be corrected by methods meeting the approval of the Engineer.

B. Additional testing or sampling required because of deficiencies shall be at the Contractor's expense.

END OF SECTION 31 23 33

SECTION 33 05 07
UTILITY HORIZONTAL DIRECTIONAL BORING

PART 1 GENERAL

1.01 SCOPE OF WORK

A. The work specified in this Section consists of furnishing and installing underground utilities using the horizontal directional drilling (HDD) method of installation, also commonly referred to as directional boring. This work will include services, equipment, materials, and labor for the complete and proper installation; testing; restoration of underground utilities; environmental protection; and restoration.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Section 01 22 00 - Unit Prices

B. Section 01 89 00 - Site Construction Performance Requirements

C. Section 31 23 16 - Structural Excavation and Backfill

D. Section 31 23 19 - Dewatering

E. Section 31 23 33 - Trenching and Backfilling

F. Section 33 14 00 - Water Utility Distribution Piping

G. Section 33 30 00 - Sanitary Utility Sewerage Piping

H. Section 33 34 00 - Sanitary Utility Force Mains

1.03 QUALITY ASSURANCE

A. Contractor will be responsible for the complete design of all methods used for directional boring including the implementation of all materials, tools, labor, and equipment proposed for use in the Work. Requirements set forth in this document specify a wide range of procedural precautions necessary to ensure that the very basic, essential aspects of a proper directional bore installation are adequately controlled. Adherence to the specifications contained herein, or the Engineer's approval of any aspect of any directional bore operation covered by this specification, will in no way relieve the Contractor of their ultimate responsibility for the satisfactory completion of the work authorized under the Contract.

B. Requirements of Regulatory Agencies:

1. Federal, State, and Local Regulations:

    a. Conform to the requirements of all federal, state, and local regulatory agencies having jurisdiction.

2. Permits and Inspections:

    a. Where applicable, obtain and pay for permits and inspections for pipe directional boring operations as required by PA 451, State of Michigan, 1994, and all government and private agencies having jurisdiction. No additional compensation will be allowed because of the Contractor's failure to obtain and pay for such permits and inspections. Be aware of and conform with Owner-obtained permits.

3. Occupation Health and Safety Requirements:

    a. Conform to the requirements of the Michigan State Department of Labor, Construction Safety Standards Commission Construction Standard, Part 14; Tunnels, Shafts, Caissons and Cofferdams, and the Michigan State Department of Public Health, Occupational Health Standards Commission, Occupational Health Standards, Part 2; Tunnels, Shafts, Caissons and Cofferdams.

1.04 REFERENCE STANDARDS

A. ASTM A615/A615M - Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement

B. ASTM A1064/A1064M - Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete

C. ASTM C139 - Standard Specification for Concrete Masonry Units for Construction of Catch Basins and Manholes

D. ASTM D1784 - Standard Classification System and Basis for Specification for Rigid Poly(Vinyl Chloride) (PVC) Compounds and Chlorinated Poly(Vinyl Chloride) (CPVC) Compounds

E. ASTM D2447 - Standard Specification for Polyethylene (PE) Plastic Pipe, Schedules 40 and 80, Based on Outside Diameter

F. ASTM D2657 - Standard Practice for Heat Fusion Joining of Polyolefin Pipe and Fittings

G. ASTM D3261 - Standard Specification for Butt Heat Fusion Polyethylene (PE) Plastic Fittings for Polyethylene (PE) Plastic Pipe and Tubing

H. ASTM D3035 - Standard Specification for Polyethylene (PE) Plastic Pipe (DR-PR) Based on Controlled Outside Diameter

I. ASTM D3350 - Standard Specification for Polyethylene Plastics Pipe and Fittings Materials

J. ASTM F477 - Standard Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe

K. ASTM F714 - Standard Specification for Polyethylene (PE) Plastic Pipe (DR-PR) Based on Outside Diameter

L. ASTM F1055 - Standard Specification for Electrofusion Type Polyethylene Fittings for Outside Diameter Controlled Polyethylene and Crosslinked Polyethylene (PEX) Pipe and Tubing

M. ASTM F1962 - Standard Guide for Use of Maxi-Horizontal Directional Drilling for Placement of Polyethylene Pipe or Conduit Under Obstacles, Including River Crossings

N. ASTM F2160 - Standard Specification for Solid Wall High Density Polyethylene (HDPE) Conduit Based on Controlled Outside Diameter (OD)

O. ASTM F2164 - Standard Practice for Field Leak Testing of Polyethylene (PE) and Crosslinked Polyethylene (PEX) Pressure Piping Systems Using Hydrostatic Pressure

P. AWWA C111/A21.11 - Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings

Q. AWWA C151/A21.51 - Ductile-Iron Pipe, Centrifugally Cast

R. AWWA C153/A21.53 - Ductile-Iron Compact Fittings

S. AWWA C605 - Underground Installation of Polyvinyl Chloride (PVC) and Molecularly Oriented Polyvinyl Chloride (PVCO) Pressure Pipe and Fittings

T. AWWA C651 - Disinfecting Water Mains

U. AWWA C900 - Polyvinyl Chloride (PVC) Pressure Pipe and Fabricated Fittings, 4 In. Through 60 In. (100 mm Through 1,500 mm)

V. AWWA C906 - Polyethylene (PE) Pressure Pipe and Fittings, 4 In. Through 65 In. (100 mm Through 1,650 mm), for Waterworks

W. NSF 14 - Plastics Piping System Components and Related Materials

X. Michigan Department of Transportation, Standard Specifications for Construction, latest edition

1.05 SUBMITTALS

A. Prior to beginning Work, Contractor will prepare and submit to the Engineer for review, detailed plans and shop drawings showing the limits of the proposed directional boring Work; the materials, equipment and methods of construction proposed for use; the connection including all thrust blocking and bracing of the directionally bored carrier pipe to other pipe; the location of shafts, pits and/or approach tunnels to be constructed; the locations of existing utilities; the proposed bore path, and methods to be implemented for protection of personnel, excavations and adjacent structures, property and utilities.

B. Prior to beginning directional boring operations, submit copies of permits and inspection records obtained from state and local authorities having jurisdiction as described under Part 1 of this Section.

1.06 QUALIFICATIONS

A. Contractor will have actively engaged in the installation of pipe using directional drilling for a minimum of seven (7) years and have installed a minimum of 35,000 feet.

B. Field supervisory personnel employed by the Contractor will have at least 7 years' experience in the performance of the work and tasks as stated in the Contract Documents.

C. Polyethylene pipe jointing will be performed by personnel trained in the use of butt-fusion joining equipment and electro-fusion joining equipment. Training will be performed by a qualified representative of the joining equipment and documented in writing.

1.07 JOB CONDITIONS

A. Where soil conditions or obstructions are encountered that prevent the completion of pipe directional boring Work started or in progress, develop and submit to the Engineer for review alternate methods of performing the Work as described under Part 1 of this Section. Perform no additional Work until completion of review by the Engineer of the alternate method proposed.

B. Protection

1. Provide structures, safety equipment and professional services required to provide for the health and safety of the general public and of personnel involved in pipe directional boring Work in accordance with the requirements of the regulatory agencies having jurisdiction.

2. Take measures necessary to protect surrounding public and private property, adjacent buildings, roads, drives, sidewalks, drains, sewers, utilities, structures, and appurtenances from damage due to pipe directional boring Work. Responsibility and payment for correction of such damage will be the sole responsibility of Contractor.

3. Pothole existing underground utilities including sanitary sewers, sanitary leads, storm sewers, water mains, water services, gas mains, gas services, telephone lines, cable television lines, oil lines, etc. to ascertain the clearance between the existing utilities and the pipe to be bored and to ensure the pipe boring will not adversely affect the existing utilities. Potholing is required and will not be paid for separately unless otherwise specified in the Proposal.

PART 2 PRODUCTS

2.01 GENERAL

A. Directional drilling equipment will consist of a directional drilling rig of sufficient capacity to perform the bore and pullback the pipe, a drilling fluid mixing and delivery system of sufficient capacity to successfully complete the crossing, a guidance system to accurately guide boring operations and trained and competent personnel to operate the system. Equipment will be in good, safe operating condition with sufficient supplies, materials and spare parts on hand to maintain the system in good working order for the duration of this project.

2.02 DRILLING RIG

A. Directional drilling machine will consist of a hydraulically powered system to rotate, push and pull hollow drill pipe into the ground at a variable angle while delivering a pressurized fluid mixture to a guidable drill (bore) head. The machine will be anchored to the ground to withstand the pulling, pushing and rotating pressure required to complete the crossing. The hydraulic power system will be self-contained with sufficient pressure and volume to power drilling operations. Hydraulic system will be free of leaks. Rig will have a system to monitor and record maximum pull-back pressure during pull-back operations. The rig will be grounded during drilling and pull-back operations.

2.03 DRILLING SYSTEM

A. The drill head will be steerable by changing its rotation and will provide the necessary cutting surfaces and drilling fluid jets.

B. Mud motors will be of adequate power to turn the required drilling tools.

C. Drilling system will be constructed of high quality 4130 seamless tubing, grade D or better, with threaded box and pins. Tool joints should be hardened to 32-36 RC.

2.04 GUIDANCE SYSTEM

A. Magnetic Guidance System (MGS) or proven gyroscopic system will be used to provide a continuous and accurate determination of the location of the drill head during the drilling operation. The guidance will be capable of tracking at depths up to one hundred feet and in any soil condition, including hard rock.

B. The MGS will enable the driller to guide the drill head by providing immediate information on the tool face, azimuth (horizontal direction), and inclination (vertical direction). The guidance

system will be accurate to +/- 2% of the vertical depth of the borehole at sensing position at depths up to one hundred feet and accurate within 18-inches horizontally.

C. The MGS will be of a proven type and will be operated by personnel trained and experienced with this system. MGS operator will be aware of magnetic anomalies on the surface of the drill path and will consider such influences in the operation of the guidance system if using a magnetic system.

2.05 DRILLING FLUID (MUD) SYSTEM

A. A self-contained, closed, drilling fluid mixing system will be of sufficient size to mix and deliver drilling fluid. Mixing system will continually agitate the drilling fluid during drilling operations.

B. Drilling Fluids:

1. Drilling fluid will be composed of clean water and appropriate additives including bentonite clay. Water will be from an authorized source with a pH of 8.5 to 10. Water of a lower pH or with excessive calcium will be treated with the appropriate amount of sodium carbonate or equal. The water and additives will be mixed thoroughly and be absent of clumps or clods. No potentially hazardous material may be used in drilling fluid.

2. The mud pumping system will be of an adequate capacity for delivering the drilling fluid at a constant pressure suitable for the Work. The delivery system will have filters in-line to prevent solids from being pumped into the drill pipe. Connections between the pump and drill pipe will be relatively leak-free. Used drilling fluid and drilling fluid spilled during drilling operations will be contained and conveyed to the drilling fluid recycling system. A berm, a minimum of 12-inches high, will be maintained around drill rigs, drilling fluid mixing system, entry and exit pits and drilling fluid recycling system to prevent spills. Pumps and or vacuum truck(s) of sufficient size will be in place to convey excess drilling fluid from containment areas to storage and recycling facilities.

3. The drilling fluid recycling system will separate sand, dirt and other solids from the drilling fluid to render the drilling fluid re-usable. Spoils separated from the drilling fluid will be stockpiled for later use or disposal.

2.06 OTHER EQUIPMENT

A. Pipe rollers will be of sufficient size to fully support the weight of the pipe while being hydro-tested and during pull-back operations. Sufficient number of rollers will used to prevent excess sagging of pipe.

2.07 PVC WATER MAIN PIPE SYSTEM

A. Pipe:

1. For pipe size in sizes 4-inches through 60-inches in diameter, pipe will be AWWA C900, fusible, PVC, DR 18 (235 psi), ductile iron pipe size.

2. PVC pipe materials must be listed and approved for use with potable water under ANSI/NSF 14 and NSF 61. The exterior wall print line of PVC pipe must bear the AWWA C906 and the “NSF-pw” identification.

3. Pipe will be Certa-lok C900/RJ or Engineer approved equal. Pipe will be Underground Solutions, Fusible C-900 or Engineer approved equal.

B. Material: PVC per ASTM D1784

C. Cell Classification: 445474C per ASTM D3350

D. Fittings:

1. Fittings (tees, crosses, bends, sleeves, etc.) and plugs, where shown on the Plans, will be ductile iron compact fittings, restrained, mechanical joint type, with a pressure rating of 350 psi (2.4 MPa), conforming to AWWA C153/A21.53, and AWWA C111/A21.11, with double thickness cement mortar lining and coal tar enamel coating on the outside of fittings.

    a. Joining fittings to HDPE pipe will use fused mechanical joint adapters with ductile iron backup rings.

    b. Fittings on PVC water main will be restrained joint for PVC pipe designed for a working pressure of 200 psi.

        1) Restraint will be provided by a clamping ring with serration to provide positive restraint around the full circumference of the pipe.

        2) Coating on wedge assemblies and related parts will be two coats of heat cured liquid thermoset epoxy.

        3) Coating on casting bodies will be electrostatically applied and heat cured polyester.

        4) Acceptable manufacturers for PVC restrained fittings include:

            (a) EBAA Iron – Megalug Series 15MJ00 (up to 12”) (above 12” Series 2000PV) or approved equal.

2. Ductile Iron, ANSI A21.10 and A21.11, flanged type joint with 1/8 inch thick rubber gasket and flange ring, full-body, Class 250, with double thickness cement mortar lining.

E. Pipe Joints:

1. Non-Metallic, restrained joint couplings with high-strength, flexible, thermoplastic spline retainers. Retainers will be inserted into mating precision machined grooves in the pipe and coupling to provide full 360-degree restraint. Couplings will be designed for use at the rated pressures of the pipe and will incorporate twin elastomeric sealing gaskets meeting the requirements of ASTM F477.

2. Butt fusion or electrofusion welded.

F. Water Service Saddles:

1. Electrofusion corporation saddles with 1-inch brass outlet threads and brass corporation stops.

2. Stainless Steel, full circle, double bolt service saddle with spring washers and 1-inch brass outlet threads and designated by the manufacturer in writing as specifically approved for use on HDPE pipe; with brass corporation stops.

3. Bronze, full circle saddles with AWWA tapered thread outlet of the size indicated. Ford S90-_____, Mueller H-1344 or Engineer approved equal. No U-Bolt type saddles are allowed.

G. Restraining Harness:

1. Ductile Iron, epoxy coated with serrated split rings on each end. EBBA Iron Series 1500 or Engineer approved equal.

H. Allowable Leakage:

1. Pipe will be tested at 150 psi for 1 hour per ASTM F2164. Leakage allowance for fused PVC pipe joints is zero. The leakage allowance per joint for gasketed fittings (based upon 150 psi test pressure) is as follows:

Size	6”	8”	10”	12”	14”
Gal / Hour	0.010	0.013	0.017	0.020	0.023

2.08 PVC FORCE MAIN PIPE SYSTEM

A. PVC, AWWA C900, DR-21 (200 psi) ductile iron pipe size.

2.09 HDPE WATER MAIN PIPE SYSTEM

A. Pipe:

1. AWWA C906, DR 11 (Pressure Class 200), Ductile Iron Pipe size. All HDPE materials must be listed and approved for use with potable water under NSF 14. AWWA C906 and the “NSF-pw” identification.

B. Material: PE4710

C. Cell Classification: 445474C per ASTM D3350

D. Fittings:

1. Ductile iron fittings (where shown on the Plans) will be mechanical joint, ductile iron compact fittings conforming to AWWA C153/A21.53, with rubber gasket joints conforming to AWWA C111/A21.11, with double thickness cement mortal lining and coal tar epoxy coating on the outside of the fittings. Joining ductile iron fittings to HDPE pipe will use fused mechanical joint adapters with ductile iron backup rings.

2. HDPE Fittings (tees, crosses, bends, etc.) and plugs will be Butt Heat Fusion Type, DR 11, per ASTM D3261 or Electrofusion Type, per ASTM F1055. Compression fittings are not allowed.

E. Pipe Joints: Butt Fusion Welded or Electrofusion Welded.

F. Valves and Hydrants:

1. As specified in Section 33 1100, Water Utility Distribution Piping.

2. Hydrant leads from the hydrant tee to the hydrant will be ductile iron pipe, AWWA C151, Class 54, PC 350, unless indicated otherwise on the plans.

a. Fittings for joining PVC C900 pipe to hydrant lead will be restrained joint for PVC pipe designed for a working pressure of 200 psi.

G. Water Service Taps:

1. Electrofusion corporation saddles with 1-inch brass outlet threads and brass corporation stops.

2. Stainless Steel, full circle, double bolt service saddle with spring washers and 1-inch brass outlet threads and designated by the manufacturer in writing as specifically approved for use on HDPE pipe; with brass corporation stops.

H. Allowable Leakage:

1. Pipe will be tested at 150 psi for 1 hours per ASTM F2164. Leakage allowance for fused HDPE pipe joints is zero. The leakage allowance per joint for gasketed fittings (based upon 150 psi test pressure) is as follows:

Pipe Diameter	6”	8”	10”	12”	14”
Gal / Hour	0.010	0.013	0.017	0.020	0.023

2.10 HDPE FORCE MAIN PIPE SYSTEM

A. Pipe:

1. Polyethylene, Nominal IPS OD, DR-11, Pressure Rating 200 psi, pipe less than 3-inch diameter will be in accordance with ASTM D3035 , pipe 3-inches and larger will be per ASTM F714.

B. Material: PE 4710

C. Cell Classification: PE 345464C per ASTM D3350

D. Joints: Heat Fusion Bonding, ASTM D2657 or Electrofusion Welded

E. Fittings:

1. Fittings (tees, crosses, bends, sleeves, etc.) and plugs, where shown on the Plans, will be Butt Heat Fusion Type, DR 11, per ASTM D3261 or Electrofusion Type, per ASTM F1055. Fittings for joining HDPE pipe to ductile iron or PVC AWWA C900 pipe or fittings will use fused mechanical joint adapters with ductile iron backup rings.

F. Allowable Leakage:

1. Allowable Leakage: Pipe will be tested at 150 psi for 1 hours per ASTM F2164. Leakage allowance for fused HDPE pipe joints is zero. The leakage allowance per joint for gasketed fittings (based upon 150 psi test pressure) is as follows:

Pipe Diameter	6”	8”	10”	12”	14”
Gal / Hour	0.010	0.013	0.017	0.020	0.023

2.11 TRACER WIRE

A. Reinforced 7 x 7 stranded copper clad steel wire with 50 mil High Density Polyethylene insulation. Continuous copper cladding metallurgically bonded to a steel core through a continuous solid cladding process. Bare wire 0.208-inch O.D., 4700 pounds breaking strength. Wire to be Copperhead® or equal.

2.12 OTHER MATERIALS

A. Concrete:

1. Concrete will conform to MDOT Section 1004, use Grade 3000 concrete; Type IA cement; MDOT 6A coarse aggregate; MDOT 2NS fine aggregate; 3 inch maximum slump; no admixtures without the Engineer's approval.

B. Concrete Reinforcement:

1. In accordance with MDOT Section 905, use ASTM A615/A615M, Grade 60 for bars and ASTM A1064/A1064M for welded wire fabric.

C. Concrete Block:

1. Block cast from Portland cement sand, gravel or crushed stone, of uniform and compact texture, free from cracks or warpage and with square corners conforming to ASTM C139.

PART 3 EXECUTION

3.01 VERIFICATION

A. Prior to performing directional boring operations, verify grades, lines and levels to which the new Work is to be installed. Directional boring Work that requires adjustment of grades, lines and levels after Work has started will be at the expense of the Contractor performing the Work.

B. Prior to beginning directional boring Work, contact the local one call system for locating buried utilities (811). Also contact the local municipalities who may not be part of the one call system, to mark their buried facilities. Excavate or pothole to verify in the field the location and elevation of existing active utilities and structures scheduled to remain and requiring protection from damage because of the Work. Existing utilities will include gas mains and services, water mains and services, sanitary sewers and house leads, oil lines, telephone lines and services, cable television lines and services, electric lines and services, and any other similar buried utilities.

C. Plan and plot a bore path and submit bore path to Engineer in accordance with Part 1 of this Section. Notify the Engineer where existing utilities directly affect the progress or performance of the Work. Contractor is responsible for excavation or potholing necessary to determine the elevation of existing utilities that cross the proposed water main at no additional cost to the Project unless otherwise indicated in the Proposal.

3.02 PREPARATION

A. Layout of the Work:

1. Stake, mark, and layout the Work using suitable stakes and markers to facilitate verification of grades, lines, levels, and locations of the Work to be performed in a manner acceptable to the Engineer.

2. From reference points established by the Engineer on the surface of the ground, carry line and grade down to the bottom of any shafts or boring pits. Perform the Work to the line and grades established using methods acceptable to the Engineer. Protect such reference points throughout the progress of the Work.

B. Examination of Materials:

1. Prior to performing directional boring Work, examine new pipe for damage due to fabrication, shipment, or handling. Inspect pipe for cracks, breaks, bends, dents, broken ends, or other damage which might affect the structural integrity, performance requirements, or jointing as shown on the Plans, specified herein or as directed by the Engineer. Defective pipe will be rejected by the Engineer and will be removed from the Work and replaced with acceptable pipe at the expense of the Contractor.

C. Notifications:

1. Prior to performing directional boring Work, Contractor will notify applicable inspecting agencies under Part 1 of this Section, of Work Schedule with a minimum of two (2) working days' notice.

3.03 INSTALLATION

A. Except for the method of installation (directional boring versus open cut), the pipe will be installed per requirements of Section 33 11 00 Water Utility Distribution Piping, Section 33 34 00 Sanitary Utility Force Mains, and 33 34 10 - High Density Polyethylene (HDPE) Pipe and Fittings.

B. Sheeting, Shoring, and Bracing:

1. Furnish, install and maintaining throughout the progress of the Work, such sheeting, shoring, and bracing in tunnels, shafts, pits and trenches as may be required for safety of workmen, for protection of the Work and adjacent structures, and for issuance of applicable agency permits. Sheeting, shoring, and bracing will be removed after completion of the Work unless otherwise indicated on the Plans or directed by the Engineer.

2. Design of earth supports will be the responsibility of the Contractor and will be as required by the nature of the soils encountered. Supports will be dimensioned and spaced as to prevent caving, loss of earth or squeezing within the neat lines of the excavation. Supports will effectively restrain movement of the adjacent soil.

3. The sheeting of pits along roads will be required if the leading edge of the pits falls within the one-on-one zone of influence from the shoulder point or curb and gutter edge.

C. Excavation:

1. Excavate as required to perform directional boring Work to the grades, lines and levels indicated on the Plans and as specified herein.

2. Construct approach trenches, pits and shafts of sufficient length and width to accommodate the equipment being used, the pipe units to be placed and the manpower working. Provide guide timbers or rails in the bottom of the trenches, pits and shafts for keeping the Work on line and grade.

D. Pipe:

1. Construction:

a. Use the types and sizes shown on the Plans. Contractor will construct the pipe on the surface in the area indicated on the Plans. Use care to not damage pipe, joints or joint material. Coiled HDPE pipe will be re-rounded before using.

2. Connection to Structures and Existing Water Mains:

a. Connecting HDPE pipe to manholes will be accomplished by butt fusion welding a flange adapter to the end of the pipe and fully embedding the flange adapter to the inside manhole wall.

b. Final connections of HDPE pipe to existing water mains will be made after the new HDPE pipe has been allowed to relax for a minimum of 24 hours. Connections of HDPE pipe to existing water mains will consist of a full-circle Flex Restraint Collar fused to the HDPE pipe embedded in a 30” x 30” concrete thrust block poured to undisturbed earth placed a maximum of 5-feet from the connection point.

3. Hydrostatic Testing:

a. The pipe will be hydrostatically tested twice for leakage, including a preliminary test after the pipe has been constructed on the surface, and an acceptance test after the pipe has been installed in the drilled hole. Contractor will furnish the pump, pipe connection, valves and other necessary apparatus including gauges, meters, and personnel necessary for conducting the test.

1) Hydrostatic testing for HDPE pipe will be in accordance with ASTM F2164.

2) Hydrostatic testing for PVC pipe will be in accordance with AWWA C605.

3) Before applying the test pressure, air will be expelled from the pipe. If necessary to accomplish this, taps will be made at points of higher elevation and afterwards plugged.

4) Allow the test section to equalize to a common temperature and pressure. Gradually increase pressure to required test pressure.

5) HDPE pipe will be held at the test pressure for 4 hours prior to beginning the test to allow for stabilization of expansion of the pipe under test pressure.

6) Full pressure will be held for the length of time as specified in Part 2 of this Section.

7) Faulty pipe fitting, valves or other accessories which permit leaks during testing will be replaced by the Contractor with sound material and the test will be repeated until specified requirements are met.

8) If no visual leakage is observed, and pressure during the test phase remains steady (within 5 % of the test phase pressure) for the entire test period, a passing test is indicated.

9) The maximum permissible leakage measured by water meter from the section of main tested under pressure, will not exceed the rate as specified in Part 2 of this Section.

10) If retesting is necessary, depressurize the test section and correct faults or leaks in the test section.

11) Test sections will not exceed 2,000 feet. In the event more than 2,000 feet of water main is tested, the permissible leakage will remain at the amount determined for 2,000 feet of pipe.

4. Water for Testing:

a. Water for testing will be obtained from a potable water supply. Contractor will provide water required at Contractor's own expense and Contractor will make the necessary arrangements with the authority which controls the source of water system for water. Contractor will be governed in using the water by the rules and regulations imposed thereon by said authority.

b. Contractor will provide and remove temporary connections between the source water system and the mains constructed under this Contract. Temporary connections will meet the approval of the Engineer, the authority controlling the source water system, and public health authorities having jurisdiction.

5. Installation:

a. After satisfactory hydrostatic testing, the Contractor will install pipe with continuous pullback until the pipe is in place as indicated on the plans. No connections to the pipe will be made for a period of 24 hours after the continuous pullback has been completed.

6. Installing Fittings (fire hydrants, gate valves, tees, crosses, etc.):

a. Where required, fittings will be cut into the new pipe after it is bored and allowed to relax sufficiently. The new pipe will be excavated and precision cut.

b. Prior to cutting fusible PVC the pipe, the pipe will be scored around the full circumference of the pipe as recommended by the manufacturer to prevent the pipe from splitting.

c. Fittings will be installed on the new pipe with cutting in sleeves. Mechanical joints will be the restrained type suitable for PVC C900 pipe.

d. Connections of HDPE pipe to mechanical joint fittings will use mechanical joint adapters with ductile iron backup rings fusion welded to each end of the pipe.

7. Disinfection:

a. Water main will be disinfected per AWWA C651. Bacteriological analysis and sampling will be in accordance with AWWA C651 and Section 33 14 00 - Water Utility Distribution Piping.

b. For HDPE pipe, disinfection with solutions containing chlorine will not contain more than 12.5% active chlorine.

8. Water Services Connections:

a. Water services connections greater than 1 inch installed on directional bored fusible PVC pipe will be:

1) a tee cut into the pipe as noted above, or,

2) a service saddle inside of a restraining harness to relieve the axial stress and keep the pipe from splitting when tapped. Contractor will verify dimensions of service saddle and restraining harness prior to construction.

b. Water services connections will be:

1) For HDPE pipes, electrofusion corporation saddle with 1-inch brass outlet threads and brass corporation stops as noted above.

2) For HDPE pipe, stainless steel, full circle, double bolt service saddle with spring washers and 1-inch brass outlet threads and brass corporation stop. Saddle will be designated by the manufacturer in writing as specifically approved for use on HDPE pipe.

9. Tracer Wire:

a. Tracer wire will be installed end to end or structure to structure for directionally drilled pipe. Contractor will ensure integrity of the wire is not compromised during pull back. Dis-continuity of the wire will require a new, continuous wire being pulled in over the path of the water main.

3.04 DRILL PATH SURVEY

A. Entire drill path will be accurately surveyed with entry and exit stakes placed in the appropriate locations within the areas indicated on Drawings. If Contractor is using a magnetic guidance system, drill path will be surveyed for surface geo-magnetic variations or anomalies. Submit completed bore path complete with line and grade references and pulling loads imposed to Engineer at completion of directional boring Work.

3.05 DRILLING PROCEDURE

A. Pilot hole will be drilled on bore path with no deviations greater than 5% of depth over a length of 100 feet. In the event that pilot does deviate from bore path more than 5% of depth in 100 feet, Contractor will notify Engineer and Engineer may require Contractor to pull-back and re-drill from the location along bore path before the deviation.

B. In the event that a drilling fluid fracture ("frac out"), inadvertent drilling fluid returns, or drilling fluid loss occurring during pilot hole drilling operations, Contractor will cease drilling, wait at least 30 minutes, inject a quantity of drilling fluid with a viscosity exceeding 120 seconds as measured by a March funnel and then wait another 30 minutes. If mud fracture or returns loss continues, Contractor will cease operations and notify Engineer. Engineer and Contractor will discuss additional options and work will then proceed accordingly.

C. Upon successful completion of pilot hole, Contractor will ream bore hole to the minimum amount necessary to accommodate outside diameter of pipe. Contractor will not attempt to ream at one time more than the drilling equipment and mud system are designed to safely handle.

D. After successfully reaming bore hole to the required diameter, Contractor will pull the pipe through the bore hole using a swivel in front of the pipe. Once pull-back operations have commenced, operations must continue without interruption until pipe is completely pulled into bore hole. During pull-back operations Contractor will not apply more than the maximum safe pipe pull pressure at any time.

E. In the event that pipe becomes stuck, Contractor will cease pulling operations to allow any potential hydro-lock to subside and will commence pulling operations. If pipe remains stuck, Contractor will notify Engineer. Engineer and Contractor will discuss options and then work will proceed accordingly.

3.06 PULLING LOADS

A. The maximum allowable tensile load imposed on the pipeline pull section will not exceed the following amounts:

1. Allowable Tensile Load:

Nominal Size (inches)	HDPE (lbs)	PVC (lbs)
1-1/4	860	
2	1,875	
3	4,072	
4	6,879	10,600
6	14,215	21,900
8	24,455	37,800
10	36,788	56,500
12	52,025	80,800
14	69,895	108,000
16	90,399	139,000
18	113,536	175,000
20	139,306	210,000
24	198,748	300,000
30	305,748	

B. The amount of pull applied to the pipe will be controlled and limited by devices such as hydraulic pressure regulator or a load sensor between the pulling equipment and the pipe.

3.07 PIPE TESTING

A. Following successful pull-back of pipe, Contractor will hydrostatic test the pipe per the requirements of this Section. After successful completion of hydrostatic test, pipe will pigged dry.

B. After completion of hydrostatic test and before connection to the water supply, the pipe will be chlorinated and tested per the requirements of AWWA C651 and Section 33 14 00 - Water Utility Distribution Piping.

3.08 BACKFILLING

A. After the pipe has been installed and approved by the Engineer, the Contractor will backfill the entrance/exit pits, approach trenches or shafts. The entrance/exit pits, approach trenches or shafts and other excavations, will be considered as open cut trench and will be backfilled as specified in Section 31 23 33 - Trenching and Backfilling. Special backfill will apply where they exceed the maximum allowable trench width.

3.09 ACCEPTANCE AND INSPECTION

A. Contractor will maintain line and grade and will provide the Engineer with as-built location at five-foot intervals. If unable to maintain line and grade or to maintain directional boring operations, Contractor will propose alternate methods of construction as specified under Part 1 of this Section to complete the Work.

B. Water main will be inspected and accepted under Section 33 14 00 - Water Utility Distribution Piping.

C. If excavation or installation Work done by the Contractor is to be abandoned or not completed, the Contractor will fill voids and spaces caused by the abandoned Work, as directed by the Engineer.

3.10 RECORD KEEPING, AS-BUILTS

A. Contractor will maintain a daily project log of drilling operations and a guidance system log with a copy given to Engineer at completion of project. As-built drawings will be certified as to accuracy by Contractor.

END OF SECTION 33 05 07

SECTION 33 34 10.15
LEAKAGE TESTING FOR HDPE PIPE

PART 1 GENERAL

1.01 SCOPE OF WORK

A. Work specified in this section consists of testing for signs of leakage in pipelines and structure to ensure they are watertight. Contractor shall furnish labor, equipment, air, water and other materials, including meters, gauges, smoke producers, blowers, pumps, compressors, fuel, bulkheads and accessory equipment for the complete and proper testing of specified utilities.

1. Test gravity sewers and drain lines by low pressure air testing.

2. Test all other pipelines with water under the specified pressures.

B. The section of the piping to be tested is isolated from other parts of the system and properly restrained in order to prevent failure of both the test section and the existing system connected to the test section. Isolated sections of the test section are vented to the atmosphere in order to ensure compressible gases do not remain within the hydraulic test section. The test section is filled with liquid, raised to the test pressure, and allowed to stabilize. The system is then inspected for leakage and the pressure is relieved. Any required repairs or replacements are then performed while the pipe is depressurized.

C. There is no leakage allowance, as properly made heat-fusion joints of HDPE do not leak. However, if any defects or leaks are revealed, they should be corrected and the pipeline retested after a minimum 24 hour recuperation period between tests. Total testing conducted on a section of pipeline shall not exceed eight hours within a 24 hour period.

D. An expansion allowance is allowed as HDPE will expand slightly due to elasticity and Poisson effects. The amount of make-up water (expansion allowance) will vary because expansion is not linear. This procedure compensates for expansion with an initial expansion phase followed by a testing phase as to which the test pressure is reduced suspending expansion. Expansion or contraction due to Poisson effects may disjoin other non-restrained joints, such as bell and spigot joints, so measures must be taken to fully restrain the test section.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Section 01 33 00 - Submittal Procedures

B. Section 33 14 00 - Water Utility Distribution Piping

C. Section 33 30 00 - Sanitary Utility Sewerage Piping

D. Section 33 34 00 - Sanitary Utility Force Mains

1.03 SUBMITTALS

A. The following shall be submitted in accordance with Section 01 33 00:

1. Pre-Testing Report: Prior to placing the sewer system in service, Contractor shall submit to Engineer a detailed bound report summarizing the leakage test data, describing the test procedure and showing the calculations on which the leakage test data is based.

2. Post Resting Report: Following leakage testing, Contractor shall submit to Engineer a detailed bound report summarizing the leakage test data, including:
    a. Length and diameter of section to tested (manhole to manhole);
    b. Location of all service laterals and their status (active or inactive);
    c. Type of plugs used and where;
    d. Depth of pipe, and ground water pressure over pipe;
    e. Stabilization time period and air pressure;
    f. Actual air test pressures used if ground water is present;
    g. The allowed time by specifications versus the actual test time;
3. The air pressure at beginning and end of test;
    a. The name of the person performing the testing;
    b. Date(s) and time(s) of testing, including any retesting; and,
    c. Description of any repairs made following testing.

1.04 REFERENCE STANDARDS

A. ASTM F1417-11A - Standard Practice for Installation Acceptance of Plastic Non-pressure Sewer Lines Using Low-Pressure Air

B. ASTM F2164-21 - Standard Practice for Field Leak Testing of Polyethylene (PE) and Crosslinked Polyethylene (PEX) Pressure Piping Systems Using Hydrostatic Pressure

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.01 GENERAL

A. New HDPE pipelines installed shall be tested for leakage. Tests to be performed shall be witnessed by the Engineer.

3.02 FLUSHING

A. Mains shall be flushed to remove sand and other foreign matter.

B. The velocity of the flushing water shall be at least 4 feet per second (fps).

C. Flushing shall be terminated at the direction of the Engineer.

D. Dispose of the flushing water without causing a nuisance or property damage.

E. Temporary flush out connections shall be installed on all dead end water mains at the locations shown on the Contract Drawings.

3.03 RESTRAIN AGAINST MOVEMENT

A. Before applying pressure, all piping and all components in the test section must be restrained. This means that if piping or parts move or separate during the test, it will not result in damage or injury. Never conduct leak tests on unrestrained piping.

1. Heat fusion joints must be properly cooled before testing.

2. Mechanical connections must be completely installed and tightened per manufacturer's instructions.

3. If backfill provides restraint, it must be properly placed and compacted. Joints and connections may be exposed for inspection.

4. End closures must be suitable for pressure service and pressure-rated for the test pressure.

5. Ensure that connections to test equipment are secure. Disconnect or isolate all low pressure filling lines and other parts that are not to be subjected to test pressure. Restrain, isolate or remove expansion joints before leak testing.

3.04 TEST SECTION

A. Testing may be conducted on the full system or in sections. Test section length is determined by the capacity of the testing equipment. Lower capacity pressurizing or filling equipment may not be capable of completing the test within permissible time limits. If so, use higher capacity test equipment or select a shorter test section.

B. Before applying test pressure, allow time for the test fluid and the test section to equalize to a common temperature.

3.05 TEST PRESSURE

A. For pressure piping systems that include polyethylene pipe or fittings:

1. The maximum permissible test pressure is measured at the lowest elevation in the test section.

2. The maximum permissible test pressure is the lower of (a) 150% of the system design operating pressure provided that all components in the test section are rated for the test pressure, or (b) the pressure rating of the lowest pressure rated component in the test section.

B. For leak testing purposes, the maximum allowable test pressure in polyethylene pipe is 150% of the pipe's design pressure rating for the application and the application service temperature.

C. Do not subject lower pressure rated, non-polyethylene parts or devices to pressures above their pressure rating. Lower pressure rated parts may be removed or isolated from the test section to avoid damage or failure. Vent isolated parts or equipment to atmosphere.

D. Thermoplastic pipes have reduced strength at elevated temperature. Test pressure must be reduced when the test section is at elevated temperature either from service conditions or from environmental conditions such as being warmed by the sun. Multiply the test pressure by the multiplier shown in the table below to determine the allowable elevated temperature test pressure.

3.06 TEST DURATION

A. When testing at pressures above system design pressure up to 150% of the system design pressure, the maximum test duration is eight (8) hours including time to pressurize, time for initial expansion, time at test pressure, and time to depressurize the test section.

1. If the test is not completed due to leakage, equipment failure, or for any other reason, depressurize the test section completely, and allow it to relax for at least eight (8) hours before pressurizing the test section again.

B. Testing at excessive pressure or for excessive time may damage the piping system.

C. When testing at system design pressure or less, test duration including time to pressurize, time for initial expansion, time at test pressure and time to depressurize should be limited to a practical time period given that the test section is not to be left unsupervised at any time during leak testing.

3.07 HYDROSTATIC LEAK TESTING

A. This hydrostatic leak test procedure consists of filling, an initial expansion phase, a test phase, and depressurizing. There are two alternatives for the test phase.

1. Filling:

a. Fill the restrained test section completely with test liquid; ensure that there is no air trapped in the test section. Failure with entrapped air can result in explosive release and result in death or serious bodily injury. Use equipment vents at high points to remove air.

2. Initial Expansion Phase:

a. Gradually pressurize the test section to test pressure, and maintain test pressure for three (3) hours. During the initial expansion phase, polyethylene pipe will expand slightly. Additional test liquid will be required to maintain pressure. It is not necessary to monitor the amount of water added during the initial expansion phase.

3. Test Phase:

a. Immediately following the initial expansion phase, reduce test pressure by 10 psi, and stop adding test liquid.

b. If test pressure remains steady (within 5% of the target value) for one (1) hour, no leakage is indicated.

3.08 LOW PRESSURE AIR TESTING OF GRAVITY FLOW SYSTEMS

A. For gravity flow and low or intermittent pressure applications such as sewer and odor control, leak testing in accordance with ASTM F1417 is recommended.

3.09 OTHER LEAK TESTS

A. Low Pressure Air Testing of Gravity Flow Systems:

1. For gravity flow and low or intermittent pressure applications such as sewer and odor control, leak testing in accordance with ASTM F1417-11A is recommended.

B. Initial Service Leak Testing:

1. An initial service leak test may be acceptable when other types of tests are not practical, or when leak tightness can be demonstrated by normal service, or when an opportunity is afforded by performing initial service tests of other equipment. An initial service leak test may apply to systems where isolation or temporary closures are impractical, or where checking out pumps and other equipment allows the system to be examined for leakage prior to full-scale operations.

2. The piping system should be gradually brought up to normal operating pressure, and held at normal operating pressure for at least ten (10) minutes. During this time, joints and connections may be examined for leakage.

C. At the conclusion of the test, depressurize the test section by the controlled release of fluid from the test section. Controlled release avoids the potential for pressure surge.

END OF SECTION 33 34 10.15

SECTION 40 23 00
PROCESS PIPING

PART 1 GENERAL

1.01 SCOPE OF WORK

A. This Section includes process piping systems complete with pipe, fittings, connections, and accessories as indicated on the Pipe Schedule at the end of this Section or indicated on the Drawings, for a complete and functioning installation.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Section 00 63 25 - Substitution Request Form

B. Section 01 33 00 - Submittal Procedures

C. Section 01 77 00 - Closeout Procedures

D. Section 03 30 00 - Cast-in-Place Concrete

E. Section 05 50 00 - Metal Fabrications

F. Section 09 96 00 - Industrial Paints and Coatings

G. Section 31 23 33 - Trenching and Backfilling

H. Section 40 05 07 - Pipe Hangers and Supports

I. Section 40 05 53 - Process Valves

1.03 REFERENCE STANDARDS

A. Unless otherwise specified, the Work for this Section must conform to the applicable portions of the following Standard Specifications:

1. ANSI - American National Standards Institute
2. ASME - American Society of Mechanical Engineers
3. ASTM - American Society for Testing and Materials
4. AWWA - American Water Works Association
5. NCPWB - National Certified Pipe Welding Bureau
6. NEMA - National Electrical Manufacturers' Association
7. UL - Underwriters Laboratories

1.04 SYSTEM DESCRIPTION

A. General: Drawings show general arrangement, direction, and sizes of pipes. Drawings are not intended to show every offset and fitting or every structural difficulty that may be encountered. Install the piping and appurtenances to suit, and to avoid interference with installation, operation, and maintenance of fixtures, equipment, or other piping. Contractor to verify measurements at the job site.

B. Provide piping with necessary hangers, anchors, and supports as specified herein and as indicated. Piping supported by equipment to which it is connected is not acceptable.

1.05 SUBMITTALS

A. Shop Drawings:

1. Submit shop drawings as required in Section 01 33 00 - Submittal Procedures, showing the layout of process piping systems complete with piping, supports, and structural dimensions. Shop drawings will identify joints, valves, fittings, connections, component parts, pipe material, insulation where required, and valve identification codes. Supports and anchors will be shown in the layout and detailed.

2. Contractor must verify in the field, the location, position, and size of existing piping (including buried pipes), as indicated on the Contract Drawings and Specification to be reused, forming a part of the new process piping layout.

3. Process piping Shop Drawings submitted to the Engineer for review must clearly indicate the location, position (elevation), and size of existing piping to be reused.

B. Product Data:

1. Submit product data as required in Section 01 33 00 - Submittal Procedures. Include manufacturer's recommendations for installation, connection to automatic operators, and instructions for proper operation and maintenance. Valve operator data must include information necessary for external controls, wiring hydraulics or pneumatics to be furnished, installed or connected by other Work.

C. Welders Certification:

1. Submit certification of welders and/or welding process for fabrication and/or field assembly.

D. Operation and Maintenance Data:

1. Submit operation and maintenance data as required in Section 01 77 00 - Closeout Procedures.

E. Record Drawings:

1. Submit record drawings as required in Section 01 77 00 - Closeout Procedures.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Handling: Piping, valves and special castings must be handled in such a manner as to avoid damage to pipe or specials. In the event pipe coating is damaged, especially on the inside of the piping, the damaged area must be cleaned by wire brushing and then recoated with an approved coating similar to that specified for the pipe.

B. Storage: Store materials in enclosures or under protective coverings. Keep inside of pipe fittings and valves free of dirt and debris. Store in a manner for easy identification of materials.

PART 2 PRODUCTS

2.01 PIPE SYSTEMS

A. General:

1. Various types of piping materials are used to meet the specific requirements of the different piping systems as indicated in the Pipe Schedule. This Schedule will be followed except that where a particular piping material is chosen for a piping system that material alone must be used throughout that entire system of pipe and fittings, except as noted otherwise on the Drawings.

2. Flanges or grooved couplings must be installed at connections to equipment and valves 3-inches in diameter and larger.

3. Unions or grooved couplings must be installed at connections to equipment and valves 2 inches in diameter and smaller.

2.02 PERFORMANCE REQUIREMENTS

A. Provide piping systems suitable for the design conditions and applications intended, coordinated to function as a system, and considering the piping both with and without internal pressure, installation factors, and supports.

B. The pressure ratings and materials specified represent minimum acceptable performance; provide fittings, flanges, valves, and appurtenances with pressure ratings no less than that required for the system in which they are installed.

C. Provide labor and equipment required to accommodate expansion and contraction of piping under varying temperature conditions; verify that anchors, guides, and expansion joints provided, adequately protect the piping systems.

D. Provide flexible connections:

1. Between piping and equipment mounted on vibration isolators.

2. Between floor mounted equipment and suspended piping.

3. Between unbraced piping and restrained suspended items.

4. At building separations and seismic joints.

5. Wherever relative differential movements could damage pipe in an earthquake.

E. Aeration Air: Provide an air distribution system, including piping, valves, and supports to distribute air from blowers to air diffusers, of adequate capacity and adjustable for balancing of air distribution.

F. Soil Investigations: Testing and measurement of soils for corrosivity will be conducted; address the external corrosion conditions indicated in piping design and installation.

2.03 PIPING APPLICATIONS

A. Pipe Applications, unless otherwise indicated:

1. Submerged: PVC plastic.

2. Below Grade: Ductile iron, non-flanged.

3. Above Grade: Ductile iron, flanged.

B. Raw Sewage:

1. Below Grade: Ductile iron, non-flanged.
2. Above Grade: Rubber-lined carbon steel.

C. Sludge:

1. Below Grade: Ductile iron, non-flanged.
2. Above Grade: Galvanized carbon steel.

D. Effluent Downstream of Primary Clarifiers:

1. Below Grade: Ductile iron, non-flanged.
2. Above Grade: Stainless steel tubing.

E. Submerged Outfall: Stainless steel pipe.

F. Aeration Air:

1. Submerged: PVC plastic.
2. Below Grade: Ductile iron, non-flanged.
3. Air Main, Above Grade, Not Submerged: Ductile iron, non-flanged.
4. Air Distribution Headers and Branches: PVC plastic.

G. Liquid Chemical Feed:

1. Smaller than 1-1/2 inch Diameter: PVC plastic.
2. 1-1/2 inch Diameter and Larger: Rubber-lined carbon steel.

2.04 FLANGED DUCTILE IRON PIPE FOR PRESSURE SERVICE

A. Ductile-Iron Pipe: AWWA C115/A21.15 with ASME B16.1 Class 125 flanges for all pipe sizes.

1. Cement-Mortar-Lining: AWWA C104/A21.4 standard thickness cement lining with tolerance of plus 1/8 inch permitted.
2. External Coating: Coated on outside with manufacturer's standard asphaltic coating, approximately one mil thick.
3. Nominal Size: As indicated on Drawings.
4. Pressure Rating: _____ psig.
5. Joints: Comply with AWWA C110/A21.10.
    a. Provide gaskets, glands, bolts and nuts as required to completely assemble joints.
    b. Gaskets: Vulcanized synthetic rubber; reclaimed rubber is not acceptable.

B. Fittings: Ductile iron or gray iron, cement mortar lined same as pipe.

1. Pipe Diameters Up To 12 inches:
2. For Mating to ASME B16.1 or ASME B16.5 Flanges: Provide pipe flanges and flanged fittings to match.

3. Bolts and Nuts: Carbon steel complying with ASTM A307, Grade B.

4. Gaskets: Minimum 1/8 inch thick nitrile with a durometer hardness of 55 to 65 conforming to AWWA C111/A21.11 requirements unless otherwise specified. Gaskets for blind flanges must be cover the full face of the blind flange. Gaskets will be as manufactured by Manville, Garlock, or approved equal.

C. Pipe Sleeves and Wall Castings: AWWA C110/A21.10, with sizes and joints as indicated.

2.05 PIPE CORROSION PROTECTION

A. Coatings: See Section 09 96 00 - Industrial Paints and Coatings, for details of coating requirements.

B. Insulating Flanges, Couplings, and Unions:

1. Materials:

a. In accordance with applicable piping material specified. Complete assembly must have ASME B31.3 working pressure rating equal to or higher than that of joint and pipeline.

b. Galvanically compatible with piping.

c. Resistant for intended exposure, operating temperatures, and products in pipeline.

2. Union Type, 2 Inches and Smaller:

a. Screwed or solder-joint.

b. O-ring sealed with molded and bonded insulation to body.

3. Flange Type, 2-1/2-inches and Larger:

a. Flanged, complete with bolt insulators, dielectric gasket, bolts, and nuts.

b. Bolt insulating sleeves must be provided full length between insulating washers.

c. Ensure fit-up of components of insulated flange assembly to provide a complete functioning installation.

d. AWWA C207 steel flanges may be drilled oversize up to 1/8-inch to accommodate insulating sleeves.

e. No less than minimum thread engagement in accordance with specified bolting standards will be permitted to accommodate thicknesses of required washers, flanges, and gasket.

4. Flange Insulating Kits:

a. Gaskets: Full-face, Type E with elastomeric sealing element. Sealing element must be retained in a groove within retainer portion of gasket.

b. Insulating Sleeves: Full-length fiberglass reinforced epoxy (NEMA LI-1, G-10 grade).

c. Insulating Washers: Fiberglass-reinforced epoxy (NEMA LI-1, G-10 grade).

d. Steel Washers: Plated, hot-rolled steel, 1/8 inch thick.

1) Flange Diameters 36 Inches or Less: Provide two washers per bolt.

2) Flange Diameters Larger Than 36 Inches: Provide four washers per bolt.

5. Manufacturers and Products:

a. Dielectric Flanges and Unions:

1) PSI, Houston, TX.

2) Advance Products and Systems, Lafayette, LA.

3) Engineer approved equal.

b. Insulating Couplings:

1) Dresser; STAB-39.

2) Baker Coupling Company, Inc.; Series 216.

3) Engineer approved equal.

PART 3 EXECUTION

3.01 CONTRACTOR'S VERIFICATION

A. Contractor must field measure relevant dimensions and check possible interferences for the pipe system and accessories.

3.02 PREPARATION

A. Pipe fittings and accessories must be free of foreign matter. Accumulations of dirt, rust, scale, etc., must be removed prior to installation. Pipe ends must be reamed and deburred to prevent loose particles from getting into the pipe line.

B. Protect pipe coatings from chemical and mechanical damage; do not install damaged products.

C. Repair damaged zinc, organic, and paint coatings with material equal to original coating in accordance with manufacturer's recommendations.

D. Before field fabrication of pipe or fittings, notify Engineer at least 2 weeks prior to date of starting fabrication.

E. Before field coating of pipe or fittings, notify Engineer at least 3 days prior to date of starting any surface preparation or coating work.

3.03 INSTALLATION

A. Install piping and appurtenances in compliance with ASME B31.3, reviewed shop drawings, if any, and manufacturer's instructions, with joints tight and no undue marring of finishes.

1. Install piping to accurate lines and grades.

2. Run piping as straight as practical in alignment shown with minimum of joints.

3. Maintain required upstream and downstream clearances.

4. At flow measuring devices, provide straight runs of piping upstream and downstream as indicated on Drawings.

5. Install piping without springing or forcing pipe to fit.
6. Pitch piping toward low points and provide a valved drain at each low point.
7. Provide a sufficient number of unions or flanges to allow for dismantling of pipe, valves, and equipment.
8. Where temporary supports are used, make them sufficiently rigid to prevent shifting or distortion of pipe.
9. Make installed piping, valves, and fittings free from strain and excessive stresses caused by weight or misalignment.

B. Provide isolation valves and miscellaneous devices as required for an operable installation.

C. Pipe Jointing: Clean the ends of pipes thoroughly, remove foreign matter and dirt from inside of pipes, and keep piping clean during and after installation.

D. Thermal Expansion and Contraction: Install piping to allow for thermal expansion and contraction resulting from difference between temperature during installation and during operation.

1. Anchors: Locate as indicated on Drawings and reviewed shop drawings, if any, to withstand expansion thrust loads and to direct and control thermal expansion.
2. Intermediate Pipe Alignment Guides:
    a. Install adjacent to pipe expansion joints and within four pipe diameters each side.
    b. At pipe mounted on metal channel framing, install intermediate pipe guide at each metal channel framing support not carrying an anchor or alignment guide.

E. Flexible Couplings and Expansion Joints: Install in accordance with manufacturer's instructions, at connections to equipment and where shown on Drawings and reviewed shop drawings, if any.

F. Couplings, Adapters and Service Saddles: Install in accordance with manufacturer's instructions.

1. Gaskets: Thoroughly clean pipe ends of oil, scale, rust, and dirt to provide clean seat for gaskets.
    a. Wipe gaskets clean.
    b. Lubricate flexible couplings and flanged coupling adapter gaskets with soapy water or manufacturer's standard lubricant before installation.
2. Tighten bolts progressively, drawing up bolts on opposite sides a little at a time until all bolts have uniform tightness.
3. Use torque-limiting wrenches to tighten bolts.

G. Pipe Tap Connections: Taps direct to pipe barrels are prohibited; make taps as follows:

1. Ductile Iron Piping: Use service saddle or tapping boss of a fitting, valve body, or equipment casting.

2. Steel Piping: Use a welded threadolet connection.

H. Metallic Piping Embedded In Concrete: Coat piping with specified underground pipe coating to prevent direct metal-to-metal contact with reinforcement bars and wires.

I. Buried Pipe Installation:

1. Carry pipe to the trench; do not drag it.

2. Exercise care when lowering pipe into trench to prevent damage and twisting of pipe.

3. At valves and connections, excavate trench bottom to sufficient length, width, and depth to ensure clearance between undisturbed trench bottom and bottom of valves and connections.

J. Joints at Rigid Structures:

1. Provide flexible joints at face of rigid structures, whether or not shown on drawings.

2. Flexible jointing methods include, but are not limited to, rubber ring joints, mechanical joints, flexible couplings, and proprietary restrained ductile iron pipe joints; welded joints are not considered flexible.

3. Joint Location: Flush with structure face or up to one (1) pipe diameter from face; maximum distance from face:

a. Pipe Diameter Over 18 inches: First joint within one (1) pipe diameter from face.

b. Smaller Diameters: 18 inches from face.

K. Provide and install supports, hangers, and guides as specified in Section 40 05 07 - Pipe Hangers and Supports.

L. Install concrete thrust restraints where indicated on Drawings and as specified in Section 40 05 07 - Pipe Hangers and Supports.

M. Painting: Pipe will be painted. See Section 09 96 00 - Industrial Paints and Coatings, for information on painting, color schedule, identification and flow direction arrows.

3.04 COUPLINGS

A. General:

1. Install in accordance with manufacturer’s written instructions.

2. Before coupling, clean pipe holdback area of oil, scale, rust, and dirt.

3. Do not remove pipe coating. If damaged, repair before joint is made.

B. Application:

a. Metallic Piping Systems: Flexible couplings, transition couplings, and flanged coupling adapters.

b. Concrete Encased Couplings: Flexible coupling.

3.05 PIPE SLEEVES

A. Application:

1. Above Grade in Nonsubmerged Areas: Hot-dip galvanized after fabrication.
2. Below Grade or in Submerged or Damp Environments: Shop-lined and coated.
3. Alternatively, Molded Polyethylene Pipe Sleeve as specified may be applied.

B. Installation:

1. Support non-insulating type securely in formwork to prevent contact with reinforcing steel and tie-wires.
2. Caulk joint with specified sealant in non-submerged applications and seal below grade and submerged applications with wall penetration seal.

3.06 SLAB, FLOOR, WALL AND ROOF PENETRATIONS

A. Applications:

1. Watertight and Below Ground Penetrations:
    a. Wall pipes with thrust collars.
2. Provide taps for stud bolts in flanges to be set flush with wall face.
3. Non-watertight Penetrations: Pipe sleeves with seep ring.
4. Existing Walls: Rotary drilled holes.
5. Fire-Rated or Smoke-Rated Walls, Floors or Ceilings: Insulated and encased pipe sleeves.

B. Wall Pipe Installation:

1. Isolate embedded metallic piping from concrete reinforcement using coated pipe penetrations as specified in Section 09 96 00 - Industrial Paints and Coatings.
2. Support wall pipes securely by formwork to prevent contact with reinforcing steel and tie-wires.

3.07 FIELD QUALITY CONTROL

A. General:

1. Installed pipe systems will be tested by hydrostatic or pneumatic means as specified herein.
2. Hydrostatic testing will be for any fluid type material to be handled with pneumatic testing for any gas, air, chemical, oil, or grease pressurized lines.
    a. Testing must be made with the temperatures of surrounding air and test water or air are approximately constant within operating temperature ranges.
3. Pipe ends must be valved or blanked off.
4. Exterior surfaces of pipes, fittings, or valves must show no cracks or other forms of leakage.

B. Hydrostatic Testing for Pressure Piping:

1. General: Perform hydrostatic testing in accordance with ASME B31.3 under normal service conditions.

2. Fluid: Clean water of such quality to prevent corrosion of materials in piping system.

3. Exposed Piping:

a. Perform testing on installed piping prior to application of insulation.

b. Maximum Filling Velocity: 0.25 foot per second, applied over full area of pipe.

c. Vent piping during filling. Open vents at high points of piping system or loosen flanges, using at least four bolts, or use equipment vents to purge air pockets.

d. Maintain hydrostatic test pressure as indicated in the pipe schedule continuously for two hours, minimum, and for such additional time as necessary to conduct examinations for leakage.

e. Examine joints and connections for leakage.

f. Correct visible leakage and retest as specified. Lines must be drop tight.

g. Empty pipe of water prior to final cleaning or disinfection.\

4. Allowable Leakage:

a. Test piping for leakage by filling with water, or other appropriate test liquid, applying specified test pressure, and measuring amount of additional liquid is necessary to maintain the specified pressure for the specified duration.

1) Maximum Allowable Leakage: As indicated on Drawings.

2) Maximum Allowable Leakage: As determined by following formula, whichever is greater:

(a) L (allowable leakage) = Cf x N x D x P0.5, in gallons per hour.

(b) Cf = conversion factor = 0.0001351

(c) N = number of joints in the length of piping tested.

(d) D = nominal pipe diameter, inch

(e) P = average test pressure during the test, psig.

b. Test Pressure: 200 psig plus/minus 5 psig.

c. Locate leaks, repair, and re-test until leakage is within specified limits.

C. Pneumatic Testing:

1. General: Perform pneumatic testing in accordance with ASME B31.3.

2. Fluid: Oil-free, dry air.

3. Procedure:

a. Test Pressure: 110 percent of design pressure.

b. Incrementally increase pressure until gauge pressure reaches lesser of 50 percent of test pressure or 25 psig.

c. Examine piping joints for leakage.

d. If no leakage is occurring, continue to increase pressure incrementally, while maintaining each incremental increase long enough to equalize pipe strains, until test pressure is reached.

e. Reduce pressure to design pressure and maintain for 10 minutes without additional energy expenditure.

f. If pressure remains steady, then no leakage is indicated.

g. Locate leaks, repair, and re-test until pressure remains steady.

4. Allowable Leakage: Piping system, exclusive of possible localized instances at pump or valve packing, must show no visual evidence of leakage.

D. Test Report Documentation:

1. Test date.

2. Description and identification of piping tested.

3. Test fluid.

4. Test pressure.

5. Remarks, including:

a. Leaks (type, location).

b. Repair/replacement performed to remedy excessive leakage.

6. Signed by Contractor and Engineer to represent that test has been satisfactorily completed.

3.08 CLEANING PIPING - PRIOR TO STARTUP

A. After testing, flush piping with water to remove accumulated construction debris and other foreign matter; continue flushing until no foreign matter exits the pipe.

B. Install cone strainers in connections of attached equipment and leave in place until flushing is completed. Remove accumulated debris through drains or by removing spools or valves.

C. Minimum Flushing Velocity: 2.5 feet per second.

D. For large diameter pipe impractical to flush at minimum flushing velocity, clean pipe in place from inside by brushing and sweeping, then flush at a lower velocity.

3.09 PIPE SCHEDULE

Service Type	Pipe Type	Size (inches)	Location
Sewage	*Ductile Iron*	*10*	*Bldg A*
Sludge	*Stainless Steel*	*8*	*Bldg B*
Water	*Ductile Iron*	*16*	*Bldg C, Bldg D*

END OF SECTION 40 23 00

SECTION 43 21 02
HORIZONTAL SELF-PRIMING DIESEL ENGINE DRIVEN CENTRIFUGAL PUMP

PART 1 GENERAL

1.01 SCOPE OF WORK

A. This Section includes horizontal self-priming diesel engine driven centrifugal pumps, including appurtenances.

B. The work under this Section is intended to include the necessary materials and workmanship that are required for the completion of this equipment, as shown on the Drawings, unless otherwise specified.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Section 01 33 00 - Submittal Procedures

B. Section 01 60 00 - Product Requirements

C. Section 01 77 00 - Closeout Procedures

D. Section 03 15 00 - Concrete Accessories

E. Section 03 30 00 - Cast-in-Place Concrete

F. Section 05 50 00 - Metal Fabrications

G. Section 40 23 00 - Process Piping

1.03 REFERENCE STANDARDS

A. Unless otherwise specified, the Work for this Section must conform to the applicable portions of the following Standard Specifications:

1. ANSI - American National Standards Institute
2. ASTM - American Society for Testing and Materials
3. HI USA - Hydraulics Institute USA
4. NEMA - National Electrical Manufacturers’ Association

1.04 QUALITY ASSURANCE

A. Submit the manufacturer's standard warranty and a performance affidavit for equipment to be furnished in accordance with this Section.

1. The warranty for workmanship and materials must be the manufacturer's standard warranty for twelve months from startup, not to exceed eighteen months eighteen (18) months from factory shipment.
2. In the performance affidavit, the manufacturer must certify to the Contractor and the Owner , that the Contract Documents have been examined, and that the equipment will meet in every way the performance requirements set forth in the Contract Documents for the application specified.

3. Shop drawings will not be reviewed prior to the receipt by the Engineer of an acceptable performance affidavit. The performance affidavit must be signed by an officer of the company manufacturing the equipment, and witnessed by a notary public. The performance affidavit must include a statement that the equipment will not clog or bind on solids typically found in the application set forth.

1.05 SYSTEM DESCRIPTION

A. Performance Requirements:

1. Pumps must be designed to handle raw, unscreened, municipal wastewater.

2. Internal passages, impeller vanes, and recirculation ports will pass a 3-inch spherical solid. Smaller internal passages that create a maintenance nuisance or interfere with the priming and pump performance will not be permitted.

B. Reprime Performance Requirements:

1. Pump must retain adequate liquid in the casing to ensure automatic repriming while operating at rated speed in a completely open system. The need for a suction check valve or external priming device is not acceptable.

2. Pump must reprime the Maximum Repriming Lift shown in the Pump Schedule at the specified speed and impeller diameter while operating with only one-half of the liquid remaining in the pump casing. The pump must reprime and deliver full capacity within 5 minutes after the pump is energized in the reprime condition.

1.06 SYSTEM RESPONSIBILITY

A. Pump manufacturer may rely upon information on Pump Schedule pertaining to steady-state operating conditions (e.g., flow, TDH, NPSHA, etc.). However, pump manufacturer will be responsible to review this Section, relevant pipework Drawings, schematics, and electrical and instrumentation Drawings to ensure that equipment offered is suitable for the purposes intended by the Contract Documents. Refer questions and clarifications to Engineer.

1.07 SUBMITTALS

A. Shop Drawings:

1. Include pertinent information needed to fully describe the pump(s) and accessories in the submittal. Where multiple options are included within standard literature, highlight project specific part numbers and options by enclosing the project-specific information (e.g., circling, clouding, text boxes); cross out other information that is not relevant to this application. Deviations to these specifications must be listed on a separate page referencing the specification section with a brief description of the deviation and why it is equal to or superior to what is specified.

2. Include the following for each size and type of pump that will be furnished and installed:

a. Name of manufacturer

b. Type and Model

c. Rotational speed

d. Major component materials of construction

e. Pump specification describing construction details

f. Outline Dimension Drawing

g. Installation Drawing

h. Complete performance data showing capacity and power input

i. Diesel Engine Drive Data that includes

1) Diesel Engine rating, hp

2) Diesel Engine Tier rating

3) Diesel Engine performance curves showing speed, efficiency, etc.

j. Include a list of manufacturer's recommended spare parts

B. Certification:

1. Provide an affidavit of compliance with all applicable provisions of this Section.

C. Test and Inspection Report:

1. Submit a written report to Engineer documenting testing and/or inspection results.

D. Operation and Maintenance Manuals:

1. Submit Operation and Maintenance Manuals for items included in this Specification.

E. Warranty:

1. Submit Warranties covering the items included under this Section.

1.08 SHOP TESTING

A. Shop Tests:

1. Conduct a full-scale, shop performance test on each pump, as well as a final performance test at the project site after installation. Testing will be incidental to the cost of the pump(s).

2. Each pump must be tested completely assembled. Conduct tests in conformity with the latest revision of the Standards of the Hydraulic Institute. Each pump must be tested over its complete anticipated head range. Pump(s) must not vibrate, cavitate, or make excessive noise during testing. In cases where deviations from the standards are required, the test procedure will be approved by the Engineer, in writing, prior to commencement of testing.

3. Furnish drawings for approval showing the proposed test arrangement at least 30 days in advance of the date scheduled for the tests. Include data on the equipment to be used and the various measuring devices on the drawings.

4. Testing apparatus and measuring devices must be properly calibrated. Furnish proof of calibration to the Engineer.

5. Test runs will be made for a least 6 points on the head capacity curve for each pump. No signs of cavitation such as break-off from the normal head capacity characteristic or any unusual sounds or vibrations will be present when operating at these conditions. The length of time of each test run will be sufficient to obtain stable and dependable results and will be subject to the approval of the Engineer.

6. If the performance of the pumping unit does not meet the requirements of the specification, similar tests will be conducted on a revised pump and proof will be furnished to the Engineer that the requirements have been met.

7. Submit certified pump curves for approval by the Engineer prior to shipment.

PART 2 PRODUCTS

2.01 PUMP DESIGN

A. Pumps will be horizontal, self-priming centrifugal type, designed specifically for handling raw, unscreened, municipal wastewater. Pump solids handling capability and performance criteria will be in accordance with requirements listed under Part 1 of this Section.

B. Materials and Construction Features:

1. Pump Casing: Cast Iron Class 30 with integral volute scroll, and will incorporate the following features:

   a. Mounting feet sized to prevent tipping or binding when pump is completely disassembled for maintenance.

   b. Casing drain plug to ensure complete and rapid draining.

2. Rotating Assembly: A rotating assembly, which includes impeller, shaft, mechanical shaft seals, lip seals, bearings, sealplate, and bearing housing, must be removal as a single unit without disturbing the pump casing or piping. Design shall incorporate the following features:

   a. Sealplate and bearing housing shall be cast iron Class 30. Separate oil filled cavities vented to atmosphere shall be provided for shaft seal and bearings. Cavities must be cooled by the liquid pumped

      1) The bearing cavity shall have an oil level sight gauge and fill plug check valve. The clear sight gauge shall provide easy monitoring of the bearing cavity oil level and condition of oil without removal of the fill plug check valve. The check valve shall vent the cavity but prevent the introduction of moist air to the bearings.

      2) The seal cavity shall have an oil level sight gauge and fill/vent plug. The clear sight gauge shall provide easy monitoring of the seal cavity oil level and condition of oil without removal of the fill/vent plug.

   b. Impeller shall be ductile iron, two-vane, semi-open, non-clog with integral pump out vanes on the back shroud. Impeller shall be fully enclosed.

   c. Shaft shall be AISI 416 Alloy Steel or better quality.

2.02 DRIVE UNIT

A. Diesel Engine:

1. Diesel engine shall be Tier III EPA compliant six (6) cylinders four (4) cycle water-cooled naturally aspirated diesel engine.
2. Engine shall drive the pump via elastomeric torsion drive coupling.
3. A 12-volt starter and alternator charging system shall be provided.
4. Engine shall have an industrial muffler.
5. Engine shall have an electronic type governor.
6. Engine shall have variable speed throttle control.
7. Engine shall have safety shutdown switches for low oil pressure and high head temperature.
8. An instrument panel shall be provided in an enclosure and mounted on rubber isolators.
9. Instrument panel shall contain the following instrumentation and controls: throttle control, key switch, tachometer, hour meter, voltmeter, oil pressure gauge and temperature gauge.

2.03 CONTROL PANEL

A. The engine control panel shall be provided in a NEMA 4X 316SS enclosure mounted on rubber isolators to reduce vibration.

B. The control panel shall be equipped with a factory installed microprocessor-based controller, able to start/stop the engine at a signal supplied by the high and low level floats, or by transducer operation.

C. The control panel shall function interchangeably from; float switches, pressure switch, or transducer, as well as manually using the start/stop selection at the keypad. No other equipment or hardware changes shall be required.

D. The control panel shall be capable of varying the engine speed to maintain a constant level in response to a change in level, pressure, or flow from the transducer, without a change to the panel, other than via the keypad.

E. In automatic mode, the control panel shall automatically conserve power by going to “sleep” mode when not active or programming mode.

F. The controller shall integrate the engine safety shut-off for low-oil temperature, high water temperature, and provide over speed protection.

G. The control panel shall be equipped with a large LCD display (4.25” diagonal), capable of showing (4) separate functions simultaneously. The LCD shall be clearly readable in both bright sunlight as well as total darkness.

H. The control panel shall be capable of withstanding vibration of 3g, 3 axis, frequency swept 10-1000 Hz, and an operating humidity range of 0-95% non-condensing.

I. Optional features include a telemetry system (installed by the manufacturer), capable of remotely monitoring, recording, reporting, and alarm information relating the engine, pump, fuel system, and other parameters.

2.04 PRIMING SYSTEM

A. The priming system shall be fully automatic eliminating the need to pre-fill the pump casing with water to achieve initial prime.

B. The priming system shall be capable of automatically priming the pump with a 28-foot static suction lift with no water in the pump or suction piping.

2.05 MOUNTING FRAME

A. The complete power unit shall be mounted on a combination frame/double wall fuel tank constructed of tubular steel, with leak detection system and with a minimum fuel capacity of sufficient for eight (8) hours runtime at full design capacity.

B. The frame shall incorporate an integral lifting bail capable of lifting the entire unit.

C. Fuel tank shall have a removable basket strainer mounted in the fill port and a lockable cap.

D. Fuel tank shall have clean-out ports.

2.06 SOUND ENCLOSURE

A. The entire unit including the pump and engine shall be completely enclosed in a lockable enclosure.

B. The enclosure shall reduce operating noise below 70 dBa measured at 7 meters at full speed (EPA Standard 40CFR204 is 76 dBa @ 7 meters).

C. The enclosure shall be fully detachable to facilitate major repairs such as replacing the engine or pump.

2.07 SPARE PARTS

A. Provide the manufacturer's recommended spare parts.

2.08 ACCEPTABLE MANUFACTURES

A. Subject to compliance with specified requirements, manufacturers offering products which may be incorporated in Work include:

1. Godwin Pump, Bridgeport, NJ
2. Thompson Pump, Port Orange, FL
3. Power Prime Pumps, Bakersfield, CA
4. Engineer approved equal.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install, level align and lubricate the equipment in strict accordance with the manufacturer’s recommendations to provide a complete working system.

3.02 FIELD QUALITY CONTROL

A. Performance Tests:

1. Conduct a performance test after the pumping unit(s) has been installed to demonstrate that the equipment has been properly installed, will operate satisfactorily, and meets the specified conditions and the guarantees of the manufacturer.

2. For the purpose of these tests, Owner will furnish the electricity and the water for a test load when these items are available.

3. Conduct the performance test under the supervision of Engineer, with the cooperation of manufacturer's factory representative.

4. It is intended that these tests be carried out by operating each pumping unit through the range specified for a continuous period of at least 2 hours, or until it is shown to the satisfaction of Engineer that all of the equipment is in perfect condition and will meet the requirements specified. Throughout these tests of the pumping equipment, the motors and pumps must run smoothly without vibration or heating, otherwise the test must be stopped and not again undertaken until the unit shall have been put into condition to comply with the requirements for smoothness of operation.

3.03 MANUFACTURER'S FIELD SERVICES

A. At a minimum of 15 days prior to Substantial Completion, provide services of a factory representative for a minimum of 2 eight-hour days on-site to inspect, test, and adjust the equipment after installation to verify the mechanical, structural, and electrical integrity and conformance to the equipment specifications. Submit the manufacturer's written certification that the equipment is properly installed within 2 days following this site visit.

B. At the time of initial startup, provide services of a factory representative for 2 eight-hour days on-site to verify the proper operating of the equipment and to instruct Owner's personnel on operation and maintenance.

C. Provide additional services at no cost to the Owner to correct any operational problems.

END OF SECTION 43 21 02

SECTION 46 24 33
OPEN-CHANNEL GRINDERS

PART 2 PRODUCTS

1.01 MANUFACTURERS

A. JWC Environmental Inc. of Santa Ana, California.

1.02 OPEN -CHANNEL GRINDER WITH SOLIDS DIVERTER

A. General:

1. Open-channel grinder with solids diverter comprised of individual grinder and solids diverter, support frame and channel frame.

2. Grinder will use an electric motor and speed reducer to provide low speed shaft rotation and high torque with individual cutters interleaved on two-counter rotating hexagonal shafts in a vertical configuration.

3. Solids diverter will include a rotating perforated screen using electric motor and speed reducer to rotate screen at a minimum 1/10th the RPM of the adjacent cutter shaft.

4. Grinder and solids diverter will be connected by a support frame that allows the grinder, solids diverter, and frame to be lifted or moved as a single component.

5. Support frame will be adjustable to optimize distance of grinder cutters to surface of solids diverter perforated drum.

6. Design will allow grinder and solids diverter to be removed and replaced individually for repair or replacement. Design will also allow solids diverter to be replaced with larger or smaller screen as needed with replacement of entire system.

B. Basis of Design:

1. Channel Monster Flex, Model CMF6036, as manufactured and supplied by JWC Environmental Inc.:

a. Maximum Design Flow Capacity:28,080 gallons per minute (gpm)

b. Cutter Stack and Perforated Drum Height: 60 inches

c. Perforated Drum Diameter: 36 inches

d. Cutter Stack Configuration:

1) Multi Zone-Staggered and Helical

(a) Zone 1 (Grit) Stack Height: Nominal 6 inches

(b) Zone 2 (Working) Stack Height: Nominal 6 inches

1.03 GRINDER

A. General:

1. Grinder will reduce solids conveyed in a wastewater stream to a size that is non-detrimental to downstream equipment.
2. Grinder will use low speed and high torque drive with two counter-rotating shafts stacked with intermeshed individual cutters and spacers supported on both ends of each shaft with mechanical seal and bearing cartridges, driven by an electric motor and speed reducer.

B. Cutter Assembly:

1. Stack Configuration:
    a. Multi-Zone-Staggered and Helical Stack
        1) Cutters and spacers stacked with two defined zones, each with its own unique cutter and spacer type, thickness, stacking configuration, and material throughout zone.
        2) Zone 1 cutters for high abrasion resistance and Zone 2 cutter for shearing and particle size control.
2. Zone 1 - Grit Zone:
    a. Material Zone 1: Monster Metal® Chromium Molybdenum Steel.
        1) Cutters: Through hardened to 55-60 HRC
        2) Spacers: Through hardened to 34-42 HRC.
    b. Cutters - Zone 1 (6-inch Grit Zone) - Staggered Stack
        1) 7-tooth Cam style, 0.875-inch effective thickness, 4.710-inch diameter. Designed specifically for waste streams containing heavy volumes of solids.
        2) Comprised of two precision ground individual cutter elements with a thickness tolerance of +0.000/ -0.001.
        3) Keyed to shaft with hexagon opening.
        4) Spacers - Zone 1 (6-inch Grit Zone)
        5) Smooth O.D. 0.892-inch thick, Alloy Steel.
        6) Comprised of two precision ground individual spacer elements with a thickness tolerance of +0.001/ -0.000.
        7) Keyed to shaft with hexagon opening.
        8) Configuration - Zone 1 (Grit Zone)
        9) Cutters and spacers form 6-inch nominal stack height
        10) Cutters stacked staggered with every other cutter’s teeth aligned to minimize absorbed torque requirement and maximize cutter tooth force.
3. Zone 2 - Working Zone:
    a. Material Zone 2: Monster Metal® Chromium Molybdenum Steel.

1) Cutters: Through hardened to 55-60 HRC

2) Spacers: Through hardened to 34-42 HRC.

b. Cutters - Zone 2 (Working Zone) - Helical Stack

1) 7-tooth Cam style, 0.438-inch thick, 4.710-inch diameter. Designed specifically for waste streams containing heavy volumes of solids.

2) Precision ground individual cutter elements with a thickness tolerance of +0.000/ -0.001.

3) Keyed to shaft with hexagon opening.

4) Spacers - Zone 2 (Working Zone)

5) Smooth O.D. 0.446-inch thick.

6) Precision ground individual spacer elements with a thickness tolerance of +0.001/ -0.000.

7) Keyed to shaft with hexagon opening.

C. Intermediate Shaft Collar with Vertical Support:

1. Intermediate shaft collars, AISI 304 stainless steel housing, SAE 660 bearing bronze bushing and 17-4 PH rotating element.

2. Vertical Support with adjustable brackets for mounting of the shaft collars.

3. Vertical Support, AISI 304 stainless steel.

4. AISI 304 stainless steel grease fittings and grease lines attached to shaft collars and routed through Vertical Support.

5. Bushing and rotating element factory lubricated with high temperature marine grade grease.

D. Mechanical Seal and Bearing Cartridges-Severe Duty:

1. Seals and bearing incorporated into a cartridge style design requiring no external seal flush or lubricants to operate wet or dry.

2. Rated for maximum operating depth: 346 feet.

3. Secondary lip seal with grease barrier.

4. Dynamic and Static seal faces to be Tungsten carbide with 6% nickel binder.

5. Cartridge bushing and housing are AISI 304 stainless steel.

6. O-rings to be Viton (Fluorocarbon).

E. Shafts:

1. 2 inch hexagon heat treated AISI 4140 alloy steel.

2. Minimum tensile strength of 170,000 psi.

3. Supported on either end by Mechanical Seal and Bearing Cartridges.
4. Cantilevered designs are not acceptable.

F. Compression Nut and Spring Disk:

1. Compression Nut:
    a. Stack nut sized to provide proper clamping force to secure cutting stack at manufacturer's recommended torque.
2. Spring Disk:
    a. Spring element provides a preload of the cutter stack maintaining a clamping force securing the cutter from movement.
    b. Disk or seat element prevents overloading of cutter stack by limiting distance spring element can be compressed.

G. End Housings, Side Rail, Screen Side Rail, Top Cover, Bottom Cover, and Gaskets

1. End Housings:
    a. Cast integral bushing deflector directs solids away from Mechanical Seal and Bearing Cartridge bushings.
    b. Directional flow arrows on side of housings indicate correct installation orientation for solids discharge.
    c. Cast ASTM A48/A48M Class 40 gray iron.
2. Side Rail:
    a. Evenly spaced horizontal fingers and flow channels. Flows channel create additional open area through grinder increasing flow capacity. Horizontal fingers direct solids toward cutters by creating a pressure differential towards the cutters.
    b. Shape of flow fingers creates a pressure gradient to force solids to cutters and minimize water head loss.
    c. Fingers and flow channel are positioned on the upstream side of the grinder terminating even with the center of the cutter proving free discharge.
    d. Side rails with flow channel running the entire length of the side rail are not allowed.
    e. Cast ASTM A536-84 65-45-12 ductile iron.
3. Screen Side Rail
    a. Opening allows Solids Diverter perforated drum to be positioned close to cutter's tooth tip.
    b. Cast ASTM A536 65-45-12 ductile iron.
4. Top Cover:
    a. Manufacturing identification plate mounting on surface.

b. Cast ASTM A48/A48M Class 40 gray iron.

5. Bottom Cover:

a. ASTM A36/A36M steel plate.

6. Gaskets:

a. Cork and neoprene rubber.

H. Transfer Gears:

1. Heat treated and hardened AISI 4140 alloy steel.

2. Number of teeth on gears creates ratio of cutter tip speed on low speed shaft to cutter tip speed of highspeed shaft greater than 0.90 and less than 1.00 to promote cleanout of processed material in cutting stack.

I. Couplings:

1. Low Speed Coupling

a. Two-piece 3-jaw interlocking design.

b. Hardened AISI 4140 alloy steel

2. High Speed Coupling

a. Type L 3-jaw with elastomer

b. Buna-N spider.

J. Lifting Brackets:

1. AISI 304 stainless steel.

K. Speed Reducer:

1. Grease lubricated cycloidal design Cyclo Series 6000 with 29:1 reduction ratio.

2. Manufacturer: Sumitomo Machinery Corporation of America.

L. Motor:

1. XPNV Immersible Explosion Proof Motor: Baldor Electric Company.

a. Installed Horsepower: 10 HP.

b. Motor Service Factor: 1.15.

c. Minimum Motor Efficiency (at Full Load): 91.7 percent.

d. Minimum Motor Power Factor (at Full Load): 87.

e. Performance:

f. Grinder Peak Torque with Reducer: 3,016 lb-ft.

g. Grinder Peak Force at Cutter Tip: 15,368 lbf.

h. UL rated NEMA 6P, Class I, Div. 1 Groups C&D, Class II Div. 2, Groups F&G, Class III Div. 1.

i. Manufacturer rating of 40 consecutive days of submergence at a maximum depth of 40 feet.

j. Capable of operating in air 100 percent of time with no external cooling required.

k. No fan cooling during operation.

l. Utilize ceramic shaft seal requiring no oil lubrication.

M. Identification:

1. Corrosion resistant nameplate affixed to top cover of grinder.

2. Nameplate Information:

a. Manufacturer’s name and address,

b. Model Number.

c. Serial Number.

d. Capacity.

e. Max. (psi).

f. Weight.

g. Manufactured Date.

N. Finishes:

1. Paint Coatings for Ferrous Materials: Prepared to SSPC-SP 6/NACE No.3 (Commercial Blast Cleaning) and coated with minimum 6 to 8 mils TDFT (total dry film thickness) of an aliphatic acrylic polyurethane paint in the color Hunter Green.

2. Paint Coatings for Previously Coated Components (Motors, Speed Reducers, etc.): Prepared to SSPC-SP 1 (Solvent Cleaning) and SSPC-SP 2 (Hand Tool Cleaning) and coated with minimum 6 mils to 8 mils TDFT (total dry film thickness) of an aliphatic acrylic polyurethane paint in the color Hunter Green.

1.04 SOLIDS DIVERTER

A. General:

1. Cylindrically formed stainless steel perforated screen drum mounted vertically between two housings containing mechanical seals and bearing cartridges, driven by an electric motor and speed reducer.

2. Solids captured on the surface of the rotating screen drum are conveyed to the cutters of the grinder.

3. Low RPM of screen drum allows cutters of grinder multiple tooth passes to remove and reduce solid.

4. Vertical brush sweeps perforations of screen drum keeping orifices free from buildup.

B. Perforated Screen Drum:

1. Screen cylindrically formed using 1/2-inch diameter holes (Orifices) with a nominal 50% open area across the surface of the screen.
2. Maximum area of each orifice: 0.2 square inches.
3. Screen deburred AISI 304 stainless steel.
4. Trunnions top and bottom of drum ASTM A564 Grade 630 condition H1150 (17-4) stainless steel.

C. Mechanical Seal and Bearing Cartridges - Severe Duty:

1. Seals and bearing incorporated into a cartridge style design requiring no external seal flush or lubricants to operate wet or dry.
2. Rated for maximum operating depth: 346 feet.
3. Secondary lip seal with grease barrier.
4. Dynamic and Static seal faces to be Tungsten carbide with 6% nickel binder.
5. Cartridge bushing and housing are AISI 304 stainless steel.
6. O-rings to be Viton (Fluorocarbon).

D. End Housings:

1. Cast ASTM A48/A48M Class 30 gray iron.

E. Shrouds and Covers:

1. Shrouds:
    a. Glass bead blast and passivate AISI 304L stainless steel.
2. Cover:
    a. Manufacturing identification plate mounting on surface.
    b. Glass bead blast and passivate AISI 304L stainless steel.

F. Drum Baffle/ Channel Seal and Brush:

1. Drum Baffle:
    a. Glass bead blast and passivate AISI 304L stainless steel.
2. Channel Seal:
    a. Buna-N rubber 60A durometer.
3. Brush:
    a. Nylon bristles with PVC base

G. Couplings:

1. Low Speed Coupling:

a. Two-piece 3-jaw interlocking design.

b. Hardened AISI 4140 alloy steel

2. High Speed Coupling:

a. Type L 3-jaw with elastomer

b. Buna-N spider.

H. Lifting Brackets:

1. AISI 304 stainless steel.

I. Speed Reducer:

1. Grease lubricated cycloidal design Cyclo Series 6000 with 377:1 reduction ratio.

2. Manufacturer: Sumitomo Machinery Corporation of America.

J. Motor:

1. XPNV immersible, explosion-proof motor by Baldor Electric Company.

a. Installed Horsepower: 1 HP.

b. Motor Service Factor: 1.15.

c. Minimum Motor Efficiency (at Full Load): 85.5 percent.

d. Minimum Motor Power Factor (at Full Load): 80.

e. UL rated NEMA 6P, Class I, Div. 1 Groups C&D, Class II Div. 2, Groups F&G, Class III Div. 1.

f. Manufacturer rating of 40 consecutive days of submergence at a maximum depth of 40 feet.

g. Capable of operating in air 100 percent of time with no external cooling required.

h. No fan cooling during operation.

i. Utilize ceramic shaft seal requiring no oil lubrication.

K. Identification:

1. Corrosion resistant nameplate affixed to top cover of Solids Diverter.

2. Nameplate Information:

a. Manufacturer’s name and address,

b. Model Number.

c. Serial Number.

d. Capacity.

e. Max. (psi).

f. Weight.

g. Manufactured Date.

L. Finishes:

1. Paint Coatings for Ferrous Materials: Prepared to SSPC-SP 6/NACE No.3 (Commercial Blast Cleaning) and coated with minimum 6 mils to 8 mils TDFT (total dry film thickness) of an aliphatic acrylic polyurethane paint in the color Hunter Green.

2. Paint Coatings for Previously Coated Components (Motors, Speed Reducers, etc.): Prepared to SSPC-SP1 (Solvent Cleaning) and SSPC-SP 2 (Hand Tool Cleaning) and coated with minimum 6 mils to 8 mils TDFT (total dry film thickness) of an aliphatic acrylic polyurethane paint in the color Hunter Green.

1.05 SUPPORT AND INSTALLATION FRAMES

A. General:

1. Support frame will provide structure for mounting and mechanism for positioning of the grinder and solids diverter combining the modules into one system for installation and removal.

2. Design will allow individual removal and replacement of the grinder and solids diverter.

3. Installation frame will mount into open channel and wet wells creating an interface for the support frame to insert.

4. Baffles will be designed to provide structural support and hold the system in place.

B. Support Frame, Guide Rail and Lifting Bail:

1. Support Frame:

a. Support frame will slide into channel frame guide slots positioning grinder and solids diverter into channel without further fastening or assembly.

b. Mechanism for adjustment of the grinder will set the distance of the cutter teeth to the perforated drum of the solids diverter.

c. Designs that do not allow for adjustment of cutter teeth to screen are not acceptable.

d. Frame will be fabricated of AISI 304L stainless steel with a passivated bead blast finish.

2. Guide Rail:

a. Rail will attach to top of support frame and extends to top of the influent structure.

b. Rail will be fabricated of AISI 304L stainless steel with a passivated bead blast finish.

3. Lifting Bail:

a. Lifting bail will attach to channel frame with a single point attachment hole for grinder removal/installation.

b. Lifting bail will be fabricated of AISI 304L stainless steel with a passivated bead blast finish.

1.06 MOTOR CONTROLLER

A. General:

1. NEMA enclosure with Programmable Logic Controller (PLC), Operator Interface Terminal (OIT) for status information and operating parameter configuration, operation and fail indicators, and selector switches.

B. Basis of Design:

1. Model PC2222 as manufactured and supplied by JWC Environmental, Inc.

a. Motor Controller Power Supply: 460 V/ 3 PH/ 60 Hz.

C. Enclosure, Selector Switches, Pushbuttons and Pilot Lights:

1. Enclosure NEMA 4X:

a. 304 Stainless Steel (36 inch. x 30 inch. x 12 inch.) with hinged door and mounting flanges.

b. Selector Switches:

1) Grinder:

(a) 0.87 inch, three-position, rated equal or better than the enclosure.

(b) Indicate ON-OFF-REMOTE.

2) Screen:

(a) 0.87 inch, three-position, rated equal or better than the enclosure.

(b) Indicate ON-OFF-AUTO.

c. Pushbuttons:

1) EMERGENCY STOP

(a) 22mm, maintained.

2) RESET

(a) 22mm, momentary.

d. Pilot Lights:

1) 0.87 inch, LED (pilot lamp), rated equal or better than the enclosure

2) Indicate POWER ON, GRINDER RUN, SCREEN RUN and FAIL.

D. Programmable Logic Controller:

1. Basis of Design: Siemens S7-1200

a. 100kB working memory.

b. Fourteen (14) 24 Vdc inputs, ten (10) relay outputs.

c. Two (2) 0-10 Vdc analog inputs.

d. PROFINET interface.

E. Operator Interface Terminal:

1. Basis of Design: Siemens KTP400

a. Key/ touch operation, 4 inch. widescreen TFT (Thin Film Transistor) display.

b. 4 MB configuration memory.

c. PROFINET interface.

d. SD card slot.

e. NEMA 4X suitable for indirect sunlight.

F. Motor Starters, Overload Relays and Control Power Transformer:

1. Starters:

a. IEC, full voltage, and reversing.

2. Overload Relays:

a. Adjustable and sized to full load amperes (FLA) of the motor.

3. Control Power Transformer:

a. Produce 120-volt AC power from the supply power. Sized and fused in accordance with code to accommodate the control power requirements.

G. Current Transducers:

1. 0-10VDC analog output.

H. Operation:

1. Grinder Control:

a. In accordance with ON-OFF-REMOTE selector switch setting.

1) OFF Position: Grinder will not run. Motor controller faults to be cleared with RESET pushbutton.

2) ON Position: Grinder will run forward.

3) REMOTE Position: Grinder operates as controlled by a remote start/stop dry contact.

2. Solids Diverter Control:

a. In accordance with ON-OFF-AUTO selector switch setting.

1) OFF Position: Solids Diverter will not run. Motor controller faults to be cleared with RESET pushbutton.

2) ON Position: Solids Diverter will run forward.

3) AUTO Position: Solids Diverter operates as controlled by Grinder operation.

3. Emergency Stop:

a. In accordance EMERGENCY STOP pushbutton depressed:

1) Control circuit de-energizes the PLC outputs to all motor starters, causing the coils of all motors starters to be de-energized.

2) Fail relay energizes. OIT will display message: Emergency Stop Activated.

3) Emergency Stop condition only cleared locally by resolving the issue, resetting the EMERGENCY STOP switch and depressing the RESET pushbutton.

4. No Current Sensed at Grinder Motor Running Condition:

a. Controller will activate FAIL indicator and OIT will display message: Grinder Fail to Run.

5. No Current Sensed at Solids Diverter Motor Running Condition:

a. No current sensed at Solids Diverter motor running condition: Controller will activate FAIL indicator and OIT will display message: Solids Diverter Fail to Run.

6. Grinder JAM Condition:

a. Controller will stop the Grinder, reverse rotation of Grinder to clear the obstruction.

1) If obstruction is cleared, controller will return Grinder to normal operation.

2) If three reverses occur within a 30 second interval, controller will stop the Grinder and Solids Diverter motors, activate the FAIL indicator and relay. OIT will display message: Grinder Jammed.

7. Solids Diverter JAM Condition:

a. Controller will stop the Solids Diverter and reverse rotation to clear the obstruction.

1) If obstruction is cleared, controller will return Solids Diverter to normal operation.

2) If two reverses occur within a 30 second interval, controller will stop the Solids Diverter motor and activate the FAIL indicator and relay. OIT will display message: Solids Diverter Jammed.

3) Grinder will continue to operate.

8. Grinder MOTOR OVERLOAD Condition:

a. Motors will be de-energized.

1) FAULT indicator lamp will be illuminated, and the FAIL contact will be closed. OIT will display message: Grinder Motor Overload.

2) Grinder and Solids Diverter will stop operation.

9. Grinder MOTOR OVERTEMP Condition:

a. Motors will be de-energized.

1) FAULT indicator lamp will be illuminated, and the FAIL contact will be closed. OIT will display message: Grinder Motor Overtemp.

2) Grinder and Solids Diverter will stop operation.

10. Solids Diverter MOTOR OVERLOAD Condition:

a. Motor will be de-energized.

1) FAULT indicator lamp will be illuminated, and the FAIL contact will be closed. OIT will display message: Solids Diverter Motor Overload.

2) Solids Diverter will stop operation.

3) Grinder will continue to operate.

11. Solids Diverter MOTOR OVERTEMP Condition:

a. Motor will be de-energized.

1) FAULT indicator lamp will be illuminated, and the FAIL contact will be closed. OIT will display message: Solids Diverter Motor Overtemp.

2) Solids Diverter will stop operation.

3) Grinder will continue to operate.

12. Power Failure:

a. While System is Operating: System will return to normal operation when power is restored.

b. While System is in a Fail Condition: System will return to a fail state when power is restored. The fail state will not be cleared until reset.

13. Reset of Grinder and Solids Diverter:

14. Accomplished from the controller only.

PART 3 EXECUTION

2.01 INSTALLATION

A. Coordinate installation of the equipment in accordance with the manufacturer’s installation instructions, approved submittals, and in accordance with OSHA, local, state, and federal codes and regulations.

2.02 FIELD QUALITY CONTROL

A. Inspection:

1. Manufacturer is required to provide the services of a factory or manufacturer’s representative for a minimum of one day to inspect the equipment for proper installation, apply power for the first time and check for proper motor rotation, oversee the initial introduction of material into the system and confirm the equipment operates as intended.

B. Training:

1. Manufacturer is required to provide the services of a factory or manufacturer’s representative for a minimum of one day to provide field training for operations, maintenance, and supervisory staff members.

2. Field instruction will cover key components of the equipment, operating and maintenance requirements and troubleshooting techniques.

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PAVEMENT ENGINEERING REPORT

CITY OF PLYMOUTH – 2025 INFRASTRUCTURE PROGRAM
PLYMOUTH, MICHIGAN

SME Project Number: 098742.00
February 5, 2025

SME

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February 5, 2025

Mr. Shawn Keough, PE
Senior Vice President
Wade Trim, Inc.
25251 Northline Road
P.O. Box 10
Taylor, Michigan 48108

Via E-mail: skeough@wadetrim.com

RE: Pavement Evaluation Report
City of Plymouth – 2025 Infrastructure Improvement Program
Plymouth, Michigan
SME Project No. 098742.00

Dear Mr. Keough:

We have completed our pavement investigation for the City of Plymouth – 2025 Infrastructure Improvement Program project in Plymouth, Michigan. This report summarizes our exploratory and laboratory testing and provides design and construction recommendations for the proposed pavement rehabilitation and utility upgrades.

We appreciate the opportunity to serve you on this project. Please contact us if you have any questions or require additional information.

Sincerely,

SME

Jeremy S. Friedley, PE
Senior Project Engineer

Enclosure: SME Pavement Engineering Report; Dated (February 5, 2025)

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APPENDIX A
BORING LOCATION DIAGRAM (FIGURE NOS. 1 THROUGH 4)

APPENDIX B
LABORATORY TESTING PROCEDURES
BORING LOG TERMINOLOGY
BORING LOG AND USACE DATA SHEETS (B1 THROUGH B10)

APPENDIX C
GENERAL COMMENTS
IMPORTANT INFORMATION ABOUT THIS GEOTECHNICAL ENGINEERING REPORT

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1. INTRODUCTION

This report summarizes our exploratory and laboratory testing and provides design and construction recommendations for the proposed pavement rehabilitation and utility upgrades. This investigation was conducted in general accordance with the scope of services outlined in SME Proposal No. P04730.24 dated December 13, 2024. Our services for this evaluation were authorized by Wade Trim, Inc.

1.1 PROJECT DESCRIPTION

We understand the City of Plymouth is planning infrastructure improvements on various sections of road within the downtown area of Plymouth, Michigan. The locations of the evaluated road sections are detailed below.

North Holbrook Street from Plymouth Road to Railroad Tracks: The length of this project is approximately 1,540 feet, between Plymouth Road and East Pearl Street. New pavement and water main system improvements are planned for this project.

East Liberty Street from North Mill Street to York Street: The length of this project is approximately 645 feet. New pavement and minor utility improvements are planned for this project.

Ann Arbor Trail from Railroad Tracks to Lilley Road: The length of this project is approximately 280 feet, between Fairground Street and Lilley Road. No project is currently planned, existing pavement section data was desired for a potential future project.

2. EVALUATION PROCEDURES

2.1 FIELD EXPLORATION

The field exploration consisted of performing a total of ten (10) borings on the various sections of road on January 7 and 10, 2025. The number, locations, and depths of the borings were jointly determined by SME and Wade Trim. Prior to commencing the field exploration, SME visited the sites on December 30, 2024, and staked the boring locations by referencing existing site features. Public underground utilities were located and marked by the MISS DIG utility clearance system.

Table 1 shows the boring number and depth of the borings performed on each road section.

TABLE 1: DEPTH AND LOCATION OF EACH BORING

SITE	BORING	DEPTH (FEET)
N. Holbrook Street	B1-B4	20
E. Liberty Street	B5-B8	4
Ann Arbor Trail	B9-B10	4

The boring location diagram included in Appendix A shows the boring locations. Site topographic information was not available at the time of sampling and existing ground surface elevations at the boring locations were not estimated by SME.

SME mobilized a truck mounted Geoprobe® rig to the site to perform sampling. The pavement surface was cored with a 4-inch-diameter core barrel. After coring and prior to performing soil sampling, the existing base and subgrade soils were evaluated with a dynamic cone penetrometer (DCP). The DCP was designed by the U.S. Army Corps of Engineers (USACE). The USACE DCP test was performed to a depth of approximately 3 feet below the existing pavement surface. The USACE DCP consists of a 5/8-inch diameter steel rod with a steel cone attached to one end that is driven into the base/subgrade by means of a sliding dual-mass hammer. The number of blows to drive the cone was recorded at selected penetration

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intervals. The USACE has developed relationships to estimate the in-situ California Bearing Ratio (CBR) value of the subsurface material from the results of the DCP test. CBR is an index commonly used in pavement design that gives an indication of base and subgrade support characteristics. Table 2 shows our opinion of the aggregate base and subgrade support conditions for various ranges of estimated in-situ CBR values from USACE DCP test results.

TABLE 2: AGGREGATE BASE AND SUBGRADE SUPPORT CONDITIONS

SUPPORT CONDITION	CBR RANGE FOR AGGREGATE BASE MATERIAL (%)	CBR RANGE FOR SUBGRADE SOILS (%)
Good	>80	>10
Marginal	60 to 80	5 to 10
Poor	30 to 60	3 to 5
Very Poor	<30	<3

After completion of the USACE DCP test, the thickness of the aggregate base, if encountered, was estimated by probing and a sample of the aggregate base was obtained. Soil sampling was performed using a truck mounted Geoprobe® rig. The Geoprobe® uses a pneumatic hammer device to obtain continuous liner samples at a boring using acetate-lined piston samplers. Groundwater measurements were obtained, if present, after completion of probing operations at each location. After completion of sampling, the bore holes were backfilled with sand and gravel and capped with asphalt cold patch. Therefore, long-term groundwater levels were not available from this evaluation. The collected soil samples were sent to the SME laboratory for further evaluation.

2.2 LABORATORY TESTING

The laboratory testing program consisted of visual soil classification of recovered samples along with moisture content and hand penetrometer testing to estimate the shear strength on portions of cohesive samples. The Laboratory Testing Procedures document included in Appendix B provide descriptions of the laboratory tests described above.

The thickness of the pavement cores obtained at the boring locations were measured to the nearest ¼-inch and the cores were photographed. Thereafter, we prepared a boring data sheet for each boring that described materials encountered, estimated in-situ CBR values from the DCP test, pertinent field observations made during the sampling operations, results from the laboratory tests, and a photograph of the obtained core. The soil descriptions included on the boring data sheets were developed from both visual classification and the results of laboratory tests. The boring data sheets are included in Appendix B.

Soil samples retained over a long time, even sealed in jars, are subject to moisture loss and are no longer representative of the conditions initially encountered in the field. Therefore, we retain soil samples in our laboratory for 60 days unless instructed otherwise.

3. PAVEMENT CONDITIONS

3.1 EXISTING SURFICIAL PAVEMENT CONDITIONS

The following section includes descriptions of the existing pavement conditions observed on the surface of each roadway.

3.1.1 NORTH HOLBROOK STREET

North Holbrook Street is surfaced with Portland Cement Concrete (PCC) and consists of two lanes, northbound and southbound. The road is bound by PCC curb and gutter. Drainage of the road is facilitated by catch basins located along the existing curb and gutter.

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SME visually reviewed the roadway surface along North Holbrook Street at the time of the field exploration. The pavement was generally in very poor condition. The predominant distresses observed on the pavement surface were high severity scaling, spalling of joints and cracks, meander cracking, and occasional potholes and failed slabs. A majority of the potholes had been previously filled with asphalt cold patch.

3.1.2 WEST LIBERTY STREET

West Liberty Street is surfaced with asphalt pavement and consists of two lanes, eastbound and westbound. The road is bound by PCC curb and gutter. Drainage of the road is facilitated by catch basins located along the existing curb and gutter.

SME visually reviewed the roadway surface along West Liberty Street at the time of the field exploration. The pavement was generally in fair to poor condition. The predominant distresses observed on the pavement surface were moderate transverse cracking and occasional block cracking. The most severe distresses were observed adjacent to the intersection with North Mill Street. There appears to be a utility cut in the pavement that has been patched with concrete approximately 55 feet east of North Mill Street.

3.1.3 ANN ARBOR TRAIL

Ann Arbor Trail is surfaced with asphalt pavement and consists of four lanes, two eastbound and two westbound. The road is bound by PCC curb and gutter. Drainage of the road is facilitated by catch basins located along the existing curb and gutter.

SME visually reviewed the roadway surface along Ann Arbor Trail at the time of the field exploration. The pavement was generally in very poor condition. The predominant distresses observed on the pavement surface were moderate to severe transverse and longitudinal cracking, raveling, high severity alligator cracking, and occasional potholes.

3.2 PAVEMENT THICKNESS AND AGGREGATE BASE CONDITIONS

The following section includes descriptions of the pavement and aggregate base conditions encountered in the borings and the aggregate base support conditions indicated by the DCP testing.

Table 3 shows the pavement layer thicknesses encountered at the boring locations.

TABLE 3: PAVEMENT THICKNESS

BORING	ROAD	THICKNESS (INCHES)			
		ASPHALT	PCC	AGGREGATE BASE	TOTAL
B1	N. Holbrook St.	N/E[1]	8 ¼	15 ¾	24
B2	N. Holbrook St.	N/E[1]	6 ½	17 ½	24
B3	N. Holbrook St.	N/E[1]	6 ¼	23 ¾	30
B4	N. Holbrook St.	N/E[1]	6	24	30
B5	W. Liberty St.	8 ¼	N/E[1]	7 ¾	16
B6	W. Liberty St.	8 ¾	N/E[1]	10 ¼	19
B7	W. Liberty St.	8 ½	N/E[1]	7 ½	16
B8	W. Liberty St.	8	N/E[1]	9	17
B9	Ann Arbor Trail	3	6 ½	9 ½	19
B10	Ann Arbor Trail	2 ½	7	9 ½	19

NOTE: [1]Not Encountered.

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3.2.1 NORTH HOLBROOK STREET

B1 through B4 were performed on North Holbrook Street. The encountered pavement section consisted of PCC on aggregate base. The PCC thickness ranged from 6 to 8 ¼ inches and averaged 6.8 inches. The aggregate base thickness ranged from 15 ¾ to 24 inches and averaged 20.3 inches. The aggregate base consisted of fine to coarse sand with gravel.

The USACE DCP test results indicated poor to very poor aggregate base support conditions were encountered with in-situ CBR values ranging from 22 to 44 percent.

3.2.2 WEST LIBERTY STREET

B5 through B8 were performed on West Liberty Street. The encountered pavement section consisted of asphalt on aggregate base. The asphalt thickness ranged from 8 to 8 ¾ inches and averaged 8.4 inches. The aggregate base thickness ranged from 7 ½ to 10 ¼ inches and averaged 8.6 inches. The aggregate base consisted of fine to coarse sand with gravel.

The USACE DCP test results indicated marginal to good aggregate base support conditions were encountered with in-situ CBR values ranging from 65 to 95 percent.

3.2.3 ANN ARBOR TRAIL

B9 through B10 were performed on Ann Arbor Trail. The encountered pavement section consisted of asphalt on PCC on aggregate base. The asphalt thickness ranged from 2 ½ to 3 inches and averaged 2.8 inches. The PCC thickness ranged from 6 ½ to 7 inches and averaged 6.8 inches. The aggregate base thickness was 9 ½ inches in both borings. The aggregate base consisted of fine to coarse sand with gravel.

The USACE DCP test results indicated very poor aggregate base support conditions were encountered with in-situ CBR values ranging from 14 to 25 percent.

3.3 SUBGRADE CONDITIONS

The following section includes descriptions of the soils and groundwater conditions encountered in the borings beneath the aggregate base and the subgrade support conditions indicated by the DCP testing.

3.3.1 NORTH HOLBROOK STREET

B1 through B4 were performed on North Holbrook Street. The subgrade generally consisted of approximately 8 to 10 feet of sand or sand with silt beneath the aggregate base at each boring location. Except at B2, beneath the sand, a layer of clayey sand and then a layer of lean clay was encountered to a depth of 18 to 20 feet. At B2, gravel was encountered below the sand to the explored depth. At B3 and B4, sand was encountered beneath the lean clay to the explored depth.

The USACE DCP test results indicated marginal to good subgrade support conditions were encountered with in-situ CBR values ranging from 10 to 18 percent.

Groundwater was encountered at each boring location with a starting depth ranging between 11.5 and 14 feet from the existing ground surface.

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3.3.2 WEST LIBERTY STREET

B5 through B8 were performed on West Liberty Street. The subgrade generally consisted of sand or sand with silt beneath the aggregate base to the explored depth. At B5 and B7, a clayey sand layer was encountered beneath the sand to the explored depth.

The USACE DCP test results indicated marginal to good subgrade support conditions were encountered with in-situ CBR values ranging from 8 to 32 percent.

Groundwater was not encountered at the time of sampling at the B5 through B8 locations.

3.3.3 ANN ARBOR TRAIL

B9 through B10 were performed on Ann Arbor Trail. The subgrade generally consisted of sand or sand with silt beneath the aggregate base to the explored depth. At B9, a clayey sand layer was intermingled between the sand layers.

The USACE DCP test results indicated marginal to good subgrade support conditions were encountered with in-situ CBR values ranging from 7 to 19 percent.

Groundwater was not encountered at the time of sampling at the B9 and B10 locations.

4. PAVEMENT RECOMMENDATIONS

The following section includes descriptions of the traffic conditions and proposed pavement section recommendations for North Holbrook Street and West Liberty Street. We understand that no pavement recommendations are needed for Ann Arbor Trail at this time.

4.1 TRAFFIC INFORMATION

No traffic data was provided to SME.

Based on our experience with similar projects, we assumed a two-way average daily traffic of 700 vehicles with 5 percent being commercial vehicles (garbage/recycle trucks and delivery vehicles) and a 3 percent annual traffic growth rate.

If traffic data becomes available or if our assumptions are found incorrect, SME should be contacted and asked to revise these recommendations accordingly.

4.2 RECOMMENDATIONS FOR PAVEMENT REHABILITATION

Based on the borings performed on North Holbrook Street, the pavement section consists of an average of about 6.8 inches of PCC over about 20.3 inches of gravelly sand base. The subgrade generally consisted of sand with silt over clayey sand and lean clay. The subgrade typically provided marginal to good support conditions in the areas evaluated by the DCP.

Based on the borings performed on West Liberty Street, the pavement section consists of an average of about 8.4 inches of asphalt over about 8.6 inches of gravelly sand base. The subgrade generally consisted of sand, sand with silt, and clayey sand. The subgrade typically provided good support conditions in the areas evaluated by the DCP.

After considering the existing conditions encountered at the boring locations on North Holbrook Street and West Liberty Street and the planned full-depth replacement of the existing water main, a complete reconstruction is recommended.

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A complete reconstruction of the pavements will involve removing the existing pavement section (PCC or asphalt and aggregate base) and constructing a new pavement section. This will allow for a uniform pavement section to be placed across the roadway and allow for the existing sand with gravel aggregate base to be replaced with new crushed limestone aggregate base for better support conditions.

We assume the water main work will utilize open-cut trenching, requiring significant removal of the existing base and subgrade, depending on the excavation method. If the entire width of the road is not removed incidentally to the water main improvements, the subgrade should be cut to allow for the installation of the recommended pavement sections. Any subgrade remaining at the existing elevation should be cut as needed, graded, compacted, and proof rolled after utility improvements have been made and before placing the new pavement section. Undercutting may be required in some areas depending on the amount of existing material left in place (see Section 6.2 for further details).

The pavement layers shown in Table 4 and 5 should then be installed on the prepared subgrade. Additional details regarding pavement construction are presented in Sections 6.3, 6.4, and 6.5 of this report.

4.2.1 NORTH HOLBROOK STREET

TABLE 4: RECOMMENDED PAVEMENT SECTION – NORTH HOLBROOK STREET

LAYER	MATERIAL	MINIMUM THICKNESS (INCHES)
PCC Surface	MDOT Grade 3500	8.0
Aggregate Base	21AA Crushed Limestone[1]	8.0
Class II Sand[2]	Sand Subbase	10.0

NOTES:

[1]Crushed concrete should not be substituted for the recommended crushed limestone due to structural differences of the materials.

[2]This layer may become incidental to required removals for the water main improvements.

4.2.2 WEST LIBERTY STREET

TABLE 5: RECOMMENDED PAVEMENT SECTION – WEST LIBERTY STREET

LAYER	MATERIAL	MINIMUM THICKNESS (INCHES)
HMA Wearing Course	MDOT 5EL	1.5
HMA Leveling Course	MDOT 4EL	2.0
HMA Leveling Course	MDOT 4EL	2.5
Aggregate Base	21AA Crushed Limestone*	10.0

NOTE: *Crushed concrete should not be substituted for the recommended crushed limestone due to structural differences of the materials.

For West Liberty Street, a mill and overlay of the existing roadway may be feasible if the planned utility improvements are not performed (and therefore full-depth pavement replacement is not required). Please contact SME if this occurs and we can provide further recommendations.

5. DRAINAGE CONSIDERATIONS

The pavement system must be properly drained to reduce the potential for frost heaving and softening of the subgrade due to water infiltrating through cracks. Provision of drainage will also extend the life of the pavements by preventing premature pavement failures. The infiltrated water, if not properly drained will adversely affect the long-term pavement performance.

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On North Holbrook Street, the existing subgrade generally consists of sandy soils, with a clay layer at of depth of approximately 14 to 15 feet below the ground surface. On East Liberty Street, no clay layer was encountered to the depth of exploration. We anticipate the existing sandy subgrade soils will drain well enough that supplemental edgedrain piping will not provide much additional drainage. We recommend grading the subgrade and aggregate base layers to shed water towards the curbline of the roads. If wet areas or pooling are noticed within the upper four feet from the road surface during construction, we recommend further investigation. Infiltration testing may be necessary if edgedrains will not be installed and wet areas are present. If edgedrains are installed, they should consist of a 6-inch diameter perforated pipe that is placed in a 1-foot-wide trench extending a minimum of 18 inches below the final subgrade elevation. The trench should be encased with a non-woven geotextile fabric and backfilled with aggregate meeting MDOT 34R requirements. The drainage structures should be surrounded by an underdrain ring and tap the structure in a single location.

6. PAVEMENT CONSTRUCTION NOTES

To provide adequate service life and protect the pavement investment, we present the following construction notes. These notes should be included in the project specifications and should be implemented during the construction activities. These recommendations were developed assuming typical conditions during the June through September construction season. Any substitution of materials or deviation from these stated assumptions should be reviewed by SME.

6.1 ENGINEERED FILL REQUIREMENTS

Any fill placed within roadway areas to adjust site grades or as utility trench backfill should be an approved material, free of frozen soil, organics, or other deleterious materials. If the proposed fill contains more than 4 percent organics, we recommend such materials not be used for engineered fill. The fill should be spread in level layers not exceeding 12 inches in loose thickness (depending on compaction equipment utilized) and be compacted to a minimum of 95 percent of the maximum dry density per ASTM D1557.

We recommend utility trenches within the roadways be backfilled with clean granular (SP or SP-SM) excavation spoils or imported MDOT Class II sand. Sands with high silt contents and clays (designated as “SM”, “SC”, “CL”, and “CH” soils) encountered at the soil borings will likely require moisture conditioning prior to reuse. Additionally, silty sands will become unstable due to the repeated loading of compaction equipment and are frost susceptible. Due to the effort required for drying these soils and the size of the working area for trench backfill required to effectively aerate and compact these cohesive soils with large or specialized compaction equipment, these soils are generally not recommended for reuse as engineered fill in trenches below pavements.

Some of the soil encountered in borings B1 through B4 had high clay content (SC or CL), this soil should be treated as described above. There are pockets of sands that may be suitable to reuse. Primarily the sand encountered in the top 10 feet of each boring (beneath the aggregate base layer). This sand may need to be conditioned before reuse.

6.2 PREPARATION OF EXISTING SUBGRADE

Proper subgrade preparation includes removing unsuitable fill and uniformly compacting the exposed subgrade with appropriate compaction equipment, performing proof roll tests, undercutting overly soft/loose (and/or debris/organic-laden) subgrade, and replacing undercuts with suitable engineered fill. We recommend including a contingency for additional earthwork (e.g., undercutting, in-place compaction, removal of unsuitable fill, importing suitable fill, etc.) that may be required to improve subsurface conditions.

Remove the existing PCC or asphalt, aggregate base and subgrade material to a sufficient depth as required for the installation of the desired pavement cross-section. The upper 12 inches of the exposed subgrade should be compacted to at least 95 percent of the maximum modified Proctor dry density (ASTM D1557). Subgrade preparation shall extend to at least 12 inches beyond the edge of pavement or curb to

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provide support for the outer edges of pavement. The prepared subgrade should be proof rolled using a loaded tandem axle dump truck in the presence of a geotechnical/pavement engineer. Any yielding or loose areas (deflections greater than ¼ inch) should be stabilized by additional compaction, undercutting and replacing with approved fill material or crushed aggregate (MDOT 21AA crushed limestone), or using a geogrid below the aggregate base as dictated by site conditions at time of construction.

Once the subgrade is stable, the pavement layers should be placed soon thereafter to prevent further subgrade disturbance. If additional subgrade disturbance occurs prior to pavement placement, the disturbed areas should be proof rolled again and recompacted or repaired as necessary.

Based on the results of the borings, the subgrade support conditions are generally marginal to good. However, undercutting may be required to stabilize the existing subgrade. Caution should be used as shallow utility feeds may be under the road and impacted by the proposed pavement section.

6.3 AGGREGATE BASE INSTALLATION

The aggregate base should extend to a minimum distance of 12 inches beyond the edge of the pavement to provide support to the outer edges of the pavement. The aggregate base placed on the prepared subgrade surface should be compacted to at least 95 percent of the maximum modified Proctor dry density (ASTM D1557) of the material.

6.4 ASPHALT MATERIALS AND INSTALLATION

The asphalt mixes should be designed for a target of 3.0 percent air voids, and a note added to design drawings indicating such. Each asphalt layer shall be compacted to a density of 94 to 97 percent of the theoretical maximum density as determined by ASTM D2041. A bond coat of SS-1H emulsion shall be required on all asphalt lifts before placing the next lift. The bond coat shall be applied in a uniform manner over the surface at a rate of 0.1 gallon/sy. The final grade of asphalt cement used in the production of asphalt mixtures shall be PG 64-28. The amount of Reclaimed Asphalt Pavement (RAP) should be limited to MDOT Tier 1 (0 to 17 percent RAP binder by weight) for wearing course mixtures and MDOT Tier 2 (18 to 27 percent RAP binder by weight) for leveling course mixtures.

6.5 PCC MATERIAL RECOMMENDATIONS AND INSTALLATION

We recommend MDOT Grade 3500 PCC mix be used and modified as noted below. The coarse aggregate used in the PCC should be from aggregate obtained from natural geologic formations and should meet MDOT 6AA specifications. Ground Granulated Blast Furnace Slag (GGBFS) may be used as a replacement to Portland cement at the rate of 25 to 35 percent by weight to mitigate future alkali silica reactivity (ASR). We recommend the test specified in ASTM C1567 be performed on the PCC mix to evaluate the potential of ASR occurring in the mix. The expansion from the ASTM C1567 test should be less than 0.1 percent. We recommend Type 1 cement to be used in the PCC and the PCC should have minimum compressive strength of 4,000 psi and air content in the range of 5 to 8 percent. If Type 1L cement will be used, the contractor should submit a pavement installation and quality control plan to the design engineer for review and approval prior to proceeding with construction, and care should be taken to address the finishing and curing of the concrete. Best practices for finishing and curing, if available from the cement manufacturer, should be followed.

We recommend transverse contraction joints be spaced a maximum of 16 feet, based on the concrete design thicknesses of 8 to 9 inches. The length to width ratio of individual slabs should not exceed 1.25. At transverse contraction joints, construction joints and full-depth expansion joints, we recommend that 1.25-inch diameter, 18-inch-long, smooth dowels be installed at 12-inch spacing along the joint. We recommend that #5, 30-inch-long, deformed tie bars be installed at 30-inch spacing along the first joint inside from unrestrained outside edge, to laterally restrain the pavement. Tie bars should not be placed within 15 inches of contraction joints, so they do not interfere with joint movement. All tie bars and dowel bars should be epoxy-coated and installed mid-depth within the slabs in accordance with MDOT requirements.

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We recommend a broom finish on the PCC surface and installing a uniform curing compound meeting the requirements of ASTM C309 Type 2 at a rate of one gallon per 225 square feet. We recommend all saw cutting be performed as soon as possible after PCC placement, without damaging the finish of the pavement. We recommend the use of soft-cut saws so that sawing can be performed within four hours after concrete placement. We recommend a saw cut depth of 2.5 inches. We recommend all joints be sealed with hot poured rubber or other approved sealant material per MDOT requirements. Traffic should not be allowed on the concrete pavement until the concrete has reached 75 percent of the design strength.

7. UTILITY CONSTRUCTION NOTES

This section provides general considerations for utility construction.

Ground water was encountered at 11.5 to 14 feet at boring locations B1 through B4. This groundwater may be perched above the clay layer that is present. Deeper excavations (greater than 5 feet), may require aggressive dewatering to temporarily lower the ground water within the vicinity of the excavation, if ground water is encountered.

The contractor must provide a safely sloped excavation or an adequately constructed and braced shoring system in accordance with federal, state, and local safety regulations for individuals working in an excavation that may expose them to the danger of moving ground. Shoring must be used to resist the extra pressure due to the imposed static or dynamic loads from the adjacent streets, as well as where material is to be stored or equipment operated near the excavation.

The contractor should be aware of the locations of existing utilities in the area before excavating and should be prepared to underpin or brace any such excavations near the utilities, as required. Shoring, bracing or underpinning should be properly designed by a qualified professional engineer, and should be installed by a contractor experienced with this type of construction.

Only the amount of trench which can be backfilled on any given day should be excavated. Excavations should not be left open overnight due to the possibility of disturbance of the exposed subgrade and side slopes (for open cut excavations) by inclement weather and/or groundwater, as well as for general safety reasons.

We recommend that as much of the existing pavement remain in place as possible during utility construction to minimize disturbing the existing subgrade. The pavement should be saw cut and removed only over the working excavation, or to the least extent possible. This will minimize the potential for damage to the underlying base and subgrade from construction traffic loading and environmental factors and provide a more stable platform for construction.

8. GENERAL COMMENTS

This report has been prepared in accordance with generally accepted geotechnical engineering and pavement engineering practices to aid in the evaluation of this project and to assist the Engineer in the design of this project. Our General Comments on this report are included in Appendix C. Appendix C also includes the document “Important Information about this Geotechnical Engineering Report” prepared by Geoprofessional Business Association that addresses interpretation of Geotechnical Reports.

9. SIGNATURES

PREPARED BY:

Max W. Reed, EIT
Senior Staff Engineer

REVIEWED BY:

Jeremy S. Friedley, PE
Senior Project Engineer

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APPENDIX A
BORING LOCATION DIAGRAM (FIGURE NOS. 1 THROUGH 4)

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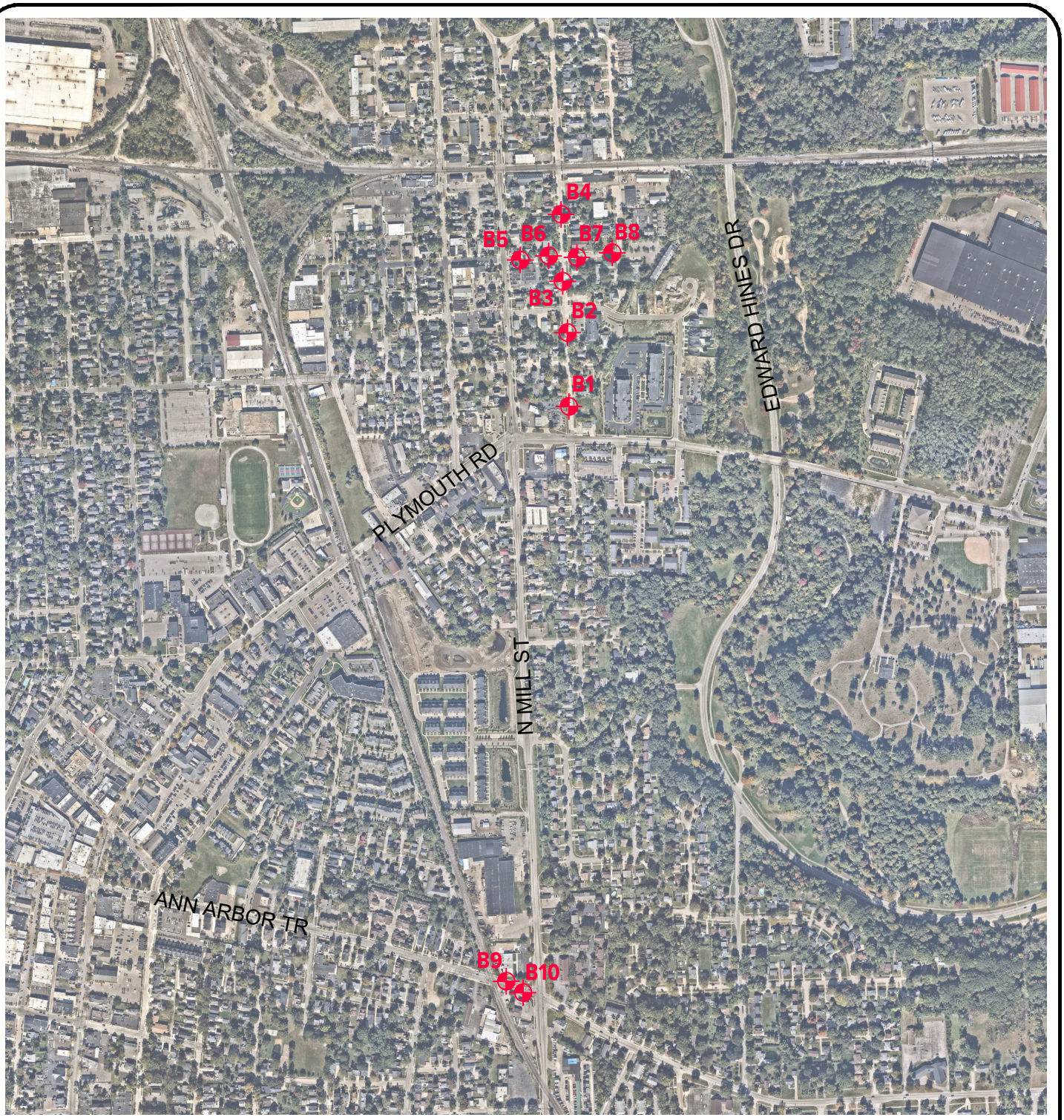

LEGEND

APPROXIMATE BORING LOCATION

NOTE:
1. AERIAL IMAGE TAKEN FROM NEARMAP WITH AN IMAGE DATE OF 10-7-2024.

0' 800' 1600'

GRAPHIC SCALE: 1" = 800'

N W E S

No.	Revision Date		
		Date	1-23-2025
		Drawn By	MNR
		Designed By	MWR
		Scale	AS NOTED
		Project	098742.00

BORING LOCATION DIAGRAM - OVERALL
CITY OF PLYMOUTH 2025 INFRASTRUCTURE PROGRAM
PLYMOUTH, MICHIGAN

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Figure No. 1

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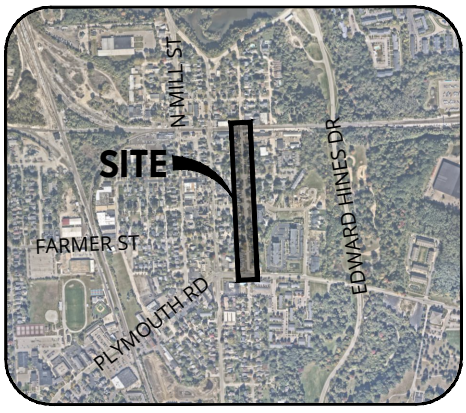

LOCATION MAP

NOT TO SCALE

LEGEND

APPROXIMATE BORING LOCATION

NOTE:
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GRAPHIC SCALE: 1" = 250'

No.	Revision Date		
		Date	1-23-2025
		Drawn By	MNR
		Designed By	MWR
		Scale	AS NOTED
		Project	098742.00

BORING LOCATION DIAGRAM - HOLBROOK STREET CITY OF PLYMOUTH 2025 INFRASTRUCTURE PROGRAM PLYMOUTH, MICHIGAN

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Figure No. 2

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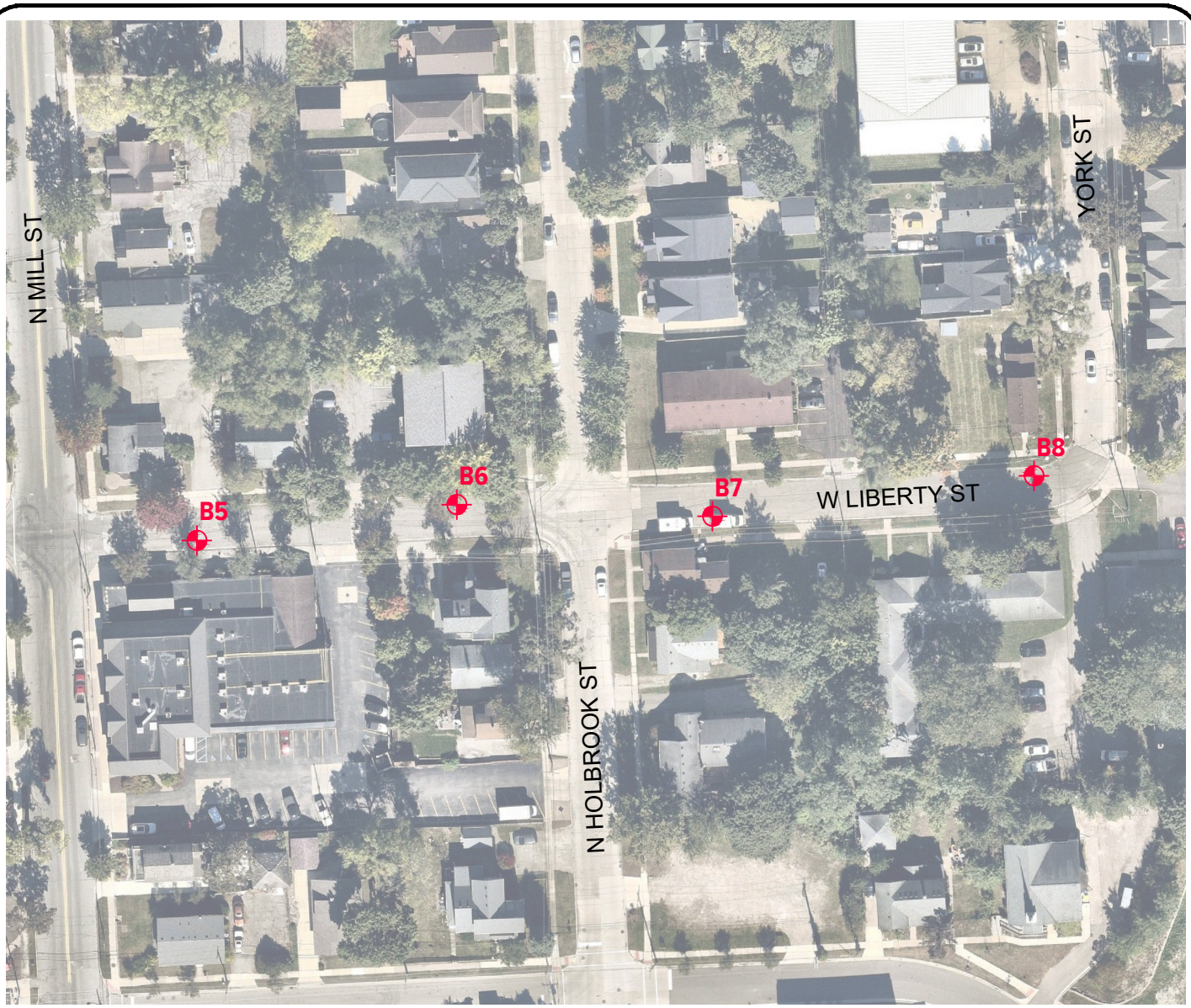

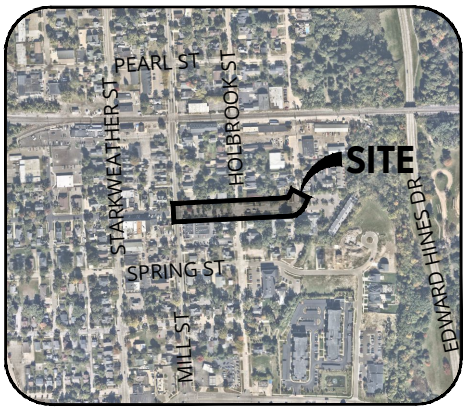

LOCATION MAP

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LEGEND

APPROXIMATE BORING LOCATION

NOTE:
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0' 100' 200'

GRAPHIC SCALE: 1" = 100'

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No.	Revision Date		
		Date	1-23-2025
		Drawn By	MNR
		Designed By	MWR
		Scale	AS NOTED
		Project	098742.00

BORING LOCATION DIAGRAM - LIBERTY STREET CITY OF PLYMOUTH 2025 INFRASTRUCTURE PROGRAM PLYMOUTH, MICHIGAN

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Figure No. 3

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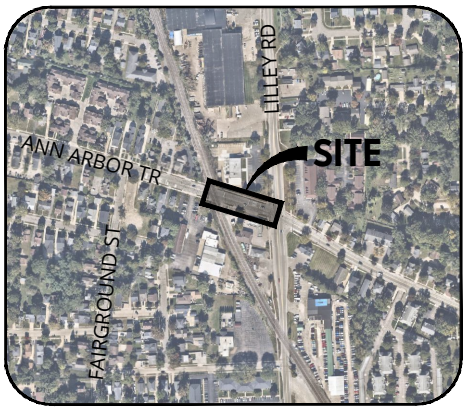

LOCATION MAP

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LEGEND

APPROXIMATE BORING LOCATION

NOTE:
1. AERIAL IMAGE TAKEN FROM NEARMAP WITH AN IMAGE DATE OF 10-7-2024.

0' 100' 200'

GRAPHIC SCALE: 1" = 100'

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No.	Revision Date		
		Date	1-23-2025
		Drawn By	MNR
		Designed By	MWR
		Scale	AS NOTED
		Project	098742.00

BORING LOCATION DIAGRAM - ANN ARBOR TRAIL CITY OF PLYMOUTH 2025 INFRASTRUCTURE PROGRAM PLYMOUTH, MICHIGAN

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Figure No. 4

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APPENDIX B

LABORATORY TESTING PROCEDURES
BORING LOG TERMINOLOGY
BORING LOG AND USACE DATA SHEETS (B1 THROUGH B10)

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LABORATORY TESTING PROCEDURES

VISUAL ENGINEERING CLASSIFICATION

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

MOISTURE CONTENT

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

HAND PENETROMETER TESTS

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

TORVANE SHEAR TESTS

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

LOSS-ON-IGNITION (ORGANIC CONTENT) TESTS

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

ATTERBERG LIMITS TESTS

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

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BORING LOG TERMINOLOGY

UNIFIED SOIL CLASSIFICATION AND SYMBOL CHART

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

OTHER MATERIAL SYMBOLS

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

LABORATORY CLASSIFICATION CRITERIA

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

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

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

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

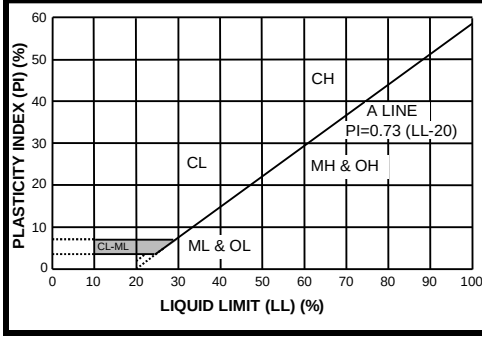
If the fines are CL-ML:

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

PARTICLE SIZES

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

PLASTICITY CHART



VISUAL MANUAL PROCEDURE

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

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

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

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

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

DRILLING AND SAMPLING ABBREVIATIONS

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

OTHER ABBREVIATIONS

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

DEPOSITIONAL FEATURES

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

DESCRIPTION OF RELATIVE QUANTITIES

The visual-manual procedure uses the following terms to describe the relative quantities of notable foreign materials, gravel, sand or fines:

Trace	–	particles are present but estimated to be less than 5%
Few	–	5 to 10%
Little	–	15 to 25%
Some	–	30 to 45%
Mostly	–	50 to 100%

CLASSIFICATION TERMINOLOGY AND CORRELATIONS

Cohesionless Soils

Relative Density	N_{60} (N-Value) (Blows per foot)
Very Loose	0 to 4
Loose	5 to 10
Medium Dense	11 to 30
Dense	31 to 50
Very Dense	51 to 80
Extremely Dense	Over 81

Cohesive Soils

Consistency	N_{60} (N-Value) (Blows per foot)	Undrained Shear Strength (kips/ft^2)
Very Soft	<2	0.25 or less
Soft	2 - 4	> 0.25 to 0.50
Medium	5 - 8	> 0.50 to 1.0
Stiff	9 - 15	> 1.0 to 2.0
Very Stiff	16 - 30	> 2.0 to 4.0
Hard	> 30	> 4.0 or greater

Standard Penetration 'N-Value' = Blows per foot of a 140-pound hammer falling 30 inches on a 2-inch O.D. split barrel sampler, except where noted. N60 values as reported on boring logs represent raw N-values corrected for hammer efficiency only.

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BORING LOG AND USACE DCP DATA

PROJECT NAME: City of Plymouth 2025 Infrastructure Program
PROJECT NO.: 098742.00
LOCATION: Plymouth, MI
CLIENT: Wade Trim
DATE: 1/7/25
DRILLED BY: JSM/ZAH
LOGGED BY: JSM/MWR

PROBE/CORE: B1
STREET: North Holbrook Street
LANE: South Bound
OFFSET: 8' East of West Curb

PAVEMENT AND SUBSURFACE CONDITIONS

Layer, in.		Layer Thickness, in.	Description	Comment
From	To			
0	8.25	8.25	Portland Cement Concrete	Intact
8.25	24	15.75	Fine to Coarse SAND with Gravel - Brown - Moist	(SP/ Agg Base)
24	37	13	Fine to Medium SAND with Silt - Brown - Moist	(SP-SM)
37	138	101	Fine SAND - Brown/Gray - Moist	(SP)
138	180	42	CLAYEY SAND - Brown/Gray - Wet	(SC)
180	240	60	LEAN CLAY with Sand - Gray - Hard	(CL) At 185" Qp= 4.5 ksf; MC= 14%
			End of Boring at 240" Below Pavement Surface	

Depth to Groundwater From Ground Surface
Upon Completion: 11.5'

NOTES:
1) The indicated stratification lines are approximate and in situ transition between materials may be gradual.
2) Qp = Estimated shear strength from hand penetrometer; MC = Moisture content.

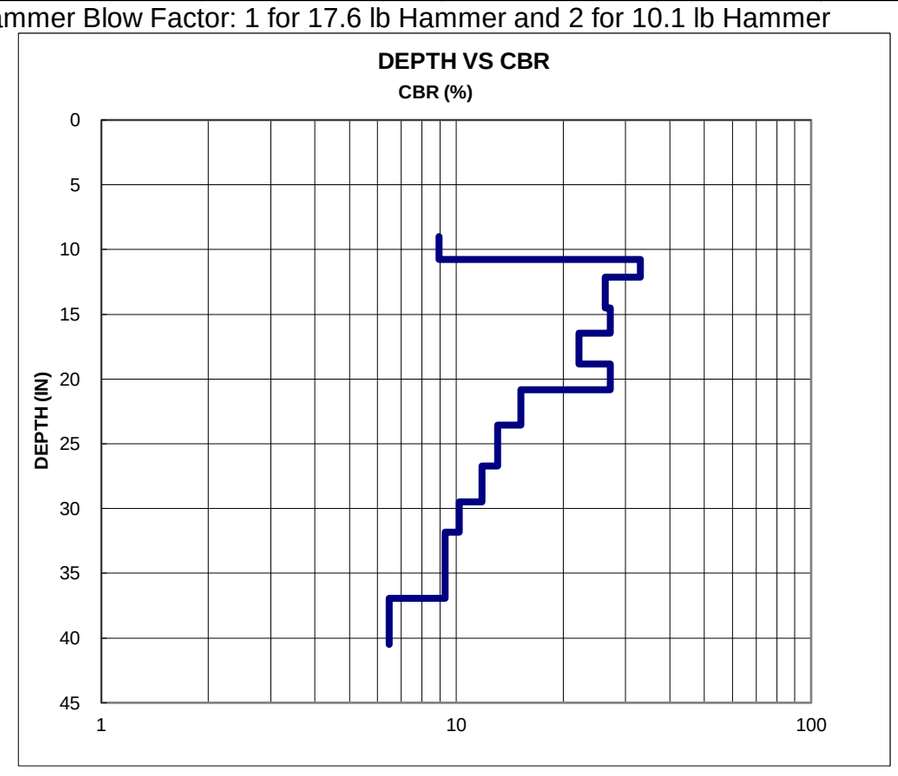
DCP TEST RESULTS

Depth to start of test from ex. ground surface: 9 inches

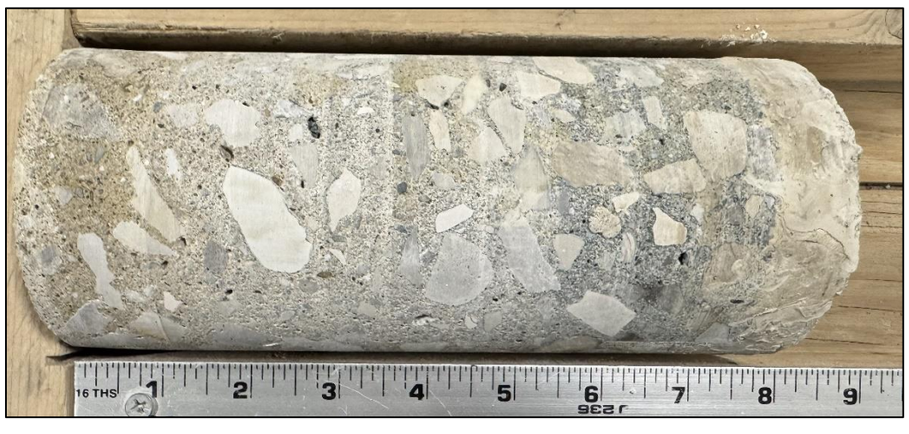
No. of Blows	Pen. (mm)	Blow Set (mm)	Pen./Blow (mm)	Blow Factor	Depth from Surface (inches)	CBR (%)	Comment	Soil Type	Average CBR (%)
0	330								
2	375	45	23	1	10.8	8.9	Very Poor	Agg Base	
5	410	35	7	1	12.1	33.0	Poor	Agg Base	
7	470	60	9	1	14.5	26.3	Very Poor	Agg Base	
6	520	50	8	1	16.5	27.2	Very Poor	Agg Base	
6	580	60	10	1	18.8	22.2	Very Poor	Agg Base	
6	630	50	8	1	20.8	27.2	Very Poor	Agg Base	
5	700	70	14	1	23.6	15.2	Very Poor	Agg Base	22.3
5	780	80	16	1	26.7	13.1	Good	Subgrade	
4	850	70	18	1	29.5	11.8	Good	Subgrade	
3	910	60	20	1	31.8	10.2	Good	Subgrade	
3	975	65	22	1	34.4	9.3	Marginal	Subgrade	
3	1040	65	22	1	37.0	9.3	Marginal	Subgrade	
3	1130	90	30	1	40.5	6.5	Marginal	Subgrade	10

Hammer Blow Factor: 1 for 17.6 lb Hammer and 2 for 10.1 lb Hammer

*CBR breaklines are based on blow counts performed prior to sampling. Depths are approximate.



Support Conditions	CBR Range for Aggregate Base Materials (%)	CBR Range for Subgrade Soils (%)
Good	>80	>10
Marginal	60 to 80	5 to 10
Poor	30 to 60	3 to 5
Very Poor	<30	<3



**Core picture shows approximate thickness

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BORING LOG AND USACE DCP DATA

PROJECT NAME: City of Plymouth 2025 Infrastructure Program
PROJECT NO.: 098742.00
LOCATION: Plymouth, MI
CLIENT: Wade Trim
DATE: 1/7/25
DRILLED BY: JSM/ZAH
LOGGED BY: JSM/MWR

PROBE/CORE: B2
STREET: North Holbrook Street
LANE: North Bound
OFFSET: 21' East of West Curb

PAVEMENT AND SUBSURFACE CONDITIONS

Layer, in.		Layer Thickness, in.	Description	Comment
From	To			
0	6.5	6.5	Portland Cement Concrete	Intact
6.5	24	17.5	Fine to Coarse SAND with Gravel - Brown - Moist	(SP/ Agg Base)
24	126	102	Fine to Medium SAND with Silt - Brown - Moist	(SP-SM)
126	168	42	Fine SAND - Brown/Gray - Moist	(SP)
168	240	72	GRAVEL with Sand - Brown - Wet	(GP)
			End of Boring at 240" Below Pavement Surface	

Depth to Groundwater From Ground Surface
Upon Completion: 14'

NOTES:
1) The indicated stratification lines are approximate and in situ transition between materials may be gradual.

DCP TEST RESULTS

Depth to start of test from ex. ground surface: 7.5 inches

No. of Blows	Pen. (mm)	Blow Set (mm)	Pen./Blow (mm)	Blow Factor	Depth from Surface (inches)	CBR (%)	Comment	Soil Type	Average CBR (%)
0	290	0							
5	345	55	11	1	9.7	19.9	Very Poor	Agg Base	
6	380	35	6	1	11.0	40.5	Poor	Agg Base	
6	430	50	8	1	13.0	27.2	Very Poor	Agg Base	
6	470	40	7	1	14.6	34.9	Poor	Agg Base	
10	525	55	6	1	16.8	43.3	Poor	Agg Base	
10	580	55	6	1	18.9	43.3	Poor	Agg Base	
10	660	80	8	1	22.1	28.4	Very Poor	Agg Base	
5	700	40	8	1	23.6	28.4	Very Poor	Agg Base	32.8
5	780	80	16	1	26.8	13.1	Good	Subgrade	
4	845	65	16	1	29.4	12.9	Good	Subgrade	
4	910	65	16	1	31.9	12.9	Good	Subgrade	
4	990	80	20	1	35.1	10.2	Good	Subgrade	
2	1050	60	30	1	37.4	6.5	Marginal	Subgrade	11.2

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BORING LOG AND USACE DCP DATA

PROJECT NAME: City of Plymouth 2025 Infrastructure Program
PROJECT NO.: 098742.00
LOCATION: Plymouth, MI
CLIENT: Wade Trim
DATE: 1/7/25
DRILLED BY: JSM/ZAH
LOGGED BY: JSM/MWR

PROBE/CORE: B3
STREET: North Holbrook Street
LANE: South Bound
OFFSET: 6' East of West Curb

PAVEMENT AND SUBSURFACE CONDITIONS

Layer, in.		Layer Thickness, in.	Description	Comment
From	To			
0	6.25	6.25	Portland Cement Concrete	Intact
6.25	30	23.75	Fine to Coarse SAND with Gravel - Brown - Moist	(SP/ Agg Base)
30	102	72	Fine to Medium SAND with Gravel - Brown/Gray - Moist	(SP)
102	138	36	Fine SAND - Brown/Gray - Moist	(SP)
138	172	34	CLAYEY SAND - Brown/Gray - Wet	(SC)
172	216	44	LEAN CLAY with Sand - Brown - Very Stiff	(CL) At 180" Qp= 2.5 ksf; MC= 21%
216	240	24	Fine SAND - Brown/Gray - Wet	(SP)
			End of Boring at 240" Below Pavement Surface	

Depth to Groundwater From Ground Surface
Upon Completion: 11.5'

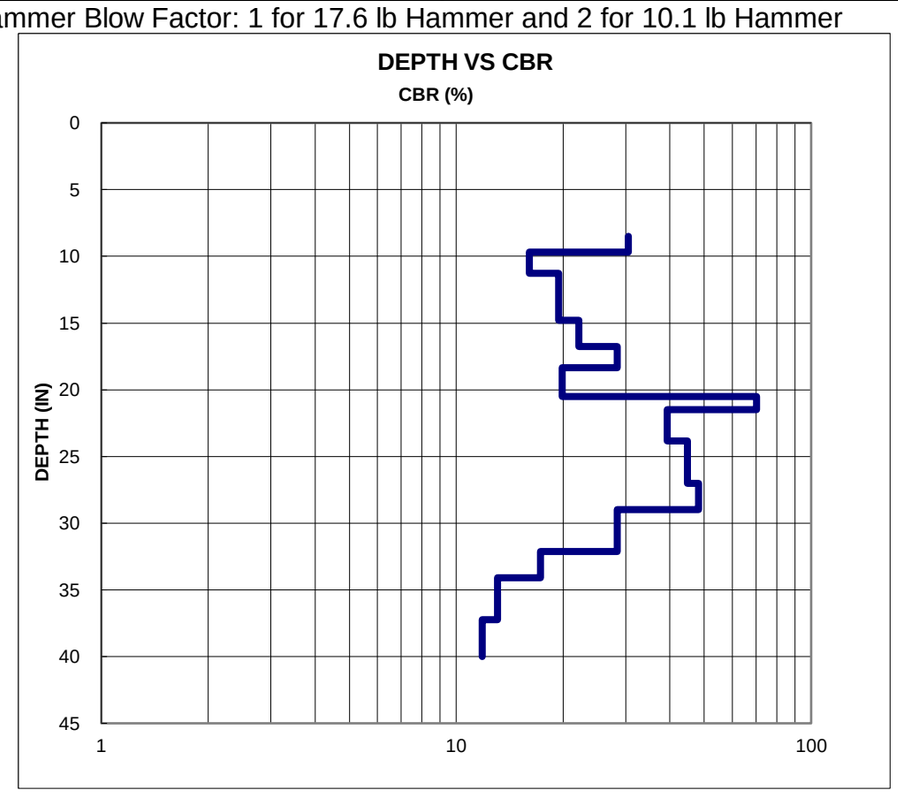
NOTES:
1) The indicated stratification lines are approximate and in situ transition between materials may be gradual.
2) Qp = Estimated shear strength from hand penetrometer; MC = Moisture content.

DCP TEST RESULTS

Depth to start of test from ex. ground surface: 8.5 inches

No. of Blows	Pen. (mm)	Blow Set (mm)	Pen./Blow (mm)	Blow Factor	Depth from Surface (inches)	CBR (%)	Comment	Soil Type	Average CBR (%)
0	290	0							
4	320	30	8	1	9.7	30.6	Poor	Agg Base	
3	360	40	13	1	11.3	16.0	Very Poor	Agg Base	
4	405	45	11	1	13.0	19.4	Very Poor	Agg Base	
4	450	45	11	1	14.8	19.4	Very Poor	Agg Base	
5	500	50	10	1	16.8	22.2	Very Poor	Agg Base	
5	540	40	8	1	18.3	28.4	Very Poor	Agg Base	
5	595	55	11	1	20.5	19.9	Very Poor	Agg Base	
7	620	25	4	1	21.5	70.2	Marginal	Agg Base	
10	680	60	6	1	23.9	39.3	Poor	Agg Base	
15	760	80	5	1	27.0	44.8	Poor	Agg Base	
10	810	50	5	1	29.0	48.1	Poor	Agg Base	32.2
10	890	80	8	1	32.1	28.4	Good	Subgrade	
4	940	50	13	1	34.1	17.3	Good	Subgrade	
5	1020	80	16	1	37.2	13.1	Good	Subgrade	
4	1090	70	18	1	40.0	11.8	Good	Subgrade	17.9

Hammer Blow Factor: 1 for 17.6 lb Hammer and 2 for 10.1 lb Hammer



*CBR breaklines are based on blow counts performed prior to sampling. Depths are approximate.

Support Conditions	CBR Range for Aggregate Base Materials (%)	CBR Range for Subgrade Soils (%)
Good	>80	>10
Marginal	60 to 80	5 to 10
Poor	30 to 60	3 to 5
Very Poor	<30	<3

**Core picture shows approximate thickness

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BORING LOG AND USACE DCP DATA

PROJECT NAME: City of Plymouth 2025 Infrastructure Program
PROJECT NO.: 098742.00
LOCATION: Plymouth, MI
CLIENT: Wade Trim
DATE: 1/7/25
DRILLED BY: JSM/ZAH
LOGGED BY: JSM/MWR

PROBE/CORE: B4
STREET: North Holbrook Street
LANE: North Bound
OFFSET: 18' East of West Curb

PAVEMENT AND SUBSURFACE CONDITIONS

Layer, in.		Layer Thickness, in.	Description	Comment
From	To			
0	6	6	Portland Cement Concrete	Intact
6	30	24	Fine to Coarse SAND with Gravel - Brown - Moist	(SP/ Agg Base)
30	72	42	Fine to Medium SAND with Silt - Trace Gravel - Brown - Moist	(SP-SM)
72	138	66	Fine to Medium SAND with Gravel - Brown/Gray - Moist	(SP)
138	168	30	CLAYEY SAND - Brown/Gray - Wet	(SC)
168	216	48	LEAN CLAY with Sand - Brown - Very Stiff	(CL) At 175" Qp= 2.5 ksf; MC= 20%
216	240	24	Fine SAND - Brown/Gray - Wet	(SP)
			End of Boring at 240" Below Pavement Surface	

Depth to Groundwater From Ground Surface
Upon Completion: 11.5'

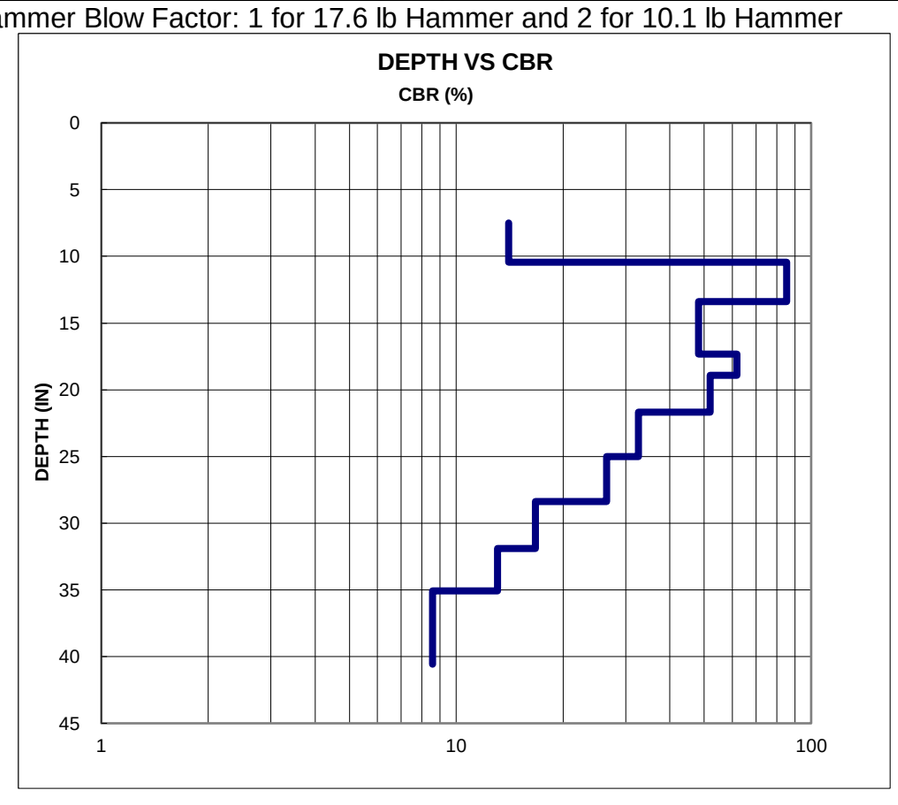
NOTES:
1) The indicated stratification lines are approximate and in situ transition between materials may be gradual.
2) Qp = Estimated shear strength from hand penetrometer; MC = Moisture content.

DCP TEST RESULTS

Depth to start of test from ex. ground surface: 7.5 inches

No. of Blows	Pen. (mm)	Blow Set (mm)	Pen./Blow (mm)	Blow Factor	Depth from Surface (inches)	CBR (%)	Comment	Soil Type	Average CBR (%)
0	230	0							
5	305	75	15	1	10.5	14.1	Very Poor	Agg Base	
10	335	30	3	1	11.6	85.3	Good	Agg Base	
15	380	45	3	1	13.4	85.3	Good	Agg Base	
10	430	50	5	1	15.4	48.1	Poor	Agg Base	
10	480	50	5	1	17.3	48.1	Poor	Agg Base	
10	520	40	4	1	18.9	61.8	Marginal	Agg Base	
15	590	70	5	1	21.7	52.0	Poor	Agg Base	
12	675	85	7	1	25.0	32.6	Poor	Agg Base	
10	760	85	9	1	28.4	26.6	Very Poor	Agg Base	44.2
7	850	90	13	1	31.9	16.7	Good	Subgrade	
5	930	80	16	1	35.1	13.1	Good	Subgrade	
3	1000	70	23	1	37.8	8.6	Marginal	Subgrade	
3	1070	70	23	1	40.6	8.6	Marginal	Subgrade	12.1

Hammer Blow Factor: 1 for 17.6 lb Hammer and 2 for 10.1 lb Hammer



*CBR breaklines are based on blow counts performed prior to sampling. Depths are approximate.

Support Conditions	CBR Range for Aggregate Base Materials (%)	CBR Range for Subgrade Soils (%)
Good	>80	>10
Marginal	60 to 80	5 to 10
Poor	30 to 60	3 to 5
Very Poor	<30	<3

**Core picture shows approximate thickness

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BORING LOG AND USACE DCP DATA

PROJECT NAME: City of Plymouth 2025 Infrastructure Program
PROJECT NO.: 098742.00
LOCATION: Plymouth, MI
CLIENT: Wade Trim
DATE: 1/7/25
DRILLED BY: JSM/ZAH
LOGGED BY: JSM/MWR

PROBE/CORE: B5
STREET: East Liberty Street
LANE: East Bound
OFFSET: 7' North of South Curb

PAVEMENT AND SUBSURFACE CONDITIONS

Layer, in.		Layer Thickness, in.	Description	Comment
From	To			
0	1.25	1.25	Asphalt Pavement Wearing Course	Intact - Slight Voids
1.25	3.75	2.5	Asphalt Pavement Leveling Course	Intact - Slight Voids
3.75	8.25	4.5	Asphalt Pavement Leveling Course	Intact - Slight Voids
8.25	16	7.75	Fine to Coarse SAND with Gravel - Brown - Moist	(SP/ Agg Base)
16	33	17	Fine to Medium SAND with Silt - Brown - Moist	(SP-SM)
33	48	15	CLAYEY SAND with Gravel - Brown - Moist	(SC)
			End of Boring at 48" Below Pavement Surface	

Depth to Groundwater From Ground Surface
Upon Completion: Not Encountered

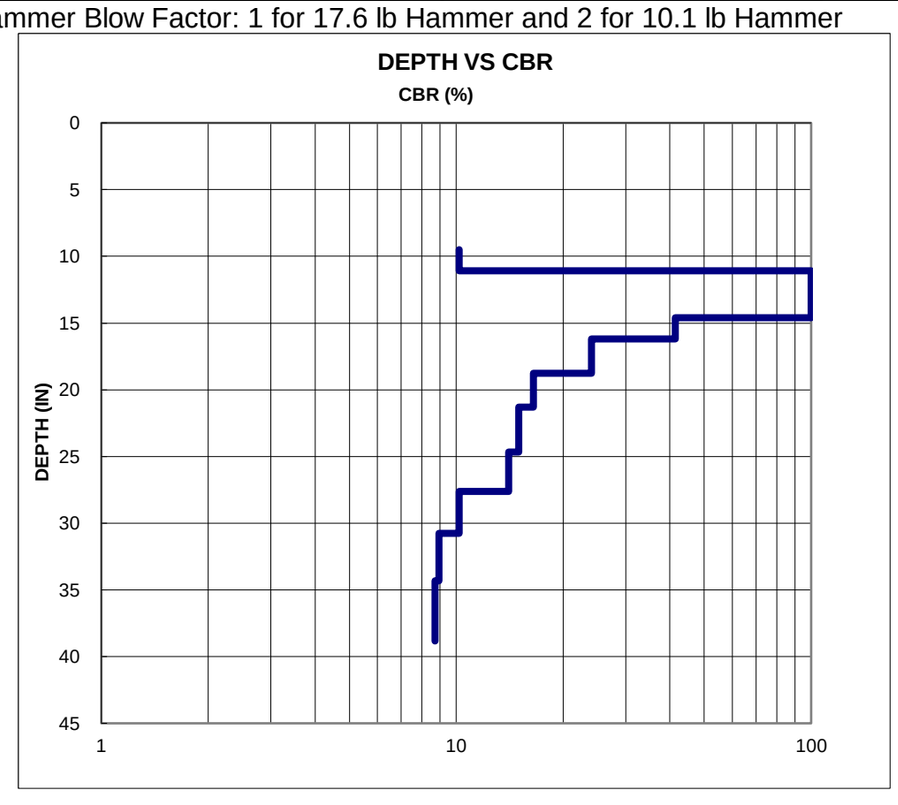
NOTES:
1) The indicated stratification lines are approximate and in situ transition between materials may be gradual.

DCP TEST RESULTS

Depth to start of test from ex. ground surface: 9.5 inches

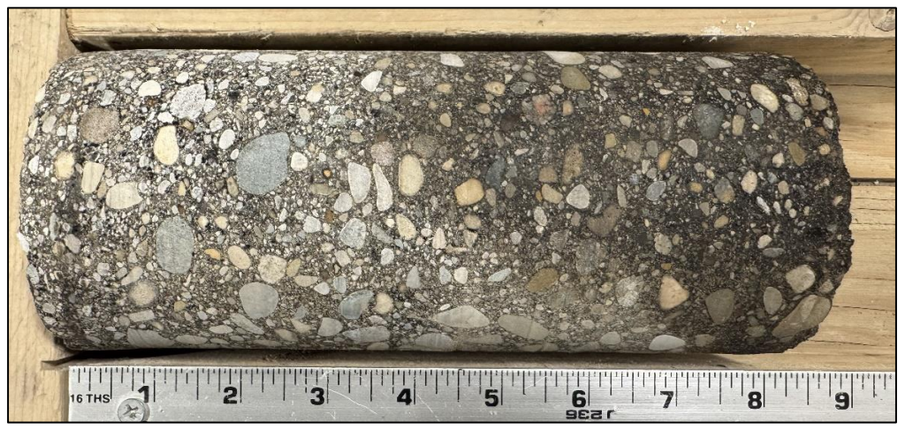
No. of Blows	Pen. (mm)	Blow Set (mm)	Pen./Blow (mm)	Blow Factor	Depth from Surface (inches)	CBR (%)	Comment	Soil Type	Average CBR (%)
0	320	0							
2	360	40	20	1	11.1	10.2	Very Poor	Agg Base	
20	400	40	2	1	12.6	100.0	Good	Agg Base	
20	450	50	3	1	14.6	100.0	Good	Agg Base	
7	490	40	6	1	16.2	41.5	Poor	Agg Base	65.1
7	555	65	9	1	18.8	24.1	Good	Subgrade	
5	620	65	13	1	21.3	16.5	Good	Subgrade	
6	705	85	14	1	24.7	15.0	Good	Subgrade	
5	780	75	15	1	27.6	14.1	Good	Subgrade	
4	860	80	20	1	30.8	10.2	Good	Subgrade	15.6
4	950	90	23	1	34.3	8.9	Marginal	Subgrade	
5	1065	115	23	1	38.8	8.7	Marginal	Subgrade	8.8

Hammer Blow Factor: 1 for 17.6 lb Hammer and 2 for 10.1 lb Hammer



*CBR breaklines are based on blow counts performed prior to sampling. Depths are approximate.

Support Conditions	CBR Range for Aggregate Base Materials (%)	CBR Range for Subgrade Soils (%)
Good	>80	>10
Marginal	60 to 80	5 to 10
Poor	30 to 60	3 to 5
Very Poor	<30	<3



**Core picture shows approximate thickness

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BORING LOG AND USACE DCP DATA

PROJECT NAME: City of Plymouth 2025 Infrastructure Program
PROJECT NO.: 098742.00
LOCATION: Plymouth, MI
CLIENT: Wade Trim
DATE: 1/7/25
DRILLED BY: JSM/ZAH
LOGGED BY: JSM/MWR

PROBE/CORE: B6
STREET: East Liberty Street
LANE: West Bound
OFFSET: 21' North of South Curb

PAVEMENT AND SUBSURFACE CONDITIONS

Layer, in.		Layer Thickness, in.	Description	Comment
From	To			
0	1.5	1.5	Asphalt Pavement Wearing Course	Intact - Slight Voids
1.5	4.75	3.25	Asphalt Pavement Leveling Course	Intact - Slight Voids
4.75	8.75	4	Asphalt Pavement Leveling Course	Intact - Slight Voids
8.75	19	10.25	Fine to Coarse SAND with Gravel - Brown - Moist	(SP/ Agg Base)
19	48	29	Fine SAND with Gravel - Brown/Gray - Moist	(SP)
			End of Boring at 48" Below Pavement Surface	

Depth to Groundwater From Ground Surface
Upon Completion: Not Encountered

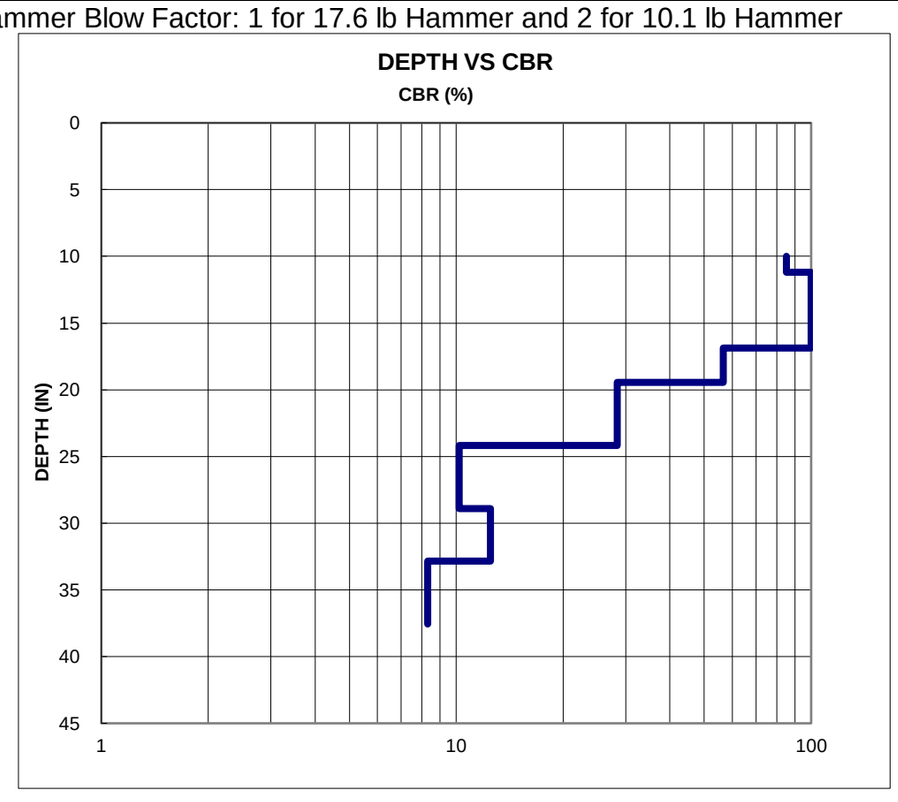
NOTES:
1) The indicated stratification lines are approximate and in situ transition between materials may be gradual.

DCP TEST RESULTS

Depth to start of test from ex. ground surface: 10 inches

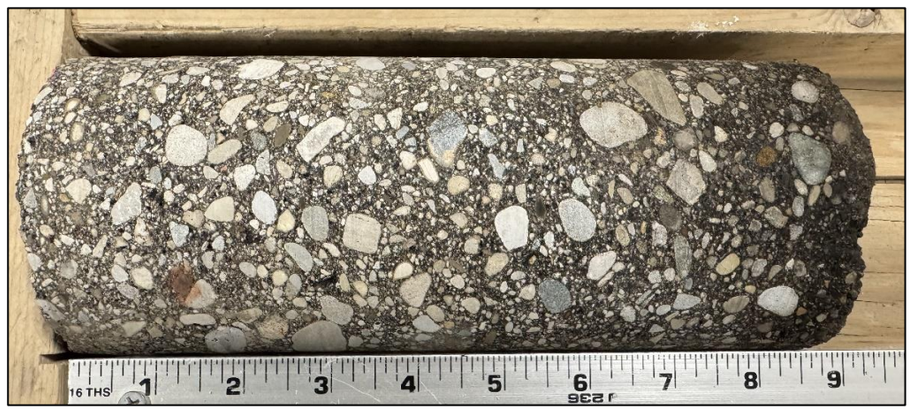
No. of Blows	Pen. (mm)	Blow Set (mm)	Pen./Blow (mm)	Blow Factor	Depth from Surface (inches)	CBR (%)	Comment	Soil Type	Average CBR (%)
0	350	0							
10	380	30	3	1	11.2	85.3	Good	Agg Base	
40	410	30	1	1	12.4	100.0	Good	Agg Base	
40	440	30	1	1	13.5	100.0	Good	Agg Base	
40	480	40	1	1	15.1	100.0	Good	Agg Base	
20	525	45	2	1	16.9	100.0	Good	Agg Base	
15	590	65	4	1	19.4	56.5	Poor	Agg Base	86.4
15	710	120	8	1	24.2	28.4	Good	Subgrade	
6	830	120	20	1	28.9	10.2	Good	Subgrade	
6	930	100	17	1	32.8	12.5	Good	Subgrade	
5	1050	120	24	1	37.6	8.3	Marginal	Subgrade	15

Hammer Blow Factor: 1 for 17.6 lb Hammer and 2 for 10.1 lb Hammer



*CBR breaklines are based on blow counts performed prior to sampling. Depths are approximate.

Support Conditions	CBR Range for Aggregate Base Materials (%)	CBR Range for Subgrade Soils (%)
Good	>80	>10
Marginal	60 to 80	5 to 10
Poor	30 to 60	3 to 5
Very Poor	<30	<3



**Core picture shows approximate thickness

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BORING LOG AND USACE DCP DATA

PROJECT NAME: City of Plymouth 2025 Infrastructure Program
PROJECT NO.: 098742.00
LOCATION: Plymouth, MI
CLIENT: Wade Trim
DATE: 1/7/25
DRILLED BY: JSM/ZAH
LOGGED BY: JSM/MWR

PROBE/CORE: B7
STREET: East Liberty Street
LANE: East Bound
OFFSET: 6' North of South Curb

PAVEMENT AND SUBSURFACE CONDITIONS

Layer, in.		Layer Thickness, in.	Description	Comment
From	To			
0	1.25	1.25	Asphalt Pavement Wearing Course	Intact - Slight Voids
1.25	4.25	3	Asphalt Pavement Leveling Course	Intact - Slight Voids
4.25	8.5	4.25	Asphalt Pavement Leveling Course	Intact - Slight Voids
8.5	16	7.5	Fine to Coarse SAND with Gravel - Brown - Moist	(SP/ Agg Base)
16	28	12	Fine to Medium SAND with Silt - Brown - Moist	(SP-SM)
28	48	20	CLAYEY SAND with Gravel - Brown - Moist	(SC)
			End of Boring at 48" Below Pavement Surface	

Depth to Groundwater From Ground Surface
Upon Completion: Not Encountered

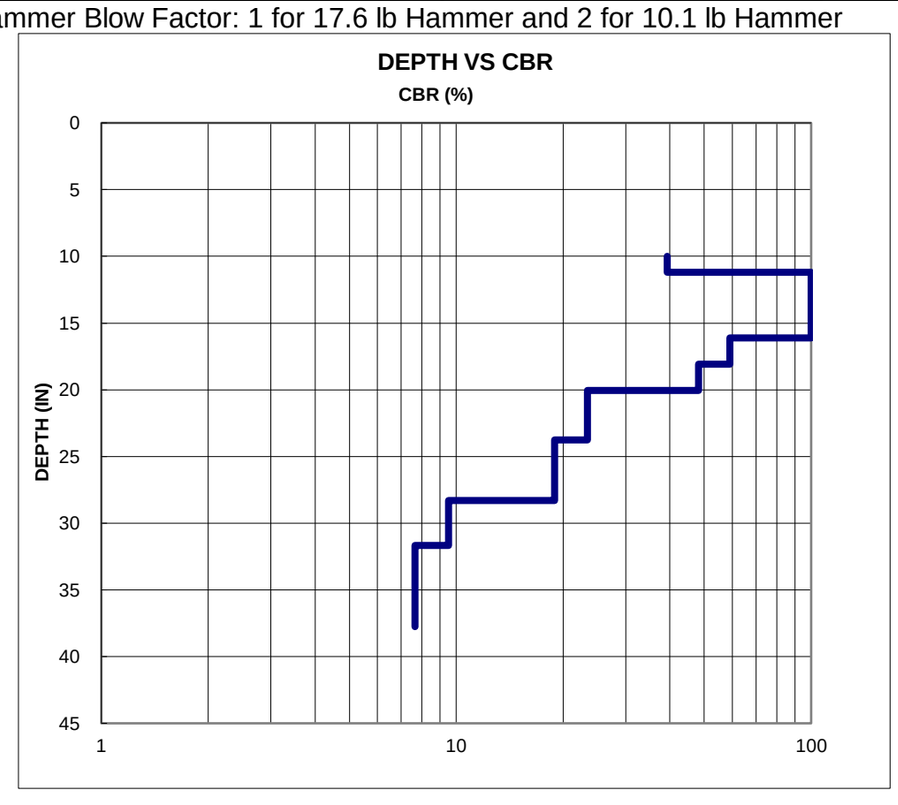
NOTES:
1) The indicated stratification lines are approximate and in situ transition between materials may be gradual.

DCP TEST RESULTS

Depth to start of test from ex. ground surface: 10 inches

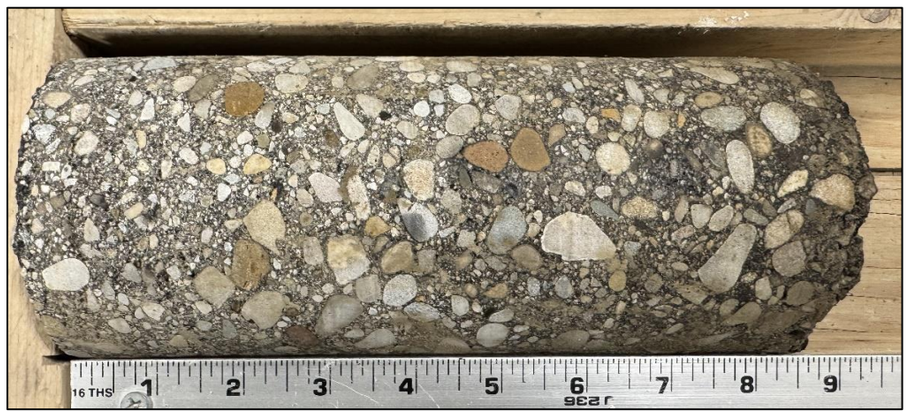
No. of Blows	Pen. (mm)	Blow Set (mm)	Pen./Blow (mm)	Blow Factor	Depth from Surface (inches)	CBR (%)	Comment	Soil Type	Average CBR (%)
0	345	0							
5	375	30	6	1	11.2	39.3	Poor	Agg Base	
40	425	50	1	1	13.1	100.0	Good	Agg Base	
20	450	25	1	1	14.1	100.0	Good	Agg Base	
25	500	50	2	1	16.1	100.0	Good	Agg Base	88.2
12	550	50	4	1	18.1	59.0	Good	Subgrade	
10	600	50	5	1	20.0	48.1	Good	Subgrade	
10	695	95	10	1	23.8	23.5	Good	Subgrade	
10	810	115	12	1	28.3	18.9	Good	Subgrade	31.5
4	895	85	21	1	31.7	9.5	Marginal	Subgrade	
6	1050	155	26	1	37.8	7.7	Marginal	Subgrade	8.3

Hammer Blow Factor: 1 for 17.6 lb Hammer and 2 for 10.1 lb Hammer



*CBR breaklines are based on blow counts performed prior to sampling. Depths are approximate.

Support Conditions	CBR Range for Aggregate Base Materials (%)	CBR Range for Subgrade Soils (%)
Good	>80	>10
Marginal	60 to 80	5 to 10
Poor	30 to 60	3 to 5
Very Poor	<30	<3



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BORING LOG AND USACE DCP DATA

PROJECT NAME: City of Plymouth 2025 Infrastructure Program
PROJECT NO.: 098742.00
LOCATION: Plymouth, MI
CLIENT: Wade Trim
DATE: 1/7/25
DRILLED BY: JSM/ZAH
LOGGED BY: JSM/MWR

PROBE/CORE: B8
STREET: East Liberty Street
LANE: West Bound
OFFSET: 16' North of South Curb

PAVEMENT AND SUBSURFACE CONDITIONS

Layer, in.		Layer Thickness, in.	Description	Comment
From	To			
0	1.25	1.25	Asphalt Pavement Wearing Course	Intact - Slight Voids
1.25	4.5	3.25	Asphalt Pavement Leveling Course	Intact - Slight Voids
4.5	8	3.5	Asphalt Pavement Leveling Course	Intact - Slight Voids
8	17	9	Fine to Coarse SAND with Gravel - Brown - Moist	(SP/ Agg Base)
17	37	20	Fine to Medium SAND with Silt - Brown - Moist	(SP-SM)
37	48	11	Fine SAND - Brown/Gray - Moist	(SP)
			End of Boring at 48" Below Pavement Surface	

Depth to Groundwater From Ground Surface
Upon Completion: Not Encountered

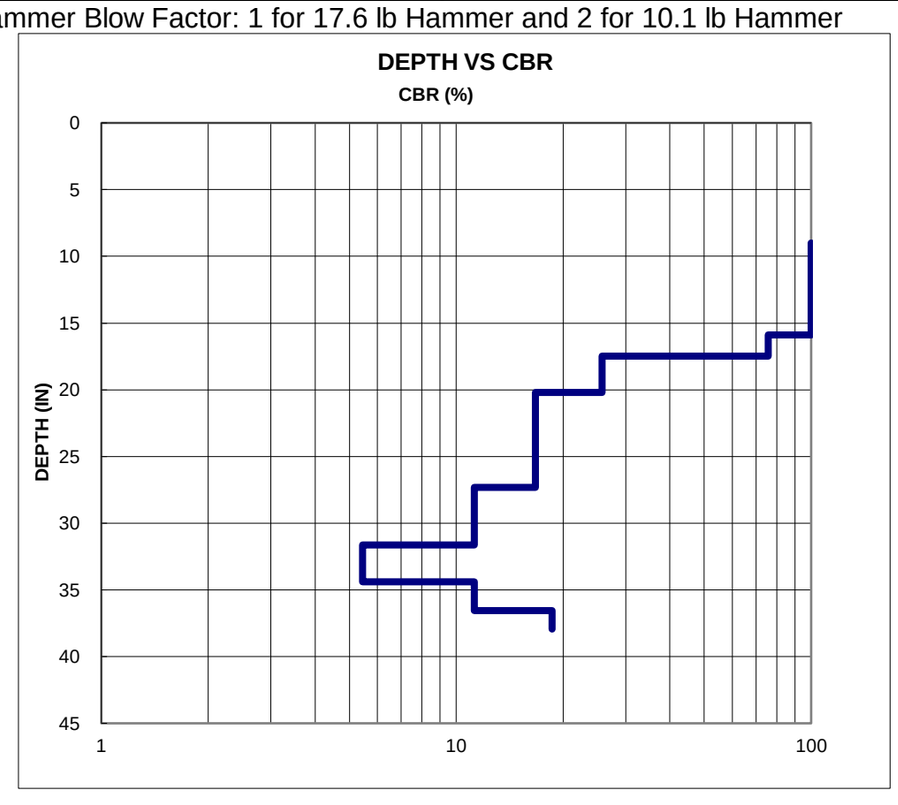
NOTES:
1) The indicated stratification lines are approximate and in situ transition between materials may be gradual.

DCP TEST RESULTS

Depth to start of test from ex. ground surface: 9 inches

No. of Blows	Pen. (mm)	Blow Set (mm)	Pen./Blow (mm)	Blow Factor	Depth from Surface (inches)	CBR (%)	Comment	Soil Type	Average CBR (%)
0	305	0							
15	340	35	2	1	10.4	100.0	Good	Agg Base	
40	380	40	1	1	12.0	100.0	Good	Agg Base	
40	420	40	1	1	13.5	100.0	Good	Agg Base	
40	480	60	2	1	15.9	100.0	Good	Agg Base	
12	520	40	3	1	17.5	75.8	Marginal	Agg Base	95.5
8	590	70	9	1	20.2	25.7	Good	Subgrade	
7	680	90	13	1	23.8	16.7	Good	Subgrade	
7	770	90	13	1	27.3	16.7	Good	Subgrade	
6	880	110	18	1	31.6	11.2	Good	Subgrade	
2	950	70	35	1	34.4	5.4	Marginal	Subgrade	
3	1005	55	18	1	36.6	11.2	Good	Subgrade	
3	1040	35	12	1	37.9	18.6	Good	Subgrade	14.8

Hammer Blow Factor: 1 for 17.6 lb Hammer and 2 for 10.1 lb Hammer



*CBR breaklines are based on blow counts performed prior to sampling. Depths are approximate.

Support Conditions	CBR Range for Aggregate Base Materials (%)	CBR Range for Subgrade Soils (%)
Good	>80	>10
Marginal	60 to 80	5 to 10
Poor	30 to 60	3 to 5
Very Poor	<30	<3

**Core picture shows approximate thickness

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BORING LOG AND USACE DCP DATA

PROJECT NAME: City of Plymouth 2025 Infrastructure Program
PROJECT NO.: 098742.00
LOCATION: Plymouth, MI
CLIENT: Wade Trim
DATE: 1/7/25
DRILLED BY: JSM/ZAH
LOGGED BY: JSM/MWR

PROBE/CORE: B9
STREET: West Ann Arbor Trail
LANE: West Bound
OFFSET: 35' North of South Curb

PAVEMENT AND SUBSURFACE CONDITIONS

Layer, in.		Layer Thickness, in.	Description	Comment
From	To			
0	1.5	1.5	Asphalt Pavement Wearing Course	Intact
1.5	3	1.5	Asphalt Pavement Leveling Course	Intact
3	9.5	6.5	Portland Cement Concrete	Intact
9.5	19	9.5	Fine to Coarse SAND with Gravel - Brown - Moist	(SP/ Agg Base)
19	34	15	Fine to Medium SAND with Silt - Brown - Moist	(SP-SM)
34	44	10	CLAYEY SAND with Gravel - Brown - Moist	(SC)
44	48	4	Fine SAND - Brown - Moist	(SP)
			End of Boring at 48" Below Pavement Surface	

Depth to Groundwater From Ground Surface
Upon Completion: Not Encountered

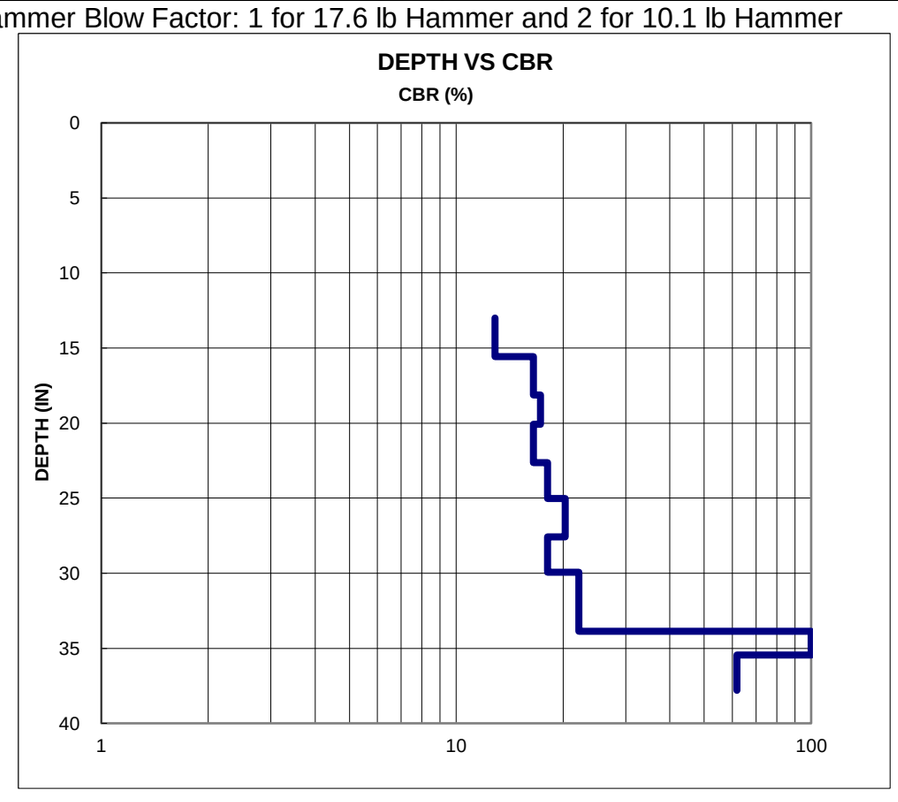
NOTES:
1) The indicated stratification lines are approximate and in situ transition between materials may be gradual.

DCP TEST RESULTS

Depth to start of test from ex. ground surface: 13 inches

No. of Blows	Pen. (mm)	Blow Set (mm)	Pen./Blow (mm)	Blow Factor	Depth from Surface (inches)	CBR (%)	Comment	Soil Type	Average CBR (%)
0	420	0							
4	485	65	16	1	15.6	12.9	Very Poor	Agg Base	
5	550	65	13	1	18.1	16.5	Very Poor	Agg Base	14.7
4	600	50	13	1	20.1	17.3	Good	Subgrade	
5	665	65	13	1	22.6	16.5	Good	Subgrade	
5	725	60	12	1	25.0	18.1	Good	Subgrade	
6	790	65	11	1	27.6	20.3	Good	Subgrade	
5	850	60	12	1	29.9	18.1	Good	Subgrade	
10	950	100	10	1	33.9	22.2	Good	Subgrade	19.1
20	990	40	2	1	35.4	100.0	Good	Subgrade	
15	1050	60	4	1	37.8	61.8	Good	Subgrade	77.1

Hammer Blow Factor: 1 for 17.6 lb Hammer and 2 for 10.1 lb Hammer



*CBR breaklines are based on blow counts performed prior to sampling. Depths are approximate.

Support Conditions	CBR Range for Aggregate Base Materials (%)	CBR Range for Subgrade Soils (%)
Good	>80	>10
Marginal	60 to 80	5 to 10
Poor	30 to 60	3 to 5
Very Poor	<30	<3

**Core picture shows approximate thickness

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BORING LOG AND USACE DCP DATA

PROJECT NAME: City of Plymouth 2025 Infrastructure Program
PROJECT NO.: 098742.00
LOCATION: Plymouth, MI
CLIENT: Wade Trim
DATE: 1/7/25
DRILLED BY: JSM/ZAH
LOGGED BY: JSM/MWR

PROBE/CORE: B10
STREET: West Ann Arbor Trail
LANE: East Bound
OFFSET: 5' North of South Curb

PAVEMENT AND SUBSURFACE CONDITIONS

Layer, in.		Layer Thickness, in.	Description	Comment
From	To			
0	1.25	1.25	Asphalt Pavement Wearing Course	Intact
1.25	2.5	1.25	Asphalt Pavement Leveling Course	Intact
2.5	9.5	7	Portland Cement Concrete	Intact
9.5	19	9.5	Fine to Coarse SAND with Gravel - Brown - Moist	(SP/ Agg Base)
19	48	29	Fine to Medium SAND with Silt - Brown - Moist	(SP-SM)
			End of Boring at 48" Below Pavement Surface	

Depth to Groundwater From Ground Surface
Upon Completion: Not Encountered

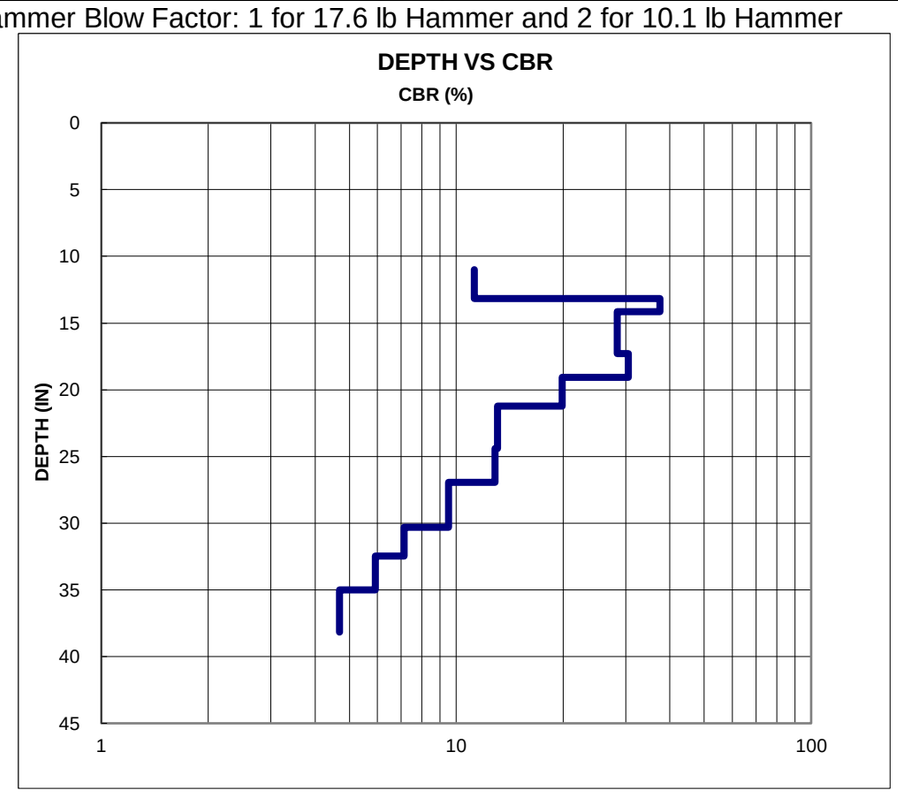
NOTES:
1) The indicated stratification lines are approximate and in situ transition between materials may be gradual.

DCP TEST RESULTS

Depth to start of test from ex. ground surface: 11 inches

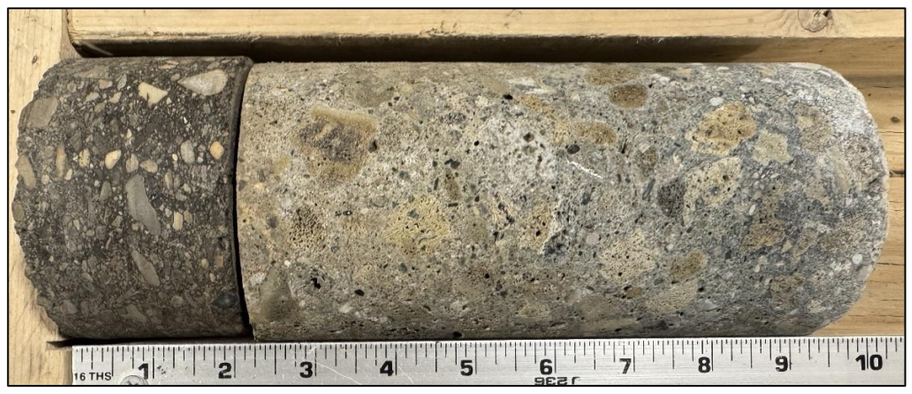
No. of Blows	Pen. (mm)	Blow Set (mm)	Pen./Blow (mm)	Blow Factor	Depth from Surface (inches)	CBR (%)	Comment	Soil Type	Average CBR (%)
0	380	0							
3	435	55	18	1	13.2	11.2	Very Poor	Agg Base	
4	460	25	6	1	14.1	37.5	Poor	Agg Base	
5	500	40	8	1	15.7	28.4	Very Poor	Agg Base	
5	540	40	8	1	17.3	28.4	Very Poor	Agg Base	
6	585	45	8	1	19.1	30.6	Poor	Agg Base	25.4
5	640	55	11	1	21.2	19.9	Good	Subgrade	
5	720	80	16	1	24.4	13.1	Good	Subgrade	
4	785	65	16	1	26.9	12.9	Good	Subgrade	14.9
4	870	85	21	1	30.3	9.5	Marginal	Subgrade	
2	925	55	28	1	32.5	7.1	Marginal	Subgrade	
2	990	65	33	1	35.0	5.9	Marginal	Subgrade	
2	1070	80	40	1	38.2	4.7	Poor	Subgrade	6.9

Hammer Blow Factor: 1 for 17.6 lb Hammer and 2 for 10.1 lb Hammer



*CBR breaklines are based on blow counts performed prior to sampling. Depths are approximate.

Support Conditions	CBR Range for Aggregate Base Materials (%)	CBR Range for Subgrade Soils (%)
Good	>80	>10
Marginal	60 to 80	5 to 10
Poor	30 to 60	3 to 5
Very Poor	<30	<3



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APPENDIX C
GENERAL COMMENTS
IMPORTANT INFORMATION ABOUT THIS GEOTECHNICAL ENGINEERING REPORT

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GENERAL COMMENTS

BASIS OF PAVEMENT EVALUATION REPORT

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

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

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

REVIEW OF DESIGN DETAILS, PLANS, AND SPECIFICATIONS

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

REVIEW OF REPORT INFORMATION WITH PROJECT TEAM

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

FIELD VERIFICATION OF PAVEMENT/GEOTECHNICAL CONDITIONS

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

PROJECT INFORMATION FOR CONTRACTOR

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

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

THIRD PARTY RELIANCE/REUSE OF THIS REPORT

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

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Important Information about This

Geotechnical-Engineering Report

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

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

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

Understand the Geotechnical-Engineering Services Provided for this Report

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

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

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

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

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

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

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

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

Read this Report in Full

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

You Need to Inform Your Geotechnical Engineer About Change

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

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

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

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

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

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

This Report's Recommendations Are Confirmation-Dependent

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

This Report Could Be Misinterpreted

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

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

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

Give Constructors a Complete Report and Guidance

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

Read Responsibility Provisions Closely

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

Geoenvironmental Concerns Are <u>Not</u> Covered

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

Obtain Professional Assistance to Deal with Moisture Infiltration and Mold

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

GEOPROFESSIONAL BUSINESS ASSOCIATION

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

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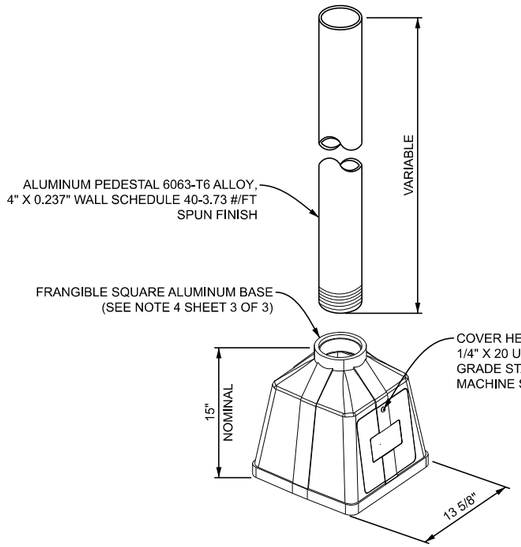
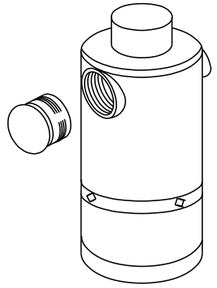
Passionate People Building
and Revitalizing our World

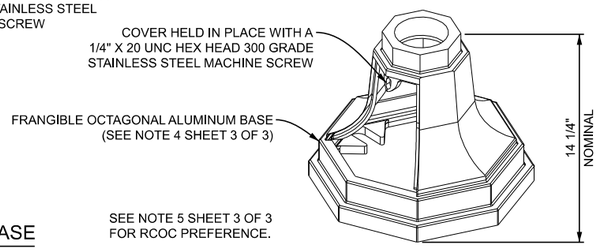
SME



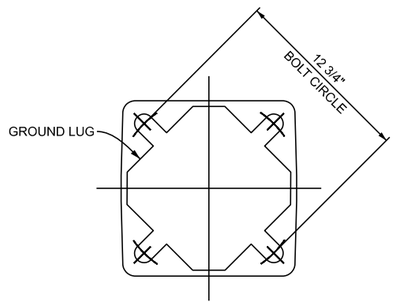
A DETAIL - SQUARE ALUMINUM BASE
N.T.S.



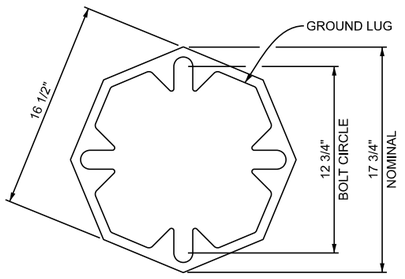
C POST TOP
DETAIL - (SLIP FITTER)
N.T.S.



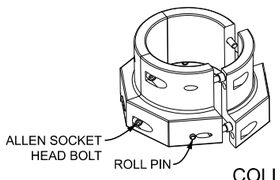
D DETAIL - OCTOGONAL BASE
N.T.S.



B DETAIL - SQUARE BASE BOTTOM PLAN
N.T.S.



E DETAIL - OCTOGONAL BASE BOTTOM PLAN
N.T.S.



F DETAIL - (OCTOGANAL BASE)
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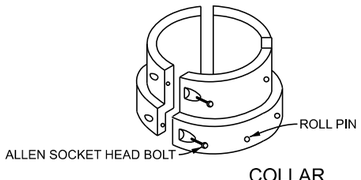


G DETAIL - (SQUARE BASE)
N.T.S.

NOTE:
USE PEDESTAL COLLAR FOR PEDESTAL LENGTH
GREATER THAN OR EQUAL TO 14' (TYPICAL FOR
3 COLOR TRAFFIC SIGNALS WITH PEDESTRIAN SIGNALS).

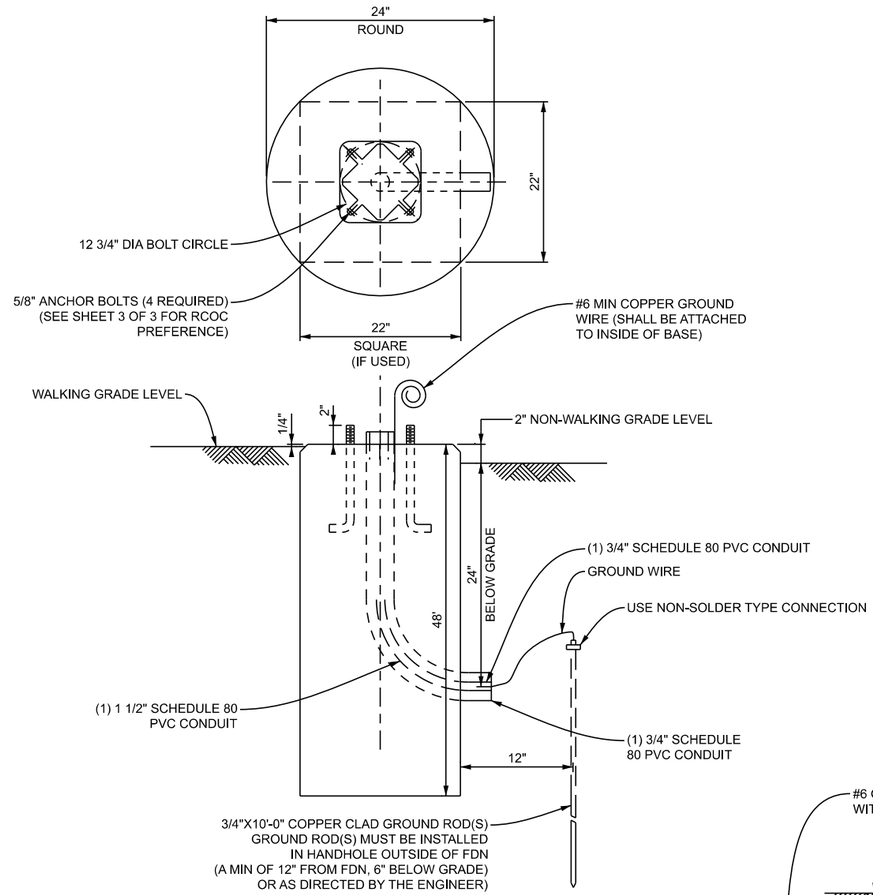
APPROVED BY: _____
DIRECTOR, BUREAU OF FIELD SERVICES

APPROVED BY: _____
DIRECTOR, BUREAU OF DEVELOPMENT

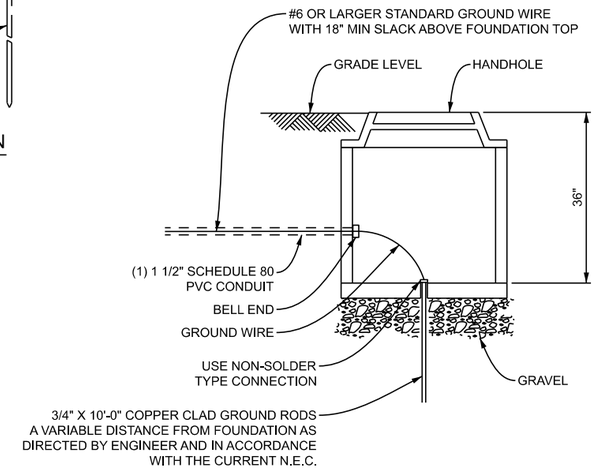
MDOT Michigan Department of Transportation
DEPARTMENT DIRECTOR
BRADLEY C. WIEFERICH, PE

STANDARD PLAN FOR
PEDESTAL FOUNDATION

(SPECIAL DETAIL) FHWA APPROVAL	10/29/2024 PLAN DATE	SIG-070-A	SHEET 1 OF 3



H DETAIL - PEDESTAL FOUNDATION
N.T.S. SEE NOTES 1, 2 & 3 ON SHEET 3 OF 3



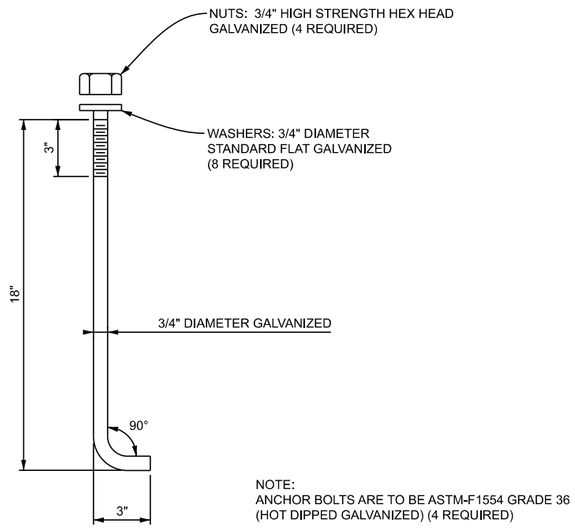
I DETAIL - HANDHOLE
N.T.S.

MDOT Michigan Department of Transportation
DEPARTMENT DIRECTOR
BRADLEY C. WIEFERICH, PE

STANDARD PLAN FOR
PEDESTAL FOUNDATION

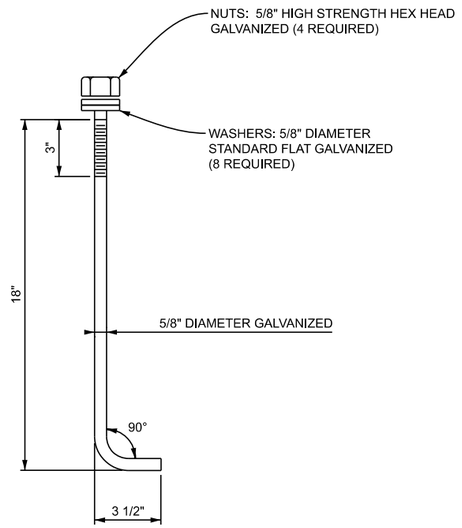
(SPECIAL DETAIL) FHWA APPROVAL	10/29/2024 PLAN DATE	SIG-070-A	SHEET 2 OF 3

SECT



NOTE:
ANCHOR BOLTS ARE TO BE ASTM-F1554 GRADE 36
(HOT DIPPED GALVANIZED) (4 REQUIRED)

FOR USE ON MDOT TRUNKLINE



FOR USE ON OAKLAND COUNTY ROADS ONLY

J DETAIL - ANCHOR BOLT DETAIL
N.T.S.

NOTES:
1) ALTERNATE FOUNDATION MAY BE CONSTRUCTED 22"X22" SQUARE - 48" DEEP.

2) GROUNDING SYSTEM SHALL MEASURE 10 OHM OR LESS TO GROUND.

3) CONSTRUCTION JOINTS NOT PERMITTED IN FOUNDATION.

4) PEDESTAL BASE MUST MEET THE REQUIREMENTS OF NATIONAL COOPERATIVE HIGHWAY RESEARCH PROGRAM REPORT 350 (NCHRP 350) OR MANUAL FOR ASSESSING SAFETY HARDWARE (MASH) AND HAVE FEDERAL HIGHWAY ADMINISTRATION (FHWA) ACCEPTANCE. PEDESTAL BASE MUST ALSO BE CERTIFIED TO HAVE A 4-INCH MAXIMUM STUB HEIGHT AFTER THE SUPPORT HAS BROKEN AWAY FROM ITS BASE, AS SPECIFIED IN THE AASHTO STANDARD SPECIFICATIONS FOR STRUCTURAL SUPPORTS FOR HIGHWAY SIGNS, LUMINARIES, AND TRAFFIC SIGNALS AND THE AASHTO ROADSIDE DESIGN GUIDE.

5) USE THE OCTAGONAL BASE AS A PREFERENCE BY THE ROAD COMMISSION FOR OAKLAND COUNTY (RCOC), FOR USE ON OAKLAND COUNTY ROADS ONLY.

APPROVED BY: _____
DIRECTOR, BUREAU OF FIELD SERVICES

APPROVED BY: _____
DIRECTOR, BUREAU OF DEVELOPMENT

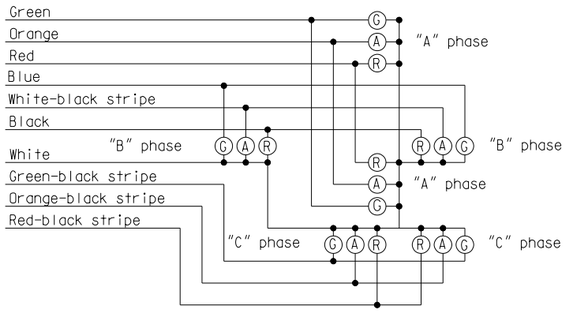
MDOT
Michigan Department of Transportation

DEPARTMENT DIRECTOR
BRADLEY C. WIEFERICH, PE

STANDARD PLAN FOR
PEDESTAL FOUNDATION

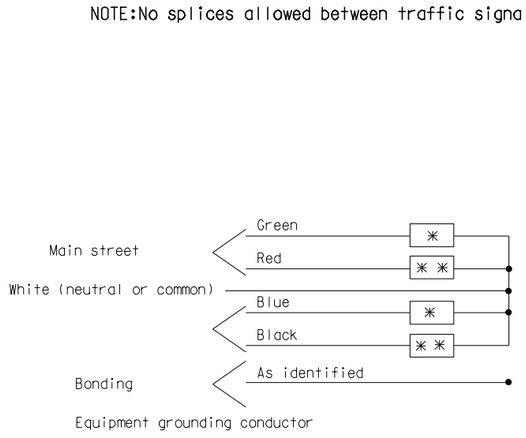
(SPECIAL DETAIL)	10/29/24	SIG-070-A	SHEET
FHWA APPROVAL	PLAN DATE		3 OF 3

SECT



COLOR CODE FOR WIRING CONNECTING TRAFFIC SIGNAL LAMPS

NOTE:No splices allowed between traffic signal head and controller.



COLOR CODE FOR WIRING CONNECTING PEDESTRIAN SIGNAL LAMPS
(WALKING PERSON - HAND SYMBOL)

NOT TO SCALE

File: RefDoc/TR/Signals/Web/Sp Det/Fin/SIG230A.dgn Rev. 02/16/17

MDOT Michigan Department of Transportation

PREPARED BY TRAFFIC AND SAFETY

DRAWN BY: DJF

CHECKED BY:

ENGINEER OF DELIVERY

ENGINEER OF DEVELOPMENT

(SPECIAL DETAIL) FHWA APPROVAL DATE

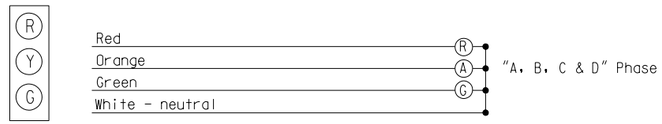
MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAYS DELIVERY STANDARD PLAN FOR

COLOR CODE WIRING/ EQUIPMENT GROUNDING

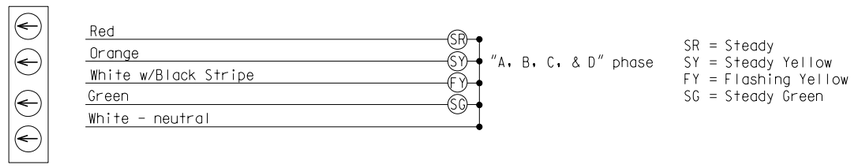
PLAN DATE

SIG-230-A

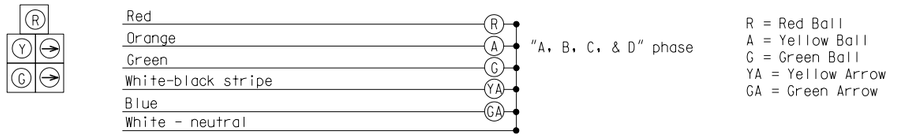
SHEET 1 of 6



STANDARD - 3 COLOR SIGNAL DISPLAY



FLASHING YELLOW ARROW (FYA) - 4 COLOR SIGNAL DISPLAY



DOG HOUSE W/RIGHT TURNS - 5 COLOR SIGNAL DISPLAY

COLOR CODE FOR WIRING CONNECTING TRAFFIC SIGNAL LAMPS

NOT TO SCALE

MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAYS DELIVERY STANDARD PLAN

(SPECIAL DETAIL) FHWA APPROVAL DATE

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PLAN DATE

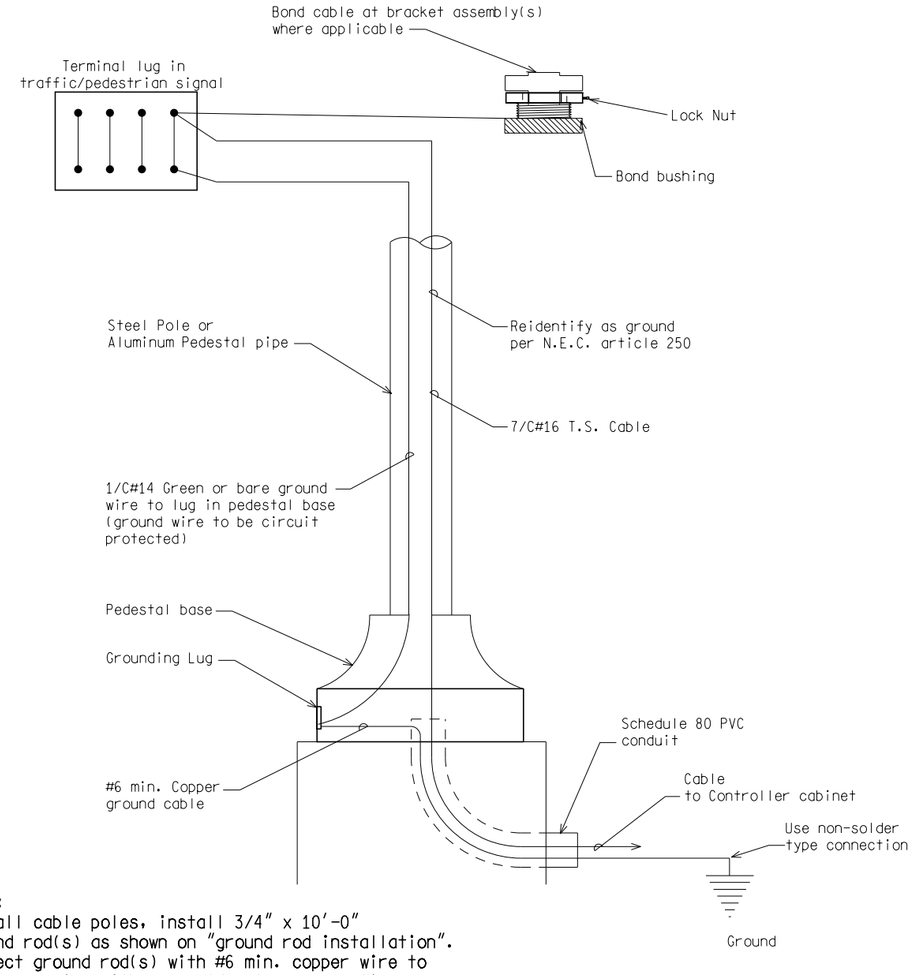
SIG-230-A

SHEET 2 of 6

AS-LET PLAN REVISIONS							
NO.	DATE	AUTH	DESCRIPTION	NO.	DATE	AUTH	DESCRIPTION

MDOT Michigan Department of Transportation

	DATE:	CS:		DRAWING	SHEET
	DESIGN UNIT:	JN:			
FILE:	TSC:				

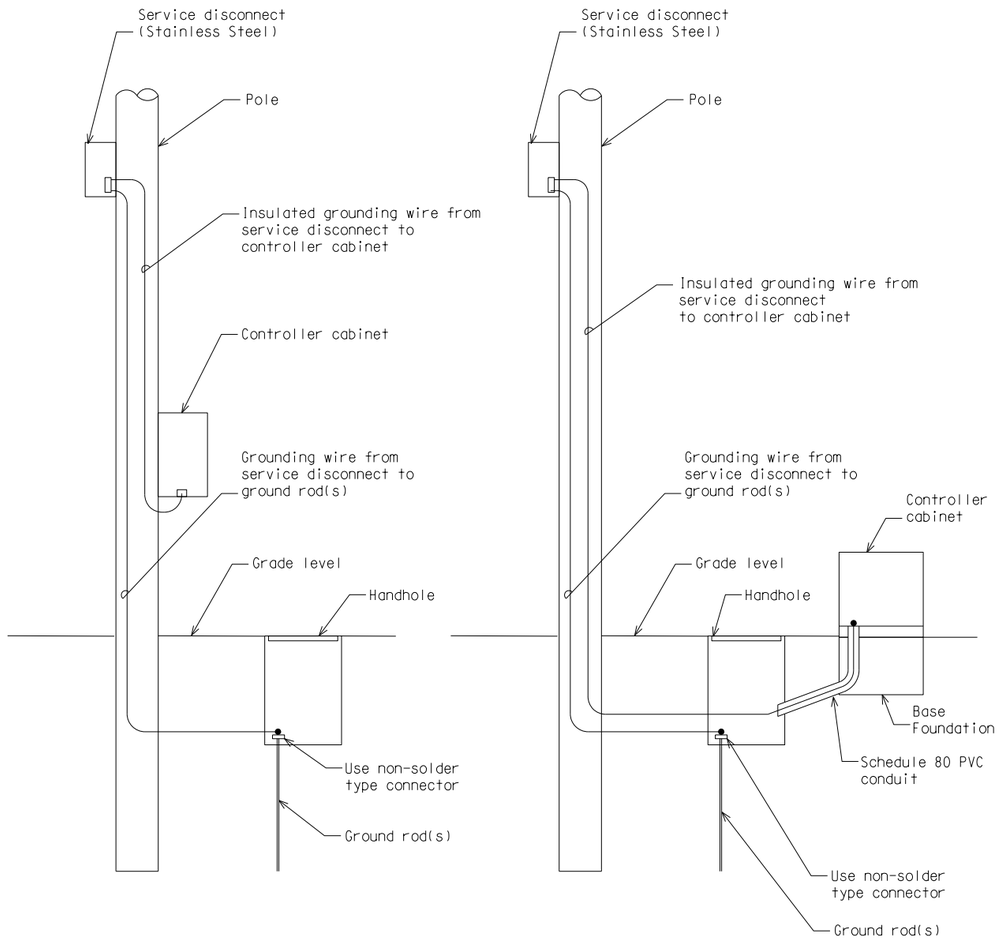


NOTE:
For all cable poles, install 3/4" x 10'-0"
ground rod(s) as shown on "ground rod installation".
Connect ground rod(s) with #6 min. copper wire to
messenger wire with non-solder type connection.

STEEL POLE/PEDESTAL GROUNDING DETAIL

NOT TO SCALE

MICHIGAN DEPARTMENT OF TRANSPORTATION BUREAU OF HIGHWAYS DELIVERY STANDARD PLAN	(SPECIAL DETAIL) FHWA APPROVAL DATE	PLAN DATE	SIG-230-A	SHEET 3 of 6
File: RefDoc/TR/Signals/Web/Sp Det/Fin/SIG230A.dgn Rev. 02/16/17				



GROUNDING

Install 3/4 " x 10'-0" copper clad ground rod(s) as required to provide less than 10 OHM resistance to ground.

Grounding wire #6 AWG min. bare copper grounding wire shall be installed to meet N.E.C. and utility company specs.

Ground wire from disconnect to ground rod to be in moulding (wood pole or post) or inside the pole (steel). Ground wire from disconnect to controller cabinet to be in conduit (wood pole, wood post, and steel pole).

CONTROLLER CABINET GROUNDING DETAIL

NOT TO SCALE

MICHIGAN DEPARTMENT OF TRANSPORTATION BUREAU OF HIGHWAYS DELIVERY STANDARD PLAN	(SPECIAL DETAIL) FHWA APPROVAL DATE	PLAN DATE	SIG-230-A	SHEET 4 of 6
File: RefDoc/TR/Signals/Web/Sp Det/Fin/SIG230A.dgn Rev. 02/16/17				

AS-LET PLAN REVISIONS							
NO.	DATE	AUTH	DESCRIPTION	NO.	DATE	AUTH	DESCRIPTION

MDOT Michigan Department of Transportation

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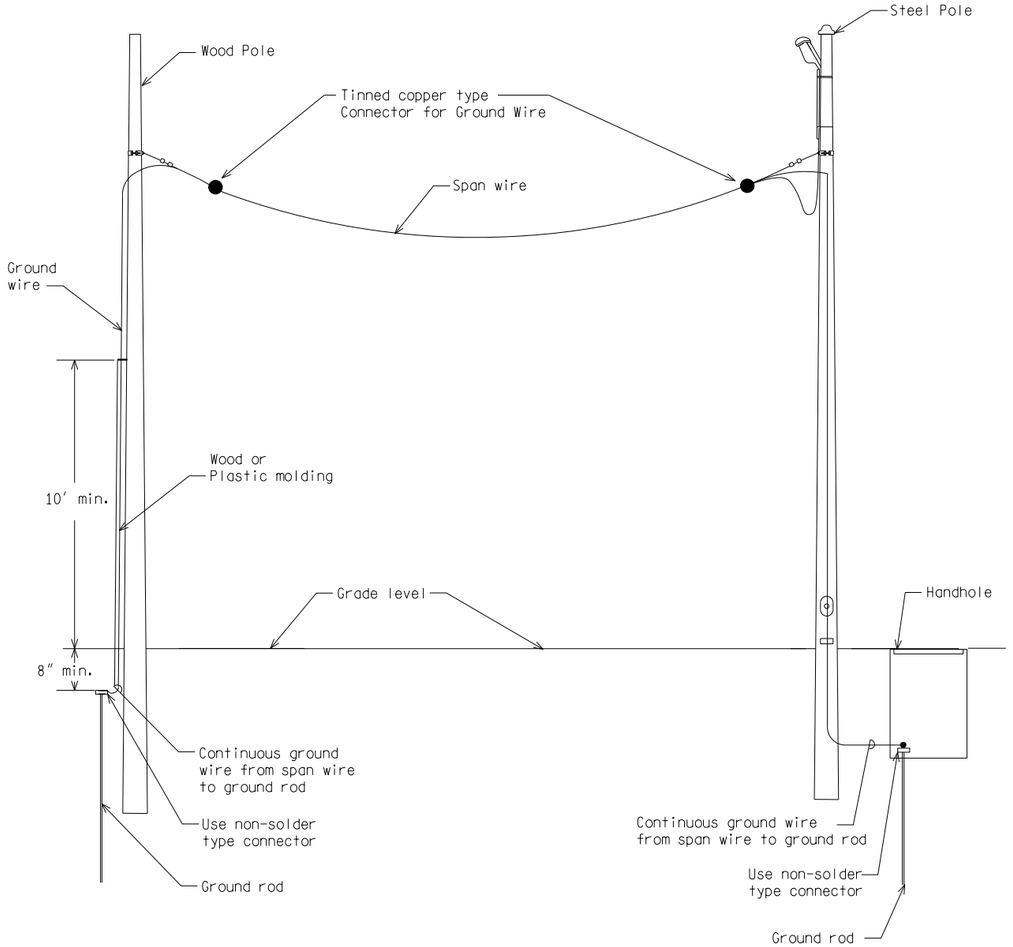
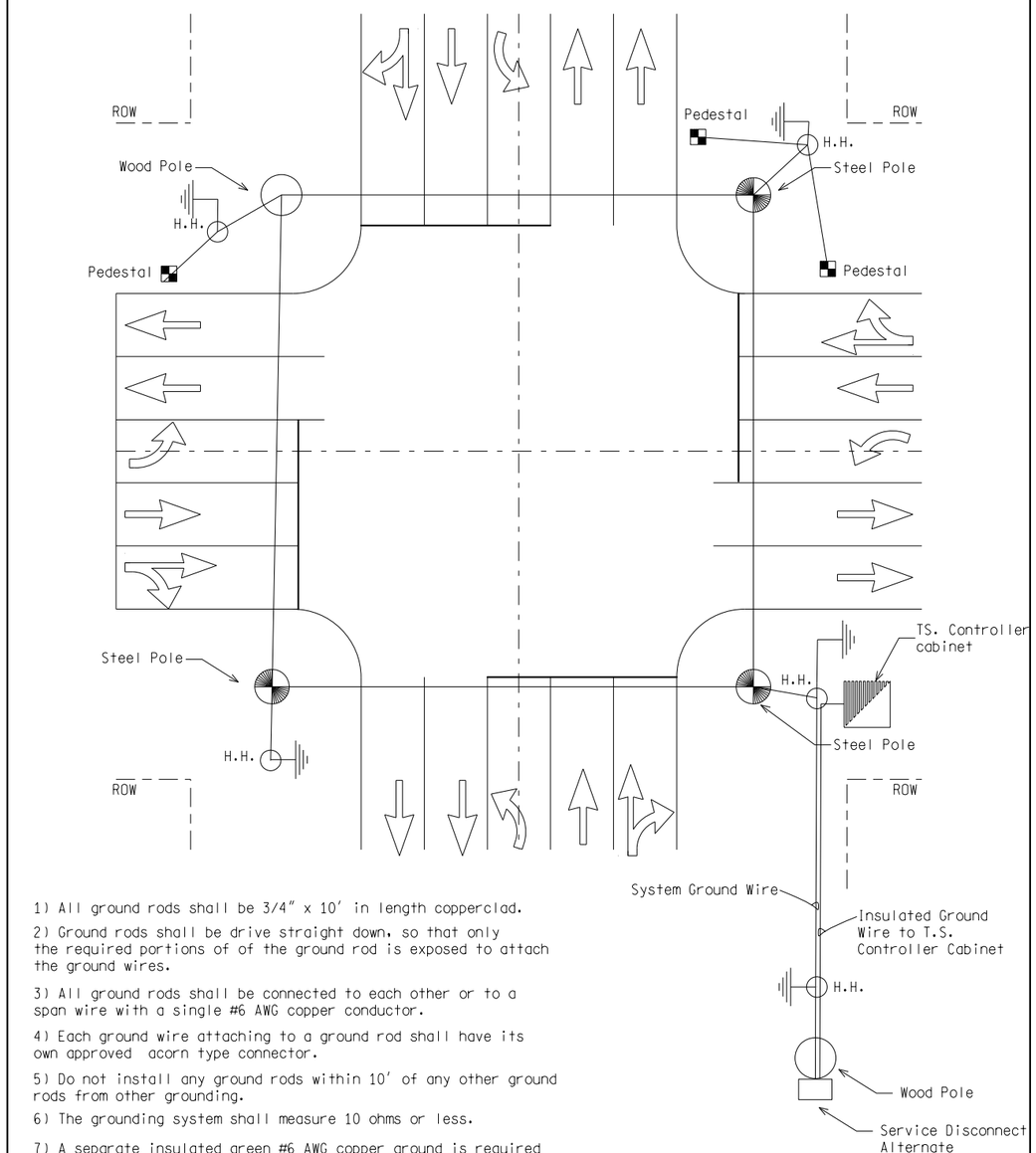
FILE:	TSC:				



SPAN WIRE GROUNDING DETAIL

NOT TO SCALE

MICHIGAN DEPARTMENT OF TRANSPORTATION BUREAU OF HIGHWAYS DELIVERY STANDARD PLAN	(SPECIAL DETAIL) FHWA APPROVAL DATE		SIG-230-A	SHEET 5 of 6
File: RefDoc/TR/Signals/Web/Sp Det/Fin/SIG230A.dgn Rev. 02/16/17		PLAN DATE		



1) All ground rods shall be 3/4″ x 10′ in length copperclad.

2) Ground rods shall be drive straight down, so that only the required portions of of the ground rod is exposed to attach the ground wires.

3) All ground rods shall be connected to each other or to a span wire with a single #6 AWG copper conductor.

4) Each ground wire attaching to a ground rod shall have its own approved acorn type connector.

5) Do not install any ground rods within 10′ of any other ground rods from other grounding.

6) The grounding system shall measure 10 ohms or less.

7) A separate insulated green #6 AWG copper ground is required from the service disconnect (safety switch) to the ground bussbar in the controller cabinet.

8) Ground rod for each steel pole, wood pole, pedestal and/or traffic signal controller cabinet shall be located in the adjacent handhole as indicated on the plans or as directed by the Engineer.

9) All metal bases must be connected to a ground rod with a #6 ground wire.

SYSTEM GROUNDING DETAL

NOT TO SCALE

MICHIGAN DEPARTMENT OF TRANSPORTATION BUREAU OF HIGHWAYS DELIVERY STANDARD PLAN	(SPECIAL DETAIL) FHWA APPROVAL DATE		SIG-230-A	SHEET 6 of 6
File: RefDoc/TR/Signals/Web/Sp Det/Fin/SIG230A.dgn Rev. 02/16/17		PLAN DATE		

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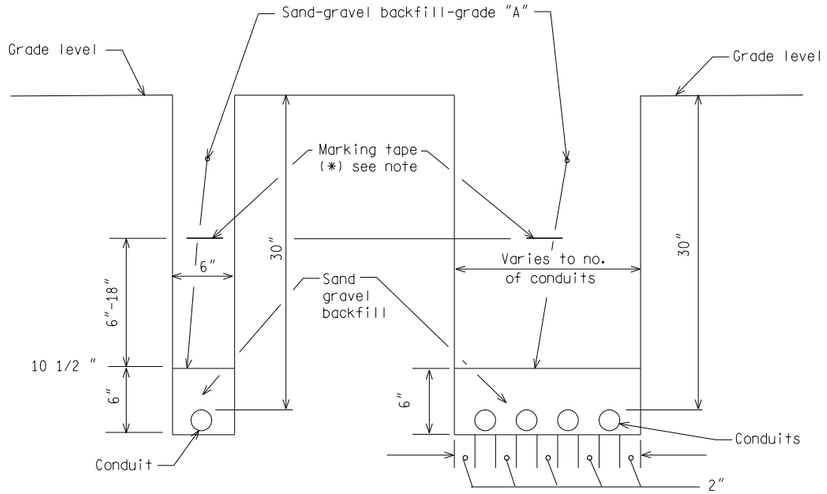
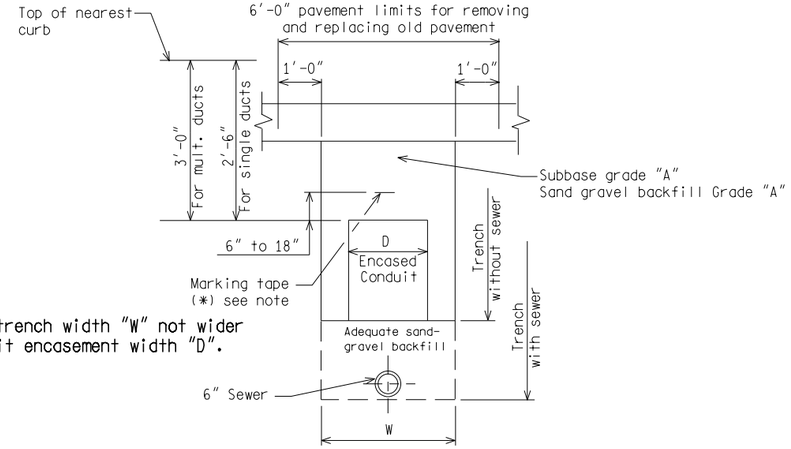
FILE:	TSC:				



(*) NOTE:
Marking tape shall have proper logo as supplied by the Engineer and installed by the Contractor.

DIRECT BURIAL CONDUIT(S)/CABLE(S)



NOTE:
Preferred trench width "W" not wider than conduit encasement width "D".

TYPICAL SECTION OF TRENCH
ENCASED CONDUIT

NOT TO SCALE

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MDOT Michigan Department of Transportation

PREPARED BY TRAFFIC AND SAFETY

DRAWN BY: DJF

CHECKED BY:

ENGINEER OF DELIVERY

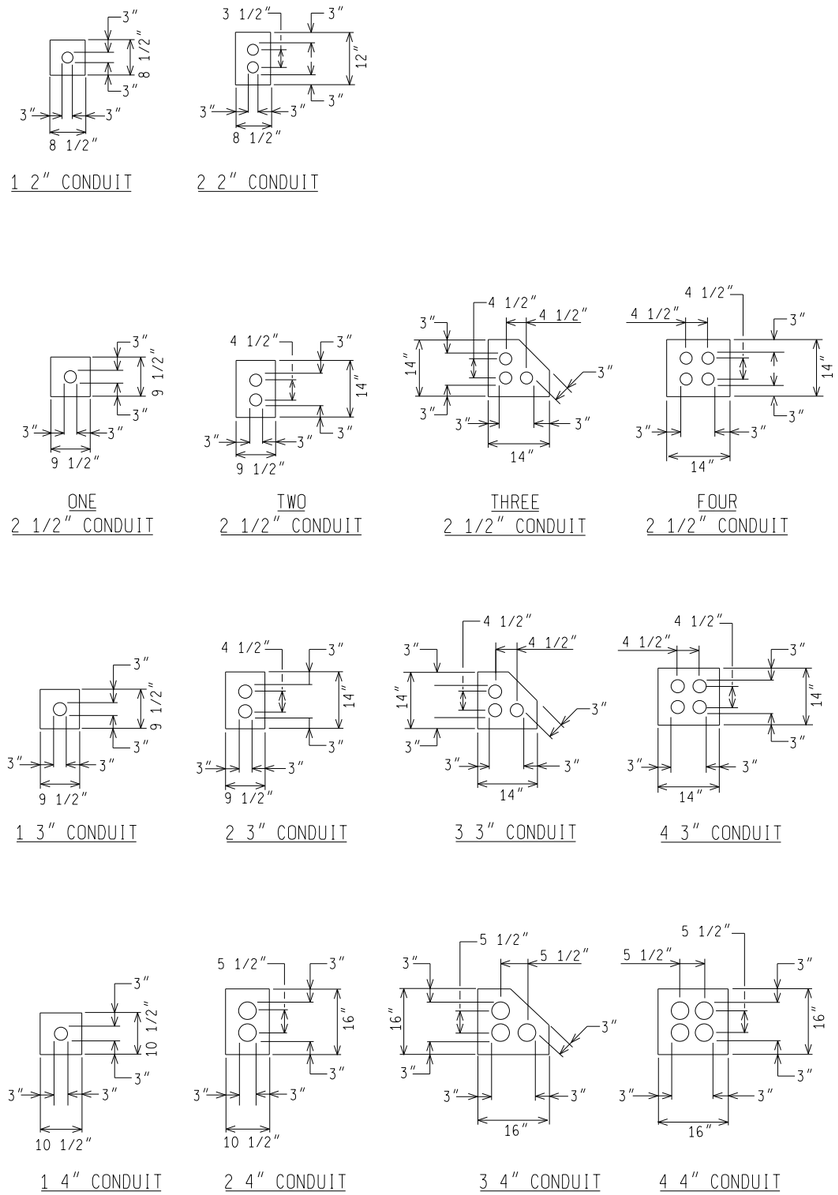
ENGINEER OF DEVELOPMENT

(SPECIAL DETAIL) FHWA APPROVAL DATE

MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAYS DELIVERY STANDARD PLAN FOR

CONDUIT (DIRECT BURIAL/ENCASED)

PLAN DATE | SIG-250-A | SHEET 1 of 2



ENCASED CONDUIT SECTIONS

NOT TO SCALE

MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAYS DELIVERY STANDARD PLAN

(SPECIAL DETAIL) FHWA APPROVAL DATE

File: RefDoc/TR/Signals/Web/Sp Det/Fin/SIG250A.dgn Rev. 02/16/17

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MDOT Michigan Department of Transportation

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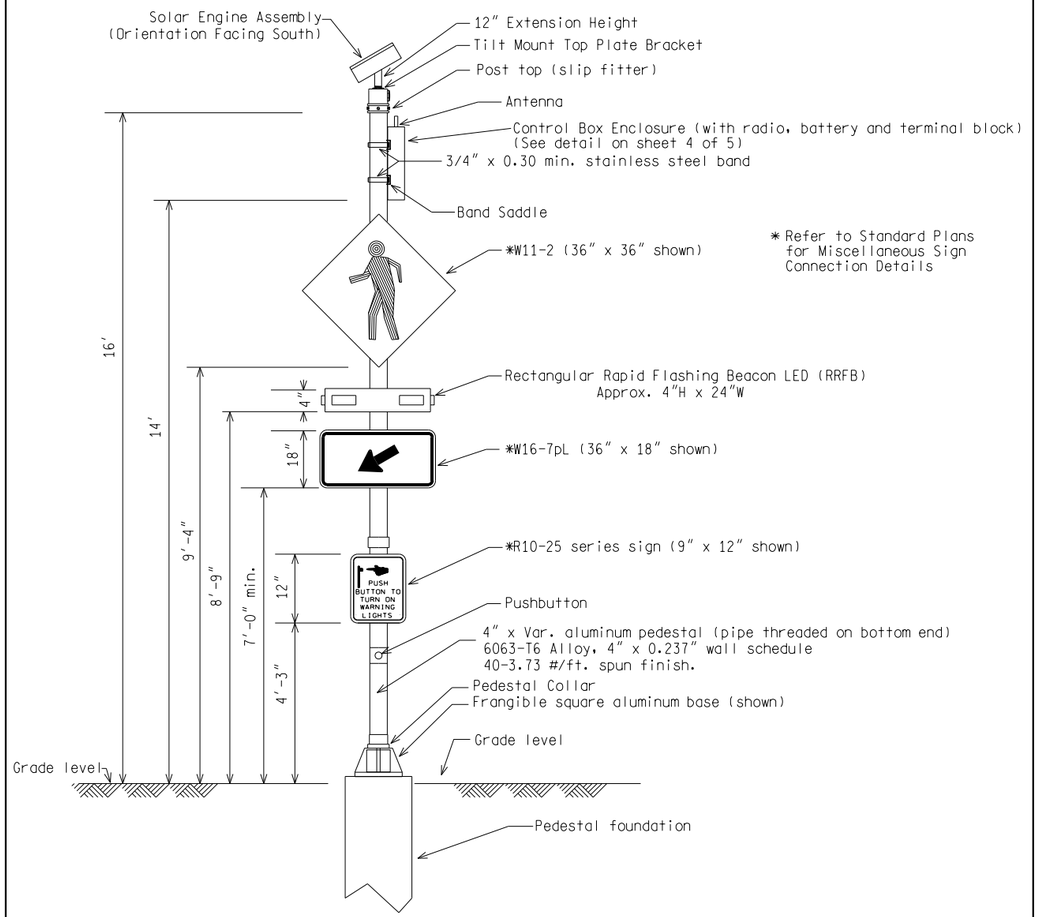

FRONT VIEW

SOLAR POWER ASSEMBLY (ONE-SIDED RRFB)

NOT TO SCALE

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MDOT Michigan Department of Transportation

PREPARED BY
TRAFFIC AND SAFETY

DRAWN BY:

CHECKED BY:

ENGINEER OF DELIVERY

ENGINEER OF DEVELOPMENT

(SPECIAL DETAIL)
FHWA APPROVAL DATE

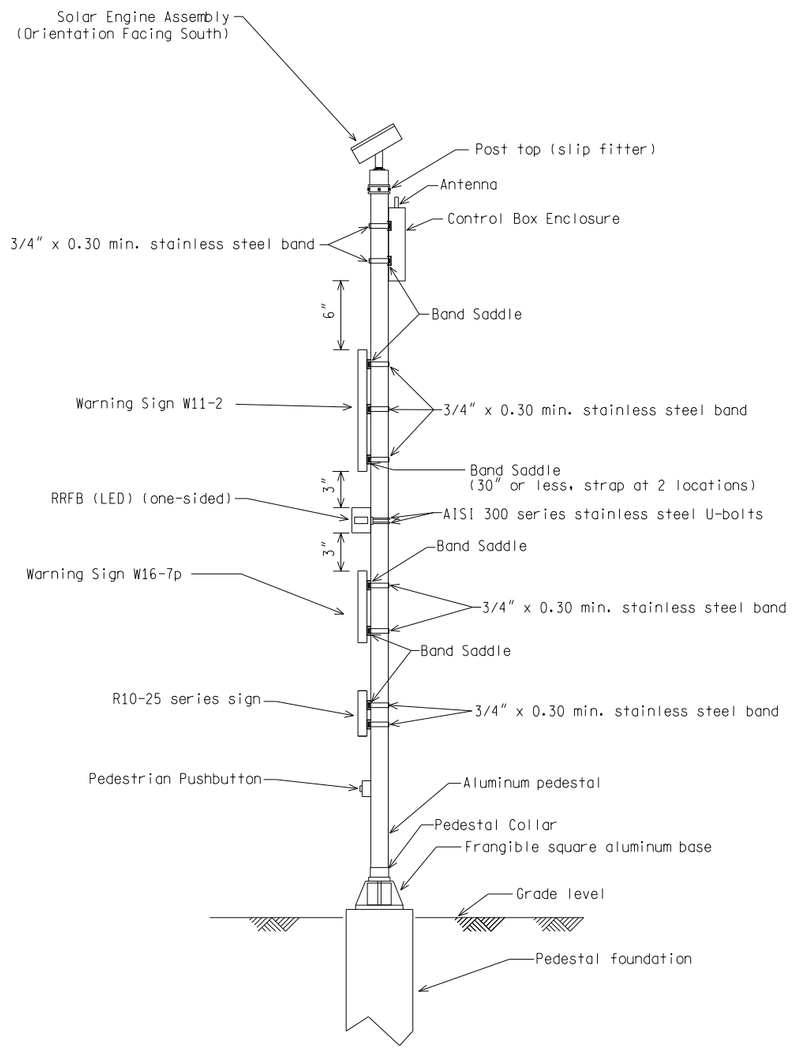
MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAYS DELIVERY STANDARD PLAN FOR

RECTANGULAR RAPID FLASHING BEACON

PLAN DATE

SIG-321-A

SHEET 1 of 5



SIDE VIEW

SOLAR POWER ASSEMBLY (ONE-SIDED RRFB)

NOT TO SCALE

MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAYS DELIVERY STANDARD PLAN

(SPECIAL DETAIL)
FHWA APPROVAL DATE

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PLAN DATE

SIG-321-A

SHEET 2 of 5

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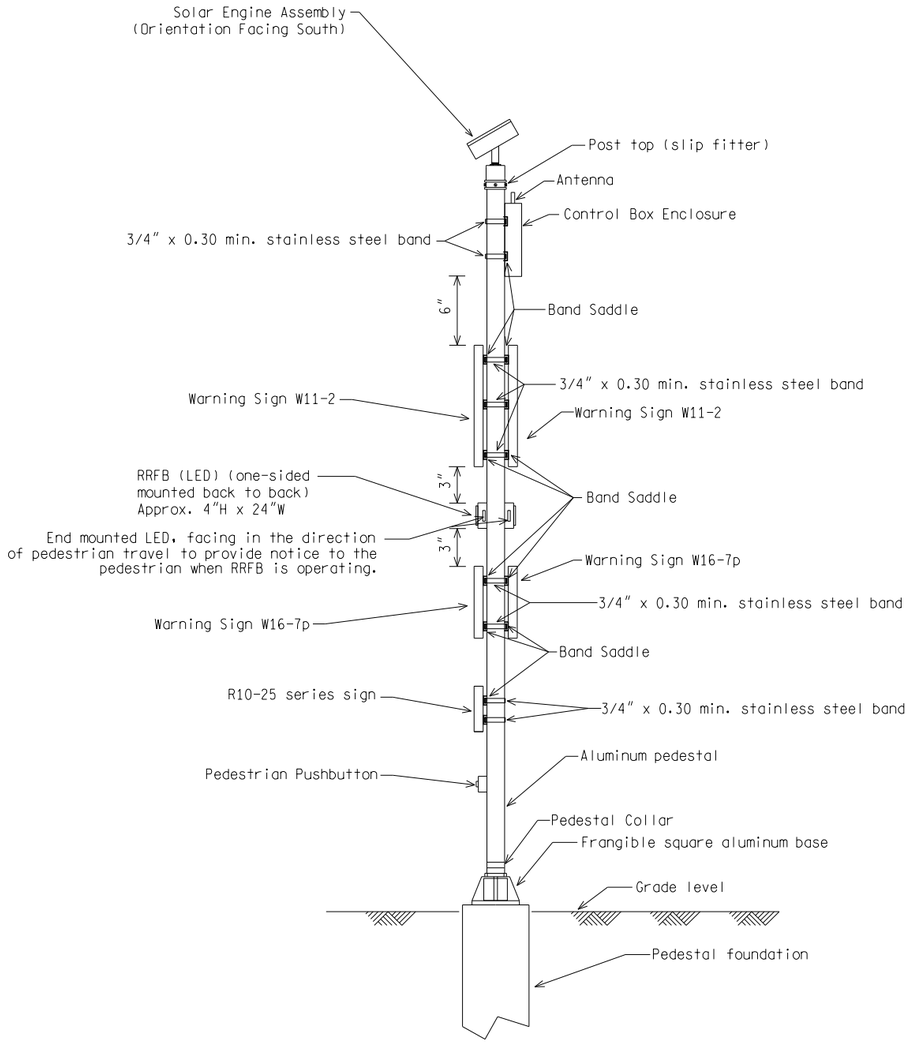
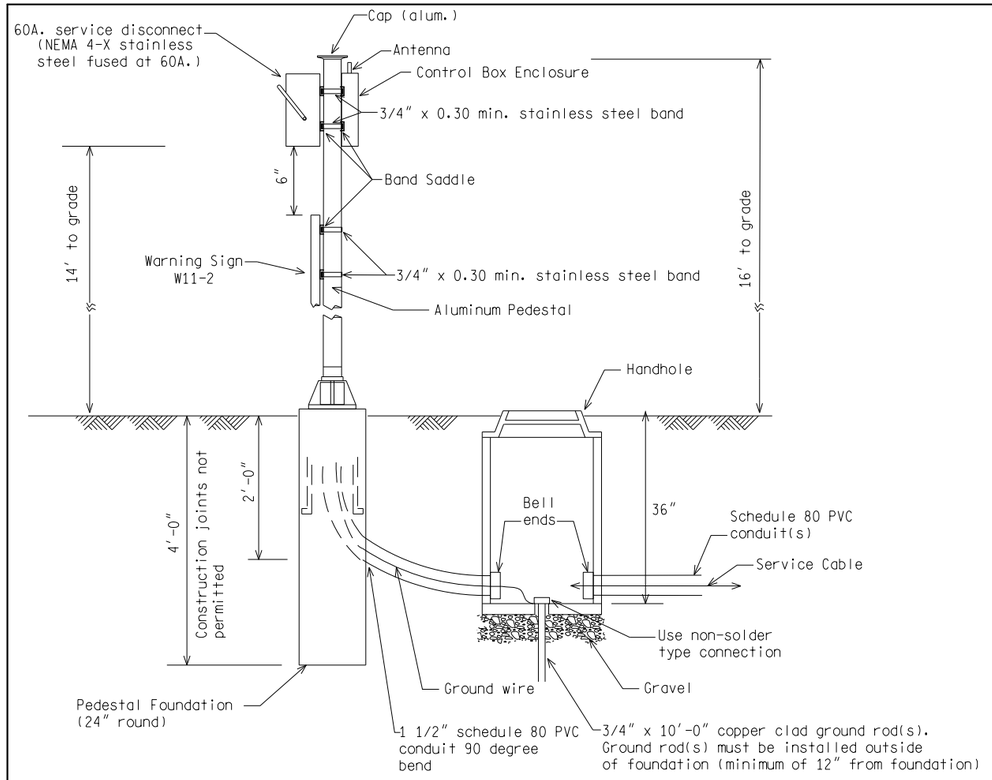


SIDE VIEW

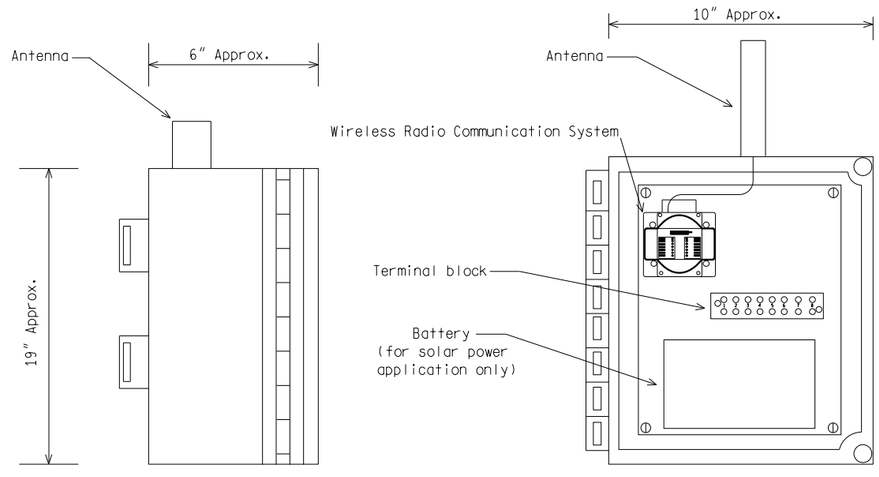
SOLAR POWER ASSEMBLY (TWO-SIDED RRFB)

NOT TO SCALE

MICHIGAN DEPARTMENT OF TRANSPORTATION BUREAU OF HIGHWAYS DELIVERY STANDARD PLAN	(SPECIAL DETAIL) FHWA APPROVAL DATE		SIG-321-A	SHEET 3 of 5
File:RefDoc/TR/Signals/Web/Sp Det/Fin/SIG321A.dgn Rev.02/16/17		PLAN DATE		



PERMANENT POWER SOURCE (RRFB)



SIDE VIEW

CONTROL BOX ENCLOSURE DETAIL

INSIDE VIEW

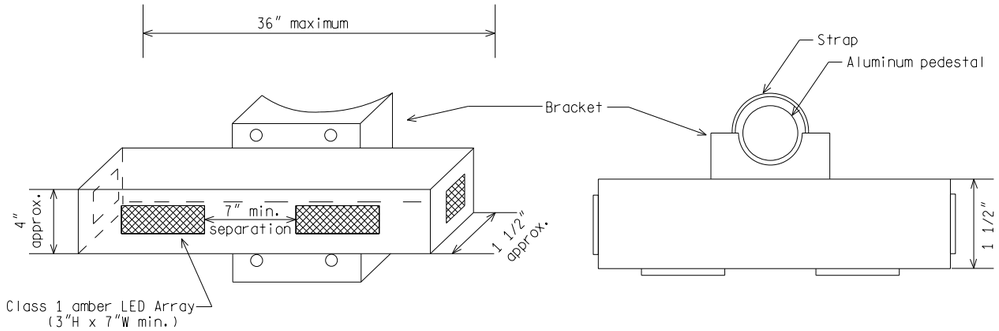
NOT TO SCALE

MICHIGAN DEPARTMENT OF TRANSPORTATION BUREAU OF HIGHWAYS DELIVERY STANDARD PLAN	(SPECIAL DETAIL) FHWA APPROVAL DATE		SIG-321-A	SHEET 4 of 5
File: RefDoc/TR/Signals/Web/Sp Det/Fin/SIG321A.dgn Rev. 02/16/17		PLAN DATE		

AS-LET PLAN REVISIONS							
NO.	DATE	AUTH	DESCRIPTION	NO.	DATE	AUTH	DESCRIPTION

MDOT Michigan Department of Transportation

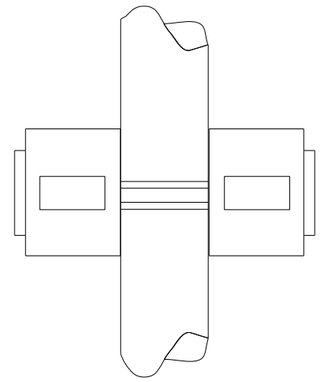
	DATE:	CS:		DRAWING	SHEET
	DESIGN UNIT:	JN:			
FILE:	TSC:				



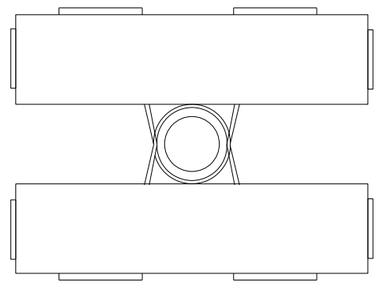
FRONT VIEW

TOP VIEW

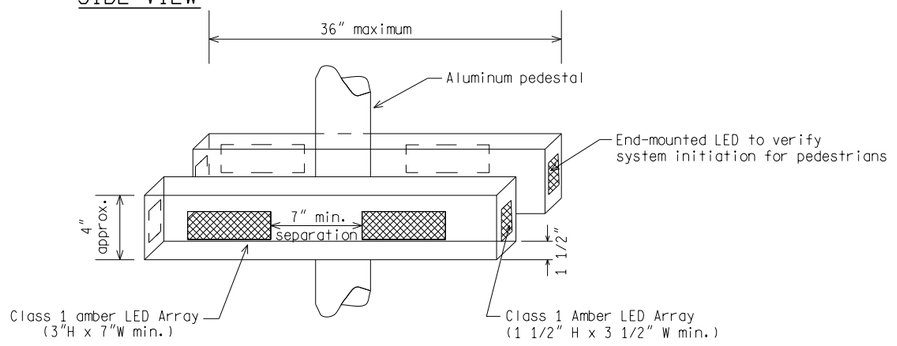
ONE-WAY RRFB (4 LED'S)



SIDE VIEW



TOP VIEW



FRONT VIEW

TWO-WAY RRFB (8 LED'S)
TWO ONE WAY MOUNTED BACK TO BACK

Notes: 1) All dimensions are approximate.
2) Use manufacturer's recommended mounting brackets, fittings, and connectors.
3) Use AISI 300 series stainless steel hardware.

NOT TO SCALE

MICHIGAN DEPARTMENT OF TRANSPORTATION BUREAU OF HIGHWAYS DELIVERY STANDARD PLAN	(SPECIAL DETAIL) FHWA APPROVAL DATE	PLAN DATE	SIG-321-A	SHEET 5 of 5
File: RefDoc/TR/Signals/Web/Sp Det/Fin/SIG321A.dgn Rev. 02/16/17				

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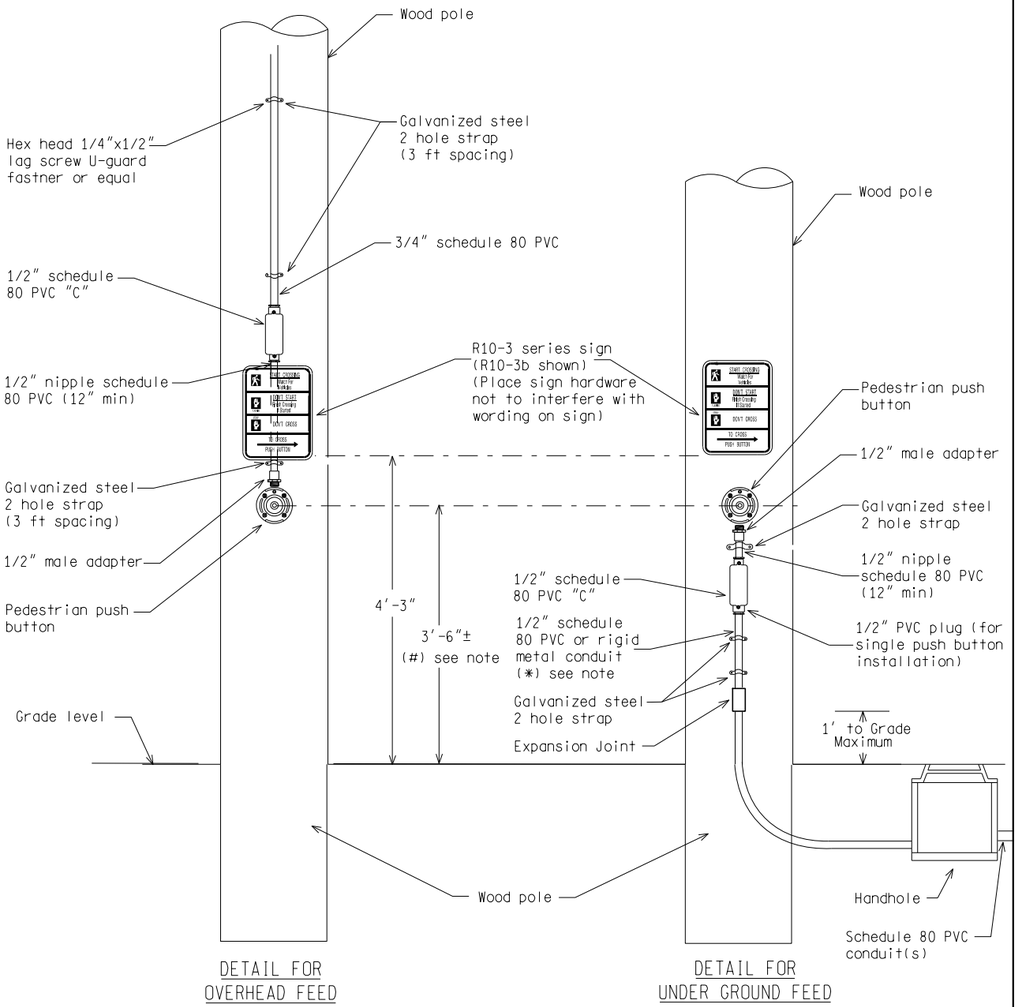


DETAIL FOR OVERHEAD FEED

DETAIL FOR UNDER GROUND FEED

Note: (*) For projects maintained by the Wayne Co. Department of Public Services (WCDPS), use rigid metal for conduit(s) from grade level to 10' (min.) above grade or as directed by the Engineer.

(#) If pushbutton is from 10" to 24" from edge of sidewalk an acceptable range is 38" to 46"

PEDESTRIAN PUSH BUTTON DETAILS ON WOOD POLE

NOT TO SCALE

File: RefDoc/TR/Signals/Web/Sp Det/Fin/SIG400A.dgn Rev. 02/16/17

MDOT Michigan Department of Transportation

PREPARED BY TRAFFIC AND SAFETY

DRAWN BY:

CHECKED BY:

ENGINEER OF DELIVERY

ENGINEER OF DEVELOPMENT

(SPECIAL DETAIL) FHWA APPROVAL DATE

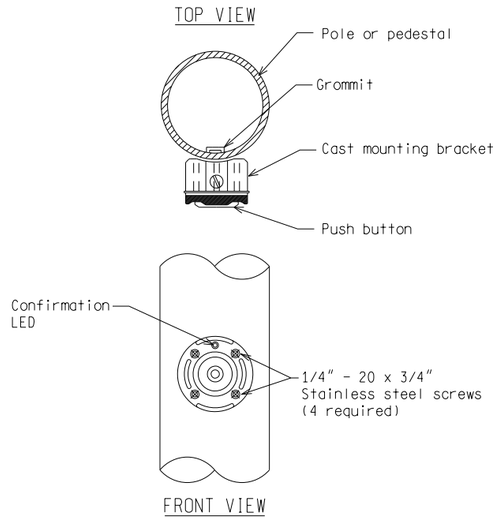
MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAYS DELIVERY STANDARD PLAN FOR

PEDESTRIAN PUSH BUTTON DETAILS

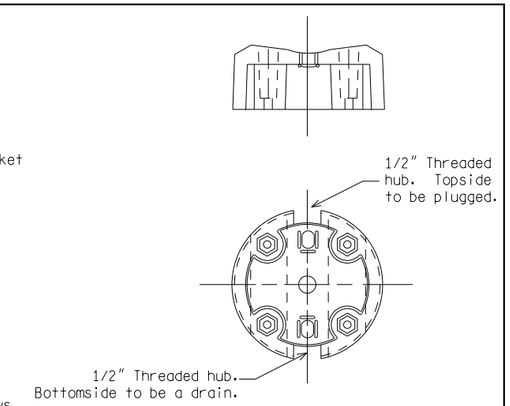
PLAN DATE

SIG-400-A

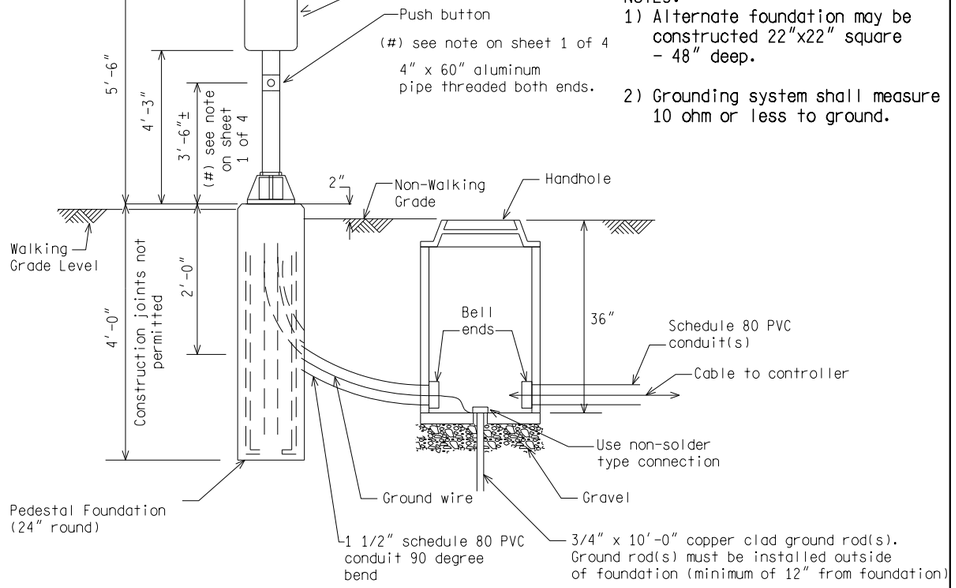
SHEET 1 of4



PEDESTRIAN PUSHBUTTON INSTALLATION ON STEEL POLE OR PEDESTAL



CAST MOUNTING BRACKET FOR PEDESTRIAN PUSHBUTTON



NOTES:
1) Alternate foundation may be constructed 22"x22" square - 48" deep.
2) Grounding system shall measure 10 ohm or less to ground.

PUSH BUTTON PEDESTAL

NOT TO SCALE

MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAYS DELIVERY STANDARD PLAN

(SPECIAL DETAIL) FHWA APPROVAL DATE

File: RefDoc/TR/Signals/Web/Sp Det/Fin/SIG400A.dgn Rev. 02/16/17

PLAN DATE

SIG-400-A

SHEET 2 of4

AS-LET PLAN REVISIONS

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MDOT Michigan Department of Transportation

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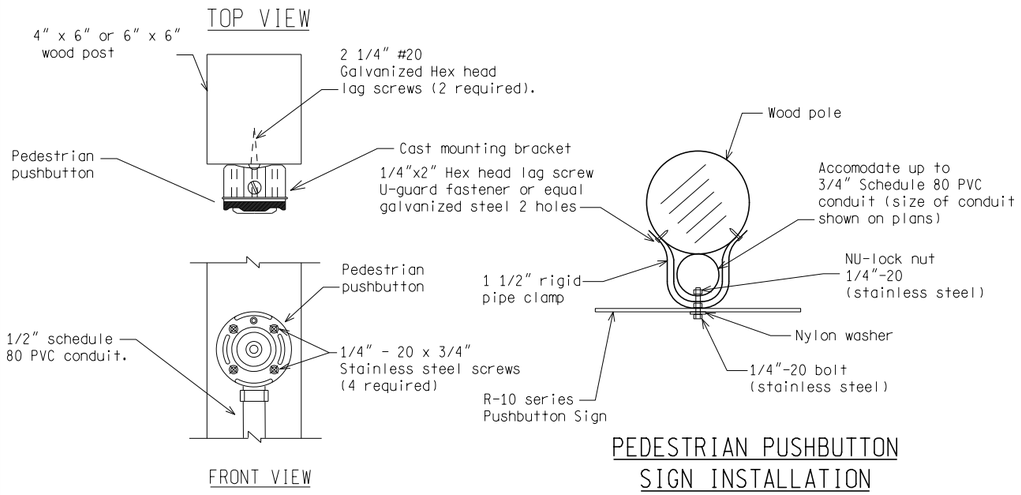
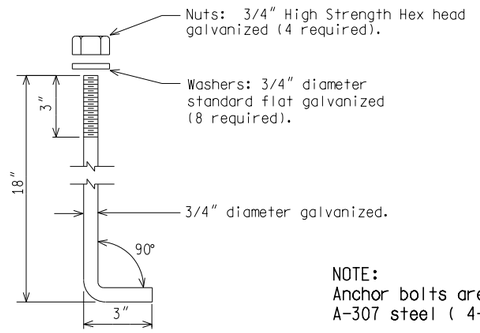


PEDESTRIAN PUSHBUTTON INSTALLATION ON WOOD POST

PEDESTRIAN PUSHBUTTON SIGN INSTALLATION ON WOOD POLE

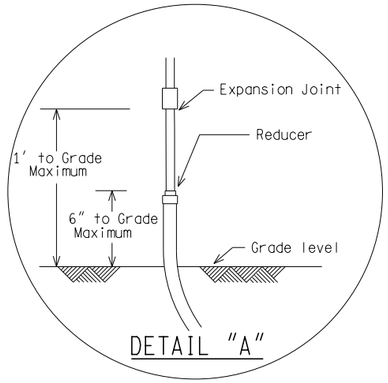


NOTE:
Anchor bolts are to be ASTM A-307 steel (4-required)

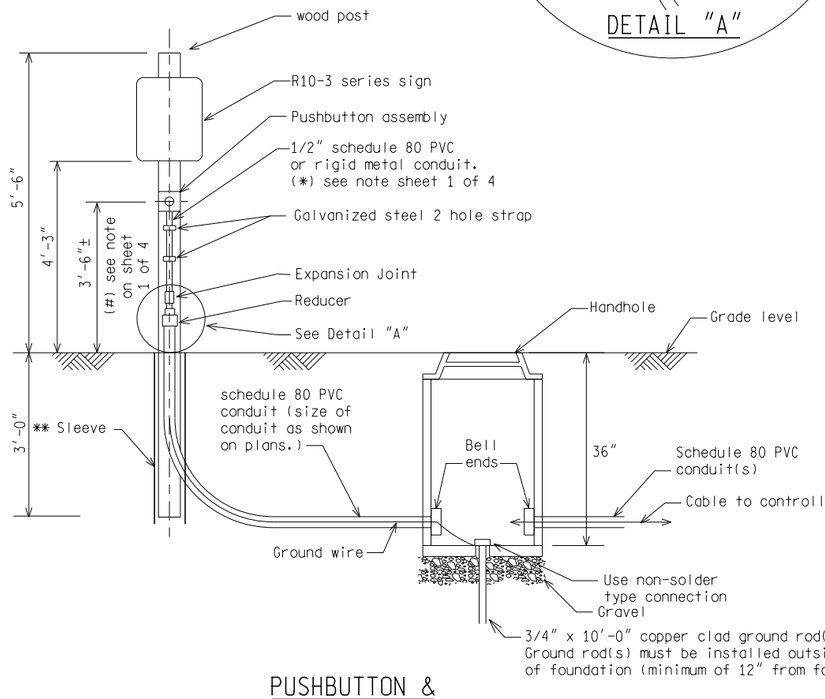
ANCHOR BOLT DETAIL

NOT TO SCALE

MICHIGAN DEPARTMENT OF TRANSPORTATION BUREAU OF HIGHWAYS DELIVERY STANDARD PLAN	(SPECIAL DETAIL) FHWA APPROVAL DATE		SIG-400-A	SHEET 3 of4
File: RefDoc/TR/Signals/Web/Sp Det/Fin/SIG400A.dgn Rev. 02/16/17		PLAN DATE		



DETAIL "A"



PUSHBUTTON & WOOD POST

** Refer to Standard Plan for Wood Posts

NOT TO SCALE

MICHIGAN DEPARTMENT OF TRANSPORTATION BUREAU OF HIGHWAYS DELIVERY STANDARD PLAN	(SPECIAL DETAIL) FHWA APPROVAL DATE		SIG-400-A	SHEET 4 of4
File: RefDoc/TR/Signals/Web/Sp Det/Fin/SIG400A.dgn Rev. 02/16/17		PLAN DATE		

AS-LET PLAN REVISIONS											
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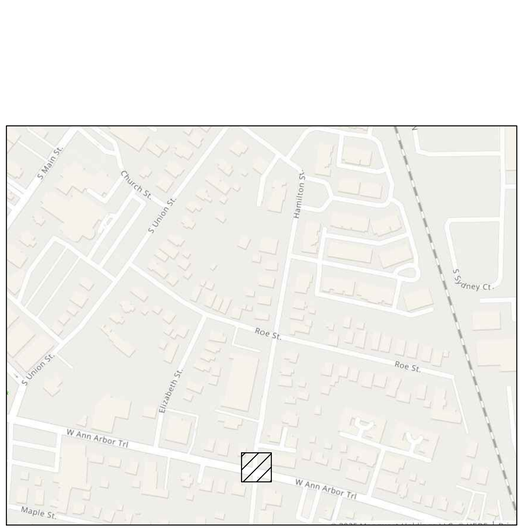
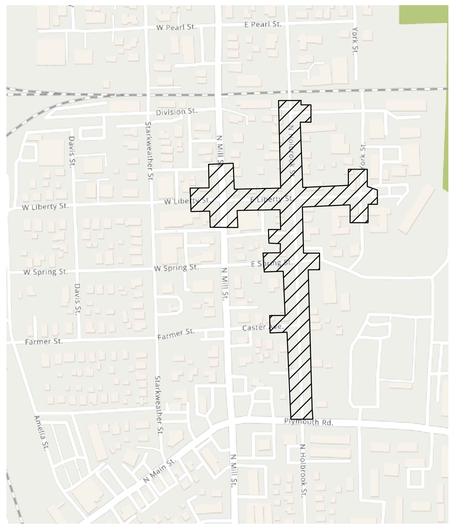
CITY OF PLYMOUTH
WAYNE COUNTY, MICHIGAN 48170
2025 INFRASTRUCTURE IMPROVEMENT PROGRAM
HOLBROOK STREET, LIBERTY STREET & ANN ARBOR TRAIL

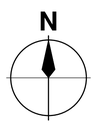
KEY MAP
NOT TO SCALE

Sheet List Table	
Sheet Number	Sheet Title
1	COVER
2	NOTES
3	LEGEND
4	HOLBROOK AVE - EXISTING CONDITIONS
5	LIBERTY ST - EXISTING CONDITIONS
6	EXISTING STRUCTURE TABLE
7	HOLBROOK AVE - MAINTENANCE OF TRAFFIC
8	HOLBROOK AVE - REMOVAL PLAN
9	HOLBROOK AVE - PROP SANITARY PLAN & PROFILE STA 1+76 TO 7+00
10	HOLBROOK AVE - PROP SANITARY PLAN & PROFILE STA 7+00 TO 16+35.6
11	HOLBROOK AVE - PROP WATER MAIN PLAN & PROFILE STA 0+00-8+50
12	HOLBROOK AVE - PROP WATER MAIN PLAN & PROFILE STA 8+50-14+88
13	HOLBROOK AVE - PROP WATER MAIN CONNECTIONS
14	TYPICALS
15	TYPICALS
16	HOLBROOK AVE - PROP PAVING PLAN STA 0+00 TO STA 8+00
17	HOLBROOK AVE - PROP PAVING PROFILE STA 0+00 TO STA 8+00
18	HOLBROOK AVE - PROP PAVING & STORM PLAN STA 8+00 TO STA 16+75.20
19	HOLBROOK AVE - PROP PAVING PROFILE STA 8+00 TO STA 16+75.20
20	HOLBROOK AVE - PROP ADA RAMPS AT PLYMOUTH ROAD
21	HOLBROOK AVE - PROP ADA RAMPS AT CASTER AVENUE
22	HOLBROOK AVE - PROP ADA RAMPS AT SPRING STREET
23	HOLBROOK AVE - PROP ADA RAMPS AT LIBERTY STREET
24	ANN ARBOR TRAIL - HAMILTON TRAFFIC SIGNALS REMOVAL PLAN
25	ANN ARBOR TRAIL - HAMILTON TRAFFIC SIGNALS CONSTRUCTION PLAN
MD-1	MISCELLANEOUS DETAILS
SE-1	STANDARD SOIL EROSION AND SEDIMENTATION CONTROL DETAILS
SS-1	STANDARD SANITARY SEWER DETAILS
SS-2	STANDARD SANITARY SEWER DETAILS
ST-1	STANDARD STORM SEWER DETAILS
ST-2	STANDARD STORM SEWER DETAILS
WM-1	STANDARD WATER MAIN DETAILS
WM-1	STANDARD WATER MAIN DETAILS
SW-1	STANDARD SIDEWALK DETAILS

811
Know what's below.
Call before you dig.







LOCATION MAPS

CITY HALL
201 S. MAIN ST
PLYMOUTH, MI 48170
(734) 453-1234

DEPARTMENT OF MUNICIPAL SERVICES
1231 GOLDSMITH
PLYMOUTH, MI 48170
(734)453-7737

SUZI DEAL
MAYOR

MAUREEN BRODIE
CITY CLERK

PAUL SINCOCK
CITY MANAGER

CITY COUNCIL

KELLY O'DONNELL, MAYOR PRO TEM
LINDA FILIPCZAK, COMMISSIONER
JENNIFER KEHOE, COMMISSIONER
ALANNA MAGUIRE, COMMISSIONER
BROCK MINTON, COMMISSIONER
NICK MOROZ, COMMISSIONER

CHRIS PORMAN
DIRECTOR, DEPARTMENT OF MUNICIPAL SERVICES
ADAM GERLACH
ASSISTANT DIRECTOR, PUBLIC UTILITIES

REV#	DATE	DESCRIPTION	BY

NOT FOR CONSTRUCTION

WADE TRIM
25251 Northline Rd.
Taylor, MI 48180
734.947.9700
www.wadetrim.com

SEAL

SHAWN W. KEOUGH, PE

42619
REGISTRATION NO.

ISSUED FOR:	DATE:	BY:
EGLE	3/19/25	SWK
WC DPS	3/20/25	SWK
BIDS	4/9/25	SWK

JOB NO.
PLY2130-01T

SHEET
1

2025 INFRASTRUCTURE IMPROVEMENT PROGRAM

© Wade Trim Group, Inc.

PROJECT MANAGER: SHAWN KEOUGH
DATA: N:\Projects\PLY2130-01T-GCS-COVER.DWG PLOTTED: 4/9/2025 3:22 PM BY: FLANAGAN, MARTIN

GENERAL NOTES:

1. ALL PROPERTY IRONS AND MONUMENTS, IF DISTURBED OR DESTROYED BY THE CONTRACTOR, SHALL BE REPLACED BY A MICHIGAN REGISTERED PROFESSIONAL SURVEYOR AT THE CONTRACTOR'S EXPENSE.

2. LOCATION OF UTILITIES OR OTHER STRUCTURES SHOWN ON THE PLANS ARE TAKEN FROM UTILITY COMPANY OR OTHER RECORDS BELIEVED TO BE RELIABLE. THE OWNER AND ENGINEER ARE NOT RESPONSIBLE FOR AN OMISSIONS OR VARIATIONS IN THE LOCATION OF THE UTILITIES ENCOUNTERED IN THE WORK.

3. THE CONTRACTOR SHALL NOTIFY "MISS DIG" (800) 482-7171, A MINIMUM OF THREE WORKING DAYS PRIOR TO BEGINNING CONSTRUCTION IN THE AREA OF THE WORK.

4. THE CONTRACTOR SHALL NOTIFY THE ENGINEER, WADE TRIM AND UTILITY COMPANIES 2 WORKING DAYS IN ADVANCE OF UNCOVERING ANY EXISTING UTILITY.

5. PRIOR TO THE INSTALLATION OF ANY PROPOSED UTILITIES, THE EXISTING UTILITIES WHICH CROSS THE PROPOSED UTILITY SHALL BE EXPOSED BY THE CONTRACTOR TO DETERMINE ANY POSSIBLE CONFLICTS WITH THE PROPOSED WORK. MAINTAIN 18-INCHES MINIMUM CLEARANCE BETWEEN ALL UTILITY CROSSINGS. THIS WORK IS INCIDENTAL TO THE PROJECT.

6. ALL EXISTING TRAFFIC SIGNS IN THE WAY OF CONSTRUCTION SHALL BE REMOVED AND RESET IN A TEMPORARY LOCATION PER THE LATEST EDITION OF MICHIGAN MANUAL OF UNIFIED TRAFFIC CONTROL DEVICES. THIS WORK SHALL BE INCIDENTAL TO THE PROJECT.

7. EXISTING LOCAL TRAFFIC SHALL BE MAINTAINED AT ALL TIMES, INCLUDING VEHICLE AND PEDESTRIAN ACCESS TO RESIDENCES AND BUSINESSES, EXCEPT WHEN OTHERWISE SHOWN ON THE PLANS OR SPECIFIED.

8. ALL TRAFFIC CONTROL AND DEVICES SHALL BE IN ACCORDANCE WITH THE MICHIGAN MANUAL OF UNIFORM TRAFFIC CONTROL DEVICES, LATEST EDITION.

9. THE CONTRACTOR SHALL LIMIT HIS CONSTRUCTION TRAFFIC AND EQUIPMENT TO THE AREA DIRECTLY UNDER CONSTRUCTION TO PREVENT DAMAGE TO ANY EXISTING IMPROVEMENTS, AND SHALL PREVENT THE SPREAD OF CONSTRUCTION DEBRIS OUTSIDE OF THE CONSTRUCTION AREA.

10. THE CONTRACTOR SHALL REMOVE AND REPLACE ANY EXISTING IRRIGATION SYSTEM COMPONENTS DISTURBED BY HIS CONSTRUCTION OPERATIONS. EXISTING MATERIAL MAY BE REUSED UNLESS DAMAGED. DAMAGED MATERIAL SHALL BE REPLACED WITH NEW MATERIAL OF THE SAME TYPE. REMOVAL AND REPLACEMENT SHALL BE INCIDENTAL TO THE PROJECT.

11. THE CONTRACTOR SHALL REMOVE AND REPLACE ANY EXISTING DECORATIVE LIGHTING SYSTEM COMPONENTS DISTURBED BY HIS CONSTRUCTION OPERATIONS. EXISTING MATERIAL MAY BE REUSED UNLESS DAMAGED. DAMAGED MATERIAL SHALL BE REPLACED WITH NEW MATERIAL OF THE SAME TYPE. COST FOR DECORATIVE LIGHTING SYSTEM REMOVAL AND REPLACEMENT SHALL BE INCIDENTAL TO THE PROJECT.

12. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO MAINTAIN THE INTEGRITY OF EXISTING UTILITIES AT ALL TIMES. ALL UTILITIES INCLUDING UTILITY POLES, IN THE VICINITY OF CONSTRUCTION SHALL BE PROTECTED BY BRACING, SUPPORTING, BY THE USE OF TRENCH BOXES OR OTHER ACCEPTABLE MEANS AS DETERMINED BY THE OWNER OF THE UTILITY. ALL COSTS FOR PROTECTION OF UTILITIES SHALL BE INCIDENTAL TO THE PROJECT.

13. ANY UTILITIES, MAINS, SERVICES, UNDERDRAINS, OIL LINES, OR OTHER SIMILAR ITEMS DAMAGED BY THE CONTRACTOR DURING CONSTRUCTION SHALL BE REPAIRED OR REPLACED BY THE UTILITY OWNER IN A MANNER ACCEPTABLE TO THE UTILITY OWNER. ALL COSTS FOR REPAIR OR REPLACEMENT SHALL BE PAID BY THE CONTRACTOR, INCIDENTAL TO THE PROJECT.

14. WORK STOPPAGE BY EMPLOYEES OF UTILITY COMPANIES WHICH RESULTS IN A DELAY OF UTILITY REVISIONS EFFECTING THE PROGRESS OF THIS PROJECT MAY BE THE BASIS FOR A CLAIM FOR AN EXTENSION OF TIME FOR COMPLETION, BUT WILL NOT BE CONSIDERED THE BASIS FOR A CLAIM FOR EXTRA COMPENSATION OR AN ADJUSTMENT IN CONTRACT UNIT PRICES.

15. THE CONTRACTOR SHALL COORDINATE ANY UTILITY RELOCATION REQUIRED TO COMPLETE THE WORK WITH THE OWNER OF THE UTILITY. THIS COORDINATION SHALL BE ACCOMPLISHED IN SUFFICIENT TIME TO ALLOW THE RELOCATION WORK TO BE COMPLETED WITHOUT INTERFERENCE OR DELAY TO THE CONSTRUCTION WORK. ALL COSTS FOR RELOCATION OF UTILITIES SHALL BE INCIDENTAL TO THE PROJECT.

16. ALL TREES, SHRUBS AND LANDSCAPING NOT DESIGNATED TO BE REMOVED SHALL BE PROTECTED DURING CONSTRUCTION. ANY TREES, SHRUBS OR LANDSCAPING DAMAGED IN ANY WAY BY THE CONTRACTOR (INCLUDING DAMAGING ROOTS), SHALL BE REPLACED WITH LIKE SPECIES AND SIZE AT THE CONTRACTOR'S EXPENSE.

17. THE CONTRACTOR SHALL HAVE AN OPERATING VACUUM SWEEPER ON THE JOB AT ALL TIMES. THE PAVEMENT SHALL BE SWEPT A MINIMUM OF ONCE A DAY OR AS DIRECTED BY THE FIELD ENGINEER. THE CONTRACTOR SHALL ALSO COMPLY WITH LOCAL AGENCY DUST ORDINANCE.

18. THE CONTRACTOR SHALL MAINTAIN EXISTING STORM WATER DRAINAGE AT ALL TIMES DURING THE WORK. EXISTING STORM SYSTEM DRAINAGE SHALL BE MAINTAINED BY PUMPING AND BY-PASSING, REPAIR, REMOVAL AND REPLACEMENT OR OTHER MEANS WHEN APPROVED BY THE ENGINEER. ALL COSTS FOR MAINTAINING DRAINAGE SHALL BE INCLUDED IN THE PROJECT PAY ITEMS EXCEPT AS MAY BE OTHERWISE PROVIDED FOR IN THE PROPOSAL.

MDOT SIGNAL SPECIAL DETAILS

WHERE THE FOLLOWING ITEMS ARE CALLED FOR IN THE PLANS THEY ARE TO BE CONSTRUCTED ACCORDING TO THE STANDARDS GIVEN BELOW, OPPOSITE EACH ITEM, UNLESS OTHERWISE INDICATED.

PEDESTAL FOUNDATION	SIG-070-A*
COLOR CODE WIRING/EQUIPMENT GROUNDING	SIG-230-A*
CONDUIT (DIRECT BURIAL/ENCASED)	SIG-250-A*
RECTANGULAR RAPID FLASHING BEACON	SIG-321-A*
PEDESTRIAN PUSH BUTTON DETAILS	SIG-400-A*

*INCLUDED IN PROPOSAL

SOIL EROSION AND SEDIMENTATION CONTROL NOTES

1. ALL SOIL EROSION AND SEDIMENTATION CONTROL SHALL BE IN ACCORDANCE WITH THE REQUIREMENTS OF WAYNE COUNTY DEPARTMENT OF ENVIRONMENT. THE CITY HAS PAID ALL FEES REQUIRED TO OBTAIN A PERMIT FROM WAYNE COUNTY.

2. CLEAN ALL ACCUMULATED SEDIMENT FROM CATCH BASINS, SEWERS AND PAVEMENT AREAS AS REQUIRED FOLLOWING COMPLETION OF CONSTRUCTION.

3. ALL SOIL EROSION MEASURES SHALL BE CHECKED A MINIMUM OF ONCE A DAY.

4. INLET PROTECTION FOR STORM SEWER CATCH BASINS SHALL BE REPLACED IMMEDIATELY IF THE FOLLOWING HAS OCCURRED: ANY TEARS OR HOLES IN THE FILTER FABRIC, AND/OR DRAIN SILT HAS COLLECTED ON FABRIC CAUSING SAGGING OF FILTER IN THE CATCH BASIN.

5. ALL TRUCKS SHALL CLEAN TIRES OF DIRT BEFORE EXITING CONSTRUCTION SITE.

6. ANY AND ALL ACCUMULATED SEDIMENT ON STREETS AND ROADS IN THE PROJECT VICINITY SHALL BE SWEPT CLEAN AT LEAST ONCE PER DAY OR AS DIRECTED BY THE ENGINEER.

SEQUENCE OF CONSTRUCTION-SESC

1. INSTALL ALL TEMPORARY SOIL EROSION CONTROL MEASURES ON EXISTING STORM STRUCTURES PRIOR TO DISTURBING ANY EARTH ON THE SITE.

2. INSTALL TEMPORARY GRAVEL CONSTRUCTION ENTRANCE/EXIT DRIVE PRIOR TO DISTURBING ANY EARTH ON SITE. ALL TRUCKS LEAVING THE CONSTRUCTION SITE SHALL PASS THROUGH A TEMPORARY GRAVEL CONSTRUCTION ENTRANCE/EXIT DRIVE TO REMOVE DIRT AND SEDIMENT. ANY DIRT AND ACCUMULATED SEDIMENT ON ROADS AND STREETS IN THE VICINITY OF THE PROJECT SHALL BE SWEPT CLEAN AT LEAST DAILY WITH A VACUUM TYPE PICKUP BROOM.

3. INSTALL INLET FILTERS ON ALL STORM CATCH BASINS UPON COMPLETING CONSTRUCTION OF EACH ONE.

4. REMOVE EXISTING PAVEMENT.

5. CONSTRUCT PROPOSED UTILITIES.

6. PREPARE SUBGRADE, CONSTRUCT CONCRETE CURB, PLACE PROPOSED ASPHALT PAVEMENT.

7. INSTALL TOPSOIL AND NURSERY SOD ON DISTURBED RIGHT-OF-WAY WITHIN 5 DAYS OF COMPLETING PAVEMENT INSTALLATION.

8. CLEAN ALL ACCUMULATED SEDIMENT FROM CATCH BASINS, SEWERS AND PAVEMENT AREAS AS REQUIRED FOLLOWING COMPLETION OF CONSTRUCTION.

9. THE EXACT SCHEDULE OF SOIL EROSION AND SEDIMENTATION CONTROL EVENTS (WITH DAYS AND/OR DATES OF THE VARIOUS ACTIVITIES) SHALL BE SUBMITTED TO WAYNE COUNTY BY THE CONTRACTOR, FOR REVIEW AND APPROVAL, PRIOR TO OBTAINING A PERMIT.

WATER MAIN NOTES

1. ALL WATER MAIN PIPE SHALL BE DUCTILE IRON, PC350 WITH PUSH-ON JOINTS; FITTINGS SHALL BE MECHANICAL JOINT, DUCTILE IRON, COMPACT FITTINGS; AS SPECIFIED IN SECTION 33 1100, WATER UTILITY DISTRIBUTION PIPING. WATER MAIN BEDDING SHALL BE CLASS F-III.

2. WATER MAIN TRENCH BACKFILL UNDER ROAD SURFACES, PAVEMENTS, CURB, DRIVEWAY, SIDEWALK AND WHERE THE TRENCH IS WITHIN 3-FEET OF THE PAVEMENT SHALL BE TRENCH B, (SAND) PER SPECIFICATION SECTION 31 2333, TRENCHING AND BACKFILLING.

3. WHENEVER THE CONTRACTOR NEEDS TO SHUT OFF A WATER MAIN, THE CONTRACTOR SHALL NOTIFY THE CITY OF PLYMOUTH. ALL VALVES SHALL BE OPENED AND CLOSED ONLY BY THE CITY OF PLYMOUTH WATER DEPARTMENT PERSONNEL. THE CONTRACTOR SHALL NOTIFY ALL AFFECTED WATER CONSUMERS IN WRITING A MINIMUM OF 48 HOURS BEFORE SHUTTING OFF ANY WATER MAIN.

4. THE EXISTING WATER MAIN SHALL NOT BE ABANDONED UNTIL AFTER THE PROPOSED WATER MAIN HAS BEEN TESTED AND ACCEPTED FOR USE, AND ALL FIRE HYDRANTS AND SERVICES ARE CONNECTED TO THE NEW WATER MAIN.

5. ALL EXISTING WATER SERVICES SHALL BE REPLACED FROM THE NEW WATER MAIN TO THE PROPERTY LINE WITH 1-INCH K COPPER AND A NEW CURB STOP AND BOX (UNLESS OTHERWISE NOTED).

6. WHILE BOTH EXISTING AND NEW FIRE HYDRANTS ARE IN PLACE ON THE PROJECT, THE FIRE HYDRANTS WHICH ARE NOT LIVE AND AVAILABLE FOR USE SHALL BE CONSPICUOUSLY COVERED OR BAGGED TO PREVENT BEING MISTAKEN FOR A LIVE HYDRANT.

7. RIM ELEVATIONS FOR NEW WATER MAIN STRUCTURES THAT ARE WITHIN PAVEMENT MAY REQUIRE ADJUSTMENT DURING CONSTRUCTION OF PAVEMENT. RIM ELEVATIONS OF NEW WATER MAIN STRUCTURES OUTSIDE OF THE PAVEMENT WILL BE SET TO GRADE AFTER FINAL GRADING HAS BEEN COMPLETED IN THE AREA. THIS WORK SHALL BE INCIDENTAL TO THE PROJECT.

8. REMOVE AND SALVAGE EXISTING GATE WELL FRAMES AND COVERS, FIRE HYDRANTS, GATE VALVES, AND VALVE BOXES AND DELIVER TO THE CITY OF PLYMOUTH. PAYMENT FOR THIS WORK SHALL BE INCIDENTAL TO PROJECT.

9. SEE SPECIFICATIONS FOR THE WORK REQUIRED FOR ABANDONMENT OF GATE WELLS, FIRE HYDRANTS, STOP BOXES AND WATER MAINS.

WAYNE COUNTY DPS GENERAL NOTES:

1. ALL WORK WITHIN THE WAYNE COUNTY ROAD RIGHT-OF-WAY (ROW) AND DRAIN EASEMENT SHALL BE IN ACCORDANCE WITH THE CURRENT STANDARDS AND GENERAL SPECIFICATIONS, INCLUDING SOIL EROSION AND SEDIMENTATION CONTROL OF THE WAYNE COUNTY DEPARTMENT OF PUBLIC SERVICES, AND MDOT 2012 SPECIFICATIONS FOR CONSTRUCTION.

2. THESE PLANS ARE NOT VALID WITHOUT ATTACHMENT OF THE WAYNE COUNTY PERMIT SPECIFICATIONS FOR CONSTRUCTION WITHIN THE ROAD ROW, PARKS, DRAIN EASEMENT OR SANITARY SEWER UNDER JURISDICTION OF THE WAYNE COUNTY (07/01/93) REVISED 12/15/2004

3. CONTRACTOR SHALL CONTACT MISS DIG AT 811 TO IDENTIFY AND FLAG / MARK THE LOCATIONS OF ALL UNDERGROUND UTILITIES AT THE PROPOSED CONSTRUCTION AREAS PRIOR TO START OF CONSTRUCTION, AND SHALL BE RESPONSIBLE FOR DETERMINING THE EXACT LOCATIONS AND ELEVATIONS OF ALL UNDERGROUND UTILITIES, AND RESOLVE ANY CONFLICT BETWEEN THE PROPOSED WORK AND THE EXISTING UNDERGROUND OR ABOVEGROUND UTILITIES.

4. CONTRACTOR SHALL MAINTAIN 18" MINIMUM VERTICAL CLEARANCE AND 3 FEET MINIMUM HORIZONTAL CLEARANCE BETWEEN THE PROPOSED AND EXISTING UTILITIES. ANY PROPOSED UTILITY PERMITTED TO CROSS UNDER THE ROAD OR DRAIN, MUST BE PLACED A MINIMUM OF 7 FEET BELOW THE LOWEST POINT OF THE ROAD, OR 6 FEET BELOW THE DRAIN BOTTOM. OVERHEAD WIRES/CABLES MUST BE INSTALLED 18 FEET MINIMUM ABOVE THE ROAD CENTERLINE. TO RELOCATE ANY UTILITY WITHIN THE ROAD ROW, THE CONTRACTOR SHALL COORDINATE THE RELOCATION WITH THE UTILITY COMPANY AND AS DIRECTED BY THE WAYNE COUNTY ENGINEER.

5. ALL SURVEY MONUMENTS / CORNERS AND BENCH MARKS LOCATED WITHIN THE CONSTRUCTION AREA MUST BE PRESERVED IN ACCORDANCE WITH PUBLIC ACT 74 AS AMENDED (INCLUDING ACT 34, P.A. 2000) AND AS PER WAYNE COUNTY PERMIT RULE 1.5. THE PERMIT HOLDER AND CONTRACTOR SHALL COORDINATE THE WORK WITH A PROFESSIONAL SURVEYOR LICENSED IN THE STATE OF MICHIGAN DURING CONSTRUCTION ACTIVITIES FOR THE PURPOSE OF WITNESSING, PRESERVING OR REPLACING SURVEY MONUMENTS AND MONUMENT BOXES.

6. EXPOSURE OF ANY UTILITIES UNDER THE PAVEMENT WILL NOT BE PERMITTED, UNLESS APPROVED BY THE WAYNE COUNTY ENGINEER. PAVEMENT REMOVAL AND REPLACEMENT SHALL BE PERFORMED PER APPLICABLE WAYNE COUNTY STANDARD DETAILS AN AS DIRECTED BY THE WAYNE COUNTY ENGINEER.

7. CONTRACTOR SHALL RESTORE ALL DISTURBED AREAS WITHIN THE WAYNE COUNTY ROAD ROW AND DRAIN EASEMENT WITH 3" TOPSOIL, THM SEED MIX AND MULCH. SLOPES STEEPER THAN 1 ON 3 SHALL BE RESTORED BY PLACING SOD ON 2" TOPSOIL.

8. ALL BACKFILLS UNDER OR WITHIN 3 FEET OF THE PROPOSED OR EXISTING PAVEMENT, CURB OR SIDEWALK SHALL CONFORM TO THE WAYNE COUNTY TRENCH "B" BACKFILL REQUIREMENTS. TRENCH "A" BACKFILL MAY BE USED WITHIN THE ROAD ROW AREAS UNDER CONDITIONS OTHER THAN THOSE SPECIFIED FOR TRENCH "B".

9. CONTRACTOR IS RESPONSIBLE FOR RESTORING OR REPLACING ALL DISTURBED LANDSCAPED AREAS, SPRINKLER SYSTEMS, FENCES, SIGNS, MAIL BOXES, ETC. WITHIN THE WAYNE COUNTY ROAD ROW AND / OR AS DIRECTED BY THE COUNTY ENGINEER.

10. CONTRACTOR SHALL MAINTAIN TWO-WAY TRAFFIC AT ALL TIMES. OTHERWISE, DETOURING TRAFFIC MUST BE PER APPROVED PLANS. ALL SIGNING AND TRAFFIC CONTROL DEVICES SHALL BE IN ACCORDANCE WITH THE LATEST EDITION OF M.M.U.T.C.D.

11. MAINTAIN A SAFE AND ADEQUATE TRAVEL ROUTE FOR PEDESTRIANS AT ALL TIMES THROUGHOUT THE PROJECT DURATION.

12. TUNNELING, BORING AND JACKING OPERATIONS SHALL BE IN ACCORDANCE WITH THE WAYNE COUNTY SPECIFICATIONS AND DETAILS. BORE PITS SHALL BE PLACED AT MINIMUM 10 FEET FROM THE BACK OF CURB OR EDGE OF PAVEMENT.

13. REMOVE ALL ABANDONED CONDUITS FROM THE COUNTY ROADS ROW OR AS DIRECTED BY THE WAYNE COUNTY ENGINEER.

14. CONTRACTOR SHALL PROVIDE COLD WEATHER PROTECTION FOR ALL PROPOSED CONCRETE WORK (PAVEMENTS, SIDEWALKS, DRIVE APPROACHES, ETC.) AS DIRECTED BY THE WAYNE COUNTY ENGINEER.

15. OVERNIGHT VEHICLE PARKING AND STORAGE OF CONSTRUCTION MATERIALS AND EQUIPMENT'S ARE NOT PERMITTED WITHIN THE WAYNE COUNTY ROADS RIGHTS-OF-WAY.

16. CONTRACTOR SHOULD OBTAIN SOIL EROSION AND SEDIMENTATION CONTROL PERMIT FROM THE WAYNE COUNTY DPS. CONTACT THE WAYNE COUNTY SOIL EROSION OFFICE AT (734) 326-5565, OR THE COMMUNITY HAVING JURISDICTION OVER THE SOIL EROSION PERMIT.

17. CONTRACTOR SHALL NOTIFY THE WAYNE COUNTY TRAFFIC SIGNAL SHOP AT (734) 955-2161 AT LEAST 72 HOURS PRIOR TO START OF WORK AT OR NEAR ANY SIGNALIZED INTERSECTIONS.

18. CONTRACTOR SHALL NOTIFY WAYNE COUNTY 72 HOURS PRIOR TO START OF CONSTRUCTION. CONTACT THE PERMIT OFFICE AT (734) 858-2761.

Know what's **below.**
Call before you dig.

PROJECT MANAGER: SHAWN MEDOUGH
CAD: K:\WADE\PLY\2130-01T\CIVIL\SHEETS\PLY2130-01T-CIVIL-NOTES.DWG PLOTTED 4/9/2025 3:15 PM BY FLANAGAN, MARTIN

BY	DESCRIPTION	DATE	REV#

WADE TRIM
25251 Northline Rd.
Taylor, MI 48180
734.947.9700
www.wadetrim.com

CITY OF PLYMOUTH
201 S MAIN ST
WAYNE COUNTY, MICHIGAN 48170
2025 INFRASTRUCTURE IMPROVEMENT PROGRAM

NOTES

ISSUED FOR:	DATE:	BY:
EGLE	3/19/25	SWK
WC DPS	3/20/25	SWK
BIDS	4/9/25	SWK

JOB NO.
PLY2130-01T

SHEET
2

2025 INFRASTRUCTURE IMPROVEMENT PROGRAM

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EXISTING CONDITIONS LEGEND

LINE WORK

- BOUNDARY
- RIGHT OF WAY — R/W
- BUILDING SETBACK
- BUILDING
- CURB & GUTTER
- EDGE OF GRAVEL
- CHAIN LINK FENCE
- ORNAMENTAL FENCE
- WOOD FENCE
- FIELD LINE — F — F
- GUARD RAIL
- TOP OF BANK
- DITCH CENTERLINE
- FLOOD PLAIN LINE — FLP
- SHORE OR EDGE OF WATER
- WETLAND
- RETAINING/SCREEN WALL
- RAILROAD TRACKS
- EDGE OF WOODS
- EDGE OF BRUSH
- EDGE OF HEDGE ROW
- TREE ROW
- MAJOR CONTOUR — 100
- MINOR CONTOUR — 101

HATCHING

- HMA SURFACE
- CONCRETE SURFACE
- AGGREGATE SURFACE
- BRICK PAVERS

TOPOGRAPHIC FEATURES

- SPOT ELEVATION + 100.59
- FOUND IRON ROD IR
- SET IRON PIPE IP
- GOVERNMENT CORNER
- BENCHMARK BM
- GPS MONUMENT BOX
- PK NAIL PK
- FOUND T IRON IRON
- FOUND PINCHED IRON PI
- FOUND SPIKE SPK
- TRAVERSE POINT
- RIGHT-OF-WAY MARKER RW
- UNDERGROUND MARKER M
- SOIL BORING SB
- AC UNIT AC
- ANTENNA
- BASKETBALL POST BP
- BILL BOARD SIGN BASE SGNB
- CAMERA TOWER
- FILL PORT
- FLAG POLE FP
- FOUNTAIN
- GAS PUMP
- LIGHT POLE BASE (NO LAMP)
- MAIL BOX MB
- MONITORING WELL MWELL
- NEWSPAPER BOX NB
- OIL WELL OW
- PIER PIER
- PILING PL
- PARKING METER PM
- ROUND POST OR BOLLARD P
- SQUARE POST P
- ROCK ROCK
- SATELLITE DISH
- SIGN POST S
- TRAFFIC LIGHT SIGNAL
- WOOD STAKE WS
- VOLLEY BALL POLE VP
- TETHER BALL POLE TP
- SWING SET
- CLIMBING BARS
- MERRY-GO-ROUND
- STRAIGHT SLIDE
- SPIRAL SLIDE
- EVERGREEN TREE OR BUSH
- DECIDUOUS TREE OR BUSH
- STUMP

UTILITIES LINE WORK

- WATER MAIN (UP TO 24") — W — W
- WATER MAIN (24" AND UP)
- SANITARY SEWER MAIN (UP TO 24") — SAN
- SANITARY SEWER MAIN (24" AND UP)
- SANITARY SEWER FORCE MAIN — FM
- STORM SEWER LINE (UP TO 24") — ST — ST
- STORM SEWER LINE (24" AND UP)
- OVERHEAD ELECTRIC — OH-E
- UNDERGROUND ELECTRIC — UG-E
- GAS MAIN OR SERVICE — G — G
- UNDERGROUND TELEPHONE — UG-T
- OVERHEAD TELEPHONE — T — T
- FIBER OPTICS — FO
- OIL PIPE LINE — OIL

UTILITIES SYMBOLS

- FIRE HYDRANT
- WATER VALVE IN BOX
- DOMESTIC WATER SHUT OFF OR WSO
- SPRINKLER HEAD SH
- SPRINKLER JUNCTION BOX JB
- POST INDICATOR VALVE
- GATE VALVE & WELL
- METER PIT MP
- WATER METER WM
- WATER FAUCET WF
- SANITARY SEWER MANHOLE S
- SANITARY SEWER CLEAN OUT CO
- SANITARY PUMP STATION PS
- SANITARY SEWER VENT SV
- SANITARY SEWER SEPTIC TANK
- STORM CATCH BASIN CB
- STORM CURB INLET CB
- STORM MANHOLE ST
- DOWNSPOUT SDS
- STORM SEWER CLEAN OUT CO
- STORM SEWER END SECTION
- STORM SEWER HEADWALL
- ELECTRIC METER EM
- ELECTRIC MANHOLE E
- UTILITY MANHOLE U
- POWER PEDESTAL PP
- ELECTRIC HAND HOLE HH
- TRANSFORMER BOX E
- POWER POLE
- UTILITY POLE
- POWER & LIGHT POLE
- TELEPHONE, POWER & L.P.
- POWER & TELEPHONE POLE
- GUY ANCHOR GA
- GUY POLE GP
- DEADMAN ANCHOR DA
- FLOOD LIGHT
- DECORATIVE LIGHT POLE
- LIGHT POLE
- METAL LIGHT POLE
- GAS METER GM
- GAS MANHOLE G
- TELEPHONE PEDESTAL TP
- TELEPHONE POLE

PROPOSED LEGEND

SITE LINE WORK

- CANOPY LIMITS
- BUILDING LINE
- CURB AND GUTTER
- STRAIGHT CURB
- BUILDING SETBACK
- RIGHT OF WAY LINE — R/W
- RETAINING/SCREEN WALL
- CHAIN LINK FENCE
- ORNAMENTAL FENCE
- WOOD FENCE
- GUARD RAIL
- THICKENED EDGE CONCRETE
- STOP BAR
- CURB & GUTTER REMOVAL
- STRAIGHT CURB REMOVAL
- PAINT STRIPE REMOVAL
- UTILITY REMOVAL/ABANDON
- SAWCUT FULL, FULL DEPTH
- TEMPORARY SILT FENCE
- MAJOR CONTOUR — 100
- MINOR CONTOUR — 101
- DRAINAGE SWALE
- TOP OF BANK
- LIMITS OF DISTURBANCE/ PROJECT LIMITS

UTILITY LINE WORK

- WATER MAIN (UP TO 24") — W — W
- WATER MAIN (24" AND UP)
- SANITARY SEWER MAIN (UP TO 24") — SAN — SAN
- SANITARY SEWER MAIN (24" AND UP)
- SANITARY SEWER FORCE MAIN — FM — FM
- STORM SEWER LINE (UP TO 24") — ST — ST
- STORM SEWER LINE (24" AND UP)
- OVERHEAD ELECTRIC — OH-E
- UNDERGROUND ELECTRIC — UG-E
- GAS MAIN OR SERVICE — G — G
- UNDERGROUND TELEPHONE — UG-T
- OVERHEAD TELEPHONE — OH-T

SITE SYMBOLS

- FILTER BERM OR CHECK DAM
- TEMPORARY INLET PROTECTION
- EROSION CONTROL KEY (TEMPORARY) ## T
- EROSION CONTROL KEY (PERMANENT) ## P
- SOIL TYPE XxX
- PARKING COUNT 5
- TRAFFIC FLOW ARROW
- SIGN AND SIGN POST — S
- BOLLARD — P
- ACCESSIBLE SYMBOL
- DETECTABLE WARNING SURFACE
- CURB ELEVATION WHERE: T = TOP OF CURB, G = GUTTER OR PVMT. — 100.50 T, 100.00 G
- THICKENED EDGE WALK ELEV. WHERE: T = TOP OF WALK, P = PAVEMENT — 100.50 T, 100.00 P
- SPOT ELEV. — 100.00 XXX

WHERE XXX IS ONE OF THE FOLLOWING:

TOP OF CONCRETE ELEV.	TOC
FINISH GRADE ELEV.	FG
DOOR ELEV.	DOOR
RIM ELEV.	RIM
BACK OF CURB ELEV.	BOC
GUTTER ELEV.	GUT
MATCH EXISTING ELEV.	MATCH
TOP OF PAVEMENT ELEV.	T/P
TOP OF WALL ELEV.	TOW
BOTTOM OF WALL ELEV.	BOW
TOP OF BANK ELEV.	TOB
TOE OF SLOPE ELEV.	TOE
FIINISH FLOOR ELEV.	FFE
ADJUST RIM ELEV.	ADJUST

- DRAINAGE FLOW
- DRAINAGE SLOPE — 1.0%
- FINISH GRADE SLOPE — 4:1
- HIGH POINT — H.P.
- GRADE BREAK — G.B.

REMOVAL LEGEND

- CURB & GUTTER REMOVAL
- STRAIGHT CURB REMOVAL
- PAINT STRIPE REMOVAL
- UTILITY ABANDON
- SAWCUT FULL, FULL DPETH
- REMOVAL ITEM — REM- XXX
- RELOCATE ITEM — REL- XXX
- ADJUST STRUCTURE — ADJ- XXX
- ABANDON ITEM — ABN
- RECONSTRUCT STRUCTURE — REC- XXX
- DECIDUOUS TREE/BUSH REMOVAL
- EVERGREEN TREE/BUSH REMOVAL
- STUMP REMOVAL
- BUILDING REMOVAL
- PAVEMENT SURFACE REMOVAL

UTILITY SYMBOLS

- FIRE HYDRANT
- WATER VALVE IN BOX
- DOMESTIC WATER SHUT OFF — WSO
- FIRE DEPARTMENT CONNECTION
- BACK FLOW PREVENTER
- POST INDICATOR VALVE
- GATE VALVE & WELL
- METER PIT — MP
- SANITARY SEWER MANHOLE (UP TO 6' DIA.) — S
- SANITARY SEWER MANHOLE (60" DIA. AND UP)
- SANITARY SEWER CLEAN OUT — CO
- SANITARY PUMP STATION — PS
- STORM CATCH BASIN (UP TO 60" DIA.) — CB
- STORM CURB INLET — CB
- STORM MANHOLE (UP TO 60" DIA.) — ST
- STORM MANHOLE/CATCH BASIN (60" DIA. AND UP)
- DOWNSPOUT — DS
- STORM SEWER END SECTION
- STORM SEWER CLEAN OUT — CO
- TRANSFORMER BOX — E
- POWER POLE
- ELECTRIC METER — EM
- ELECTRIC MANHOLE — E
- POWER PEDESTAL — PP
- DECORATIVE LIGHT POLE
- SINGLE LIGHT POLE
- PARKING LOT LIGHT POLE
- GAS METER — GM
- TELEPHONE PEDESTAL — TP

HATCHING

- CONSTRUCTION ENTRANCE
- STAGING/STOCK PILE AREA
- HMA SURFACE
- HEAVY DUTY HMA SURFACE
- CONCRETE SURFACE
- HEAVY DUTY CONCRETE SURFACE
- DECORATIVE CONCRETE SURFACE
- AGGREGATE SURFACE
- PAINTED ISLAND
- BUILDING REMOVAL

LANDSCAPE HATCH

- PERENNIALS-1
- PERENNIALS-2
- GROUND COVER-1
- GROUND COVER-2
- SEED MIX-1
- SEED MIX-2
- MULCH
- ROCK
- LAWN

Know what's below. Call before you dig.

PROJECT MANAGER: SHAWN KEOUGH
DESIGNED: MMG DRAWN: MMG CHECKED: CJS L:\EGLE\GLS-LEGEND.DWG PLOTTED 4/9/2025 3:15 PM BY FLANAGAN, MARTIN

REV#	DATE	DESCRIPTION	BY

25251 Northline Rd.
Taylor, MI 48180
734.947.9700
www.wadetrim.com

WADE TRIM

CITY OF PLYMOUTH
201 S MAIN ST
WAYNE COUNTY, MICHIGAN 48170
2025 INFRASTRUCTURE IMPROVEMENT PROGRAM
LEGEND

ISSUED FOR:	DATE:	BY:
EGLE	3/19/25	SWK
WC DPS	3/20/25	SWK
BIDS	4/9/25	SWK

JOB NO. PLY2130-01T

SHEET 3

2025 INFRASTRUCTURE IMPROVEMENT PROGRAM

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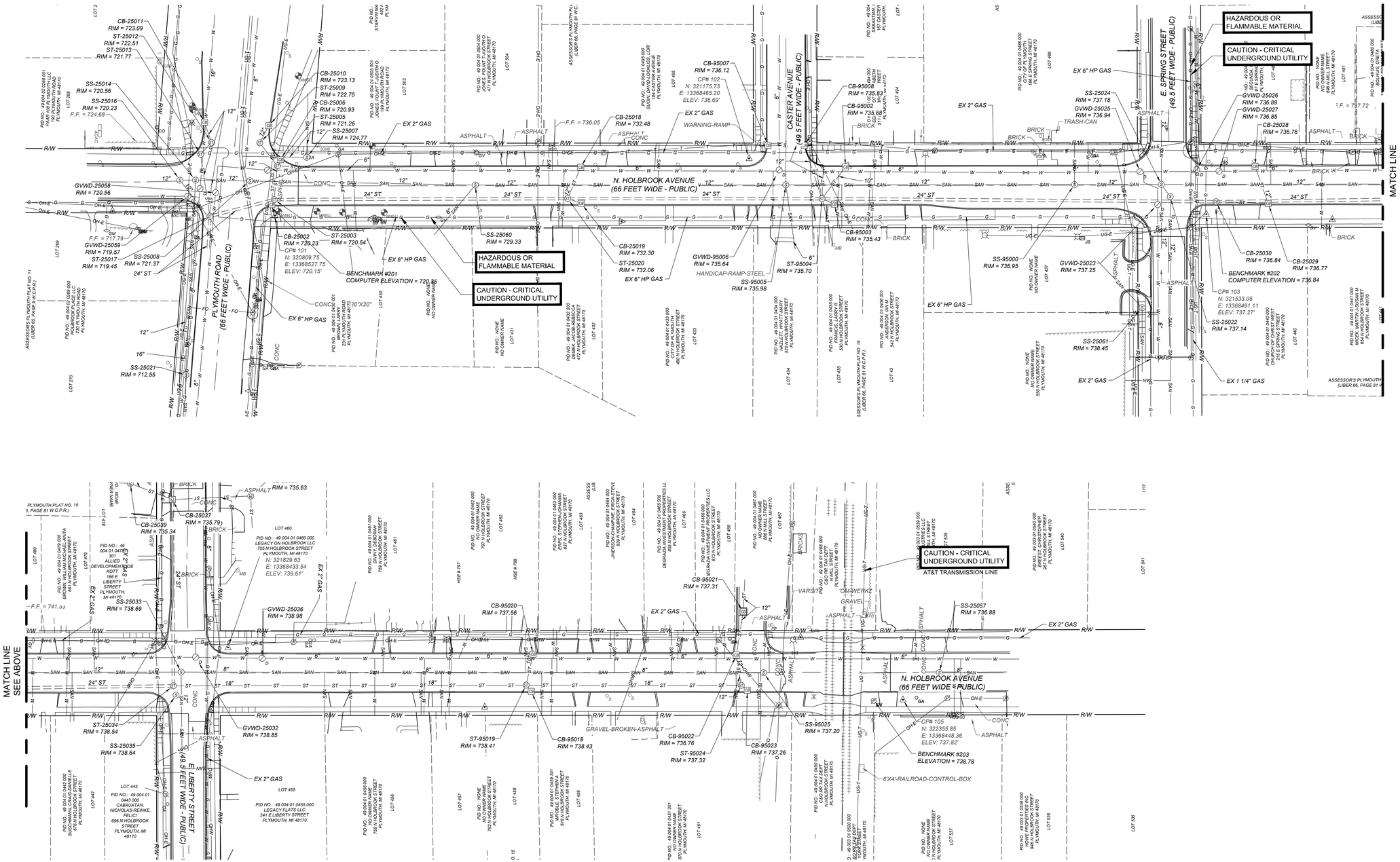
BENCHMARK #201 ELEV. 720.35
CHISELED X IN SOUTHEAST CORNER OF CATCH BASIN
SQUARE IN NORTHEAST QUADRANT OF PLYMOUTH ROAD
AND N HOLBROOK STREET

BENCHMARK #203 ELEV. 738.78
SET 6 INCH NAIL IN WEST FACE OF POWER POLE IN
WEST LAWN OF 920 N HOLBROOK STREET, NORTHEAST
FROM TRAIN TRACKS AND N HOLBROOK STREET

HORIZONTAL SCALE IN FEET
40 20 0 40 80

N


N. HOLBROOK AVENUE
(66 FEET WIDE - PUBLIC)
PLYMOUTH ROAD
(66 FEET WIDE - PUBLIC)
CASTER AVENUE
(49.5 FEET WIDE - PUBLIC)
E. SPRING STREET
(49.5 FEET WIDE - PUBLIC)
E. LIBERTY STREET
(49.5 FEET WIDE - PUBLIC)
HAZARDOUS OR FLAMMABLE MATERIAL
CAUTION - CRITICAL UNDERGROUND UTILITY
AT&T TRANSMISSION LINE
MATCH LINE SEE BELOW
MATCH LINE SEE ABOVE
BENCHMARK #201 COMPUTER ELEVATION = 720.35
BENCHMARK #202 COMPUTER ELEVATION = 736.84
BENCHMARK #203 ELEVATION = 738.78
CB-25011 RIM = 723.09 ST-25012 RIM = 722.51 ST-25013 RIM = 721.77
CB-25010 RIM = 723.13 ST-25009 RIM = 722.75
CB-25006 RIM = 720.93 ST-25005 RIM = 721.26 SS-25007 RIM = 724.77
SS-25014 RIM = 720.56
SS-25016 RIM = 720.23
GVWD-25058 RIM = 720.56
GVWD-25059 RIM = 719.57 ST-25017 RIM = 719.45
SS-25008 RIM = 721.37
CB-25002 RIM = 729.23 ST-25003 RIM = 720.54
SS-25060 RIM = 729.33
CB-25019 RIM = 732.30 ST-25020 RIM = 732.06
CB-95007 RIM = 736.12
CB-95008 RIM = 735.83
CB-95002 RIM = 735.68
CB-25018 RIM = 732.48
GVWD-95006 RIM = 735.64
SS-95004 RIM = 735.70
SS-95005 RIM = 735.98
CB-95003 RIM = 735.43
SS-95000 RIM = 736.95
GVWD-25023 RIM = 737.25
SS-25024 RIM = 737.18
GVWD-25025 RIM = 736.94
GVWD-25026 RIM = 736.89
GVWD-25027 RIM = 736.85
CB-25028 RIM = 736.76
CB-25030 RIM = 736.84
CB-25029 RIM = 736.77
SS-25022 RIM = 737.14
SS-25061 RIM = 738.45
SS-25021 RIM = 712.55
CB-25039 RIM = 735.34
CB-25037 RIM = 735.79
GVWD-25036 RIM = 738.98
SS-25033 RIM = 738.69
GVWD-25032 RIM = 738.85
ST-25034 RIM = 738.54
SS-25035 RIM = 738.64
CB-95021 RIM = 737.31
CB-95020 RIM = 737.56
CB-95019 RIM = 738.41
CB-95018 RIM = 738.43
CB-95022 RIM = 736.76
ST-95024 RIM = 737.32
CB-95023 RIM = 737.26
SS-95025 RIM = 737.20
SS-25057 RIM = 736.88
CP# 101 N: 320809.75 E: 13368527.75 ELEV: 720.15'
CP# 102 N: 321175.73 E: 13368465.20 ELEV: 736.69'
CP# 103 N: 321533.06 E: 13368491.11 ELEV: 737.27'
CP# 105 N: 322355.85 E: 13368448.36 ELEV: 737.82'
F.F. = 724.68
F.F. = 736.05
F.F. = 717.79
F.F. = 737.72
F.F. = 741.03
EX 6" HP GAS
EX 2" GAS
EX 1 1/4" GAS
WARNING-RAMP
TRASH-CAN
6'X4'-RAILROAD-CONTROL-BOX
GRAVEL-BROKEN-ASPHALT
HANDICAP-RAMP-STEEL
ASPHALT
BRICK
CONC
GRAVEL
VARSITY
OM-WERKZ
24" ST
12" ST
6" ST
PLYMOUTH PLAT NO. 15 5, PAGE 81 W.C.P.R.)
ASSESSOR'S PLYMOUTH PLAT NO. 11 (LIBER 65, PAGE 9 W.C.P.R.)
ASSESSOR'S PLYMOUTH PLAT NO. 15 (LIBER 66, PAGE 81 W.C.P.R.)
ASSESSOR'S PLYMOUTH (LIBER 66, PAGE 81 W.C.P.R.)
ASSESSOR'S PLYMOUTH PLAT NO. 15 (LIBER 65, PAGE 81 W.C.P.R.)
ASSESSOR'S PLYMOUTH PLAT NO. 15 (LIBER 66, PAGE 81 W.C.P.R.)
LOT 460
LOT 461
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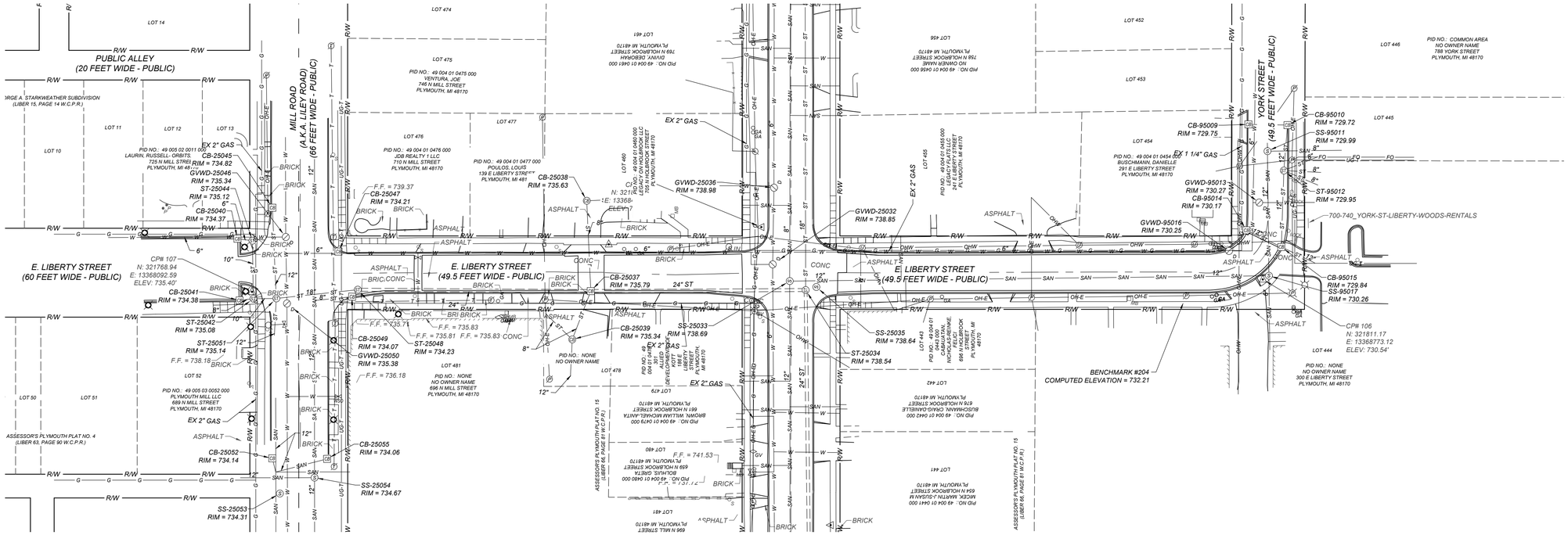
LOT 470
LOT 471
LOT 472
LOT 473
LOT 474
LOT 475
LOT 476
LOT 477
LOT 478
LOT 479
LOT

BENCHMARK #201 ELEV. 732.21
CHISELED X IN SOUTHEAST CORNER OF CATCH BASIN SQUARE IN NORTHEAST QUADRANT OF PLYMOUTH ROAD AND N HOLBROOK STREET

BENCHMARK #204 ELEV. 732.21
SET 6 INCH NAIL IN NORTH FACE OF POWER POLE IN FRONT LAWN OF 300 E LIBERTY STREET

N

HORIZONTAL SCALE IN FEET
40 20 0 40 80



25251 Northline Rd.
Taylor, MI 48180
734.947.1700
www.wadetrim.com

WADE TRIM

REV#	DATE	DESCRIPTION	BY

CITY OF PLYMOUTH
201 S MAIN ST
WAYNE COUNTY, MICHIGAN 48170
2025 INFRASTRUCTURE IMPROVEMENT PROGRAM

LIBERTY ST - EXISTING CONDITIONS

ISSUED FOR:	DATE:	BY:
EGLE	3/19/25	SWK
WC DPS	3/20/25	SWK
BIDS	4/9/25	SWK

JOB NO.
PLY2130-01T

SHEET
5

2025 INFRASTRUCTURE IMPROVEMENT PROGRAM

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Know what's below.
Call before you dig.

PROJECT MANAGER: SHAWN KESJOHN
CAD: K:\PROJECTS\PLY2130-01T\VISP-EXISTING CONDITIONS.DWG PLOTTED 4/9/2025 3:16 PM BY FLANAGAN, MARTIN

STRUCTURE INVENTORY

CB-25002
RIM = 720.23
12" RCP NW INV=716.38
12" RCP W INV=716.53

ST-25003
RIM = 720.54
24" RCP S/SE INV=712.59
24" RCP N INV=712.69
12" RCP NW INV=716.64
12" RCP SE INV=716.24

WMH-25004
RIM = 721.46
BRICK FOD FOW NPV TOV-2.85 TOW-3.85

ST-25005
RIM = 721.26
12" RCP N INV=718.20
12" RCP NW INV=718.00
12" RCP SW INV=717.90
12" RCP SE INV=717.76

CB-25006
RIM = 720.93
12" RCP SE INV=717.98

SMH-25007
RIM = 724.77
12" RCP W INV=719.12
12" RCP S INV=718.97

SMH-25008
RIM = 721.37
UTO HEAVY TRAFFIC

ST-25009
RIM = 722.75
12" RCP NW INV=718.60
12" RCP NE INV=718.05

CB-25010
RIM = 723.13
12" RCP E INV=718.63

CB-25011
RIM = 723.09
12" RCP NE INV=718.29

ST-25012
RIM = 722.51
12" RCP SE INV=716.21
12" RCP NW INV=718.31

ST-25013
RIM = 721.77
12" RCP E INV=715.17
12" RCP NW INV=718.47

SMH-25014
RIM = 720.56
12" CLAY E INV=710.86
12" CLAY N INV=710.96
12" PVC S INV=714.06

WMH-25015
RIM = 720.32
BRICK NPV FOD FOW TOW-3.5 TOV-2.85

SMH-25016
RIM = 720.23
12" CLAY N INV=710.33
12" CLAY N INV=710.33
12" PVC N INV=713.53
8" CLAY NW INV=715.13

ST-25017
RIM = 719.45
24" RCP N/NW INV=711.60
24" RCP E INV=711.05
12" RCP W INV=711.95
12" RCP SW INV=713.85

CB-25018
RIM = 732.48
12" CLAY ELBOW SE INV=727.48

CB-25019
RIM = 732.30
12" CLAY SW INV=726.90

ST-25020
RIM = 732.06
24" RCP S INV=721.86
24" RCP N INV=721.86
12" CLAY NE INV=726.81
12" CLAY NW INV=726.81

SMH-25021
RIM = 712.55
12" RCP E INV=703.45
12" RCP W INV=703.55

SMH-25022
RIM = 737.14
12" CLAY SW INV=727.24
12" CLAY E INV=727.24

WMH-25023
RIM = 737.25
STEEL DIR: E/W
T/PIPE=732.75

SMH-25024
RIM = 737.18
12" CLAY S INV=721.18
12" CLAY N INV=721.28
12" CLAY NE INV=721.28
12" CLAY W INV=721.28
8" CLAY E INV=721.58

WMH-25025
RIM = 736.94
STEEL DIR: N/S
T/PIPE=732.64

WMH-25026
RIM = 736.89
STEEL DIR: E\W
T/PIPE=732.59

WMH-25027
RIM = 736.85
STEEL DIR: N/S
T/PIPE=732.70

CB-25028
RIM = 736.76
12" RCP E INV=732.96

CB-25029
RIM = 736.77
12" RCP W INV=731.87
12" RCP S INV=731.92

CB-25030
RIM = 736.84
24" RCP N INV=725.44
24" RCP S INV=725.44
12" RCP N INV=731.74

WMH-25032
RIM = 738.85
STEEL DIR: W
T/PIPE=734.15

SMH-25033
RIM = 738.69
12" CLAY E INV=723.09
12" CLAY S INV=722.99
8" CLAY N INV=723.69
8" CLAY N INV=729.79

ST-25034
RIM = 738.54
24" RCP S INV=726.54
24" RCP W INV=726.54
18" RCP N INV=727.64

SMH-25035
RIM = 738.64
BRICK FOD NPV

WMH-25036
RIM = 738.98
STEEL DIR: N\S
T/PIPE=734.73

CB-25037
RIM = 735.79
24" RCP W INV=726.49
24" RCP E INV=726.49
6" PVC SW INV=731.59
8" PVC N INV=727.69

CB-25038
RIM = 735.63
8" PVC SE INV=729.18
4" PVC E INV=729.78

CB-25039
RIM = 735.34
12" RCP S INV=732.14
6" PVC NW INV=732.34
6" PVC NE INV=732.24

CB-25040
RIM = 734.37
6" PVC E INV=732.07

CB-25041
RIM = 734.38
8" PVC E INV=730.18

ST-25042
RIM = 735.08
10" CLAY E INV=727.88
8" PVC W INV=729.88
10" CLAY N INV=731.38

ST-25044
RIM = 735.12
6" PVC W INV=731.72
10" CLAY S INV=731.72

CB-25045
RIM = 734.82
12" CLAY S INV=731.32

WMH-25046
RIM = 735.34
UTO HEAVY TRAFFIC

CB-25047
RIM = 734.21
BLOCK FOD NPV

ST-25048
RIM = 734.23
18" RCP W INV=726.83
24" RCP E INV=726.83
12" RCP SW INV=730.43

CB-25049
RIM = 734.07
12" RCP NE INV=730.57
8" CLAY W INV=731.07

WMH-25050
RIM = 735.38
UTO HEAVY TRAFFIC

ST-25051
RIM = 735.14
18" RCP E INV=727.34
10" CLAY W INV=727.94
12" CLAY S INV=729.24
10" CLAY NW INV=729.24

CB-25052
RIM = 734.14
12" CLAY SE INV=729.44

SMH-25053
RIM = 734.31
12" CLAY N INV=728.11
12" CLAY NW INV=729.61
12" CLAY NE INV=729.31
8" CLAY W INV=729.21
12" CLAY S INV=728.11

SMH-25054
RIM = 734.67
12" CLAY N INV=725.77
12" CLAY S INV=725.67
12" CLAY W INV=725.77

CB-25055
RIM = 734.06
BLOCK HEAVY OFFSET NPV FOD FOW

SMH-25057
RIM = 736.88
8" CLAY N INV=728.88

WMH-25058
RIM = 720.56
BRICK FOD FOW NPV TOV-3.25 TOW-3.5

WMH-25059
RIM = 719.57
BLOCK FOD NPV TOV-3.7

SMH-25060
RIM = 729.33
12" RCP N INV=720.13
12" RCP S INV=720.03
6" CLAY SE INV=722.73

SMH-25061
RIM = 738.45
12" RCP SW INV=730.25
12" RCP E INV=730.25

SMH-95000
RIM = 736.95
12" CLAY N INV=728.85

CB-95002
RIM = 735.68
10" RCP SE INV=730.28

CB-95003
RIM = 735.43
12" RCP SW INV=731.03

ST-95004
RIM = 735.70
24" RCP N INV=724.40
24" RCP S INV=724.40
12" RCP NE INV=730.60
10" RCP NW INV=728.46
12" RCP W INV=730.40
12" CLAY SW INV=729.70

SMH-95005
RIM = 735.98
12" CLAY N INV=720.58
12" CLAY S INV=720.48
6" CLAY E INV=728.38

WMH-95006
RIM = 735.64
BRICK FOD NPV TOV-3.05

CB-95007
RIM = 736.12
12" RCP N INV=732.52

CB-95008
RIM = 735.83
12" RCP E INV=731.73
12" RCP S INV=732.13

CB-95009
RIM = 729.75
12" RCP E INV=727.15

CB-95010
RIM = 729.72
12" RCP S INV=726.72
12" RCP W INV=726.72

SMH-95011
RIM = 729.99
12" CLAY S INV=723.99
12" CLAY N INV=724.09
8" PVC E INV=724.09

ST-95012
RIM = 729.95
12" RCP S INV=726.55
8" PVC E INV=724.20
8" CLAY SE INV=724.65
8" CLAY NE INV=724.65
12" RCP N INV=726.45

WMH-95013
RIM = 730.27
STEEL DIR: E/W
T/PIPE=724.32

CB-95014
RIM = 730.17
12" RCP SE INV=727.17

CB-95015
RIM = 729.84
12" RCP N INV=726.34
12" RCP NW INV=726.34
12" RCP SE INV=725.44

WMH-95016
RIM = 730.25
POOR FOD FOW NPV TOW-0.8

SMH-95017
RIM = 730.26
12" CLAY N INV=723.76
12" CLAY W INV=723.66
6" CLAY S INV=724.56

CB-95018
RIM = 738.43
12" RCP SW INV=732.73

ST-95019
RIM = 738.41
12" RCP N INV=729.11
12" RCP S INV=729.11
12" RCP NE INV=732.66
10" RCP NW INV=731.71

CB-95020
RIM = 737.56
10" RCP SE INV=732.66

CB-95021
RIM = 737.31
12" RCP E INV=732.01
6" PVC W INV=732.31

CB-95022
RIM = 736.76
12" RCP E INV=731.06
12" RCP W INV=731.76

CB-95023
RIM = 737.26
12" RCP SW INV=733.16

ST-95024
RIM = 737.32
12" RCP S INV=730.17
12" RCP W INV=730.97
12" RCP NE INV=733.02

SMH-95025
RIM = 737.20
8" CLAY S INV=732.40
8" CLAY N INV=732.45

Know what's below.
Call before you dig.

PROJECT MANAGER: SHAWN KEOUGH
CAD OPERATOR: AMANDA BRANDT
P:\PLY\2130-01T\CAD\SHEET\VIP-EXISTING CONDITIONS.DWG PLOTTED 4/9/2025 3:16 PM BY FLANAGAN, MARTIN

REV#	DATE	DESCRIPTION	BY

WADE TRIM
25251 Northline Rd.
Taylor, MI 48180
734.947.7700
www.wadetrim.com

CITY OF PLYMOUTH
201 S MAIN ST
WAYNE COUNTY, MICHIGAN 48170
2025 INFRASTRUCTURE IMPROVEMENT PROGRAM

EXISTING STRUCTURE TABLE

ISSUED FOR:	DATE:	BY:
EGLE	3/19/25	SWK
WC DPS	3/20/25	SWK
BIDS	4/9/25	SWK

JOB NO.
PLY2130-01T

SHEET
6

2025 INFRASTRUCTURE IMPROVEMENT PROGRAM

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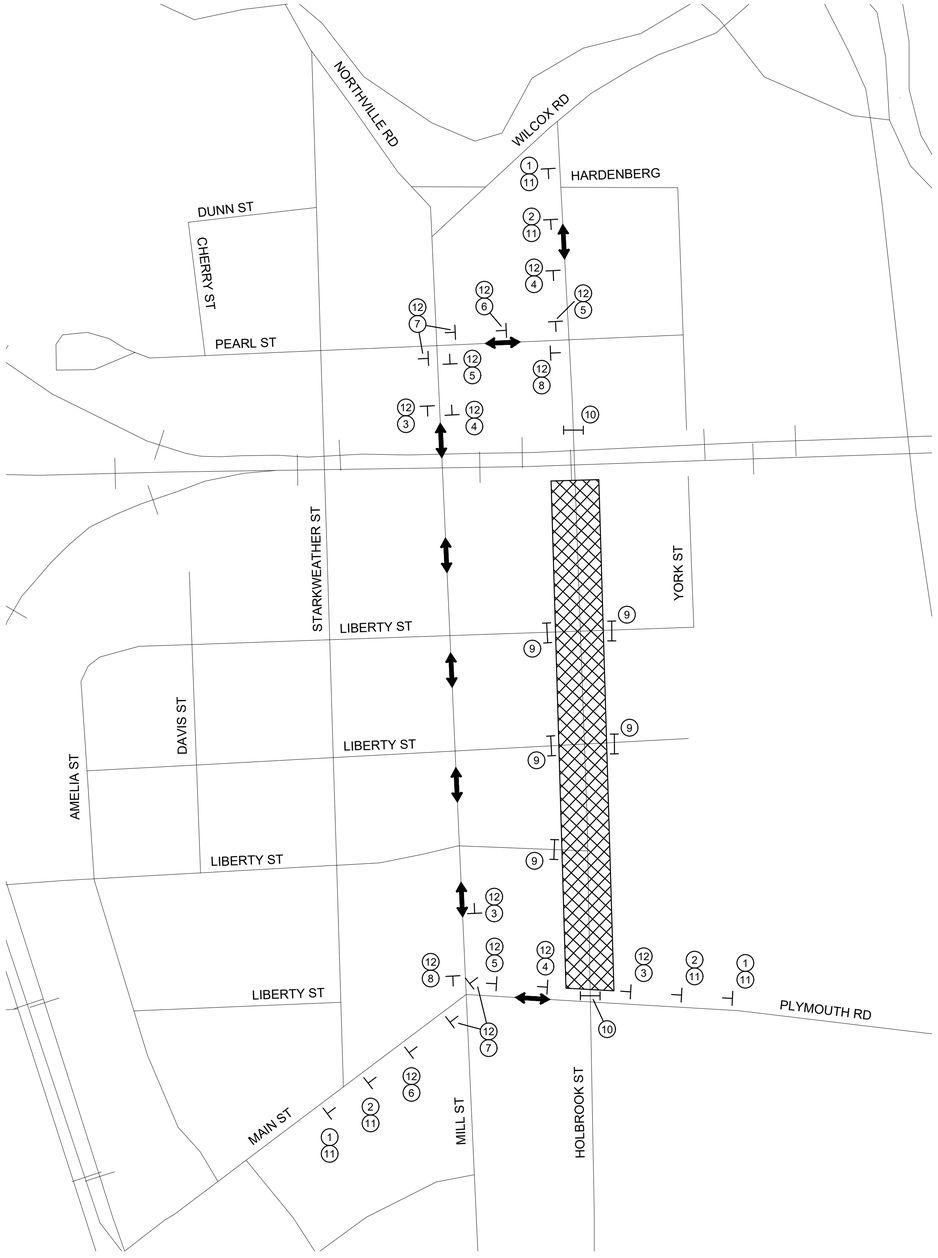

N

ROAD CLOSED AHEAD	W20-3 48"x48"	1
DETOUR AHEAD	W20-2 48"x48"	2
DETOUR	M4-9j 30"x24"	3
DETOUR	M4-9kR 30"x30"	4
DETOUR	M4-9R 30"x24"	5
DETOUR	M4-9kL 30"x30"	6
DETOUR	M4-9L 30"x24"	7
END DETOUR	M4-8a 24"x18"	8
ROAD CLOSED	R11-2 48"x30"	9
ROAD CLOSED TO THRU TRAFFIC	R11-4 60"x30"	10
HOLBROOK	W20-13P 48"x18"	11
HOLBROOK	W20-12P 30"x12"	12

NOTE:
1. AT LEAST ONE ACCESS TO BUSINESSES AND RESIDENTS MUST BE MAINTAINED AT ALL TIME.
2. CONSTRUCTION, WARNING, REGULATORY, AND GUIDE SIGNS SHOWN MAY REQUIRE FIELD ADJUSTMENTS AS DIRECTED BY THE ENGINEER.
3. WHEN THE ROADWAY IS CLOSED, TYPE III BARRICADES SHALL BE PLACED FROM EDGE OF PAVEMENT TO EDGE OF PAVEMENT TO COMPLETELY BLOCK TRAFFIC FROM ENTERING THE ROAD.
4. ALL SIGNS ARE TO BE PLACED 350' APART UNLESS NOTED

LEGEND

- TEMPORARY TRAFFIC SIGN
- TYPE 3 BARRICADE
- WORK ZONE
- PROPOSED DETOUR ROUTE

Know what's below. Call before you dig.

PROJECT MANAGER: SHAWN KEOUGH
DESIGNED: MARK MARTIN DRAWN: SWK CHKD: CPM MOT.DWG PLOTTED 4/9/2025 3:18 PM BY FLANAGAN, MARTIN

REV#	DATE	DESCRIPTION	BY

WADE TRIM
25251 Northline Rd
Taylor, MI 48180
734.947.9700
www.wadetrim.com

CITY OF PLYMOUTH
201 S MAIN ST
WAYNE COUNTY, MICHIGAN 48170
2025 INFRASTRUCTURE IMPROVEMENT PROGRAM
HOLBROOK AVE -
MAINTENANCE OF TRAFFIC

ISSUED FOR:	DATE:	BY:
EGLE	3/19/25	SWK
WC DPS	3/20/25	SWK
BIDS	4/9/25	SWK

JOB NO.
PLY2130-01T

SHEET
7

2025 INFRASTRUCTURE IMPROVEMENT PROGRAM

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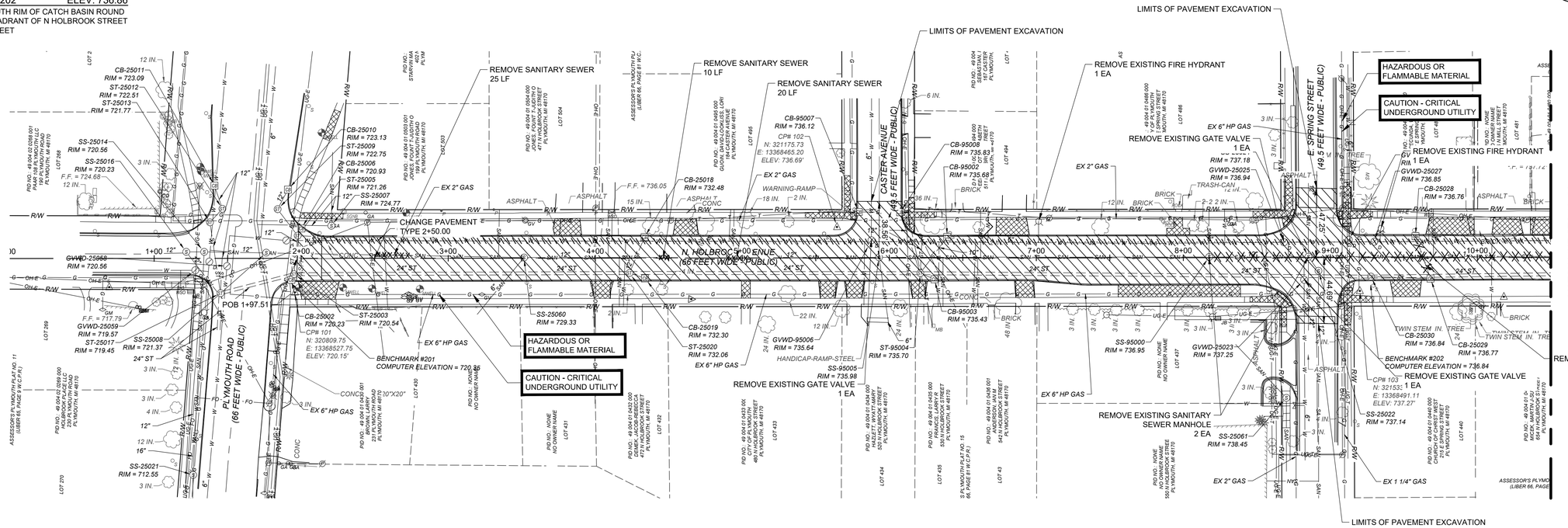
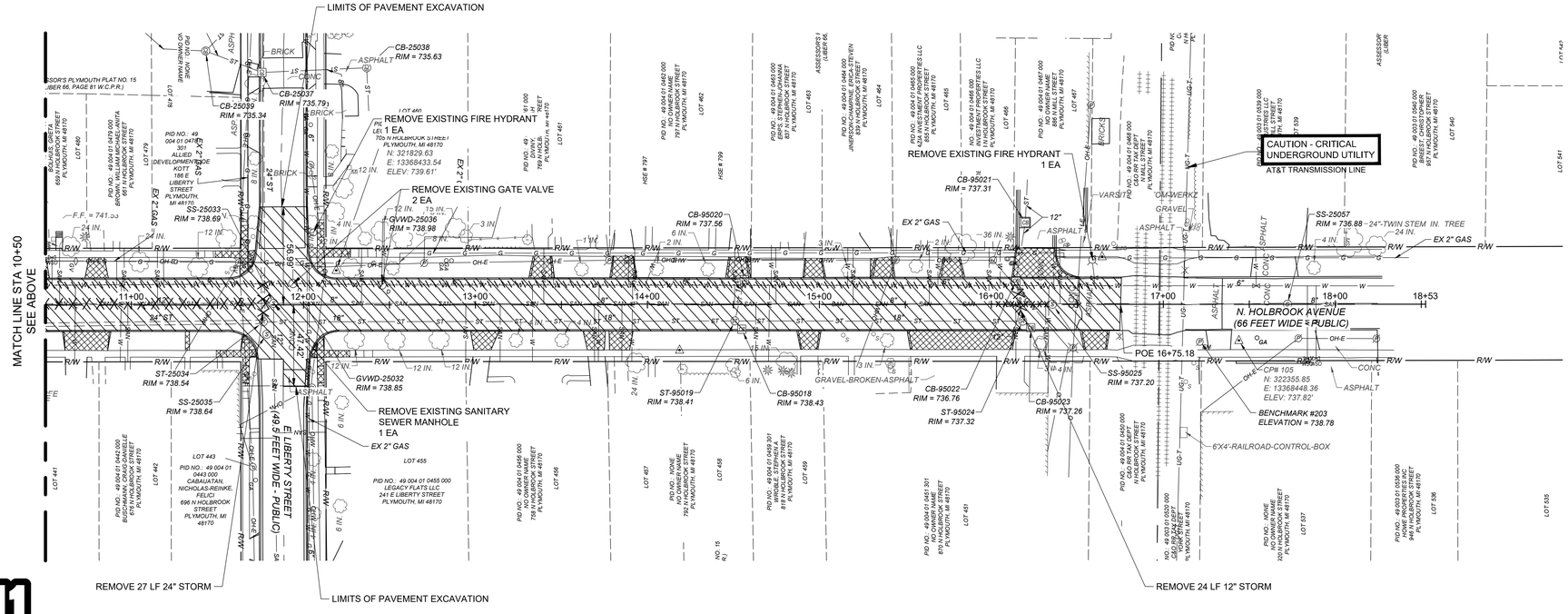
BENCHMARK #201 ELEV. 732.21
CHISELED X IN SOUTHEAST CORNER OF CATCH BASIN SQUARE IN NORTHEAST QUADRANT OF PLYMOUTH ROAD AND N HOLBROOK STREET

BENCHMARK #202 ELEV. 736.86
CHISELED X IN SOUTH RIM OF CATCH BASIN ROUND IN NORTHEAST QUADRANT OF N HOLBROOK STREET AND E SPRING STREET

HORIZONTAL SCALE IN FEET
40 20 0 40 80

N





LEGEND

- PAVEMENT EXCAVATION
- CONCRETE DRIVE AND SIDEWALK, REMOVE
- ABANDON UTILITY
- REMOVE UTILITY
- REMOVE CURB

SUMMARY OF QUANTITIES THIS SHEET

3000	CY	PAVEMENT EXCAVATION
10000	SF	CONCRETE DRIVES AND SIDEWALK, REMOVE
150	SF	BRICK PAVER REMOVAL
456	LF	REMOVE EXISTING SANITARY SEWER (PAID FOR AS REMOVE AND REPLACE ___-INCH SANITARY SEWER, TRENCH B (SAND))
85	LF	STORM SEWER, REMOVE
40	SY	PAVEMENT FOR BUTT JOINT REMOVE

Know what's below. Call before you dig.

PROJECT MANAGER: SHAWN KEOUGH
DWG: N:\JOBS\PLY2130-01T\CAD\SHEET\CSP-REMOVAL.DWG PLOTTED 4/9/2025 3:16 PM BY FLANAGAN, MARTIN

REV#	DATE	DESCRIPTION	BY

WADE TRIM
25251 Northline Rd.
Taylor, MI 48180
734.947.7700
www.wadetrim.com

CITY OF PLYMOUTH
201 S MAIN ST
WAYNE COUNTY, MICHIGAN 48170
2025 INFRASTRUCTURE IMPROVEMENT PROGRAM
HOLBROOK AVE - REMOVAL PLAN

ISSUED FOR:	DATE:	BY:
EGLE	3/19/25	SWK
WC DPS	3/20/25	SWK
BIDS	4/9/25	SWK

JOB NO. PLY2130-01T

SHEET 8

2025 INFRASTRUCTURE IMPROVEMENT PROGRAM

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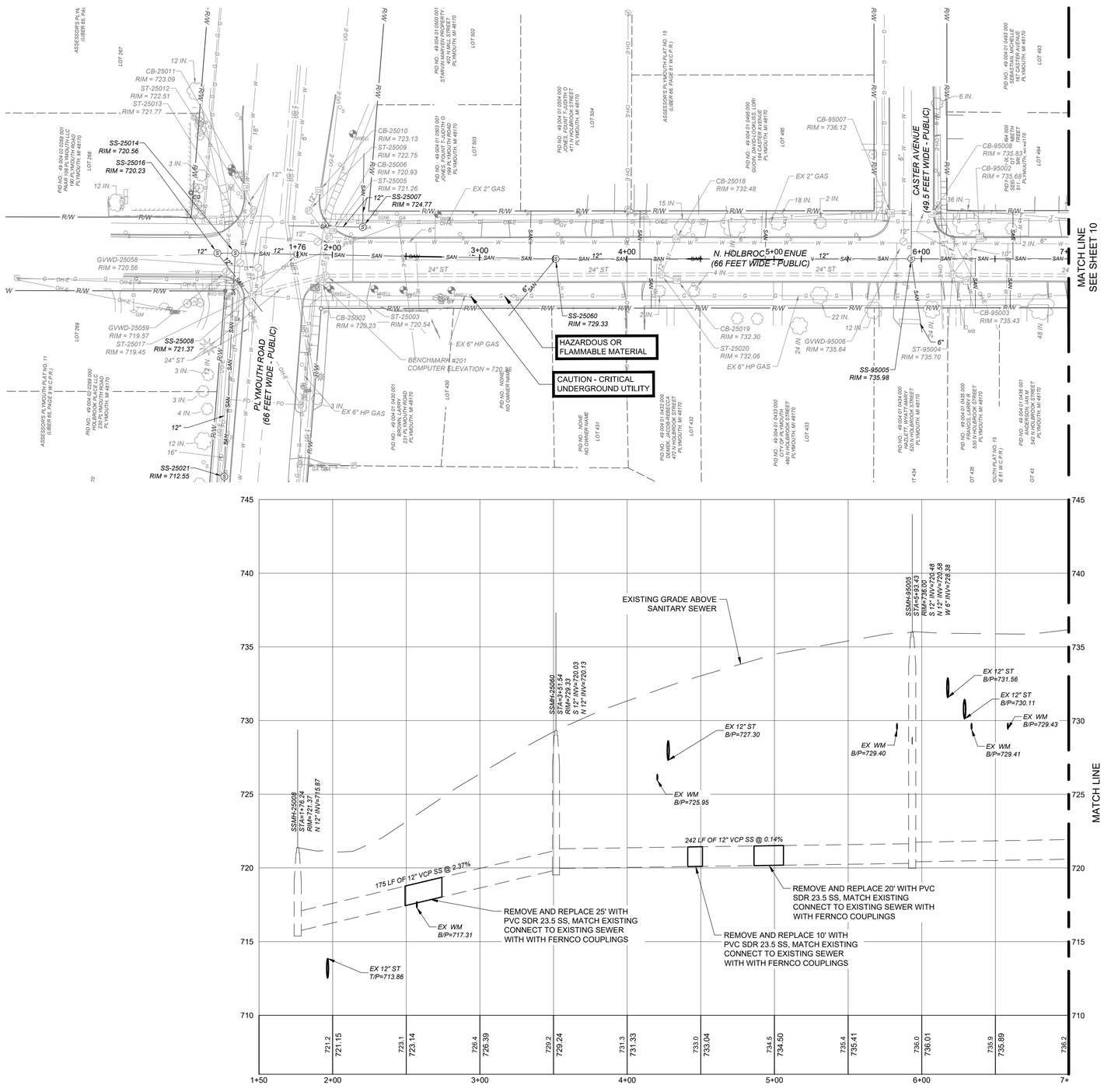
BENCHMARK #202 ELEV. 736.86

CHISELED X IN SOUTH RIM OF CATCH BASIN ROUND IN NORTHEAST QUADRANT OF N HOLBROOK STREET AND E SPRING STREET

BENCHMARK #203 ELEV. 738.78

SET 6 INCH NAIL IN WEST FACE OF POWER POLE IN WEST LAWN OF 920 N HOLBROOK STREET, NORTHEAST FROM TRAIN TRACKS AND N HOLBROOK STREET



NOTES

DEWATERING: ALL GROUNDWATER ENCOUNTERED FROM THE EXCAVATION/INSTALLATION OF THE SANITARY SEWER SHALL BE PUMPED DIRECTLY INTO THE CITY OF PLYMOUTH DOWNSTREAM STORM SEWER. (CONTRACTOR WILL COORDINATE LOCATION WITH CITY PRIOR TO DEWATERING). THE COST FOR DEWATERING WILL BE INCLUDED IN THE COST OF THE SANITARY SEWER AND SANITARY MANHOLE PAY ITEMS.

CONTRACTOR WILL DESIGN AND INSTALL A TEMPORARY EARTH RETENTION SYSTEM ALONG BOTH SIDES OF THE PROPOSED UTILITY TRENCH. THE CONTRACTOR WILL BE RESPONSIBLE FOR EXPLAINING THEIR PROPOSED WIDTH AND DEPTH OF THEIR RETENTION SYSTEM AS PART OF THE DESIGN. THE INTENT OF THE TEMPORARY RETENTION SYSTEM IS TO PROTECT THE EXISTING UTILITIES ADJACENT TO THE PROPOSED SANITARY SEWER. (PLEASE SEE SME GEOTECHNICAL REPORT AND EXISTING UTILITY PLAN). THE DESIGN WILL BE PREPARED BY A LICENSED PROFESSIONAL ENGINEER (MICHIGAN) AND WILL BE SUBMITTED TO THE OWNER/ENGINEER FOR REVIEW AND APPROVAL PRIOR TO USE. ALL COSTS FOR THE TEMPORARY EARTH RETENTION SYSTEM WILL BE PAID FOR AS PART OF THE PAY ITEM "TEMPORARY EARTH RETENTION SYSTEM" (LS).

SUMMARY OF QUANTITIES THIS SHEET

55	LF	REMOVE AND REPLACE 12-INCH, PVC SOLID WALL SDR 23.5, SANITARY SEWER, TRENCH B (SAND)

Know what's below. Call before you dig.

PROJECT MANAGER: SHAWN KEOUGH
CAD OPERATOR: ADAM@WADETRIM.COM - C:\SS-SAN.DWG PLOTTED 4/9/2025 3:16 PM BY FLANAGAN, MARTIN

REV#	DATE	DESCRIPTION	BY

WADE TRIM
25251 Northline Rd.
Taylor, MI 48180
734.947.9700
www.wadetrim.com

CITY OF PLYMOUTH
201 S MAIN ST
WAYNE COUNTY, MICHIGAN 48170
2025 INFRASTRUCTURE IMPROVEMENT PROGRAM
HOLBROOK AVE - PROP SANITARY
PLAN & PROFILE STA 1+76 TO 7+00

ISSUED FOR:	DATE:	BY:
EGLE	3/19/25	SWK
WC DPS	3/20/25	SWK
BIDS	4/9/25	SWK

JOB NO.
PLY2130-01T

SHEET
9

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2025 INFRASTRUCTURE IMPROVEMENT PROGRAM

BENCHMARK #202 ELEV. 736.86
CHISELED X IN SOUTH RIM OF CATCH BASIN ROUND IN NORTHEAST QUADRANT OF N HOLBROOK STREET AND E SPRING STREET

BENCHMARK #203 ELEV. 738.78
SET 6 INCH NAIL IN WEST FACE OF POWER POLE IN WEST LAWN OF 920 N HOLBROOK STREET, NORTHEAST FROM TRAIN TRACKS AND N HOLBROOK STREET

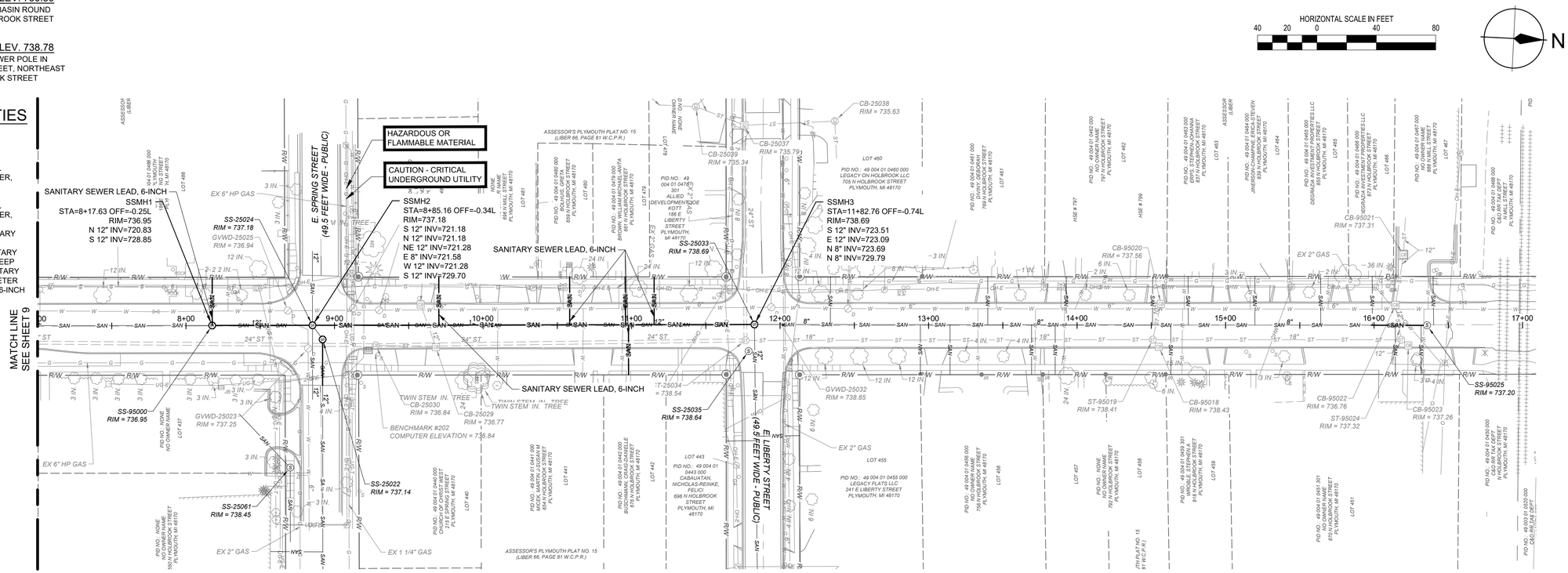
SUMMARY OF QUANTITIES THIS SHEET

35	LF	REMOVE AND REPLACE 10-INCH, PVC SOLID WALL SDR 23.5, SANITARY SEWER, TRENCH B (SAND)
366	LF	REMOVE AND REPLACE 12-INCH, PVC SOLID WALL SDR 23.5, SAB-SANITARY SEWER, TRENCH B (SAND)
68	LF	REMOVE EXISTING SANITARY SEWER
3	EA	STANDARD 4-FOOT SANITARY MANHOLE, 0 TO 8 FEET DEEP
26	VF	ADDITIONAL DEPTH SANITARY MANHOLE, 48-INCH DIAMETER
6	EA	SANITARY SEWER LEAD, 6-INCH

NOTES

DEWATERING: ALL GROUNDWATER ENCOUNTERED FROM THE EXCAVATION/INSTALLATION OF THE SANITARY SEWER SHALL BE PUMPED DIRECTLY INTO THE CITY OF PLYMOUTH DOWNSTREAM STORM SEWER. (CONTRACTOR WILL COORDINATE LOCATION WITH CITY PRIOR TO DEWATERING). THE COST FOR DEWATERING WILL BE INCLUDED IN THE COST OF THE SANITARY SEWER AND SANITARY MANHOLE PAY ITEMS.

CONTRACTOR WILL DESIGN AND INSTALL A TEMPORARY EARTH RETENTION SYSTEM ALONG BOTH SIDES OF THE PROPOSED UTILITY TRENCH. THE CONTRACTOR WILL BE RESPONSIBLE FOR EXPLAINING THEIR PROPOSED WIDTH AND DEPTH OF THEIR RETENTION SYSTEM AS PART OF THE DESIGN. THE INTENT OF THE TEMPORARY RETENTION SYSTEM IS TO PROTECT THE EXISTING UTILITIES ADJACENT TO THE PROPOSED SANITARY SEWER. (PLEASE SEE SME GEOTECHNICAL REPORT AND EXISTING UTILITY PLAN). THE DESIGN WILL BE PREPARED BY A LICENSED PROFESSIONAL ENGINEER (MICHIGAN) AND WILL BE SUBMITTED TO THE OWNER/ENGINEER FOR REVIEW AND APPROVAL PRIOR TO USE. ALL COSTS FOR THE TEMPORARY EARTH RETENTION SYSTEM WILL BE PAID FOR AS PART OF THE PAY ITEM "TEMPORARY EARTH RETENTION SYSTEM" (LS).


HORIZONTAL SCALE IN FEET
40 20 0 40 80
N
HAZARDOUS OR FLAMMABLE MATERIAL
CAUTION - CRITICAL UNDERGROUND UTILITY
E SPRING STREET (49.5 FEET WIDE - PUBLIC)
E LIBERTY STREET (49.5 FEET WIDE - PUBLIC)
SANITARY SEWER LEAD, 6-INCH
SSMH1 STA=8+17.63 OFF=-0.25L RIM=736.95 N 12" INV=720.83 S 12" INV=728.85
SSMH2 STA=8+85.16 OFF=-0.34L RIM=737.18 S 12" INV=721.18 N 12" INV=721.18 NE 12" INV=721.28 E 8" INV=721.58 W 12" INV=721.28 S 12" INV=729.70
SSMH3 STA=11+82.76 OFF=-0.74L RIM=738.69 S 12" INV=723.51 E 12" INV=723.09 N 8" INV=723.69 N 8" INV=729.79
SS-95000 RIM = 736.95
SS-25022 RIM = 737.14
SS-25061 RIM = 738.45
SS-25024 RIM = 737.18
SS-25033 RIM = 738.69
SS-25034 = 738.54
SS-25035 RIM = 738.64
SS-95025 RIM = 737.20
CB-25038 RIM = 735.63
CB-25039 RIM = 735.34
CB-25037 RIM = 735.79
CB-95021 RIM = 737.31
CB-95020 RIM = 737.56
CB-25030 RIM = 736.84
CB-25029 RIM = 736.77
GVWD-25023 RIM = 737.25
GVWD-25032 RIM = 738.85
ST-95019 RIM = 738.41
CB-95018 RIM = 738.43
CB-95022 RIM = 736.76
ST-95024 RIM = 737.32
CB-95023 RIM = 737.26
BENCHMARK #202 COMPUTER ELEVATION = 736.84
TWIN STEM IN. TREE
EX 6" HP GAS
EX 2" GAS
EX 1 1/4" GAS
MATCH LINE SEE SHEET 9
LOT 460
LOT 455
LOT 456
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LOT 451
LOT 452
LOT 453
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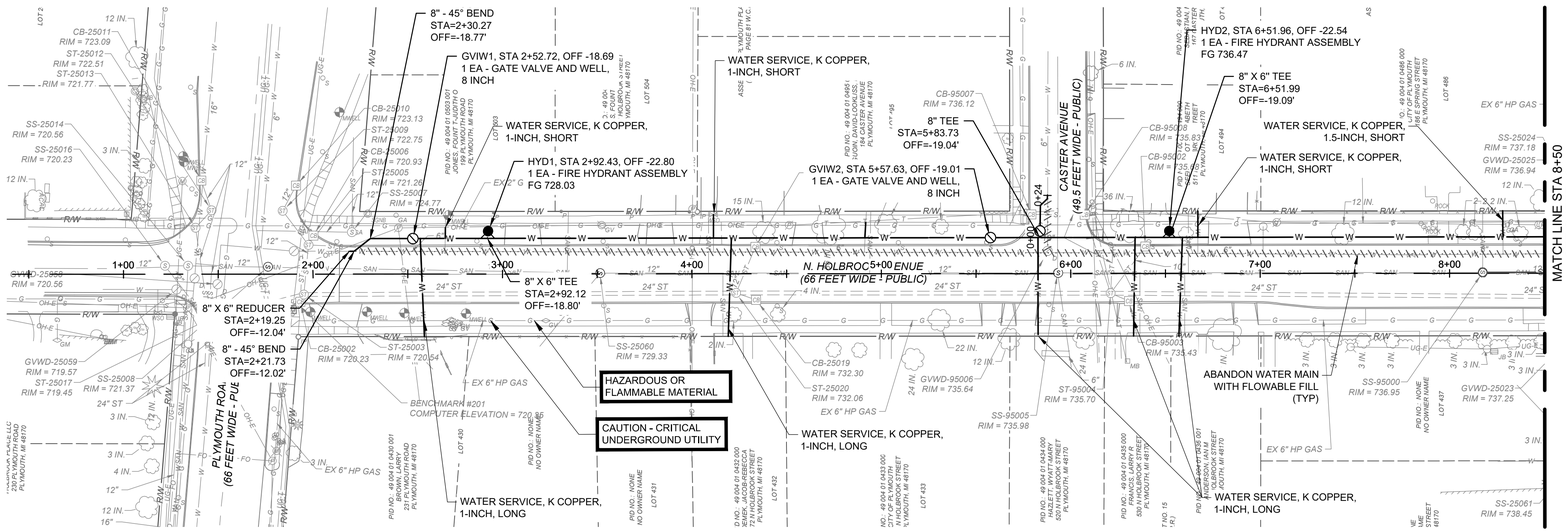
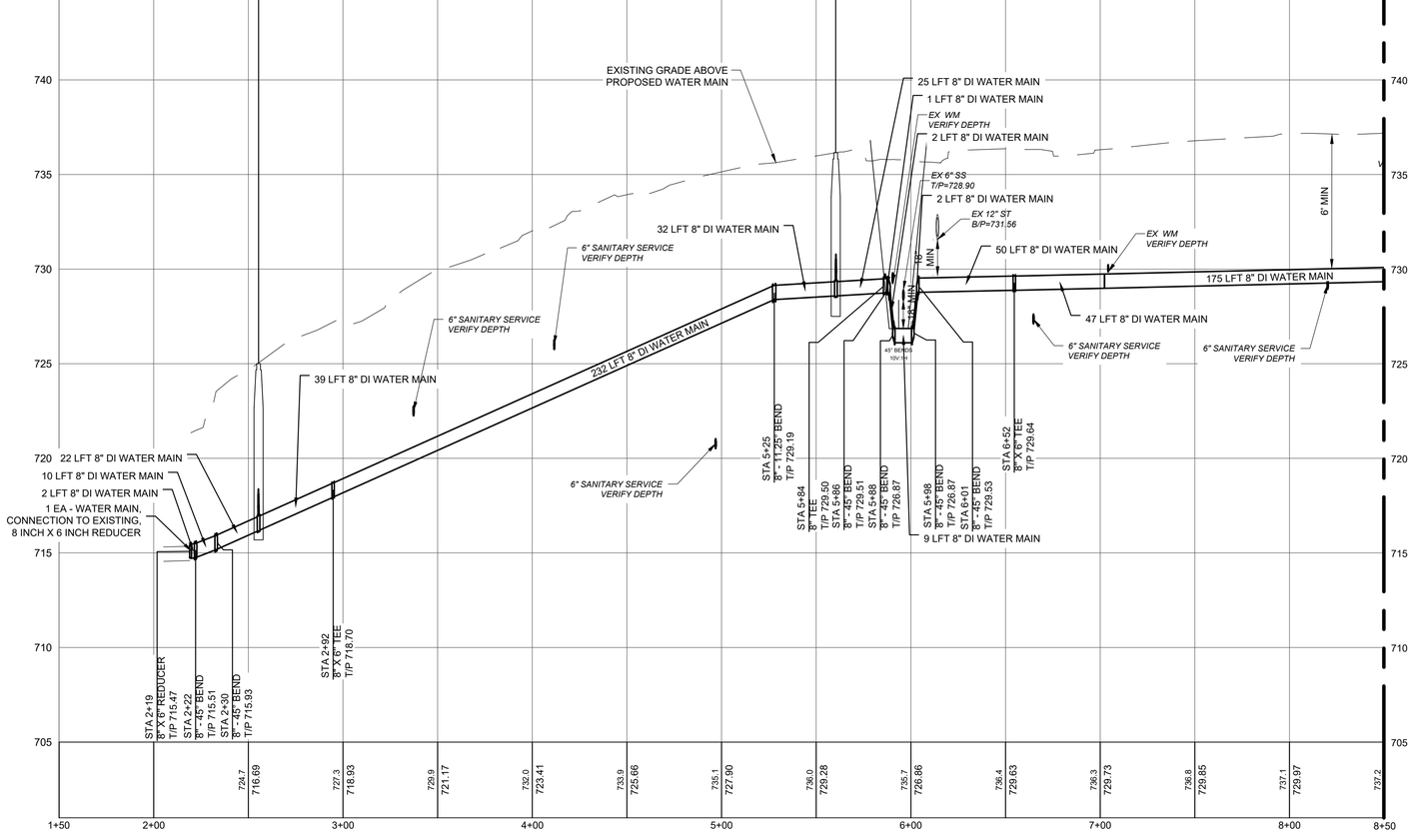
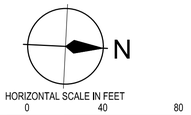






BENCHMARK #201 ELEV. 720.35
CHISELED X IN SOUTHEAST CORNER OF CATCH BASIN SQUARE IN NORTHEAST QUADRANT OF PLYMOUTH ROAD AND N HOLBROOK STREET

BENCHMARK #205 ELEV. 735.04
CHISELED X IN SOUTH RIM OF SANITARY MANHOLE IN SOUTHWEST QUADRANT OF E LIBERTY STREET AND N MILL STREET

Holbrook Water Main Services					
West Side			East Side		
Address	Size (in)	Curb Box Found in Field?	Address	Size (in)	Curb Box Found in Field?
199 Plymouth Rd	1"		231 Plymouth Rd	1"	
184 Caster Ave	1"		472 N Holbrook St	1"	
186 Caster Ave	1"	Yes	520 N Holbrook St	1"	
511 N Holbrook St	1"		530 N Holbrook St	1"	
186 E Spring St	1.5"		542 N Holbrook St	1"	

NOTE:
IF WATER SERVICE CURB BOX WAS NOT FOUND IN THE FIELD, THE LOCATION SHOWN IN THE PLANS IS BASED OFF INFORMATION PROVIDED BY PLYMOUTH

QUANTITIES THIS SHEET

1	EA	CONNECTION TO EX 6 INCH WM W/ 8X6-INCH REDUCER AND CUTTING-IN SLEEVE
630	LF	WATER MAIN, 8-INCH, PC 350 D.I., TRENCH 'B'
2	EA	FIRE HYDRANT ASSEMBLY
2	EA	GATE VALVE AND WELL, 8-INCH
5	EA	WATER SERVICE, K COPPER, 1-INCH, LONG
1	EA	WATER SERVICE, K COPPER, 1.5-INCH, SHORT
4	EA	WATER SERVICE, K COPPER, 1-INCH, SHORT
123	CY	ABANDON WATER MAIN WITH FLOWABLE FILL

CONNECTION NOTE:

CONNECT TO EXISTING WATER MAIN AFTER HYDROSTATIC AND BACTERIOLOGICAL TESTS HAVE BEEN SUCCESSFULLY COMPLETED AND REVIEWED BY THE ENGINEER.

CONTRACTOR SHALL SEND COPY OF ALL BACTERIOLOGICAL TESTS TO THE CITY OF PLYMOUTH FAX# 734.455.1666

GENERAL UTILTY NOTES:

1. CONTRACTOR SHALL PROTECT THE EXISTING WATER SERVICE LEADS DURING CONSTRUCTION. ANY DAMAGE TO EXISTING LEADS DUE TO THE CONTRACTOR'S CONSTRUCTION ACTIVITIES SHALL BE REPAIRED AT THE CONTRACTOR'S EXPENSE.
2. MANY OF THE EXISTING CURBSTOP LOCATIONS ARE APPROXIMATE AND SHOULD BE FIELD LOCATED WITH DIRECTION FROM CITY OF PLYMOUTH.
3. ALL PROPOSED 8-INCH WATER MAIN SHALL MAINTAIN 18-INCH VERTICAL SEPARATION BETWEEN UTILITIES AT ALL CROSSINGS.
4. GAS MAIN - ASSUME ALL PLASTIC GAS MAIN IS LIVE.
5. CONTRACTOR SHALL BE AWARE THAT STEEL/CAST IRON MAY BE LIVE (BUT MAY ALSO BE ABANDONED IN-PLACE).
6. IT IS THE CONTRACTOR'S RESPONSIBILITY TO COORDINATE WITH THE CITY IN LOCATING, VERIFYING AND RECONNECTING ALL EXISTING ACTIVE SERVICES.
7. EXISTING SANITARY SERVICE LEADS HAVE BEEN SHOWN BASED ON AN ASSUMPTION OF 6' COVER AT THE PROPERTY LINE. CONTRACTOR TO FIELD VERIFY SERVICE DEPTH.
8. DEWATERING: ALL GROUNDWATER ENCOUNTERED FROM THE EXCAVATION/INSTALLATION OF THE SANITARY SEWER SHALL BE PUMPED DIRECTLY INTO THE CITY OF PLYMOUTH DOWNSTREAM STORM SEWER. (CONTRACTOR WILL COORDINATE LOCATION WITH CITY PRIOR TO DEWATERING). THE COST FOR DEWATERING WILL BE INCLUDED IN THE COST OF THE WATER MAIN AND GATE VALVE PAY ITEMS.

REV#	DATE	DESCRIPTION	BY

25251 Northline Rd.
Taylor, MI 48180
734.947.9700
www.wadetrim.com

WADE TRIM

CITY OF PLYMOUTH
201 S MAIN ST
WAYNE COUNTY, MICHIGAN 48170
2025 INFRASTRUCTURE IMPROVEMENT PROGRAM
HOLBROOK AVE - PROP WATER MAIN PLAN
& PROFILE STA 0+00-8+50

ISSUED FOR:	DATE:	BY:
EGLE	3/19/25	SWK
WC DPS	3/20/25	SWK
BIDS	4/9/25	SWK

2025 INFRASTRUCTURE IMPROVEMENT PROGRAM

JOB NO. PLY2130-01T

SHEET 11

© Wade Trim Group, Inc.

Know what's below. Call before you dig.

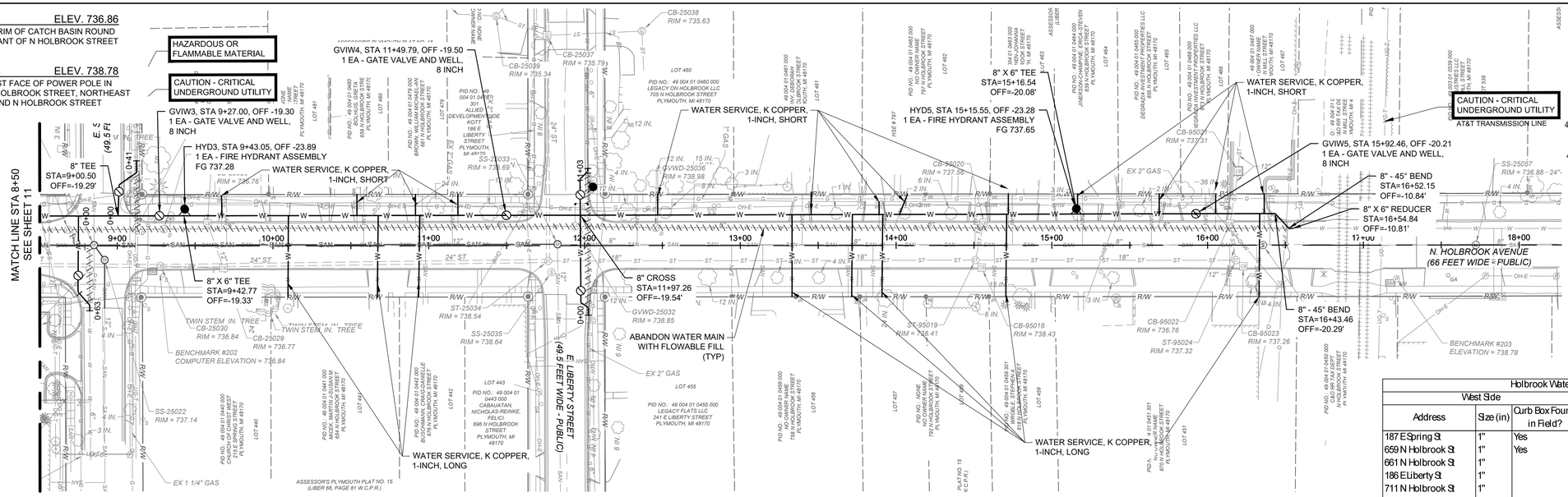
PROJECT MANAGER: SHAWN KEOUGH
CITY OF PLYMOUTH\ENGINEERING\SHT-COM\WATER MAIN.DWG PLOTTED 4/9/2025 3:18 PM BY FLANAGAN, MARTIN

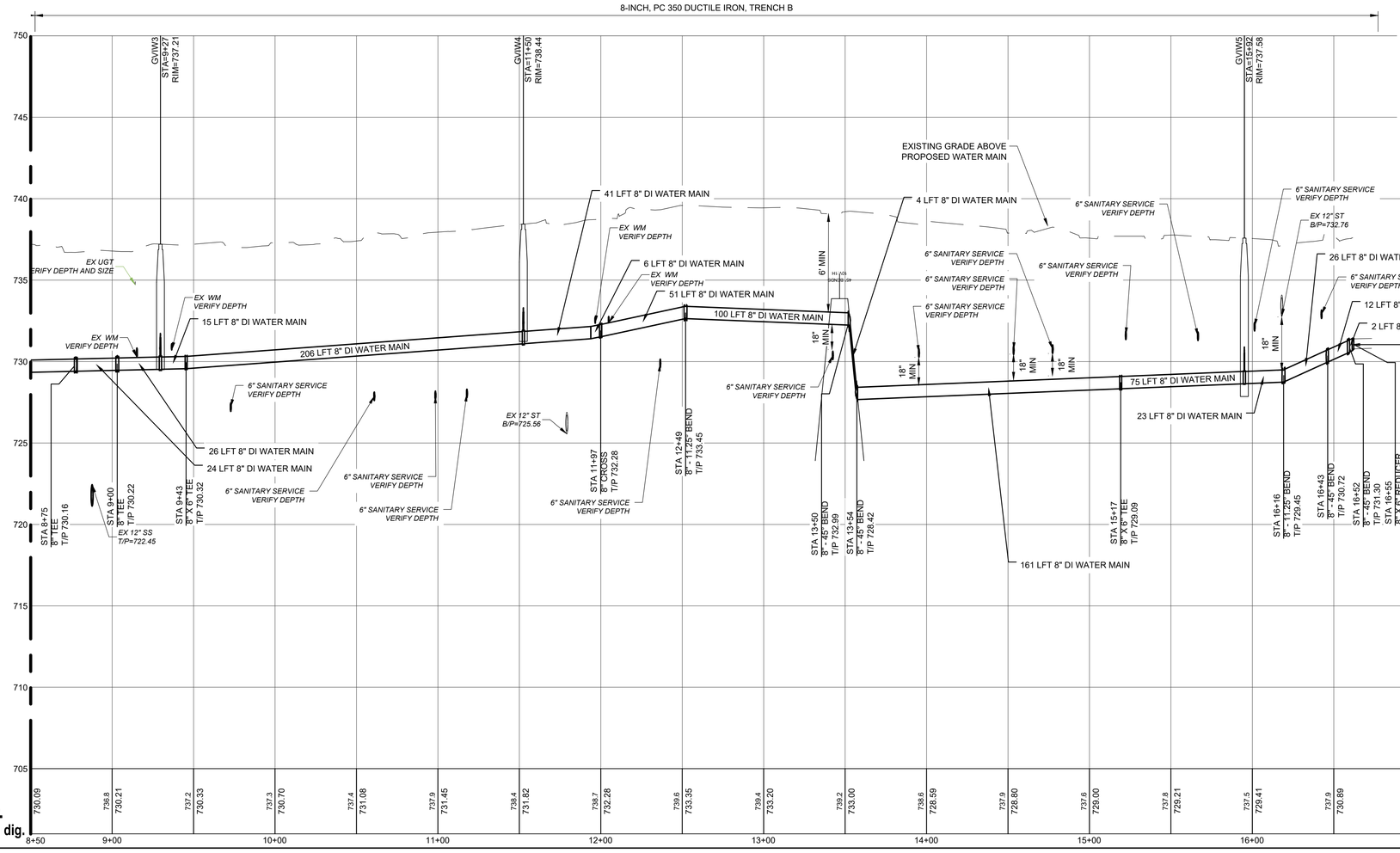
BENCHMARK #202 ELEV. 736.86

CHISELED X IN SOUTH RIM OF CATCH BASIN ROUND IN NORTHEAST QUADRANT OF N HOLBROOK STREET AND E SPRING STREET

BENCHMARK #203 ELEV. 738.78

SET 6 INCH NAIL IN WEST FACE OF POWER POLE IN WEST LAWN OF 920 N HOLBROOK STREET, NORTHEAST FROM TRAIN TRACKS AND N HOLBROOK STREET





Holbrook Water Main Services					
West Side			East Side		
Address	Size (in)	Curb Box Found in Field?	Address	Size (in)	Curb Box Found in Field?
187 E Spring St	1"	Yes	640 N Holbrook St	1"	
659 N Holbrook St	1"	Yes	654 N Holbrook St	1"	
661 N Holbrook St	1"		676 N Holbrook St	1"	
186 E Liberty St	1"		241 E Liberty St	1"	
711 N Holbrook St	1"		706 N Holbrook St	1"	
769 N Holbrook St	1"		758 N Holbrook St	1"	
797 N Holbrook St	1"	Yes	764 N Holbrook St	1"	
799 N Holbrook St	1"		784 N Holbrook St	1"	
837 N Holbrook St	1"		818 N Holbrook St	1"	
839 N Holbrook St	1"		870 N Holbrook St	1"	
855/857 N Holbrook St	1"		920 N Holbrook St	1"	Yes
873 N Holbrook St	1"		920 N Holbrook St	1"	Yes
886 N Mill St	1"		946 N Holbrook St	1"	
885 N Holbrook St	1"				
927 N Holbrook St	1"				
900 N Mill St	1"				
957 N Holbrook St	1"				

NOTE:
IF WATER SERVICE CURB BOX WAS NOT FOUND IN THE FIELD, THE LOCATION SHOWN IN THE PLANS IS BASED OFF INFORMATION PROVIDED BY PLYMOUTH

QUANTITIES THIS SHEET

1	EA	CONNECTION TO EX 6 INCH WM W/ 8X6-INCH REDUCER AND CUTTING-IN SLEEVE
808	LF	WATER MAIN, 8-INCH, PC 350 D.I., TRENCH 'B'
2	EA	FIRE HYDRANT ASSEMBLY
3	EA	GATE VALVE AND WELL, 8-INCH
8	EA	WATER SERVICE, K COPPER, 1-INCH, LONG
13	EA	WATER SERVICE, K COPPER, 1-INCH, SHORT
158	CY	ABANDON WATER MAIN WITH FLOWABLE FILL

CONNECTION NOTE:

CONNECT TO EXISTING WATER MAIN AFTER HYDROSTATIC AND BACTERIOLOGICAL TESTS HAVE BEEN SUCCESSFULLY COMPLETED AND REVIEWED BY THE ENGINEER.

CONTRACTOR SHALL SEND COPY OF ALL BACTERIOLOGICAL TESTS TO THE CITY OF PLYMOUTH FAX# 734.455.1668

GENERAL UTILTY NOTES:

1. CONTRACTOR SHALL PROTECT THE EXISTING WATER SERVICE LEADS DURING CONSTRUCTION. ANY DAMAGE TO EXISTING LEADS DUE TO THE CONTRACTOR'S CONSTRUCTION ACTIVITIES SHALL BE REPAIRED AT THE CONTRACTOR'S EXPENSE.
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Know what's below. Call before you dig.

REV#	DATE	DESCRIPTION	BY

25251 Northline Rd.
Taylor, MI 48180
734.947.9700
www.wadetrim.com

WADE TRIM

CITY OF PLYMOUTH
201 S MAIN ST
WAYNE COUNTY, MICHIGAN 48170
2025 INFRASTRUCTURE IMPROVEMENT PROGRAM
HOLBROOK AVE - PROP WATER MAIN PLAN & PROFILE STA 8+50-14+88

ISSUED FOR:	DATE:	BY:
EGLE	3/19/25	SWK
WC DPS	3/20/25	SWK
BIDS	4/9/25	SWK

JOB NO. PLY2130-01T

SHEET 12

2025 INFRASTRUCTURE IMPROVEMENT PROGRAM

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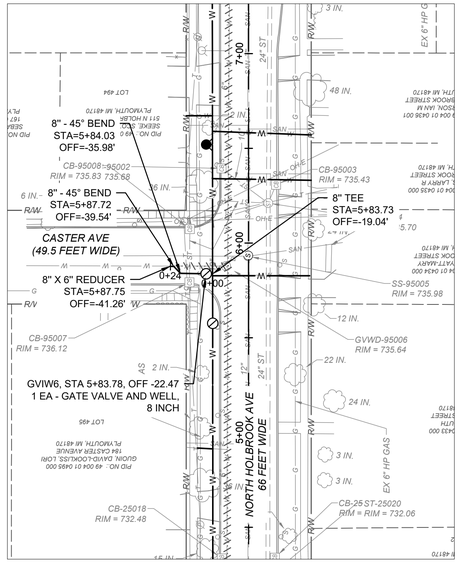
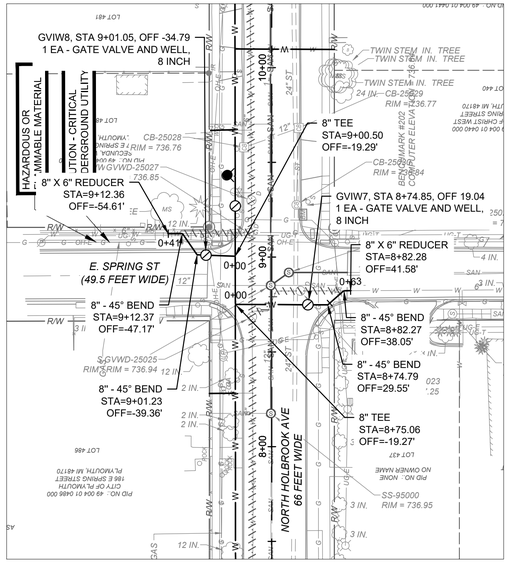
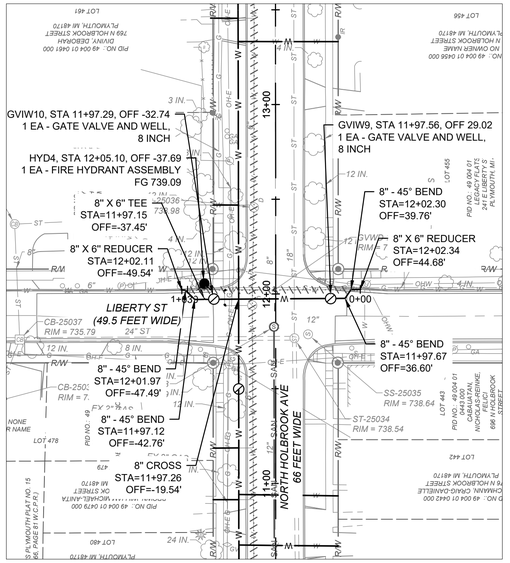
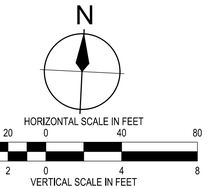
PROJECT MANAGER: SHAWN KEOUGH
DWG NAME: L:\PROJECTS\PLY2130-01T-CVM\WATER MAIN.DWG PLOTTED: 4/9/2025 3:17 PM BY: FLANAGAN, MARTIN









BENCHMARK #202 ELEV. 736.84

CHISELED X IN SOUTH RIM OF CATCH BASIN ROUND IN NORTHEAST QUADRANT OF N HOLBROOK STREET AND E SPRING STREET

BENCHMARK #205 ELEV. 735.04

CHISELED X IN SOUTH RIM OF SANITARY MANHOLE IN SOUTHWEST QUADRANT OF E LIBERTY STREET AND N MILL STREET

QUANTITIES THIS SHEET

5	EA	CONNECTION TO EX 6 INCH WM W/ 8X6-INCH REDUCER AND CUTTING-IN SLEEVE
235	LF	WATER MAIN, 8-INCH, PC 350 D.I., TRENCH 'B'
1	EA	FIRE HYDRANT ASSEMBLY
5	EA	GATE VALVE AND WELL, 8-INCH
41	CY	ABANDON WATER MAIN WITH FLOWABLE FILL

CONNECTION NOTE:

CONNECT TO EXISTING WATER MAIN AFTER HYDROSTATIC AND BACTERIOLOGICAL TESTS HAVE BEEN SUCCESSFULLY COMPLETED AND REVIEWED BY THE ENGINEER.

CONTRACTOR SHALL SEND COPY OF ALL BACTERIOLOGICAL TESTS TO THE CITY OF PLYMOUTH FAX# 734.455.1666

GENERAL UTILTY NOTES:

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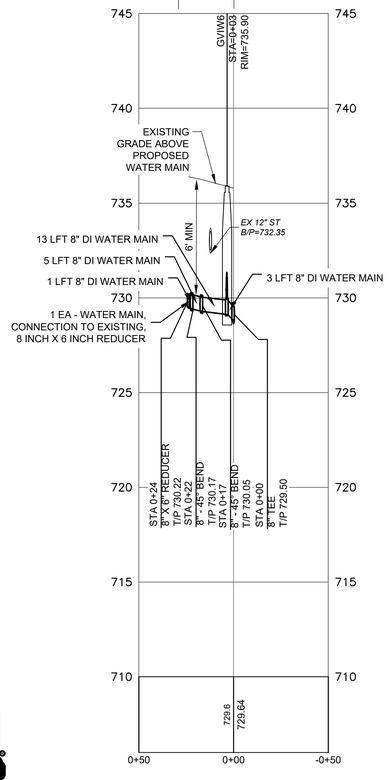
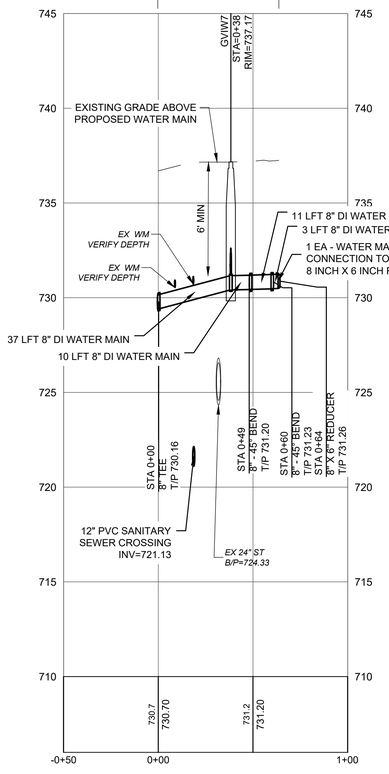
8-INCH, PC 350 DUCTILE IRON, TRENCH B



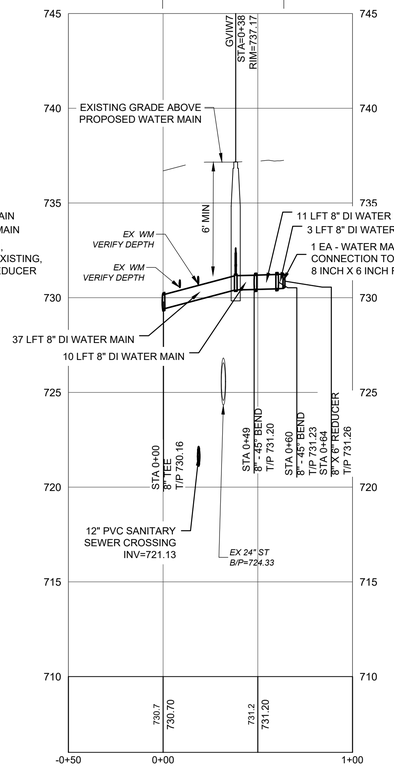
CASTER WM CONNECTION

8-INCH, PC 350 DUCTILE IRON, TRENCH B



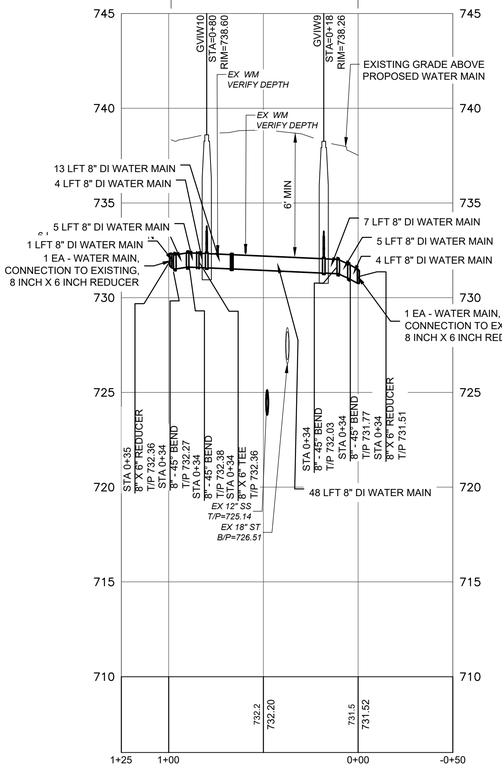
SPRING (WEST) WM CONNECTION

8-INCH, PC 350 DUCTILE IRON, TRENCH B



SPRING (EAST) WM CONNECTION

8-INCH, PC 350 DUCTILE IRON, TRENCH B



LIBERTY WM CONNECTION

Know what's below. Call before you dig.

REV#	DATE	DESCRIPTION	BY

25251 Northline Rd.
Taylor, MI 48180
734.947.9700
www.wadetrim.com

WADE TRIM

CITY OF PLYMOUTH
201 S MAIN ST
WAYNE COUNTY, MICHIGAN 48170
2025 INFRASTRUCTURE IMPROVEMENT PROGRAM
HOLBROOK AVE - PROP WATER MAIN CONNECTIONS

ISSUED FOR:	DATE:	BY:
EGLE	3/19/25	SWK
WC DPS	3/20/25	SWK
BIDS	4/9/25	SWK

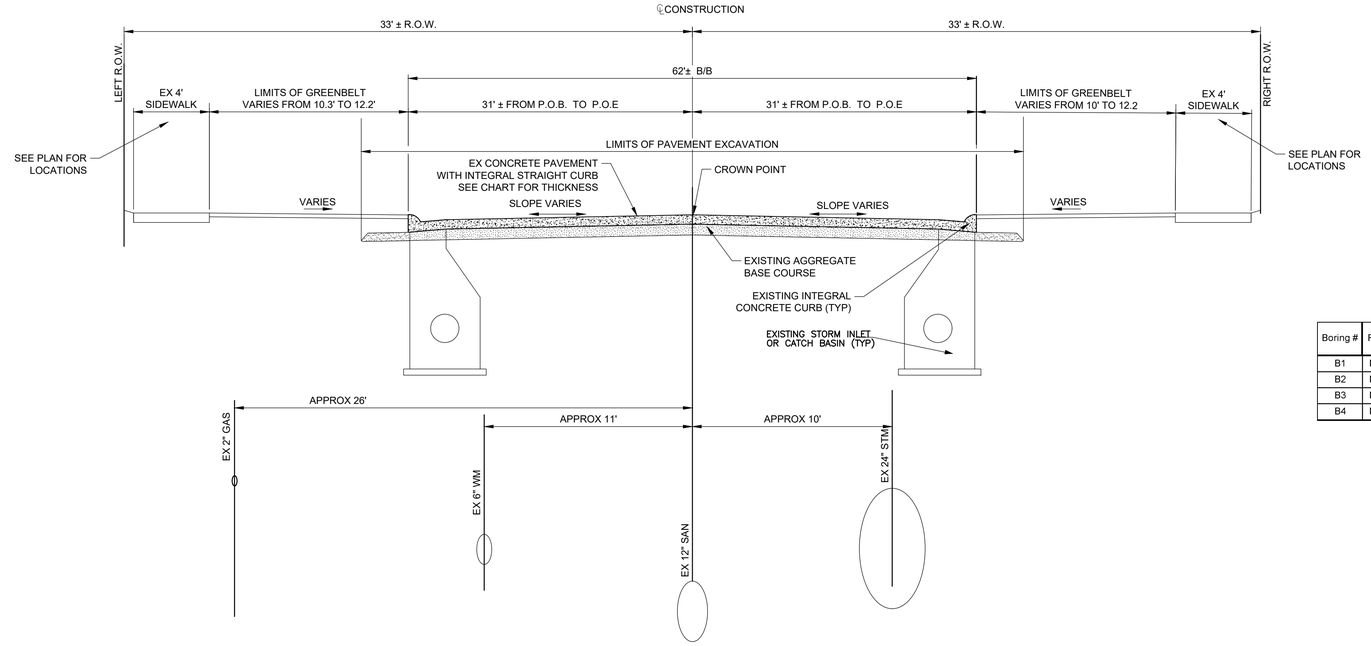
JOB NO. PLY2130-01T

SHEET 13

2025 INFRASTRUCTURE IMPROVEMENT PROGRAM

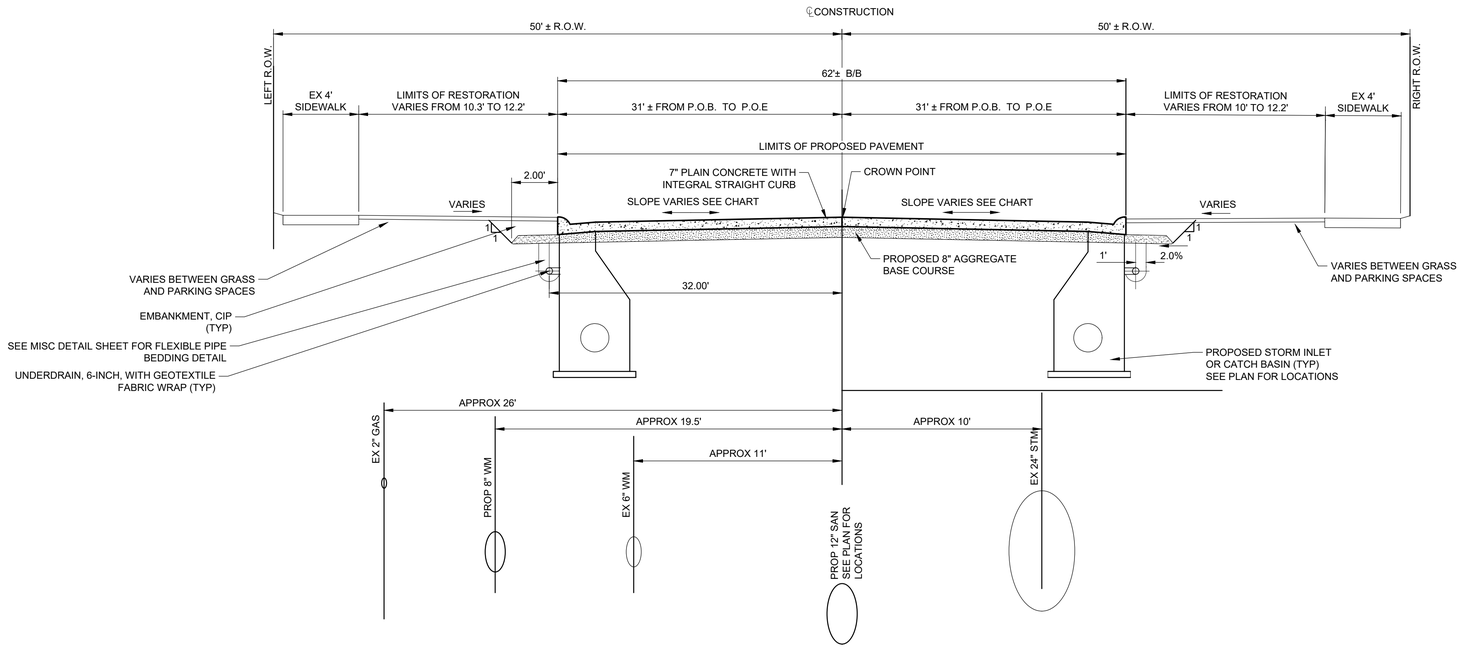
© Wade Trim Group, Inc.

PROJECT MANAGER: SHAWN KEOUGH
DWG: K:\WADE\PROJECTS\PLY2130-01T-COM\WATER MAIN\DWG PLOTTED 4/9/2025 3:17 PM BY FLANIGAN, MARTIN



EXISTING TYPICAL CROSS SECTION
HOLBROOK AVENUE
P.O.B. STA 1+94.96 TO P.O.E. STA 16+75.23
NOT TO SCALE

Boring #	Road Name	Thickness in Inches			
		Asphalt	Concrete	Aggregate Base	Total Thickness
B1	N Holbrook	0	8.25	15.75	24
B2	N Holbrook	0	6.5	17.5	24
B3	N Holbrook	0	6.25	23.75	30
B4	N Holbrook	0	6	24	30



PROPOSED TYPICAL CROSS SECTION
HOLBROOK AVENUE
P.O.B. STA 1+94.96 TO P.O.E. STA 2+50
NOT TO SCALE

CROSS SLOPE CHART

STATION RANGE	LEFT LANE SLOPE	RIGHT LANE SLOPE
POB - 5+25	3%	-3%
5+25 - 13+00	-2%	-2%
13+00 - POE	-3%	3%

REV#	DATE	DESCRIPTION	BY

25251 Northline Rd.
Taylor, MI 48180
734.947.9700
www.wadetrim.com

WADE TRIM

CITY OF PLYMOUTH
201 S MAIN ST
WAYNE COUNTY, MICHIGAN 48170
2025 INFRASTRUCTURE IMPROVEMENT PROGRAM
TYPICALS

ISSUED FOR:	DATE:	BY:
EGLE	3/19/25	SWK
WC DPS	3/20/25	SWK
BIDS	4/9/25	SWK

JOB NO.
PLY2130-01T

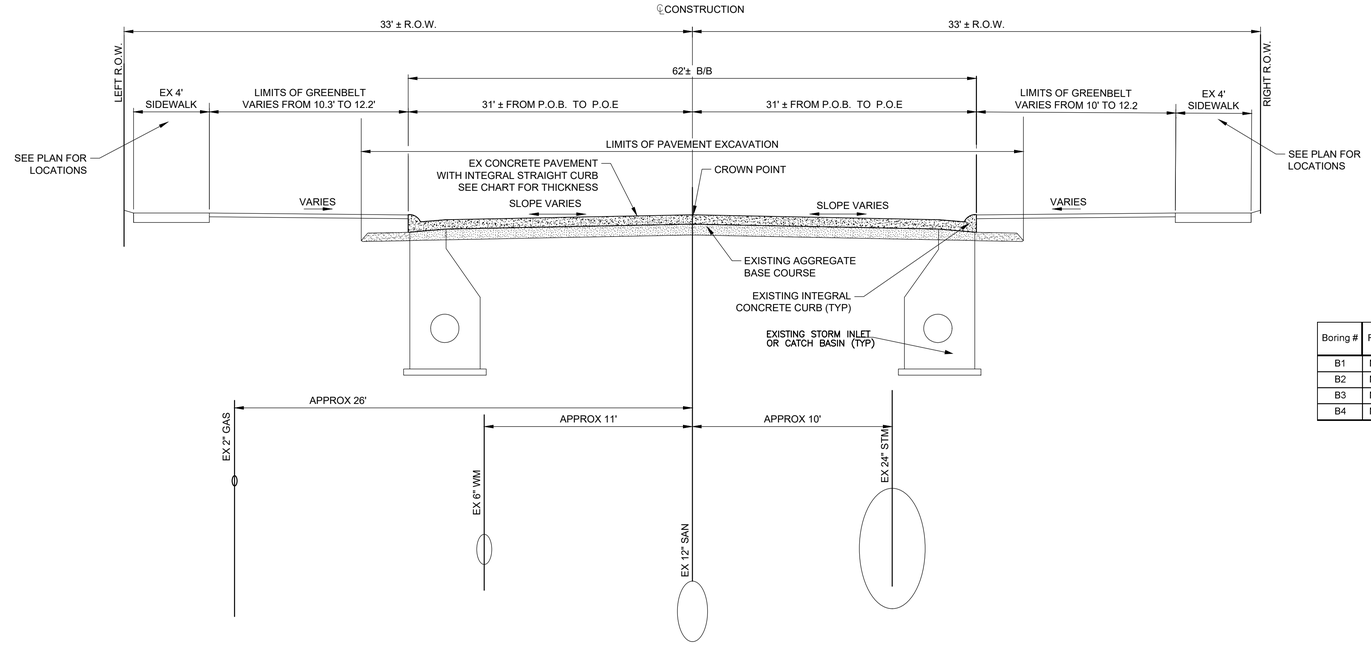
SHEET
14

2025 INFRASTRUCTURE IMPROVEMENT PROGRAM

© Wade Trim Group, Inc.

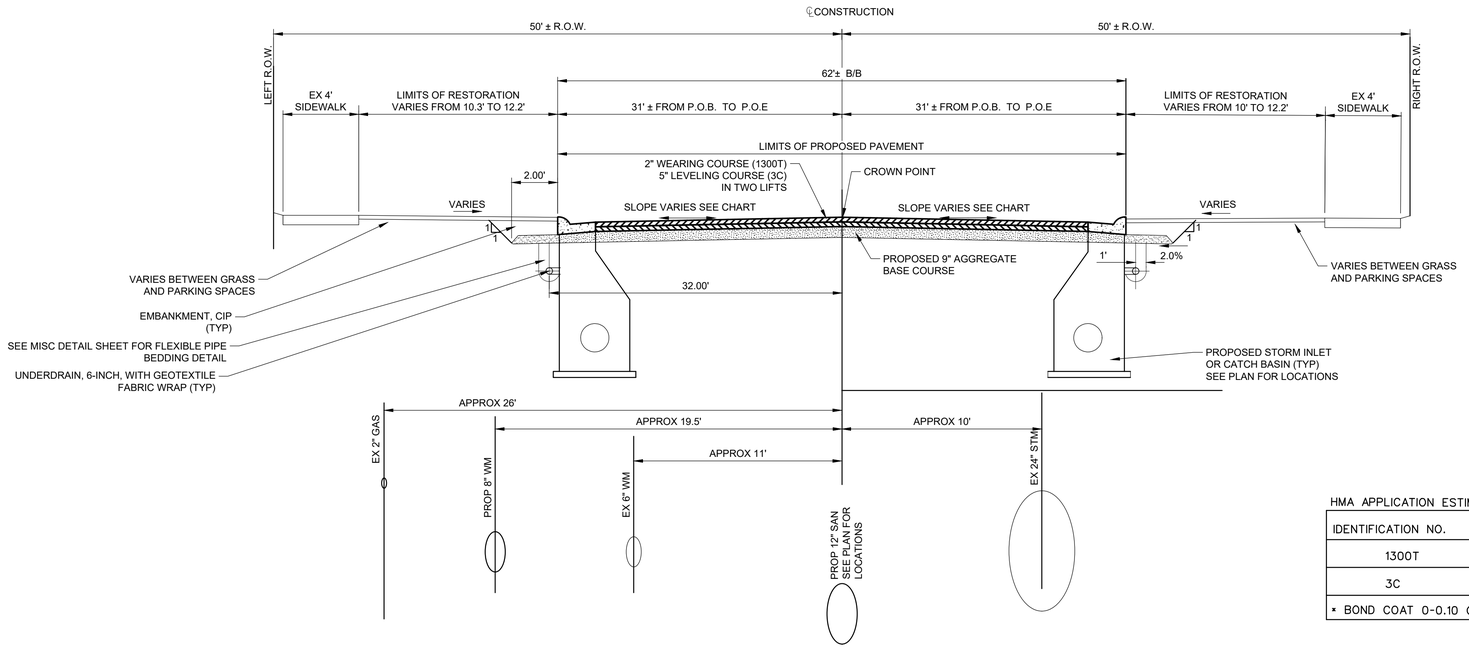
811 Know what's below. Call before you dig.

PROJECT MANAGER: SHAWN KEOUGH
DRAWN BY: MARTIN FLANAGAN
P:\PLY\2130-01T-GTS-TYPICALS.DWG PLOTTED 4/9/2025 3:17 PM BY FLANAGAN, MARTIN



EXISTING TYPICAL CROSS SECTION
HOLBROOK AVENUE
P.O.B. STA 1+94.96 TO P.O.E. STA 16+75.23
NOT TO SCALE

Boring #	Road Name	Thickness in Inches			
		Asphalt	Concrete	Aggregate Base	Total Thickness
B1	N Holbrook	0	8.25	15.75	24
B2	N Holbrook	0	6.5	17.5	24
B3	N Holbrook	0	6.25	23.75	30
B4	N Holbrook	0	6	24	30



CROSS SLOPE CHART

STATION RANGE	LEFT LANE SLOPE	RIGHT LANE SLOPE
POB - 5+25	3%	-3%
5+25 - 13+00	-2%	-2%
13+00 - POE	-3%	3%

HMA APPLICATION ESTIMATE

IDENTIFICATION NO.	RATE PER SYD	PERFORMANCE GRADE	REMARKS
1300T	220*	64-22	WEARING
3C	550*	64-22	LEVELING
* BOND COAT 0-0.10 GAL/SYD		FOR INFORMATION ONLY	

PROPOSED TYPICAL CROSS SECTION
HOLBROOK AVENUE
P.O.B. STA 2+50 TO P.O.E. STA 16+75.23
NOT TO SCALE

Know what's below. Call before you dig.

PROJECT MANAGER: SHAWN KEOUGH
DW: K:\Projects\Plymouth\0025\01-GIS-TYPICALS.DWG PLOTTED 4/9/2025 3:17 PM BY FLANAGAN, MARTIN

REV#	DATE	DESCRIPTION	BY

25251 Northline Rd.
Taylor, MI 48180
734.947.9700
www.wadetrim.com
WADE TRIM

CITY OF PLYMOUTH
201 S MAIN ST
WAYNE COUNTY, MICHIGAN 48170
2025 INFRASTRUCTURE IMPROVEMENT PROGRAM
TYPICALS

ISSUED FOR:	DATE:	BY:
EGLE	3/19/25	SWK
WC DPS	3/20/25	SWK
BIDS	4/9/25	SWK

JOB NO.
PLY2130-01T

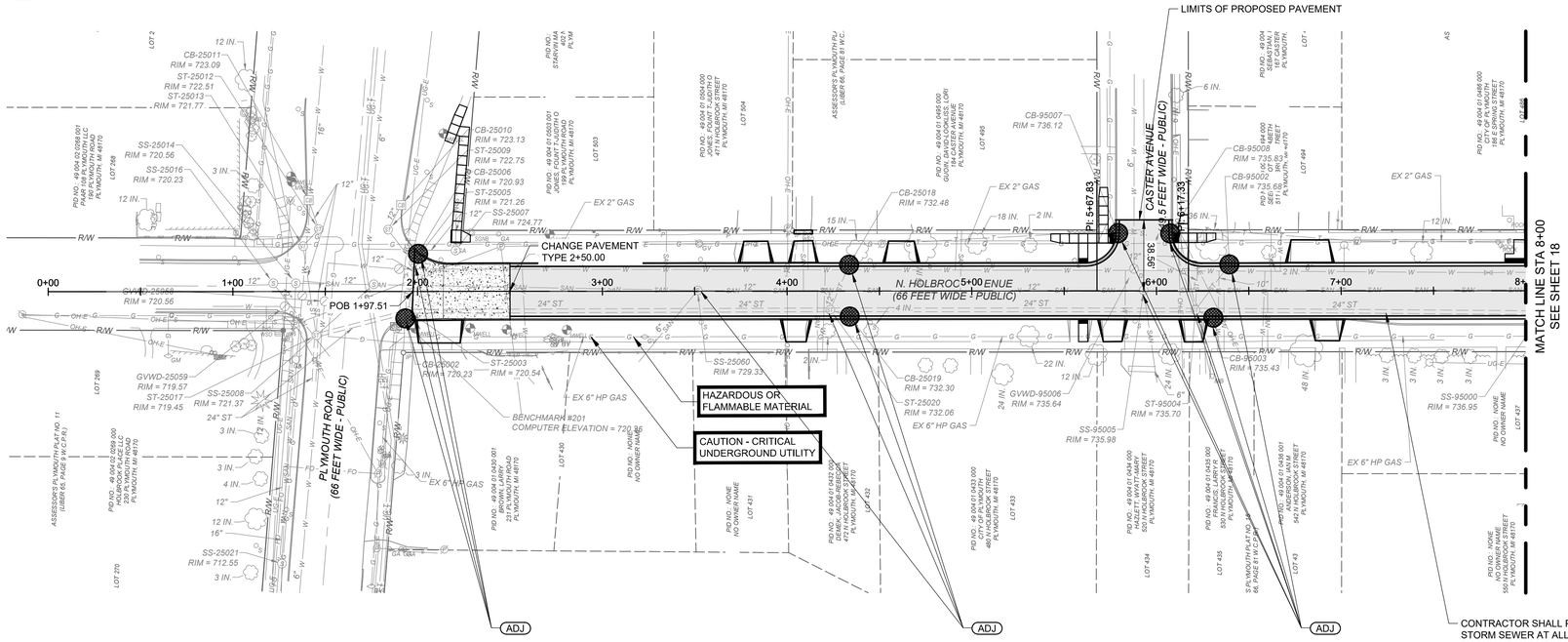
SHEET
15

2025 INFRASTRUCTURE IMPROVEMENT PROGRAM

© Wade Trim Group, Inc.

BENCHMARK #201 ELEV. 732.21
CHISELED X IN SOUTHEAST CORNER OF CATCH BASIN SQUARE IN NORTHEAST QUADRANT OF PLYMOUTH ROAD AND N HOLBROOK STREET

BENCHMARK #202 ELEV. 736.86
CHISELED X IN SOUTH RIM OF CATCH BASIN ROUND IN NORTHEAST QUADRANT OF N HOLBROOK STREET AND E SPRING STREET



N

HORIZONTAL SCALE IN FEET
40 20 0 40 80

LEGEND

- PROPOSED ASPHALT PAVEMENT
- PROPOSED CONCRETE PAVEMENT
- PROPOSED INLET FILTER
- ADJ — ADJUST STRUCTURE

SUMMARY OF QUANTITIES THIS SHEET

50	CY	SUBGRADE UNDERCUT AND 21AA AGGREGATE BACKFILL
28	VF	RECONSTRUCT STRUCTURE
1100	TON	AGGREGATE BASE COURSE, 21AA
250	TON	BITUMINOUS PAVEMENT, WEARING COURSE, 1300T
625	TON	BITUMINOUS PAVEMENT, LEVELING COURSE, 3C
200	SY	7-INCH PLAIN CONCRETE
1300	LF	CURB AND GUTTER, CONCRETE, DET F4
1000	SF	SIDEWALK CONCRETE 4-INCH
250	SF	SIDEWALK RAMP, CONCRETE 6-INCH
14	EA	ADJUST STRUCTURE
4920	LB	REMOVE AND REPLACE FRAME AND COVER
1300	LF	UNDERDRAIN, 6-INCH W/ GEOTEXTILE FABRIC WRAP
8	EA	INLET FILTER
5000	SF	6-INCH CONCRETE, DRIVES AND SIDEWALK
2000	SY	RESTORATION WITH 3-INCHES TOPSOIL AND NURSERY SOD

Know what's below. Call before you dig.

REV#	DATE	DESCRIPTION	BY

WADE TRIM
25251 Northline Rd.
Taylor, MI 48180
734.947.9700
www.wadetrim.com

CITY OF PLYMOUTH
201 S MAIN ST
WAYNE COUNTY, MICHIGAN 48170
2025 INFRASTRUCTURE IMPROVEMENT PROGRAM
HOLBROOK AVE - PROP PAVING PLAN
STA 0+00 TO STA 8+00

ISSUED FOR:	DATE:	BY:
EGLE	3/19/25	SWK
WC DPS	3/20/25	SWK
BIDS	4/9/25	SWK

JOB NO.
PLY2130-01T

SHEET
16

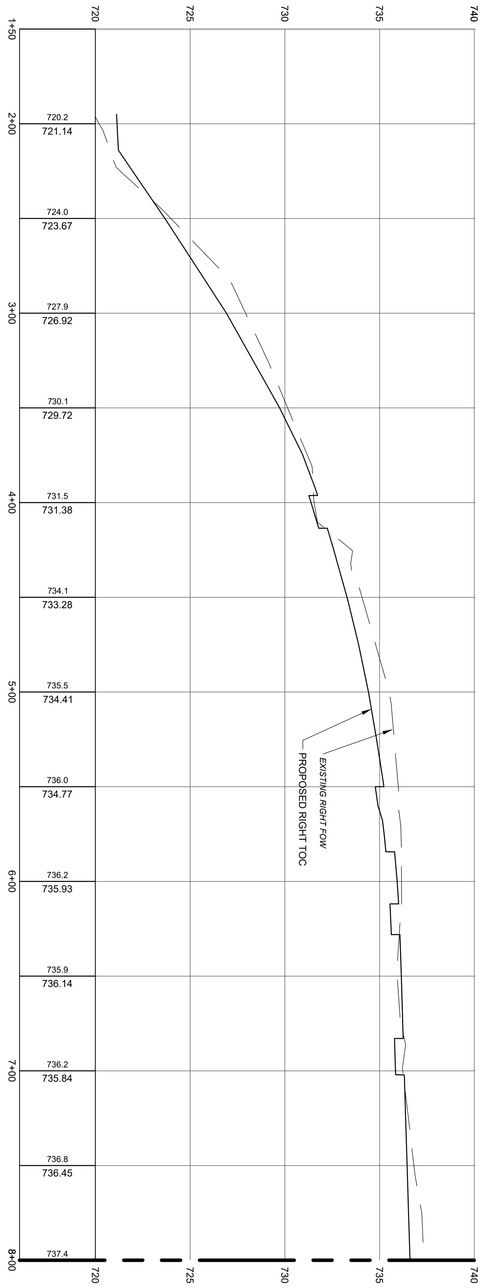
2025 INFRASTRUCTURE IMPROVEMENT PROGRAM

© Wade Trim Group, Inc.

PROJECT MANAGER: SHAWN KEOUGH
DATA XREF: N:\Active\PLY2130-01T-CPS-PAVING.DWG PLOTTED 4/9/2025 3:17 PM BY FLANIGAN, MARTIN

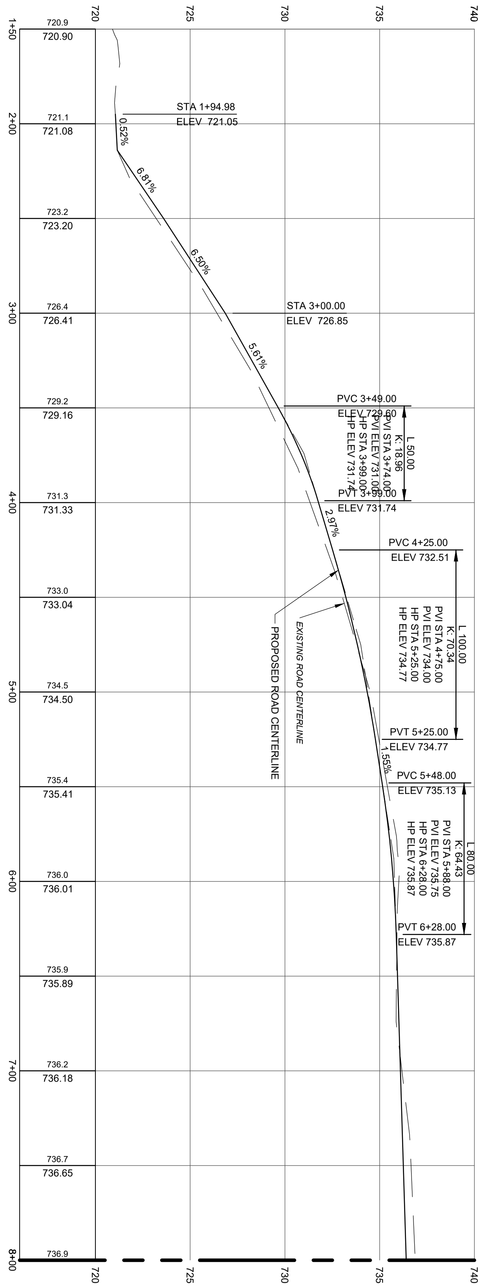
Know what's below.
Call before you dig.
811

RIGHT



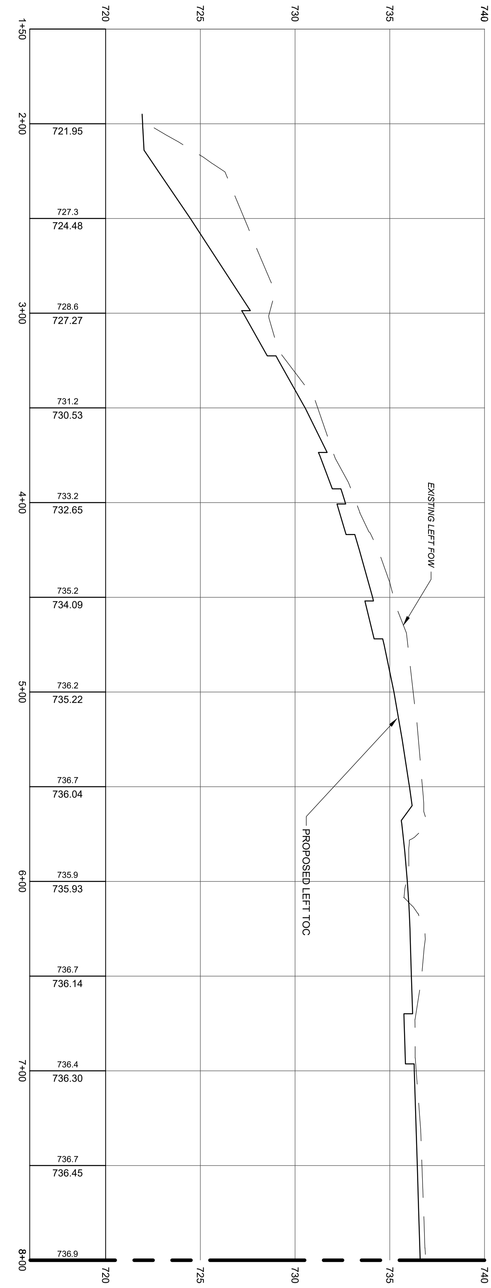
MATCH LINE STA 8+00
SEE SHEET 19

CENTER



MATCH LINE STA 8+00
SEE SHEET 19

LEFT



MATCH LINE STA 8+00
SEE SHEET 19

SHEET 17

JOB NO. PLY2130-01T

ISSUED FOR:	DATE:	BY
EGLE	3/19/25	SWK
WC DPS	3/20/25	SWK
MDS	4/9/25	SWK

CITY OF PLYMOUTH
201 S MAIN ST
WAYNE COUNTY, MICHIGAN 48170
2025 INFRASTRUCTURE IMPROVEMENT PROGRAM
HOLBROOK AVE - PROP PAVING PROFILE
STA 0+00 TO STA 8+00

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REV#	DATE	DESCRIPTION	BY

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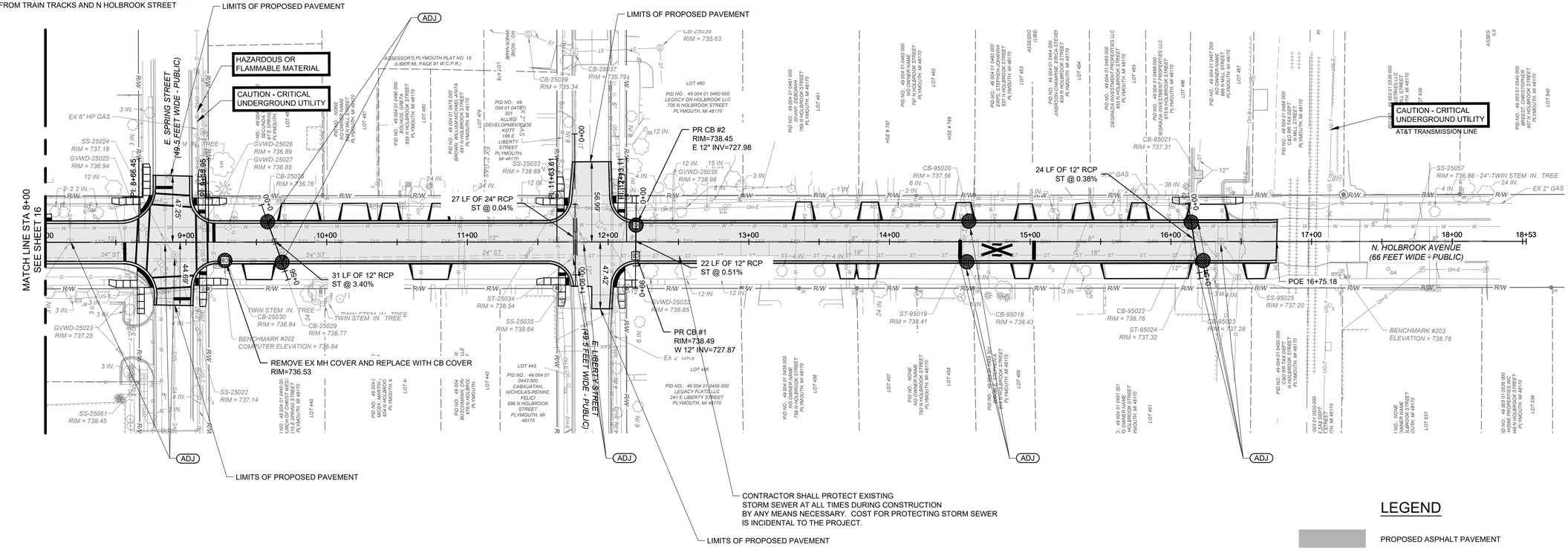
BENCHMARK #202 ELEV. 736.86
CHISELED X IN SOUTH RIM OF CATCH BASIN ROUND IN NORTHEAST QUADRANT OF N HOLBROOK STREET AND E SPRING STREET

BENCHMARK #203 ELEV. 738.78
SET 6 INCH NAIL IN WEST FACE OF POWER POLE IN WEST LAWN OF 920 N HOLBROOK STREET, NORTHEAST FROM TRAIN TRACKS AND N HOLBROOK STREET

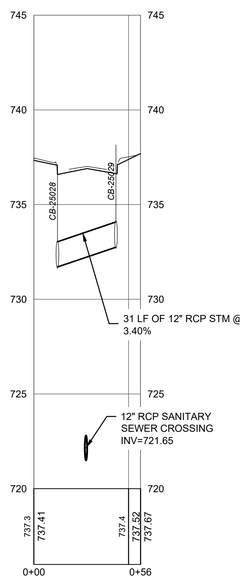
HORIZONTAL SCALE IN FEET
40 20 0 40 80

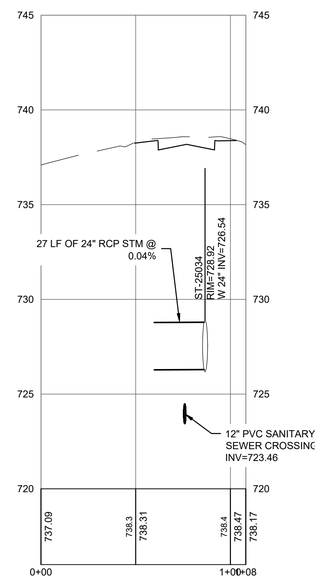
N

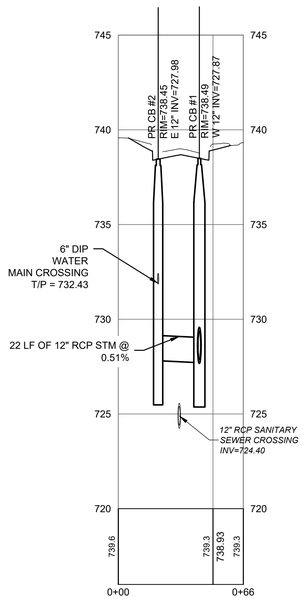


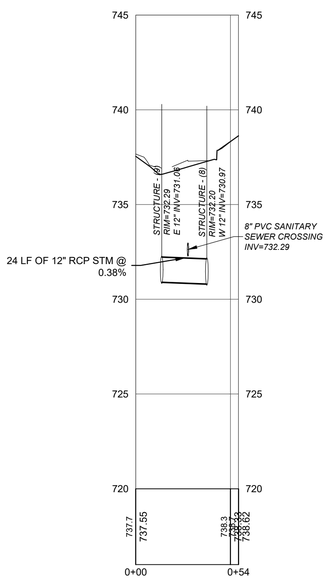
LEGEND

- PROPOSED ASPHALT PAVEMENT
- PROPOSED CONCRETE PAVEMENT
- PROPOSED INLET FILTER
- (ADJ) ADJUST STRUCTURE









SUMMARY OF QUANTITIES THIS SHEET

50	CY	SUBGRADE UNDERCUT AND 21AA AGGREGATE BACKFILL
30	VF	RECONSTRUCT STRUCTURE
2000	TON	AGGREGATE BASE COURSE, 21AA
450	TON	BITUMINOUS PAVEMENT, WEARING COURSE, 1300T
1050	TON	BITUMINOUS PAVEMENT, LEVELING COURSE, 3C
2100	LF	CURB AND GUTTER, CONCRETE, DET F4
1500	SF	SIDEWALK CONCRETE 4-INCH
1400	SF	SIDEWALK RAMP, CONCRETE 6-INCH
15	EA	ADJUST STRUCTURE
4605	LB	REMOVE AND REPLACE FRAME AND COVER
2100	LF	UNDERDRAIN, 6-INCH W/ GEOTEXTILE FABRIC WRAP
55	LF	12-INCH STORM SEWER, C76 CLIV, TRENCH B
27	LF	24-INCH STORM SEWER, C76 CLIV, TRENCH B
1	EA	6' DIA STANDARD STORM CATCH BASIN
1	EA	REMOVE EX MANHOLE COVER AND REPLACE WITH CB COVER
8	EA	INLET FILTER
50	FT	PAVEMENT MARKING, THERMOPLASTIC, 24-INCH STOPBAR
275	FT	PAVEMENT MARKING, THERMOPLASTIC, 12-INCH CROSSWALK
1	EA	PAVEMENT MARKING, THERMOPLASTIC, RAILROAD CROSSING SYMBOL
2000	SF	6-INCH CONCRETE, DRIVES AND SIDEWALK
3000	SY	RESTORATION WITH 3-INCHES TOPSOIL AND NURSERY SOD
400	LF	24-INCH STORM SEWER, C76 CLIV, TRENCH B (PROVISIONAL)
2	EA	6' DIA STANDARD STORM CATCH BASIN (PROVISIONAL)

Know what's below. Call before you dig.

PROJECT MANAGER: SHAWN KESOUGH
CAD OPERATOR: MARK MARTIN
PLOT DATE: 4/9/2025 3:11 PM BY: FLANAGAN, MARTIN
P:\2021\21A0236\Design\SHT-CPS-PAVING.DWG PLOTTED 4/9/2025 3:17 PM BY FLANAGAN, MARTIN

REV#	DATE	DESCRIPTION	BY

25251 Northline Rd.
Taylor, MI 48180
734.947.9700
www.wadetrim.com

WADE TRIM

CITY OF PLYMOUTH
201 S MAIN ST
WAYNE COUNTY, MICHIGAN 48170
2025 INFRASTRUCTURE IMPROVEMENT PROGRAM
HOLBROOK AVE - PROP PAVING &
STORM PLAN STA 8+00 TO STA 16+75.20

ISSUED FOR:	DATE:	BY:
EGLE	3/19/25	SWK
WC DPS	3/20/25	SWK
BIDS	4/9/25	SWK

JOB NO. PLY2130-01T

SHEET 18

2025 INFRASTRUCTURE IMPROVEMENT PROGRAM

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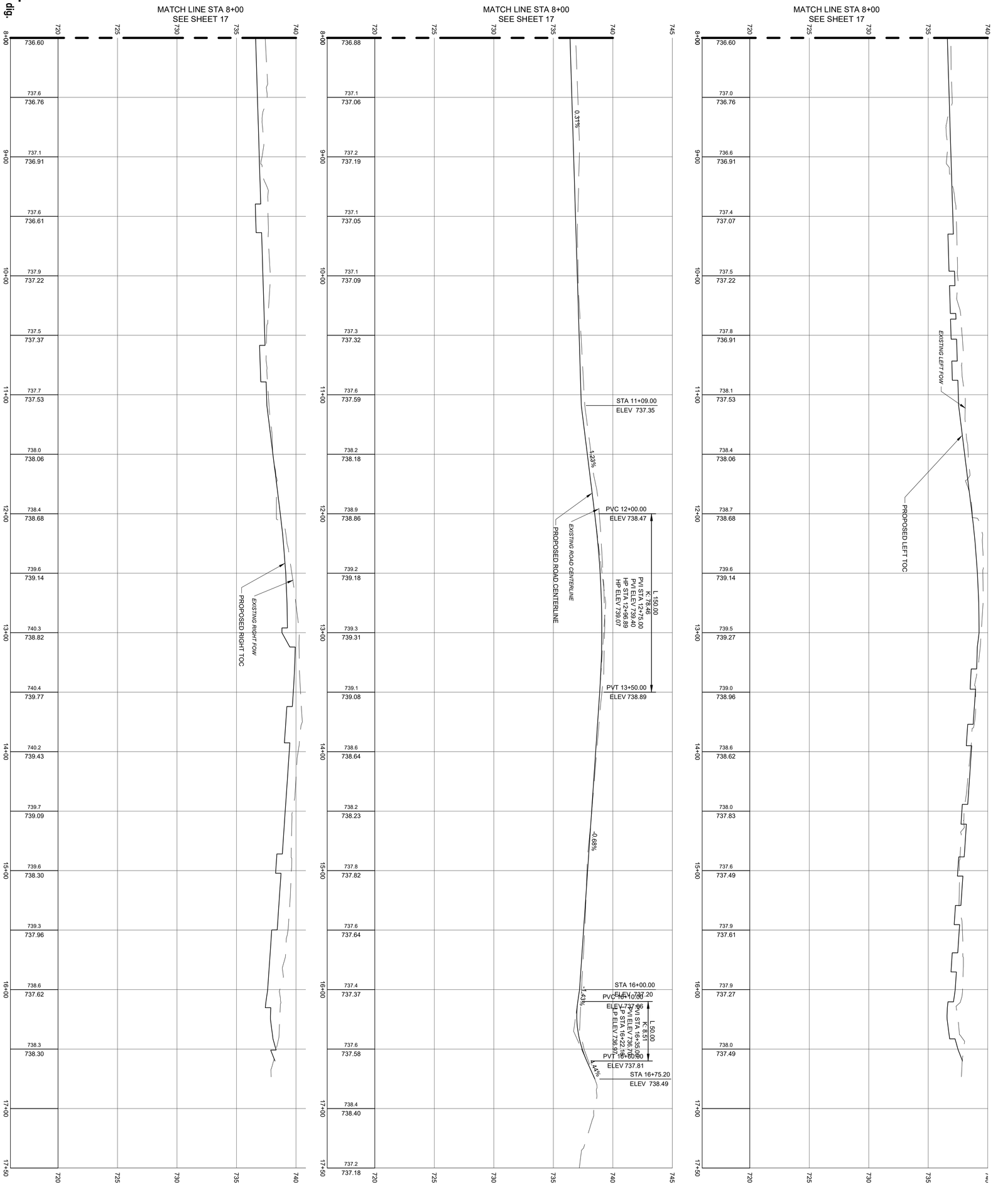
Know what's below. Call before you dig. 811



SHEET	JOB NO.	ISSUED FOR:	DATE:	BY
19	PLY2130-01T	EGLE	3/19/25	SWK
		MC DPS	3/20/25	SWK
		BIDS	4/9/25	SWK

CITY OF PLYMOUTH
201 S MAIN ST
WAYNE COUNTY, MICHIGAN 48170
2025 INFRASTRUCTURE IMPROVEMENT PROGRAM
HOLBROOK AVE - PROP PAVING PROFILE
STA 8+00 TO STA 16+75.20

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REV#	DATE	DESCRIPTION	BY

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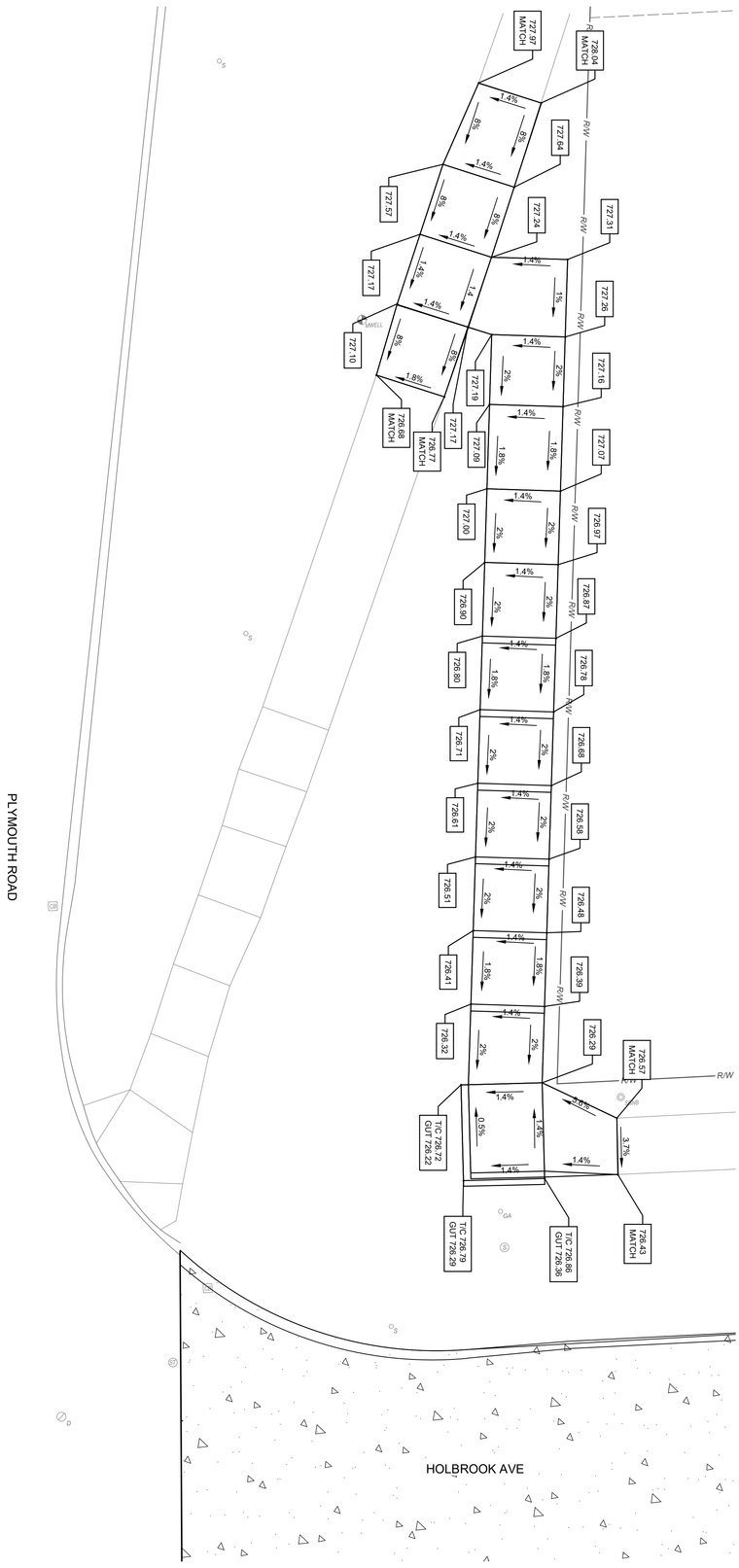

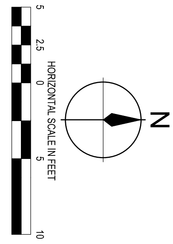

SHEET 20

JOB NO. PLY2130-01T

ISSUED FOR:	DATE:	BY:
EGLE	3/19/25	SWK
WC DPS	3/20/25	SWK
MDG	4/9/25	SWK

CITY OF PLYMOUTH
201 S MAIN ST
WAYNE COUNTY, MICHIGAN 48170
2025 INFRASTRUCTURE IMPROVEMENT PROGRAM
HOLBROOK AVE - PROP ADA RAMPS AT
PLYMOUTH ROAD

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Taylor, MI 48180
734.947.9700
www.wadetrim.com

REV#	DATE	DESCRIPTION	BY

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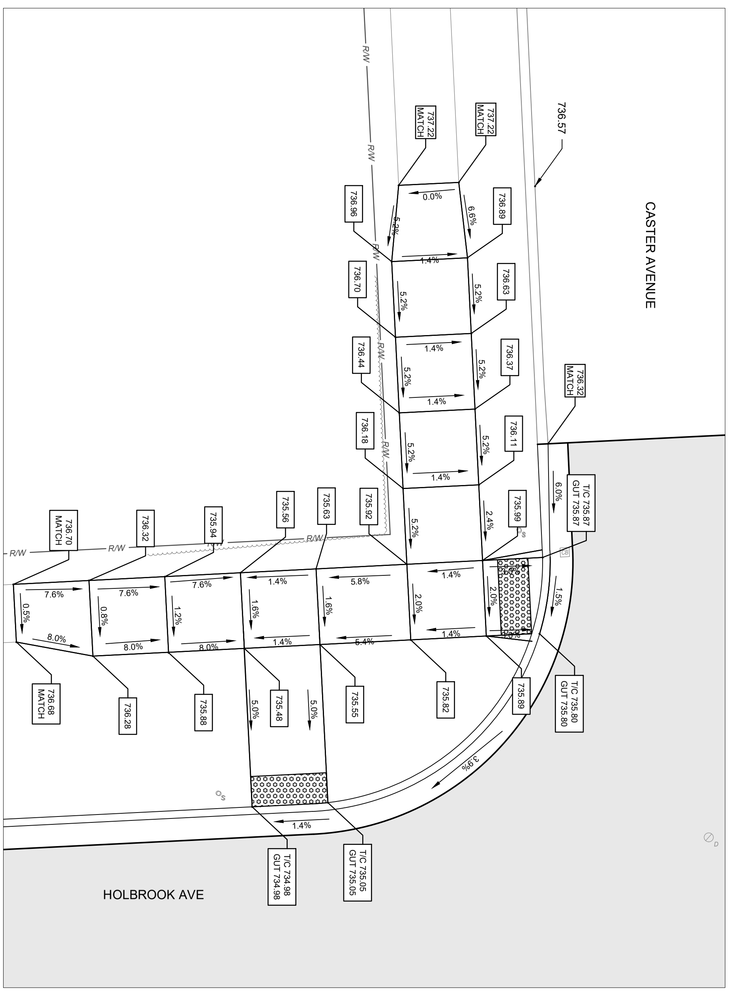

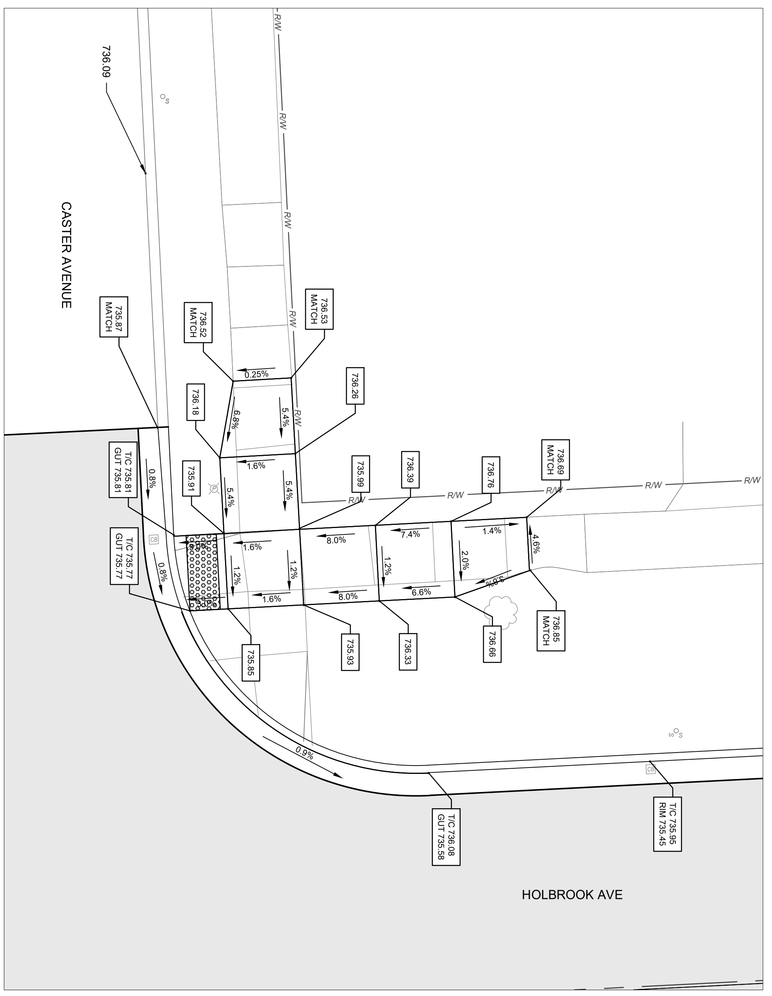

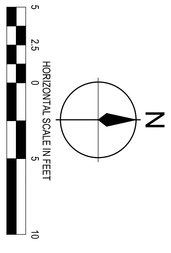

SHEET 21

JOB NO. PLY2130-01T

ISSUED FOR:
EGLE
WC DPS
IRGS

DATE:
3/19/25
3/20/25
4/9/25

BY:
SWK
SWK
SWK

CITY OF PLYMOUTH
201 S MAIN ST
WAYNE COUNTY, MICHIGAN 48170
2025 INFRASTRUCTURE IMPROVEMENT PROGRAM
HOLBROOK AVE - PROP ADA RAMPS AT CASTER AVENUE

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Taylor, MI 48180
734.947.9700
www.wadetrim.com

REV#	DATE	DESCRIPTION	BY

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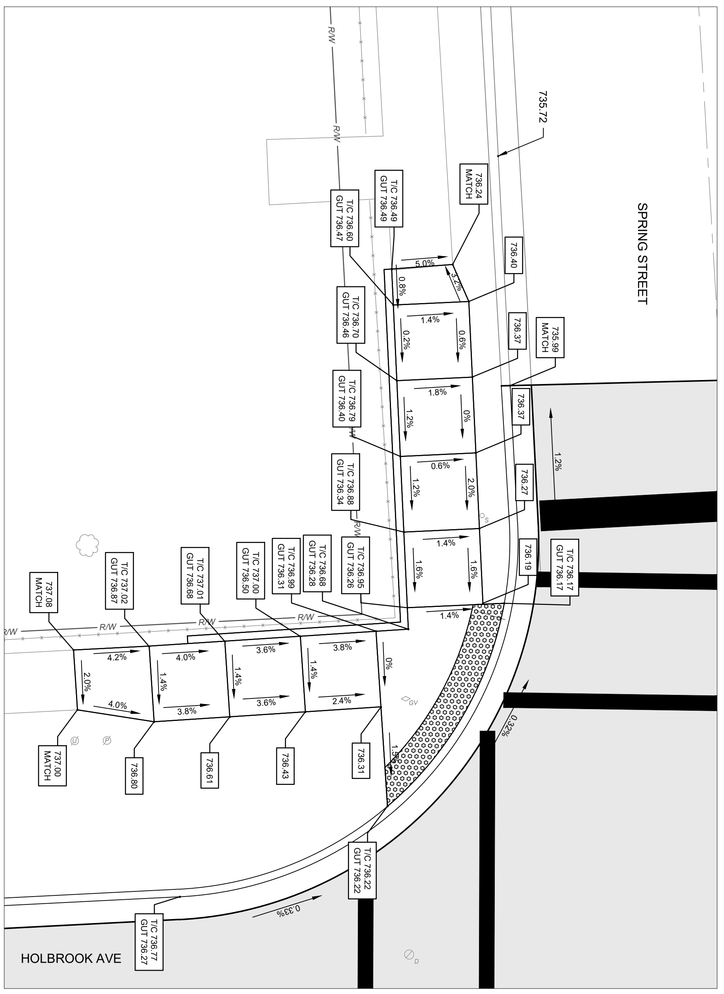
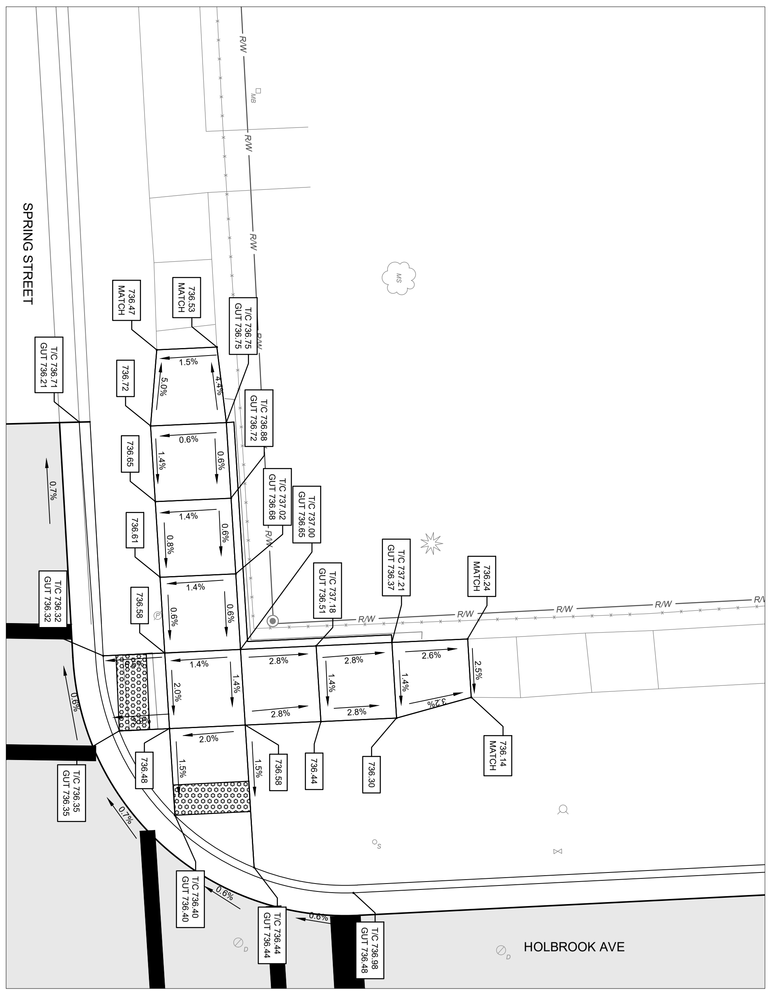
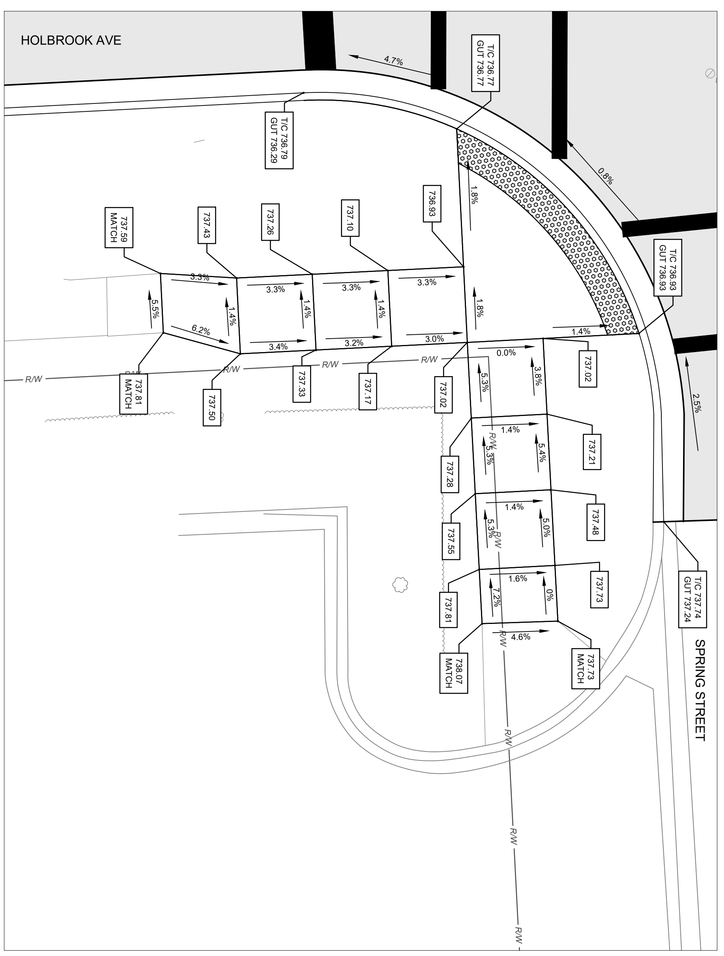
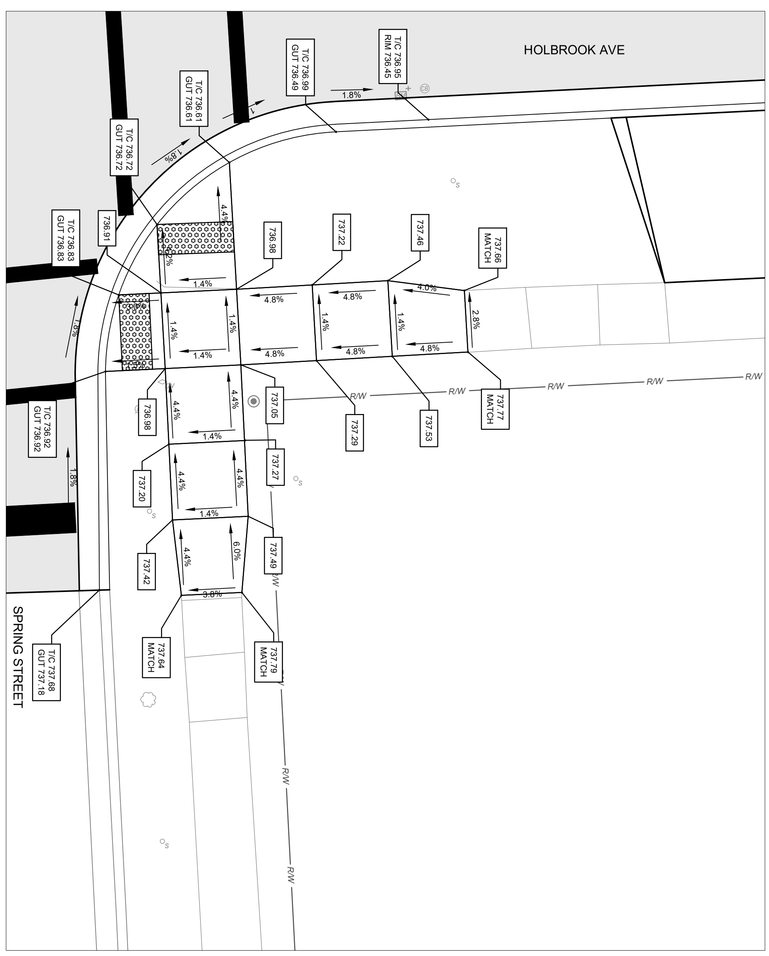
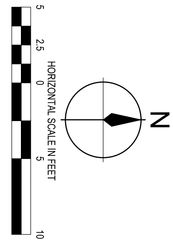
PROJECT MANAGER: SHAWN KEOUGH
C:\PW_WORK\MF\LANAGAN\D1588982\SHT-CSW-ADA RAMPS.DWG PLOTTED 4/9/2025 3:18 PM BY FLANAGAN, MARTIN











SHEET	JOB NO.	ISSUED FOR:	DATE:	BY:
22	PLY2130-01T	EGLE	3/19/25	SWK
		MIC DPS	3/20/25	SWK
		BIDS	4/9/25	SWK

CITY OF PLYMOUTH
201 S MAIN ST
WAYNE COUNTY, MICHIGAN 48170
2025 INFRASTRUCTURE IMPROVEMENT PROGRAM
HOLBROOK AVE - PROP ADA RAMPS AT
SPRING STREET

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Taylor, MI 48180
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REV#	DATE	DESCRIPTION	BY

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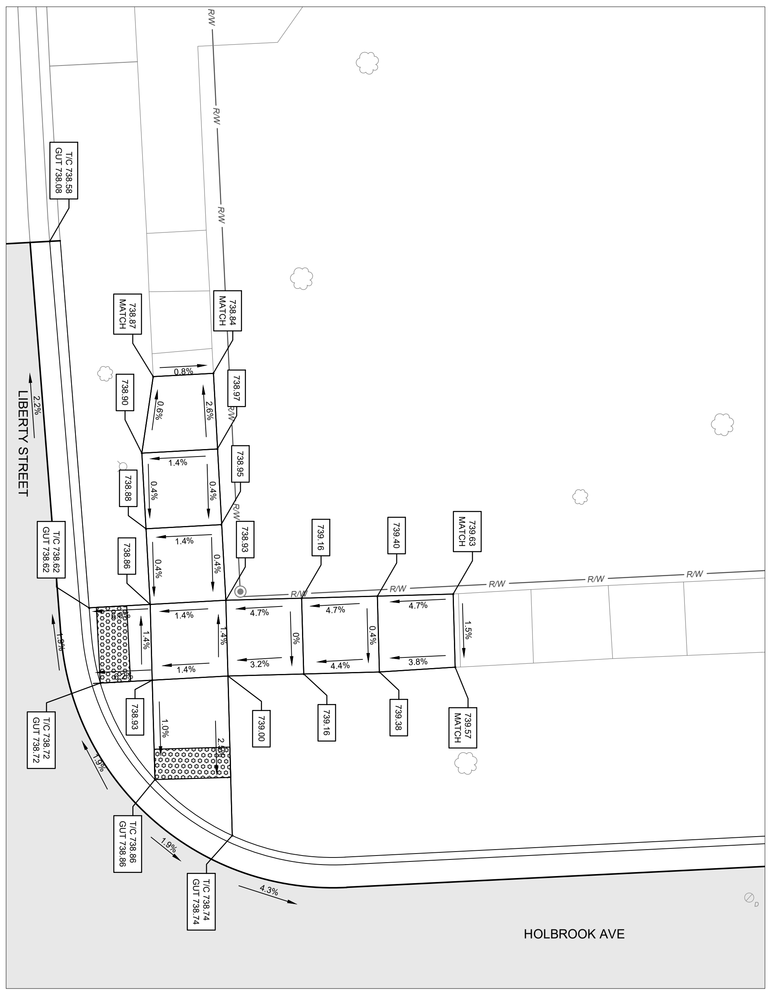

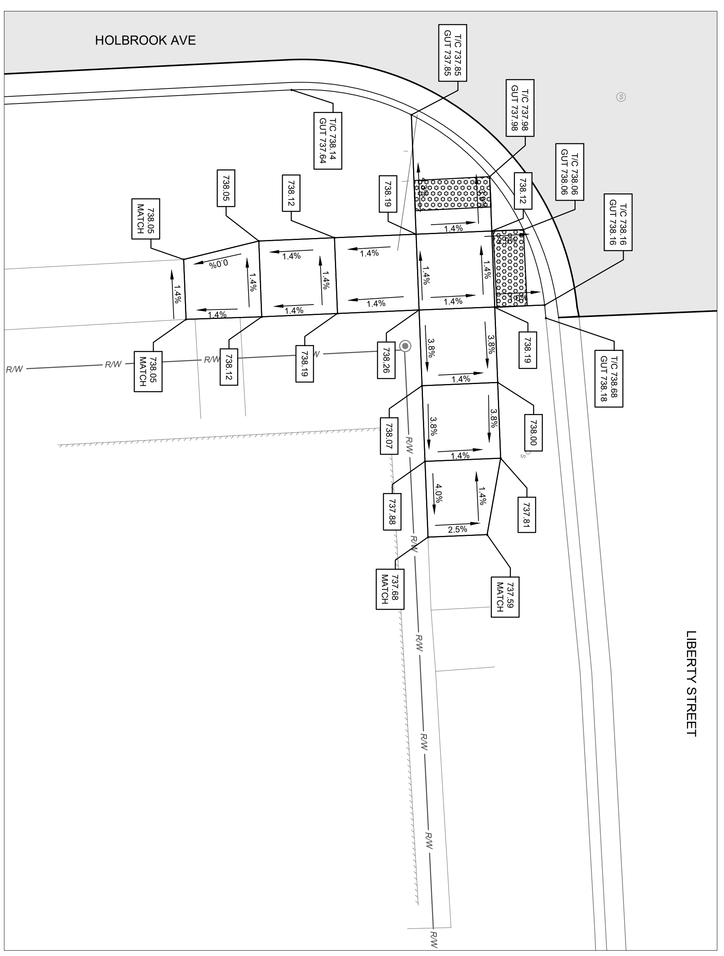

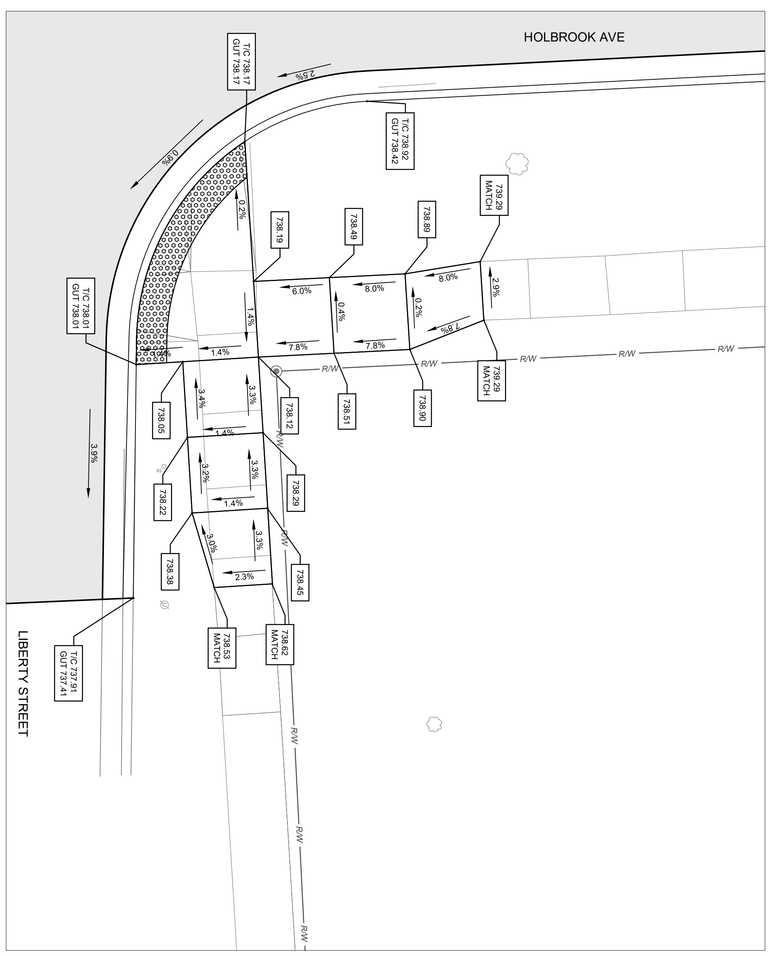

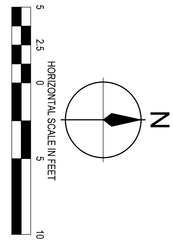

SHEET 23

JOB NO. PLY2130-01T

ISSUED FOR:	DATE:	BY
EGLE	3/19/25	SWK
WC DPS	3/20/25	SWK
MDB	4/9/25	SWK

CITY OF PLYMOUTH
201 S MAIN ST
WAYNE COUNTY, MICHIGAN 48170
2025 INFRASTRUCTURE IMPROVEMENT PROGRAM
HOLBROOK AVE - PROP ADA RAMPS AT
LIBERTY STREET

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REV#	DATE	DESCRIPTION	BY

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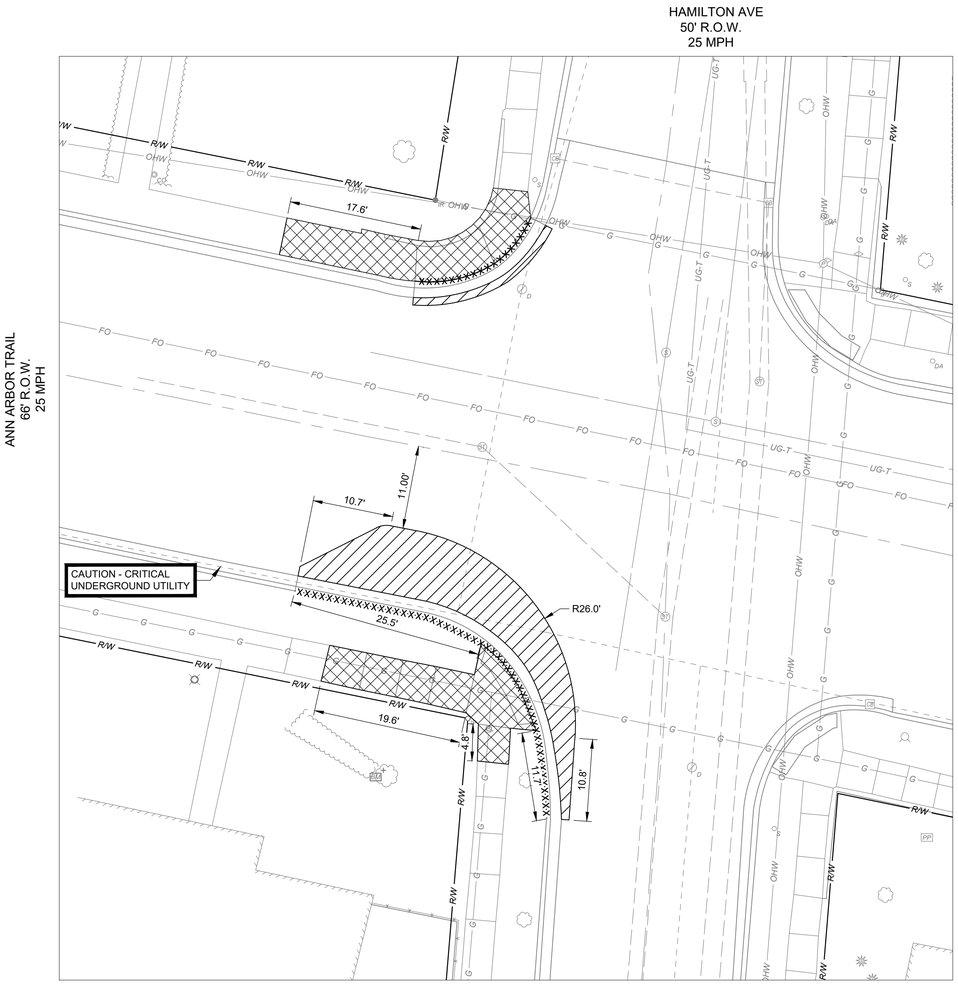

N

HORIZONTAL SCALE IN FEET
10 5 0 10 20

REV#	DATE	DESCRIPTION	BY

WADE TRIM
25251 Northline Rd.
Taylor, MI 48180
734.947.9700
www.wadetrim.com

CITY OF PLYMOUTH
201 S MAIN ST
WAYNE COUNTY, MICHIGAN 48170
2025 INFRASTRUCTURE IMPROVEMENT PROGRAM
ANN ARBOR TRAIL - HAMILTON TRAFFIC SIGNALS
REMOVAL PLAN

ISSUED FOR:	DATE:	BY:
EGLE	3/19/25	SWK
WC DPS	3/20/25	SWK
BIDS	4/9/25	SWK

JOB NO.
PLY2130-01T

SHEET
24

2025 INFRASTRUCTURE IMPROVEMENT PROGRAM

LEGEND

- CURB AND GUTTER, REM
- PAVT, REM
- SIDEWALK, REMOVE

SUMMARY OF QUANTITIES THIS SHEET

CONCRETE DRIVE AND SIDEWALK, REM	50	SYD
PAVT, REM	50	SYD
CURB AND GUTTER, REM	100	FT
EXCAVATION, EARTH	5	CYD

Know what's below.
Call before you dig.

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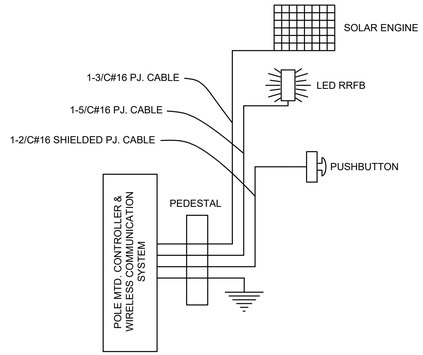
PROJECT MANAGER: SHAWN REDDISH
DESIGNED: MARTIN FLANAGAN DRAWN: SWK CHECKED: MFT-CTS-AA TRAIL SIGNALS.DWG PLOTTED 4/9/2025 3:18 PM BY FLANAGAN, MARTIN

BENCHMARK #103 ELEV. 716.87

SET NAIL IN THE NORTH FACE OF 8 INCH MAPLE TREE, ±12 FEET SOUTHWEST OF INTERSECTION OF BACK OF WALK FOR WEST SIDE OF HAMILTON STREET AND SOUTH SIDE OF ANN ARBOR TRAIL.

BENCHMARK #104 ELEV. 718.07

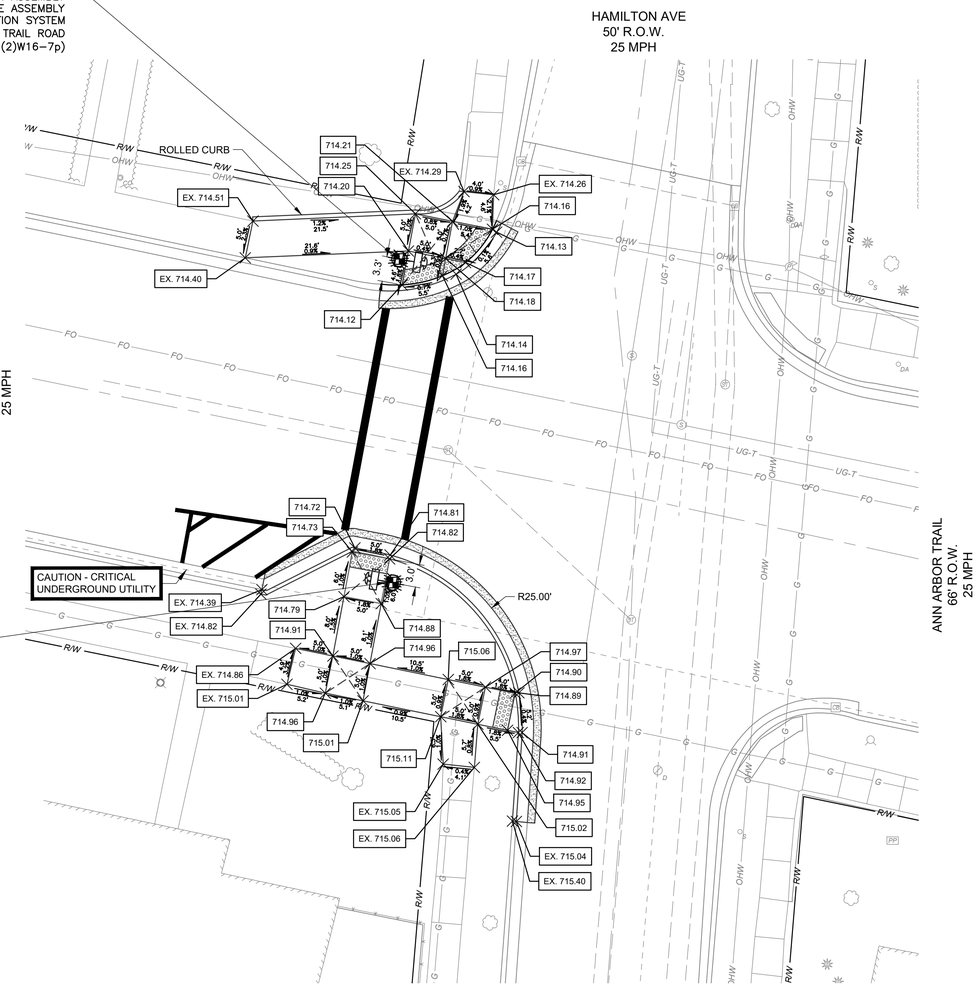
TOP OF ARROW ON HYDRANT ON EAST SIDE OF HAMILTON STREET, ±75 FEET NORTH OF ANN ARBOR TRAIL, NORTH OF DRIVEWAY FOR CARRIAGE COURT CONDOMINIUMS.



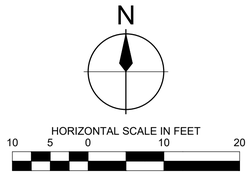
CABLING INSTALLATION DIAGRAM (TYP)

NOT TO SCALE

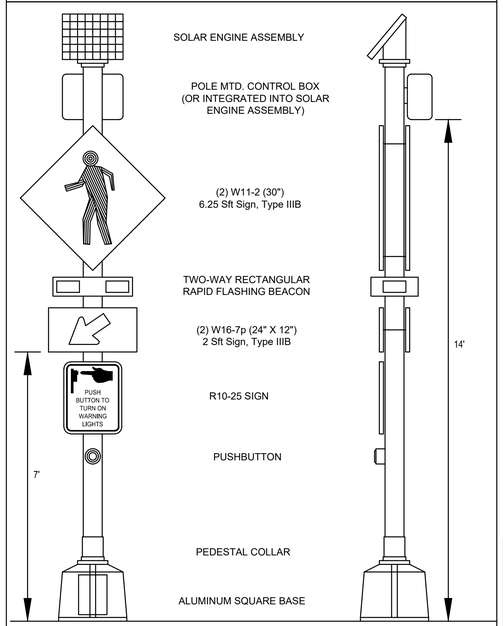
ALUMINUM PEDESTAL ON NEW FDN.
TWO-WAY RECTANGULAR RAPID FLASHING BEACON ASSEMBLY WITH SOLAR ENGINE ASSEMBLY AND WIRELESS COMMUNICATION SYSTEM
PUSHBUTTON AND SIGN (R10-25) FOR CROSSING ANN ARBOR TRAIL ROAD PEDESTRIAN CROSSING SIGNS ((2)W11-2 & (2)W16-7p)



ALUMINUM PEDESTAL ON NEW FDN.
TWO-WAY RECTANGULAR RAPID FLASHING BEACON ASSEMBLY WITH SOLAR ENGINE ASSEMBLY AND WIRELESS COMMUNICATION SYSTEM
PUSHBUTTON AND SIGN (R10-25) FOR CROSSING ANN ARBOR TRAIL ROAD PEDESTRIAN CROSSING SIGNS ((2)W11-2 & (2)W16-7p)



RRFB NOTES: THE SOLAR ENGINE SHALL BE ORIENTED TOWARD THE SOUTH WITH A TILT ANGLE (FROM HORIZONTAL) OF 45 TO 60 DEGREES. THE TWO-WAY RECTANGULAR RAPID FLASHING BEACON SHALL INCLUDE AN LED INDICATION FACING TOWARD THE ROADWAY TO INFORM PEDESTRIANS WHEN THE DEVICE IS ACTIVATED.



RRFB & SIGN DETAIL (TYP)

Know what's below. Call before you dig.

INTERSECTION SPECIFIC NOTES:

INSTALLATION OF PEDESTALS WITH PUSHBUTTONS SHALL BE COORDINATED WITH THE CONSTRUCTION OF THE SIDEWALK RAMPS AND CROSSWALK PAVEMENT MARKINGS. LOCATIONS SHALL MEET CURRENT ADA REQUIREMENTS.

THE SOLAR ENGINE SHALL BE CAPABLE OF ACCOMMODATING AT LEAST 200 ACTIVATIONS PER DAY FOR A DURATION OF 20 SECONDS WITH 10 DAYS OF AUTONOMY.

THE NEW ALUMINUM PEDESTALS SHALL BE INSTALLED WITH SQUARE BASES AND SUPPORT COLLARS. THE SUPPORT COLLARS SHALL BE INCLUDED IN THE PAY ITEM "PEDESTAL, ALUM" AND WILL NOT BE PAID FOR SEPARATELY.

THE PAY ITEM "FLSH BEACON, RECTANGULAR RAPID, SOLAR POWER" INCLUDES A TWO-WAY LED RECTANGULAR RAPID FLASHING BEACON (WITH AN LED PEDESTRIAN INDICATION), A POLE MOUNTED CONTROLLER, A WIRELESS COMMUNICATION SYSTEM WITH ANTENNA, AND A SOLAR ENGINE ASSEMBLY WITH BATTERY.

CONTRACTOR SHALL BE RESPONSIBLE FOR ANY WIRING AND PROGRAMMING OF RRFB CONTROLLERS AND CABINETS. THIS WORK SHALL BE CONSIDERED TO BE INCLUDED IN OTHER PAY ITEMS AND WILL NOT BE PAID FOR SEPARATELY.

R10-25 SIGN

LEGEND

HAND PATCHING

SUMMARY OF QUANTITIES THIS SHEET

SIDEWALK, CONC, 4 INCH	310	SFT
SIDEWALK RAMP, CONC, 6 INCH	152	SFT
CURB AND GUTTER, CONC, DET F4	45	FT
AGGREGATE BASE COURSE, 21AA	20	TON
HAND PATCHING	2	TON
PEDESTAL, ALUM	2	EA
PEDESTAL, FDN	2	EA
PUSHBUTTON AND SIGN	2	EA
FLSH BEACON, RECTANGULAR RAPID, SOLAR POWER	2	EA
SIGN, TYPE IIIB	33	SFT
BITUMINOUS PAVEMENT, WEARING COURSE, 1300T	5	TON
BITUMINOUS PAVEMENT, LEVELING COURSE, 3C	10	TON
RESTORATION W/ 3-INCHES TOPSOIL AND NURSERY SOD	60	SYD
PAVEMENT MARKING, THERMOPLASTIC, 4 INCH, WHITE	55	FT
PAVEMENT MARKINGS, THERMOPLASTIC, 12 INCH, CROSSWALK	65	FT

REV#	DATE	DESCRIPTION	BY

25251 Northline Rd.
Taylor, MI 48180
734.947.9700
www.wadetrim.com
WADE TRIM

CITY OF PLYMOUTH
201 S MAIN ST
WAYNE COUNTY, MICHIGAN 48170
2025 INFRASTRUCTURE IMPROVEMENT PROGRAM
ANN ARBOR TRAIL - HAMILTON TRAFFIC SIGNALS
CONSTRUCTION PLAN

ISSUED FOR:	DATE:	BY:
EGLE	3/19/25	SWK
WC DPS	3/20/25	SWK
BIDS	4/9/25	SWK

JOB NO.
PLY2130-01T

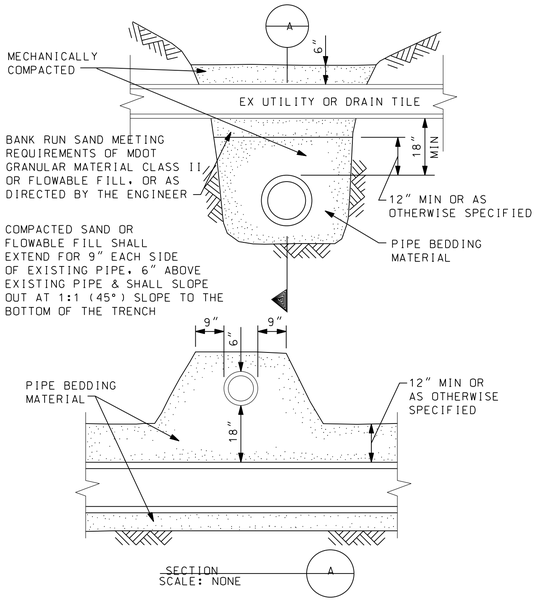
SHEET
25

2025 INFRASTRUCTURE IMPROVEMENT PROGRAM

© Wade Trim Group, Inc.

PROJECT MANAGER: SHAWN KESKOH
PW: J:\PROJECTS\2021\210067\CONSTRUCT\CTS-AA TRAIL SIGNALS.DWG PLOTTED 4/9/2025 3:18 PM BY FLANAGAN, MARTIN

NOTE:
WHERE CONCRETE ENCASEMENT IS SPECIFIED FOR NEW UTILITY A 6" MINIMUM LAYER OF MECHANICALLY COMPACTED SAND SHALL BE MAINTAINED BETWEEN EXISTING UTILITY & TOP OF CONCRETE ENCASEMENT.



STANDARD PIPE SUPPORT
N.T.S.

GENERAL NOTES

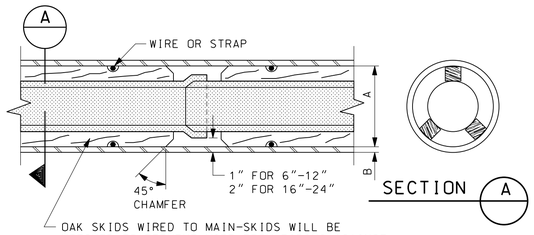
1. PRIOR TO CONSTRUCTION, THE CONTRACTOR SHALL ATTEND A RECONSTRUCTION MEETING, AT A TIME AND PLACE AS ARRANGED BY THE COMMUNITY, IN WHICH VARIOUS UTILITY COMPANIES AND GOVERNMENTAL AGENCY REPRESENTATIVES WILL BE PRESENT.
2. PRIOR TO CONSTRUCTION, THE CONTRACTOR MUST HAVE IN HIS POSSESSION A COPY OF ALL PERMITS NECESSARY TO CONSTRUCT A CONNECTION TO, OR AN EXTENSION OF, THE WATER SUPPLY, SANITARY SEWER, OR STORM SEWER SYSTEMS.
3. THE CONTRACTOR SHALL MAINTAIN HIS CONSTRUCTION OPERATIONS WITHIN THE PRESENTLY EXISTING ROAD RIGHTS-OF-WAY AND EASEMENTS AS NOTED ON THE PLANS THROUGHOUT THE PROJECT. IN THE EVENT THAT THE CONTRACTOR DEEMS IT NECESSARY OR ADVISABLE TO OPERATE BEYOND THE LIMITS OF THE EXISTING RIGHTS-OF-WAY OR EASEMENTS, HE SHALL BE RESPONSIBLE FOR MAKING SPECIAL WRITTEN AGREEMENTS WITH THE PROPERTY OWNERS AND SHALL FURNISH SUCH COPIES OF AGREEMENTS TO THE COMMUNITY AND ENGINEER.
4. THE CONTRACTOR SHALL NOTIFY "MISS DIG" (800-482-7171) 3 DAYS (NOT INCLUDING HOLIDAYS OR WEEKENDS) BEFORE STARTING CONSTRUCTION. HE SHALL MAKE ANY NECESSARY ARRANGEMENTS WITH UTILITY COMPANIES FOR RELOCATION OF EXISTING UTILITIES. THESE ARRANGEMENTS SHALL BE MADE IN SUFFICIENT TIME TO ALLOW THE RELOCATION WORK TO BE COMPLETED WITHOUT INTERFERING WITH OR DELAYING THE SEWER CONSTRUCTION.
5. THE CONTRACTOR SHALL NOTIFY ALL UTILITY COMPANIES AND THE ENGINEER 48 HOURS PRIOR TO UNCOVERING ANY EXISTING UTILITIES.
6. ON ALL WORK WITHIN THE WAYNE COUNTY RIGHT-OF-WAY, THE CONTRACTOR SHALL NOTIFY THE COUNTY ENGINEER AND THE COMMUNITY 72 HOURS PRIOR TO THE START OF ANY CONSTRUCTION.
7. THE CONTRACTOR SHALL MAINTAIN ALL TRAFFIC AT ALL TIMES AS PER THE MICHIGAN MANUAL OF UNIFORM TRAFFIC CONTROL DEVICES.
8. THE CONTRACTOR SHALL AT ALL TIMES PROVIDE EMERGENCY ACCESS TO PROPERTY IN THE VICINITY OF THE CONSTRUCTION FOR POLICE AND FIRE EQUIPMENT, AMBULANCES OR OTHER EMERGENCY VEHICLES TO PROTECT LIFE, HEALTH AND PROPERTY.
9. THE CONTRACTOR SHALL MAINTAIN PUBLIC ROADS AFFECTED BY THE CONSTRUCTION OPERATIONS IN A PASSABLE CONDITION UNTIL SUCH TIME AS FINAL RESTORATION OF THESE IMPROVEMENTS CAN BE MADE. IF THE PUBLIC SAFETY IS IN DANGER OR THE NECESSITY EXISTS FOR MAINTAINING TRAFFIC, BACKFILLING MUST BE COMPLETED IMMEDIATELY. IN THE EVENT THAT THE NECESSARY BACKFILL MATERIAL AND EQUIPMENT ARE NOT AVAILABLE WHEN DIRECTION IS GIVEN FOR IMMEDIATE BACKFILL, THE TRENCH SHALL BE BACKFILLED WITH NATIVE MATERIAL TO PROVIDE FOR THE NECESSARY MAINTENANCE OF TRAFFIC AND SAFETY; HOWEVER, THE NATIVE MATERIAL SHALL BE REMOVED WITHIN 48 HOURS AND THE TRENCH PROPERLY BACKFILLED.

GENERAL NOTES CONTINUED

10. NO STREET, ROAD OR SECTION THEREOF SHALL BE CLOSED TO THROUGH TRAFFIC UNLESS AUTHORIZED BY THE AGENCY WITH JURISDICTION OVER THE ROADS. PRIOR TO CLOSING A STREET, ROAD, OR SECTION THEREOF, THE CONTRACTOR SHALL PROVIDE THE ENGINEER WITH A COPY OF A DETOUR PLAN APPROVED BY THE AGENCY HAVING JURISDICTION OVER THE ROADS.
11. IN THE EVENT ROADS ARE TO BE CLOSED, THE CONTRACTOR SHALL NOTIFY THE LOCAL FIRE DEPARTMENT, POLICE DEPARTMENT, LOCAL ROAD AUTHORITY, AMBULANCE AND EMERGENCY SERVICES, DEPARTMENT OF PUBLIC WORKS, PUBLIC TRANSIT AUTHORITY, PUBLIC SCHOOL SYSTEM, LOCAL TRASH PICKUP AUTHORITY, AND PUBLIC AND PRIVATE UTILITIES DAILY AS TO WHAT STREETS WILL BE PARTLY BLOCKED OR CLOSED, THE LENGTH OF TIME THE STREETS WILL BE BLOCKED OR CLOSED AND WHEN THE STREETS WILL BE REOPENED TO TRAFFIC.
12. PAVED STREETS AND DRIVEWAYS SHALL BE MAINTAINED IN A REASONABLE STATE OF CLEANLINESS AND THE CONTRACTOR SHALL REMOVE ACCUMULATIONS OF DEBRIS CAUSED BY HIS OPERATIONS. THE CONTRACTOR SHALL HAVE, AS A MINIMUM, AN OPERATING SWEEPER BROOM ON THE SITE AT ALL TIMES. THE PAVEMENT SHALL BE CLEANED AT THE CLOSE OF EACH DAYS OPERATION AND AS OFTEN AS NECESSARY BEFORE THAT TIME. FAILURE TO COMPLY SHALL BE CAUSE TO STOP CONSTRUCTION. CONTRACTOR SHALL ALSO COMPLY WITH THE LOCAL AIR POLLUTION CONTROL ORDINANCE.
13. ALL GRAVEL AND DIRT ROADS, STREETS OR DRIVEWAYS USED SHALL BE MAINTAINED BY GRADING, PLACING DUST PALLIATIVES, AND MAINTENANCE GRAVEL IN SUFFICIENT QUANTITIES TO ELIMINATE DUST AND MAINTAIN TRAFFIC AS DIRECTED BY THE AGENCY.
14. CONTRACTOR SHALL PROVIDE ALL NECESSARY SHEETING, SHORING, DEWATERING, BRACING, TRENCH BOXES, ETC., TO PERFORM WORK SAFELY AND PROTECT EXISTING UTILITIES AND IMPROVEMENTS.
15. THE FLOW IN THE EXISTING SEWERS SHALL BE MAINTAINED AT ALL TIMES DURING CONSTRUCTION.16. CULVERTS, DITCHES, DRAIN TILES, TILE FIELD, DRAINAGE STRUCTURES, ETC., THAT ARE DISTURBED BY THE CONTRACTOR'S OPERATIONS SHALL BE IMMEDIATELY RESTORED.
16. CULVERT, DITCHES, DRAIN TILES, TILE FIELDS, DRAINAGE STRUCTURES, ETC. THAT ARE DISTURBED BY THE CONTRACTOR'S OPERATIONS SHALL BE IMMEDIATELY RESTORED.
17. ALL PROPERTY IRONS AND MONUMENTS, IF DISTURBED OR DESTROYED BY THE CONTRACTOR'S OPERATION, SHALL BE REPLACED BY A LICENSED LAND SURVEYOR AT THE CONTRACTOR'S EXPENSE.
18. AFTER ALL THE PIPE, STRUCTURES, ETC., HAVE BEEN LAID, CONSTRUCTED, AND BACKFILLED, THE SYSTEM SHALL BE TESTED AND FINAL INSPECTED. THE INSPECTION AND TESTING SHALL CONSIST OF A FIRST INSPECTION, TELEVISION INSPECTION (IF APPLICABLE) TESTING, AND FINAL INSPECTION AND MEASUREMENT. THE CONTRACTOR SHALL PROVIDE THE NECESSARY SUPERVISION, LABOR, TOOLS, EQUIPMENT, AND THE MATERIALS NECESSARY FOR THE TESTS WHICH SHALL BE CONDUCTED IN THE PRESENCE OF THE ENGINEER. HE ENGINEER SHALL BE NOTIFIED TWO (2) WORKING DAYS IN ADVANCE OF ALL TESTING.

GENERAL NOTES CONTINUED

19. THE FIRST INSPECTION SHALL BE COMPLETED AND ALL REPAIRS MADE IN AMPLE TIME SO THAT THE TELEVISION INSPECTION OF THE UNDERGROUND PORTION OF THE SYSTEM CAN BE COMPLETED WITHIN FOUR (4) WEEKS OF THE COMPLETION OF THE CONSTRUCTION. WHEN RE-TELEVISION IS NECESSARY, AN ADDITIONAL TWO (2) WEEKS WILL BE ALLOWED FOR COMPLETION. TESTING OF THE SYSTEM AS HEREIN DESCRIBED SHALL IMMEDIATELY FOLLOW THE TELEVISION INSPECTION AND SHALL BE COMPLETED WITHIN A TWO (2) WEEK PERIOD.
20. FAILURE TO MAINTAIN A SCHEDULE IN COMPLIANCE WITH THESE TERMS WILL AUTOMATICALLY CAUSE THE STOPPAGE OF OTHER WORK AT THE PARTICULAR SITE IN QUESTION UNTIL SUCH TIME AS THE FINAL INSPECTION OF THE COMPLETED UNDERGROUND PORTION OF THE SYSTEM HAS PROGRESSED TO ACCEPTABLE LIMITS.
21. THE CONTRACTOR SHALL HAVE THE UNDERGROUND PORTION OF THE SEWER SYSTEM READY FOR THE FIRST INSPECTION WITHIN TWO (2) WEEKS AFTER THE COMPLETION OF UTILITY.
22. THE FIRST INSPECTION SHALL CONSIST OF A VISIBLE AND AUDIBLE CHECK OF SEWERS, MANHOLES, GATE WELLS, AND OTHER STRUCTURES TO ASCERTAIN THAT THE STRUCTURE STEPS HAVE BEEN PLACED, ALL LIFT HOLES PLUGGED, THE CHANNELING OF THE MANHOLE BOTTOMS COMPLETED, ALL VISIBLE OR AUDIBLE LEAKS STOPPED, ALL PIPE HAS BEEN PLACED STRAIGHT AND TRUE TO THE PROPER GRADES AND ELEVATION, THE REQUIRED ADJUSTING RINGS AND FRAME AND COVER PROPERTY INSTALLED, ALL TRENCHES AND STRUCTURES BACKFILLED IN AN ACCEPTABLE MANNER AND THAT THE SYSTEM HAS BEEN THOROUGHLY CLEANED.
23. THE FIRST INSPECTION SHALL BE CONSIDERED COMPLETED WHEN ALL TREE PAIRS HAVE BEEN MADE AND THE SYSTEM IS READY FOR A TELEVISION INSPECTION AND SUBSEQUENT TESTING.
24. TRENCH BACKFILL UNDER ROAD SURFACES, PAVEMENTS, CURBS, DRIVEWAY, SIDEWALK AND WHERE THE TRENCH EDGE IS WITHIN 3-FEET OF THE PAVEMENT SHALL BE TRENCH B (SAND) PER SPECIFICATIONS SECTION 312333, TRENCHING AND BACKFILLING.
25. AFTER ALL TESTING, TELEVISION INSPECTION, FINAL RESTORATION AND CLEAN-UP HAS BEEN COMPLETED, A FINAL INSPECTION AND MEASUREMENT WILL BE DONE. THE FINAL INSPECTION SHALL BE REQUESTED BY THE CONTRACTOR AND CONSIST OF, BUT IS NOT LIMITED TO, CHECKING FOR PROPER ALIGNMENT, PROPER GRADE, CLEANLINESS, LEAKS, CONFORMANCE TO THE PLANS AND SPECIFICATION, PROPER STRUCTURAL AND MECHANICAL ADJUSTMENTS, AND RESTORATION. FINAL MEASUREMENT INCLUDES STRUCTURE ELEVATIONS, DISTANCES BETWEEN STRUCTURES, AND CONFIRMATION UTILITIES ARE LOCATED WITHIN EASEMENT AND RIGHT-OF-WAY AREAS.
26. SUCCESSFUL COMPLETION OF ANY TEST OR INSPECTION SHALL NOT RELIEVE THE CONTRACTOR FROM THEIR RESPONSIBILITY TO CORRECT ANY DEFICIENCY OR NONCONFORMANCE TO THE PLANS OR SPECIFICATIONS WHICH MAY THEREAFTER BECOME KNOWN.

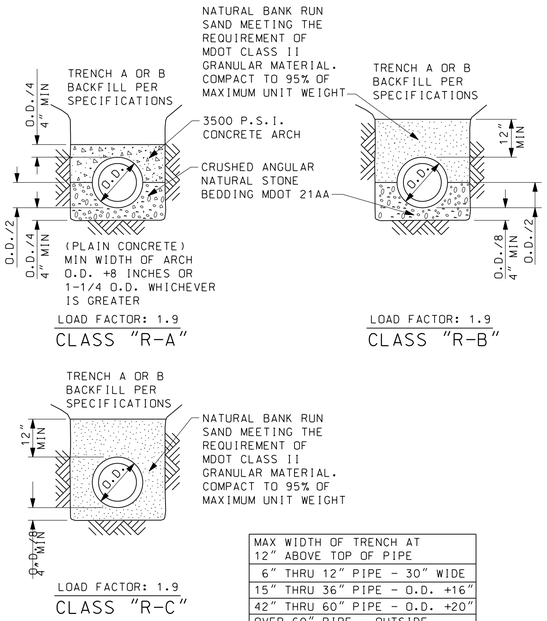


DIA OF SEWER	DIA OF MAIN	MIN "A"	ROAD CROSSING MIN "B"	RAILROAD CROSSING MIN "B"
	6"	16"	.375	.375
	8"	16"	.375	.375
	12"	20"	.375	.438
10"	16"	24"	.375	.500
12" & 15"	20"	30"	.375	.500
18"	24"	36"	.375	.500

CASING PIPE SHALL BE WELDED STEEL PIPE A.S.T.M. A-252, GR 2 UNLESS OTHERWISE SPECIFIED.

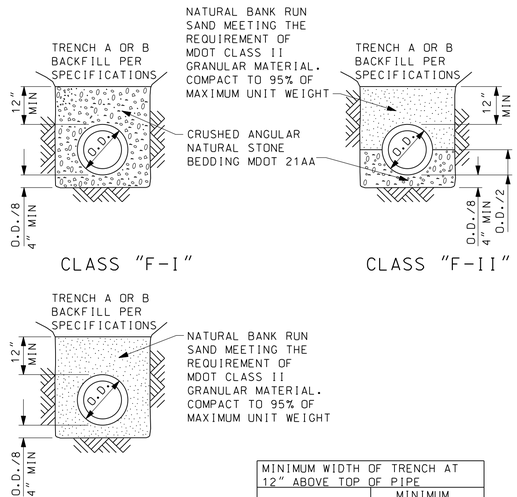
NOTES:
1. NO WATER SHALL BE USED IN BORING UNDER RAILROADS.
2. MAINTAIN MINIMUM OF 5'-6" OF COVER BETWEEN BASE OF RAIL AND TOP OF CASING.
3. THE ENDS OF THE CASING SHALL BE SUITABLY PROTECTED AGAINST THE ENTRANCE OF FOREIGN MATERIAL, BUT SHALL NOT BE TIGHTLY SEALED.
4. WHEN BORING ALL VOIDS OUTSIDE OF CASING PIPE SHALL BE FILLED BY MEANS OF PRESSURE GROUTING WITH 1:3 CEMENT-SAND MORTAR. THIS WORK MUST BE ACCOMPLISHED WITHIN 24 HOURS AFTER THE CROSSING HAS BEEN COMPLETED. BORING SHALL EXTEND A MINIMUM OF 10 FEET OUTSIDE THE EDGES OF THE PAVEMENT.
5. SKIDS ARE TO BE MINIMUM OF 80% OF PIPE LENGTH.
6. CASING SPACERS AS ALLOWED BY THE ENGINEER.

STANDARD CASING SECTON



MAX WIDTH OF TRENCH AT 12" ABOVE TOP OF PIPE
6" THRU 12" PIPE - 30" WIDE
15" THRU 36" PIPE - O.D. +16"
42" THRU 60" PIPE - O.D. +20"
OVER 60" PIPE - OUTSIDE DIAMETER OF PIPE +24"
MIN WIDTH OF TRENCH 12" ABOVE THE TOP OF PIPE SHALL BE 6" ON EACH SIDE OF PIPE

RIGID PIPE BEDDING DETAILS



MINIMUM WIDTH OF TRENCH AT 12" ABOVE TOP OF PIPE	
PIPE O.D.	MINIMUM TRENCH WIDTH
UP TO 16"	O.D. + 16"
GREATER THAN 16"	O.D. x 1.25 PLUS 12"

FLEXIBLE PIPE BEDDING DETAILS

NO.	DESCRIPTION	DATE	BY
REV*			

NOT VALID FOR CONSTRUCTION UNLESS SIGNED AND DATED:

WADE TRIM
29261 Northline Rd.
Suite 101
Taylor MI 48180
734.947.9700
www.wadetrim.com

CITY OF PLYMOUTH
201 SOUTH MAIN STREET
PLYMOUTH, MICHIGAN 48170
MISCELLANEOUS DETAILS (MD-1)

ISSUED FOR: DATE: BY:

JOB NO. -

SHEET MD-1

MISCELLANEOUS DETAILS (MD-1 OF 1)

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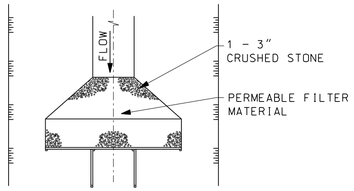
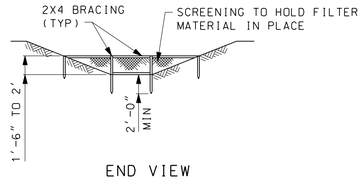
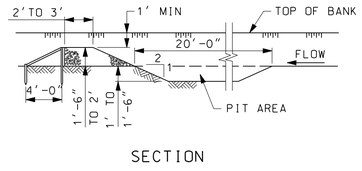
PROJECT MANAGER: -
FIELD BOOK INFORMATION: -
pw:\\WTPWIN116.wadetrim.com:projectwise\Documents\Standards\WadeTrim\Standard Details\Plymouth\CDT-PLYMDTL.dgn 4/18/2023 2:37:16 PM BY mflanagan



PLAN VIEW



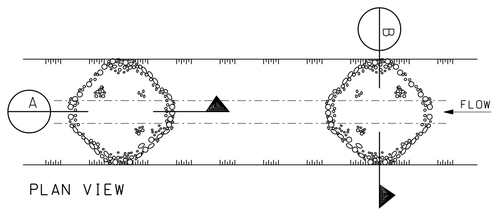
END VIEW



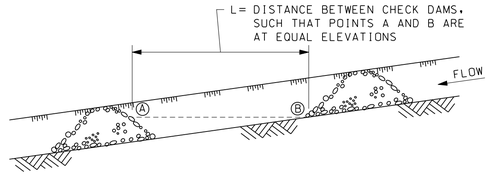
SECTION

NOTES:
1. PLACE DITCH SEDIMENT TRAP PRIOR TO ON-SITE CONSTRUCTION WORK.
2.MAINTAIN DITCH SEDIMENT TRAP IN GOOD OPERATION DURING PROJECT & REMOVE AT END OF PROJECT.
3.CHANNEL TO BE RESTORED TO ORIGINAL CONDITION OR BETTER AS DIRECTED BY THE ENGINEER.
4.CRUSHED STONE INCLUDED WITH DITCH SEDIMENT TRAP.

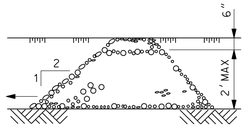
DITCH SEDIMENT TRAP
NOT TO SCALE



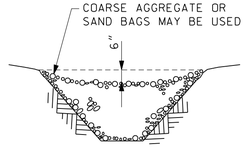
PLAN VIEW



CROSS-SECTION



SECTION A-A



SECTION B-B

NOTE:
CHECK DAMS GREATER THAN TWO FEET IN DEPTH MAY SERIOUSLY IMPACT THE FLOW CHARACTERISTICS OF THE DITCH.

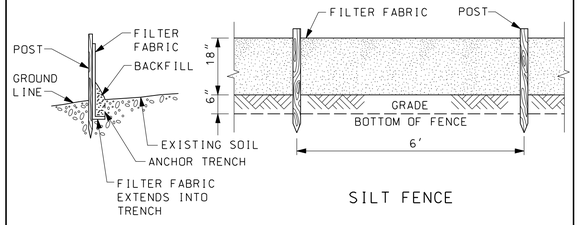
CHECK DAMS
NOT TO SCALE

SOIL EROSION AND SEDIMENTATION CONTROL NOTES

1. ALL EROSION AND SEDIMENT CONTROL WORK SHALL CONFORM TO THE STANDARDS AND SPECIFICATIONS OF THE AGENCY HAVING JURISDICTION.
2. ALL SOIL EROSION CONTROL MEASURES SHALL BE CHECKED A MINIMUM OF ONCE PER WEEK AND WITHIN A MINIMUM OF 24 HOURS AFTER EVERY RAINFALL. ANY SOIL EROSION CONTROL MEASURES DAMAGED OF RENDERED INEFFECTIVE SHALL BE IMMEDIATELY REPAIRED OR REMOVED AND REPLACED AT NO ADDITIONAL COST.
3. EROSION AND ANY SEDIMENT FROM WORK ON THIS SITE SHALL BE CONTAINED ON THE SITE AND NOT ALLOWED TO COLLECT ON ANY OFF-SITE AREAS OR IN WATERWAYS. WATERWAYS INCLUDE BOTH NATURAL AND MANMADE OPEN DITCHES, STREAMS, STORM DRAINS, LAKES, AND PONDS.
4. ALL SOIL EROSION AND SEDIMENTATION CONTROL (SESC) DEVICES SHALL BE INSTALLED PRIOR TO CONTRACTOR BEGINNING ANY WORK. ALL SESC DEVICES SHALL BE MAINTAINED IN AN EFFECTIVE, FUNCTIONING CONDITION AT ALL TIMES DURING THE COURSE OF THE WORK. ALL TEMPORARY SESC DEVICES SHALL BE REMOVED AND THE AREA RESTORED AFTER THE PERMANENT SESC MEASURES ARE INSTALLED AND FUNCTIONING.
5. DEBRIS FROM THE PROJECT SHALL BE LEFT ON THE SITE BY DELIVERY OR CONSTRUCTION VEHICLES THROUGH THE USE OF CLEAN STONE EXITS. SHOULD THE STONE BECOME INEFFECTIVE IT WILL BE REPLACED. ALL CONSTRUCTION TRAFFIC WILL USE THE CLEAN STONE EXITS.
6. EARTH EMBANKMENT BRIDGES PLACED OVER NEW PAVEMENT SHALL BE LOCATED ONLY AT PAVEMENT HIGH-POINTS AND SHALL HAVE STRAW BALES PLACED ALONG EACH SIDE OF THE BRIDGE FOR THE WIDTH OF THE PAVEMENT.
7. IMMEDIATELY AFTER SEEDING, MULCH ALL SEEDED AREAS WITH UNWEATHERED SMALL GRAIN STRAW OR HAY SPREAD UNIFORMLY AT THE RATE OF 1-1/2 TO 2 TONS PER ACRE. ANCHOR MULCH WITH DISC-TYPE MULCH ANCHORING TOOL OR OTHER MEANS AS APPROVED BY THE AGENCY WITH JURISDICTION.
8. ALL MUD, DIRT, AND DEBRIS TRACKED OR SPILLED ONTO EXISTING ROADS FROM THIS SITE SHALL BE PROMPTLY REMOVED BY THE CONTRACTOR.
9. PERMANENT SOIL EROSION CONTROL MEASURES FOR ALL SLOPES, CHANNELS, DITCHES, OR ANY DISTURBED LAND AREA SHALL BE COMPLETED WITHIN 15 CALENDAR DAYS AFTER FINAL GRADING OR FINAL EARTH CHANGES HAVE BEEN COMPLETED. WHEN IT IS NOT POSSIBLE TO PERMANENTLY STABILIZE A DISTURBED AREA AFTER AN EARTH CHANGE HAS BEEN COMPLETED OR WHERE SIGNIFICANT EARTH CHANGE ACTIVITY EASES, TEMPORARY SOIL EROSION CONTROL MEASURES SHALL BE IMPLEMENTED IMMEDIATELY. ALL TEMPORARY SOIL EROSION CONTROL MEASURES SHALL BE MAINTAINED UNTIL PERMANENT SOIL EROSION CONTROL MEASURES ARE ESTABLISHED.ALL PERMANENT SOIL EROSION CONTROL MEASURES WILL BE IMPLEMENTED AND ESTABLISHED BEFORE A CERTIFICATE OF COMPLIANCE IS ISSUED.ALL DRAIN BANKS DISTURBED BY CONSTRUCTION SHALL BE RESTORED WITHIN FIVE CALENDAR DAYS AND SOD PEGGED IN PLACE.

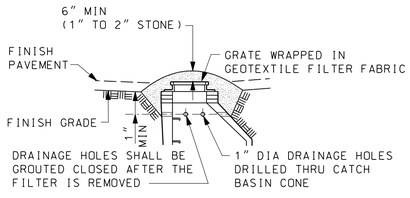
SOIL EROSION AND SEDIMENTATION CONTROL NOTES

10. PARTICULAR CARE SHOULD BE TAKEN WHEN WORKING ALONG THE PERIMETER OF THE SITE. IN NO EVENT SHALL WORK AREA EXTEND BEYOND THE LIMITS INDICATED ON THE PLANS.
11. SHOULD IT BE NECESSARY FOR THE CONTRACTOR TO DEWATER THE GROUND IN THE COURSE OF CONSTRUCTING THE PROPOSED UTILITY, THE CONTRACTOR SHALL CONSTRUCT A TEMPORARY SOIL EROSION CONTROL DEVICE IN A MANNER THAT WILL FILTER ALL DISCHARGED WATER FROM THE DEWATERING OPERATION. IN NO INSTANCE SHALL THE DEWATERING DISCHARGE BE PERMITTED TO FLOW UNFILTERED FROM THE CONSTRUCTION SITE.
12. THE CONTRACTOR SHALL CONTROL THE DUST ON THE SITE DURING THE LIFE OF THE CONTRACT. IN ACCORDANCE WITH THE SPECIFICATIONS AND THE REQUIREMENTS OF THE COMMUNITY THIS DUST CONTROL SHALL BE ACCOMPLISHED BY THE APPLICATION OF A POSITIVE DUST PICK-UP METHOD WITH WATER ON HARD SURFACES. SUCH DUST CONTROL MATERIALS SHALL BE APPLIED AS OFTEN AS IS NECESSARY IN THE OPINION OF THE COMMUNITY TO CONTROL THE DUST.
13. SHOULD THE SOIL EROSION CONTROL REQUIREMENTS BE NEGLECTED OR NOT ADEQUATELY FOLLOWED, THE COMMUNITY MAY REQUIRE THE CONTRACTOR TO CEASE CONSTRUCTION OPERATIONS AND TO APPLY HIS ENTIRE FORCE TO MEET THE REQUIREMENTS BEFORE PROCEEDING FURTHER WITH THE PROJECT.
14. SOIL EROSION AND SEDIMENTATION CONTROL SHALL BE IN ACCORDANCE WITH PART 91 SOIL EROSION AND SEMIMENTATION CONTROL(SESC), OF THE NATURAL RESOURCES AND ENVIRONMENTAL PROTECTION ACT, 1994 PA 451, AS AMENDED (NREPA).
15. AS SOON AS POSSIBLE, COMPLETE FINAL GRADING AND PLACING OF PERMANENT SOIL EROSION CONTROL DEVICES. AFTER ESTABLISHMENT OF PERMANENT VEGETATION, REMOVE ALL TEMPORARY SOIL EROSION CONTROL MEASURES.
16 SOIL EROSION AND SEDIMENTATION CONTROL IS UNDER THE JURISDICTION OF THE CITY OF PLYMOUTH.

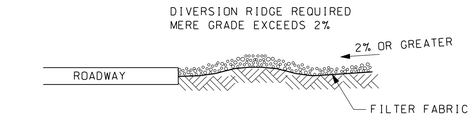


SILT FENCE

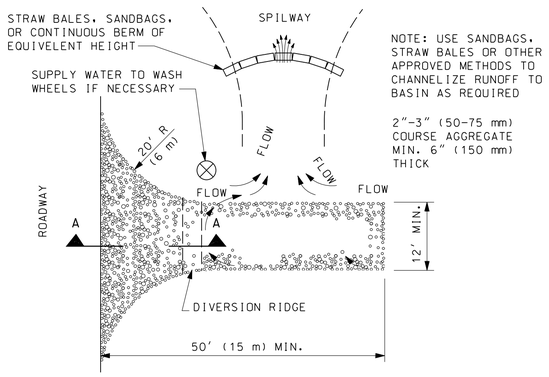
SILT FENCE
NOT TO SCALE



DRAINAGE STRUCTURE FILTER
NOT TO SCALE



SECTION A-A



NOTE:
1. THE ENTRANCE SHALL BE MAINTAINED IN A CONDITION THAT WILL PREVENT TRACKING OR FLOWING OF SEDIMENT ONTO PUBLIC RIGHT-OF-WAYS. THIS MAY REQUIRE TOP DRESSING, REPAIR AND/OR CLEANOUT OF ANY MEASURES USED TO TRAP SEDIMENT.
2. WHEN NECESSARY, WHEELS SHALL BE CLEANED PRIOR TO ENTRANCE ONTO PUBLIC RIGHT-OF-WAY.
3. WHEN WASHING IS REQUIRED, IT SHALL BE DONE ON AN AREA STABILIZED WITH CRUSHED STONE THAT DRAINS INTO AN APPROVED SEDIMENT TRAP OR SEDIMENT BASIN.

TEMPORARY GRAVEL CONSTRUCTION ENTRANCE/EXIT
NOT TO SCALE

SEQUENCE OF CONSTRUCTION - SESC

1. INSTALL ALL TEMPORARY SOIL EROSION CONTROL MEASURES PRIOR TO DISTURBING ANY EARTH ON THE SITE.
2. INSTALL TEMPORARY GRAVEL CONSTRUCTION ENTRANCE/EXIT DRIVE PRIOR TO DISTURBING ANY EARTH ON SITE. ALL TRUCKS LEAVING THE CONSTRUCTION SITE SHALL PASS THROUGH A TEMPORARY GRAVEL CONSTRUCTION ENTRANCE/EXIT DRIVE TO REMOVE DIRT AND SEDIMENT. ANY DIRT AND ACCUMULATED SEDIMENT ON ROADS AND STREETS IN THE VICINITY OF THE PROJEVT SHALL BE SWEPT CLEAN AT LEAST TWICE DAILY WITH A VACUUM TYPE PICKUP BROOM.
3. STABILIZE SLOPES STEEPER THAN 1 ON 4, CHANNELS AND SWALES WITHIN 7 DAYS OF EARTH DISTURBANCE. INSTALL PERMANENT STABILIZATION MEASURES WITHIN 5 DAYS OF FINAL GRADING.
4. DURING STORM SEWER INSTALLATION, ALL NEWLY CONSTRUCTED DRAINAGE STRUCTURES SHALL BE PROTECTED WITH A DRAINAGE STRUCTURE FILTER. THIS WORK WILL BE INCLUDED IN THE DRAINAGE COST.
5. INSTALL TOPSOIL, SEED AND MULCH / TOPSOIL AND SOD HYDROSEED ON DISTURBED RIGHT-OF-WAY WITHIN 5 DAYS OF COMPLETING UTILITY INSTALLATION.
6. PLACE RIPRAP WITHIN 24 HOURS OF PLACING CULVERTS, HEADWALLS OR OTHER DRAINAGE INLETS/OUTLETS.
7. CLEAN ALL ACCUMULATED SEDIMENT FROM CATCH BASINS, SEWERS AND PAVEMENT AREAS AS REQUIRED FOLLOWING COMPLETION OF CONSTRUCTION.
8. THE EXACT SCHEDULE OF SOIL EROSION AND SEDIMENTATION CONTROL EVENTS (WITH DAYS AND/OR DATES OF THE VARIOUS ACTIVITIES) SHALL BE SUBMITTED TO (WAYNE COUNTY DEPARTMENT OF ENVIRONMENT, AND LAND RESOURCE MANAGEMENT DIVISION) BY THE CONTRACTOR, FOR REVIEW AND APPROVAL, PRIOR TO OBTAINING A PERMIT.

REV#	DATE	DESCRIPTION	BY

NOT VALID FOR CONSTRUCTION UNLESS SIGNED AND DATED:

WADE TRIM
25251 Northline Rd.
P.O. Box 135
Taylor, MI 48180
734.947.9700
www.wadetrim.com

CITY OF PLYMOUTH
201 SOUTH MAIN STREET
PLYMOUTH, MICHIGAN 48170

STANDARD SOIL EROSION AND SEDIMENTATION CONTROL DETAILS (SE-1)

ISSUED FOR: DATE: BY:

JOB NO. -

SHEET SE-1

STANDARD SOIL EROSION AND SEDIMENTATION CONTROL DETAILS (SE-1 OF 1)

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PROJECT MANAGER: -
FIELD BOOK INFORMATION: -
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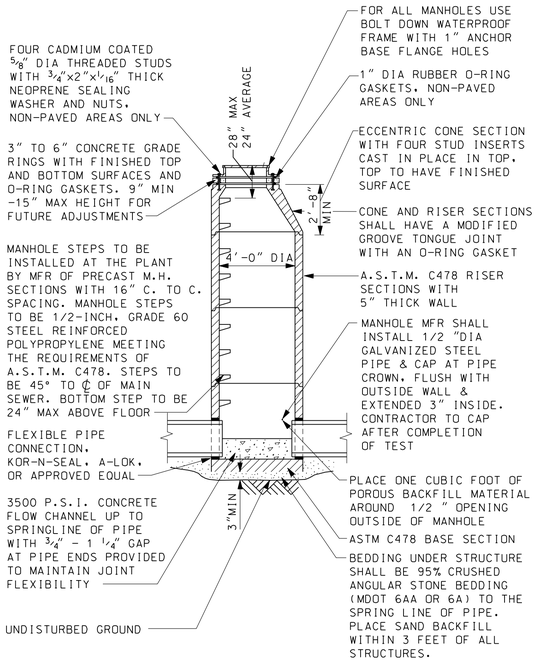
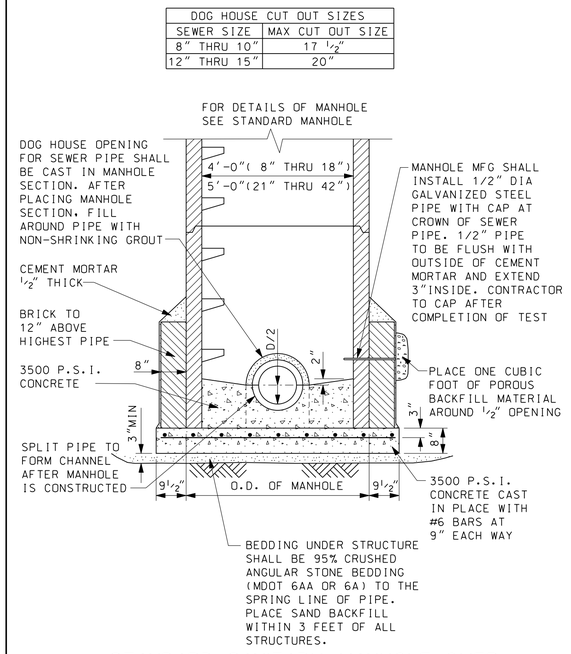
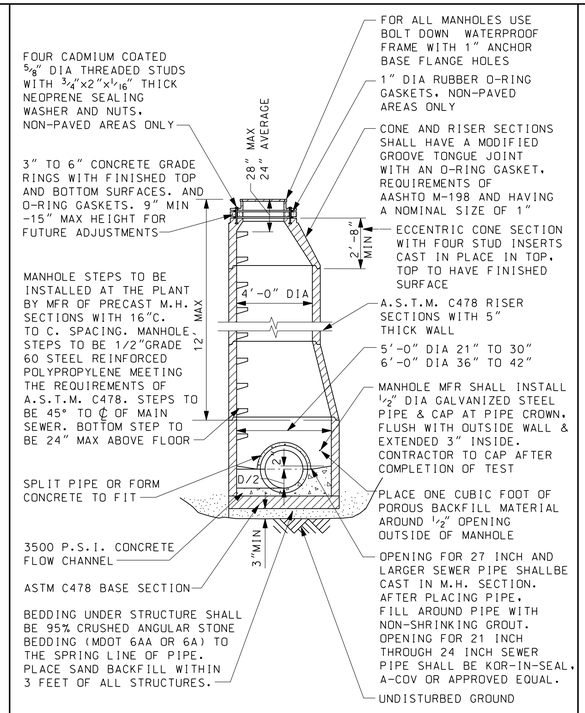


STANDARD SANITARY MANHOLE
FOR SEWERS 8" THROUGH 18"

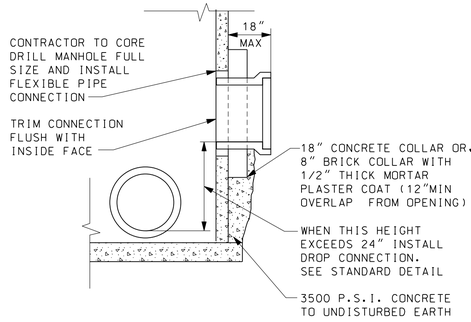
DOG HOUSE CUT OUT SIZES	
SEWER SIZE	MAX CUT OUT SIZE
8" THRU 10"	17 1/2"
12" THRU 15"	20"



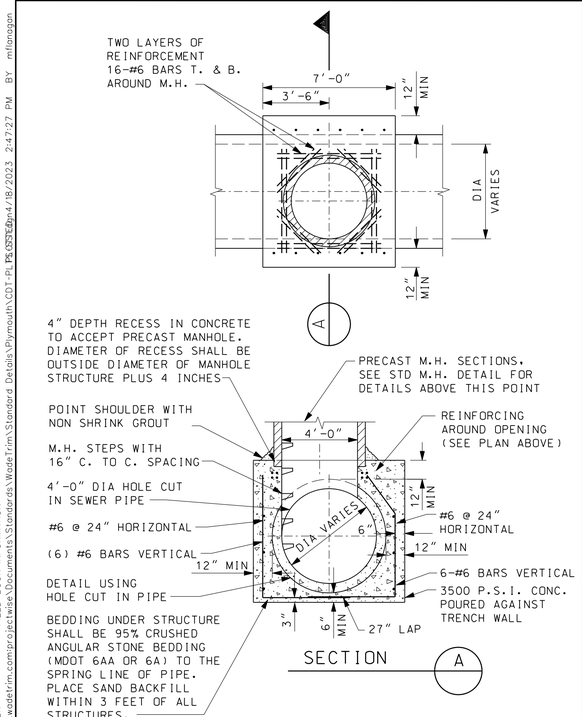
STANDARD SANITARY MANHOLE OVER
EXISTING SEWERS 8" THROUGH 42"



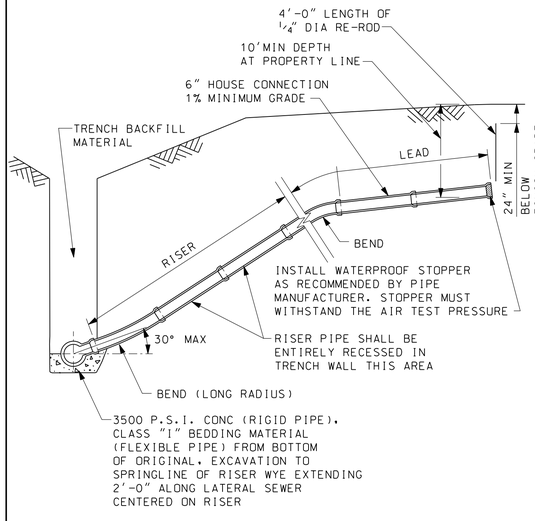
STANDARD SANITARY MANHOLE
FOR SEWERS 21" THROUGH 42"



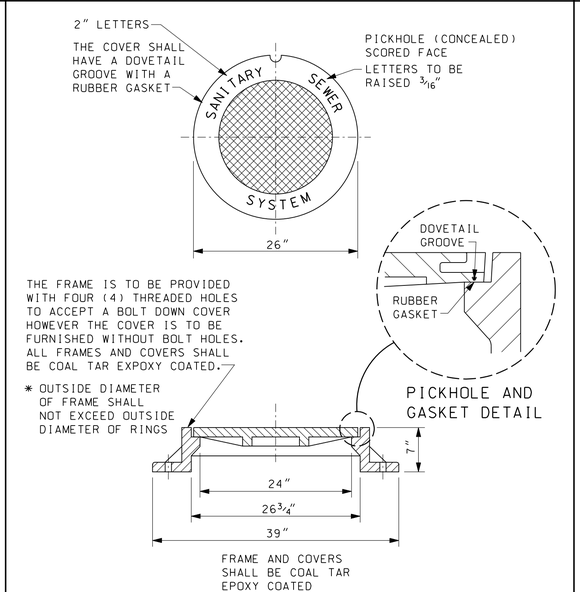
STANDARD CONNECTION TO EXISTING
MANHOLE (WCD-7)



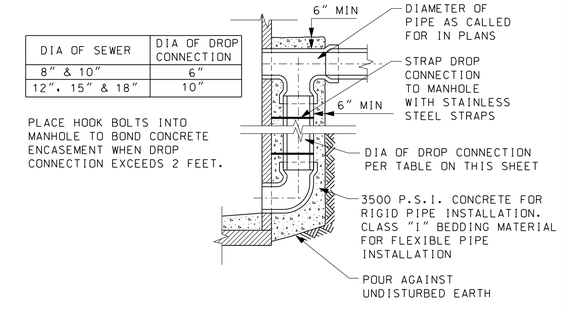
STANDARD SANITARY MANHOLE
FOR 48" & LARGER SEWERS



RISER/LEAD DETAIL



STANDARD FRAME AND COVER



DIA OF SEWER	DIA OF DROP CONNECTION
8" & 10"	6"
12", 15" & 18"	10"

EXTERIOR DROP CONNECTION

REV#	DATE	DESCRIPTION	BY

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WADE TRIM
25251 Northline Rd.
Taylor, MI 48180
734.947.9700
www.wadetrim.com

CITY OF PLYMOUTH
201 SOUTH MAIN STREET
PLYMOUTH, MICHIGAN 48170

STANDARD SANITARY SEWER DETAILS (SS-1)

ISSUED FOR: DATE: BY:

JOB NO. -

SHEET SS-1

STANDARD SANITARY SEWER DETAILS (SS-1 OF 2)

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SANITARY SEWER NOTES

1. ALL SEWER SYSTEM CONSTRUCTION SHALL CONFORM TO THE CURRENT STANDARDS AND GENERAL SPECIFICATION OF THE COMMUNITY SEWER DEPARTMENT AND ANY OTHER AGENCY HAVING JURISDICTION OF THE CONSTRUCTION AREA.
2. DETAILS ARE FOR STRUCTURES WITH NO MORE THAN TWO PIPES ENTERING, 180° APART. LARGER DIAMETER STRUCTURES MAY BE REQUIRED FOR DIFFERENT CONFIGURATIONS.
3. THE MANHOLE STRUCTURE REQUIRES A MINIMUM OF 8 INCHES OFCONCRETE WALL BETWEEN PIPE OPENINGS. LARGER DIAMETER STRUCTURES MAY BE REQUIRED WHERE PIPE ENTERING THE STRUCTURE ARE LESS THAN 90° APART IN ANY DIRECTION.
4. CONSTRUCTION SHALL NOT COMMENCE WITHOUT A REPRESENTATIVE OF THE OWNER PRESENT.
5. ALL MANHOLES SHALL USE ECCENTRIC CONES PLACED WITH STEPS AWAY FROM THE ROAD UNLESS DIRECTED OTHERWISE.
6. ALL MANHOLES SHALL BE PROVIDED WITH WATER TIGHT MANHOLE COVERS AND RIMS SHALL BE SET TO GRADE OR AS INDICATED ON THE PLANS.
7. ALL PRECAST PRODUCTS SHALL CONFORM TO THE REQUIRMENTS OF ASTM C-478.
8. DIFFERENTIAL OF EXCAVATION AROUND EXISTING MANHOLES SHALL NOT EXCEED SIX FEET.
9. EXTERIOR DROP CONNECTIONS ARE REQUIRED WHENEVER A SEWER INVERT IS 2.0 FEET OR GREATER ABOVE THE MANHOLE FLOW CHANNEL INVERT. INTERIOR DROP CONNECTIONS ARE NOT ALLOWED.
10. NO SEWERS SHALL BE CONSTRUCTED LESS THAN 10-INCH DIAMETER WITHOUT SPECIFIC APPROVAL OF THE COMMUNITY SEWER DEPARTMENT.
11. ALL RIGID SANITARY SEWER PIPE SHALL BE CLASS "R-B" BEDDING. ALL FLEXIBLE PIPE SHALL BE CLASS "F-I" BEDDING. UNLESS OTHERWISE NOTED ON THE PLANS. SEE SHEET MD1.
12. PLACE ONE 6-INCH WYE FOR EACH LOT OR PARCEL 100 FEET OR LESS IN WIDTH OR EVERY 100 FEET FOR LOTS OR PARCELS IN EXCESS OF 100 FEET ON SANITARY SEWERS UNLESS OTHERWISE NOTED.
13. NO CONNECTION RECEIVING STORM WATER, SURFACE WATER, OR GROUND WATER SHALL BE MADE TO SANITARY SEWERS.
14. NO FOOTING DRAINS SHALL BE CONNECTED TO THE BUILDINGS SANITARY SEWER.
15. RISERS ON SANITARY SEWERS SHALL BE INSTALLED TO A DEPTH OF 10 FEET WHERE SEWER IS OVER 12 FEET.
16. PRIOR TO THE BACKFILLING OF A SERVICE LEAD, A 2" BY 2" PIECE OF WOOD SHALL BE PLACED FROM A POINT IMMEDIATELY IN FRONT OF THE SERVICE CONNECTION TO 2-FOOT BELOW THE FINISH GROUND SURFACE. DO NOT REST THE MARKER ON ANY PORTION OF THE SERVICE CONNECTION OR STOPPER.

SANITARY SEWER NOTES
CONTINUED

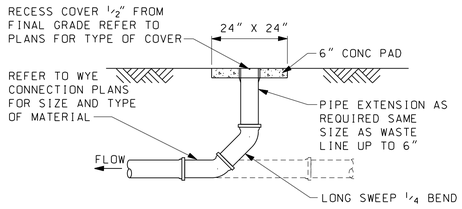
17. ALL STUBS SHALL HAVE A WATER TIGHT BULKHEAD.
18. INFILTRATION FOR ANY SECTION OF SEWERS BETWEEN MANHOLES SHALL NOT EXCEED 100 GALLONS PER INCH DIAMETER PER MILE OF SEWER PER 24 HOURS AND SHALL INCLUDE THE INFILTRATION FROM ALL MANHOLES AND OTHER APPURTENANCES.
19. ALL SEWERS SHALL BE SUBJECTED TO AIR, INFILTRATION OR EXFILTRATION TESTS, OR A COMBINATON OF SAME, PRIOR TO ACCEPTANCE. ALL SEWERS OVER 24-INCH DIAMETER SHALL BE SUBJECTED TO INFILTRATION TESTS. ALL SEWERS OF 24-INCH DIAMETER OR SMALLER, WHERE THE GROUND WATER LEVEL ABOVE THE TOP OF THE SEWER IS OVER SEVEN FEET, SHALL BE SUBJECTED TO INFILTRATION TESTS. ALL SEWERS OF 24-INCH DIAMETER OR LESS, WHERE THE GROUND WATER LEVEL ABOVE THE TOP OF THE SEWER IS SEVEN FEET OR LESS, SHALL BE SUBJECTED TO AIR TESTS OR EXFILTRATION TESTS.
20. THE PROCEDURE FOR AIR TESTING OF SEWERS SHALL BE IN ACCORDANCE WITH ASTM C828, ASTM C924, OR ASTM F1417 AS APPLICABLE.
21. NINE POINT MANDREL TEST IS REQUIRED FOR ALL FLEXIBLE PIPES AND MAY NOT BE PERFORMED UNTIL 30 DAYS AFTER INSTALLATION.
22. IF A SEWER FAILS TO PASS ANY OF THE PREVIOUSLY DESCRIBED TESTS, THE CONTRACTOR SHALL DETERMINE THE LOCATION OF THE LEAKS, REPAIR THEM, AND RETEST THE SEWER. THE TEST SHALL BE REPEATED UNTIL SATISFACTORY RESULTS ARE OBTAINED. TELEVISION INSPECTION SHALL BE CONSIDERED COMPLETED WHEN THE NECESSARY CONSTRUCTION REPAIRS HAVE BEEN MADE AND THE INSTALLATION RETELEVISED AND THE SYSTEM IS ACCEPTABLE FOR THE TESTING PHASE.
23. THE CONTRACTOR SHALL PROVIDE FOR TELEVISION INSPECTION OF THE SANITARY SEWER LINES. ALL SANITARY LEADS FOR COMMERCIAL AND INDUSTRIAL SITES OVER 100 FEET IN LENGTH MUST BE AIR TESTED AND TELEVISION INSPECTION COMPLETED.
24. ALL SEWER SHALL BE TELEVISED, WITH RESULTS APPROVED BY THE COMMUNITY PRIOR TO PLACING THE SEWER IN SERVICE. COPIES OF THE TELEVISION RECORDING (DVD FORMAT) NEED TO GO TO THE COMMUNITY AND THE ENGINEER PRIOR TO THE CONTRACTOR LEAVING THE SITE. THE TELEVISION INSPECTION MUST BE WITNESSED BY THE OWNERS REPRESENTATIVE.
25. THE CONTRACTOR SHOULD ARRANGE FOR, ENGAGE, AND PLAY ALL EXPENSES INVOLVED FOR THE SERVICES OF A COMPETENT COMPANY TO PERFORM THIS TELEVISION INSPECTION.
26. THE TELEVISION INSPECTION SHALL BE OBERVED BY REPRESENTATIVES OF THE OWNER, ENGINEER, AND THE CONTRACTOR. ANY TELEVISION VIEWING PERFORMED IN THE ABSENCE OF THE ENGINEER WILL NOT BE CONSIDERED AS A PART OF THE FINAL INSPECTION.

SANITARY SEWER NOTES
CONTINUED

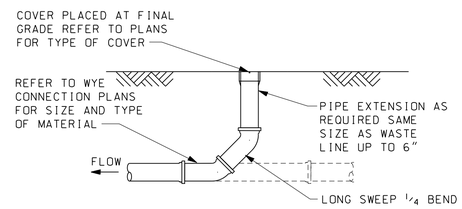
27. THE INSPECTION SHALL INVOLVE THE VISUAL OBSERVATION BY CLOSED CIRCUIT TELEVISION OF ALL SANITARY SEWER INSTALLED AS PART OF THIS CONTRACT. THE INSPECTION SHALL BE PERFORMED AT A RATE OF SPEED WHICH WILL ALLOW EXAMINATION OF ALL POINTS OF INFILTRATION, CRACKED OR CRUSHED PIPE, DEFECTIVE JOINTS, MISALIGNMENT IN LINE OR GRADE, LOCATION OF ALL WYE OPENINGS AND ANY DEFECTS OR ITEMS OF POOR WORKMANSHIP WHICH MAY APPEAR. ANY ITEMS WHICH, IN THE OPINION OF THE ENGINEER, REQUIRE REPAIR SHALL BE PRECISELY LOCATED AND PHOTOGRAPHED ALONG WITH A DETAILED STATEMENT OF THE CONDITION. THE CONTRACTOR SHALL TAKE IMMEDIATE ACTION TO REPAIR ALL SUCH DEFECTS INCLUDING EXCESSIVE INFILTRATION AT ANY SPECIFIC LOCATION. EVEN THOUGH THE INFILTRATION LIMITS AS HEREIN SPECIFIED HAVE NOT BEEN EXCEEDED FOR THE ENTIRE LENGTH OF SEWER BEING INSPECTED. FOLLOWING COMPLETION OF THE REPAIR, THE ENGINEER AT THEIR DISCRETION, MAY REQUIRE A SECOND TELEVISION INSPECTION OF ANY REPAIRED AREAS. THE CONTRACTOR SHALL ARRANGE FOR AND PAY ALL COSTS INVOLVED IN PERFORMING THIS RE-INSPECTION.
28. THERE SHALL BE NO DISCHARGE OF UNTREATED SANITARY SEWAGE TO THE SURFACE WATERS OF THE STATE DUE TO CONSTRUCTION ACTIVITIES ASSOCIATED WITH THIS PROJECT.
29. CONTRACTOR SHALL NOTIFY WAYNE COUNTY DEPARTMENT OF PUBLIC SERVICES, ENGINEERING DIVISION, PERMIT OFFICE, 48 HOURS PRIOR TO START OF CONSTRUCTION [(734) 595-6504 X 2009], IF THE CONSTRUCTION IS WITHIN A WAYNE COUNTY RIGHT-OF-WAY.

PLYMOUTH NOTES

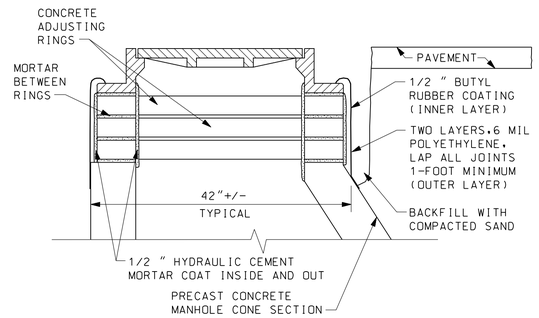
1. THE SANITARY SEWER PIPE IS TO BE ASTM C-76 CL-IV R.C.P. OR C-700 E.S. V.C.P. OR FOR INDUSTRIAL USE AND PVC TRUSS WITH RUBBER GASKET JOINTS OR ABS TRUSS MEETING ASTMD2680 FOR RESIDENTIAL/COMMERCIAL USE.
2. THE 6-INCH SANITARY LEAD WILL BE C-700 E.S. V.C.P. FOR INDUSTRIAL USE OR SDR 23.5 FOR RESIDENTIAL/COMMERCIAL USE.
3. BULKHEADS ARE TO BE PLACED IN THE EXISTING SEWERS AND WHERE THE NEW SEWER WILL CONNECT TO IT. THE BULKHEADS ARE NOT TO BE REMOVED UNTIL THE SEWERS HAVE BEEN ACCEPTED BY THE CITY OF PLYMOUTH.



CLEAN - OUT
(LOCATED IN PAVED AREA)



CLEAN - OUT
(LOCATED IN GREENBELT AREA)



* OUTSIDE DIAMETER OF FRAME SHALL NOT EXCEED OUTSIDE DIAMETER OF RINGS

NOTE:
THIS DETAIL TO BE USED IN CONCRETE OR BITUMINOUS PAVED AREAS. ALL OTHER AREAS SHALL USE BOLT DOWN FRAMES WITH RUBBER O-RINGS AS SHOWN ON MANHOLE DETAILS.

EXTERNAL FRAME SEAL DETAIL
FOR PAVED AREAS ONLY

REV#	DATE	DESCRIPTION	BY

NOT VALID FOR CONSTRUCTION UNLESS SIGNED AND DATED:

WADE TRIM
25251 Northline Rd.
P.O. Box 135
Taylor MI 48180
734.947.9700
www.wadetrim.com

CITY OF PLYMOUTH
201 SOUTH MAIN STREET
PLYMOUTH, MICHIGAN 48170

STANDARD SANITARY SEWER DETAILS (SS-2)

ISSUED FOR: DATE: BY:

JOB NO. -

SHEET SS-2

STANDARD SANITARY SEWER DETAILS (SS-2 OF 2)

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FIELD BOOK INFORMATION: -
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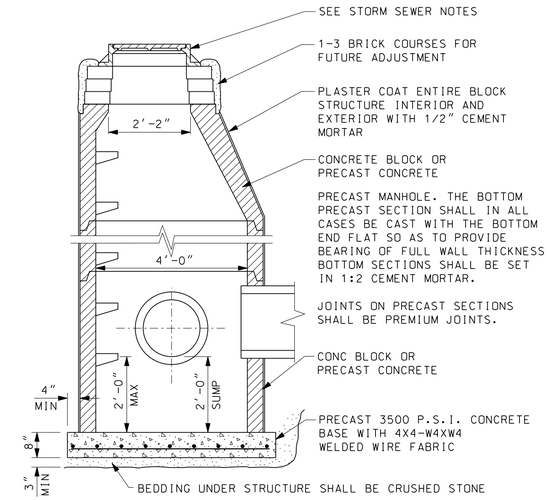


M.H. STEPS SHALL BE SPACED AS FOLLOWS:
CONC BLK. M.H.....18" CENTERS
PRECAST M.H. .....16" CENTERS

TOP STEP TO BE 24" MAX BELOW TOP OF FRAME

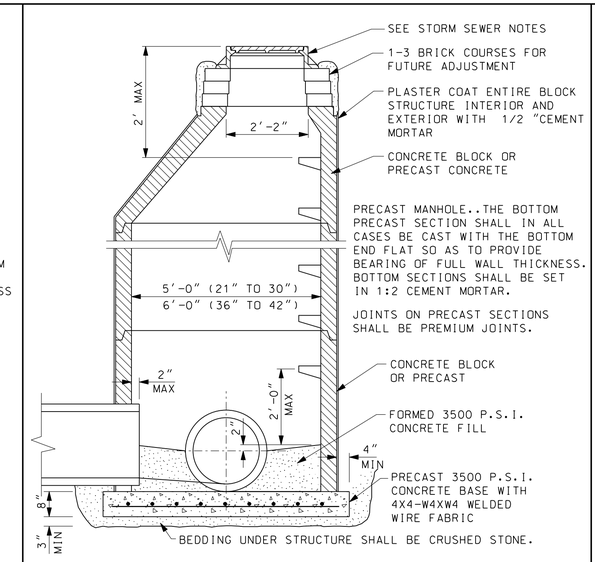
MIN CONE HEIGHTS AS FOLLOWS:
BLOCK CONCENTRIC 3'-0"
PRECAST ECCENTRIC 2'-8" OR 3'-4"

CONC BLOCK MANHOLE:
APPROVED CONC BLODK USE 6" OR 8" MIN THICK BLOCK TO 16' DEPTH USE 12" MIN THICK BLOCK TO 24' DEPTH 16" MIN BLOCK WALL BELOW 24' DEPTH

PRECAST MANHOLE:
ASTM C-478 UP TO 32' DEEP WITH 5" MIN THICK WALL

STANDARD STORM MANHOLE FOR SEWERS WITH OUTLETS OF 18" & UNDER

N.T.S.



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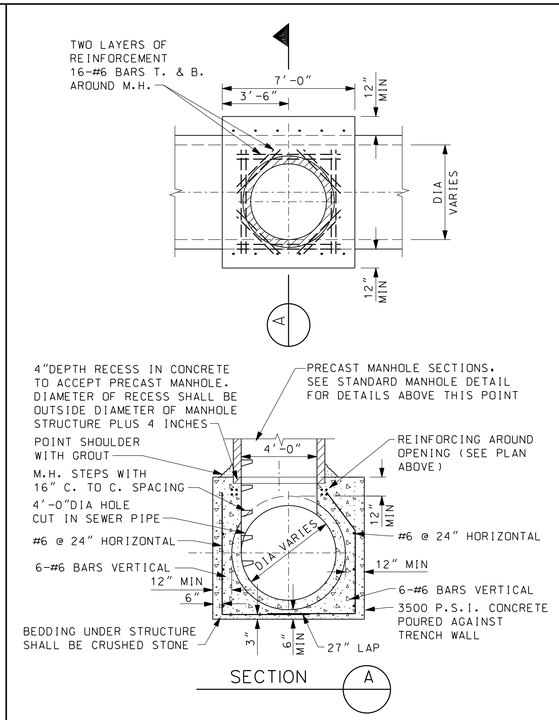
PRECAST MANHOLE:
ASTM C-478 UP TO 32' DEEP WITH 5" MIN THICK WALL

STANDARD STORM MANHOLE FOR SEWERS 21" TO 42"

N.T.S.



STANDARD STORM MANHOLE FOR 48" & LARGER SEWERS

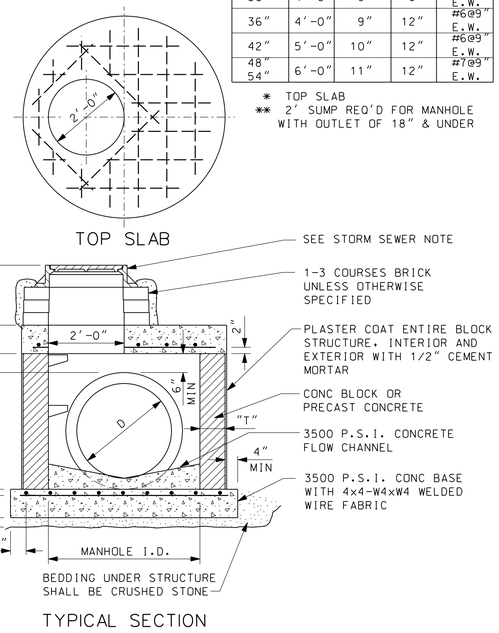
N.T.S.

STORM SEWER NOTES

1. ALL STORM SEWER CONSTRUCTION SHALL CONFORM TO THE CURRENT STANDARDS AND GENERAL SPECIFICATION OF THE AGENCY OR AGENCIES HAVING JURISDICTION OF THE STORM SEWER AND CONSTRUCTION AREA.
2. DETAILS ARE FOR STRUCTURES WITH NO MORE THAN TWO PIPES, 180° APART. LARGER DIAMETER STRUCTURES MAY BE REQUIRED FOR DIFFERENT CONFIGURATIONS.
3. ALL STRUCTURES REQUIRE A MINIMUM OF 8-INCHES OF WALL BETWEEN PIPE OPENINGS. LARGER DIAMETER STRUCTURES MAY BE REQUIRED WHERE PIPE ENTERING THE STRUCTURE ARE LESS THAN 90° APART IN ANY DIRECTION.
4. ALL CASTING RIMS SHALL BE SET TO GRADE OR AS SHOWN ON THE PLANS.
5. NO MANHOLES OR OTHER STRUCTURES MAY BE INSTALLED WITHIN DRIVEWAYS, DRIVE APPROACHES, OR SIDEWALKS.
6. ALL CATCH BASIN STORM PIPE SHALL BE 12-INCH DIAMETER C76, CL-IV CONCRETE UNLESS OTHERWISE NOTED.
7. MANHOLE STEPS TO BE GRAY IRON OR STEEL REINFORCED POLYPROPYLENE ASTM 2146, TYPE II, GRADE 49108.
8. CATCH BASIN AND INLET FRAME AND COVERS SHALL BE SPECIFIED AS FOLLOWS:
   A. WHEN LOCATED IN PAVEMENT GUTTER LINE, FRAME AND COVER SHALL BE E.J.I.W. NO. 5080, NEENAH R-3448-C TYPE "A" (RECTANGULAR), OR EQUIV.
   B. WHEN LOCATED IN PAVED AREAS OTHER THAN GUTTER LINE, FRAME SHALL BE E.J.I.W. NO. 1040 WITH TYPE "M1" COVER, NEENAH R-2370 TYPE "G" COVER, OR EQUIV.
   C. WHEN LOCATED IN YARD AREAS, FRAMES SHALL BE E.J.I.W. NO. 1000 WITH TYPE "N" OR "M" COVER, NEENAH R-2370 TYPE "D" OR "B" COVER, OR EQUIV.
9. MANHOLE FRAME AND COVER SHALL BE E.J.I.W. NO. 1040 OR NEENAH R-1642 WITH SOLID COVER OR EQUAL.
10. DIFFERENTIAL OF EXCAVATION AROUND EXISTING MANHOLES SHALL NOT EXCEED SIX FEET.
11. PLACE SAND BACKFILL WITHIN THREE FEET OF ALL STRUCTURES.
12. ALL STORM SEWER PIPE SHALL HAVE CLASS "R-B" BEDDING UNLESS OTHERWISE NOTED ON THE PLANS. SEE SHEET MD1 FOR BEDDING DETAILS.
13. ALL PRECAST PRODUCTS SHALL CONFORM TO THE REQUIREMENTS OF ASTM C-478.
14. ALL DRAINAGE STRUCTURES LOCATED WITHIN PAVEMENT MUST HAVE UNDER DRAIN AS SHOWN.

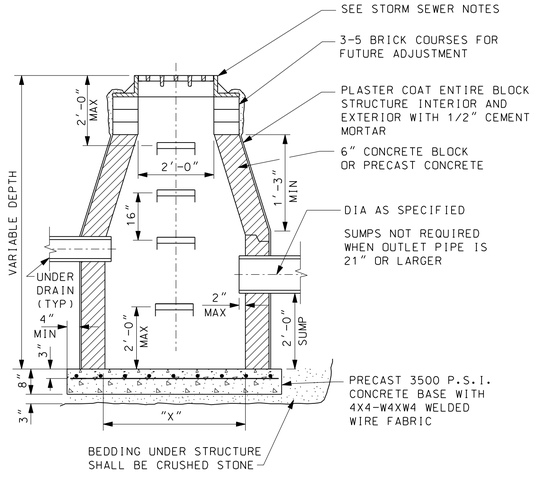
OUTLET "D"	M.H. I.D.	TOP SLAB"T"	WALLS "T"	REINF STEEL
** 24" OR LESS	4'-0"	9"	8"	#6@9"* E.W.
30"	4'-0"	9"	8"	#6@9" E.W.
36"	4'-0"	9"	12"	#6@9" E.W.
42"	5'-0"	10"	12"	#6@9" E.W.
48" 54"	6'-0"	11"	12"	#7@9" E.W.

* TOP SLAB
** 2' SUMP REQ'D FOR MANHOLE WITH OUTLET OF 18" & UNDER



TYPICAL MANHOLE/ CATCH BASIN "D"

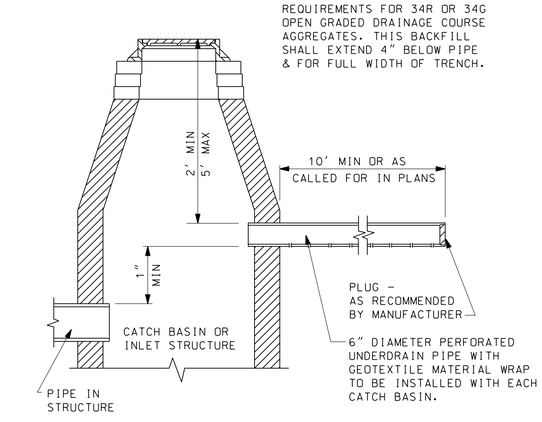
N.T.S.



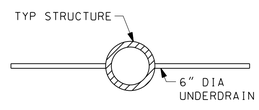
DIAMETER OF OUTLET PIPE	"X" INSIDE DIA.
12"-18"	4'-0" MIN
21"-30"	5'-0" MIN

NOTE:
MINIMUM OF TWO-10' LONG 6"DIA. PERFORATED UNDERDRAIN PIPE WITH GEOTEXTILE MATERIAL WRAP TO BE INSTALLED WITH EACH CATCH BASIN SEE UNDERDRAIN DETAIL FOR INSTALLATION AND MATERIAL REQUIREMENTS.

STANDARD CATCH BASIN

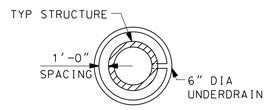


STANDARD UNDERDRAIN



TYPICAL UNDERDRAIN PARALLEL W/CURB

N.T.S.



TYPICAL UNDERDRAIN IN PARKING LOT

N.T.S.

PLYMOUTH NOTES

1. STORM SEWER THAT IS 12 INCHES AND LARGER SHALL BE C-76 R.C.P. WITH PREMIUM JOINTS.
2. THE REAR YARD STORM PIPE WHICH DOES NOT TRAVERSE PAVED AREAS MAY BE 8-INCH DIAMETER SOLID WALL, PVC OR ABS TRUSS OR PVC TRUSS PIPE.
3. BACKFILL FOR ALL REAR YARD STORM IS TO BE NATURAL BANK RUN SAND MDOT CL-II GRANULAR MATERIAL OR 3/4 INCH CRUSHED STONE TO A MINIMUM OF 12 INCHES OVER PIPE.
4. EVERY LOT IS TO HAVE DIRECT ACCESS TO A DRAINAGE STRUCTURE.
5. THE STORM SEWER WILL NOT BE CONSIDERED SUBSTANTIALLY COMPLETE UNTIL THE DETENTION POND HAS BEEN COMPLETED. THIS INCLUDES FINAL GRADING OF THE POND AND STABILIZATION OF THE SIDE SLOPES. THE SIDE SLOPES MUST BE STABI- LIZED BY SODDING OR BY PLACING A MULCH BLANKET PEGGED IN PLACE OVER SEED.
6. COVER FOR ON-LINE CATCH BASIN SHALL BE EJIW 1000 SERIES WITH TYPE N COVER OR NEENAN 2077-B WITH TYPE B COVER.
7. SUMP PUMP LEADS ARE TO BE A MINIMUM OF 3-INCH SCHEDULE 30 PVC.

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CITY OF PLYMOUTH
201 SOUTH MAIN STREET
PLYMOUTH, MICHIGAN 48170

STANDARD STORM SEWER DETAILS (ST-1)

ISSUED FOR: DATE: BY:

JOB NO. -

SHEET ST-1

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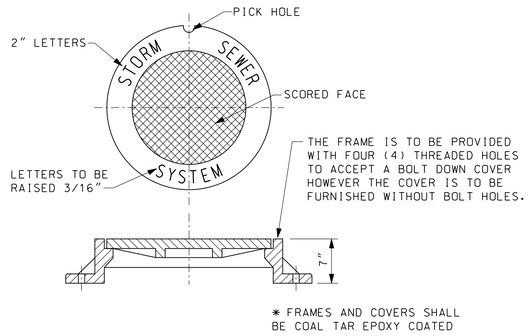
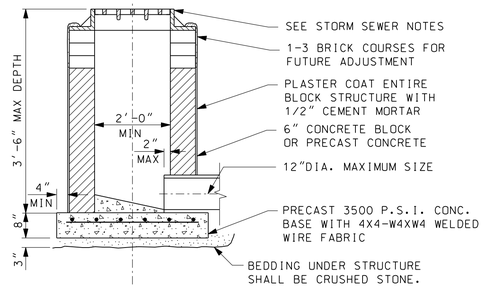
pw:\\WTPWNT16.wadetrim.com:projectwise\Documents\Standards\WadeTrim\Standard Details\Plymouth\CD7-PLS.DGN 4/18/2023 2:49:47 PM BY mfionagan



STANDARD MANHOLE FRAME AND COVER

N.T.S.



STANDARD INLET

N.T.S.

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201 SOUTH MAIN STREET
PLYMOUTH, MICHIGAN 48170

STANDARD STORM SEWER DETAILS (ST-2)

ISSUED FOR: DATE: BY:

JOB NO.
PLY2101-02T

SHEET
ST-2

STANDARD STORM SEWER DETAILS (ST-2 OF 2)

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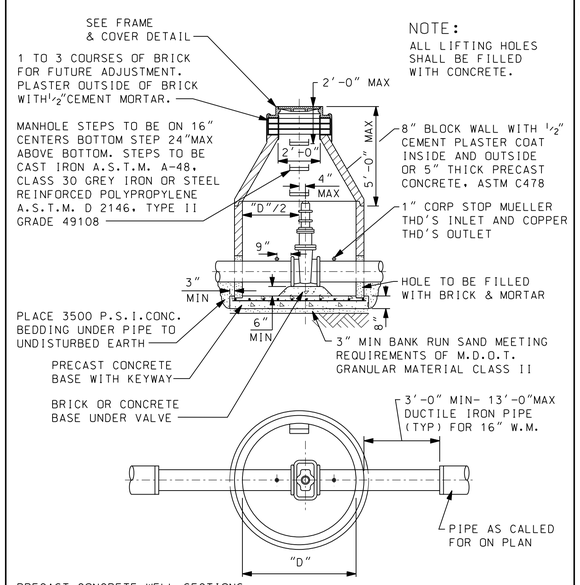
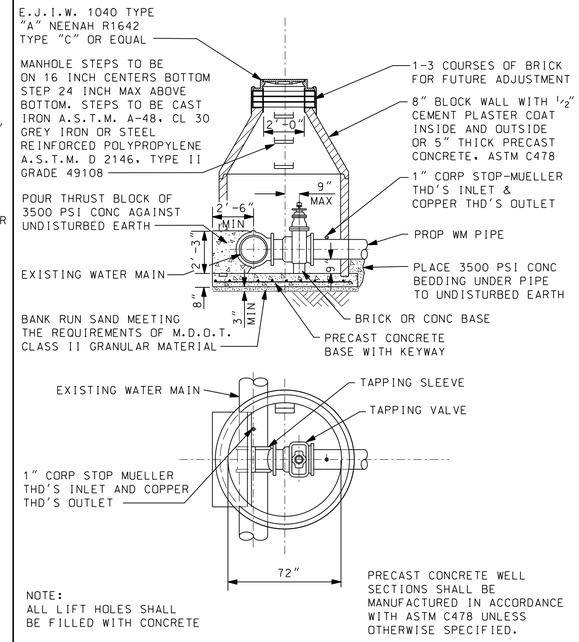
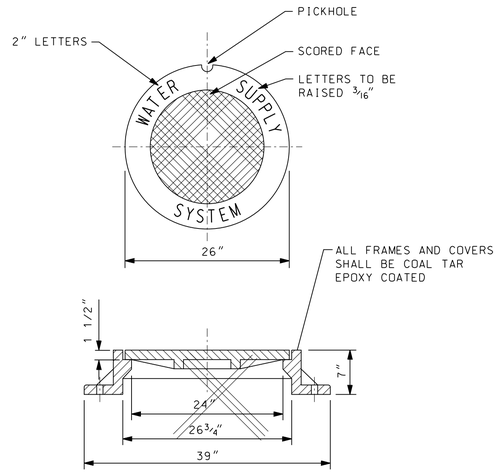


STANDARD GATE WELL
N.T.S.

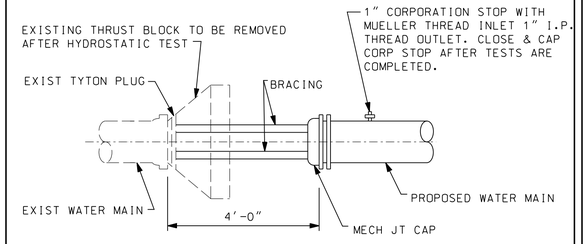


STANDARD TAPPING SLEEVE, VALVE & WELL
N.T.S.

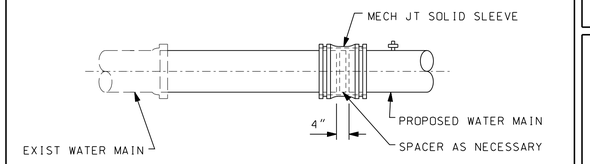


E.J.I.W. #1040, TYPE "A"
NEENAH #R1642, TYPE "C"
OR EQUAL

STANDARD FRAME AND COVER
N.T.S.



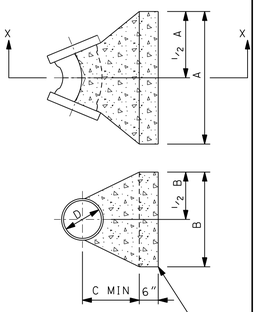
TEMPORARY ARRANGEMENT FOR HYDROSTATIC TEST



NOTE:
ALL JOINTS NOT SUBJECTED TO HYDROSTATIC TEST SHALL BE OBSERVED UNDER LINE PRESSURE TO ASSURE WATER TIGHTNESS.

COMPLETED CONNECTION TO EXIST WATER MAIN
N.T.S.

DIA OF WATER MAIN	THRUST BLOCK		
D	A	B	C
6"	2'-0"	1'-6"	1'-0"
8"	2'-0"	2'-0"	1'-3"
10" & 12"	3'-6"	2'-6"	1'-6"
14" & 16"	5'-6"	3'-0"	1'-9"
18" & 20"	6'-6"	4'-0"	1'-9"
24"	7'-0"	5'-0"	2'-0"

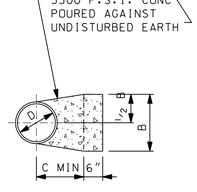


NOTE:
WHEN "A" DIMENSION IS 6'-0" OR GREATER, USE #4 BARS AT 12" CENTERS EACH WAY.

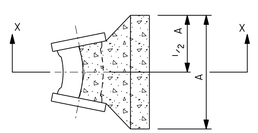
THRUST BLOCK AT 30° & 45° BEND

SEC X-X

DIA OF WATER MAIN	THRUST BLOCK		
D	A	B	C
6"	1'-6"	1'-0"	1'-0"
8"	1'-9"	1'-3"	1'-0"
10" & 12"	3'-0"	1'-6"	1'-3"
14" & 16"	4'-0"	2'-0"	1'-6"
18" & 20"	4'-0"	3'-0"	1'-9"
24"	4'-0"	4'-6"	2'-0"

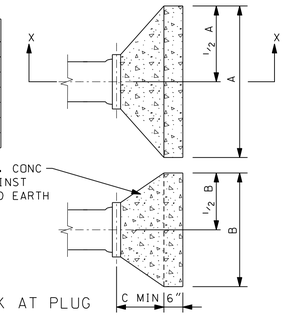


SEC X-X



THRUST BLOCK AT 22 1/2° BEND
N.T.S.

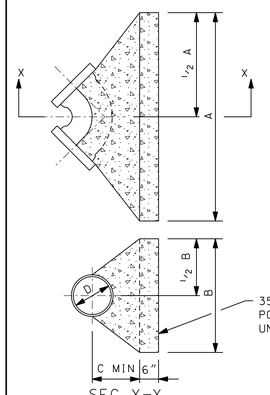
DIA OF WATER MAIN	THRUST BLOCK		
D	A	B	C
6"	2'-0"	1'-6"	9"
8"	2'-6"	2'-0"	1'-0"
10" & 12"	4'-0"	3'-0"	1'-3"
14" & 16"	5'-0"	4'-0"	1'-6"
18" & 20"	8'-0"	4'-0"	1'-9"
24"	9'-0"	5'-0"	2'-0"



NOTE:
WHEN "A" DIMENSION IS 6'-0" OR GREATER, USE #4 BARS AT 12" CENTERS EACH WAY.

THRUST BLOCK AT PLUG

SEC X-X



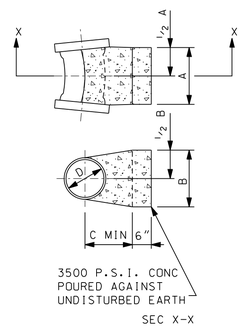
SEC X-X

DIA OF WATER MAIN	THRUST BLOCK		
D	A	B	C
6"	2'-9"	1'-6"	9"
8"	3'-0"	2'-6"	1'-0"
10" & 12"	5'-6"	3'-0"	1'-3"
14" & 16"	6'-0"	5'-0"	1'-6"
18" & 20"	9'-0"	5'-0"	1'-9"
24"	11'-0"	6'-0"	2'-0"

NOTE:
WHEN "A" DIMENSION IS 6'-0" OR GREATER, USE #4 BARS AT 12" CENTERS EACH WAY.

THRUST BLOCK AT 60° & 90° BEND
N.T.S.

DIA OF WATER MAIN	THRUST BLOCK		
D	A	B	C
6"	1'-0"	1'-0"	1'-0"
8"	1'-3"	1'-3"	1'-0"
10" & 12"	1'-6"	1'-6"	1'-3"
14" & 16"	2'-0"	2'-0"	1'-6"
18" & 20"	3'-1"	2'-0"	1'-9"
24"	3'-0"	3'-0"	2'-0"

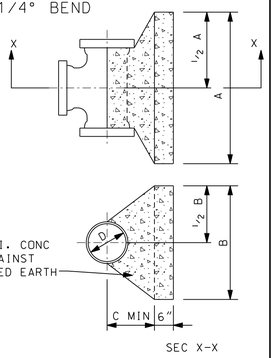


SEC X-X

NOTE:
THESE TABLES ARE BASED ON SOIL BEARING OF 1500 P.S.F. IN MUCK, PEET OR OTHER UNSUITABLE SOILS HAVING A SOIL BEARING LESS THAN 1500 P.S.F., THE CONTRACTOR SHALL PROVIDE SUITABLE ADDITIONAL BLOCKING, ENCASEMENTS OR RESTRAINTS, BLOCKING IN BORE PIT EXCAVATIONS SHALL BE AGAINST UNDISTURBED SOIL OR SHALL BE PROVIDED WITH RESTRAINTS AS REQUIRED.

THRUST BLOCK AT 11 1/4° BEND

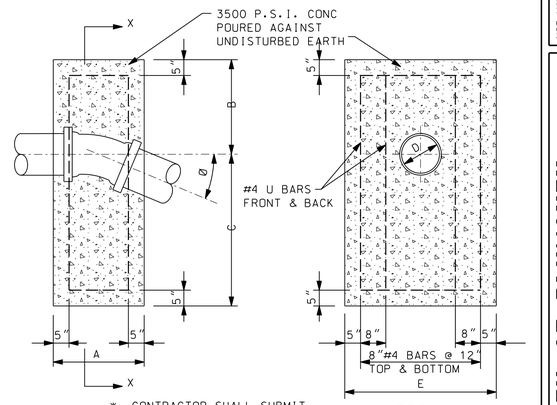
DIA OF WATER MAIN	THRUST BLOCK		
D	A	B	C
6"	2'-0"	1'-6"	9"
8"	2'-6"	2'-0"	1'-0"
10" & 12"	4'-0"	3'-0"	1'-3"
14" & 16"	5'-0"	4'-0"	1'-6"
18" & 20"	8'-0"	4'-0"	1'-9"
24"	9'-0"	5'-0"	2'-0"



SEC X-X

NOTE:
WHEN "A" DIMENSION IS 6'-0" OR GREATER, USE #4 BARS AT 12" CENTERS EACH WAY.

THRUST BLOCK AT TEE
N.T.S.



SEC X-X

* CONTRACTOR SHALL SUBMIT DETAILS OF RESTRAINED JOINTS TO ENGINEER PRIOR TO USE.

D	Ø	A	B	C	E
6"	22 1/2°	1'-6"	1'-6"	1'-9"	3'-0"
	45°	1'-8"	1'-6"	2'-6"	4'-0"
8"	22 1/2°	2'-0"	1'-6"	2'-6"	4'-0"
	45°	2'-0"	2'-6"	3'-0"	4'-0"
10"	22 1/2°	2'-0"	2'-6"	3'-0"	4'-0"
	45°	2'-3"	2'-6"	4'-0"	5'-0"
12"	22 1/2°	2'-0"	2'-6"	4'-0"	4'-0"
	45°	2'-4"	3'-0"	4'-6"	5'-0"
16"	22 1/2°	2'-2"	3'-0"	4'-6"	5'-0"
	45°	*	*	*	*

ANCHORAGE DETAILS FOR VERTICAL BENDS
N.T.S.

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www.wadetrim.com

CITY OF PLYMOUTH
201 SOUTH MAIN STREET
PLYMOUTH, MICHIGAN 48170

STANDARD WATER MAIN DETAILS (WM-1)

ISSUED FOR: DATE: BY:

JOB NO. -

SHEET WM-1

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PROJECT MANAGER: -
FIELD BOOK INFORMATION: -
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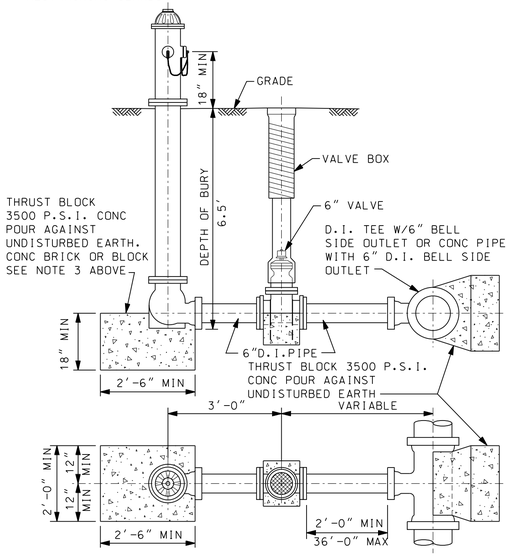
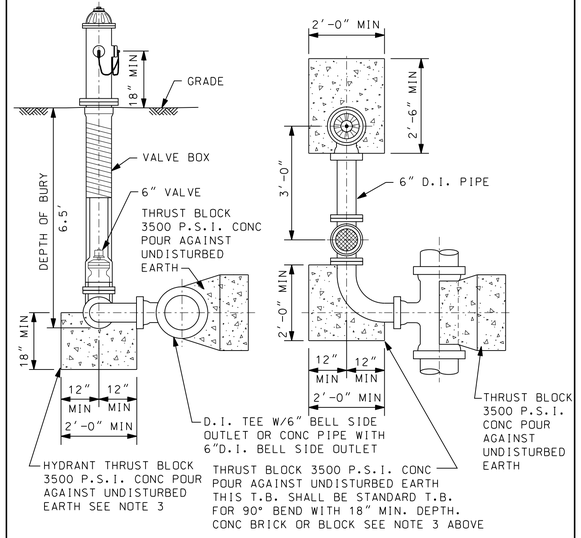
NOTES:
1. INSTALL ADDITIONAL FITTINGS, BENDS & SPIGOT PIPE AS NECESSARY BETWEEN WATER MAIN & VALVE BOX TO ADJUST FOR PROPER LOCATION AND GRADE OF HYDRANT.
2. VERTICAL ANCHORAGES WILL BE REQUIRED ON ALL VERTICAL HYDRANT BENDS IN EXCESS OF 11 1/4°.
3. WHERE HYDRANTS ARE INSTALLED ON EXISTING MAINS THAT ARE TO BE PLACED BACK INTO SERVICE IMMEDIATELY, PLACE CONCRETE BRICK OR BLOCK TO UNDISTURBED EARTH AND ENCASE WITH CONCRETE OR USE RESTRAINING GLANDS.

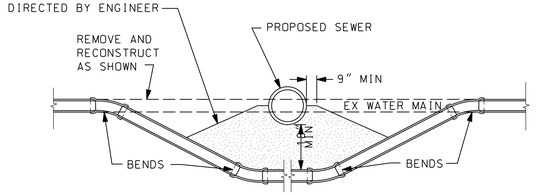


STANDARD FIRE HYDRANT ASSEMBLY "T" TYPE
N.T.S.

NOTES:
1. INSTALL ADDITIONAL FITTINGS & SPIGOT PIPE AS NECESSARY BETWEEN WATER MAIN & VALVE BOX TO ADJUST FOR PROPER LOCATION AND GRADE OF HYDRANT.
2. VERTICAL ANCHORAGES WILL BE REQUIRED ON ALL VERTICAL HYDRANT BENDS IN EXCESS OF 11 1/4°.
3. WHERE HYDRANTS ARE INSTALLED ON EXISTING MAINS THAT ARE TO BE PLACED BACK INTO SERVICE IMMEDIATELY, PLACE CONCRETE BRICK OR BLOCK TO UNDISTURBED EARTH AND ENCASE WITH CONCRETE OR USE RESTRAINING GLANDS.



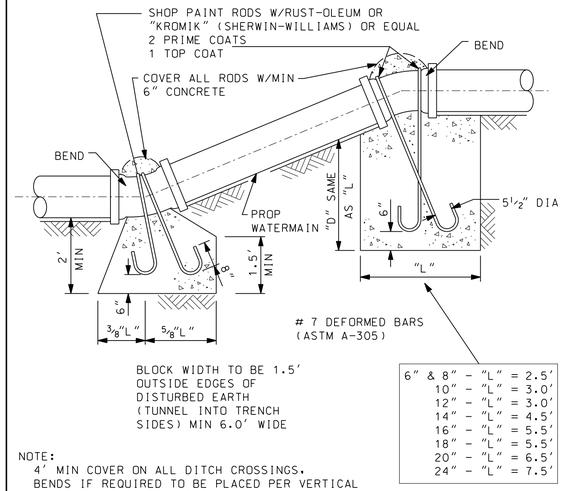
STANDARD FIRE HYDRANT ASSEMBLY CLOSE COUPLE TYPE
N.T.S.



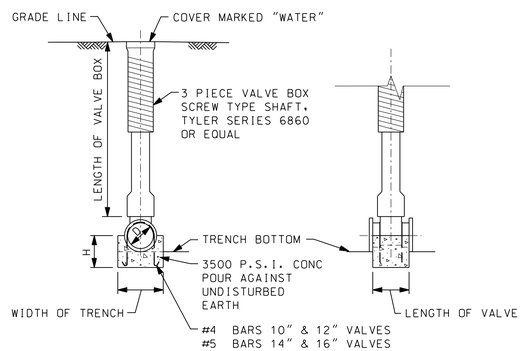
RELOCATION OF WATER MAIN
N.T.S.

WATER MAIN NOTES

1. ALL WATER SYSTEM CONSTRUCTION SHALL CONFORM TO THE CURRENT STANDARDS AND GENERAL SPECIFICATION OF THE AGENCY OR AGENCIES HAVING JURISDICTION OF THE WATER SUPPLY SYSTEM AND CONSTRUCTION AREA.
2. WATER MAINS SHALL NOT BE CONSTRUCTED UNDER SIDEWALKS OR ROAD PAVEMENT AREAS.
3. ALL SURFACE STRUCTURES, SUCH AS HYDRANTS, GATE WELLS AND VALVE BOXES SHALL BE SET TO GRADE OR AS INDICATED ON THE PLANS.
4. FIRE HYDRANTS ARE TO BE INSTALLED PLUMB AND HAVE THEIR NOZZLES AS DETERMINED BY THE ENGINEER.
5. ALL FITTINGS SHALL BE DUCTILE IRON, PRESSURE RATING 350 P.S.I., CONFORMING TO ANSI/AWWA C 153/A21.53 COMPACT FITTINGS WITH DOUBLE THICKNESS CEMENT MORTAR LINING AND COAL TAR ENAMEL COATING INSIDE AND OUTSIDE.
6. GATE WELLS AND OTHER WATER MAIN STRUCTURES SHALL NOT BE CONSTRUCTED IN DRIVEWAYS, DRIVE APPROACHES, OR SIDEWALKS.
7. PROVIDE 7-FOOT MINIMUM COVER BELOW EXISTING PAVEMENT CENTERLINE OR GROUND AT WATER MAIN LOCATION, WHICHEVER IS LOWEST, WHEN PROPOSED WATER MAIN IS WITHIN 32 FEET OF CENTERLINE ON SECTION LINE ROADS, OR WITHIN 19 FEET OF CENTERLINE ON 1/4 LINE ROADS. SEVEN FEET COVER SHALL ALSO BE REQUIRED AT OTHER LOCATIONS AS NOTED ON THE PLAN. PROVIDE 6-FOOT MINIMUM COVER BELOW EXISTING ROAD CENTERLINE OR GROUND AT WATER MAIN LOCATION, WHICHEVER IS LOWEST, AT ALL OTHER LOCATIONS UNLESS OTHERWISE NOTED.
8. PLACE NATURAL BANK RUN SAND BACKFILL WITHIN THREE FEET OF ALL STRUCTURES, INCLUDING VALVE WELLS, FIRE HYDRANTS, ETC.
9. ALL WATER MAIN PIPE SHALL HAVE CLASS III BEDDING UNLESS OTHERWISE NOTED ON THE PLANS. SEE SHEET MD-1.
10. ALL PRECAST PRODUCTS SHALL CONFORM TO THE REQUIREMENTS OF ASTM C-478.
11. CONTRACTOR SHALL BAG ALL NEW FIRE HYDRANTS UNTIL THE WATER MAIN IS ACCEPTED FOR SERVICE.
12. WHEN THE FIRE HYDRANT IS BEING INSTALLED. THE 6-INCH DIAMETER FIRE HYDRANT VALVE SHALL BE INSTALLED IN THE FULL OPEN POSITION.
13. WATER MAIN TO BE PLACED LEVEL THROUGH ALL GATE WELLS.
14. ALL WATER SYSTEM BOLTS ARE TO BE COR-BLUE, MASTIC COATED, OR SPRAY PAINTED WITH UNDER COATING.
15. A FIRE HYDRANT SHOULD BE PLACED AT THE END OF ALL DEAD END WATER MAIN.



VERTICAL REACTION BLOCKING
N.T.S.



SIZE OF PIPE	H
6"	6"
8"	8"
10"	10"
12"	12"

VALVE BLOCK AND BOX DETAIL
N.T.S.

PLYMOUTH NOTES

1. THE TYPE OF PIPE FOR WATER MAIN THREE (3) INCHES IN DIAMETER AND LARGER IS TO BE CLASS 54 DUCTILE IRON PIPE. ONE (1) AND TWO (2) INCH SERVICE LEADS SHALL BE TYPE "K" COPPER.
2. ALL HORIZONTAL FITTINGS SHALL BE PUSH ON TYPE O-RING JOINTS. VERTICAL FITTINGS ARE TO BE MECHANICAL JOINT. BOLTS ARE TO BE COR-BLUE T-BOLT TYPE.
3. ALL VALVES ARE TO ROTATE CLOCKWISE TO OPEN. SIX (6) INCH THROUGH TWELVE (12) INCH DIAMETER GATE VALVES SHALL BE EAST JORDAN - RESILIENT SEAT WEDGE.
4. HYDRANTS SHALL BE EAST JORDAN IRON WORKS 5BR250 TRAFFIC MODEL, DRY BARREL COMPRESSION TYPE CONFORMING TO AWWA C502. UNIT SHALL HAVE A SEAT VALVE AND DOUBLE OPERATING STEM "O" RING SEALS. HYDRANTS SHALL BE 6-FOOT BURY, HAVE A 5-1/4 INCH DIAMETER VALVE OPENING AND 6-INCH MECHANICAL JOINT CONNECTION. TWO, 4-INCH DIAMETER PUMPER NOZZLES SHALL BE PROVIDED. NOZZLE THREADS SHALL BE TO CITY OF DETROIT FIRE DEPARTMENT STANDARDS. HYDRANT SHALL HAVE A 1-1/8-INCH PENTAGON OPERATING NUT AND BE DESIGNED TO OPEN IN A COUNTERCLOCKWISE DIRECTION WITH AN ARROW CAST INTO THE TOP OF THE HYDRANT IN A CLEARLY VISIBLE LOCATION INDICATING THE OPENING DIRECTION.
5. THE CITY'S WATER DEPARTMENT WILL BE THE ONLY AUTHORIZED PERSONNEL TO OPERATE THE VALVES ON THE MAIN LINE.
6. ANY ANGLE POINTS OR BENDS ARE TO BE MARKED AT GRADE LEVEL WITH A 2"x2" BOARD FOR LOCATION PURPOSES.
7. ALL WATER MAIN IS TO BE PLACED LEVEL THROUGH ALL GATE VALVES.
8. WHEN JACKING OR BORING ALL VOIDS SHALL BE FILLED BY MEANS OF PRESSURE GROUTING WITH 1:3 CEMENT SAND MORTAR. WATER MAIN JACKING OR BORING SHALL EXTEND A MINIMUM OF 10-FEET OUTSIDE THE EDGES OF PAVEMENT.
9. HYDRANT LEADS GREATER THAN 10-FEET IN LENGTH FROM THE TRANSMISSION LINE SHALL BE CONSTRUCTED WITH 8-INCH DIAMETER PIPE.
10. NO HYDRANTS SHALL BE LOCATED WITHIN 10-FEET OF ANY ROADWAY OR DRIVEWAY.
11. WATER MAIN SHOWN TAPPING ANY EXISTING LINE UTILIZING AN EQUIVALENT PIPE DIAMETER SHALL BE DONE BY USING A TAPPING SLEEVE WITH THE NEXT SMALLEST DIAMETER AND THEN ENLARGED TO THE REQUIRED SIZE.

BY	DESCRIPTION	DATE	REV#

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WADE TRIM
29261 Northline Rd.
Suite 101
Taylor, MI 48180
734.947.9700
www.wadetrim.com

CITY OF PLYMOUTH
201 SOUTH MAIN STREET
PLYMOUTH, MICHIGAN 48170

STANDARD WATER MAIN DETAILS (WM-2)

ISSUED FOR: DATE: BY:

JOB NO. -

SHEET WM-2

STANDARD WATER MAIN DETAILS (WM-2 OF 2)

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PROJECT MANAGER: -
FIELD BOOK INFORMATION: -
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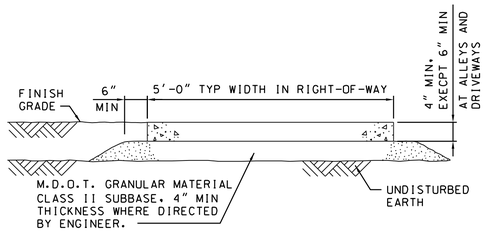
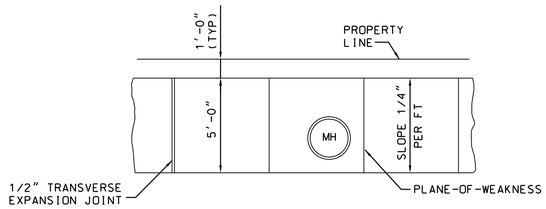


TYPICAL SECTION
N.T.S.



TYPICAL PLAN IN RIGHT-OF-WAY
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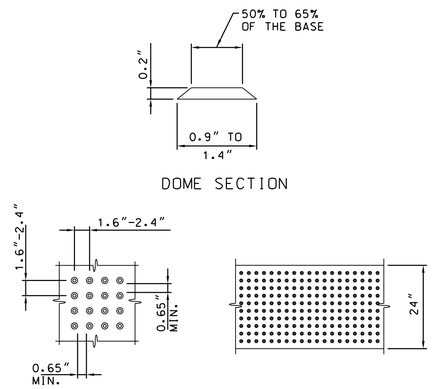


DETECTABLE WARNING DETAILS
N.T.S.

NOTES:

1. ONE-HALF INCH TRANSVERSE EXPANSION JOINTS SHALL BE PLACED THROUGH THE SIDEWALK AT UNIFORM INTERVALS OF NOT MORE THAN 50 FEET. ONE-HALF INCH EXPANSION JOINT SHALL ALSO BE PLACED BETWEEN THE SIDEWALK AND ABUTTING PARALLEL CURB, BUILDINGS, RIGID STRUCTURES, CONCRETE DRIVES AND CONCRETE. DRIVE A PPROACHES. ONE INCH EXPANSION JOINTS SHALL BE PLACED BETWEEN SIDEWALK RAMPS AND BACK OF CURB.
2. PLANE-OF-WEAKNESS JOINTS SHALL BE PLACED EVERY 5 FEET AND BE PRODUCED BY USE OF SLAB DIVISION FORMS EXTENDING TO THE FULL DEPTH OF CONCRETE OR BY CUTTING JOINTS IN THE CONCRETE. AFTER FLOATING, TO A DEPTH OF NOT LESS THAN ONE-FOURTH THE THICKNESS OF THE SIDEWALK. THE CUT JOINTS SHALL BE NOT LESS THAN 1/8 INCH NOR MORE THAN 1/4 INCH IN WIDTH AND SHALL BE FINISHED SMOOTH AND TRUE TO LINE.

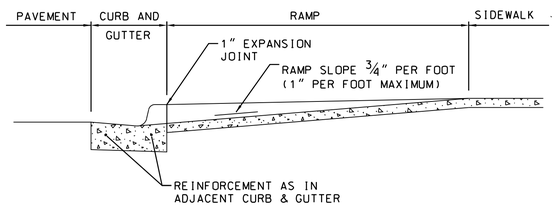
SIGN NOTES:

1. SIGN PANEL SHALL BE 0.080 INCH THICK, ALUMINUM SHEET, TYPE 6061-T6 (MDOT TYPE III).
2. HOLES IN SIGN POSTS SHALL BE CONTINUOUS ?" DIA HOLES ON 1-INCH CENTERS.
3. POSTS, BOLTS, NUTS AND WASHERS SHALL BE GALVANIZED STEEL.
4. SIGN FACE SHALL BE PER THE FOLLOWING TYPE:

TYPE	BACKGROUND	LEGEND
A.	Reflectorized	Reflectorized
B.	Reflectorized	Non-Reflectorized
C.	Non-Reflectorized	Reflectorized

SIDEWALK RAMP NOTES:

1. ALL SIDEWALK RAMPS AS CALLED FOR ON THE PLANS SHALL HAVE DETECTABLE WARNINGS.
2. DETECTABLE WARNING SURFACES SHALL CONTRAST VISUALLY WITH THE ADJACENT WALKING SURFACE.
3. DETECTABLE WARNING SHALL BE MODULAR PLASTIC TILE, POLYMER CONCRETE TILE OR OTHER SIMILAR TILE EMBEDDED INTO THE FRESH CONCRETE, AS APPROVED BY THE ENGINEER; OR A STAMPED PATTERN IN THE FRESH CONCRETE WITH INTEGRAL COLOR (NOT SHAKE-ON COLOR). ADHESIVE APPLIED DETECTABLE WARNINGS ARE NOT ACCEPTABLE.
4. ALL DETECTABLE WARNINGS SHALL HAVE SKID RESISTANT SURFACE.
5. SYSTEM AND COLOR SHALL BE APPROVED BY THE ENGINEER PRIOR TO BEGINNING WORK.



SECTION A-A
(TYPICAL ALL RAMP DETAILS)

TYPICAL PLAN IN RIGHT-OF-WAY
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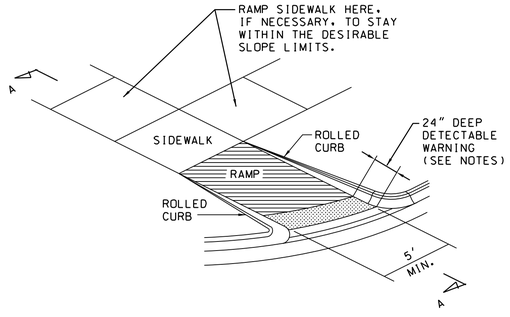
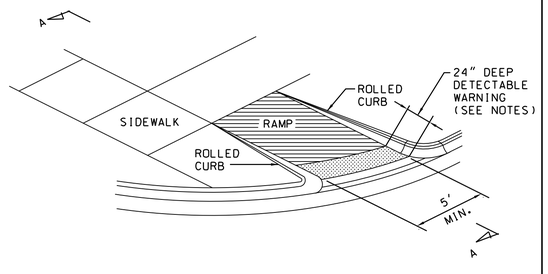


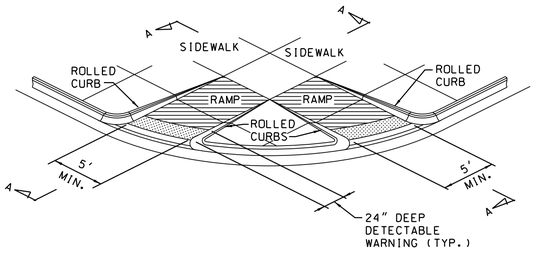
SIDEWALK RAMP TYPE 1

TYPICAL PLAN IN RIGHT-OF-WAY
N.T.S.



SIDEWALK RAMP TYPE 2

SIDEWALK RAMP DETAILS
N.T.S.



(TWO RAMPS ARE SHOWN)

SIDEWALK RAMP TYPE 4
N.T.S.

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29261 Northline Rd.
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CITY OF PLYMOUTH
201 SOUTH MAIN STREET
PLYMOUTH, MICHIGAN 48170

STANDARD SIDEWALK DETAILS (SW-1)

ISSUED FOR:	DATE:	BY:

JOB NO. -

SHEET SW-1

STANDARD SIDEWALK DETAILS (SW-1 OF 1)

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